М. М. Кутепова

The World of Chemistry

Мир химии

Учебник
английского языка
для студентов-химиков

УНИВЕРСИТЕТ
КНИЖНЫЙ ДОМ

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РЕКОМЕНДОВАНО Советом по химии УМО университетов РФ в качестве учебника для студентов химических специальностей, изучающих английский язык

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Учебник "The World of Chemistry" предназначен для студентов химических вузов и факультетов университетов и смежных специальностей, слушателей специальных курсов по английскому языку данного профиля и специалистов-химиков, самостоятельно повторяющих курс английского языка. Учебник рассчитан на два года обучения и ориентирован на продолжающих изучение английского языка в вузе. Цель учебника — развитие навыков и умений самостоятельного чтения оригинальной литературы по специальности, ведения научной беседы, реферирования и аннотирования, а также написания и презентации стендовых сообщений и докладов, связанных с научными интересами обучаемых.

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Предисловие

Учебник английского языка "The World of Chemistry" (Мир химии) предназначен для студентов вузов химического профиля и факультетов университетов близких специальностей, слушателей специальных курсов по английскому языку, а также специалистов-химиков, самостоятельно изучающих английский язык. Учебник рассчитан на два года обучения (180–200 часов аудиторного времени и 90–100 часов самостоятельной работы) и ориентирован на лиц, продолжающих изучение английского языка в вузе.

В соответствии с требованиями государственных программ России по профессиональной подготовке студентов-химиков высших специальных учебных заведений учебник имеет целью развитие у обучаемых навыков и умений самостоятельно читать оригинальную литературу по специальности, быстро извлекать из нее необходимую информацию, вести научную беседу с использованием химической терминологии и выражений речевого этикета, составлять аннотации и рефераты статей по химии на английском языке.

При создании учебника автор руководствовался тем, что научное общение есть вид коммуникативной деятельности со своей спецификой как по форме, так и по содержанию, являющейся частью научной деятельности ученых, направленной на дальнейшее развитие науки и установление взаимопонимания между учеными разных стран. Такая коммуникативная деятельность осуществляется в определенных условиях в виде письменной или устной речи (диалоги, монологи, доклады, деловая переписка). Исходя из этого, в задачи учебника входит:

1) обучение по принципу «от содержания к форме», т. е. использование лексического и грамматического материала в качестве средства, а не цели обучения (актуализация лексики и грамматики в действии, в реальных или смоделированных коммуникативных актах). Для эффективного усвоения языкового материала предусмотрены различные упражнения, стимулирующие мыслительную деятельность обучаемых и позволяющие отказаться от механического заучивания слов и выражений;

2) одновременное развитие навыков и умений всех видов речевой деятельности (слушания, говорения, чтения, письма, перевода и «думания»), исходя из их взаимосвязанного и взаимообусловленного функционирования в реальном научном общении;

3) обучение творческому отношению к прорабатываемому учебному материалу (выражение своего мнения по прочитанному или услышанному, логическое обоснование и отстаивание своей точки зрения и т. п.);

4) оказание помощи преподавателям в творческом осмыслении и развитии материала учебника в зависимости от уровня знаний студентов.

Учебник состоит из десяти основных уроков (Units) и четырех дополнительных (Revision and Development), предназначенных для повторения каждых двух пройденных уроков и всех уроков в конце каждого года обучения. Кроме того, учебник имеет три приложения (Appendices), включающих грамматический и поурочный лексический материал; ключи к некоторым упражнениям и список химических элементов с их произношением и образцами чтения некоторых химических формул, а также рекомендации по написанию научных статей, деловых писем, составлению документов и презентации устных стендовых докладов.

Грамматика учебника включает практически все явления, изучаемые в средней школе, которые рассматриваются применительно к научному тексту. Лексический материал составляет приблизительно 750 активно использующихся единиц и около 1000 единиц пассивного словарного запаса. В каждый урок включены выражения речевой стратегии, необходимой для устного научного общения (понимания, непонимания, сомнения, переспроса и пр.)

В конце каждого года обучения предусмотрена экзаменационная работа (Final Examination Paper), позволяющая проверить степень усвоения студентами изученного материала.

Тексты к учебнику отобраны из оригинальных статей и учебников по химии для английских и американских школ, колледжей и университетов, а также из учебных пособий США и Великобритании, предназначенных для обучения LSP (Language for Special Purposes — английский язык для специальных целей).

К учебнику прилагаются аудиокассеты с записью основных текстов, выступлений и диалогов*.

Кроме того, в качестве дополнительного материала для закрепления нами разработан видеокурс "A State of Matter", "The Atom".

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* При отсутствии аудиозаписи тексты и диалоги на занятии читает преподаватель. — *Автор.*

Методические рекомендации

Каждый урок открывается дискуссией (упр. 1), направленной на активизацию мыслительной деятельности обучаемых и мотивации изучения обсуждаемого материала. Это может быть заполнение таблиц и графиков с использованием связанных с темой понятий или ответы на вопросы, т. е. выяснение исходных знаний обучаемых по данному предмету.

Далее (упр. 2) студентам предлагается текст для прослушивания или чтения (в зависимости от уровня их владения языком) с заданиями до и после прослушивания или просмотра текста типа: найти необходимую информацию, дать более подробные ответы на вопросы и пр. Затем выполняются упражнения, связанные с запоминанием лексики и химических терминов: найти в тексте указанные эквиваленты русских слов, сопоставить термины и их определения, найти синонимы или антонимы, заполнить пропуски в предложениях подходящими по смыслу словами и т. д.

Грамматические упражнения, как правило, предполагают самостоятельное предварительное повторение грамматического материала, а затем поиск аналогичных конструкций в тексте с переводом их на русский язык. Такие упражнения немногочисленны, при работе с ними большая роль отводится преподавателю, который может дать дополнительные разъяснения или предложить студентам варианты закрепления грамматического материала. Закрепление грамматического материала происходит в процессе работы над предложениями и текстами, упражнениями на перевод с английского языка на русский и с русского на английский, что, по мнению психологов, также является одним из видов речевой деятельности.

Для развития умения аудирования студенты прослушивают диалог или монолог с предтекстовыми и послетекстовыми заданиями, направленными на проверку понимания или на выяснение наиболее существенных положений аудируемого текста. Тексты и диалоги для прослушивания снабжены списком незнакомых слов и выражений с их переводом на русский язык для снятия трудностей восприятия.

Некоторые упражнения специально составлены для дальнейшего развития умений «думания» (термин И. А. Зимней). К таким упражнениям относятся сравнение различных определений одного и того же понятия, выбор наиболее адекватного из них и обоснование своего выбора, критическое осмысление услышанного или прочитанного, а также решение проблемных задач.

Следующая группа упражнений предполагает обучение написанию аннотаций и синопсисов (составлению плана текста, выбору основной идеи каждого абзаца, сокращению абзацев, предложений и т. д.).

Последняя группа упражнений — обучение заполнению бланков, анкет на английском языке, написанию деловых писем и ответов на них, составлению и презентации своих собственных тезисов и пр.

Автор выражает искреннюю признательность старшим преподавателям кафедры английского языка химического факультета МГУ им. Ломоносова Л. Н. Дружининой, А. Н. Кореневской, Н. П. Семеновой и Е. В. Шведовой за ценные замечания и пожелания, сделанные ими в процессе апробационного обучения студентов по данному учебнику, заведующей библиотекой химического факультета МГУ З. Н. Иваненко за помощь в подборе материала, нашим американским коллегам Татьяне и Рональду Лукенбил и Аннетт Шкуриджин за поправки и исправления, сделанные ими во время подготовки учебника к звукозаписи, а также кандидату химических наук С. А. Тарасенко за научное редактирование текстов, диалогов и заданий.

Автор

The First Year

UNIT 1

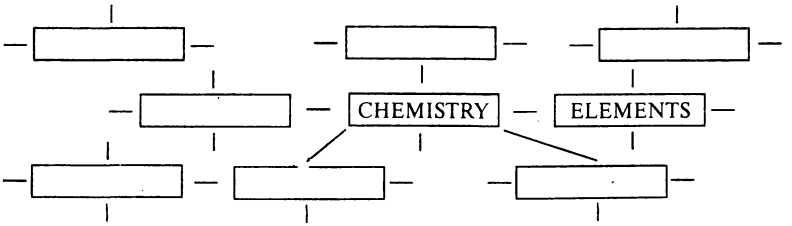
OVERVIEW OF CHEMISTRY

Grammar: **Revision of Tenses.**
Speech Strategy: CLARIFICATION, ASKING AND ANSWERING QUESTIONS.

1. Warming-up:

1. How would you define *chemistry?*
2. Think of the word *chemistry.* What comes to your mind?

Complete the chart and share your ideas with your fellow students:



2. Listen to or look through the text and say how many ideas you've just discussed it contains:

What is chemistry? All definitions of chemistry include the study of *matter. Matter is defined as anything that has mass and occupies space.* All matter is arranged or organized. The way it is arranged is called its *structure.* The parts of the structure and the ratio in which they are organized are called its *composition.* In addition, all matter has characteristics or *properties.* That is, each *substance* has a set of properties that are characteristic of that substance and give it a unique or special identity. These physical or chemical properties are the "personality

traits" of that substance. In brief, chemists study the properties, the composition, and the structure of matter. They also study changes in the composition and the structure as well as the *reactions* of matter, especially of atomic and molecular systems. Basically, *chemistry is a science that deals with the composition and properties of substances and with the reactions by which substances are produced from, or converted into, other substances.*

People have practiced chemistry since ancient times. The Egyptian, Arabic, Greek, and Roman cultures each contributed significant developments to chemistry. These early developments were *empirical.* That is, they were achieved by trial and error and were not based on any valid theory of matter. The alchemists (500–1600 A.D.) whose practical goal was to change base metals into gold and to prolong life, also contributed to the development of chemistry. However, it was not until the 17th and 18th centuries that modern chemistry began to develop through systematic experimentation rather than trial and error. In fact, this systematic experimentation, called *the scientific method,* is usually credited with being the most important single factor in the development of chemistry and its application to technology.

Chemistry is related to physics, another basic branch of science. It is also related to biology, the science of life, because life itself is basically a complicated system of interrelated chemical processes.

The range, or scope, of chemistry is very wide. In fact, it includes the whole universe and every animate (living) and inanimate (nonliving) thing in it. Chemistry may be broadly classified into two main branches: *organic* chemistry (the chemistry of living things) and *inorganic* chemistry (the chemistry of nonliving things). Through the study of chemistry we try to learn and understand the *principles* and *laws* that control the activity of all matter.

Chemists may try to observe and to explain natural situations, or phenomena, or they may invent experiments that will show the composition and structure of complex substances. They may look at methods to improve natural processes or, sometimes, create or combine substances that are unknown in nature.

Even though the total of chemical knowledge is so enormous that no one could learn all of it in one's lifetime, the basic *concepts* are not difficult. In fact, these fundamental concepts in chemistry have become part of the education required for many professionals in a wide variety of fields and they have contributed to the rapid growth of technology.

3. Look through the text again and deduce which of the following ideas are *not* expressed in the passage:

1. Chemistry plays the central role in the life of modern world.
2. Chemistry studies the composition, the properties and the structure of matter.
3. Reactions of matter in atomic and molecular systems are also studied by chemists.
4. It's necessary to demonstrate the influence of chemistry on science in general and its position in society.
5. The history of chemistry can be traced back to ancient times.
6. Experimentation in chemistry began only in the 17th and 18th centuries.
7. In chemical reactions one or more substances change their chemical composition and form one or more new substances.
8. Scientific method is the most important factor in the development of chemistry.
9. Every chemical element is characterized by a definite atomic number.
10. Chemistry is related to other sciences, e.g. physics and biology.

4. Look through the text again and a) find all the definitions that are given in it; b) give your own definitions to the chemical terms in italics.

5. Read the text thoroughly with a dictionary and answer the following questions:

1. Why are the contributions of ancient cultures to chemistry called empirical?
2. What were the principle goals of alchemists?
3. When did chemistry begin to develop through systematic experimentation?
4. What is the most important single factor in the development of chemistry?
5. What other sciences is chemistry related to?
6. How are subfields of chemistry classified?

6. a) Find in the text English equivalents to the following Russian words, word combinations and chemical terms:

1. *глаголы (verbs):* включать, определять, организовывать, приписывать, управлять, создавать, улучшать, рассматривать, наблюдать, объяснять, изобретать

2. *существительные (nouns):* явления, знания, определение, развитие, цель, применение, масштаб, деятельность, многообразие, рост, ошибка, вселенная, пространство
3. *прилагательные (adjectives):* обоснованный, взаимосвязанный, огромный, быстрый, основной, требуемый, живой, неживой
4. *наречия (adverbs)* и *словосочетания (word combinations):* лишь, а не, в дополнение, то есть, короче, в основном, однако, по сути дела, посредством, иногда, даже, хотя, внести вклад
5. *научные термины (scientific terms):* материя, вещество, изменение, свойство, эксперимент, химия, закон, наука, научный метод, состав, структура, отрасль, соотношение

b) Using a dictionary give the plural form of the following Latin words and translate them into Russian:

phenomenon, basis, thesis, index, focus, criterion, datum, equilibrium, medium, synthesis, analysis, curriculum, symposium, spectrum, maximum, vacuum, stratum, hypothesis, phasis, nucleus.

7. a) Using some chemical terms (see below) complete the following sentences in the short text:

scientific method, law, composition, experiments, chemistry, changes, properties, branch, matter, science

(1) ... , which is the study of the (2) ... and (3) ... of (4) ... , and of the (5) ... that it undergoes, is a (6) ... of (7) ... , which itself provides us with the way of knowing and understanding the universe we live in. In the operation of the (8) ... we ask questions of the universe through tests and (9) ... . By observing the results we can formulate additional questions, perform additional experiments, and finally develop a tentative explanation of what we have learned. If this tentative explanation is confirmed by others and becomes widely accepted, it becomes a (10) ... and helps us understand better the world around us.

b) Match the words in column *A* with their definitions in column *B*:

A	*B*
1. matter	a) a material, type of matter
2. structure	b) a division of science
3. composition	c) a way or manner of doing scientific work

4. property	d) a quality or power, or effect that belongs naturally to smth
5. chemistry	e) smth done wrongly, a mistake
6. scientific method	f) all space and the matter around us
7. animate	g) the material that makes up the world and everything in space and can be seen or touched
8. inanimate	h) the arrangement of various parts of which smth is made up
9. space	i) the science studying the substances which make up the Earth, the universe and living things
10. ratio	j) nonliving objects
11. substance	k) a figure showing the number of times one quantity contains another
12. trial	l) living animals and plants
13. error	m) the way in which parts are formed into a whole
14. branch	n) an act of testing smth
15. universe	o) smth that surrounds all objects and continues in all directions

8. Revise English tenses studying grammar tables 1 and 1A in Appendix 1 and find in the text all the sentences containing 1) the perfect tenses; 2) the passive voice. Translate them into Russian.

9. Translate the following text into English:

Химия — это наука, которая рассматривает вопросы, связанные с веществами, их составом, свойствами и превращениями (transformations). Уже в глубокой древности человек начал использовать многие химические процессы, и в дальнейшем химия развивалась в тесной связи со всеми практическими нуждами (needs) человеческого общества (society). Древние цивилизации внесли свой вклад в развитие химии.

До XVII–XVIII веков развитие химии шло по пути накопления (accumulation) практических знаний и экспериментальных навыков (skills). Лишь в XVIII веке начали появляться научно обоснованные начала (elements) химии.

Современная химия подразделяется на ряд областей: неорганическую химию, изучающую свойства химических элементов и их превращений — неживую материю; органическую химию, объектом изучения которой являются соединения углерода (carbon) — живую материю; физическую химию, широко применяющую методы физики для изучения химических процессов и пр. (etc).

Химия тесно связана с биохимией, изучающей химические процессы живых организмов; геохимией, исследующей то, что химически происходит в земной коре (the Earth's crust) и т. д. (and so on).

10. Listen to a short communication given by a university professor. Make notes. After that ask questions to clarify the points of the lecture you don't understand. The expressions of clarification and the strategy of asking questions come handy. You are also given notes and words to understand the communication better.

CLARIFICATION

I'm afraid it's not quite clear what you mean by...
I'm sorry I didn't quite follow what you said about...
I'm afraid I don't understand what... mean(s).
When you say..., do you mean that...?

ASKING QUESTIONS

I'd like to know what/when/why/how/who/if...
Could you tell me what/when/why/how/who/if...?
I wonder what/when/why/how/who/if...
Would you tell me what/when/why/how/who/if...?
It's interesting to know (to find out) what/when/why/how/who/if...

NOTES

1. **most of the elements** — большая часть элементов
2. **breaking down** — разложение
3. **it's taken for granted** — принимается как должное

WORDS

to accompany — сопровождать
behaviour — поведение
density — плотность
determination — определение
drug — лекарственное растение
dye — краситель
hardness — твердость, жесткость
insecticide — средство от насекомых

liberation — высвобождение
paint — краска
smell — запах
solubility — растворимость

J. B: Ladies and gentlemen! Let me begin by introducing myself. I'm John Brown, and I'm going to teach you chemistry during the first semester. The purpose of today's lecture is to provide an introduction to chemistry.

As you probably know, chemistry is an experimental and theoretical science, studying the composition of matter and the changes that take place in it. Let me remind you that chemical changes involve changes in composition of matter, accompanied by energy changes. Physical changes involve changes in the position, location, or size of matter without any alteration in its composition.

Energy changes may be explained as the liberation or absorption of energy in the form of light, heat, or electricity. Another thing to remember is that all forms of matter, and we'll discuss it in detail in other lectures, consist of either pure substances or mixtures of two or more substances.

Right? What are the building blocks of matter?... Yes, they are elements. And compounds are combinations of elements. Most of the elements are metals and most of them unite with other elements and form compounds.

Now, the formation of a compound from simpler substances is known as synthesis. Another process, analysis, is breaking down a compound into simpler substances or elements, and in this way determining its composition.

Remember, please, that the composition of a pure substance never changes.

Furthermore, every substance has physical and chemical properties. Physical properties include... what do they include?

STUDENT: Oh... colour, smell... well, what else?... solubility, density ah... probably hardness... oh, yes and boiling and melting points.

J. B: Right. They include colour, smell, solubility, density, hardness, and boiling and melting points. As for chemi-

cal properties, they include the behaviour with other materials. Now, a few words about matter. It exists in three states. What are they?

STUDENT: Ah... solid, liquid, oh, yes, and gas, gaseous state.

J. B: Quite true. The solid, the liquid, and the gaseous state. Usually a substance can be transformed from one state to another under the changes of its... what?

STUDENT: Temperature.

J. B: Yes, temperature. Let me conclude by saying that chemistry is so much a part of our lives that it's very easily taken for granted. Metals, glass, plastics, dyes, paints, drugs, insecticides, plants, paper and a lot more are made of chemicals. Now, do you have any questions? Is everything clear?

11. Listen to the communication again and say what ideas absent in the first text it contains.

12. Listen to the talk once again if necessary and answer the following questions. Begin your answer with the given opening phrases:

OPENING PHRASES

As far as I know/understand/can judge;
According to the lecturer;
As far as... is concerned;
The lecturer says that;
The professor gives information on... ;
Dr. Brown claims that... .

1. What does Professor J. Brown begin his lecture with?
2. What is the aim of the lecture?
3. What science is chemistry?
4. What does it study?
5. What does a chemical change involve?
6. What are chemical changes usually accompanied by?
7. What are the building blocks of matter?
8. What is synthesis?
9. What is analysis?
10. What are the three states of matter?

13. Read another text on chemistry and choose the most suitable title out of the given ones:

1. The Scope of Chemistry.
2. The Nature of Chemistry.
3. The Body of Chemical Knowledge.
4. The Work of a Chemist.
5. Chemical Education.

What is chemistry? A popular dictionary gives this definition: Chemistry is a science of the composition, structure, properties, and reactions of matter, especially of atomic and molecular systems. Another, somewhat simpler dictionary definition, is: Chemistry is a science dealing with the composition of matter and the changes in composition that matter undergoes. Neither of these definitions is entirely adequate. Chemistry, along with the closely related science of physics, is a fundamental branch of knowledge. Chemistry is also closely related to biology, not only because living organisms are made of material substances but also because life itself is an essentially complicated system of interrelated chemical processes.

The scope of chemistry is extremely broad. It includes the whole universe and everything, animate and inanimate, in it. Chemistry is concerned not only with the composition of matter, but also with the energy and energy changes associated with matter. Through chemistry we seek to learn and to understand the general principles that govern the behaviour of all matter.

The chemist, like other scientists, observes nature and attempts to understand its secrets: What makes a rose red? Why is sugar sweet? What is occurring when iron rusts? Why is carbon monoxide poisonous? Why do people wither with age? Problems such as these — some of which have been solved, some of which are still to be solved — are part of what we call chemistry.

A chemist may interpret natural phenomena, devise experiments that will reveal the composition and structure of complex substances, study methods for improving natural processes, or, sometimes, synthesize substances unknown in nature. Ultimately, the efforts of successful chemists advance the frontiers of knowledge and at the same time contribute to the well-being of humanity. Chemistry can help us to understand nature, however, it is not necessary to be a professional

chemist or scientist to enjoy natural phenomena. Nature and its beauty, its simplicity within complexity, are for all to appreciate.

The body of chemical knowledge is so vast that no one can hope to master it all, even in a lifetime of study. However, many of basic concepts can be learned in a relatively short period of time. These basic concepts have become part of the education required for many professionals including agriculturists, biologists, dental hygienists, dentists, medical technologists, microbiologists, nurses, nutritionists, pharmacists, physicians, and veterinarians, to name just a few.

14. Read the text again and say if the following statements are true (T) or false (F):

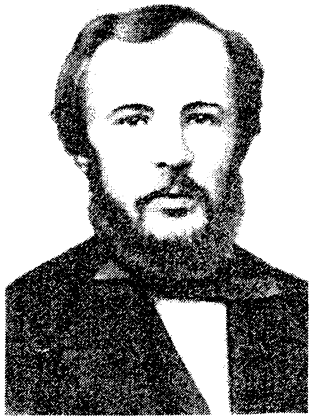
1. We can infer that physics is a fundamental branch of knowledge.
2. In paragraph 2, the study of energy is said to be a part of chemistry.
3. The author writes that every animate and inanimate thing in the universe is governed by general principles.
4. According to the author, even though there are unsolved secrets in nature, principles govern these secrets.
5. The author believes that if chemists "advance the frontiers of knowledge", they will "contribute to the well-being of humanity".
6. To truly enjoy nature, the author thinks, we must have some knowledge of chemistry.
7. If you are studying to become a veterinarian (a doctor for animals), you will have to take courses in chemistry.

15. Read the text once again and entitle its paragraphs.

16. Write out a) key words out of each paragraph; b) the sentences expressing the main idea(s) of each paragraph.

17. Retell the text briefly in your own words making use of the key words and the sentences you've written out.

18. Look at the portrait of a famous scientist. You certainly know who he is. Share the information you have with your fellow students.



19. Read the following text about this scientist and make notes on his personal information: first name, family name, date and place of birth, occupation, qualification, nationality, etc.

Dmitry Ivanovich Mendeleyev was born in Tobolsk in 1834. In 1850 he entered the Pedagogical Institute in St. Petersburg to study chemistry. Five years later he graduated from it with a gold medal and was invited to lecture on theoretical and organic chemistry at Petersburg University.

Then, in 1859, he was sent to Germany to continue his education. When he was living abroad, he made a number of important investigations.

The year 1868 was the beginning of his highly important work *Fundamentals of Chemistry*. When Mendeleyev was working on the subject, he analysed an enormous amount of literature, and made thousands of experiments and calculations. This tremendous work resulted in the Periodic Table of the Elements consisting of vertical groups and horizontal periods.

Thanks to his investigations Mendeleyev was able to predict not only the existence of a few unknown elements but their properties as well.

D. I. Mendeleyev was engaged not only in the study of chemistry. He combined theory with practical activity and carried out enormous research in coal, petroleum, iron and steel industries in Russia.

Mendeleyev died in 1907 at the age of 73.

20. Fill in the form with the information about D. I. Mendeleyev:

First name .....
Middle name .....
Family name .....
Date of birth .....
Place of birth .....
Nationality .....
Occupation .....
Qualification .....

21. Match the points on the left with the questions on the right:

1. First name	a) Are you married or single?
2. Middle name	b) What do you do in your free time?
3. Family name	c) What's your first name?

4. Nationality	d) What do you do?
5. Date of birth	e) When were you born?
6. Age	f) Where were you born?
7. Place of birth	g) What degrees, diplomas do you have?
8. Permanent address	h) What's your family name?
9. Marital status	i) What nationality are you?
10. Occupation	j) What's your middle name?
11. Qualification	k) Where do you live?
12. Hobbies/Interests	l) How old are you?

22. a) Ask some of your fellow students the same questions and read the information you'll get before the class; b) Fill in the first form in Appendix 3 (Registration Form).

23. Be ready to give personal information about a well-known scientist in the field of chemistry.

UNIT 2

HISTORY OF CHEMISTRY

Grammar: **Questions Formation.**
Speech Strategy: OPINION.

1. Warming-up:

1. What is alchemy?
2. What do you know about alchemists?
3. When did they experiment?
4. Why were their ideas forgotten?

Share your information with your fellow students.

2. Listen to or look through the following text and say what information you've just discussed it contains:

Thousands of years ago people valued gold as a rare and beautiful substance. They also understood that gold had a unique ability to resist decay and corrosion. Since there was no known acid or other substance that could damage gold they thought that gold had a quality of performance that could be transmitted to humans. Therefore, every medicine that fought ageing contained gold as an essential ingredient and doctors urged people to drink from gold cups to prolong life.

This universal desire for gold made alchemy a formal discipline in the first century A.D. It first appeared among Greek scholars, then spread to eastern Mediterranean countries, and finally to Spain and Italy in the 12th century. Though the attempts to produce gold from other substances was the original and central purpose of alchemy, a number of physician-alchemists in Europe in the Middle Ages tried to produce medicines that were not dependent on gold or related to it.

They worked to produce medicines and spirits from raw materials, such as herbs, and in this way improved methods of separating elements by distillation. For example, as early as the 13th century, Thaddeus of Florence identified the medical benefits of alcohol distillates taken internally and applied locally. Paracelsus (1493–1541), the German-Swiss physician and alchemist, was the first person to unite medicine with chemistry through his use of remedies that contained mercury, sulphur, iron, and copper sulphate. This led to steam distillation and improved equipment.

The development of apparatus and the extensive efforts to break down or distil substances laid the foundation for modern chemistry, but as true science began to evolve during the Renaissance, the study of alchemy blocked the birth of modern chemistry. Some scientists tried to lead people toward reliance on empirical evidence (that is, what can actually be observed and/or measured), but the idea of four essential elements (earth, air, fire, and water) lived on and there was no recognition that these four substances are made up of a combination of basic elements.

3. Look through the text again and find the sentences describing a) gold; b) production of medicines; c) contributions of scholars. Translate these sentences into Russian.

4. Read the text thoroughly with a dictionary and answer the following questions:

1. Why did every medicine fighting ageing contain gold?
2. What made alchemy a formal discipline?
3. When and where did alchemy appear?
4. What did some physicians use to produce medicines in the Middle Ages?
5. Who was the first to unite alchemy with chemistry?
6. What laid the foundation for modern chemistry?
7. What was the idea of ancient scholars about the four essential elements?

5. Match the English words, word combinations and chemical terms in *A* with their Russian equivalents in *B*:

A. 1. to value; 2. rare; 3. unique; 4. ability; 5. to resist; 6. decay; 7. acid; 8. to damage; 9. quality; 10. permanence; 11. ageing; 12. to urge;

13. desire; 14. to spread; 15. purpose; 16. dependent; 17. to be related to; 18. spirit; 19. herb; 20. as early as; 21. benefit; 22. remedy; 23. mercury; 24. sulphur; 25. iron; 26. copper sulphate; 27. steam; 28. to lay the foundation; 29. to evolve; 30. reliance; 31. evidence; 32. recognition; 33. therefore; 34. since

B. 1. пар; 2. сопротивляться; 3. старение; 4. поэтому; 5. распространять(ся); 6. спирт; 7. зависимый; 8. преимущество; 9. железо; 10. кислота; 11. страсть (желание), 12. развивать; 13. лекарство; 14. ценить; 15. качество; 16. свидетельство; 17. еще; 18. ртуть; 19. редкий; 20. доверие; 21. цель; 22. разрушать; 23. признание; 24. заложить основы; 25. единственный в своем роде; 26. постоянство; 27. сера; 28. быть связанным; 29. медный купорос; 30. убеждать (заставить); 31. трава; 32. способность; 33. разложение; 34. так как

6. a) Match the synonyms in columns *A* and *B:*

A	*B*
1. to value	a) admission
2. ability	b) testimony
3. decay	c) lust
4. to damage	d) advantage
5. to urge	e) medication
6. desire	f) hence
7. purpose	g) to ruin
8. to be related to	h) to develop
9. benefit	i) to appreciate
10. remedy	j) to force
11. to evolve	k) decomposition
12. reliance	l) trust
13. evidence	m) to be connected with
14. recognition	n) power
15. therefore	o) aim
16. rare	p) to oppose
17. to resist	q) constancy
18. permanence	r) to scatter
19. to spread	s) subordinate
20. dependent	t) unique

b) **Study the list of chemical elements in Appendix 3 and give full names to the symbols below. Be sure you can pronounce them correctly:**

Fe, Cu, S, Hg, Pb, Au

7. **Write out of the text all irregular verbs and give their infinitives.**

8. **Study carefully grammar tables 2 and 3 in Appendix 1 and ask all kinds of questions to the following sentences:**

1. Alchemy began to decline in the 16th century.
2. People have long had a lust for gold.
3. Ancient civilizations were practicing the art of chemistry as early as 3000 B.C.

9. **Listen to a short talk on safety in the laboratory. Make notes. Ask each other questions to clarify the points you don't understand. The following notes and words will help you to understand the talk better:**

NOTES

1. **are designed** — предназначены
2. **become familiar** — познакомиться
3. **setting up the experiments** — организовать эксперименты
4. **common sense** — здравый смысл
5. **might catch fire** — могли бы загореться
6. **suffered through periods** — периодически страдал
7. **mental instability** — психическая неустойчивость
8. **preserved specimens** — сохраненные образцы

WORDS

abnormally — ненормально
to complement — дополнить
consequence — следствие
consequently — следовательно
fume — пар, испарение
goggles — очки
to grade — оценивать
insomnia — бессонница
to insist — настаивать
lead — свинец
protective — защитный
purposely — намеренно
to reinforce — подкрепить
responsibility —ответственность
routinely — обычно
safety — безопасность
to sniff — нюхать
to taste — пробовать на вкус

Good afternoon. My name's Mary Raffety. For the next eleven weeks, I'll be your lab instructor. The lab experiences you'll be having are designed to complement your work in Dr. Kaplan's inorganic chemistry course. Today's experiment is purposely a short one; it'll help you become familiar with the lab setup and equipment.

As your lab instructor, it's my duty to assist you in setting up your experiments and understanding the results. I'll also grade your lab notebooks. But I have an even more basic responsibility: your physical safety. I'll insist on proper precautions, such as wearing protective goggles at all times. I also expect you to use common sense: don't wear long scarfs that might catch fire; don't smoke; don't taste unknown substances.

Let me reinforce this point with a story. Isaac Newton, perhaps the greatest scientist of all ages, lived in a period when the toxic effects of chemicals were less understood than today. He routinely sniffed fumes, tasted chemicals, and used open containers for heating substances. In the early 1690's, he suffered through a period of insomnia, depression, and mental instability. Though his biographers linked this situation to problems in his personal life, researchers now think that it was a consequence of his lab procedures: they found abnormally high concentration of lead, mercury, and other heavy metals in preserved specimens of his hair.

Consequently, we must learn from the past and put safety first.

10. Listen to the talk again and answer the following questions choosing the correct answer out of the given ones:

1. Who is the speaker?

a) Dr. Kaplan
b) a university technician
c) a lab instructor
d) a specialist in chemistry history

2. At what point of the semester does the talk take place?

a) at the beginning
b) in the middle
c) near the end
d) during the final exam

3. Why is the speaker addressing the students?

a) to explain the purpose of the lab notebooks
b) to stress the importance of safety in the laboratory
c) to tell them where to buy safety equipment
d) to help them to understand their lab results

4. Which of the following are the students told *not* to wear?

a) protective goggles
b) eyeglasses
c) running shoes
d) long scarfs

5. Why does the speaker tell the story about Newton?

a) to illustrate what a great scientist he was
b) to explain why lab equipment must be cleaned carefully
c) to emphasize the need for proper precautions
d) to demonstrate how theoretical chemistry has advanced since Newton's days

6. How did researchers discover that Newton might have suffered from metal poisoning?

a) by testing samples of his hair
b) by reading his biographies
c) by examining the scientific practices of his time
d) by performing the experiments listed in his notebook

7. According to the talk, what important lesson can be learned from Newton's life?

a) an innovative scientist cannot take normal precautions while performing experiment
b) an inventor must be willing to make some painful sacrifices to achieve his or her goals
c) precautionary measures must be followed in the laboratory work to ensure one's safety and health
d) chemists with personal problems should never use toxic substances

8. What will the students probably do after the talk?

a) leave the room
b) hand in their notebooks
c) go to Dr. Kaplan's office
d) work on an experiment

11. Listen to the talk once again if necessary and give reasoning to the choice of the answers you've just given by expressing your opinion. The list of expressions comes handy:

I think	**I have a feeling**
I believe	**to my mind**
I suppose	**in my opinion**
I guess	**in my view**
I feel	**according to my point of view, etc.**

You may use the given example:

Example: **I think that** the talk takes place at the beginning of the semester because...

12. Read the text of another author on alchemy, compare it with the first one and say what information they have in common and what is different. Share your ideas with your fellow students.

One of the most interesting periods in the history of chemistry was that of the alchemists (500–1600 A. D.). People have long had a lust for gold, and in those days gold was considered the ultimate, most perfect metal formed in nature. The principle goals of alchemists were to find a method of prolonging human life indefinitely and to change the base metals, such as iron, zinc, and copper, into gold. They searched for a universal solvent to transmute base metals into gold and for the "philosopher's stone" to rid the body of all diseases and to renew life. In the course of their labours they learned a great deal of chemistry. Unfortunately, much of their work was done secretly because of the mysticism that shrouded their activity, and very few records remained.

Although the alchemists were not guided by sound theoretical reasoning and were clearly not in the intellectual class of the Greek philosophers, they did something that philosophers had not considered worthwhile. They subjected various materials to prescribed treatment under what might be loosely described as laboratory methods. These manipulations, carried out in alchemical laboratories, not only uncovered many facts of nature but paved the way for the systematic experimentation that is characteristic of modern science.

Alchemy began to decline in the 16th century when Paracelsus (1493–1541), a Swiss physician and outspoken revolutionary leader in chemistry, strongly advocated that the objectives of chemistry be directed toward the needs of medicine and the curing of human ailments. He openly condemned the mercenary efforts of alchemists to convert cheaper metals to gold.

13. Read one more text on the history of chemistry and entitle it.

Modern chemistry was slower to develop than astronomy and physics. It began in the 17th and 18th centuries when Joseph Priestley (1733–1804), who discovered oxygen in 1774, and Robert Boyle

(1627–1691) began to record and publish the results of their experiments and to discuss their theories openly. Boyle, who has been called the founder of modern chemistry, was one of the first to practice chemistry as a true science. He believed in the experimental method. In his most important book, *The Sceptical Chemist*, he clearly distinguished between an element and a compound or mixture. Boyle is best known today for the gas law that bears his name. A French chemist, Antoine Lavoisier (1743–1794), placed the science on a firm foundation with experiments in which he used a chemical balance to make quantitative measurements of the weights of substances involved in chemical reactions. The use of the chemical balance by Lavoisier and others later in the 18th century was almost as revolutionary in chemistry as the use of the telescope had been in astronomy. Thereafter, chemistry became a quantitative experimental science. Lavoisier also contributed greatly to the organization of chemical data, to chemical nomenclature, and to the establishment of *the law of conservation of mass* in chemical changes. During the period from 1803 to 1810, John Dalton (1766–1844), an English schoolteacher, advanced his atomic theory. This theory placed the atomistic concept of matter on a valid rational basis. It remains today as a tremendously important general concept of modern science. Since the time of Dalton, knowledge of chemistry has advanced in great strides, with the most rapid advancement occurring at the end of the 19th century and during the 20th century. Especially outstanding achievements have been made in determining the structure of atom, understanding the biochemical fundamentals of life, developing chemical technology, and mass production of chemicals and related products.

14. a) Read the text again and complete the chart. The first line is completed as an example. b) Extend the chart by using information from other texts.

Date	The name of the scientist	Contribution
1733–1804	Joseph Priestley	Discovery of oxygen

15. Read the text once again, divide it into logical parts and entitle them.

16. Write out of the text 1) key words; 2) the sentences expressing the main idea(s) of each logical part.

17. Condense the sentences you've written out in any possible way omitting unnecessary details.

Example: The use of the chemical balance by Lavoisier and others later in the 18th century was almost as revolutionary in chemistry as the use of the telescope had been in astronomy. → The use of the chemical balance was revolutionary in chemistry.

18. Using your plan, the key words, the sentences you've written out and condensed, and the completed chart give an oral summary of the text.

19. You're given a sample CV (résumé). Read it attentively. You'll need it in future.

CV (*Curriculum Vitae*) is a short account of one's carrier, education and qualifications prepared typically by an applicant for a position, for continuation of education or for participation in a conference. Synonym: résumé.

CV (RÉSUMÉ)

Name:	Emily Alison Biggins
Address:	47 Putley Hill Helena, Montana, the USA SW 16 4QX
Tel.:	London 475 78 65
Date of birth:	15 July, 1965
Age:	35
Marital status:	Married, with 2 children
Nationality:	British
Objective:	To participate in the conference on history of chemistry
Education & Training	
Dates:	1991–1994 London University Department of Natural Sciences
Qualifications:	Researcher in Chemistry PhD diploma was obtained in April, 1994

Dates:	1987–1991 South Thames College
Qualifications:	Master of Sciences (major: chemistry)
Dates:	1983–1987 Oxleigh College, Oxleigh
Qualifications:	Bachelor of Arts (major: history)
Employment:	
Dates:	1994 to present Carrol College, Helena Montana, the USA Teacher of Chemistry History
Skills:	Strong organisational skills, ability to work under pressure
Computer literacy:	Word Perfect, MS Word for Windows, Lotus Ami-Pro 3.1., Lotus 1-2-3, e-mail Internet user
Languages:	Native English, fluent French and Russian
Interests *Social/Cultural:*	Travelling, classical literature, world history, scientific work
Date:	January 15, 2000
Signature	

20. Look at the portrait of a famous Russian chemist. Can you guess who he is? Discuss your ideas with your fellow students:

21. Read the information about this scientist and write down his CV by translating the necessary information into English. Use an encyclopedia to obtain the information you don't have.

9.09.1899 г.	Родился в Москве, Россия.
1917 г.	Окончил гимназию Страхова в Москве и поступил на естественное отделение физико-математического факультета Московского государственного университета (МГУ).

1922 г.	Окончил естественное отделение физико-математического факультета МГУ по специальности физико-химия и, по предложению академика Н. Д. Зелинского, был оставлен при университете для подготовки к профессорскому званию.
1924–1938 гг.	Ассистент, доцент, профессор кафедры органической химии химического факультета МГУ.
1930–1934 гг.	Заведующий лабораторией органической химии Института удобрений и инсектофунгицидов (Москва).
1934 г.	Присуждена ученая степень доктора химических наук и присвоено звание профессора.
1935–1938 гг.	Действительный член Института химии МГУ — заведующий лабораторией металлоорганических соединений Института органической химии АН СССР (ИОХ АН СССР).
1939 г.	Избран членом-корреспондентом АН СССР.
1939–1954 гг.	Директор ИОХ АН СССР.
1943 г.	Избран действительным членом АН СССР.
1945–1948 гг.	Декан химического факультета МГУ.
1948–1951 гг.	Ректор Московского государственного университета им. М. В. Ломоносова.
1951–1961 гг.	Президент АН СССР.
1961–1963 гг.	Член Бюро отделения химических наук АН СССР.
1963–1975 гг.	Академик-секретарь отделения общей и технической химии АН СССР.
1967–1979 гг.	Член экспертной комиссии по присуждению золотой медали им. М. В. Ломоносова АН СССР.

22. Using the information above, speak about this scientist. You may begin in the following way:

_____ is a prominent Russian scientist in the field of _____. He was born in Moscow in _____

23. An application form differs from CV (résumé) from company to company. Below you are given a completed application form as an example. Read it attentively and complete another form with your personal information:

BMI Import-Export Corp. • Darien, Connecticut

Job Application Form

Job *Export sales representative*

Name *Paula Chandler*

Address *32 Johnson Road, Lowell, MA 01854*

Social Security No. *423-50-2151*

Education

	Institution	Address	Degree
High School	*Emerson High School*	*Lowell MA*	Diploma ☑ yes ☐ no
College	*Suffolk University*	*Boston MA*	☑ BS ☐ BA major *Bus. Admin.*
Graduate School			☐ MS ☐ MA ☐ PhD in ___
Other	*Sperry Sales Seminars*	*New York NJ*	*& Certificates*

Work Experience

Employer	Address	Position
Lipton Machines	*New York NJ – 6 Years*	*Latin American Sales Rep.*
Computech	*Stanford CT – 4 Years*	*Sales Rep. for Mexico and*
		Central America

Special Skills *Spanish*

Hobbies _____

Signature _____ **Date** _____

24. a) Working with a partner check up the information in his/her application form. Make use of the following interview:

International Export, Inc.

Job Application Form

Job _____

Name _____

Address _____

Social Security No. _____

Education

	Institution	Address	Degree
High School			Diploma ☐ yes ☐ no
College			☐ BS ☐ BA major _____
Graduate School			☐ MS ☐ MA ☐ PhD in _____
Other			

Job Experience

Employer	Address	Position

Special Skills _____

Hobbies _____

Signature _____ Date _____

b) Fill in a visa application form in Appendix 3.

MIRANDA: How do you do? It's Paula Chandler, isn't it?

PAULA: Yes. How do you do?

MIRANDA: I'm Art Miranda, and I have your application form here. I just want to check the information.

PAULA: Fine, sure.

MIRANDA: You're applying for the position of an export sales manager representative, aren't you?

PAULA: Yes, I am.

MIRANDA: You aren't from Connecticut, are you?

PAULA: No, I'm from Massachusetts.

MIRANDA: You received a bachelor's degree in business administration at college, didn't you?

PAULA: Yes, that's right.

MIRANDA: But you didn't get a master's degree, did you?

PAULA: No, I didn't. I started working when I was 22.

MIRANDA: I see. You've worked in international sales, haven't you?

PAULA: Yes, I've been a sales representative in Latin America for two companies.

MIRANDA: But you haven't worked in the Middle East, have you?

PAULA: No, I haven't, but I'd like to.

MIRANDA: You can't speak Arabic or French, can you?

PAULA: No, but I can read and speak Spanish very well.

MIRANDA: I'm sure you can learn another language quickly, can't you?

PAULA: Sure! I'd like to learn Arabic — or French.

REVISION AND DEVELOPMENT

UNITS 1 and 2

1. Read the given definitions and find those of them that are quite inappropriate for the definition of chemistry:

1. The science which studies substances — their structure, their properties, and their reactions that change them into other substances.
2. The study of matter and energy and their interactions.
3. The science which deals with making new materials and finding out about them.
4. The science that deals with the composition, structure, and properties of substances and of the transformations they undergo.
5. The science which treats of the properties of substances and their combinations and reactions.
6. The science that deals with living organisms and vital processes.
7. The study of the properties, composition and structure of our world materials with the changes by which these materials are converted into other materials and accompanying energy changes.
8. The science that deals with the composition and properties of substances and with the reactions by which these substances are produced from, or transformed into, other substances.
9. The science dealing with plant life.
10. The science of the composition, structure, properties, and reactions of matter.

2. As you know, there are more than thirty branches of chemistry. Below you're given the names of a few chemical sciences. See if you know what this or that branch deals with. Match the numbers and the letters. Then write the complete definitions. Pay attention to the different meaning and usage of the verbs in the middle column of the table:

No. Field of Chemistry		The Subject Matter
1. Organic chemistry		a) radioactive elements.
2. Inorganic chemistry		b) chemical properties and reactions involving ions in solutions.
	deals with	
3. Analytical chemistry	covers	c) compounds of carbon.
4. Physical chemistry	considers	d) methods of separating pure substances from mixtures.
	treats of	
5. Biochemistry	concerns itself with	e) elements other than carbon.
6. Radiochemistry	is concerned with	f) effects of chemical structure on physical properties of matter.
7. Electrochemistry		g) substances contained in living organisms.
8. Magnetochemistry		h) spatial arrangement of atoms in molecules.
9. Stereochemistry		i) complex substances produced by living cells.
10. Enzimology		j) the magnetic properties of compounds.

3. Indicate whether the answer to each of the questions is *Yes* or *No:*

1. Is matter only living animals and plants?
2. Is structure the arrangement of the various parts of which something is made up?
3. Is scientific method a way of doing a scientific work?
4. Is substance a material type of matter?
5. Is ratio a quality or power, or effect that belongs naturally to something?
6. Is chemistry all space and matter around us?
7. Is trial a method of testing something?

4. Choose the correct word in each of the following pairs enclosed in brackets:

1. Chemistry (*includes/inclines*) the study of elements and their compounds.
2. We can (*defile/define*) "universe" as all space and the matter around us.
3. The mechanical (*properties/proprieties*) of polymeric materials are very complex.
4. M. V. Lomonosov discovered the (*law/low*) of the conservation of matter.
5. Organic chemistry is a (*breach/branch*) of chemistry dealing with carbon and its compounds.

6. This vibrational resonance can (*create/credit*) new protons.
7. Chemists are trying to (*impute/improve*) the properties of plastics.
8. The experiments of ancient scholars contributed to the (*development/devolution*) of chemistry.

5. Revise grammar and lexical material to Units 1 and 2 and render the following in English. Entitle the text.

Первую современную атомистическую теорию создал Джон Дальтон. Он предположил, что каждый химический элемент состоит из атомов, одинаковых по размерам и массе. Эти частицы предполагались неделимыми и неизменными в ходе химической реакции. Дальтон приписал (assigned) атомам таких элементов, как водород, кислород, азот и сера, определенные относительные веса (точнее, массы), а также дал каждому элементу определенный символ.

Однако в конце XIX века был сделан ряд открытий, которые показали, что атом вовсе не является неделимой частицей. Первое из этих открытий основывалось на изучении лучей (rays), испускаемых (emitted) отрицательно заряженным (charged) электродом (electrode). Существование этих катодных лучей было продемонстрировано в 70-х годах XIX века в целом ряде экспериментов, которые выполнили Крукс и Гольдштейн (Crookes and Goldstain). В 1895 г. Вильгельм Рентген (Wilhelm Roentgen) открыл X-лучи, которые в дальнейшем были названы рентгеновскими лучами. В следующем году Антуан Анри Беккерель (Antoine Henri Becquerel) показал, что соль урана самопроизвольно (spontaneously) испускает невидимое излучение (radiation), подобное рентгеновским лучам, и явление было названо радиоактивностью. За свои исследования Рентген и Беккерель были удостоены Нобелевской премии.

6. Read the following text, entitle it and change its sentences from the active into the passive voice where possible. Give titles to the paragraphs of the text in the form of questions.

People have practiced empirical chemistry from the earliest times. Ancient civilizations were practicing the art of chemistry in such processes as wine-making, glass-making, pottery-making, elementary metallurgy and so on. The early Egyptians, for example, had consider-

able knowledge of certain chemical processes. Excavations into ancient tombs dated about 3000 B.C. have uncovered workings of gold, silver, copper and iron, pottery from clay, glass beads, and beautiful dyes and paints as well as bodies of Egyptian kings in remarkably well-preserved states. Many other cultures made significant developments in chemistry. However, all these developments were empirical, that is, they were achieved by trial and error and did not rest on any valid theory of matter.

Philosophical ideas relating to the properties of matter (chemistry) did not develop as early as those relating to astronomy and mathematics. The Greek philosophers made great strides in philosophical speculation concerning materialistic ideas about chemistry. They led the way to placing chemistry on an intellectual, scientific basis. They introduced the concepts of elements, atoms, shapes of atoms, and chemical combination. They believed that all matter was derived from four elements: earth, air, fire, and water. The Greek philosophers had keen minds and perhaps came very close to the establishing chemistry on a sound basis similar to one that was to develop about 2000 years later. The main shortcoming of the Greek approach to scientific work was a failure to carry out systematic experimentation.

Greek civilization was succeeded by Roman civilization. The Romans were outstanding in military, political and economic affairs. They practiced empirical chemical arts such as metallurgy, enameling, glass-making, and pottery-making, but they did very little to advance new and theoretical knowledge. Eventually the Roman civilization was succeeded in Europe by the Dark Ages. During this period European civilization and learning were at a very low ebb.

In the Middle East and in North Africa, knowledge did not decline during the Dark Ages as it did in Western Europe. At this time Arabic cultures made contributions that were of great value to the development of modern chemistry. In particular, the Arabic number system, including the use of zero, gained acceptance; the branch of mathematics known as *algebra* was developed; and alchemy, a sort of pseudo-chemistry, was practiced extensively.

7. Ask all possible questions to the text and let your fellow students answer them.

8. Write out of the text the sentences expressing the main idea(s) of each paragraph. Retell the text briefly using your plan and the sentences you've written out.

9. a) Listen to the following statements and state whether they are declarative (повествовательные), negative (отрицательные), interrogative (вопросительные), or imperative (повелительные). Put the number of the corresponding statement in the table. The first one is given to you as an example:

Example: 1. Every substance has physical and chemical properties.

Declarative	Negative	Interrogative	Imperative
1.			

2. Don't wear long scarves that might catch fire.
3. What are the building blocks of matter?
4. The next eleven weeks I'll be your lab instructor.
5. Isaac Newton lived in a period when toxic chemicals were not quite understood.
6. The purpose of today's lecture is to provide an introduction to chemistry.
7. What are the three states of matter?
8. The composition of a pure substance never changes.
9. Wear protective goggles all the time in the laboratory.

b) Listen to the following dialogue, answer the questions below choosing the correct answer out of the given ones and say what rules were violated. The list of unknown words and expressions comes handy:

WORDS and EXPRESSIONS

a riot — very funny
smudged — very dirty
singed — burnt at the ends
TNT — trinitrotoluene
a sub — a substitute
boiling mad — very furious

JACK: My chemistry prof was a riot today! He came to class with his face all smudged and his hair singed.
ANN: What happened?
JACK: Well, I guess some students didn't follow the rules, and blew something up by accident in the lab when he was doing an experiment.

ANN: Wow, did anyone get hurt?

JACK: Apparently not, but the professor was so angry with the student that he used our class to lecture us about the lab rules and equipment.

ANN: That happened once in my high school lab, I remember. Some kids actually tried to make TNT just for a joke one day when the teacher was sick and we had a sub. They blew a hole right through the celling.

JACK: Well, I don't suppose your high school teacher thought it was any funnier than our chem prof did today. He came into the room boiling mad!

1. How did the accident in the chemistry laboratory happen?
   a) Some kids tried to make TNT in the lab.
   b) The professor had not given the students proper instructions.
   c) A student was careless in carrying out an experiment.
   d) The explosion was part of the experiment.
2. What does Ann say happened in her high school the day her teacher was sick?
   a) Her class was cancelled (отменено).
   b) The students were told to make TNT.
   c) The chemistry professor taught the class.
   d) They had a substitute teacher.
3. Where was Jack when the professor lectured about the proper use of equipment?
   a) In chemistry lab.
   b) In chemistry class.
   c) In physics lab.
   d) In physics class.

10. Work in pairs. Student A reads text A and asks Student B questions on the information absent in the text. Student B answers the questions using text B. Then Student B asks Student A questions on the information missing in text B. Student A answers the questions taking information from text A. In this way both students get full information about D. I. Mendeleyev, write his CV and hand it to the teacher.

A

D. I. Mendeleyev, the great Russian chemist, was born in Siberia on ... . When he was seven years old, he went to gymnasium in Tobolsk. He studied very hard, he especially liked mathematics, physics and history. At the age of ... he entered the Pedagogical Institute in St. Petersburg, ... department. He graduated from the Institute in 1855 and began ... at the Technological Institute and then at the University. In 1865 Mendeleyev was granted the Doctor of Science Degree for ... . This work was ... . Soon after that D. I. Mendeleyev was appointed Professor of General Chemistry of ... University. Besides lectures and supervision of the laboratory, D. I. Mendeleyev carried out great research work.

Mendeleyev's greatest discovery was ... . The Periodic Law suggested by Mendeleyev stated that the properties of the elements were a periodic function of their atomic masses. He presented the work to ... . opened a new era in the history of chemistry.

Mendeleyev was interested in ... , indeed there is hardly any field of science that was not enriched by his contribution. His numerous works dealt with many subjects: properties of liquids, theories of solutions, the development of the gas law, the use of oil and many others.

D. I. Mendeleyev was a great patriot. He did everything for the development and progress of his country.

D. I. Mendeleyev continued his research work to the very last day of his life. He died in ... .

The world is thankful to Mendeleyev for ... . At present there is hardly anyone who doesn't know this Russian scientist and his Periodic Law. We are proud of D. I. Mendeleyev who did so much for his country, for the development of world science.

B

D. I. Mendeleyev, the great Russian scientist, was born in ... on February 8, 1834. When he was ..., he went to gymnasium in Tobolsk. He studied very hard, he especially liked ... , ... , and ... . At the age of 16 he entered ... in St. Petersburg, physico-mathematical department. He graduated from the Institute in ... and began to teach chemistry at the ... and then at the University. In 1865 Mendeleyev was granted ... for the thesis on the combination of alcohol with water. This work was both of great theoretical and practical significance. Soon after that D. I. Mendeleyev was appointed ... of St. Petersburg University. Besides ... , D. I. Mendeleyev carried out great research work.

Mendeleyev's greatest discovery was the Periodic Table. The Periodic Law suggested by Mendeleyev stated that the properties of elements were a periodic function of their atomic masses. He presented the work to the Russian Chemical Society. Mendeleyev's Periodic Law opened ... .

Mendeleyev was interested in many branches of science, indeed, there is hardly any field of science that was not enriched by his contribution. His numerous works dealt with many subjects: ... .

D. I. Mendeleyev was a great patriot. He did everything for the development and progress of his country.

D. I. Mendeleyev continued his research work ... . He died in 1907.

The world is thankful to Mendeleyev for his great contribution to the world science. At present there is hardly anybody who doesn't know this Russian scientist and his Periodic Law. We are proud of D. I. Mendeleyev who did so much for his country, for ... .

11. Give a short talk on one of the following topics. Make use of the information from the texts you've read in Units 1 and 2 and from an encyclopedia.

1. Chemistry as a Science.
2. History of Chemistry.

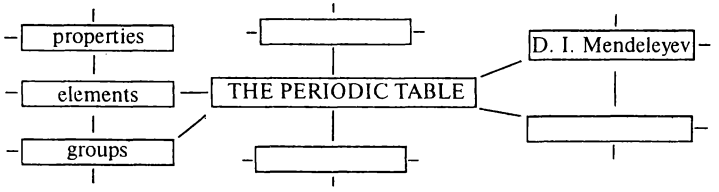
UNIT 3

PERIODIC TABLE AND PERIODIC LAW

Grammar: **Sequence of Tenses.**
Speech Strategy: IMPORTANCE AND CERTAINTY.

1. Warming up:

1. What would you tell your students about the Periodic Table and the Periodic Law as a teacher of chemistry?
2. What important information on newly discovered elements can you give?
3. Have you heard about Element 114? Is it natural or synthesized?
4. Complete the following chart with your ideas:



Exchange the information with your fellow students.

2. Listen to or look through the following text and find the facts you've *not* mentioned in the discussion:

The story of how D. I. Mendeleyev established the Periodic System of Elements has long been a matter of great interest to research workers.

When Mendeleyev began to teach at St. Petersburg University, chemistry was still far from being the well-ordered and harmonious branch of science that we know today.

The great majority of scientists were firmly convinced that atoms of different elements were in no way connected with each other, and that they were quite independent particles of nature. Only a few advanced scientists realized that there must be a general system of laws which regulates the behaviour of atoms of each and every element. However, the few attempts made by Beguyer de Chancourtois, Newlands, Lother Meyer and others to find a system of laws controlling the behaviour of atoms were unsuccessful and experienced no influence on Mendeleyev, the future founder of the Periodic System of Elements.

"Mendeleyev was a man who could not bear any kind of disorder and chaos," writes Academician A. A. Boikov. "This is why at the beginning of his course in chemistry at St. Petersburg University, where he had been appointed to the department of chemistry, D. I. had to establish order in the chemical elements."

By comparison of chemical properties of different elements researchers had long ago discovered that elements could be placed in several groups according to similarity in their properties.

Mendeleyev applied in his system the principles that he developed and included in his table the listing of the elements according to increasing weights.

Because he had the insight to see that many elements had not yet been discovered, he left open spaces in the Periodic Table. For example, he predicted that an unknown element with atomic weight of 44 would be found for the space following calcium. And in 1879 the Swedish chemist Lars Fredric Nilson discovered scandium.

Mendeleyev's table developed into modern Periodic Table, one of the most important tools in chemistry. The vertical columns of the modern Periodic Table are called groups and the horizontal rows are called periods. The atomic number of an element is the number of protons in the nucleus of the atom of that element. The modern Periodic Table not only clearly organizes all the elements, it lucidly illustrates that they form "fa· lies" in rational groups, based on their characteristics.

3. Look through the text again and find the sentences where the author describes the following facts:

1. Mendeleyev could foresee the existence of new elements because he was very gifted.

2. Scientists of Mendeleyev's time didn't believe that elements are connected with each other.
3. Mendeleyev's character made him order the elements.
4. Mendeleyev's work on the Periodic Table and the Periodic Law has long interested scientists.
5. There were some scientists' attempts to find a system to order the elements but they failed.
6. Thanks to Mendeleyev modern chemistry uses the clearly developed Periodic System as the main instrument.

4. Read the text thoroughly with a dictionary and answer the following questions choosing the correct answer out of the given ones:

1. Where did Mendeleyev start ordering the elements?

   a) at school;
   b) at St. Petersburg University;
   c) abroad.

2. Why did Mendeleyev turn to ordering the elements? Because:

   a) other scientists' attempts failed;
   b) he had talent;
   c) he didn't like disorder.

3. What did the researchers try to do to find some order of the elements?

   a) they compared different properties;
   b) they read scientific literature;
   c) they denied the earlier attempts of the scientists.

4. How did Mendeleyev list the elements?

   a) according to their names;
   b) according to their atomic weights;
   c) according to their chemical symbols.

5. What did scientists of Mendeleyev's time think about atoms of different elements?

   a) they were independent particles of nature;
   b) they were closely connected;
   c) they belonged to a well-ordered system.

5. Give Russian equivalents to the following words, word combinations and chemical terms from the text:

1. research worker
2. well-ordered
3. majority
4. firmly
5. were convinced
6. particles
7. advanced
8. realized
9. unsuccessful
10. to exercise
11. to influence
12. could not bear
13. had been appointed
14. disorder
15. comparison
16. according
17. similarity
18. applied
19. increasing
20. insight
21. for example
22. weight
23. tools
24. nucleus
25. lucidly
26. density

6. Match the synonyms in ex. 5 and ex. 6:

a) to affect
b) investigator
c) were sure
d) unlucky
e) resolutely
f) progressive
g) had been given a position
h) instruments
i) for instance
j) centre
k) very small bits
l) understood
m) to exert
n) chaos
o) likeness
p) making greater
q) collation
r) properly organized
s) in agreement with
t) thickness
u) used
v) disliked very much
w) intuitive cognition
x) heaviness
y) clearly
z) a greater number

7. Study carefully grammar table 4 in Appendix 1 and find in the text all the sentences containing the sequence of tenses. Translate them into Russian.

8. a) Translate the following sentences into Russian:

1. The scientist said that our age was the age of chemistry.
2. The ancient Greek philosophers thought that matter consisted of infinitely small particles.
3. Aristotle believed that his theory would agree with the general views on nature.
4. After Copernicus and Galileo everybody could know that the Earth turns round the Sun.
5. Cavendish discovered that water consists of a definite proportion of hydrogen and oxygen.

6. Few scientists of that time knew that Mendeleyev had discovered the Periodic System of Elements.
7. It was reported that those interesting experiments would initiate a series of similar investigations.
8. The professor said that they had found some unknown properties of that substance.
9. It was reported that the new element would occupy the definite place in the Periodic Table.
10. They assumed that their method of investigation could be applied in many experiments.

b) Translate the following sentences into English:

1. Профессор сказал, что этот эксперимент проводится для иллюстрации его доклада.
2. Студенты сказали, что узнали о новом открытии на семинаре.
3. Преподаватель знал, что несколько студентов станут исследователями.
4. Ученые были уверены, что некоторые открытия повлияли на научные взгляды Менделеева.
5. Несколько прогрессивных ученых понимали, что существует определенная система элеменов.
6. В своей книге Б. Н. Конарев доказывает, что в древности люди знали только те вещества, которые были им необходимы для жизни.
7. Арабские алхимики уже в IX–X вв. считали, что все вещества можно разделить на органические и неорганические.
8. Лавуазье ответил на те вопросы, на которые не могли найти ответы ученые нескольких поколений.
9. Преподаватель рассказал на лекции, какой вклад внес Берцелиус в неорганическую химию.
10. Мы знаем, что Берцелиус был автором нескольких учебников по химии.

9. Listen to the presentation of a newly discovered element. Make notes. After the talk ask questions to clarify the points you don't understand. Make use of opening phrases (see Unit 1). The notes and the words below will help you to understand the presentation better:

NOTES

1. **team** — группа, команда
2. **are held** — удерживаются
3. **continuous exchange** — постоянный обмен
4. **it can be detected** — он может быть обнаружен
5. **it comes in contact with** — он реагирует с
6. **a minute** [maɪ´nju:t] **amount** — очень малое количество
7. **to take over 4 days to complete** — нужно более 4 дней для завершения
8. **in less than** — менее чем
9. **undergoes reorganization** — подвергается реорганизации
10. **occurs naturally** — естественно присутствует
11. **it tends to concentrate** — он стремится концентрироваться
12. **best-appointed** — наилучшим образом оборудованный
13. **best-maintained** — наилучшим образом содержащийся в исправности
14. **plenty of fluids** — много жидкости
15. **levels of exposure** — уровни воздействия

WORDS

approximately — приблизительно
to cause — вызывать
to impede — замедлять
morons — слабоумные
tentatively — предварительно
to warn — предупреждать

Dear colleagues! I'd like to begin by introducing myself. I'm Professor David Elliot and I am here to represent the team of researchers of the Mondanga University, Chemistry Faculty. I have the pleasure to inform you that we've discovered a new element tentatively called *ADMINISTRATIUM.*

First, to describe its properties, I'll say that it has no protons or electrons and thus has an atomic number of 0. However, it has one neutron, 15 assistant neutrons, 70 vice assistant neutrons and 161 associate vice assistant neutrons. This gives it an atomic mass of 247. These 247 particles are held together in a nucleus by a force that involves continuous exchange of meson-like particles called morons.

Second. Since it has no electrons, *ADMINISTRATIUM* is inert. However, it can be detected chemically as it impedes every reaction it

comes in contact with. According to our experiments, a minute amount of *ADMINISTRATIUM* added to one reaction caused it to take over four days to complete. I particularly want to emphasize that without *ADMINISTRATIUM*, the reaction ordinarily occurred in less than one second.

I wish to draw your attention to the fact that *ADMINISTRATIUM* has a normal half-life of approximately three years, at which time it doesn't actually decay, but instead undergoes a reorganization. During a reorganization assistant neutrons, vice assistant neutrons and associate vice assistant neutrons exchange places. It's essential to realize that our studies showed the actual increase of the atomic weight after each reorganization.

Our research indicates that *ADMINISTRATIUM* occurs naturally in the atmosphere. Undoubtedly it tends to concentrate in certain locations such as government agencies, large corporations and universities. It can be found in the newest, best-appointed, and best-maintained buildings.

Let me warn you that without doubt *ADMINISTRATIUM* is very toxic and we recommend plenty of fluids and rest even after low levels of exposure. Thank you for attention.

10. In his speech Professor Elliot emphasizes certain points and expresses his certainty in connection with some statements. Listen to the talk again and state which expressions of emphasis and certainty Dr. Elliot uses and in what context. The expressions of emphasis and certainty come handy:

Emphasais	Certainty
I particularly want to emphasize	I'm certain
It's essential to realize	There's no doubt
It's well worth noting	Without doubt
I wish to draw your attention to	Undoubtedly
I consider this point of utmost importance	It goes without saying
	I'm positive
	I'm sure

11. a) Listen to the presentation for the third time, if necessary, and say whether the following statements are true (T), false (F), or not mentioned (NM).

1. *ADMINISTRATIUM* was synthesized in the laboratory.	T	F	NM
2. Dr. Elliot's team have been working on this element for nearly five years.	T	F	NM
3. It is the heaviest element known to science.	T	F	NM
4. This discovery will advance science.	T	F	NM
5. *ADMINISTRATIUM* is element number 1 in the Periodic Table.	T	F	NM
6. *ADMINISTRATIUM* behaves like a catalyst and fastens every reaction.	T	F	NM
7. Meson-like particles are called morons.	T	F	NM
8. *ADMINISTRATIUM* is abundant in nature.	T	F	NM
9. Scientists can't say exactly whether it is poisonous or not.	T	F	NM

b) Explain what different scientific terms in the presentation mean in everyday life. Use again the expressions of emphasis and certainty. You are given an example:

Example: I'm sure that *ADMINISTRATIUM* is a body of officials and clerks.
Or:
Undoubtedly, by *ADMINISTRATIUM* a body of officials and clerks is meant.

The words to be explained: neutron, assistant neutron, vice assistant neutrons, exchange of meson-like particles, to impede, half-life of three years, doesn't decay, undergoes reorganization, increase of atomic weight, it tends to concentrate in certain locations, toxic, levels of exposure, etc.

12. Comment on the facts given in the presentation making use of the expressions from ex. 10.

Example: There's no doubt that the new discovery will advance science.
Or:
It's essential to realize that the new discovery will advance science.

13. Read the following text attentively and choose the most suitable title out of the given ones:

1. History of Scientific Discoveries.
2. Mendeleyev's Contribution to Chemistry.
3. Elements of the Periodic Table.
4. The Periodic System of Elements.

In spite of the importance of the contributions that had been made earlier, the greatest portion of credit for the development of the Periodic System must undoubtedly go to the Russian scientist, D. I. Mendeleyev. The understanding that the properties of the elements can be represented as periodic functions of their atomic weights made possible classification that has suffered few significant changes in the subsequent years. In March of 1869 D. I. Mendeleyev published his first description of the Periodic System in which he gave the arrangement of the elements in terms of their increasing atomic weights. He fully realized the importance of this periodicity. In his first article D. I. Mendeleyev pointed out the similarities of a number of properties of certain elements and changed the order of atomic weights where necessary in order to have the group similarity. D. I. Mendeleyev left vacant positions in his table for yet undiscovered elements and expressed the opinion that the chemical and physical properties of the elements would be discovered, as he predicted, from their positions in the table. In the summer of 1871 D. I. Mendeleyev published a more comprehensive work and called it the Periodic Law. At this time he presented the more familiar form of the Periodic Table and although it differs somewhat from the one we use today, it is in general the same. In his publication of 1871 D. I. Mendeleyev used the periodic character to predict the properties of the elements which would be later described as those of scandium, gallium, and germanium. The remarkable agreement of the properties of these elements as they had been described by Mendeleyev and those that were observed later is without doubt a complete justification of D. I. Mendeleyev's faith in his Periodic Law. In December 1945 Glenn Seaberg made his first publication of a Periodic Table which described a new actinide series beginning with actinium. He said that American scientists were proud and happy to honour the name of D. I. Mendeleyev by calling element 101 "mendelevium".

14. Read the text again and list the points of the given plan in the order of events they occur in the text:

Plan:

1. Advent of the Periodic Law.
2. Discovery of "Mendelevium".
3. Similarities of Elements' Properties.
4. The Inventor of the Periodic System of Elements.

15. Read the text for the third time, write out the main sentence(s) of each logical part and translate them into Russian.

16. Combine the sentences you've written out into a summary. Then rewrite them in your own words, omitting unnecessary details.

17. Suppose you are a member of the Organizing Committee. Compile the text of invitation letters to the Symposium on the Latest Discoveries of New Elements which is going to be held... You are given a letter as an example.

SYMPOSIUM ON THE LATEST DISCOVERIES
OF NEW ELEMENTS, Moscow, 200...

October 10, 200...

Dr. P. E. Pilet
Department of Chemistry
University of London
England

Dear Dr. Pilet,

On behalf of the Organizing Committee, I have the pleasure of inviting you to attend the Symposium on the Latest Discoveries of New Elements to be held in Moscow, March 18–22, 200... .

We are sure that your participation will contribute much to the success of the Symposium and personal contact with you will enhance the exchange of scientific information.

I am looking forward to hearing from you soon and hope that your response will be favourable.

Sincerely yours
Dr. A. A. Stepanov,
Chairman,
Organizing Committee

18. Choose two scientists out of the ones given below and write letters of invitation for them to take part in different gatherings.

1. International Conference on Chemical Sciences in Development. May 14–18, 200...
2. The 10th International Conference on Computers in Chemical Research and Education. July 14–19, 200...
3. The 11th International Conference on Chemical Education. August 25–30, 200...

Scientists: Roger Black, Montana University, USA
Dr. Cyril Smith, Institute of Chemistry, Ceylon
Professor David Wood, Department of Organic Chemistry, University of York, Heslington, U.K.
N. N. Greenwood, Department of Chemistry, University of Leeds, U.K.

Use the following words and word combinations to write various letters of the same kind:

(1)

I have the pleasure of extending to you an invitation (to);
may I have the pleasure of inviting you (to);
may we sincerely invite you (to);
officially (cordially) invites you (to);
It gives me a great pleasure to invite you (to);
It's a great pleasure (and honor) to extend to you an invitation (to)

(2)

to participate in the Congress (Conference, Symposium) on;
to attend the Congress (Conference, Symposium);
to be a participant of...

(3)

to be held in (London) from... to... ;
which is scheduled on (the 1st) to (the 5th) of (September);
in the... Hotel at ... o'clock on (Friday), (the 10th) of (May), 200...

For more information on useful expressions see Appendix 3.

UNIT 4

MATTER IN THE UNIVERSE

Grammar: **Modal Verbs.**
Speech Strategy: SURPRISE. REQUEST.

1. Warming-up.

1. What is the difference between a thing and a stuff?
2. Can you tell a thing from a stuff: *brass, bottle, atmosphere, chair, pan, boiled egg, glass, ornament, wood, sea water, air, plastics, toy soldier?* Match a thing with the stuff it is made of.
3. Can we call a stuff matter? Explain why.

2. Listen to or look through the following text and say what information is *not* necessary to understand the topic:

That matter may exist in three physical states (solid, liquid and gas) is common knowledge. It is usually possible to change matter from one state to the other by changing its temperature. For instance, a piece of ice is called a solid; it may melt and form a liquid; as it evaporates, liquid water changes into a vapour, i. e. into the gaseous state.

Many kinds of matter, like water, can be obtained in each of the three states; for some, however, extraordinary means have to be used in order to produce one, or even two of the states; and for others, only two states are known or can be produced.

Common salt, for example, exists normally as a solid; at a temperature of several hundred degrees, it can be liquefied; and at still higher temperature it is converted into vapour. Carbon, a solid under normal conditions, can be vaporized, but it has never been liquefied.

Solids have both a definite volume and a definite shape. Liquids, too, have a definite volume, but they take the shape of their containers.

Gases have neither a definite shape nor a definite volume. A chemist must have a thorough knowledge of the states of matter and of physical laws that govern the behaviour of matter in various states.

That all matter is composed of molecules is known to everybody. The question which must be answered, then, is: if all matter is composed of molecules, what is the essential difference between the states of matter? The answer to this question is that the essential difference between these states is the relative quantities of energy molecules possess in different states.

3. Look through the text again and find the sentences where the author describes:

1) the facts that are well-known;
2) examples of matter changes;
3) the necessity for a specialist to know matter transformations;
4) a question on the matter composition and the answer to it.

4. Read the text thoroughly with a dictionary and answer the following questions:

1. How is it usually possible to change matter from one state to the other?
2. Can all kinds of matter be obtained in each of the three states?
3. What do solids have?
4. What characterizes gases?
5. Why should a chemist know the states of matter?
6. What other substances besides water can be obtained in the three states?

5. Find in the text English equivalents to the given Russian words, word combinations and chemical terms:

1. общеизвестно
2. обычно
3. существовать
4. чрезвычайные средства
5. таять/плавиться
6. градусы
7. определенный
8. состоять из
9. относительное количество
10. преобразовывать(ся)
11. получить
12. произвести
13. форма
14. твердое тело
15. испаряться
16. объем

17. тщательный/глубокий
18. аналогично
19. выпаривать(ся)
20. углерод
21. еще

6. Match the Russian words, word combinations and chemical terms from ex. 5 with their English equivalents:

a) to obtain
b) common knowledge
c) definite
d) relative quantity
e) still
f) to melt
g) to exist
h) volume
i) to evaporate
j) to produce
k) thorough
l) like
m) usually
n) carbon
o) to be composed of
p) extraordinary means
q) to vaporize
r) degrees
s) to convert
t) solid
u) shape

7. Study carefully grammar tables 5 and 6 in Appendix 1 and find in the text all the sentences containing modal verbs. Translate them into Russian.

8. Complete the following sentences using modal verbs:

1. Chemicals ... be used carefully in the laboratory.
2. You ... stay out of the laboratory if your teacher is not there.
3. You ... obey the laboratory rules when working there.
4. If you ... to smell any chemical, fill your lungs with air first, then sniff carefully.
5. As you ... see, many of the chemicals ... be dangerous.
6. All chemicals ... to be treated with care.
7. Ethanol and water ... look alike.
8. What we ... to remember is that a substance ... be recognized by its properties.
9. How ... you tell that a substance is pure?
10. Dalton's ideas about atom ... explain many experimental observations and scientific laws.
11. Elements ... be decomposed because the atoms they are made of are indestructible.
12. The question that we ... answer at the start is: how do the atoms get electrical charges?

9. **Listen to the following dialogue, then answer questions choosing the correct answer out of the given ones. The notes and words given below will help you to understand the conversation better:**

1. Who are the participants of the conversation?
   a) *students,*
   b) *teachers,*
   c) *chemical engineers.*
2. What are they doing in Tokyo?
   a) *they are having vacation,*
   b) *they are on business leave,*
   c) *they are working.*

NOTES

1. **I can hardly believe my eyes!** — Я не верю своим глазам!
2. **I'll be darned!** — Провалиться мне на этом месте!
3. **Would you believe it?!** — Веришь ли?!
4. **It must be...** — Должно быть...
5. **What a coincidence!** — Какое совпадение!
6. **Fancy that!** — Подумать только!
7. **You must be kidding!** — Ты, должно быть, шутишь!
8. **Right you are** — Совершенно верно
9. **Good job!** — Молодец!
10. **Look.** — Послушай.
11. **Same old Philip.** — Все тот же старина Филипп.

WORDS

chlorine — хлор
corrosive — едкий
dangerous — опасный
explosive — взрывоопасный
flammable — огнеопасный
to happen — происходить
immediately — немедленно
to light — зажигать
mixed — смешанный
phosphorus — фосфор
skin — кожа
to spill — пролить
to splash — брызгать
sulphuric acid — серная кислота
unless — если не

MARY: Excuse me, sir... Philip! I can hardly believe my eyes!

PHILIP: Mary... Mary Raffety! Oh, well, I'll be darned!

MARY: It must be all of... how many years?

PHILIP: Two... no... three. Would you believe it? And here we are in Tokyo. What a coincidence!

MARY: What are you doing here? Are you on vacation?

PHILIP: No, I work here. Teaching chemistry for The British Council. What about you?

MARY: The same with me. Assistant professor at the University.

PHILIP: I've just made a short presentation on safety in the laboratory.

MARY: Really? Fancy that! You must be kidding!

PHILIP: Well, why?

MARY: Because I've just done the same.

PHILIP: Oh, no! And how did you begin your talk?

MARY: Well, first I said that many of the chemicals could be dangerous.

PHILIP: Right. Phosphorus, sulphuric acid and chlorine, for instance. Did you tell them that chemicals must never be tasted?

MARY: Yes, sure. I also said that some chemicals are flammable.

PHILIP: Certainly. They could be explosive if the students try to light them under certain conditions. By the way, what about the chemicals that are corrosive. Have you mentioned them?

MARY: Oh, yes. I explained that if these chemicals are spilled or splashed on the skin they must be washed off immediately with water.

PHILIP: Good job! I also spoke about the chemicals that are very reactive with one another.

MARY: Do you mean that students should never play with chemicals to see what happens when they are mixed?

PHILIP: Right you are! That's why they shouldn't stay in the laboratory unless a teacher is there.

MARY: Good job!

PHILIP: Look... Let's have lunch together. There's a cafe nearby.

MARY: Same old Philip!

10. Listen to the dialogue again and write out 1) all the expressions of surprise; 2) all the safety rules.

11. Listen to the conversation again if necessary and summarize the instructions in the form that you see in the example below. You may add whatever rules you wish. Share your ideas with your fellow students.

Example: Stay out of the laboratory unless your teacher is there.

12. a) Change the safety rules you've written out from commands into requests. The expressions of request come handy: *will you? could you? won't you?; please.*

Example: A: Stay out of the laboratory unless your teacher is there.
B: Will you stay out of the laboratory unless your teacher is there?
Or:
A: Wear protective goggles.
B: Wear protective goggles, will you?
Or:
A: Don't taste chemicals.
B: You won't taste chemicals, will you?

b) Express your surprise at the clumsy actions of your fellow students connected with the safety rules. Use the expressions you've written out of the dialogue.

Example: A: Oh, no. I left my goggles at home!
B: Really? You've never left them before.
Or:
B: You're kidding! You've never left them before.

1. Oh, no. I've spilled this stuff!
2. Oh, no. I haven't washed off the substance!
3. Oh, no. I've just smelt the fumes!
4. Oh, no. I've forgotten that this chemical is flammable.
5. Oh, no. I've just splashed it!
6. Oh, no. I've only tasted it!
7. Oh, no. Be careful! I've lighted the mixture!
8. Look! I've mixed them up!
9. Look! My scarf! I've forgotten to take it off!
10. Look! I've just opened the container!

13. Read another text attentively and say which statements following the text are true (T) to the fact, false (F), or not mentioned (NM):

Antoine Laurent Lavoisier (1743–1794), the son of a wealthy Parisian lawyer, pursued the family tradition and received his licence to practice law in 1764. But within two years he was drawn back to his desire to learn more about science, an interest first experienced during his earlier education in maths, astronomy, chemistry, and botany. By 1772 he'd disproven several of ancient Greek principles about earth, air, fire, and water, and developed a reputation for exact quantitative procedures and brilliant experiments. He expanded the list of known elements to thirty-three, although some were erroneous. From 1776 to 1782, Lavoisier conducted experiments in which he isolated oxygen in air and furthered Priestley's work on oxygen's role in combustion and respiration. In a 1783 paper titled *On the Nature of Water and on Experiments that Appear to Prove that this Substance is not Properly Speaking on Element, but Can Be Decomposed and Recombined* Lavoisier reported to the French Academy of Sciences that water was the product of combining hydrogen and oxygen. In a subsequent paper delivered to the Academy, Lavoisier presented a logical analysis about the substance that we now call oxygen. Through Lavoisier's sensitive balance instrument, keen insight, and inductive reasoning, he vanquished the Greek concept of earth, air, fire, and water, once and for all. For this and other work, he is now considered the father of modern chemistry. Lavoisier had been active in political affairs his entire adult life, and devoted much of his career to public service, including positions in the French government from 1768 to 1790 in the areas of economics, agriculture, education and social welfare. In the aftermath of the French Revolution of 1789, despite his many contributions as a reformer and political liberal and despite his participation in the Revolution, he came under attack because of his status as a wealthy member of the French aristocracy, but primarily because of a position he had held in 1768 in the Ferme-Generale, the country's tax collecting agency. When the Reign of Terror commenced in 1793, resulting in the suppression of the French Academy of Sciences and other learned societies, Lavoisier was arrested. On May 8, 1794, after a one-day trial, the prospect of Lavoisier's further contributions to science and rational thought were prematurely held at the age of 50 at *Place de la Concorde* in Paris, as his great mind fell into the blood-soaked basket at the foot of the guillotine along with twenty-seven former members of the Ferme-Generale.

1. Antoine's father made him practice science.	T	F	NM
2. Lavoisier didn't believe in the four essential elements.	T	F	NM
3. Lavoisier expanded the list of known elements.	T	F	NM
4. Lavoisier discovered oxygen.	T	F	NM
5. All the elements he discovered are now in the Periodic Table.	T	F	NM
6. In 1770 Lavoisier investigated the effect of heat on tin.	T	F	NM
7. Lavoisier understood the composition of water.	T	F	NM
8. Lavoisier logically analyzed oxygen.	T	F	NM
9. Lavoisier invented chemical balance.	T	F	NM
10. He emphasized the role of oxygen in combustion and respiration.	T	F	NM
11. The main interest of Lavoisier was chemistry.	T	F	NM
12. Lavoisier thought that true knowledge could be obtained simply by discussing.	T	F	NM
13. Lavoisier based his theories on those facts which he could establish in his laboratory.	T	F	NM
14. Lavoisier was appointed Commissioner of Gunpowder to the French Government.	T	F	NM

14. Read the text again, divide it into logical parts and entitle them.

15. Write out the sentence(s) expressing the main idea(s) of each logical part of the text.

16. Write a summary of the text in your own words making use of the plan and the sentences you've written out. Provide your summary with a title.

17. Translate one of the logical parts into Russian.

18. You've received an invitation to participate in the Conference on The Structure of Atom to be held on October 21–15, 200... in Missoula, USA. Agree to take part in the conference and write a letter of content to the Organizing Committee. The letter of Dr. V. Yakovlev will serve as an example:

Institute of Chemistry
St. Petersburg, Russia

22 March, 200...

Dr. R. H. Lookenbill
Chairman
Organizing Committee
Montana University
Missoula, USA

Dear Dr. Lookenbill,

Thank you for your letter of October the 10th together with the kind invitation to participate in the Symposium on History of Chemistry to be held in Missoula next year.

I shall be happy to participate in this gathering and would be prepared to give a talk on "Alchemy".

I enclose my preliminary registration form and will send an abstract of my paper before the end of the year.

Yours sincerely,
V. Yakovlev

The next letter is for you to reply positively:

The 14th International Conference on the Structure of Atom
Missoula, Montana, USA

25 September, 200...

Dr. ... ...
Chemistry Faculty, MSU
Moscow, Russia

Dear Dr. ... ,

This letter is to call your attention to the 14th International Conference on the Structure of Atom to be held October 21–25, 200... in Missoula, Montana, USA.

In view of your active interest in this field, we would be pleased to have you as a participant in this Conference. If you are interested in attending, please forward the application form (also enclosed) to Professor A. B. Hill, Department of Chemistry, Montana University.

Attendance to this Conference is limited to approximately 100 persons. Nevertheless, if you know of anyone who has a significant contribution to make to this Conference, please ask him to send an application form to Professor A. B. Hill.

We are planning to allow room in the programme for short presentations of very recent work warranting general discussion.

If you are aware of such developments, we would be grateful if you could bring them to the attention of the Conference Chairman.

Sincerely yours,
J. L. Phillips
Conference Secretary

You're given additional words and word combinations to write different letters of this kind:

(1)

I am very grateful (for); thank you very much (for); I wish to thank you (for); I would like to thank you (for); May I express my gratitude to you (for); I wish to express my gratitude to you (for).

(2)

It is a great pleasure to accept your kind invitation; It is with great pleasure that I accept your invitation; I shall be happy to participate in

For more information on useful expressions see Appendix 3.

REVISION AND DEVELOPMENT

UNITS 3 and 4

1. Read the following text about the elements' names and be able to develop the topic by describing the origin of some other elements' names which haven't been mentioned. Make use of either an encyclopedia or a dictionary:

The ancient elements have been known for so long that none can say how they were named, e.g. gold, silver, iron, tin, lead.

When new elements began to be discovered in the 18th century, it was decided that metals and nonmetals should be given different kinds of names. All the new metals would be named with *-ium* at the end. Nonmetals would have *-on* at the end of their names.

The *-ium* idea has generally worked out quite well. You should be able to tell that potass*ium*, and sod*ium* and magnes*ium* are metals from their names. (But helium is a gas, and is definitely *not* a metal. It was given a metal's name by mistake! Helium would really be named helon).

The *-on* idea for nonmetals hasn't been used as widely. So, carb*on*, arg*on* and silic*on* are nonmetals. But there are plenty of nonmetals with different name endings, e. g. bromine, hydrogen (and iron is definitely a metal, even though its name ends in *-on*).

Some of the elements have names with a meaning. Sometimes the name tells a story about the element. The Table below shows some examples:

Name	Meaning	Reason
bromine	Greek: *bromos* (bad smell)	Bromine has a very sharp smelling vapour.
carbon	French: *charbon* (charcoal)	Charcoal is almost pure carbon.
chlorine	Greek: *chloros* (green)	Chlorine is a pale green gas.
helium	Greek: *helios* (the Sun)	Helium was first discovered by investigating sunlight.
hydrogen	Greek: *hydor gennao* (I form water)	Water is formed when hydrogen burns.

2. a) Read another text about an element. Translate it into Russian and show the words, word combinations and chemical terms which are to be found in serious scientific writing, but are used figuratively here:

A WOMAN AS SEEN BY A CHEMIST

Symbol: Wo
Accepted atomic weight: 120
Physical properties: Boils at nothing and freezes in a minute.
Melts when properly treated. Very bitter if not used well.
Occurrence: Found wherever man exists.
Chemical properties: Possesses great affinity for gold, silver, platinum and precious stones. Violent reaction if left alone. Able to absorb great amounts of food matter. Turns green if placed beside a better looking specimen.
Uses: very ornamental, useful as a tonic in acceleration of low spirits, as an equalizer in the distribution of wealth. It is probably the most effective income reducer known.
Caution: Highly explosive in inexperienced hands.

b) What is the way a chemist might describe a man? Give your ideas similar to those expressed in the text you've just read.

3. Classify all the words from ex. 5 (Units 3 and 4) according to the parts of speech.

4. Choose any 10 words from ex. 5 (Units 3 and 4) and give their derivatives.

5. Translate the following sentences into English:

1. В своей статье Менделеев писал, что он открыл периодический закон.
2. Древние греки считали (верили, думали), что вещество состоит из бесконечно (infinitely) малых частиц.
3. Аристотель (Aristotle) думал, что его теория будет согласовываться с его общими взглядами (general views) на природу.
4. Уже в 1789 г. Лавуазье доложил Французской академии наук, что вода — это соединение кислорода и водорода.
5. В то время Пристли не понимал, что его открытие очень важно.

6. Кавендиш (Cavendish) открыл, что вода состоит из определенного процента (proportion) водорода и кислорода.
7. Авторы твердо убеждены, что их работа может повлиять на развитие химии.
8. Мы должны провести новый опыт, потому что необходимо (it is necessary) получить эти вещества.
9. Мы не знали, что должны были выбрать ход реакции.
10. Докладчик (speaker) сообщил, что должен закончить новую серию (series) экспериментов.
11. Якоб Берцелиус (Jakob Berzelius) начал свои исследования после того, как узнал об атомистической теории Дальтона (Dalton).
12. Авогадро (Avogadro) разработал свою гипотезу до того, как были классифицированы элементы.
13. Крукс (Crookes) смог описать несколько характеристик лучей (rays).
14. Бор (Bohr) был уверен, что теорию света, которую разработали Планк (Planck) и Эйнштейн (Einstein) можно применить к атому.

6. Listen to the dialogue and answer the questions below:

1. Who has found the information about number 114 element?
2. Who predicted the discovery of the element?
3. When was the discovery predicted?
4. What famous book by Da Vinci did Leo read?
5. In what way did Leonardo Da Vinci predict the element?
6. What was peculiar about the great man?
7. What was one of the reasons for coding the discovery?
8. Who suggested the name of the element?
9. What does the last line in the dialogue mean?

MIKE: Look, Ann. I've heard that a new element was discovered by one of our fellow students. Can you imagine that!
ANN: Hm... What kind of element is it?
MIKE: As far as I know, it's a transuranium element.
ANN: Was it given any number in the Periodic Table?
MIKE: Yes, its number is 114. Leo said that this discovery...
ANN: Leo? Leo who?

MIKE: Leo Matveyev. He is the student who found out the origin of the element.

ANN: Matveyev. How did he do it?

MIKE: I'm trying to tell you, but you interrupt me all the time.

ANN: I'm sorry. Go ahead, please.

MIKE: The thing is, Leo thinks that this discovery was predicted by Leonardo da Vinci as early as the 16th century.

ANN: How did Leo find it out?

MIKE: I guess, he's read Leonardo da Vinci's famous book *Anatomy*.

ANN: Yes, and so what?

MIKE: Well, according to Leo, da Vinci gave a column of digits and didn't tell anybody about their meaning.

ANN: Do you remember these figures?

MIKE: Yes. Here you are. Vertical column with digits. 8, 7, 1, 7, 4, 7. Leonardo da Vinci was crazy about coding his ideas. But *our* Leo supposed that this column contains some information which was dangerous for those times. Or probably too early to decipher it.

ANN: More than that, these were the times of alchemy and all scholars were trying to discover the formula of "philosophic stone".

MIKE: Correct. And our fellow student made an attempt to decipher the column by means of simple arithmetic operations.

ANN: Could you show me his calculations?

MIKE: I'm afraid I can't. I remember only the result. Two numbers were obtained: 114 and 184.

ANN: I see. It's a formula of this element.

MIKE: Quite right. Our Leo has once again proved the genius of the great Italian.

ANN: What about the name of the element? Does any name exist?

MIKE: Yes, believe me or not, Leo suggested the name of the element in honour of Leonardo da Vinci — Leonardium.

ANN: Only in honour of da Vinci?...

What do you think of the discovery? Is it possible? Prove that.

7. Listen to the dialogue again and develop it by using the expressions of surprise, emphasis, certainty and request. Act the dialogue with your partner in front of your fellow students.

8. Work in pairs and make up a dialogue out of the text below. Act your dialogue in front of your fellow students. There are a few possible situations where your dialogue could take place:

1. Two students are discussing the lecture they've just heard.
2. A student discusses his/her paper with the supervisor.
3. At the examination the professor asks the student a few questions on the states of matter, and the student answers.

Matter can occupy three different states — gas, liquid and solid. Changes of state depend on the motion of sub-microscopic particles. The motion of these particles depends on energy. Cooling particles takes away energy and slows them down. Heating particles adds energy and speeds them up. In a gas these particles move quickly and randomly, they have neither set volume nor shape. In a liquid the particles slow down and clamp together. We use gases, such as a natural gas, in many important ways. Cooling a gas into a liquid decreases its volume dramatically. This makes it possible to store and transport it more effectively. In a solid particles of matter have a definite volume and shape. They are held in a pattern that repeats itself in three dimensions. Crystals are highly ordered form of solid matter. They were one of the first clues to the arrangement of particles in the solid state.

The states of matter are few. But the ways in which they are realized, the number of different substances around us, are many. Let me give you an example. On breathing oxygen — the life-giver — is obviously a gas. But here is another element, sulphur, that chemically very closely related to oxygen. And yet, it is obviously different: it is a solid at room temperature. Now, there are obviously different forces that work between the atoms of molecules of sulphur and oxygen within these two substances. We want to know why this is so. We have to probe deeper, we have to, then, ask: What is the nature of the atom? What is it that makes oxygen and sulphur similar or different?

9. Read the following text, entitle it and write an abstract:

In 1896, one year after the discovery of X-rays by Roentgen, a French physicist, Becquerel, discovered that uranium emits rays similar to those of X-rays; these rays were called "Becquerel rays".

In 1897, two brilliant physicists, Maria Skłodowska-Curie and Pierre Curie, began work on pitchblende residues from Bohemia

containing uranium oxide, U_3O_8. Soon they discovered an element more radioactive than uranium itself and this was named polonium, in honour of Marie's native Poland. The Curies then succeeded in separating radioactive barium sulphate from pitchblende. This led them to conclude that pitchblende contains a certain element which renders other elements radioactive. Consequently, they treated the barium sulphate and obtained a new compound, one million times as active as uranium, radium bromide. In 1902, after completing nearly five hundred experiments, Madam Curie obtained about 0.2 gram of radium chloride from a series of fractional crystallizations of pitchblende. This compound is a salt of radium and its activity is over two million times as great as that of uranium. In 1910, four years after her husband had been killed in a street accident, Madam Curie finally succeeded in isolating pure radium from radium chloride. Thus, the science of radioactivity was established, a new science that has changed many concepts regarding the structute of matter, and opened the door to the Atomic Age.

During their research, the Curies also discovered that thorium is nearly as radioactive as uranium. Many new radioactive elements have been discovered since Madam Curie succeeded in isolating pure radium, but uranium and thorium still comprise the parent elements of natural radioactivity.

10. a) You're given descriptions of ten elements of the Periodic Table. Give the names and symbols of the elements. If in the given definitions some important details are lacking, add whatever you consider necessary. Choose the elements from the list below:

chlorine, tin, hydrogen, zinc, copper, bromine, carbon, helium, silver, oxygen

1. Chemically it is a reactive metal, combining with oxygen and other nonmetals and reacting with dilute acids to release hydrogen.
2. Chemically it is reactive. It combines directly with chlorine and oxygen and displaces hydrogen from dilute acids. It also dissolves in alkalis to form stannates.
3. It is a white lustrous soft metallic transition element. It is used in jewellery, tableware, etc., and its compounds are used in photography.

4. A colourless, odourless gaseous element. It is the most abundant in the Earth's crust (49.2 percent by weight) and is present in the atmosphere (28 percent).
5. A colourless, odourless gaseous chemical element. It is the lightest and the most abundant element in the universe. It is used in the Haber process.
6. This nonmetallic element is totally inert and has no known compounds. It was discovered in the solar spectrum in 1868.
7. It is a red volatile liquid at room temperature. Chemically, it is intermediate in reactivity between chlorine and iodine. The liquid is harmful to human tissues and the vapour irritates the eyes and throat.
8. It is manufactured by the electrolysis of brine and also obtained in the Downs process for making sodium. It has many applications, one of which is purification of drinking water.
9. The name of this element comes from the island of Cyprus. It is used for making electric cables and wires. Its alloys are used extensively. Water does not attack it, but in moist atmospheres it slowly forms a characteristic green surface layer (patina).
10. A nonmetallic element belonging to group IV of the Periodic Table. It has two main allotropic forms (diamond and graphite).

b) Give your answer to the following quiz; add other characteristics of the element.

Which metal is the best conductor of heat and electricity? Its conductivity is a standard, which means that all other metals are compared to it when it comes to measuring their conductivity of heat and electricity. Another thing about it is that it reflects 95% of all the light reaching it, which makes it the whitest and brightest of all metals. It was the rarest and most precious metal for ancient Egyptians. It is five hundred times more expensive than iron, fifty times more expensive than copper, but is only worth one-fiftieth as much as platinum and one-twentieth as much as gold.

11. The two friends (Ann and Mike) spoke with their fellow student (Leo Matveyev) and advised him to take part in the Conference on New Discoveries in Chemistry to be held in the nearest future, and Leo got the invitation. He was happy but he didn't know how to write a letter to inform the

Organizing Committee that he would be a participant. Will you help Leo to write the letter? The Conference will take place in January, from 25 to 31, 200... , in New York University, USA. The Chairman of the Conference is Dr. Philip Corn.

12. Speak on the following topics:

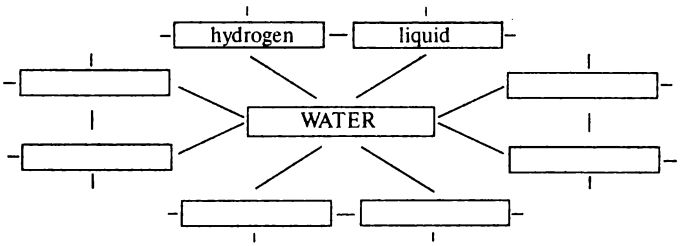
1. The Periodic Table and Periodic Law.
2. The Matter of State or the States of Matter.

UNIT 5

WHY IS WATER SO IMPORTANT?

Grammar: **Direct and Indirect Speech.**
Speech Strategy: RE-ASKING. ORAL AND WRITTEN SPEECH.

1. Warming up.
What comes to your mind if you see or hear the word "*water*"? Complete the following chart with your ideas and share the information with your fellow students:



Why is water so important? Make a list of all important uses of water. Compare your list with the lists of your fellow students.

2. Listen to or look through the following text and say 1) what facts about water you haven't mentioned it contains; 2) what characteristics of spoken English you can find in the text:

Three-quarters of the Earth's surface is covered in water. This makes water the most common material on the Earth. Like other substances, water can exist as a liquid, as a gas, or as a solid. Water in the form of a gas (water vapour) is commonly called *steam*. Solid water is *ice*. We

can change one form into another form by simply changing the conditions, for example by heating it up or cooling it down. The change from one form to another is usually called a *change of state*. Changes of state are examples of a physical change. They don't involve making new substances.

Single substances are either compounds or elements. What about water? From the chemical point of view water has many points of interest, because it enters into chemical reactions which are of fundamental importance. Water not only reacts with many substances but it also has a marked influence upon many chemical reactions.

Well, water can be decomposed. So it can't be an element, can it? Decomposition of water can be made by electric current. In this way two volumes of hydrogen and one volume of oxygen are obtained. So we can say that water is *a compound of hydrogen and oxygen*. The chemical name for water is *hydrogen oxide*. Right? Is it possible to make water from its elements? The answer is — yes! In fact, it's quite easy to do (but rather dangerous).

Hydrogen's the water former, remember? When it's burnt in air, water is formed. The "artificial water" formed in this way is exactly the same as "natural water". The experiment can be made in the laboratory, but only by the teacher, and with strict safety precautions.

3. Look through the text again and find the sentences which are summarized in the following way:

1. The three forms of water are all the same chemical substances.
2. Water is the most abundant substance on the Earth.
3. Water can be decomposed into its elements by electrolysis.
4. Water's chemical symbol is H_2O.
5. Water can be synthesized by burning hydrogen in air.

4. a) Read the text attentively using a dictionary and answer the following questions:

1. What makes water similar to other substances?
2. How is water in the form of gas called?
3. Can we call solid water ice?
4. What should we do to change one form of water into another? Give examples.
5. Why is water interesting from the chemical point of view?

6. What important chemical reactions with water can you name?
7. How does water influence chemical reactions?
8. Why can't water be an element?
9. What is the chemical name for water?
10. How can you get "artificial water"? What are its properties?

b) Read another text on water, put questions to some sentences so that to get the answers below; show the difference in oral and written presentation of the same problem:

1. Water is a compound of hydrogen and oxygen.
2. Water vapour.
3. Because of its physical properties.
4. Water is purified by distillation.
5. It's 0° C.
6. Greasy, fatty substances or most plastics.
7. It's colourless, tasteless, and odourless.
8. It's 100° C.

Water is hydrogen oxide, a compound of hydrogen and oxygen. It can be made if hydrogen or a hydrogen-containing substance is burnt in air or oxygen.

Most of the world's water is liquid, but an important fraction is solid as ice and snow.

Many mineral substances contain water of crystallization (e. g., copper sulphate) and in the atmosphere there are millions of tons of water vapour. Clouds consist of minute droplets of water or crystals of ice.

Water dissolves a very large number of substances and is the most important solvent. It does not dissolve greasy, fatty substances or most plastics.

After they had found the composition of water, the scientists could investigate its properties. It was stated that ordinary water is impure, it usually contains dissolved salts and dissolved gases, and sometimes organic matter.

For chemical work water is to be purified by distillation. Pure water is colourless, tasteless, and odourless. Rain water formed by condensation of water in the air is nearly pure water, which contains only small proportions of the dust and of dissolved gases.

After the examination of the water properties the chemists found that physical properties of water can be used to define many physical constants and units.

The freezing point of water (saturated with air at 1-atm pressure) is taken at 0° C and the boiling point of water at 1 atm is taken as 100° C.

The unit of volume in the metric system is chosen so that 1 ml of water at 3.98° C (the temperature of its maximum density) weighs 1,000 g/cm.

So water is one of the most important of all chemical substances. It is a major constituent of living matter and of the environment in which we live.

5. Give Russian equivalents to the following words, word combinations and chemical terms. Where exactly are they used in the texts?

nouns: 1. condition, 2. current, 3. hydrogen oxide, 4. importance, 5. point of view, 6. quarter, 7. surface, 8. vapour

verbs: 9. burn, 10. cool, 11. cover, 12. heat

adjectives: 13. artificial, 14. dangerous, 15. marked, 16. strict

adverbs: 17. commonly, 18. exactly, 19. in this way

conjunctions: 20. either ... or.

6. Read and translate the following words both as nouns and verbs:

change, state, water, mark, influence, increase, decrease, experiment, experience, comment, matter

7. Match the words of ex. 5 with their synonyms given below:

a) to warm up
b) usually
c) stream
d) steam
e) to chill
f) hazardous
g) the 4th part of a whole
h) noted
i) state
j) thus
k) water
l) viewpoint
m) synthetic
n) to fire
o) rigorous
p) to hide
q) significance
r) the outer part
s) precisely

8. Match antonyms in *A* and *B*:

A	*B*
1. the commonest	a) impossible
2. like	b) the most unusual
3. simple	c) old
4. usually	d) common
5. new	e) few
6. single	f) exceptionally
7. many	g) to lose
8. decomposition	h) natural
9. to obtain	i) unlike
10. possible	j) integration
11. easy	k) complicated
12. dangerous	l) secure
13. artificial	m) lenient
14. strict	n) difficult

9. Study carefully grammar table 7 in Appendix 1 and change the given sentences into indirect speech:

1. The author writes: "Three-quarters of the Earth is covered in water."
2. The writer asks: "Is it possible to make water from its elements?"
3. The scientists stated: "The radiation from thorium nitrate is unsteady."
4. Rutherford remarked: "It's really very fine to see the things one has seen in imagination visibly demonstrated."
5. He said: "I have already drawn your attention to the social implications of the release of atomic energy."
6. Pauling often repeated: "I keep on the outlook for aspects that I don't understand."
7. The scholars usually asked: "What causes electrons to change orbits?"
8. They also asked: "Is the electron a wave or a particle?"

10. Listen to the following dialogue and choose the title out of the given ones. The notes and words will help you to understand the conversation better.

1. Water in Our Life.
2. The Composition of Water.
3. The Water Cycle.

NOTES

1. **you see** — видишь ли
2. **getting down on paper** — записываю
3. **kind of** — что-то вроде
4. **Why?** — А что?
5. **You know what?** — Знаешь что?
6. **Wait a tick** — Подожди минутку.
7. **Right you are.** — *зд.* Ну вот (я готов).
8. **Fire away** — Начинай.
9. **to get the figures** — записать цифры
10. **Mind you.** — Слушай внимательно.
11. **I've got that.** — Я понял.
12. **Go on, will you?** — Продолжай же!
13. **You know** — знаешь ли
14. **I didn't** — я не (говорила)
15. **I mean** — я хочу сказать
16. **That's incredible.** — Невероятно.
17. **Did you get it all down?** — Ты все записал?
18. **My pleasure!** — Всегда готов помочь!
19. **I can't wait** — не могу дождаться
20. **Have a good day.** — Всего хорошего.

WORDS

to check — проверить
circulation — циркуляция
deadline — последний срок
to deposit — отлагать(ся)
dew — роса
figures — цифры
fresh — свежий
hail — град
hurricane — ураган
lake — озеро
total — общий
plant — растение
press — печать
quantity — количество
recently — недавно
relatively — относительно
to release — освобождать(ся)
soil — почва
to sublime — сублимировать
thunderstorm — гроза
tornado — торнадо (ветер)

SUSAN: Look, Nick... about the article you've got to write...

NICK: On water? Well, I'm working on it right now. Getting down on paper the most essential facts... kind of... common knowledge. Why?

SUSAN: Good. You know what? There's something that might be of interest. It's from a book published recently. I've made a copy but I can't find it.

NICK: Pity. Wait a minute... while I get a paper and a pen. Perhaps you'd tell me about it. Later I could check the details.

SUSAN: O.K.

(Pause.)

NICK: Right you are. Fire away.

SUSAN: Well, try to get the figures. They're important.

NICK: Yes, I will.

SUSAN: Mind you, it's about water circulation. As you know, Earth's water passes through a great cycle. But how it happens? First, it evaporates from oceans, lakes, rivers, soil and plants...

NICK: Wait a tick. Did you say soil and plants?

SUSAN: That's right... and sublimes from snow and ice into the atmosphere.

NICK: Where did you say it sublimes into?

SUSAN: I said it sublimes into the atmosphere.

NICK: Right.

SUSAN: Second. The sun supplies the energy needed for evaporation and sublimation. Winds move the water vapour around.

NICK: I've got that... go on, will you.

SUSAN: Well... water then returns to the Earth as snow or rain...

NICK: Only in two forms?

SUSAN: You see, you may also write as hail and dew if you like. Third. When water vapour condences to liquid water or deposits as solid ice, energy is released.

NICK: Yes, what happens then?

SUSAN: In fact, the transfer of energy by evaporation and condensation of water are major facts of the weather.

NICK: What about energy release by thunderstorms, tornadoes, and hurricanes? Does it happen?

SUSAN: I think it's obvious. However the quantity of water vapour in the atmosphere at any time is relatively small.

NICK: How small did you say it is?

SUSAN: I didn't. I'm just going to tell you about this, — only about 0.001 percent of the total water on the Earth. However, the quantity of water that passes through the atmosphere in a year is large. I mean much greater than the total volume of fresh water on the Earth. That's it.

NICK: That's incredible, Susan.

SUSAN: Did you get it all down?

NICK: Yeah... I think so... thank you, Susan.

SUSAN: My pleasure. I hope you'll get that article finished soon. When's it to go to press?

NICK: End of the week... is the deadline. One of the copies is yours.

SUSAN: O.K. I can't wait to see it published.

NICK: Thanks again.

SUSAN: Have a good day.

11. a) Listen to the dialogue again and say who the participants of the conversation are:

1. Two chemistry students.
2. A journalist and his friend.
3. A professor and his assistant.
4. Two research workers.

b) Answer the following questions:

1. What article is Nick writing?
2. What information does Susan give to Nick?
3. What are the forms of water that Susan names?
4. What figures does Susan cite?
5. When will Nick's article go to press?

12. Listen to the dialogue for the third time and change any ten statements of the conversation into the ones that are used in the written speech. The first statement is changed for you as an example:

Example: NICK: Wait a minute... While I get a pen and a paper.
Nick asks Susan to wait while he gets a paper and a pen.

Use the words: *say, advise, think, interrupt, express surprise, give, hope, explain*, etc.

13. Work in pairs. One student reads the given statements, the other pretends that he does not hear and asks him/her to repeat. Take turns. You are given an example:

Example: STUDENT A: When H_2O falls from clouds it's called a rain.
STUDENT B: Where did you say it falls from?
or
What form did you say it falls in?
STUDENT A: I said it falls from clouds.
or
STUDENT A: I didn't. But it falls in a liquid form.

1. When H_2O falls in small frozen crystals, it's called snow.
2. When the snow begins to melt, it's called slush.
3. If the slush freezes again and becomes hard and solid, it's called ice.
4. The combination of rain and snow is known as sleet.
5. Small round lumps that fall during a thunderstorm are called hail.
6. The H_2O forming on the leaves and flowers is a dew in warm weather.
7. The same in cold weather is frost.
8. The H_2O united into a liquid body which is relatively motionless may be a puddle, a pond, a lake, a sea, or even an ocean.
9. While the water moves, it may be a brook, a creek or stream, or a river.
10. When H_2O comes out of the tap, it is just plain water.

14. Make up a dialogue out of the statements above and act it in front of your fellow students. You are given a few situations where such a dialogue could take place:

1. At the seminar you've just attended one of the students has made a report on water. In your opinion his/her report deserves attention. You're telling him/her this and you are discussing some details you've become interested in.
2. Two students are speaking about new information on water they've found in *Nature*.
3. A journalist is interviewing a famous scientist who has just presented a very interesting communication on water.

4. You've just watched a scientific programme on TV about different uses of water and some chemical explanations of the material. Criticize the programme.
5. You were given an assignment to test water from a tap. You offer a few solutions to the problem speaking with your lab instructor.

15. Read another text on water. What ideas correspond to those expressed in ex. 2 and ex. 11 and what are different?

The abundance of water in liquid, solid and gaseous state is a matter of common observation. Water is not only the most abundant compound, but it is also very important for life. To be sure life would be impossible without water. For many purposes water must be pure. The purest natural water is rain. But we can't say that it is really pure. The same can be said about ground water. It contains a great deal of impurities which fail to settle. Dissolved substances do not settle and don't evaporate with water, and this makes their removal difficult. One of the most important problems is to obtain water sufficiently pure to meet our needs. The choice what process is to be used for purification of water depends upon the uses for which it is intended as well as the impurities it contains. Water used for steam boilers should be free from substances that cause corrosion and scale formation. Water for washing should not contain substances that react with soap. When water is to be used for drinking, it is necessary to kill the microbes it may contain. To achieve this, water which is to be purified is thoroughly filtered. Another way to purify water is to boil it. None of these methods is fit for producing pure water in the chemical sense, because most of the soluble salts are unaffected by the treatment. To remove these and to prepare chemically pure water suitable for scientific use, we take advantage of the fact that water is usually changed to steam while most of the dissolved substances as have already been mentioned are not volatile. If we condense the steam, we are thus able to remove all the impurities except volatile ones. This process is called distillation. Distilled water has many uses, both in the laboratory and in industry, when even a small quantities of impurities are undesirable.

16. Read the text again, entitle it, then divide it into logical parts thus making a plan.

17. Write out the sentence(s) which express the main idea(s) of each logical part. Condense them where possible.

18. Write an abstract to the text in your own words using the plan and the sentences you've written out and condensed. Omit all unnecessary details. Begin your abstract in the following way:

A problem of water purification is studied/considered/analysed/examined/investigated/described/discussed/outlined, etc.

19. Sometimes it's impossible to attend the conference you've been invited to. In this case you should write a letter in which you decline the invitation and explain why you can't attend the gathering. Decline the invitation to attend:

1. Symposium on Water Purification to be held in Washington D.C., USA, September 25–30, 200...
2. Conference on Chemistry in Our World to be held in London, UK, January 10–12, 200...
3. Conference on Natural Sciences and Their Role in Environment Protection to be held in Toronto, Canada, May 15–20, 200...

The letter of Dr. J. Hill is given to you as an example:

Montana University
Misoula, USA

October 1, 200...

Prof. R. Houseman
Chemistry Faculty
University of London
England

Dear Prof. R. Houseman,

I am greatly honoured by the letter of J. A. Phillips, of September 25th inviting me to participate in the 14th International Conference on New Applications of Biochemical Research.

However, I am afraid I shall have to decline your kind invitation, for I see no possibility of attending the Conference, owing to a prior engagement for that time.

I would appreciate it greatly if you could send me the Proceedings of the Conference.

Please accept my best regards,

Yours truly,
Dr. Hill

You are given additional words and word combinations to write different letters of this kind:

(1)

I very much regret that I am unable to accept (it);
I am very sorry I must decline (it);
I am afraid I must decline

(2)

as I have already accepted a previous invitation;
as I have an urgent business to attend to;
as I see no prospects of attending the Conference (Congress, Symposium) owing to (because of) my poor health (other obligations);
owing to a prior engagement for that time

For more information on useful expressions see Appendix 3.

REVISION AND DEVELOPMENT

UNITS 1–5

1. a) Look through the following text and find the answers to the given questions:

1. What did the ancients think of simple substances?
2. What is R. Boyle famous for?
3. What elements is water decomposed into?
4. What is an element?
5. What unites sugar, starch, wood and paper?
6. What is the finding of astronomers?

b) What might be the title to the text?

We meet the idea of an element very early in our study of chemistry. The ancients suspected that there must be some very simple substances from which more complicated ones were built. At one time they thought that everything might be made up of earth, air and water; these got the name "element" which comes from the same word as "elementary" or simple.

This idea, though wrong, is still an important one. In the middle of the 17th century Robert Boyle recognized the modern type of an element. His idea was that an element was just something which could not be broken down chemically into anything simpler. He knew of metals like iron, copper, tin, lead, gold and silver and nonmetals like carbon and sulphur, and some gases which were called "air".

In the years after Boyle over one hundred different elements have been defined. Some of these are quite common and well-known but a lot of them are man-made. Examples are mendelevium, nobelium, and laurencium. One of the first distinctions between elements was the division into metals and nonmetals.

As you know, a dull-red mercuric oxide is decomposed into mercury and oxygen. The weights of oxygen and mercury which are obtained are together equal to the weight of mercuric oxide. Similarly, water is decomposed by electrolysis into oxygen and hydrogen. No chemist, however, has been able to separate any other substances from mercury, oxygen or hydrogen: these three substances are known, therefore, as elements. An element is a substance which, so far as is known, contains only one kind of atom. It has been found possible to resolve all known substances into about 109 elements: many of these elements are rare, and relatively few are common in nature.

Sugar, starch, cellulose, wood and paper, for example, differ from one another in many ways, yet each of these substances is composed of the same three elements: carbon, hydrogen and oxygen. Just as several thousand bricks may be arranged to form many different types of buildings, so may the atoms of elements be arranged in different ways to form molecules of different types of matter.

Astronomers have found that the same elements which are common on the Earth, e.g. nitrogen, carbon and hydrogen, are also the commonest in the Sun and other stars. Thus elements are the primary building materials of the universe.

2. Make a plan of the text and entitle each of its points.

3. Write an abstract to the text according to your plan.

4. Revise grammar and lexical material to Units 1–5 and translate the following sentences into English:

1. Химия — это наука, которая рассматривает свойства, состав и строение материи.
2. Химия изучает различные формы материи, а физика имеет дело главным образом с природными превращениями и действием различных форм энергии.
3. С химической точки зрения дождевая и грунтовая вода в действительности не являются чистыми.
4. Газы не имеют ни собственной формы, ни объема.
5. Вода — это сложное вещество.
6. Большинство веществ являются сложными по составу и могут быть разложены с образованием двух или более простых веществ.

7. Если вещество нельзя разложить или получить соединением других веществ, его называют элементом.
8. Я знал, что мы будем проводить опыт.
9. Он думал, что жидкость испарится быстрее.
10. Кислород может быть превращен в жидкость, которая кипит при температуре −183° С.
11. Любой элемент при соединении с кислородом образует окись.
12. Так как водород самый легкий из элементов, его плотность самая маленькая из всех веществ.
13. После того как опыт завершили, был получен водород.
14. Мы начали расчеты после того, как опыты были выполнены.
15. Молекулы — это мельчайшие частицы, которые образуют все виды вещества.

5. Ask all possible questions to the given sentences:

1. Life is impossible without water.
2. Air is not a chemical compound, but a mixture of nitrogen and oxygen with small quantity of other gases.
3. A chemist is to know the states of matter and the physical laws that govern the behaviour of matter in various states.

6. Listen to the following statements and complete the chart to show that you understand what the speakers mean. Put the number of the statement you hear under the corresponding heading. The first statement and its number is given as an example.

Example: 1. I think that the ancient discoveries are very important.

Clarification	Agreement	Disagreement	Opinion	Certainty	Surprise	Emphasis
			1			

2. I'm afraid I don't quite understand what "quantity" means.
3. Do you really want to participate in the conference?
4. It's essential to realize that an element can't be decomposed.
5. Leo discovered a new element! Fancy that!
6. We are absolutely certain that Lavoisier is the father of chemistry.
7. I particularly want to emphasize that crystals are formed from solutions.

8. To my mind more than 109 elements have been defined after Boyle.
9. It's not quite correct to deny the importance of alchemists' investigations.
10. I wish to draw your attention to the safety precautions in the laboratory.
11. You are quite right when you say that Leo's calculations must be tested.
12. It's not quite clear what the speaker means.

7. Listen to a short talk about one of the chemical discoveries and choose its title out of the given ones.

1. Chemical Reactions.
2. Small Changes.
3. The Atomic Theory.
4. Chemical Observations.

Good morning! I'm Gean Umland from the University of Huston. I was asked by your Chemistry Faculty Dean to make a short presentation of an extract from my General Chemistry Textbook published recently. I'm going to speak about John Dalton's contribution.

Well, I'll start by saying that the modern atomic theory was suggested by an English schoolteacher, John Dalton, in 1803-1809. Dalton saw that the existence of atoms would explain the law of constant composition. Do you remember it? Yes, quite right. In a pure compound the percent (by weight) of each element is always the same. Atoms' existence could explain other observations that had been made about chemical reactions. However, the scientific establishment of that day was unwilling to approve of the new idea. Can you imagine, that more than 50 years had passed before the atomic theory was generally accepted?! Isn't it incredible that even as late as 1900 the author of one General Chemistry textbook refused to mention Dalton's theory?! We see that today the main ideas of his theory are still used, though, I should say, the discovery of new facts has made a few changes necessary.

Now let's summarize the main points of Dalton's theory.

First, all matter is composed of atoms. What is an atom? It's the smallest particle of an element that takes part in chemical reactions.

Second, all atoms of a given element are alike. What does this mean? Good. It means that all atoms of gold, for instance, are the

same. Atoms of different elements are different. Can you give us an example? That's it. An atom of copper is lighter than an atom of gold.

Third, compounds... what are compounds? You're quite right. They are combinations of atoms of more than one element. And the relative number of each type of atom is always the same. Any examples? How smart you are! Yes, in water there are always two hydrogen atoms for each atom of oxygen.

Now, can atoms be created or destroyed? No, definitely not. And atoms of one element can't be changed into atoms of another element by chemical reactions.

I think, that's all that I wanted to speak about today. Thank you. Do you have any questions?

8. Listen to the lecture again and 1) write out the statements which the speaker uses to address the students; 2) change the questions from direct into indirect speech using the expressions from Unit 1 (ex. 10); 3) change the statements expressing Dr. Umland's approval of the students' answers into indirect speech. You are given two examples:

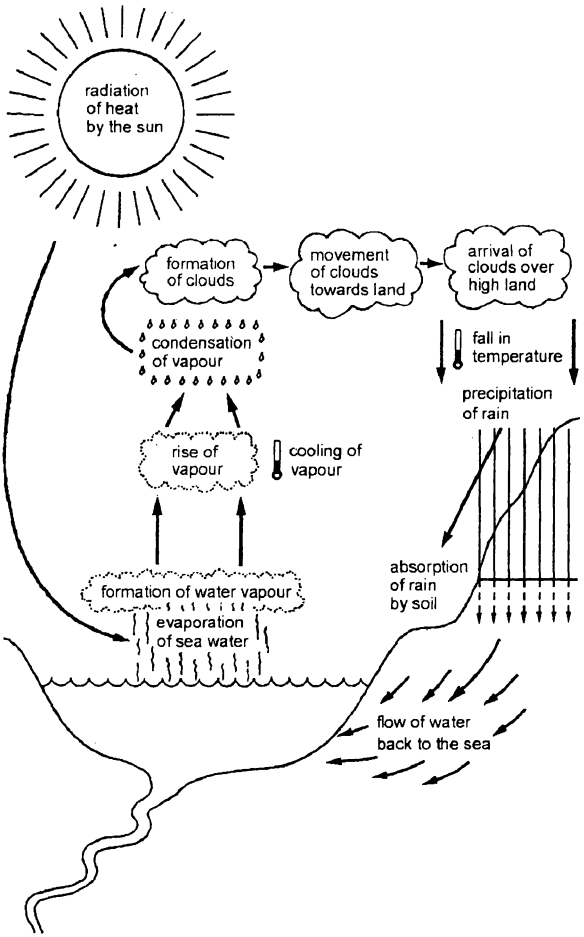
Example 1: Do you have any questions?
I'd like to know if you have any questions.
Example 2: Good morning!
Dr. Umland greets the students.

9. Look at the picture of Water Cycle on page 90 and describe it to your fellow students.

10. 1. You're invited to participate in a conference. Fill in an application form, then write your CV (résumé).

2. You've got a letter of invitation to participate in the Conference on Hard Water to be held in London in August, 200... . Write a letter saying that you accept the invitation. The letter to you was signed by Dr. P. Green, Chairman of Organizing Committee.

3. You've been invited to take part in Symposium on Nitrogen Fixation. It will take place on the 7th of February, 200... in University of Berkeley, California, USA. You can't comply with the invitation because you'll be very busy. Write a letter to your correspondent (Dr. Sweetheart), express your gratitude and explain the reason for declining the invitation.



11. **Read the biography of a famous chemist and speak in front of your fellow students as if you were him/her. Don't introduce yourself. Let your fellow students guess themselves in whose person's name you are speaking. They may ask you questions but you should give evasive answers.**

12. **Do the same with an element from the Periodic Table. Describe it to your fellow students in such a way that they will have to ask you questions to find out what element you've spoken about.**

FINAL EXAMINATION PAPER 1

Section 1. LISTENING COMPREHENSION

This section of the test requires a demonstration of your ability to understand a lecture or a talk. After you hear a lecture or a talk, you'll have to answer a few questions. The questions and the answers are given to you. Choose the best answer from the four given. Record your answers on a piece of paper.

The word "alchemy" is derived from the Egyptian *kem-it* (the black) or from the Greek *chyma* (molten metal), but in any event it came to use through Arabic. It is believed that the practice of alchemy existed among the Alexandrine Greeks of Egypt. From there it spread to Asia, then to Europe.

In discussing alchemy we must rid ourselves of the conception of it as a collection of fantastic superstitions. It arose as a reaction against the mechanist nature of Greek scientific thinking, which had reached a dead end.

The chemistry of early times was chiefly concerned with attempts to make gold and silver from base metals and to prepare a universal medicine capable of curing all ills. In a large sense it was the beginning of the modern science of chemistry.

Early alchemists investigated and recorded the properties and reactions of many materials. It is true that the practice of alchemy was accompanied by much deceit but there were serious workers engaged in the search. By their investigations they laid the foundation of modern chemistry. In any event, who would dare say that this search for health and prosperity was unworthy in itself?

In the 16th century Paracelsus and others gave a new direction to alchemy through their investigation of the effects of chemicals on the

human body and through the preparation of medicines. Paracelsus's followers laid the foundations of chemistry as we know it today.

Modern chemists and physicists have, in fact, achieved the alchemists' dream of converting one metal into another. For example, by bombarding the nucleus of an element in a nuclear reactor, scientists change the composition of the nucleus and thus transform one element into another — a thing which was considered impossible during the 19th century.

1. What language does the word "alchemy" come to us through?

a) Latin
b) Arabic
c) Greek
d) French

2. According to the passage, what is the word "alchemy" derived from?

a) the Greek *chei*
b) the Greek *chimaira*
c) the Greek *chyma*
d) the Greek *chiton*

3. According to the passage, what was the alchemy of ancient times concerned with?

a) molten metals
b) making gold and silver from base metals
c) mystery in experiments
d) fantastic superstitions

4. According to the passage, how did alchemy come to Europe?

a) Asia → Egypt → Europe
b) Greece → Egypt → Europe
c) Egypt → Asia → Europe
d) Asia → Greece → Europe

5. According to the passage, why did alchemy arise?

a) to collect fantastic superstitions
b) to record the properties of many materials
c) to react against the mechanist nature of thinking
d) to lay the foundation of modern chemistry

6. According to the passage, what did Paracelsus contribute to?

a) a new direction of alchemy
b) converting one metal into another
c) the search for prosperity
d) the recording of data

7. What attempts of alchemists are *not* mentioned in the passage?

a) conversion of base metals into gold;
b) preparation of universal medicine;
c) cure of all ills;
d) search for "philosopher's stone"

8. What might be a suitable title for the passage?

a) Foundations of Modern Chemistry
b) Alchemy — the Science of the Ancients
c) Paracelsus and His Followers
d) The Composition of a Nucleus

Section 2

In this section of the test each problem consists of an incomplete sentence. Below the sentence there are four choices, marked (a), (b), (c), and (d). You should find the one choice that best completes the sentence.

Example: These basic concepts ... part of the education required for many professionals.

a) has become
b) have become
c) are becoming
d) became

The correct answer is (b), so you should mark your answer (b).

9. People ... chemistry since ancient times.

a) have practiced
b) are practicing
c) had practiced
d) practiced

10. Chemistry ... the studies of the whole universe and everything in it.

a) is included
b) includes
c) include
d) included

11. D. Mendeleyev ... in Tobolsk in 1834.

a) was born
b) is born
c) born
d) borns

12. You ... very extensive lab practice during the next years of your studies.

a) had
b) were having
c) will be having
d) have had

13. **In ancient times gold ... the most perfect metal.**

a) considered
b) was considered
c) has considered
d) has been considered

14. **Boyle ... in experimental method.**

a) believed
b) has believed
c) will believe
d) was believed

15. **Outstanding achievements ... in the structure of atom.**

a) make
b) made
c) have been made
d) is made

16. **You've got a bachelor's degree in chemistry, ... ?**

a) didn't you?
b) haven't you?
c) don't you?
d) aren't you?

Section 3

Put C if the sentence is correct. Put X if there is a mistake in the use of the modal verbs.

17. **It was decided that metals and nonmetals can be given different names.**

18. **Matter can occupy three different states.**

19. **Could you show me his calculations?**

20. **Water must exist as a liquid, as a gas, or as a solid.**

21. **Water can be decomposed.**

22. **This experiment is to give good results.**

23. **Water for washing must contain substances that react with soap.**

24. **If we condense the steam, we are thus able to remove all the impurities except volatile ones.**

25. **At one time the ancients thought that everything should be made up of earth, air and water.**

26. **No chemist has been able to separate any other substances from mercury, oxygen or hydrogen.**

27. **Atoms of elements may be arranged in different ways to form molecules of different types of matter.**

28. **Dalton saw that the existence of atoms will explain the law of constant composition.**

29. **Atoms' existence could explain other observations that had been made about chemical reactions.**

30. **Can atoms be created or destroyed?**

Section 4

Each problem in this section consists of a sentence in which one word or phrase has been underlined. From the four choices given, you should choose the one word or phrase which could be substituted for the underlined word or phrase without changing the meaning of the sentence.

Example: This experiment is rather <u>dangerous</u> to make.

a) important
b) significant
c) hazardous
d) interesting

The correct answer is (c), so you should mark answer (c).

31. **Thousands of years ago people <u>valued</u> gold as a rare substance.**

a) thought of
b) appreciated
c) considered
d) respected

32. **The universal <u>desire</u> for gold made alchemy a formal discipline.**

a) lust
b) admiration
c) ambition
d) dream

33. **These phenomena have long been of interest to research workers.**

a) scientists
b) examiners
c) scholars
d) investigators

34. **These reactions are of fundamental significance.**

a) interest
b) importance
c) attention
d) concern

35. **This makes water the commonest material on the Earth.**

a) fibre
b) flesh
c) substance
d) fabric

Section 5

You will be given three reading passages. Each passage is followed by questions concerning its content. You are to choose the one answer to each question from the four choices given.

TEXT 1

Chemistry is an experimental and theoretical study of the composition of matter and the changes that take place in matter. A chemical change involves changes in composition and in properties. Chemical changes are usually accompanied by the liberation or absorption of energy in the form of light, heat or electricity.

All forms of matter consist of either pure substances or mixtures of two or more pure substances. Elements are the building blocks of matter. Compounds are combinations of elements. Most of the elements are metals and most of them will unite with other elements and form compounds. The formation of a compound from simpler substances is known as synthesis. Analysis is the process of breaking down a compound into simpler substances or its elements and thus determining its composition. The composition of a pure substance never changes.

Every substance has physical and chemical properties. Physical properties include colour, smell, solubility, density, hardness and boil-

ing and melting points. Chemical properties include the behaviour with other materials.

Matter exists in three states: the solid, the liquid, and the gaseous state. A substance (usually) can be transformed from one state to another under the changes of its temperature.

Chemistry is so much a part of our lives that it is very easily taken for granted. Metals, glass, plastics, dyes, drugs, paints, paper, soap, detergents, explosives and perfumes are all made of chemicals.

36. What does *not* chemistry study?

a) composition of substances
b) behaviour with other materials
c) states of matter
d) human races

37. According to the passage, what are elements?

a) building blocks of matter
b) the basis of any science
c) the heating parts of a piece of electrical apparatus
d) a part of a whole

38. According to the passage, what is a compound?

a) a group of buildings enclosed by a wall
b) mixture
c) a number involving more than one unit
d) metal

39. According to the passage, what physical changes do *not* include ... ?

a) colour
b) smell
c) density
d) changes in composition

40. What might be a suitable title to the passage?

a) Analysis in Chemistry
b) Synthesis in Chemistry
c) Introduction to Chemistry
d) Elements and Compounds

TEXT 2

The process of vaporization requires the addition of heat to the liquid. The quantity of heat required to vaporize a unit mass of a liquid at a constant temperature is called heat of vaporization.

Experiments show that the heat of vaporization of a liquid depends upon the temperature at which vaporization takes place; the higher the temperature, the smaller is the heat of vaporization. For example, in the case of water, the heat of vaporization at 100°C is 540 calories per gram.

At 20°C, however, the heat of vaporization of water is 590 calories per gram, while at 300°C it is 331 calories per gram. Of course, the heat of vaporization is also a quantity of heat liberated when a unit mass of the substance condenses at a constant temperature from the vapour to the liquid phase. Thus when steam at 1000°C is condensed to water at the same temperature, 540 calories of heat are liberated for each gram of steam which is condensed. One of the methods for measuring the heat of vaporization of water is to take steam from a boiler and add it to a known quantity of water.

In this process the steam is first condensed to water and then cooled from the boiling point down to the final temperature of the mixture.

41. According to the passage, what does it mainly describe?

a) theories to explain the nature of heat
b) expansion due to heat
c) heat of vaporization
d) temperatures and molecular energy

42. According to the passage, what substance is used in the examples?

a) water
b) acidic solution
c) ethanol
d) cobalt (II) cloride

43. According to the passage, what is the heat of water vaporization at 100°C?

a) 331 calories per gram
b) 590 calories per gram
c) 540 calories per gram
d) 20 calories per gram

44. When steam at 1000°C is condensed to water at the same temperature, how many calories of heat are liberated?

a) 300
b) 331
c) 540
d) 100

45. According to the passage, what does the process of vaporization require?

a) the addition of steam to the liquid
b) the increase of temperature
c) the addition of heat to the liquid
d) the decrease of temperature

46. What might be the possible title to the text?

a) Heat Is a Form of Energy
b) What Is Heat
c) Heat of Vaporization
d) Heat and Temperature

TEXT 3

At the Paris Exhibition of 1855 aluminium was exhibited for the first time. It was regarded as one of the principal novelties of that year. The new metal was shown as a bar, bearing a very sensational inscription "Silver from Clay". It was regarded even at that time as the metal of future with great practical possibilities. Scientific and non-scientific press devoted long articles to its description. Special attention was paid to the advantages of aluminium — it is light, it does not rust, and is very strong especially when mixed with other metals.

The first attempts to isolate this metal from its oxide were made by Davy and some years later by Berzelius. But both failed to obtain any satisfactory results. Nearly fifty years had passed before French and German scientists isolated aluminium in 1854. It was isolated by electrolysis. Scientists also investigated the distribution of the metal in nature. Aluminium is one of the most widely distributed of the chemical elements but it is never found in the free state. Metallic aluminium has a beautiful silver lustre, but when impure, aluminium has a grey or a bluish colour. The isolation of aluminium became simple and cheap only when man harnessed electricity. Only then was it possible to produce aluminium and put it to use.

47. When was aluminium first exhibited?

a) 1807
b) 1854
c) 1855
d) 1829

48. According to the passage, where was it exhibited?

a) in Paris
b) in Berlin
c) in London
d) in Moscow

49. According to the passage, when were the first attempts to isolate aluminium made?

a) 1855
b) 1854
c) 1829
d) 1807

50. What might be the title of the text?

a) Paris Exhibition
b) The Metal of Future
c) Aluminium: Its History
d) The Advantage of Aluminium

The Second Year

UNIT 6

THE PRECIOUS ENVELOPE

Grammar: **Infinitive. Gerund. Participle.**
Speech Strategy: INTERRUPTIONS. AGREEMENT/DISAGREEMENT.

1. Warming up.

1. Proving that air is not a chemical compound involves what?
2. Is air the same as atmosphere?
3. Can any chemical formula be written that would *exactly* show the proportions of oxygen and nitrogen?
4. What is the nearest simple formula?

2. Listen to or look through the following text and say what answers you've just discussed are not in it.

The layer covering all over the Earth like a blanket is called the atmosphere. It is made of very thin stuff called air. Air is so thin you hardly know it's there. But it's all around us. Really, we live at the bottom of a very deep "ocean of air".

Air gets thinner and thinner as you go up. There's enough air to breathe at the top of Mt. Everest (five miles above sea level), but getting there is hard work! Most climbers have used breathing apparatus on their way up. By the time you get to 50 miles above sea level, there's practically no air left. The air doesn't stop suddenly, however, so it's impossible to say exactly how deep the atmosphere is.

Air is not a single substance. It's made of a number of gases all mixed together. It's impossible to stop gases mixing together. They mix together spontaneously. So a gas that escapes from the Earth becomes a part of the atmosphere. Scientists believe that the atmosphere has

changed a very great deal since the Earth was first formed. At first, the atmosphere may have been made up of gases like ammonia, methane, carbon dioxide and water vapour. Later, the first early forms of life developed and gradually more and more oxygen was added to the atmosphere. Nowadays the main gases in the air are oxygen and nitrogen.

You can easily make experiments in the laboratory to find out about the air, for example, to prove that it's a mixture rather than a single substance, or find out how much oxygen there is in it. These experiments usually involve getting the oxygen to combine with another substance. In other words, to get rid of the oxygen altogether a chemical reaction is used.

There are plenty of ways to do this because oxygen is a very reactive gas. For instance, burning and rusting are two kinds of chemical change that use up oxygen.

The main gas left after removing oxygen is nitrogen. In fact, nearly all of the remainder (about four-fifths) is nitrogen. To put this another way, 78 percent of the air is nitrogen.

Apart from oxygen and nitrogen, there are only small amounts of other gases in the air. One of them is carbon dioxide. Another of the minor constituents of the air is water vapour. Ordinary air always contains some of it. The best way to show that there is water vapour in the air in the laboratory is to condense the water. This can be done by cooling the air. Although there's not much of either water vapour or carbon dioxide in the air, both of them are very important.

So far we've mentioned oxygen, nitrogen, carbon dioxide and water vapour. Are these the only gases in the air? The answer is "no", but it's hard to prove.

Evidence for other gases in the air came towards the end of the 19th century (a long time after oxygen and nitrogen had been sorted out). The work leading to their discovery was an investigation into the density of nitrogen.

Unlike oxygen, nitrogen is very unreactive. So it's difficult to make experiments to remove nitrogen from the air. But it's quite easy to take the oxygen, carbon dioxide and water vapour out of the air practically leaving nitrogen alone. This nitrogen might be called "atmospheric nitrogen".

The main gas that "contaminates" the atmospheric nitrogen is argon. Being a very inert gas, it's used for filling electric light bulbs.

3. Look through the text again and find all the definitions connected with air.

4. a) Look through the text once more and change the given questions to the order of events they occur in the text:

1. What is air?
2. What other gases are there in the air?
3. What is atmosphere?
4. What experiments with air can one make?
5. How deep is the "ocean of air"?

b) Answer these questions in your own words.

5. Listen to or read the given extracts of critical reviews of the book "Air" and decide if they are positive (P) or negative (N):

1. After reading and rereading Dr. Steward's new book "Air", I simply can't understand why some of the reviewers have found something wrong with the conclusions which this famous writer makes.
2. Since the time Dr. Steward began writing his book, new information has been obtained which clearly shows how questionable the conclusions that he makes are.
3. Dr. Steward always writes his books in a very understandable manner, but even his clear style cannot hide the lack of understanding of what he describes.
4. It will be a great pity if Dr. Steward's new book "Air" is read only by specialists in the field of inorganic chemistry because a writer of such high qualification surely deserves a much greater audience of readers.
5. Although Dr. Steward's new book "Air" doesn't contain many pages, I find it impossible to imagine how a better description of the subject could ever be produced.
6. On page after page of Dr. Steward's new book "Air" I found statements which my own experience in this field certainly leads me to a number of questions.
7. One cannot help expressing pity that more writers in this field have Dr. Steward's talent of clear expression combined with convincing proof of his conclusions.
8. There is certainly a great need in this field for a short, general review which combined scientific theory with good literary style, but,

though Dr. Steward's literary style is worth speaking about, the theory which he tries to develop, leaves one unsatisfied.

9. In my previous books in this difficult field, I expressed the opinion that no satisfactory treatment of the subject had ever been published; and after reading Dr. Steward's latest attempt in the same area, I'm ready to report that the situation remains unchanged.
10. In his latest book Dr. Steward has tried to present the beginning student with a popular introduction to the subject, and, although I am certainly in full sympathy with his purpose, I must honestly report here that in so many popular treatments in the field of science, the effort to give a simple but yet true picture of a difficult subject has proved to be far beyond the capacity of the writer.

6. Read the text thoroughly with a dictionary and answer the following questions. Use your knowledge of chemistry as well.

1. Why can't you know that there's air around us?
2. Why is it impossible to say how deep the atmosphere is?
3. Why isn't it possible to stop gases mixing together?
4. What was the atmosphere made up at first?
5. What are the main gases in the atmosphere nowadays?
6. What experiments can be made in the laboratory to find out about the air?
7. What can you say about carbon dioxide and its importance?
8. What will you do to show that there is water vapour in the air?
9. Why is it difficult to make experiments for removing nitrogen from the air?
10. What do you know about argon?

7. Using a dictionary, find in the text English equivalents to the following Russian words, word combinations and chemical terms:

nouns: слой, одеяло, вещество, дно, вершина, уровень, скалолаз, свидетельство

verbs: упоминать; вести; загрязнять; дышать; улетучиваться; добавить; выяснить; доказать; выделять (изолировать)

adjectives: тонкий; глубокий; перемешанный; обычный

adverbs: вокруг; вдруг; точно; стихийно; начало; позже; постепенно; полностью; много; почти; в отличие; около

prepositions and conjunctions: с тех пор как; до сих пор

word combinations: очень сильно; возможно состояла; другими словами; избавиться; наилучший способ; трудно; совершенно легко; можно было бы назвать; иначе говоря

chemical terms: горение; ржаветь; кислород; азот; аргон; реактивный; инертный; углекислый газ; охлаждение; удалить; смесь

8. Match the words, word combinations and chemical terms in *A* with their synonyms in *B*:

A	*B*
1. stuff	a) inert
2. evidence	b) usual
3. to contaminate	c) precisely
4. to sort out	d) testimony
5. ordinary	e) to delete
6. suddenly	f) to isolate
7. exactly	g) much
8. spontaneously	h) matter
9. gradually	i) combustion
10. plenty	j) impulsively
11. burning	k) to pollute
12. rusting	l) corrosion
13. unreactive	m) unexpectedly
14. to remove	n) amalgam
15. mixture	o) little by little

9. Complete the following sentences using the words from the list below. Some of the words can be used more than once:

level, layer, blanket, top, evidence, to mention, to lead, to contaminate, to isolate, nitrogen, oxygen, argon, spontaneously, gradually, to escape, atmosphere, density, bottom

1. ... for other gases in the ... came towards the end of the 19th century.
2. The work ... to the discovery was an investigation into the ... of ... .
3. The ... lying all over the Earth like a ... is called the ... .
4. So far we've ... ... , ... , carbon dioxide and water vapour.
5. By the time you get to 50 miles above sea ... , there's practically no air left.

6. The main gas that ... the atmospheric ... is ... .
7. Gases mix together ... .
8. So a gas that ... from the Earth becomes a part of the ... .
9. ... more and more ... is added to the ... .
10. ... and ... were ... long before the end of the 19th century.
11. We live at the ... of a very deep "ocean of air".
12. There's enough air to breathe at the ... of Mt. Everest.

10. Complete the other sentences, this time using chemical terms from the list below. Some of them can't be used in the given sentences, while the others can be used a few times:

combustion, rusting, hydrogen, oxygen, nitrogen, argon, inert, reactive, atmosphere, carbon dioxide, cooling, heating, remove, mixture, substance, isolate

1. ... is a corrosion of iron or steel to form a hydrate iron (III) oxide.
2. ... occurs in the air (78%) and is an essential constituent of proteins and nucleic acids in living organisms.
3. ... is a chemical reaction in which a ... reacts rapidly with ... producing heat and light.
4. ... is a colourless, odourless gas, soluble in water, ethanol and acetone.
5. ... occurs only in the presence of both water and ... .
6. Reactions of ... are often free-radical chain reactions, which can usually be summarized as the oxidation of carbon to form its oxides and the oxidation of ... to form water.
7. ... is really prepared in the laboratory by the action of dilute acids on metal carbonates.
8. Though ... is essential to all forms of life, the huge amount present in the ... is not directly available to most organisms.
9. ... is the lightest element and most abundant at the universe.
10. ... is an electrochemical process in which different parts of iron surface act as electrodes in a cell reaction.
11. Flame is a luminous ... of gases undergoing ... .
12. ... is a by-product (побочный продукт) from the manufacture of lime (известь) and from fermentation process.

11. a) Study carefully grammar tables 8–11 in Appendix 1 and find in ex. 2 and ex. 5 all the sentences containing infinitive, participle (I and II) and gerund. Translate these sentences into Russian.

b) Translate the following text into English paying attention to the italicized parts of the sentences:

При нормальных условиях кислород представляет собой бесцветный газ, *не имеющий* запаха и *состоящий* из двухатомных молекул. *Для получения* кислорода в лабораторных условиях используется несколько методов. Кислород является сильным окислителем и, *соединяясь* со многими элементами, образует оксиды. Реакции образования оксидов экзотермичны (exothermic), и это во многих случаях может приводить к возгоранию *соединяющегося* с кислородом элемента, либо *образующего* соединения.

Кислород и его соединения необходимы *для поддержания* жизни. Они играют важнейшую роль в процессах *обмена* веществ и *дыхания*.

Озон — это один из аллотропов (allotrope) кислорода. Это голубой газ, *обладающий* небольшой растворимостью в воде. При низких концентрациях он нетоксичен, но при концентрациях, *превышающих* 100 миллионных долей, становится токсичным.

Озон реагирует с алкенами (alkene), *расщепляя* (to split) их двойные связи (bond) в процессе, *известном* как озонолиз (ozonolysis), и *образуя* органические соединения, которые называются озонидами (ozonide).

12. Listen to the following dialogue and say what problems the participants are discussing. The notes and words will help you to understand the text better:

NOTES

1. **don't follow me** — не успеваете за мной
2. **to begin with** — начнем с того, что
3. **you mean** — вы имеете в виду
4. **it's not as simple as that** – не так все просто
5. **it should be noted** — следует отметить
6. **sorry to interrupt** — простите, что перебиваю
7. **absolutely true** — абсолютно верно
8. **I have a point to make here** — здесь я хочу сказать
9. **as far as I know** — насколько я знаю
10. **to a large extent** — в большой степени
11. **to tell you the truth** — по правде говоря
12. **see you later** — до встречи

WORDS

abundant — распространенный
approximately — приблизительно
colour — цвет
to compress — сдавливать, сжимать
dust — пыль
main — главный, основной
negligible — незначительный
odour — запах
outstanding — выдающийся
pale — бледный
slightly — слегка, немного
supporter — сторонник; *зд.* тот, кто поддерживает
taste — вкус

C. S.: Good afternoon. I'm Carl Spider and today we're going to discuss oxygen. If you don't understand or follow me, or if you have anything to add, you're welcome to interrupt. O.K.? Well, to begin with, it's common knowledge, oxygen is the most abundant element on our planet...

STUDENT 1: May I interrupt you for a moment? When was it isolated?

C. S.: You mean discovered? It's a good question. Well, it was discovered by Priestley as early as 1774. But it's not as simple as that. Because Lavoisier also made experiments with oxygen isolating it from air and developing Priestley's work. Lavoisier emphasized the role of oxygen in combustion and respiration. Well, coming back to what I was saying, in nature oxygen may occur in a free state or may be found combined with other elements. It should be noted, that because of its chemical properties it has been called the most important of all elements to man.

STUDENT 2: Sorry to interrupt you, but is it because of being a supporter of combustion and of forming oxides with both metals and nonmetals?

C. S.: Quite right. Let me continue and say that oxygen is a colourless, odourless, tasteless gas. It's slightly heavier than air and is slightly soluble in water. Being compressed and cooled it can form a pale blue liquid boiling at – 192.98°C which would be slightly magnetic.

STUDENT 1: I wonder if I could comment on the chemical property of oxygen?

C. S.: Do, please.

STUDENT 1: Well, the outstanding property of oxygen is its activity. Correct? In other words, its tendency to combine with other substances.

C. S.: Absolutely true. It will combine with all the elements.

STUDENT 2: I have a point to make here...

C. S.: Yes?

STUDENT 2: As far as I know, it doesn't combine with inert gases, does it?

C. S.: Yes, quite correct. Before I could resume, would you answer my question? What happens to oxygen with the increase in temperature?

STUDENT 2: I guess, it would greatly increase the oxygen activity.

C. S.: Yes, that's true. Now, oxygen, silicon, aluminium and hydrogen together constitute approximately 80 percent of the Earth's crust, sea and atmosphere.

STUDENT 1: May I interrupt you again, Dr. Spider? What about nitrogen?

C. S.: Oh, yes. It's the main element in the air, but it isn't one of the most common elements...

STUDENT 2: Could I say something about nitrogen?

C. S.: I'd be delighted to hear.

STUDENT 2: Nitrogen forms only a small percentage of the crust and oceans, and the mass of the atmosphere is negligible compared to the total mass of the Earth.

C. S.: It's a good comment, I should say. Speaking about air, could anybody tell me about its composition?

STUDENT 1: Oh, it varies and depends to a large extent on plants and animals which control the amounts of oxygen and carbon dioxide by photosynthesis and respiration.

C. S.: Good. What else does air contain? Anybody?

STUDENT 2: Water vapour and dust. If dust is removed, then... to tell you the truth, I don't remember the exact figures...

C. S.: Well, the approximate composition by volume is the following: nitrogen — 78 percent, oxygen — 21 percent, argon — 0.93 percent, carbon dioxide — 0.03 percent, plus small quantities of other gases. Well, thank you for

your active participation. Next time we'll speak about combination of oxygen with metals. What do they form?

STUDENT 2: Oxides, I suppose.

C. S.: Well done! See you later.

13. Listen to the dialogue again and say who of the students is the most active in the conversation. What makes you think so?

14. Listen to the conversation again and say in which situations a) the students interrupt the lecturer and what expressions they use to do this; b) the lecturer agrees with the students and approves of their contribution using the expressions of agreement and approval. What are they?

15. What parts of Dr. Spider's explanation would you develop having in mind the latest knowledge about air, atmosphere and gases?

16. Read another text on the same problem and say what ideas can be found in it that are the same in the 1st text and the dialogue. Which information presented in this text is not found in the others? Pay attention to the sentences in brackets which have been condensed to show you how the verbals may be used.

REACTIONS OF OXYGEN

No other element is more important to life than oxygen. It is not only the most widely distributed element on the surface of the globe, but it is absolutely necessary to the maintenance of life. (It is the most widely spread element on the suface of the globe, and it is necessary to maintain life.) To be sure, air breathing animals would die within a few minutes if the supply of oxygen in the atmosphere stopped suddenly. (Air breathing animals would die very quickly, if the supply of oxygen in the atmosphere stopped.) After we have learned the methods of oxygen's preparation, let us study its main reactions. (Having learned the methods of oxygen's preparation, let us study its main reactions.) When oxygen combines with an element, it forms a product which is called an oxide. (Combining with an element, oxygen forms a product called an oxide.) The process is called oxidation. There are only a few elements which are attacked by oxygen. (There are only a few elements attacked by oxygen.) Among the substances which are unaffected

by it we should mention inert gases. (Among the substances unaffected by it mention should be made of the inert gases.) Combinations with oxygen often liberate heat and light in which case the process is known as combustion. (Combinations with oxygen often liberate heat and light and this process is known as combustion.) There are some elements which do not catch fire unless they are heated. (There are some elements not catching fire unless heated.) Some substances will ignite even if they are very slightly heated; others have to be heated before they take fire. (Some substances will ignite even if slightly heated; others have to be heated before taking fire.) The temperature at which a substance ignites is called its kindling point. Once these reactions are started, they liberate heat and light. (Once started, these reactions liberate heat and light.) The heat which is liberated maintains the substance at or above the kindling temperature. (The heat liberated maintains the substance at or above the kindling temperature.) The amount of heat which is liberated by very slow oxidation such as rusting of metals and the decay of wood, is the same as that which is liberated by rapid combustion, but there is no rise in temperature because the heat is radiated to the surrounding air. (The amount of heat liberated by very slow oxidation (rusting and the decay of wood) and by rapid combustion is the same, but there is no rise in temperature because the heat is radiated to the surrounding air.) The difference between combustion, on the one hand, and corrosion and decay, on the other, is one of the rates of reaction and temperature at which these reactions take place. (The difference between combustion and corrosion and decay is one of the rates of reaction and temperature at which these reactions take place.)

17. a) Read the text again and state which of the following statements are true (T), false (F) or not mentioned (NM) in the text:

1. There are many elements that are more important than oxygen.
2. Oxygen is very reactive.
3. Oxygen is a bluish coloured gas.
4. The amount of heat liberated on oxidation doesn't depend on the rate of oxidation.
5. Combinations with oxygen seldom liberate heat.
6. Liquid oxygen boils at –185.5°C.

b) Using the following expressions agree or disagree with the given statements. Work in pairs: one student translates the statement and says it out loud, the other agrees or disagrees. Take turns. The list of expressions comes handy:

Agreement:	**Disagreement:**
That's right.	You're not right, I'm afraid.
You're quite right.	Not quite right.
Fine.	Just the opposite, I'm afraid.
True.	Just on the contrary, I'm afraid.
Quite true.	It's not quite so.
Right.	I can't quite agree with you here.
Quite right.	You're wrong, I'm afraid.

1. Насколько я знаю, азот и фосфор являются самыми важными элементами в группе VI.
2. В лекции было сказано, что при нормальных условиях азот представляет собой газ, состоящий из двухатомных молекул.
3. Известно, что азот составляет приблизительно 60 процентов всего объема атмосферы.
4. Никто не знает, что процесс превращения атмосферного азота в форму, усвояемую растениями и животными, называется фиксацией азота.
5. И хочу добавить, что этот процесс является составной частью круговорота азота в природе.
6. Я где-то читал, что ежегодно в мире вырабатывается свыше 100 млн. тонн азота.
7. Это правда, что фосфор является самым незаменимым для жизни элементом и входит в состав почти всех живых организмов?
8. Насколько я понимаю, фосфор необходим животным для построения костных тканей и обеспечения организма энергией в процессе дыхания.
9. Красный фосфор используется для изготовления спичек, не так ли?
10. Следует отметить, что фосфор входит в состав всех минералов, важнейшим из которых является апатит.

18. **Read the text again, divide it into logical parts and entitle them thus making a plan. Write out the sentences expressing the main idea(s) of the text.**

19. **Write a summary of the text using your plan and the sentences you've written out.**

20. **In your future life you'll probably need to write a letter to a scientist who couldn't attend the conference you have taken part in. You know this scientist, that's why write a letter to him/her expressing your disappointment and hope to see him/her at another conference. The following letter is given to you as an example:**

Chemistry Faculty
University of London
England

15 October, 200...

Dr. Hill
Montana University
Missoula, USA

Dear Dr. Hill,

I was disappointed that it was not possible for you to attend the 16th International Conference on New Applications of Biochemical Research although I fully appreciate your obligations. I enclose the programme and abstracts of the Conference for your information. When the proceedings are available, I will send you a copy, too.

We were fortunate, indeed, that Dr. Lookenbill could attend and actively participate in the Conference work. I am sure you will hear a report from him about many details of the scientific programme.

For myself, let me close this brief letter with the hope that some time in the future it will be possible for us to meet again and discuss scientific problems of mutual interest. In particular, I shall be greatly interested in discussing *bacteria in nature* as well as the problems of *cells and genetics* which I mentioned to you last year in Paris. I have made some progress on the latter problem and would like to have your opinion on directions for further work. All your colleagues here send you their best wishes.

Yours sincerely,
R. Housemann

21. **Write letters to those unable to participate in the conferences. See Unit 3, ex. 18. Some of the scientists mentioned there will not have the opportunity to attend. Choose a conference and a scientist and write him a letter of understanding.**

You may use the following expressions to write different letters of this kind:

(1)

I/we was/were sorry/frustrated/upset; I very much regret

(2)

to attend/to visit/to participate/to be a participant

(3)

I fully understand; I'm fully aware; I realize that

(4)

your duties/responsibilities/business

(5)

We were lucky/happy/fortunate

(6)

I'd like to have your point of view/comment/thoughts/ideas

For more information on useful expressions see Appendix 3.

UNIT 7

ORGANIC CHEMISTRY

Grammar: **Complex Object. Complex Subject. Infinitive, Participle and Gerundial Constructions.**
Speech Strategy: COMPREHENSION/INCOMPREHENSION.

1. Warming up.

1. Look at the portrait of this well-known scientist. Can you guess who he is?
2. What does his name tell you about?
3. What is organic chemistry?
4. Why
   a) are there more organic compounds than inorganic ones?
   b) What is the most important source of organic compounds at the present time?

2. Listen to or look through the following text and say what *new* information besides the one you've just discussed it presents:

Non-chemist can't help being surprised to learn that many chemical compounds are obtained from living things. For example, sugars, ethanol, methane, urea, etc.

What all these compounds have in common are the elements carbon and hydrogen. Thus, it can be said that nearly all compounds obtained from living things are carbon compounds.

In the early days of chemistry the compounds obtained from living things were not even thought of to be made in the laboratory. The idea

was that there were special processes going on inside the organism (living thing). The special processes were believed to be essential for the formation of the compounds. So, chemists considered the compounds from organisms to be somehow special and different from "ordinary" chemicals that could be made in the laboratory. They called chemicals from living things *organic chemicals* and the others *inorganic chemicals.*

However, in 1828 a chemist called Wöhler showed organic chemicals to be just ordinary chemical substances. He did this by converting an inorganic chemical into an organic one simply by heating it in the laboratory. Gradually, more and more organic chemicals were shown to be just like ordinary chemicals. But we still use the terms "organic" and "inorganic" to divide chemicals into two classes. Nowadays, however, we use the term "organic compounds" to mean *carbon compounds*, there being some exceptions to the rule.

Most of the organic chemicals we have nowadays are man-made and are obtained directly from organisms. However, the main raw material for manufacturing organic chemicals is *petroleum*, it having been formed in the past from marine organisms.

Why do we have to separate a branch of chemistry just for carbon compounds? Couldn't its compounds be included with those of other elements?

There's a simple reason for keeping carbon compounds separate: there are just too many of them. *There are more compounds of carbon than compounds of all the other elements put together.* Organic chemistry is sure to be a very large branch of chemistry. It includes millions of compounds. Most of these are compounds of carbon involving just a few other nonmetallic elements, for example, hydrogen, nitrogen, oxygen and the halogens.

Why does carbon have so many more compounds than other elements? What is special about it? The answer to these questions is: carbon atoms have the special property of being able to join together to form chains of atoms. The chains may be short, or they may be hundreds or even thousands of atoms long.

The carbon chain being practically any length, the number of possible hydrocarbons is enormous.

3. Look through the text again and find all the sentences where the word *carbon* is used. Have you found ten of them? Read these sentences to your fellow students.

4. Look through the text again and find the sentences where the author states that:

1. The material for producing organic chemicals used to be found in the sea.
2. In the past chemists didn't even think of preparing organic chemicals in the laboratory.
3. The reason for a great variety of carbon compounds is its ability of forming atom chains of different length.
4. The method of obtaining an organic chemical from an inorganic one turned out to be a very simple one.
5. There were some experiments proving that man-made organic compounds didn't differ much from ordinary chemicals.

5. Read the text thoroughly with a dictionary and answer the following questions. Use your knowledge of chemistry or an encyclopedia as well.

1. What sugars does the author mean?
2. Why are carbon compounds so important?
3. What was the source of organic chemicals in the past?
4. What chemical did Wöhler prepare in the laboratory?
5. What else can Wöhler be credited with?
6. What do you know about petroleum?
7. It's written in the text: "Nowadays, however, we use the term "organic compounds" to mean *carbon compounds,* there being some exceptions to the rule." What are the exceptions?

6. Find in the text English equivalents to the given Russian words, word combinations and chemical terms:

nouns: исключение, образование, правило, причина, сырье
verbs: означать, рассматривать (считать), узнать, преобразовывать, соединять(ся), разделить, производить
adjectives: отдельный, искусственный, существенный, морской
adverbs and prepositions: внутри, некоторым образом, просто, непосредственно, конечно, несколько (мало), вместе, слишком много

word combinations: нельзя не удивиться, можно сказать, в настоящее время

chemical terms: сахар, этиловый спирт, метан, мочевина, углерод, цепочка атомов, углеводород

7. Choose a word in the columns (a) or (b) that has nearly the same meaning as the italicized word:

	(a)	(b)
1. *to learn*	to know	to find out
2. *essential*	significant	fundamental
3. *man-made*	important	artificial
4. *to consider*	to think	to weigh
5. *to convert*	to study	to transform
6. *to manufacture*	to do	to produce
7. *to join*	to combine	to associate
8. *separate*	divisible	isolated
9. *directly*	spontaneously	immediately
10. *nowadays*	at present	at some time
11. *exception*	elimination	deviation
12. *reason*	cause	intuition
13. *rule*	law	instruction
14. *marine*	naval	oceanic

8. Study carefully grammar tables 12–15 and find in the text all the sentences, containing 1) infinitive constructions; 2) participle constructions; 3) gerundial constructions. Translate them into Russian.

9. Translate the following text into English:

Еще в начале XIX века химики не могли не удивляться тому, что органические вещества при нагревании легко превращаются в неорганические. Ученые того времени, имевшие дело с самыми обычными соединениями и пользовавшиеся самыми обычными методами, не могли синтезировать органические соединения. В 1828 году немецкий химик, ученик Берцелиуса, Фридрих Вёлер, путем нагревания цианата аммония (ammonia cyanide) получил мочевину. Повторив свой опыт несколько раз, Вёлер понял, что может превращать неорганическое соединение в органическое. Он сообщил Берцелиусу о своем открытии, и Берцелиус не мог не согласиться с тем, что Вёлер прав.

Открытие Вёлера вдохновило (encouraged) химиков на попытки синтезировать органические вещества. В 1845 году Адольф Кольбе, ученик Вёлера, успешно синтезировал уксусную кислоту (acetic acid), считавшуюся в его время несомненно органическим веществом.

Французский химик Пьер Бертло в 50-е годы XIX века начал систематическую разработку синтеза органических веществ и достиг больших успехов. Он синтезировал, в частности, такие хорошо известные и важные соединения, как метиловый и этиловый спирты, метан, бензол, ацетилен.

10. Listen to the following dialogue and say:

1. **who the participants of the conversation are**
   a) a brother and a sister; b) a husband and a wife;c) research workers
2. **where the conversation takes place**
   a) at a conference; b) at a lecture; c) at home
3. **what writer they are speaking about**
   a) a detective stories writer; b) a science fiction stories writer; c) a thriller stories writer

The following notes and words will help you to understand the dialogue better:

NOTES

1. **I say** — Послушай
2. **Stop making that noise** — Прекрати так шуметь.
3. **you're too loud** — слишком громко
4. **science fiction stories** — научная фантастика
5. **if I can put it this way** — если так можно сказать
6. **I mean** — я хочу сказать
7. **say** — скажем
8. **I'm dying** — я умираю (от нетерпения)

WORDS

as soon as — как только
to depend on — зависеть от
gifted — талантливый
novel — роман

JACK: I say, Dolly! Stop making that noise, please!
DOLLY: Oh, Jack, I'm dancing. Why?
JACK: You're too loud. I'm reading.
DOLLY: What are you reading?
JACK: A book.
DOLLY: A textbook? In summer?! On vacation?!
JACK: It's not a textbook, Dolly. It's a book by Isaac Asimov.
DOLLY: I know his books. Have just read a story "Take a Match". He writes science fiction stories, doesn't he?
JACK: In general, yes. But this time it's a *History of Chemistry*.
DOLLY: I can't understand why *Chemistry*?!
JACK: Because he is a biochemist and knows chemistry and its history perfectly well. Besides, he is a gifted writer. I'm reading the book like a novel.
DOLLY: What exactly are you reading at the moment?
JACK: Organic chemistry.
DOLLY: Organic chemistry?
JACK: You'll study it next year.
DOLLY: What is organic chemistry?
JACK: It's the chemistry of carbon or organic compounds. They are very important.
DOLLY: What do you mean by "organic"?
JACK: Compounds that may be obtained from animated things.
DOLLY: Animated? Jack, I don't get the idea... I know animated movies, but what does this word mean in chemistry?
JACK: It's simple... living organisms.
DOLLY: Oh, I see. The only thing that I still can't make out is why carbon compounds are so important...
JACK: Well, all life depends on water and the compounds of carbon. Right? You know why water is essential to us, don't you?
DOLLY: Sure. Because... of... uhm...
JACK: Carbon, if I can put it this way, provides molecules of life. Clear?
DOLLY: Not quite. And how did it all start? I mean who invented or discovered or, say, developed organic chemistry?
JACK: You know what? Read this book. It'll open your eyes.
DOLLY: Oh, Jack, I'm dying to read it. Can I take it right now?
JACK: No, not now... as soon as I finish reading.

11. Listen to the dialogue again and write down all the expressions of incomprehension that Dolly uses. Translate them into Russian.

12. Using these expressions ask your partner the following questions and let him/her give you the answers.

Example: What compounds belong to the class called hydrocarbons?
I can't understand what compounds belong to the class called hydrocarbons.

1. What is the formula of glucose?
2. What is the structure of an inorganic compound?
3. What is the process of forming petroleum from other liquid fraction?
4. How is calcium carbonate converted into calcium oxide?
5. Why is pure water a poor conductor of electricity?
6. How can carbon dioxide be removed from dioxide/nitrogen mixture?
7. What class of organic compounds do principle components of petroleum belong to?
8. Why is the study of organic chemistry a part of general chemistry?

13. Read another text on carbon and say which information corresponds to the ideas expressed in the first text and the dialogue and which *does not?*

CARBON

Carbon is to be ranked along with hydrogen and oxygen as one of the most important of all the elements to man. Carbon occurs in nature as a free element and in many compounds. It constitutes only about 0.03 percent of the Earth's crust, but this relatively small amount of the element is of great importance. Its importance is indicated by the 300,000 or more compounds of the element which exist naturally or which have been prepared. It is proved that this number is approximately ten times the number of compounds of all the other elements put together. For a long time it was believed that these compounds might have never been produced except with the aid of organic life, in other words, by living plants and animals. For this reason they were called organic compounds. It is known that carbon occurs in two crystalline forms which differ strikingly by their properties. Graphite is black, soft, a good conductor of electricity. Diamond, on the contrary,

is colourless and transparent, the hardest of known substances, a non-conductor of electricity. It is the crystal structure, as determined by X-rays, which gives an explanation of this contrast of properties. The four valence electrons of each carbon atom enable it, by sharing electrons with four of its neighbours, to be linked with them in a covalent union. It may be shown by X-rays examination that in the diamond the four nearest neighbours of each carbon atom are symmetrically arranged about it in space. All atoms in a diamond are thus firmly linked together, hence the whole crystal acts as a giant molecule. Thus we account for the extreme hardness of the diamond, its high melting point, and its failure to dissolve in any solvent. On the other hand, it is found that graphite possesses parallel planes of atoms, and each is at a considerable distance from its neighbours. Each carbon atom in graphite has three nearest neighbours and they all are present in its own plane. Only three of the four valence electrons of each atom are needed for furnishing bonds with these nearest neighbours and the fourth is available for producing a bond with a neighbouring plane. A certain portion of the electrons in graphite are relatively free to move as it is true of metals. Hence, graphite is a conductor of electricity.

14. Read the text again, divide it into logical parts and entitle them.

15. Condense the sentences of the text if possible using 1) infinitive constructions; 2) participle constructions; 3) gerundial constructions. One of the sentences is given to you as an example:

Example: It is known that carbon occurs in two crystalline forms.
Carbon *is known to occur* in two crystalline forms.

16. Write out of the text all the sentences expressing the main idea(s) of each logical part taking into account all the changes that you've made.

17. Write a summary of the text in your own words using your plan, and the sentences you've written out and condensed. Omit all unnecessary details.

18. Do you remember Leo who discovered element 114? Now he's synthesized another element and wants to present his investigation in front of the participants of the next Conference on New Discoveries in Chemistry. He's written a covering letter (сопроводительное письмо) to the Organizing Committee.

MSU Chemistry Faculty
Moscow, Russia

July 17, 200...

Montana University
Missoula, USA
Dr. R. Houseman
Organizing Committee
Chairperson

Dear Dr. Houseman,

In the recent issue of *Chemical Review* I've found information on the New Discoveries in Chemistry Conference to be held in December 9–11, 200... in Missoula. I'm looking forward to reporting my new discovery to scientific establishment and listening to what they think about it.

For you to know what I mean some information on a new element follows.

I named it Bodium (Bo). It is a solid at room temperature, but is easily cut with a knife to reveal a shiny surface which rapidly tarnishes. It reacts vigorously with water liberating a flammable gas and forming a solution with a high pH value. When Bodium reacts with chlorine, it forms a white solid containing 29.5 percent by mass of chlorine. $A_r(Bo) = 85$.

If you think my work is worth being spoken about, give me a chance to present it. I'll appreciate it very much.

I'm looking forward to hearing from you soon.

Truly yours,
Leonid Matveyev
P.S. Enclosed are my CV and two recommendation letters.

19. Do you agree that Leo's discovery is really interesting for science? Why?

20. Write a covering letter with the information about your contribution and request to invite you to participate in any of the gatherings mentioned in Unit 5, ex. 19. You can use some other words and expressions to write letters of this kind:

(1)

publication, reprint, material, copy

(2)

the paper, the material, the data

(3)

to be held, to take place, to schedule, to fix

(4)

I'd like to, I'm very much interested in, I'm eager, I'm very keen on

(5)

is worth being discussed/presented/listened to

(6)

I'm sending you, I have the pleasure of sending you

For more information on useful expressions see Appendix 3.

REVISION AND DEVELOPMENT

UNITS 6 and 7

1. Look through the following text and find the answers to the given questions:

1. Who eats plants?
2. What is the form of carbon in the Earth's crust?
3. What energy is used by green plants and algae and what do they do with it?
4. What are the ways of forming carbon dioxide?
5. How are human activities now estimated?
6. Why is it hard now to estimate them?

It is known, that carbon, like water cycles from the Earth into the atmosphere and back again. Green plants and algae use the sun's energy to convert carbon dioxide (and water) into carbohydrates. The plants are eaten by animals, including people and fish, who exhale carbon dioxide. It was discovered that carbon dioxide is also formed by decomposition of dead animals and animal wastes by microorganisms. The carbon dioxide passes into the atmosphere and is again used for photosynthesis. An equilibrium also exists between carbon dioxide in the atmosphere and dissolved carbon dioxide and H_2CO_3 in oceans and lakes. In addition it was estimated that much carbon is stored in the Earth's crust in the form of fossil fuels — coal, petroleum, and natural gas — and in the form of limestone and coral. Since the middle of the nineteenth century, it has been observed that the production of carbon dioxide by the combustion and the decomposition of limestones is increasing rapidly. In addition, it has been proved that destruction of tropical forests is reducing the quantity of carbon dioxide

used up by photosynthesis. Human activities have now reached a scale where interference with the natural carbon cycle may well be significant. The longest continuous records of the concentration of CO_2 in the atmosphere unfortunately were made only in 1958, and therefore it's hard to be sure how harmful human activities have been since that time.

2. Read the text again and entitle it. Then divide the text into logical parts, give titles to all of them thus making a plan.

3. Write out all the sentences, expressing the main idea(s) of each logical part and translate them into Russian.

4. Condense the sentences of the text where possible.

5. Write an abstract to the text in your own words using the plan and the sentences you've written out and condensed.

Remember: 1. An abstract is an introduction of a reader into the matter.
2. An abstract is much more shorter than a summary.
3. Points in an abstract are more generalized than in a summary.

6. Revise the grammar and lexical material to Units 6 and 7 and translate the following text into Russian without a dictionary:

THE ORIGIN OF COAL

Carbon compounds are very abundant in nature. All organic substances are carbon compounds, and dead animals or plant matter, once exposed to the air, decay very rapidly owing to the oxidation brought about by the agency of bacteria. The gaseous products of this process of decay escape into bacterial decomposition, and have become trapped or fixed in rock. Coal and petroleum are supposed to be the result of this failure of nature's cleaning system.

When plant matter from the great prehistoric forests came submerged in swamps and bogs, the supply of air was limited, and complete oxidation was, therefore, impossible.

These beds of dead plant matter gradually became covered with deposits of sand and mud, so that the pressure above them became very

great, the beds of plant tissue being pushed deeper into the hotter zones of the Earth's crust. As a result of this terrific compression, water is believed to have been pressed out of the plant remains and the chemical changes taking place resulted in the loss of hydrogen and hydrogen compounds such as methane (marsh gas).

The final result, after thousands of years, was coal: a material containing a high percentage of carbon. Different varieties of coal, dependent on the pressure involved, may be formed. The process of coal formation is generally believed as follows:

plant matter → peat (29%C) → lignite (43%C) → bituminous coal (64%C) → anthracite (87%C).

The percentages of carbon given above are average values from the analysis of a large number of coals, but the gradual increase in carbon content is clearly shown. If the pressure of the rock has been so great that all the hydrogen has been expelled, graphite is formed. Coal is not found, therefore, in the oldest rocks since the pressures involved would have expelled (удалили бы) all hydrogen from the original plant tissue. The theory of the biological origin of coal may be represented by the following diagram:

atmospheric carbon dioxide → photosynthesis → sugar → starch → cellulose → (plant tissue) → wood → coal.

Thus, the solar energy stored by plants during the process of photosynthesis millions of years ago is liberated as heat energy in the combustion of coal today.

7. Translate the following sentences into English:

1. При нагревании это соединение преобразуется в органическое вещество.
2. После того как сырье было исследовано, ученые назвали новые элементы.
3. Узнав, что прибор плохо работает, они прекратили опыт.
4. Прежде чем рассматривать эти теории, вспомним некоторые вопросы из общей химии.
5. Вы можете помочь мне сформулировать это правило.
6. Им удалось провести опыт.
7. Вместо доказательства новой теории они выясняли, кто прав.
8. Этот прибор используют для измерения давления.

9. Они не могли не понимать важности этого доказательства.
10. Стоит обсудить результаты нашей работы.
11. У нас есть возражения против использования этилового спирта.
12. Был изучен выделенный метан.
13. Использовав эту реакцию, мы получили четыре различных вещества.
14. Реакция идет очень медленно и требует нескольких часов кипячения раствора.
15. После того как вещество было преобразовано, выходы (the yields) возросли.
16. После того как опыт был закончен, мы начали новое исследование.
17. Нашли, что применение этой реакции нецелесообразно (unnecessary).
18. Они, по-видимому, были первыми, предложившими этот механизм реакции (reaction mechanism).
19. Полагают, что поглощение (the uptake) кислорода является последней стадией, определяющей скорость реакции (the rate-determining step).
20. Де Бор (De Boer) определил (reported), что плотность этого вещества равняется 2.5.
21. Ученые полагают, что открыли новое соединение.
22. Фарр (Farr) полагает, что доказал свое положение.
23. Было высказано предположение (to postulate), что поверхность этого катализатора состоит из атомов кобальта (cobalt).
24. Вероятно (несомненно), это вещество содержит примеси (admixtures).
25. Он, конечно, выяснит это предположение.

8. Listen to the following dialogue and state what the subject of the conversation is:

1. Scientific observations.
2. The greenhouse effect.
3. The Earth's future.
4. The history of the Earth.

The following notes and words will help you to understand the conversation better:

NOTES

1. **greenhouse effect** — парниковый эффект
2. **I'd be glad to** — буду рад
3. **much discussed** — широко обсуждаемый
4. **gradual warming** — постепенное потепление
5. **a global heat trap** — всеобщая тепловая ловушка
6. **I should say** — я бы сказал
7. **be blamed for** — быть обвиненным в
8. **a warming trend** — тендеция к потеплению
9. **generally speaking** — говоря в целом
10. **extinction of human life** — вымирание человека
11. **fossil fuel** — природное топливо

WORDS

to argue — доказывать, спорить
coastal — прибрежный
to confirm — подтверждать
to cope with — справиться с
dire — зловещий
disaster — бедствие
doomsayer — предсказатель
doomsday — день страшного суда
eventually — постепенно
to face — встретиться, столкнуться
forecast — предсказание, прогноз
to generate — вызывать, порождать
huge — огромный
indefinitely — бесконечно
indication — показатель; указание
influence — влияние
to inundate — затоплять
nitric oxide — азотная кислота
objective — задача
policymaker — политический деятель
roughly — грубо
sharp — резкий
swallen — *зд.* переполненные
to tend — стремиться
to threaten — угрожать
to trigger — запускать
to undertake — предпринимать
to unfold — разворачивать(ся)
to warn — предупреждать
to wither — высыхать
to worry — беспокоиться

MARY: Excuse me, Dr. Rowland...
DR.: Yes?
MARY: I'm Mary Smith, a journalist... writing for *Nature*. How do you do?
DR.: How do you do? Can I be of any help?

MARY: You see, I'm writing an article on the greenhouse effect and its influence on our future life. It's commonly known that you are one of the best experts in this field, so you could probably answer some of my questions?

DR.: I'd be glad to. What *exactly* are you interested in?

MARY: First, I'd like to know if the much discussed greenhouse effect is *really* the disaster of our time? I mean... if a gradual warming of the Earth *really* threatens life itself? Or... if it's a... say... a political tool for environmentalist doomsayers?

DR.: Well, for thirty years, scientists have theorized that, as harmful gases accumulate in the atmosphere, the Earth's blanket of air will become, if I can put it this way, a global heat trap triggering long-term and possibly cataclysmic changes in climate...

MARY: May I interrupt you for a moment, Dr. Rowland? Has this theory been confirmed?

DR.: I should say that individual studies have *tended* to confirm it. But there are some scientists who have taken sharp exception to a doomsday scenario. They argue that the theory is being used to generate research funding and top further political objectives of environmental groups.

MARY: Oh, I see what you mean. I attended some meetings in Vienna and Geneva in August and...

DR.: The Advisory Group on Greenhouse Gases. Right?

MARY: Yes, ... and they warned that the question was no longer *whether* but *how* policymakers would cope with the warmer world by the first half of the next century.

DR.: I've heard that.

MARY: Dr. Rowland, what I still can't understand is how it all started?

DR.: Well, since the beginning of the Industrial Revolution...

MARY: The mid-18th century?

DR.: Yes. Since that time roughly 20 billion tons of carbon dioxide have been released into the atmosphere from both industrial and natural processes.

MARY: What about in our times? Can we be blamed for the situation?

DR.: Definitely. Over the past 50 years, other harmful gases -- chlorofluorocarbons (CFCs), nitric oxide and methane have been accumulating in the atmosphere.

MARY: What can we expect in the near future?

DR.: In the new century, we'll probably know with more certainty what we face. What we know now for sure is that the world's oceans and forests normally absorb most of these carbon-based by-products, but geochemists worry that they may be approaching their limit.

MARY: Could we say that if the greenhouse scenario unfolds, the Earth will eventually dry up?

DR.: Yes. What's more, rich farmlands will turn into deserts, forests will wither and die. Oceans swallen by the melted polar ice caps will inundate coastal areas...

MARY: So, indications of a warming trend are unmistakable, aren't they?

DR.: Generally speaking, yes, but at present no one can say for certain when the dire effects of global warming will be felt.

MARY: Dr. Rowland, can *you* make a prediction?

DR.: As I see it, if you have the greenhouse effect going on indefinitely, then you have a temperature rise that will bring the extinction of human life in 500–1000 years.

MARY: I see, Dr. Rowland. Then my last question. Can any corrective actions be undertaken right now?

DR.: In my view, we should, first, renew the search for safe, clean alternative to fossil fuels like coal and oil; second, decrease the release of harmful gases from industrial processes and, third, stop clearing the tropical forests that absorb huge amounts of carbon dioxide.

MARY: Thank you, Dr. Rowland, you've helped me a great deal. Now I've got an idea of how to cope with the situation.

DR.: You're welcome. Glad I could be of some help.

9. Listen to the conversation again and answer the following questions:

1. Have Mary and Dr. Rowland met before? How do you know?
2. What is Mary interested in?
3. What have scientists theorized about for 30 years?
4. What does a doomsday scenario mean?
5. What is the scientists' argument?
6. When did the first Industrial Revolution take place?

7. What do geochemists worry about?
8. What will happen if the greenhouse scenario unfolds?
9. What is Dr. Rowland's forecast?
10. What are the measures to be undertaken at present to avoid negative effects of global warming?

10. Listen to the conversation once again and write out all the questions that Mary asks.

11. Ask your fellow students the questions you've written out and let them answer them. Do their answers agree with Dr. Rowland's replies?

12. Listen to the dialogue for the fourth time if necessary and say in what connection Mary interrupts the scientist and what she doesn't seem to understand.

13. Read the following text, divide it into logical parts and entitle them. Condense the sentences of the text where possible and write an abstract in your own words using your plan and the sentences that you've condensed.

MERCURY IN THE ENVIRONMENT

Mercury is known to be a rare metal. The element is found in trace amounts throughout the lithosphere (rocks and soil), the hydrosphere, the atmosphere and the biosphere (in tissues of plants and animals). In the rocks and soil mercury is found to be measured in fractions of one part per million. In the hydrosphere (the seas and fresh water) it occurs only in parts per million. In the atmosphere mercury is present both as vapour and in the form of particles. It should be noted, however, that under natural conditions the amount of mercury in the atmosphere is so small that extremely sensitive methods are required for detecting and measuring it. The situation is somewhat different in the biosphere. Plants and animals tend to concentrate mercury. For example, it has been found that some marine algae contain a concentration of mercury more than 100 times higher than that in the seawater in which they live. Mercury today is used on a substantial scale in chemical industries, it being used in the manufacture of paints and paper as well as in agriculture. The world production of mercury has been found to amount to about 10,000 tons per year. In agriculture mercury

in the form of corrosive sublimates ($HgCl_2$) can be used for disinfecting seeds. The chlorides of mercury are employed in protecting a number of vegetable crops. Due to such large-scale uses a considerable amount of mercury wastes is likely to flow into the air, the soil, the streams, rivers, lakes. One might ask whether all these may present a threat to health? In order to answer this question it is necessary to examine the forms in which mercury occurs. Liquid mercury itself is not toxic to man, but mercury vapour, however, can be injurious. It has long been known that the soluble inorganic salts are toxic. So, knowing properties and forms of mercury, it is possible to use it. Mercury being very important, it is useful to continue investigating its properties very closely.

14. Write a letter declining the invitation to take part in the Conference on Properties of Mercury to be held in September 5–6, 200... in New York University. The Chairperson of Organizing Committee is Dr. D. Wordwood.

15. Write a covering letter to the Chairperson of Organizing Committee for Symposium on Greenhouse Effect to be held in June, 3–7, 200... , in Florida State University, USA. The Chairperson's name is Dr. F. Rowland.

16. a) Do you remember Leo Matveyev who discovered Bodium? He presented his communication and answered questions of the scientists. Can you answer the same questions?

1. Calculate the empirical formula of Bodium chloride.
2. Which group of the Periodic Table should Bodium be assigned to?
3. What kind of bonding is likely to be present in Bodium chloride?
4. If concentrated aqueous Bodium chlorine was electrolyzed, what would be the main products discharged at carbon electrodes? Write equations for the reactions which take place.
5. Write an equation and name the products for the reaction between Bodium and water.
6. Write the formula for (1) Bodium nitrate and (2) Bodium carbonate. For each of these compounds, state whether it would decompose at Bunsen burner temperature. Name any product(s) and write an equation for any reaction which occurs.

b) Answer the other questions on the problems connected with the ideas expressed in Units 6 and 7:

1. a) What are essential elements on the Earth?
   b) Which two elements on or near the Earth's surface are not essential?
   c) Why are these two elements probably not essential?
2. Describe one of the ways we use the energy released by a burning candle?
3. What would be the danger of using pure methane as a household fuel for heating and cooking?
4. Give your answer to the following quiz:

If you compress carbon at about eighty thousand kilos per square centimetre at a temperature of about 2500 degrees Centigrade, what do you get? This process in fact happens about 160 kilometres below the surface of the Earth. The resulting hard stones are pushed up to the Earth's surface through natural pipes, and about five tons of them are mined every year, mostly in Russia and South Africa. These stones are vital for the metal industry, as they are used for cutting metal. This substance rates 15 on the Mohs' scale of hardness — the maximum on the scale — and is the hardest natural substance. It is also the only precious stone composed of just one element.

17. Speak on the following topics:

1. The Greenhouse Effect.
2. The Significance of Organic Chemistry.

UNIT 8

THE AGE OF POLYMERS

Grammar: **Subjunctive Mood. Emphatic Constructions. Suppositional Mood.**
Speech Strategy: PERSUASION.

1. Warming up.

1. Could you give a definition of a polymer?
2. What is the material capable of being shaped into virtually any form?
3. What do you think is the origin of the word "polymer"?
4. What polymers could you name?
5. What is the difference between a plastic and a polymer?
6. Give two examples of the polymers we eat.
7. What can you say about the following: *starch* (крахмал), *cellulose*, and *proteins* (белки)?

2. Listen to or look through the following text and say if it contains the answers to the questions you've just discussed:

Life depends fundamentally on organic polymers. If it were not so, we wouldn't have food, clothing, shelter and transportation.

Indeed, nearly all the material needs of man could be supplied by natural organic products. The list of these materials and things made from them might be very long: wood, fur, leather, wool, cotton, silk, rubber, oils, paper, paint and so on. The organic polymers which these things are made from include: proteins, cellulose, starch, resins, and a few other classes of compounds.

But for the complexity and fragility of the molecules of the natural organic polymers they wouldn't have defied the attempts to analyse their molecular structure until very recently.

There would be no industry of man-made organic polymers, were it not for modern methods of physical and chemical analyses which uncovered the principles that govern the properties of the natural polymers. One could list the principal products as fibres, synthetic rubbers, coatings, adhesives and a lot of materials called "plastics". Plastics and synthetic coating are already in common use. It is desirable that they should be used on a large scale, and get further developed.

Synthetic polymers now available already possess several of the properties required in a structural material. They are light in weight, easily transported, easily repaired, highly resistant to corrosion and solvents, and satisfactorily resistant to moisture. It would be necessary to add that they have long-lived durability and resistance to high temperatures. A very important question could arise over whether synthetic polymers could be made inexpensive enough to compete with the structural materials such as metals and ceramics. The answer could be — "yes".

It might seem odd that man came rather late to the investigation of organic polymers as the principal means of supporting life. The natural polymers such as proteins, cellulose and others dominated his existence and even in ancient times people used these materials.

Yet as late as the end of the 19th century polymer chemistry got little attention.

Chemists attacked sugar, glycerol, fatty acids and other ordinary organic compounds — dissolving, precipitating, crystallizing and distilling them to learn what these substances were composed of.

But only feeble efforts were made to investigate such common materials as wood, starch, wool, and silk. The substances composing these materials couldn't be crystallized from solutions, nor could they be isolated by distillation.

It was only in the 20th century that the scientists began thorough investigation of these materials. Having used some powerful physical instruments, an electron microscope, viscosimeter, X-ray diffraction apparatus, they could have revealed the polymers in all their intricacy. Their molecules were incredibly large, the molecular weights running as high as millions of units, whereas simple organic substances such as, for instance, sugar and gasolene have molecular weights in the range of only about 50–500.

The giant molecules can be composed of a large number of repeating units, they being given the name "polymer" from the Greek word *poly* (many) and *meros* (a part). Many polymers have the form of long, flexible chains. If the chemists had not found that out, they wouldn't have been able to synthesize artificial polymers. This has led to the establishment of industries producing synthetic fibres and numerous polymeric materials, many of which were less expensive and superior in various ways to the natural materials.

3. Look through the text again and choose the suitable title out of the given ones:

1. The Age of Plastics.
2. The Importance of Proteins.
3. The Nature of Polymeric Materials.
4. Man-made Polymers.

4. Look through the text once more and put the numbers of the given plan in the order of events they occur in the text:

1. The history of polymers.
2. Natural organic products.
3. The molecules of polymers.
4. Discoveries made by modern methods.
5. The importance of organic polymers.
6. New industries of man-made organic polymers.
7. Properties of synthetic polymers.

5. Read the text thoroughly with a dictionary and answer the following questions:

1. What does the life depend on?
2. Why does life depend upon organic compounds?
3. What is the list of materials needed for life?
4. What do organic polymers include?
5. What have modern methods of physical and chemical analyses uncovered?
6. What products appeared on the basis of the discovery of polymers?
7. What properties do synthetic polymers possess?
8. Did people use natural polymers in ancient times?
9. What were those polymers?

10. When did the scientists begin thorough investigation of natural organic polymers?
11. What have they found out about polymers?
12. What are the molecules of polymers composed of?

6. Give Russian equivalents to the following English words, word combinations and chemical terms:

nouns: means, needs, existence, clothing, wood, intricacy, moisture, attention, fragility, establishment
verbs: list, require, defy, repair, uncover, compete
adjectives: resistant, superior, available, giant, expensive, feeble, odd
adverbs: recently
prepositions and conjunctions: until, whereas
word combinations: as late as, on a large scale, it is desirable, long-lived durability, in the range of, in common use
chemical terms: glycerol, rubber, diffraction, oils, resins, distil, proteins, ceramics, fibre, fatty acids, cellulose, starch, adhesives, coating, solvent, precipitate, solution, dissolve

7. Find in the text synonyms to the following words:

1. wants, 2. weakness, 3. tools, 4. complexity, 5. oppose, 6. demand, 7. provide, 8. register, 9. discover, 10. obtainable, 11. humidity, 12. contend, 13. withstanding, 14. strange, 15. weak, 16. huge, 17. elastic, 18. currently, 19. better

8. Give chemical terms to the following definitions:

1. Any of large group of organic compounds found in all living organisms.
2. A synthetic or naturally occurring polymer used in making plastics.
3. A polysaccharide that consists of a long unbranched chain of glucose units.
4. A liquid that dissolves another substance or substances to form a solution.
5. A process of boiling a liquid and condensing and collecting a vapour.
6. A suspension of small particles produced in a liquid by chemical reaction.
7. A homogeneous mixture of a liquid with a gas or solid.

9. Study carefully grammar material to Unit 8 and find in the text all the sentences containing the subjunctive mood, emphasis and inversion. Translate them into Russian.

10. Translate the following sentences into Russian:

1. It is necessary that this substance should be analysed under suitable conditions.
2. If they used these materials, the cost of production would not be expensive.
3. Everybody should know that Russian scientists developed methods of obtaining strong and cheap glass fibre.
4. If you use such fibres, the material will be durable.
5. Had they known about this new discovery earlier, they would have applied the method in their investigation.
6. Were I in your place, I should investigate the properties of these synthetic materials before using them.
7. The professor insisted that I (should) take part in the conference.
8. It is desirable that a chemist (should) know the structure of a polymer.
9. Unless synthetic polymers possessed such valuable properties, they would not be so important for industry.

11. a) Listen to the following dialogue and say what the subject of the conversation is. The following notes and words will help you to understand the dialogue better:

NOTES

1. **for that matter** — в этом отношении
2. **just a minute** — минутку
3. **just think** — только подумай
4. **benefit mankind** — приносить пользу человечеству
5. **Come on!** — Перестань!
6. **to be under way** — проходить, вестись
7. **I wouldn't say that exactly.** — Я бы так не сказал.
8. **At least this is my way of looking at it.** — По крайней мере, я так думаю.
9. **You see what I mean.** — Ты понимаешь, что я хочу сказать.
10. **How shall I say?** — Как это сказать?

WORDS

by-product — побочный продукт
besides — кроме того
to furnish — обеспечить
incidentally — случайно
moreover — более того
nourishing — питательный
positively — конечно
are underfed — не доедают
virtually — в сущности

MARY: I can't understand, James, what right have the Americans and... the Russians — or anyone else for that matter — to spend huge sums of money on research into space?

JAMES: Could I just... ?

MARY: Just a minute... huge sums of money are being spent on research of this kind? We should think about solving our problems on the Earth before we try to make further investigations in space. Just think... If that money were spent on protein research or cell research, for example, what progress they could make, ... how they could benefit mankind!

JAMES: True... But there is research that would be of more immediate use. Other kinds too... not just research into...

MARY: What d'you mean? The research into proteins and cell are absolutely necessary. Just think... Proteins are vital to our lives and furnish us with virtually every atom of nitrogen that's found in our tissues.

JAMES: Yes, yes, right. Moreover, even the secret of life itself seems to be sealed in a protein molecule. But... cloning...

MARY: Come on! What's wrong with cloning? Especially now when the lamb Dolly's examination is under way.

JAMES: And yet, they're questioning the legitimacy of the research.

MARY: But, James, the research is perfectly legitimate, I feel.

JAMES: Well, I wouldn't say that exactly... But — at least this is my way of looking at it — cloning is absolutely useless. If we spent money on cultivating new foods, ... discovering new types of foods. Well you see what I mean, now, when a big percentage of population is underfed.

MARY: That's one way of looking at it. But simplistic. You don't always solve the problem by concentrating on it. Solutions often come... er... How shall I say? — incidentally.

JAMES: As by-products?

MARY: Yes, if you like... as by-products or other discoveries. I mean can you imagine... Think a bit... Can you imagine how many problems could be solved as by-products of protein and cell research? Ah? New materials, new nourishing foods, mm... . More than that, many of these have already found their way into our homes and... well... little do we realise their origin.

JAMES: You may be right, Mary... but all the same... .

b) All your answers to the following questions will be reports on the opinions of the speakers and the ways they are trying to persuade each other. Answer each question briefly and as far as possible in your own words:

1. What does Mary think about research into space?
2. What arguments does she use to try to persuade James to share her opinion?
3. Mary has a definite view about how money set aside for research should be spent? What is her view?
4. Does it seem to James that research into cell and proteins are justified?
5. What does he think of cloning?
6. Explain James' arguments for uselessness of cloning?

12. All the statements below are from the discussion you've just heard. Imagine you're taking part in this conversation and follow each statement expressing your point of view:

1. We should think about solving our problems on the Earth before we try to make further investigations in space.
2. The research into proteins and cell are extremely necessary.
3. Even the secret of life itself seems to be sealed in a protein molecule.
4. What's wrong with cloning?
5. If we spent money on discovering new types of foods...
6. You don't always solve the problem by concentration on it.
7. Can you imagine how many problems could be solved as by-products of protein and cell research?

13. Work in groups of four or five. Play the roles of the members of a Special Committee set up by a National Research Council. The sum of 100 mln dollars has been allocated to initiate research into a new project, to be decided by you. Read *only* the instructions for your own role and spend a few

minutes making notes on which to base your contribution to the discussion. In conclusion the Chairperson in each group should report his Committee's conclusions to the class.

STUDENT A: (*Plays the role of Sir Gordon Bray, Chairman*). *He*

1) *opens the meeting and introduces the members to each other;*
2) *invites each member to speak in turn, beginning with Malcolm Donalds;*
3) *politely interrupts any committee member who speaks too long;*
4) *sums up the opinions of the members.*

Some expressions to be used when:
opening the meeting: Ladies and Gentlemen, I declare the meeting open.
inviting the members to speak: I'd like to give the floor to...
summing up: To sum up, there seems to be...

STUDENT B (*Plays the role of Malcolm Donalds, Head of the Food Research Centre.*):
You're particularly anxious that all the money allocated should be spent on the development of new forms of food cultivation, especially marine cultivation.

STUDENT C (*Plays the role of Danise Hacker, Environmental Studies Expert.*):
You think that the money should be spent on improving man's natural environment by eliminating the causes of pollution.
You strongly disagree with Malcolm Donalds, Head of Food Research.

STUDENT D (*Plays the role of Sally Broughton, Economist.*):
You wish to set up a Council for Economic Research.
The country's rapidly declining economy is, in your view, the main cause of many other ills.

STUDENT E (*Plays the role of David Donnolly, Head of the Fuel Research Association.*):
You feel strongly that, with rising cost of petroleum and the possibility of world supplies being exhausted, research into alternative fuels is imperative.

14. So far you almost certainly expressed views on research which were not your own. Discuss your own views on the spheres of research you feel to be the most important (1) in your country and (2) in the world.

15. Read the following text, divide it into logical parts, and entitle them.

PLASTICS

But for plastics man wouldn't have had an endless variety of products such as threads, sheets, tubes, moulded objects, etc. It is known that plastics are organic substances which are made synthetically by polymerization. The ancestor of synthetic plastics is celluloid. If the properties of celluloid had been perfect, it could have been the basis for a new industry. But celluloid has certain disadvantage — its flammability. More than that, it is necessary that the material of this kind be readily moulded, which was not the case with celluloid. Thus it was not until the discovery of bakelite in 1907 that the real foundation of the synthetic plastics industry was laid. Plastics consisting of long-chain molecules, they can be softened by heat and moulded into a desired shape. It is known that these plastics are thermoplastic. Plastics which are having cross-linked polymeric chains are of much greater rigidity and cannot be softened. They are called thermosetting. It is essential that the terms thermoplastic and thermosetting be also applied to the resins from which plastics are made, the resin being the principal agent incorporated in plastics. It may be natural, like cellulose, but it is most generally synthetic. It is also known that the resin is a binder. There are some other substances added to the plastics without which it would not be possible to synthesize these wonderful materials. Because it is necessary that plastics should enhance such properties as hardness, resistance to shock, or resistance to abrasion, filters are added; examples of filters are: asbestos, glass fibres, and wood flour. It is required that plasticizers be also included in the formulation. Hadn't antioxidants been added, chemical stability and long life of plastics wouldn't have been possible. It was suggested that catalysts should be added to assist the final cure (final formation of the product). Furthermore, if it were not for stabilizers, plastics would not be protected against sunlight, heat and other destructive factors. The procedure which is used to shape plastics into a final form depends on their properties. Some plastics may be injection moulded. Other plastics must be

compression moulded, it means that after they are filled into the mould they must be subjected to pressure. Certain plastics are simply cast into their final shape.

16. Condense the sentences of the text where possible.

17. Give your own conclusion to the text.

18. Write out of the text the sentences expressing the main idea(s) of each logical unit.

19. Give an oral summary of the text in your own words using your plan and the sentences you've written out.

20. Write an abstract to the text.

21. After leaving school, college, or university a graduate needs a reference letter to continue his/her education or to apply for a job. He or she will have to ask somebody for a letter of this kind. The letter below is given to you as an example.

Coppin State College
Baltimore, USA

May 12, 200...

New York University
Dr. J. Fowles

Dear Dr. Fowles,

As you know I'll be leaving college this summer. I'm now looking for a university to continue my education and will soon be making a number of inquiries and send my applications.

I should be very grateful if you would agree to act as my referee, should I need one. Please let me know if you would have time to write a letter of reference to one of the universities.

Yours sincerely,
Robert Carrington

22. Write a letter to ask for a reference. Choose any reason you like. The names and the positions of the addressees are given in ex. 13. The following words and expressions will help you to write different letters of this kind:

(1)

I'm getting my BS, MS; I'm getting my diploma from

(2)

I'm planning to find; I'm interested in finding; I'm trying to find

(3)

I'd be very happy, thankful; I'd appreciate it greatly; I would be very much obliged to you

(4)

if you could provide President with a reference

For more information on useful expressions see Appendix 3.

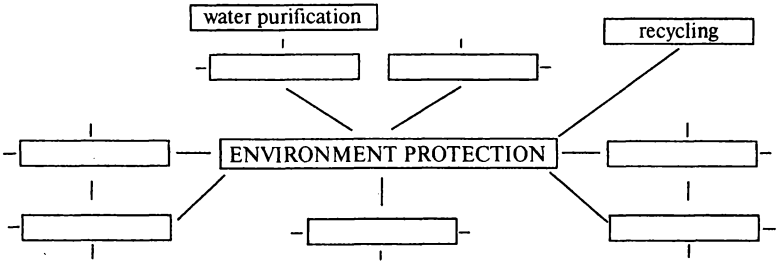
UNIT 9

MAN AND HIS ENVIRONMENT

Grammar: **Incomplete Clauses with Participle. Emphatic Constructions.**
Speech Strategy: GRATITUDE.

1. Warming up.

a) What comes to your mind when you see or hear the words "environment" and "environment protection"? Complete the following chart and give reasoning for your choice. Share your views with your fellow students.



b) Put your ideas into words and write a complete sentence.

Example: There are several methods to provide **water purification.**

2. Listen to or look through the following text and say what ideas you've just discussed it contains:

PROBLEMS AND SOLUTIONS

If a chemist or a physicist or anyone for that matter endeavoured a brief description of the current environmental problems, he would find it troublesome and far exceeding the knowledge of an individual scholar,

for the situation with our environment has long become a subject of joint research of scientists from different fields who have to combine their wisdom and information from other domains, with experts in sociology, psychology, philosophy hurriedly coming into the picture.

Yet, to put it briefly, one of the causes of the current situation with our environment should be searched in the lack of development of particular fields of knowledge, and of an adequate picture of the intricately acting whole, which is our planet.

It is man's intervention in nature that has singled him out from the rest of the animal world since his early days. It is this very intervention that has put him in this highly technological world of ours, with the rate of progress in particular fields being faster than that in our fundamental knowledge of the general operation of the Earth.

It is this very discrepancy between the two rates which appears to be the cause of most of today's problems. This is by no means an exhaustive explanation, overlooking as it does, the social factor.

The threat to the environment is a demanding problem man has to cope with at the beginning of the 21st century. What is so peculiar about the environmental crisis when compared to the other menacing problem, that of a nuclear catastrophy? Surely not its global character and everybody's involvement.

A nuclear catastrophy, as seen nowadays by practically everyone everywhere, would inevitably involve any country, no matter how small or big it is, and would disturb every individual, whatever life he might be living. Should it happen, its inescapability is too obvious to be disputed. So is its explosive character.

In contrast to this, the environmental crisis is of an accumulative nature. It is just not clearly understandable and the intricate pattern of the interaction of all factors is what makes it so hazardous. For no single action taken, or decision made, can bring about an immediate catastrophy, nor could there be the last step that would set in motion an avalanche of irrevocable and immediate events leading to the ultimate doomsday. It is only step by step that we approach the critical point, were there such a "point" in this context.

Consequently, what is needed first and foremost is to take close to our hearts the possible adverse impact of the long-range effects of our actions, however noble the motives may seem to us at present, on the entire human civilization. Should we fully realize the danger, quite a new approach to the problem would appear.

Next comes the urgent need for basic research to get more profound knowledge of the cause-effect relationship, the time factor necessarily taken into account, in the whole realm of human environment, both natural and man-invaded.

Fundamental and irreversible as they may often be, the changes in our environment are not likely to bring mankind to the brink of extinction overnight. It would take us some time yet to get there. So let us use the time for learning how to preserve our planet in good shape and in running order for an indefinitely long time.

3. Look through the text again and say how the author describes the following things. Read the sentences from the text to support what you have found.

1. Environmental crisis.
2. The causes of the menacing situation on the Earth.
3. Possible solutions of the problems mentioned.
4. Threat to living organisms.
5. Threat to the Universe.

4. Read the text thoroughly with a dictionary and answer the following questions:

1. What is common and what is different between environmental crisis and nuclear catastrophy?
2. Why can't an individual scientist describe the environmental situation we are witnessing now?
3. What is necessary to do first of all?
4. What is one of the causes of the present-day menacing situation?
5. What has separated man from the rest of animal world?

5. Read the following definitions of *ecology*, choose the one you consider the best. Give reasoning for your choice. What do all the definitions have in common? What is the difference?

1. The scientific study of the natural interrelations of plants, animals, and the people and their relation to the environment.
2. The science devoted to the system of interrelationships between organisms and their environment.
3. Study of relations of living organisms to their environment.
4. Study of ecosystems.
5. Study of the environmental conditions of existence.
6. A branch of science concerned with the interrelationship of organisms and their environment.

6. Find in the text synonyms to the following words:

speed, reason, shortage, try (*n*), interference, look for, complicatedly, calling, undeniably, deep, destruction, imperative, evident, domain, incompatibility, consider, protect, thus, hostile, threatening, characteristic, virtuous

7. Match the Russian words and word combinations in *A* with their English equivalents in *B*:

A	*B*
1. попытаться	a) adverse
2. насущный	b) discrepancy
3. скорость	c) challenging
4. причина	d) urgent
5. сложно	e) realm
6. особенный	f) consequently
7. угрожающий	g) cause
8. оберегать	h) by no means
9. очевидный	i) noble
10. принять во внимание	j) to search
11. ни в коем случае	k) lack
12. неизбежно	l) to try
13. взрывоопасный	m) to take into account
14. вызывающий интерес	n) menacing
15. область	o) to preserve
16. таким образом	p) profound
17. благородный	q) rate
18. искать	r) intricately
19. отсутствие	s) intervention
20. вмешательство	t) peculiar
21. влиять	u) explosive
22. враждебный	v) inevitably
23. уничтожение	w) to influence
24. несоответствие	x) obvious
25. глубокий	y) annihilation

8. Study carefully grammar material to Unit 9 and find in the text all the sentences containing: incomplete clauses with the participle; emphatic concessive clauses; elliptical and emphatic constructions. Translate them into Russian.

9. Translate the following sentences into Russian:

1. Important as this problem is in itself, it can't be solved due to the lack of understanding among scientists.
2. Little though the probability of the Earth's becoming as hot as the Sun may be, the possibility still exists.
3. Uncertain though information about the Earth's warming, the recent data indicated the temperature rise quite obviously.
4. Simple as it seemed at its discovery, this element is now known to be very complex.
5. With no free oxygen and little, if any, water, the Mars still appears to have some evidence of life.
6. The next problem of importance which occupied most of the investigators in this field was to determine the long-wave limit, if any, of the infrared radiation.
7. Not only does chlorine unite with gaseous hydrogen, but it will sometimes take hydrogen from other elements.
8. Only upon the absorption of larger amounts of water was the sensitivity again lowered.
9. Carborn dioxide does not burn, nor does it support combustion.
10. Whoever the author may have been, he should have dwelt on this problem.
11. Not until the 20th century did man begin to understand the menace of ozone depletion.
12. Should we listen to the pessimists, none of us would sleep at night.
13. Unless we thought new research were necessary, we wouldn't be spending money on it.
14. Not until 1956 did the British Government introduce legislation against air pollution.

10. Listen to a talk at a Symposium made by John Firror, a well-known atmospheric scientist from the National Centre for Atmospheric Research and say what kind of talk it is:

1. A lecture.
2. A book presentation.
3. Answers to the questions.
4. A scientific communication.

The following notes and words will help you to understand the talk better:

NOTES

1. **first of all** — прежде всего
2. **representative forum** — представительное собрание (специалистов)
3. **acid rains** — кислотные дожди
4. **ozone depletion** — исчезновение озона
5. **I took advantage** — я воспользовался возможностью
6. **chapter outline** — краткое содержание главы
7. **they're a joy to address** — с ними приятно общаться
8. **tell us straight** — скажите нам прямо
9. **Are we in trouble?** — Мы в опасности?
10. **overlooked facets** — незамеченные аспекты
11. **I have the privilege of serving on the staff** — я имею честь работать в штате
12. **to acknowledge my debt** — признать, что я в долгу
13. **I also wish to express** — также хочу выразить

WORDS

appreciation — оценка по достоинству
approach — подход
contribution — вклад
decision-maker — законодатель
emission — выделение
judgement — суждение
pioneer — первооткрыватель
request — просьба
to suspect — подозревать
ultimate — конечный
volume — книга, том

Dear colleagues! First of all, I'd like to thank the Chairman and the Organizing Committee for their kind invitation for me to participate in such a representative forum, and for the opportunity of presenting my new book in front of these high-ranking experts.

Let me begin by saying that but for a publisher's request to develop an essay I had written about atmospheric problems into a book, this volume would have never arisen. In the essay I had discussed the "big three" atmospheric issues — acid rains, ozone depletion, and climate heating — and had emphasized how the three problems were related.

Attempting to expand this theme into a book, I took advantage of invitations to speak about the atmosphere by using each chapter out-

line as the basis for a lecture. This approach allowed me to test my material both by observing the audience's reaction and by trying to answer the questions that arose.

You know, there are always a few people in any group, who are truly interested in the details of a technical subject, and they're a joy to address. But the question I received most often was not about detail; it was a request for a judgement. "All that science is OK," people seemed to say, "but tell us straight – are we in trouble or not?" And I began to suspect that I shouldn't simply add more technical details to the discussions of the essay: the book should address this commonly asked, ultimate question. It's my great hope that I have reached my goal.

Dear colleagues! My aim hasn't been to produce just one more careful discussion of the state of the science surrounding acid rains, ozone depletion, and climate heating, but to show *why* so many workers in this field have become convinced that emissions into the atmosphere have indeed reached a *very* serious level.

The book consists of seven chapters. The first one introduces two overlooked facets of the atmosphere that are essential to understanding today's worries. The next two cover two of the three well-known atmospheric problems: acid rains and depletion of ozone. Climate heating, as produced by infrared-trapping gases accumulating in the air, is so firmly at the centre of all these issues that chapters four and five are devoted to it. The final two chapters discuss what these problems mean to people, to decision-makers, and to civilization, and what can be done about them.

Well, to sum up, I'd like to say that I have the privilege of serving on the staff of the National Centre for Atmospheric Research, and the constant interaction with other NCAR scientists and with visitors has been the most important influence on my scientific understanding and appreciation of the complex system that is the atmosphere.

I would like especially to acknowledge my debt to Waler Roberts, William Kellogg, and Stephan Schneider, three modern pioneers in the study and understanding of how the atmosphere responds to human activities. And to Michal Glantz, who studies how human activities respond to the atmosphere and its changes.

In conclusion I also wish to express my deepest gratitude to all those who made scientific and important contributions, made critical comments and helpful suggestions. Thank you.

11. Listen to the talk again and say what problems out of the given ones were mentioned by John Firror:

1. Animal extinction. 2. Acid rains. 3. Ozone depletion. 4. Air pollution. 5. Greenhouse effect. 6. Climate heating. 7. Atmospheric composition. 8. Harmful activities. 9. Recycling. 10. Industrial wastes.

12. Listen to the talk once again and answer the following questions:

1. Where is Dr. Firror making his report?
2. What had he written about atmospheric problems?
3. Why did he speak in front of different audiences?
4. What did most of the people worry about?
5. What kinds of problems does Dr. Firror study?
6. What is the aim of his book?
7. What is the composition of the book?
8. What influences Dr. Firror's investigations?
9. Why is he so thankful to different people?

13. Listen to the talk for the fourth time if necessary and write down all the expressions of gratitude John Firror uses.

14. Now listen to the fragments from the discussion that followed the presentation and say if they are positive (P) or negative (N):

1. Firror's book is persuasive because it is based more on everhanded analysis than on advocacy... Most of *The Changing Atmosphere* is devoted to clear explanations of the relationships between acid rains, climate warming, and stratospheric ozone depletion, as well as to their causes and effects. This book could serve as a primer for anyone confused by the wealth of technical information that has been published about these complex atmospheric phenomena.
2. A very interesting book, partly because it provides novel ways of describing concepts such as steady states, numerical modelling, and radiochemical dating to the nonscientist, but more importantly, because it discusses possible solutions to our dilemma.
3. Of John Firror's latest book I can only say that his and my views remain worlds apart, and though I yield to no one in my admiration for his smooth-flowing literary style, my opinions of what he has to say are quite another matter.

4. *The Changing Atmosphere* is a valuable addition to the growing literature on our unique and scary moment in history. It is calm; it is reasonable; therefore it is frightening as hell. A good short introduction to the situation.
5. When I first opened the package containing John Firror's latest book and read its title, I must admit that I felt a sudden sinking in my heart; yet, once I had gathered the courage to begin reading, I found the work so far beyond my wildest hopes that I actually missed supper rather than put the volume down unfinished.
6. John Firror states in the introduction to his latest book that it was four years in preparation; one wonders, then, why he didn't check his facts with greater care.
7. John Firror does an excellent job of explaining difficult problems in a way that everyone can understand, while presenting much information that should provoke thought in all of us. I recommend it to anyone who is interested in how we are changing the atmosphere that supports our Earth.
8. One cannot quarrel with the nature of evidence which Firror offers in his latest book; but at the same time one cannot honestly accept the conclusions which he reaches on the basis of this evidence.
9. In today's world it becomes increasingly essential for everyone to acquire some knowledge and understanding of our atmosphere; but to such understanding John Firror's book will, alas, contribute very little.
10. I'll say just a few words about *The Changing Atmosphere*. John Firror provides practical and long-range suggestions for controlling these and other forms of atmospheric deterioration. And it's difficult to see how anyone could find his book anything but completely satisfying.

15. Look through the following text taken from J. Firror's book *The Changing Atmosphere* and order the paragraphs so that to have a logically connected reading:

STRATOSPHERIC OZONE

1. Ordinarily there is very little chlorine in the stratosphere. Chlorine gas is sometimes spilled in industrial or shipping accidents, but this gas reacts strongly with almost any waterdrop or particle it touches

and, as a result, is used up long before it can diffuse upward. Ocean waves throw up small droplets of salty water, some of which evaporate, leaving salt particles in the air. Although these particles contain chlorine, the chance that one of them will get as high in the atmosphere as the ozone layer is small, since salt is very soluble and these particles are readily washed out of the air by the rain. Some biological systems emit methyl chloride, a gas that contains chlorine. But this gas reacts fairly rapidly with other substances, and most of it disappears before it can diffuse to the stratosphere. Thus, strong barriers prevent chlorine from reaching high in the atmosphere, unless people contrive to put it there.

2. Damage to the layer of ozone in the high atmosphere by human activity is complex, esoteric, and completely invisible to anyone but the scientists who are studying the issue. Yet, around the world, people who twenty years ago had never heard the word *ozone* are now worried about its disappearance.

3. Two of these substances, CFC-11 and CFC-12, have proved so valuable in a number of applications that more than 20 million tons have been manufactured worldwide. Most of these 20 million tons still exist and either escaped to the atmosphere or eventually will. Once in the air, these substances mix and diffuse, finally reaching all parts of the atmosphere. Those CFC molecules that find themselves in the stratosphere are subjected to intense ultraviolet radiation from the Sun; they split apart into smaller fragments, releasing chlorine. The chlorine then starts a new career as a catalyst in the reactions that destroy ozone.

4. Ozone plays an important role in the high atmosphere in addition to screening out UV-B. By absorbing ultraviolet sunlight, ozone deposits the heat associated with this light into that level of the atmosphere, thus creating a layer much warmer than those immediately below. The stable region so created is the stratosphere. It is in this stable layer that disturbing changes are occurring. As scientists' understanding of the chemical reactions that create and destroy ozone increased, it became clear that relatively small quantities of some substances could change these reactions and hence the amount of ozone in the stratosphere, provided those substances were placed in the high atmosphere. And chlorine, an effective chemical catalyst that can change

ozone into normal oxygen, is appearing in rapidly increasing concentrations in the atmosphere.

5. If we did wish, for some reason, for chlorine at the Earth's surface to move into the atmosphere, we would have to arrange for the emission at the surface of the Earth of a chlorine-containing gas. We would, in addition, have to find a chlorine-containing gas that did not react readily with anything, one that was not very soluble, and one that, upon reaching the stratosphere, could be broken down to release free chlorine only by the action of strong ultraviolet light. (If it were broken down too soon, by sunlight that penetrates low into the atmosphere, the free chlorine would react with something and be removed.) The properties I have just described would also make the gas extremely useful here at the surface of the Earth, and people have worked hard to create such a substance.

6. Laboratory scientists created such substances decades ago. They are called chlorofluorocarbons, indicating that they contain carbon, fluorine, chlorine, and sometimes hydrogen. The name is frequently abbreviated to CFC, and a numbering scheme is used to tell how much of each element is in the molecule of the particular CFC under discussion. CFC-12, for example, has one atom of carbon, no atoms of hydrogen, two atoms of fluorine (and, by implication, two atoms of chlorine) in each molecule.

16. Entitle each paragraph so as to make a plan and write down the sentence(s) that express the main idea(s) of each paragraph.

17. Write a summary of the text in your own words using the plan and the sentences you've written out. Omit all unnecessary details.

18. Look through the following book reviews and say what problem(s) each book deals with:

1. ECOLOGY for BEGINNERS

By Stephen Croall and William Rankin

Amusing, solidly researched, and sophisticated, *Ecology for Beginners* tells a fast and furious tale of Man, Woman, and their struggle with the environment (not to speak of each other!) From the ancient

Greeks (they lost their topsoil) to late last night's strip mines and acid rain, you learn the basics of climate, agriculture, pollution, energy, and much else that affects our Earth for better or for worse. The varied cast of characters includes Roman sewer builders, conquistadors, modern agri-businessmen, and Ronald Reagan. Even Mother Nature puts in a guest appearance in the historical tour conducted by your distinguished Eco-Flow.

William Rankin's witty drawings combine with Stephen Croall's informative text to create a useful as well as entertaining hand-book for people who want to combat the challenge to our environment and have ecofacts at their fingertips.

2. AIR POLLUTION

By W. Strauss and S. Y. Mainwaring

A straightforward, readable text covering the nature, sources and effects of air pollution and the methods to measure and control pollutants. The authors conclude with chapters on the socio-economic factors which impinge on pollution control and on the problems the future will bring. Only a limited prior knowledge of chemistry is required.

3. ENVIRONMENTAL CHEMISTRY

By R. W. Raiswell and P. Brimblecomb

As an introduction for students studying environmental science, geology or chemistry, it is superb. It should be compulsory reading for anyone who is involved in reporting on the environmental debate for a general readership. Instant authority for those of us who never took environmental science courses at university!

19. Write your own review on any book on chemistry or related science you've read or are reading.

20. Bob Carrington (Unit 8) asked Dr. Fowles for a reference letter. The letter below was received by President of Washington University:

New York University
Chemistry Faculty

May 25, 200...

Washington State University
President

Dear Mr. President,

I write to say that Robert Carrington who is currently a student at Coppin State College has been in touch with me to say that he is going to continue his education at Washington State University and has asked me if I could act as a referee for him and submit this reference to you.

I have to say that I am very happy indeed to do so. Robert has been at New York State University Summer School every year since 1997 and I think that the best way of describing him is as a very positive person. He is a very serene person and with the confidence to deal with any problem that arise from time to time either on his own initiative or, by asking a superior how a particular matter should be dealt with.

I have also found him an extremely willing person and one who never complains whilst he also has the ability to study independently, and in 1998 we gave him the opportunity to carry out research in connection with Ecological Studies.

I have to say, therefore, that I have absolutely no doubts in recommending Robert to you.

I am absolutely sure that he will study well and will also mix in well with other students.

I do hope that the foregoing is of help and if I can assist further, please do not hesitate to contact me.

Yours sincerely,
Jane Fowles

21. Write a reference letter for one of your fellow students as if you were his/her scientific advisor. Your fellow student is going to apply to study at New York University, Chemistry Faculty. Your letter should be sent to the Admission Committee. The following words and expressions will help you to write different letters of this kind:

(1)

wrote me a letter to say; asked me to write a letter of recommendation; asked me if I could be a referee for...

(2)

displayed accuracy, thoroughness and initiative; possesses excellent (word processing) skills; worked harmoniously and effectively with others; was an important contributer to the success of the department

(3)

it's a pleasure to recommend (name) for... ; I believe (name) would be a valuable contribution to your (college, university, company); I'm absolutely sure that (name) will (work, study, serve you) well and will also mix well with other (students, researchers, colleagues)

For more information on useful expressions see Appendix 3

REVISION AND DEVELOPMENT

UNITS 8 and 9

1. Look through the following text and entitle it.

Once came into being from inorganic environment, the living matter has deeply altered the lifeless Earth, step by step changing the composition of the atmosphere, the sea, and the upper layers of the solid crust both on land and under the ocean. Since then, were one to find out a single objective to evolution it would be the perpetuation of life.

Though there are more than 100 chemical elements in the Periodic Table, only four prove to be essential for the biosphere. They are: hydrogen, carbon, nitrogen and oxygen. Ecologists define the biosphere as the part of the world where life can exist and as the point of interaction of these four essential elements. While the elements mentioned above go wonderfully with much of the chemistry life, the definition turns out to be a little too limited, ignoring as it does, the role of sulphur and phosphorus.

Consequently, it is a fact, that most of the problems of the environmental disturbance arise from the extraordinary reactivity of these six elements, with the first four actually building protein molecule, sulphur being the "fastening" in protein, and phosphorus supplying "high-energy bond" which is known to be universal fuel for biochemical work within the cell.

If the biosphere continues in running order, biologically important materials must undergo cyclic changes so that after utilization they are put back, at the expense of some solar energy, into a form in which they can be reused. So far nature itself saw to the whole arrangement go on smoothly, and all the cycles be governed by complex mechanisms that were fitted together and held the whole in balance. Yet during the few last decades the man's intervention into the natural cycling

of the living matter has been going on on an unprecedented scale and at an unprecedented rate. Never before has nature been treated in such a drastic and often irreversible way, with both immediate consequences and ultimate incineration, not even vaguely foreseeable. For too little do we know for certain about the way nature has been self-regulating for millions of years since life began and too many variables are involved, to be able to foresee the final aftermath of our rapid technological development on the biosphere as the home of life.

Thus, what is now recognized as a threat to our environment is caused first of all by disturbances either in natural cycles of the six essentials, or in the energy cycle of the biosphere, energy being the driving force of all life processes.

2. Read the text thoroughly with a dictionary and answer the following questions:

1. How did all living matter appear?
2. What is the objective of evolution?
3. What four elements are essential for biosphere?
4. What are the roles of sulphur and phosphorus in the biosphere?
5. What changes must the biologically important materials undergo?

3. Entitle each paragraph of the text, write out the sentence(s) expressing the main idea(s) of each of them and translate these sentences into Russian.

4. Write a summary and an abstract to the text.

5. Revise grammar and lexical material to Units 8 and 9 and translate the following sentences into Russian:

1. Not only is man replacing the Earth's major ecosystems with cities and land devoted to agriculture, but leakage of toxic substances from man-dominated provinces of the Earth is reducing the structure and self-regulation of the remaining natural ecosystems.
2. Important as these conditions for the existence of a biosphere may be in terms of historical evolution, it is not the history that we are concerned with now but rather what the future developments are likely to be.
3. It would seem not unlikely that we are approaching a crisis comparable to the one that occurred when free oxygen began to accumulate in the atmosphere.

4. Presumably, if we do want to continue living in the biosphere, we must introduce unprecedented processes.
5. It is the industrial fixation of nitrogen that far exceeds all the others in magnitude.
6. We do know that excessive run-off nitrogen compounds in streams and rivers can result in "blooms" of algae and intensified biological activity that deplete the available oxygen and destroy fish and other oxygen-dependent organisms, the process known today as eutrophication.
7. Different as the world might become from the present one, there is no reason a priori why it would be necessarily unpleasant.

6. Translate the following text into English making use of grammar and lexical material you've revised. Pay special attention to the italicized parts:

С первых шагов своего существования человек стремится увеличить господство (domination) над природой, *но только в последнее время глобальный характер воздействия человеческой деятельности на природные условия стал бесспорной реальностью.*

Несомненно, человечество сумело значительно расширить свои знания о природе и поставить себе на службу ряд ее новых сил, явлений и ресурсов, *но никогда прежде человек не был свидетелем таких успехов, достигнутых в наше время.*

Однако, наряду с успехами, изменяется и сам характер вмешательства человека в развитие природы. Огромных масштабов достигает загрязнение окружающей среды химическими веществами. Согласно имеющимся данным, необычайно усилилась связь между загрязнением среды и состоянием ряда природных ресурсов. Так, увеличение в атмосфере загрязнителей, содержащихся в промышленных дымах и газах, приводит к повышению кислотности почв, сброс в водные системы жидких отходов (wastes) уменьшает ресурсы чистой пресной воды. Загрязнение атмосферы фреонами и углеводородами вызывает разрушение тонкого озонового слоя в верхней атмосфере, выполняющего роль защитного экрана против избыточной ультрафиолетовой радиации.

Проведенный экологический обзор состояния планеты неоспоримо свидетельствует о появлении важной черты во взаимодействии человека и природы — о глобальном характере вносимых

человеком изменений в природные условия на Земле. Теперь стало ясно, что, *если процесс загрязнения окружающей среды не будет прекращен немедленно, он может стать необратимым.*

Выяснилось, что современный этап отношений между обществом и природой характеризуется появлением экологических проблем, которых ранее либо просто не существовало, либо они существовали в неявном виде. *И какими бы частными ни казались на первый взгляд новые проблемы окружающей среды, их решение в конечном счете зависит от объединенных усилий ученых разных наук и разных стран.*

7. Listen to the communication made by a participant of the radio programme *Late Night Report* devoted to the problems of the world's limited energy resources and say what the position of the speaker is and what organization he represents. The notes and words below will help you to understand the speech better:

NOTES

1. **emotional warning** — эмоциональное предупреждение
2. **harmful use** — опасное использование
3. **by the way** — между прочим
4. **there's no cause for concern** — нет причин для беспокойства
5. **as far as fossil fuels are concerned** — что касается природного топлива
6. **let me assure you** — позвольте заверить вас
7. **in the short run** — сейчас, в настоящее время

WORDS

announcer — диктор
campaign — кампания
communication — сообщение
conservation — сохранение
fairly — достаточно, довольно
position — должность
power — энергия
to rely on — полагаться на
representative — представитель

ANNOUNCER: Our final speaker in the studio on the subject of energy is Joseph Huang, Under-Secretary of Energy.

J. HUANG: Thank you very much for the opportunity to join the discussion.

First, I should like to thank Professor William White of the New England Institute of Technology for his valuable contribution to the discussion. It's also pleasure to express my thanks to Jane Black, the representative of CANE, the Campaign Against Nuclear Energy for her emotional warning on the harmful use of nuclear energy. I also acknowledge with gratitude and affection the brilliant proposals on the use of alternative sources expressed by Dr. Catalina Burgos, the author of several books on alternative technology. I've been listening to them all with great interest. By the way, I don't agree with some of the estimates of the world energy reserves. There's no cause for concern as far as fossil fuels are concerned. Let me assure you that more oil and gas is being discovered all the time. If we listened to the pessimists (and there are a lot of them around), none of us would sleep at night. In the short run, we must continue to rely on the fossil fuel — oil, coal and gas. Wouldn't you agree that we must look to the future? It would be in our own interests if our policy were flexible. Unless we thought new research was necessary, we wouldn't be spending money on it. After all, we wouldn't have a Department of Energy unless most people thought it was important. The big question is where to spend the money — on conservation of present resources or on research into new forms of power. But I'm fairly optimistic. I wouldn't be in this job unless I were an optimist. I can't help feeling that under no circumstances should we come to a hasty decision on that.

8. Listen to the talk again, make notes and answer the following questions:

1. Who is the last to speak?
2. Why does Joseph Huang thank Prof. White?
3. Why is he thankful to Jane Black?
4. Why does he highly appreciate Dr. Burgos' work?
5. How does he estimate the world's energy resources?
6. What, to his mind, must people do in the short run?

9. Listen to Joseph Huang's speech again and write down all the expressions of 1) gratitude; 2) persuasion.

10. Comment on the following:

1. The frog does not drink up the pond in which he lives.

(Indian proverb)

2. "The greatness of a nation can be judged by the way its animals are treated."

(Mohandas Gandhi)

3. "The "boundless" blue sky, the ocean which gives us breath and protects us from the endless black and death, is but infinitesimally thin film. How dangerous it is to threaten even the smallest part of this gossamer covering, this conserver of life."

(Vladimir Shatalov)

11. Develop the text below into a short communication. The communication in ex. 7 can serve as an example.

"The most alarming of all man's assaults upon the environment is the contamination of air, earth, rivers and sea with dangerous and even lethal chemicals."

Rachel Carson, *Silent Spring*

Air pollution is the result of man's use of lethal chemicals, and is a common hazard in both industrial and developing countries. One form of air pollution is acid rain.

Acid rain results from the release into the atmosphere of sulphur oxide and nitrogen oxide. Electrical generating plants, industrial boilers, large smelters, and automobiles are among the chief sources of these emissions. The gases react with water droplets, forming a diluted mixture of sulphuric acid and nitric acid, and it is this mixture that returns to the Earth in the form of acid rain, mist, or snow. Pushed by wind currents, the acid rain often falls to the ground far from its point of origin.

Acid rain is killing vast stretches of forest in Canada, the United States, and central and nothern Europe. In Europe nearly every species of tree is affected. Symptoms include thinning of leaves and nee-

dles, deformed growth, and, in some cases death. Acid rain has acidified lakes and streams, rendering them unable to support fish, wildlife, plants, or insects. In Sweden at least 40,000 of the 90,000 lakes have been affected, and in the United States one in five lakes suffers from this type of pollution.

12. You're going to apply for a position at the Department of Energy. Write a letter to anyone you know and ask him/her to be your referee.

13. Write a reference letter for a friend of yours who is applying for a position at New England Institute of Technology.

14. Speak on the following topics:

1. Energy Crisis.
2. How to Avoid Negative Effects of Chemical Investigations on the Environment.

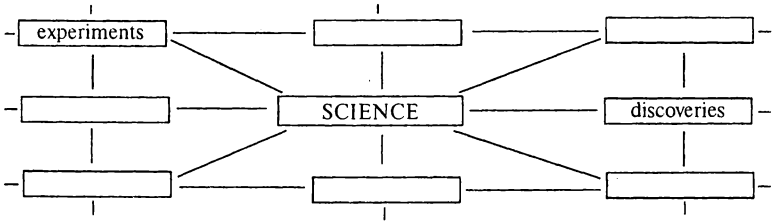
UNIT 10

SCIENCE AND ITS FUTURE

Grammar: **Additional Difficulties of English Grammar.**
Speech Strategy: PROCEEDINGS OF A FORMAL MEETING.

1. Warming up.

What comes to your mind when you see or hear the word "science"? Complete the following chart and explain it to your fellow students:



2. Listen to or look through the following text and say what ideas you've just discussed it contains. What have *not* you mentioned?

Can the average person really understand science? Does the average person want to know about science? Does science matter to us? The answer to these questions is a resounding **yes**!

For many of us, however, the mere memory of physics, chemistry, and biology classes in high school and college makes our eyes glaze over. We left the classroom with the belief that science was dull and abstract and virtually impossible for the average person to understand. Back then, it wasn't cool to understand science, and it seemed to have little immediate relevance to our lives. Yet as we matured and headed

into the world, we found ourselves face to face with sophisticated computers at work and frequent headlines about matters of science — mapping the human genetic make-up, cloning, test-tube babies, and the August 1996 discovery of the possibility of past life on the Mars, to name a few. Suddenly, scientific knowledge has not only become acceptable, it has become a useful, essential, and inescapable part of our lives.

For some of us, our fascination with science began in the 1950's and 1960's, when the Soviet Union launched Sputnik or when Neil Armstrong set foot on the Moon — striking evidence of mankind's ability to apply scientific knowledge to accomplish extraodinary goals. For others, all it took to become interested in science was getting out of high school or merely witnessing the unending series of new scientific achievements and inventions that occurred during the 1970's, 80's, and 90's: the Venus landing, fiber optics, deciphering DNA code, black holes, space stations, microchips and computers, microsurgery, the Space Shuttle, heart transplants, artificial heart, superconductivity, the discovery of other solar systems, and much more.

You don't have to be a theoretical physicist to be awed by space exploration or curious about whether life exists on the Mars or how the Universe began. You don't have to be a biochemist to have an interest in the fundamental processes of life. It's impossible *not* to be curious about such matters. Scientific knowledge and discoveries are much too interesting and profound to be left only to scientists.

Science can be fascinating. Many great discoveries of the past have now, in our lifetime, culminated in the most incredible and pervasive scientific and technological revolution that could be imagined. Whether we approve of it or not, we're swept up in that revolution and the resulting culture — unless you live in a cave. Not only is science fascinating, it matters to us because it is life. They say that whatever road we take, our fate is indissolubly bound up with science. It is essential as a matter of simple survival for us to understand science. The more we know science, the better we understand life. It means feeling more comfortable with our everyday lives, and using science and technology to accomplish goals. Science is a part of our culture and heritage. It is of great importance for not merely "ivory tower" intellectuals but for the masses of average people.

Knowledge is our destiny. *Homo sapiens* will continue to search for the answers to new questions. We will develop new concepts, new theories, and we will continue our quest to understand the natural world. We must continue to discover, create, explore, and invent. We must search for the cure and the life-saving solution, for we are the discoverers, creators, explorers, and inventors. We seek the unknown — the deep, the dark, the never before seen — and we have within us the capacity for ever greater wisdom.

We have come to the future. We have found our place by looking back and understanding history. We are poised to become twenty-first centurions. As one scientist said: "We don't have to look too far to see the future. We can already see it will be magnificent." We have now reached the 15-billion-year journey.

3. Look through the text again and entitle it.

4. Look through the text once more and say what kind of passage it is:

1. A scientific paper.
2. A fragment from a science fiction story.
3. An introduction to a book for science students.
4. A fragment from a popular scientific article.

What makes you think so?

5. Read the text thoroughly with a dictionary and answer the following questions:

1. What does the author say about general attitude to science in high school or college?
2. When, according to the author, do we find ourselves face to face with science?
3. Where is the news about scientific achievements published? What makes you think so?
4. Why, in the author's opinion, has science become a useful, essential and inescapable part of our lives?
5. What scientific achievements of the 1970's, 80's, and 90's does the author mention?
6. Why does the author think it's impossible not to be curious about scientific matters?

7. Why does science matter to us?
8. Who does the author call "ivory tower" intellectuals?
9. Do you agree with the answer to the questions given at the beginning of the text? What makes you think so?

6. Give Russian equivalents to the following words, word combinations and scientific terms from the text:

1. to matter
2. virtually
3. to glaze over
4. an average person
5. it wasn't cool
6. immediate
7. to have relevance
8. to head into the world
9. matter (*n*)
10. genetic makeup
11. test-tube babies
12. to name a few
13. to set foot on
14. striking evidence
15. to accomplish a goal
16. fiber optics
17. DNA code
18. heart transplants
19. to be curious
20. pervasive
21. to be swept up
22. to be awed
23. to be indissolubly bound up
24. survival
25. heritage
26. ivory tower intellectuals
27. destiny
28. quest
29. wisdom
30. to be poised
31. headline
32. fascination

7. Complete the following sentences choosing the words, word combinations or scientific terms from the list below.

a matter, destiny, DNA code, heart transplants, survival, an average person, to accomplish a goal, is indissolubly bound up, were curious, head into the.

1. At the turn of the 19th century, ... were unthinkable, while by the turn of the 20th century many have survived because another person's heart sustains them.
2. We have come to understand the intricate workings of the cell, as we have learned to decipher ... .
3. Understanding the universe and ourselves must continue to be the goal of science. In order ... , institutions must exist that best facilitate a free and prosperous society.
4. Human advancement in all respects ... with freedom.

5. In 1987, at an abandoned radiology clinic in Goiania, Brasil, a group of youngsters, who .. , broke open a 300-pound lead capsule containing cesium 137, a radioactive substance used in cancer treatment.
6. You cannot fully understand the concept of gravity until you realize it is more ... of semantics to distinguish between an object falling and being pulled to the ground.
7. ... really can understand the great scientific discoveries.
8. After graduation many science students ... scientific world.
9. The very ... of humanity depends on man attitude towards nature.
10. Our ... is in our own hands.

8. Find synonyms to the given words, word combinations and scientific terms in ex. 6:

a) it was modern
b) instant
c) subject
d) to have relation to
e) to signify
f) to land
g) practically
h) to achieve an aim
i) to be inquisitive
j) to be astonished
k) penetrating
l) inheritance
m) to be inseparably connected
n) an ordinary person
o) to pave the way into
p) inquiry
q) splashline
r) to be ready
s) to list a few
t) insight
u) to be embraced
v) to stare
w) astounding witness
x) fate
y) outliving
z) attraction

9. Study grammar material to Unit 10 in Appendix 1, find the similar sentences in the text and translate them into Russian.

10. Translate the following sentences into Russian paying attention to the italicized words:

1. The data obtained cannot be regarded as evidence of the postulated reaction *for* the system is greatly complicated by other reactions.
2. The procedure is applicable *whether* the product is pure or contaminated.

3. The reaction of hydrogen with carbon to produce methane *is not of great significance* at the moment.
4. This demonstration is *the more* convincing, *the greater* the variety of adsorbate vapors.
5. *Whatever its nature* the activity of methacrylate is readily destroyed by hydrogen atom and iodine molecules.
6. *There appear to be* no exceptions in the data in table I.
7. His *knowledge* on the subject *is* very good.
8. *It didn't take* them long to get interested in this branch of science.
9. *Whether you* understand it *or not* doesn't matter at the moment.
10. *It was of great surprise* for us to realize that 10-step reaction did not give the result we expected.

11. Listen to Dr. Walling's talk and say what its subject is. The following notes and words will help you to understand the talk better:

NOTES

1. **on the agenda** — в повестке дня
2. **to give the floor** — дать слово
3. **scientific enterprise** — научное сообщество
4. **to come into question** — стать предметом обсуждения
5. **to be on the safe ground** — избежать риска
6. **to take steps** — предпринять шаги
7. **I'll make no claim** — я не буду заявлять
8. **a clear-cut case** — выявленный случай
9. **a deadline** — крайний срок
10. **treatment of data** — обработка данных
11. **to become mired** — оказаться в затруднительном положении
12. **on the other hand** — с другой стороны
13. **to get out of hand** — выйти из-под контроля
14. **to walk a delicate line** — ходить по лезвию бритвы
15. **to go astray** — сбиться с пути
16. **to burst forth** — разразиться
17. **in the first place** — во-первых
18. **not to mention** — не говоря уже о...
19. **to come under criticism** — подвергаться критике
20. **in regard to** — по отношению .

WORDS

to address -- обратиться
betrayal — предательство
confidence — уверенность
to content — довольствоваться
deliberate — намеренный
egregious — отъявленный
to enliven — оживлять
to erode — разрушать
to exaggerate — преувеличивать
fraud — обман
to fudge — делать недобросовестно
at least — по крайней мере
meticulous — тщательный
morass — запутанное положение
overly — халатный
probity — честность
to recall — вспомнить
recalcitrant — упрямец
undue — неправомерный

CHAIRMAN: Ladies and Gentlemen! After having listened to the previous speakers I understood that we had been quite right including the problem I call "fraud in research" on the agenda.

Before I give the floor to Dr. Maureen Walling I'd like to say that the problem I've just mentioned is getting continued publicity and attracting the attention of not only granting agencies, but even governmental committees. Exaggerated or not, there seems to be a growing concern among the public that all is not well, and the probity of the scientific enterprise is coming increasingly into question.

It's not an easy task to introduce a speaker to an audience, especially when she is such an outstanding scientist as Dr. Walling. It's rather like introducing a member to his or her family. I'll, however, be on the safe ground, I think, if I content myself by thanking you, Dr. Walling, on behalf of your audience for coming along to our conference "Science and Its Problems" and joining the discussion. Will you address us, Dr. Walling?

DR. WALLING: Dear Mr. Chairman! Dear colleagues! The problem I'm going to speak about must be recognized by all working scientists and we should take some steps to decrease the frequencies of such betrayals of our sci-

entific ethics. I feel strongly that, at least in my own field of chemistry, two major keys to meeting the problem are simply keeping good records, and the proper assumption of responsibility by senior investigators. There are matters on the importance of which we all agree, but their implementation is easily eroded by carelessness, impatience, and the rush to get results. In fact, I'll make no claim to having always been blameless myself.

Deliberate fraud by senior investigator is rare, and in academic chemistry I can't recall a clear-cut case during the 50 years I've been in science. Fabrication of data by students or other junior members of a research group is, unfortunately, not as uncommon and occurs most frequently to meet a deadline, to complete a thesis or publication, or to force recalcitrant experiments to fit some preconceived pattern. To this side of deliberate fraud, exists, as we all know, a large morass, which I may call subjective treatment of data. Into this we all step, and, occasionally, some of us become badly mired. Basically, it involves selecting and arranging data to support a favoured hypothesis. Much of this is legitimate, and indeed necessary if a comprehensible publication is to be distilled from a mass of data accumulated over a long period. On the other hand, as we grow increasingly enamoured with our hypotheses, such selection can easily get out of hand. Since confidence in our own ideas and the ability to present our results in the most favourable light increase with experience, it is here that senior investigators most often go astray. We all have to walk a delicate line, and occasionally step over it. Such overly subjective interpretations of data are probably the major source of the polemics that occasionally burst forth and enliven our science. Some are significant, but many are rather trivial.

Although most students and junior investigators tend to be honest, good and meticulous records are also a

strong disincentive to fudging data, overlooking inconvenient results, and giving undue weight to sloppy or incomplete work. This makes them an important barrier to both fraud and the undue massaging of data in the first place, not to mention that good records are vital in identifying the source of trouble if results cannot be reproduced or published work comes under criticism.

As I said at the beginning, the importance of responsibility and of good record keeping are matters on which all scientists generally agree. I think if we can put our own house in order in regard to them, we'll not only be in better position to meet criticism, but can significantly decrease the cases of fraud and egregious misinterpretation of data that occasionally arise in our business, and which are currently causing us so much trouble. And, to conclude, I should say that this is a much better solution than waiting for some higher power to issue regulations on how we should behave. Thank you for attention.

12. Listen to the talk again and answer the following questions:

1. What is the conference devoted to?
2. What problem is increasingly coming into question?
3. What do you think "the granting agencies" are?
4. What problem is Dr. Walling anxious about?
5. Who to her mind violates the rules of experimenting?
6. How do some researchers treat data?
7. What steps according to Dr. Walling should be taken to avoid fraud in data treatment?
8. When does the situation with data treatment get out of hand?
9. Who in Dr. Walling's view should be responsible for honest results of the experiments?
10. What is your opinion on the question discussed?
11. Do there exist similar problems in your laboratory?

13. a) Listen to the talk once again and write down all the expressions you consider useful in the procedure of a conference. What other expressions of this kind may be used at formal gatherings? Make use of the expressions from other units of the textbook.

b) Read another text on international conference participation and be ready to answer a few questions:

Do you know how to take part in international meetings? If you don't, here are some bits of advice. At an international meeting you don't only represent yourself, your own aspirations or even your own professional organization. You are also representing your country and should endeavour to do so with appropriate dignity.

The only way of participating in an international congress is to do so whole-heartedly and intelligently. It is the behaviour and active participation of the congress-goers which above all ensures the success of a congress. Don't be the type of participant who cannot adapt himself.

Think about what you hope from the meeting. Remember that its duration is limited to a few days. Remember that the other participants expect you to contribute something. Be active, ready to listen to the ideas of others. Don't be self-centred or quick-tempered. Familiarize yourself with the rules of the congress, but with a view of respecting them, not to causing difficulties.

Do not stay in an ivory tower, but do not take part in discussions just for the pleasure of hearing your own voice or of having your name written down in the minutes.

Make sure that by your own behaviour you are helping the chairperson and other organizers in their difficult task of guiding the proceedings successfully to concrete conclusions, in an atmosphere of cooperation and friendship among the participants of each country. Contact with other participants.

If you wish to draw the greatest benefit from an international congress, make contact with persons who you already know but also make a point of meeting as large number of unfamiliar faces as possible.

Take advantage of meals, receptions and excursions, change to another group instead of staying with your countrymen, or at the same table, or in the same coach.

Discretion is all very well, but timidity is useless and annoying. Remember that others are in the same position as you, and many may be

even more isolated. Introduce yourself to other people and make as many introductions as possible among other participants. Taking part in a discussion, be clear and brief. Don't overstep your allotted time. This may annoy the chairperson and other participants. Make use of your notes but don't simply read them out. A well-prepared impromptu speech will interest listeners far more than one read from notes.

Speak in the working congress language you know best and don't try to display your multilingual talents. It should never be necessary for you to be translated into your mother tongue.

Don't change your mind without good reason.

1. How should you make contact with other participants of a conference?
2. What do the other participants expect from you?
3. Why should you familiarize yourself with the rules of the conference?
4. Why should you not stay in an ivory tower?
5. How should you take part in a discussion?
6. What language should you speak?

14. Make up your own communication on a scientific problem that you are interested in and speak in front of your fellow students bearing in mind the information you've got from the above text.

15. Read the next text connected with science and give answers to the following questions:

1. What to your mind might be a title of the text?
2. How have the relations between science and society changed?
3. What scientific achievements are gaining catastrophic values?
4. Are the dangers really exaggerated?
5. What is the "ivory tower" attitude to scientific achievements?
6. In what case can we escape our own destruction on this planet?
7. What is a "technophobic" point of view on the development of science?
8. Who is there to advocate the interests of mankind?
9. What else besides science needs reforming?
10. What attitude to science and its development is called out-of-date?

The relations between science and society have changed over the centuries. When modern science was born during the Renaissance, its first epoch was a fight for its life against an authoritarian and representative society. After the fight had been won, science released creative forces leading to the scientific avalanche. The second epoch started in the Age of Enlightment, in itself partly the result of the application of scientific thinking to society. It resulted in the destruction of the feudal society and added more momentum to the march of science. The third epoch began with the technological application of science, which has done more to change the quality of human life than any other development in the history of mankind.

Thus far science had displayed only a benevolent aspect. But the forth epoch is marked by increasing fear of the negative aspects of science which are the product of its very success. The dynamic society caused by science is marked by a large number of exponentially increasing variables. Too many of them are now approaching catastrophic values. The atomic bomb, the population explosion, and the deterioration of the human environment are all the products of science, or rather of the malfunctioning of the relations between science and society. We are facing a serious crisis. There are many people, including scientists, who call these fears "doomsday prophesies", and claim the dangers are exaggerated. Are not the bombs in the hands of responsible people? Does not the Earth abound in waste land ready to absorb the population increase? Is pollution really such a serious problem? Admittedly some of the fears may be exaggerated, but no one who has made any serious study of the arms race and the population explosion can fail to be alarmed. Lack of concern stems either from ignorance or from the attitude of *apres nous le deluge* (после нас хоть потоп). Among scientists there also exists a third variant, often termed the "ivory tower" attitude: a scientist should be a scientist and nothing else. His works aim at the increase of knowledge, and knowledge is a good in itself. He should leave to others the task of deciding how to use it. This attitude worked perfectly throughout the whole long era during which science contributed almost exclusively to the progress of mankind. But this is no longer the case. How are we to tackle this crisis? Some have adopted the defeatist view that our scientific-technological culture carries within itself the seeds of its own destruction. Man rules the Earth at present but will soon be extinct, like dinosaurs who were

once masters of the world. Our crazed technology and outmoded political systems are the instruments of our own destruction. Perhaps a few of us can escape and start a new culture if we get away from the Blue Planet in time and form a space colony. All this may be true, but we must strive instead for other solutions. They don't lie easy to hand. Some think that the development of science and technology should be halted. This "technophobic" view is shortsighted. Science and technology confer such enormous benefits that they must not be halted, but used in a sensible way. We come closer to the truth if we say that it is the rules that govern world politics that must be changed: power politics have now become so dangerous that they must be abolished. Scientists and technologists are accustomed to look with pride at all the "progress curves" that rise exponentially and think it is their agreeable duty to keep them rising or even induce them to rise still faster. But we have now learned that the rise of many of these curves spells disaster, and scientists cannot plead innocence by putting the blame on others by saying: "We, scientists, are simply doing our job, and "others" must take the blame if our findings are used irresponsibly." There are no "others" willing to assume the responsibility. There are many instances in which new discoveries can bring power and wealth to certain groups, but only at the expense of others. Possibly mankind as a whole is paying the price through a decline in security, the deterioration of human environment, and the widening gap between the rich and the poor. In cases such as these, who is there to advocate the interests of mankind? Indeed, there are few who are capable of it, since often only a handful of specialists really understand the consequences of new discoveries.

16. **Read the text again, divide it into logical parts, entitle them thus making a plan.**

17. **Write out of the text all sentences expressing the main idea(s) of each logical part, condense them in any possible way (or paraphrase for the sentences to be shorter) and write 1) a summary, and 2) an abstract to the text.**

18. **Make an oral summary of the text.**

19. **To take part in any scientific gathering it is necessary to present either a thesis of your report or the report itself. To do this you should know international requirements for written research paper. Study carefully the recommendations given in Appendix 3 and write your own report on one of the problems posed in the text you've just read.**

20. Sometimes you will need to write a letter to inquire about anything you need in your work as well as to reply to information inquiry. Two letters below will help you to write letters of these kinds:

Letter 1 (Information Inquiry)

Dear Dr. Reading,

I should be grateful if you would send me information about the regulations for admission to the University of Bradford Chemistry Centre. I would like to work for you making research in organic chemistry and teaching students. Could you inform of the arrangements I should make? Could you also tell me whether the Centre arranges accommodation for overseas academics?

Yours faithfully,
Dr. Igor Ivanov

Letter 2 (Reply to Information Inquiry)

Dear Dr. Ivanov,

Thank you for your letter inquiring about the possibility of doing research in the Department of Chemistry at our University.

I am most interested in your research and would be happy to help you in any way I can. I have spoken to my colleague, Professor David Miller who specializes in your field and is, therefore, very familiar with the sort of arrangements that can be made. We would suggest you to apply to the British Council in Moscow for financial support. However, in doing so you should send them a full résumé, and, of course, a well-defined research proposal. It would also be probably worth writing to the FCO in London to ask whether any help might be available from the Know-How-Fund, which has been specifically set up to assist academics and practitioners in the countries such as your own.

In the meantime I would find it most helpful if you could send me a copy of your résumé, so that if I am approached by the BC or the FCO, then I will be in a good position to support your application.

I hope it will be possible to arrange something and therefore hope you will keep in touch.

Yours sincerely,
Dr. Edward Reading

FCO (Foreign and Commonwealth Office) — МИД (Министерство иностранных дел и по делам Содружества) (*Великобритания*)

academics — ученые, преподаватели

21. Write similar letters. The following words and expressions will help you:

Information Inquiry

(1)

May I; Would you kindly; Will you be so kind as

(2)

ask you (for); request you (for); make a request about; (to) approach you with a request about

(3)

advice; help; information (to) give me; send me; supply me with; help me with; inform me about

Reply to Information Inquiry

(1)

In reply/Referring/According to your letter of.../to your request; in accordance with your request; as requested by you; thank you for your letter of (*date*)

(2)

I am sending you; I have the pleasure of sending to you; I shall send you; I am very glad to supply you with/inform you about; I would be pleased to provide; I'm pleased to say that; I apologize for the lengthy delay in responding to your letter of... (*date*)

(3)

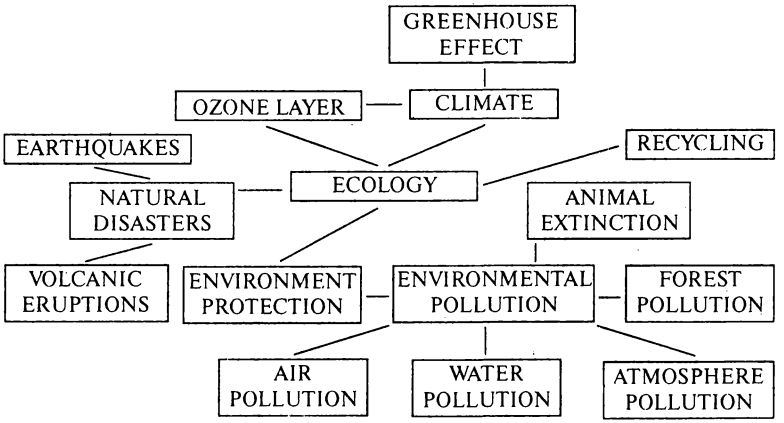
Clearly, it would be useful; contact me

For more information on useful expressions see Appendix 3.

REVISION AND DEVELOPMENT

UNITS 6–10

1. Do you know all the words and word combinations in the chart?



2. Do you agree that *ecology* is concerned with all these problems? What other problems would *you* add to the chart?

3. Find out your fellow students' attitude toward some specific environmental problems asking questions like the given ones:

What do you think of... ?
What is your opinion on... ?
What to your mind can be done with... ?
How do you suppose the problem of... should be treated?
What problem interests you and why?
Do you feel our government is doing enough to protect... ?
Are you concerned about the problem of... ? Why or why not?

4. Give definitions to the following words, word combinations and chemical terms:

1. greening
2. ecology
3. extinct
4. endangered species
5. rain forest
6. environmentalist
7. ozone layer
8. acid rain
9. greenhouse effect
10. landfill
11. global warming
12. solar energy
13. biogradable
14. fuel-efficient
15. recycling
16. organic fertilizers
17. deforestation
18. composting
19. hazardous waste
20. energy-efficient
21. non-toxic
22. ecologist
23. lethal chemicals
24. environment
25. nature

5. Match the words, word combinations and chemical terms from ex. 4 with their definitions. Are your definitions similar or different?

a) a moist, densely wooded area with annual rainfall of 200 cm;
b) a person who works toward protecting the environment from destruction or pollution;
c) a region in the upper atmosphere containing a high amount of ozone gas that absorbs the Sun's ultraviolet radiation;
d) the phenomenon by which the Earth's atmosphere traps some of the Sun's heat as it radiates from the Earth's surface;
e) precipitation containing high levels of nitric and sulphuric acids resulting from car exhausts and factories;
f) a method of solid waste disposal in which refuse is buried between layers of dirt to fill in low-lying areas;
g) the increases in world's temperature due to the greenhouse effect;
h) electrical power generated by the heat of the Sun;
i) using little fuel;
j) capable of quick decomposition into the products that are not harmful to the environment;
k) the process of collecting used products and remanufacturing them into new products instead of throwing them away as garbage;
l) a natural product such as manure to make the soil more productive for agriculture;

m) making a mixture of decaying organic matter to improve soil structure and provide nutrients for crop production;
n) nuclear waste or industrial by-product that is potentially damaging to the environment and harmful to the health and well-being of living organisms;
o) the destruction of forests resulting from excessive clearing;
p) using little energy;
q) not poisonous;
r) a specialist in a branch of science concerned with the interrelationship of organisms and their environment;
s) substances capable of causing death;
t) the complex of climatic, adaptive and biotic factors that act upon an organism and ecological community and ultimately determine its form and survival;
u) the external world in its entirety;
v) a division of biology concerned with the relationship between living things and their environment;
w) animals that are threatened with extinction (disappearance);
x) no longer existing or found on the Earth;
y) the act of making something green or fresh; a restoration

6. Revise the lexical and grammar material to Units 6–10 and (a) translate the first four paragraphs of the following article into English. (b) Render the whole text in English.

КТО ВИНОВАТ В ГЛОБАЛЬНОМ ПОТЕПЛЕНИИ?

Состоящий из видных ученых межправительственный Совет ООН по проблеме потепления климата пришел к неутешительному выводу: обнаружены дополнительные доказательства вины человечества в глобальном потеплении.

Ученые, правда, отмечают и иные причины глобального потепления. Например, усиление солнечной радиации и сульфатные брызги, выбрасываемые при вулканических извержениях. Эти выбросы могут, с одной стороны, создавать парниковый эффект, с другой — охлаждать атмосферу, так как отражают солнечный свет.

Однако влияние человеческой деятельности все же решающее. Это связано прежде всего с увеличением объема отработанных

промышленных газов типа углекислого, удерживающего тепло в атмосфере, и аэрозолей промышленного происхождения. Именно этот комплекс создает новую климатическую модель.

Эта популярная в научной среде теория привела к тому, что Совет по проблеме изменения климата склонен теперь более критически оценивать влияние человека. Раньше, до 1995 года, считалось, что потепление, наблюдаемое в двадцатом столетии, в большей степени связано с естественными причинами и в меньшей — с активизацией человеческой деятельности.

Группа исследователей во главе с Саймоном Тедом обнаружила, что повышение средней температуры в начале XX века можно объяснить увеличением солнечной активности или сочетанием этого фактора с ростом выброса промышленных газов в атмосферу. Но, начиная с середины 70-х годов, основной причиной потепления всё больше становились промышленные газы, создающие парниковый эффект.

Об этом ученые говорили на научной конференции, устроенной Вашингтонской исследовательской организацией «Ресурсы будущего».

Однако некоторые участники были осторожны в суждениях. Например, профессор Иллинойского университета климатолог Майкл Шлифингер считает, что наука еще не располагает знаниями, позволяющими измерить долю влияния человека на глобальное потепление. Эту точку зрения разделяет и другой эксперт — Рональд Прин из Массачусетского технологического университета.

Тем временем глобальное потепление становится все очевиднее, а его влияние все опаснее. В начале 1999 года ученые из Массачусетского и Аризонского университетов построили график изменения среднегодовой температуры в Северном полушарии за последнюю тысячу лет. При всей приблизительности расчетов стало видно, что XX столетие самое теплое, а самые теплые годы в нем — 90-е.

Каковы бы ни были причины потепления, даже незначительное повышение температуры на планете меняет поведение флоры и фауны.

Так, в журнале "Nature" рассказывается о том, как ученые-орнитологи из английского Института экологии земли исследовали 20 видов пернатых в Великобритании. Выяснилось, что по мере потепления климата птицы начинают откладывать яйца всё раньше. Это означает, что метеорологически весна в Северном полушарии наступает тоже раньше, и есть свидетельства того, что осень приходит позже.

Другое исследование, о котором сообщает всё тот же журнал, обнаружило по анализу пузырьков атмосферного газа, содержащегося в пузырьках льда из антарктического ледяного покрова, что сегодня концентрация удерживающего тепло углекислого газа выше, чем когда бы то ни было за последние 420 тысяч лет, а точнее, на 20 процентов выше, чем в самые теплые времена межледниковых периодов, и в два раза выше, чем во времена ледникового периода.

Если выбросы газов, способствующих образованию парникового эффекта не снизятся, говорят члены неправительственного Совета, концентрация углекислого газа в атмосфере будет расти, а температура на планете повышаться. В докладе Совета в 1995 году прогнозировалось что к 2100 году температура на Земле повысится на 1–3 градуса. На этом, скорее всего, глобальное потепление не остановится.

И если оно пойдет нынешними темпами, считают члены Совета, то вызовет очень серьезные климатические и экологические изменения, включая сдвиги климатических зон, усиление тепловых волн, потепление северных зим, увеличение осадков в период дождей и усиление засухи летом, подъем уровня моря с постепенным затоплением небольших островных государств, что вызовет переселение десятков миллионов человек не только с островов, но и из прибрежных районов, в которых всё чаще будут бушевать разрушительные ураганы и штормы.

В борьбе сторонников доминирования природных и антропогенных факторов, может быть, и родится тот инструмент, благодаря которому можно будет стабилизировать климатическую обстановку на планете.

Александр Алябьев
«Вечерняя Москва», 19 октября 1999 г.

7. Group work. Round-table discussion on the problems posed in the text. First elect the Chairperson.

Roles: A. Alyabyev — a news analyst; Simon Tedd — the head of research team; Michael Shliffenger — professor of climatology; Ronald Prin — an expert; British ornithologists; *The Nature* editor.

8. Read the following text and put the numbers of the ideas expressed in the order they occur in it:

1. The scientists now know how to discover other elements with a very long life period.
2. There is no name for the new element yet.
3. It will take much time to prove the existence of the new element.
4. The beginning of the experiment dates back to 1992.
5. Scientists of different nationalities took part in the experiment.
6. The first life period of the new element was astounding.

The 114th element in the Mendeleyev Periodic Table has now been found. The element, whose atomic weight is 289 and which is yet to be named, was predicted by theoretical physicists and has been synthesized by a group of researchers under Professor Yury Oganesyan at the Flerov Laboratory of Nuclear Reactions in Dubna. It had taken the Oganesyan group more than six years to prepare the experiment whereby, on November 3, they started bombarding a plutonium 244 target, sent by their US colleagues, with beams of accelerated calcium — 48 ions. The existence of a new chemical element was registered on New Year's eve. The real value of the discovery lies in the fact that element 114 existed for an extraordinarily long period: all of 30 seconds, which is longer than its predecessors by at least a factor of 10^6, and which is quite enough to prove in practice a theory that was advanced in 1964 — about the existence, in the turbulent ocean of nuclear life, of the so-called "islands of stability" where the life of super-heavy nucleus can be measured not in nanoseconds, but in minutes, and maybe even in years. "We consider this experiment one of the most important events of the past year. At last the efforts of many years by physicists in Russia, the United States, and Germany, who have been looking for 'islands of stability' have been crowned with success," says Mikhail Itkis, head of the Flerov Laboratory of Nuclear Reactions. "The programme will certainly be continued. After all, we have obtained just

one long-living nucleus. We also expect to discover elements that can live for a year and even 100 years." Professor Yury Oganesyan himself is far more cautious in his appraisals. It is not just out of modesty that he has thus far refused to accept congratulations. Oganesyan and his colleagues will have to spend a great deal of time yet to confirm the existence of element 114, repeating the experiment again and again, to achieve the same result — a super-heavy nucleus with atomic number 289. Be that as it may, deep down, Yury Oganesyan hardly has any doubts that the discovery has been made. When the experiment was just getting underway, he said: "If our understanding of the atomic nucleus is so correct that by 'driving' it into extreme conditions we will gain conclusive proof of its long life, we'll be happy. If not, I dread to think what'll happen: We'll have to revise everything so drastically that nothing will be left of our present theoretical constructs."

By Oleg Volkov

From *The Moscow News*, No. 2, January 21–27, 1999.

9. (a) Provide the text with a title. (b) Divide it into logical parts. (c) Write out key words. (d) Write an abstract to the text.

10. a) Listen to the following dialogue and say what its subject is: a) inorganic chemistry; b) new chemicals exhibition; c) plastics; d) greenhouse effect.

b) Listen to the questions and answer them choosing the correct answer out of the given ones.

SUSAN: I just can't help thinking of things made from plastics as imitations, as cheap substitutes.

GILES: If by "cheap" you mean less expensive, then you're quite right. For example, that new watering can we bought for the garden.

SUSAN: Yes, it did cost less than a metal one.

GILES: Do you remember why we bought it?

SUSAN: I liked the nice bright yellow colour. But you can buy coloured metal ones, too.

GILES: Ah! But with plastics, the colour goes all the way through, because the pigments are mixed in with raw materials. They don't have to be painted like metal. And...

SUSAN: Can I interrupt your chemical lecture for a second? It doesn't matter anyway. The result's the same!

GILES: No, it isn't. Take a watering can, or a child's toy, or even something you use in the kitchen, like your washing-up bowl. What happens when they're knocked against something hard?

SUSAN: You mean if they're metal?

GILES: Yes.

SUSAN: I suppose, after a while the paint becomes chipped. All right, I see the point. With plastics the colours won't chip off.

GILES: But do you remember another reason why we decided to buy a new watering can?

SUSAN: Yes, certainly. The old one was so rusty. There were holes in the bottom... I see. Plastics don't rust like metal.

GILES: Exactly. Are you beginning to feel more kindly towards plastics?

SUSAN: I've nothing against them, Giles, but they are used instead of the original materials, so that makes them substitutes, doesn't it?

GILES: Do you remember what Mrs. Harvey said?

SUSAN: Who?

GILES: The plastics expert, you know, the chemist, in the recording I made at the exhibition.

SUSAN: Oh, yes.

GILES: And, incidentally, my tape recorder wouldn't be so small or so light if it weren't for the fact...

SUSAN: I see what you mean: if it wasn't made of plastics.

GILES: You're learning. I'll just run the tape back to the right place. I think this is where it is. Listen.

(On the tape recorder.)

GILES: ... people who call them substitutes.

MRS. H: Oh, yes, some still do but they're quite wrong, Mr. Newton. Plastics are materials in their own right. Cheapness is not the only factor that makes them acceptable to industry. Before it can replace any other material — like wood, metal or a natural fabric — a plastics material must have a performance that is at least comparable to whatever was previously used.

SUSAN: And I suppose sometimes they're even better.

MRS. H: Frequently, particularly when the properties of the materials are adjusted, or even created, to suit the specific requirements of the end product.

GILES: What sort of properties?

MRS. H: The degree of rigidity or flexibility, for example: resistance to acids, insulating qualities, ability to withstand sudden changes of temperature. Oh, the list is endless because the plastics industry is being continually asked to recommend or develop materials for such a wide variety of new uses.

GILES: Do they succeed?

MRS. H: More often than not. In fact, there are so many types of plastics with so many unique properties, they frequently provide answers to unsolved engineering problems.

GILES: On behalf of our journal let me express my deepest gratitute to you, Mrs. Harvey, for such a brilliant explanation.

MRS. H: My pleasure.

(Giles stops the tape recorder.)

GILES: Well, Susan?

1. Who are the speakers?
   a) two students and a professor of chemistry
   b) three research workers
   c) a journalist, his wife and a chemist
   d) three factory workers

2. Why did they buy a new watering can?
   a) because Susan liked the colour
   b) because Giles liked the shape
   c) because Giles and Susan liked the material
   d) because Susan likes plastics

3. Who is Mrs. Harvey?
   a) a guide
   b) a plastics expert
   c) their friend
   d) their neighbour

4. When did they meet Mrs. Harvey?
   a) at a lecture
   b) at an exhibition
   c) at a plastics factory
   d) while buying a watering can

5. What properties of plastics were *not* mentioned?

a) resistance to acids
b) hardness
c) insulating properties
d) ability to withstand sudden changes in temperature

6. What things made from plastics were mentioned?

a) threads
b) tubes
c) toys
d) sheets

11. a) Retell the conversation in indirect speech. b) Make up your own dialogue using one of the following situations and act it in front of your fellow students:

1. An interview of a famous environmentalist.
2. Two scientists are discussing the future of science.
3. Two postgraduate students are speaking about fraud in their laboratory.

12. Listen to the report on the protection of biosphere and be ready to support or contradict the scientist's argument that "we are polluting ourselves out of existence":

Dear colleagues! I appreciate this opportunity to talk about ecological problems in your country where enviromental protection is the constitutional duty of every citizen.

Interrelations between man and the biosphere are of a very complex nature. Man, like every other living organism, depends for his life on what the biosphere provides: water, oxygen, food, etc. On the other hand, the biosphere is strongly affected by all sorts of human activities. The conflicts that arise in this man and the environment interaction are different. For example, man creates new compounds, new substances, pure chemical elements which are unknown to the biosphere. They do not belong to the natural cycle of matter. They undermine the capacity of natural complexes for self-regulation. Though not changing biologically, we change the medium in which we live. We are polluting ourselves out of existence.

Forests are disappearing. Deserts are advancing at the same speed and, if there are qualitative changes in the biosphere, it will no longer correspond to the biological requirements of man, whose ability to adapt is very limited.

Your great scientist Vladimir Vernadsky was the first to realize the necessity for quite a new approach to the biosphere as early as the mid-forties. It is Vernadsky's concept of the biosphere that we accept today.

That we must act now is clear. If your house is in order, you're all right. And I would like some of the Russian environmentalists to share their experience and speak about how environmental protection is organized now in Russia.

13. Listen to the report again if necessary and say in what connection the name of V. Vernadsky is mentioned.

14. a) Listen to the report again if necessary and answer the following questions:

1. What is one of the constitutional duties of Russians?
2. What does man depend for his life on?
3. In what way is the biosphere affected by man?
4. What is happening to forests?
5. When did V. Vernadsky introduce a new approach to the biosphere?
6. Do you know anything of his approach?
7. What do you know about environment protection organization in Russia?

b) Using an encyclopedia define the following notions: atmosphere, hydrosphere, lithosphere, biosphere, noosphere.

c) Read the following text and comment on the ideas and facts expressed in it:

The idea of the biosphere was introduced into science almost a century ago by the Austrian geologist Eduard Suess, who was the first to use the term in a discussion of the various envelopes of the Earth in his book published in 1875. The concept played little part in scientific thought until the publication in 1926 of two lectures by the Russian mineralogist Vladimir Ivanovich Vernadsky. It is essentially Vernadsky's concept that we use today.

The necessity to quite a new approach to the biosphere was realized by Vernadsky as early as the mid-forties. According to him man has become a geological and biological factor by far exceeding everything that preceded him throughout evolution, the rate of his intervention in nature steadily increasing.

Yet it was with optimism that he looked ahead when he wrote: "I think we undergo not only a historical but also a planetary change as well. We live in a transition to the noosphere." By "noosphere" Vernadsky meant the envelope of mind that was to supersede the biosphere, the envelope of life.

15. Choose one of the given topics to make an oral communication:

1. Ways of Water Purification.
2. Nuclear Power and Nuclear Wastes.
3. Alternative Sources of Energy.

16. Write any letter to express:

1. Your interest in a conference and your desire to participate in it. (A covering letter.)
2. Your wish to have a letter of recommendation.
3. A letter of recommendation for one of your fellow students.

17. Choose one of the given topics for a written research paper:

1. Industrial Pollution and Waste Disposal.
2. The Destruction of the Rainforests.
3. The Ozone Layer.
4. Polymers and Plastics.
5. Petroleum — the Driving Force of Energy.

FINAL EXAMINATION PAPER 2

Section 1. LISTENING COMPREHENSION

This section of the test requires a demonstration of your ability to understand a lecture or a talk. After you hear a lecture or a talk you'll have to answer a few questions. The questions and the answers are given to you. Choose the best answer from the four given. Record your answer on a piece of paper.

PLASTICS

Plastics are organic substances made synthetically by polymerization, and capable of being formed into an almost endless variety of products, e. g. threads, sheets, tubes, and moulded objects. The ancestor of modern synthetic plastics is celluloid. Celluloid has certain disadvantages — its flammability and the fact that it is not readily moulded. Thus it was not until the discovery of bakelite in 1907 that the real foundation of synthetic plastics industry was laid.

Plastics that consist of long-chain molecules can be softened by heat and moulded into a desired shape. These plastics are called thermoplastics. Plastics in which the polymer chains are cross-linked have much greater rigidity and cannot be softened readily. They are called thermosetting. The terms "thermoplastic" and "thermosetting" are also applied to the resins from which plastics are made.

The principal agent incorporated in a plastic is the resin; it may be natural, like cellulose, but it is most generally synthetic.

The resin is also known as the binder. Substances added to the plastic to enhance certain properties, e. g. hardness, resistance to shock, or resistance to abrasion, are called fillers; examples are asbestos, glass fibres, and wood flour.

Plasticizers are also included in the formation. Antioxidants may be added to promote chemical stability and thus prolong life. Catalysts

are added to assist the final cure (final formation of the product), and stabilizers to protect against sunlight, heat, and other destructive factors.

The procedure used to shape a plastic into its final form depends on the properties of the plastic. Some plastics can be injection moulded. Other plastics must be compression moulded; after they are filled into the mould they are subjected to pressure. Certain plastics are simply cast into their final shape.

1. What does the passage mainly discuss?

a) the importance of plastics in the Second World War
b) plastics as substances
c) various uses of plastics
d) people's attitude toward new material

2. According to the passage, materials which can be softened by heat and moulded into a desired shape are called...

a) thermoplastics
b) ebonites
c) thermosets
d) resins

3. According to the passage, when was bakelite discovered?

a) in 1807
b) in 1927
c) in 1907
d) in 1901

4. According to the passage, what is the principal agent incorporated into plastics?

a) resins
b) antioxidants
c) catalysts
d) stabilizers

5. Which of the following will be *least* useful if it were made from thermoplastics?

a) a vase of flowers
b) a doorknob
c) a table
d) a coffee cup

6. The paragraph following the passage most probably discusses

a) celluloid and its characteristics
b) the properties of plastics
c) the properties of thermosetting plastics
d) the uses of plastics

Section 2

In this section of the test each problem consists of an incomplete sentence. Below the sentence there are four choices, marked (a), (b), (c) and (d). You should find the one choice that best completes the sentence.

Example: Carbon ... to occur in two crystalline forms.

a) know
b) is known
c) knows
d) it is known

The correct answer is (b), so you should mark answer (b).

7. In the early days of chemistry the compounds obtained from living things were not even thought of ... in the laboratory.

a) to be obtained
b) obtaining
c) being obtained
d) obtain

8. Organic chemistry ... to be a very large branch of chemistry.

a) is sure
b) is likely
c) is unlikely
d) is certain

9. The carbon chain ... practically any length, the number of possible hydrocarbons is enormous.

a) is
b) was
c) been
d) being

10. The material for ... organic chemicals used to be found in the sea.

a) producing
b) produce
c) produced
d) being produced

11. But for the complexity of the molecules of natural organic polymers they ... the attempts to analyse their molecular structure until very recently.

a) would have defied
b) would defy
c) wouldn't have defied
d) have defied

12. ... these salts decompose.

a) On being heated
b) Having heated
c) On heated
d) Heating

13. ... rare antibodies, tests at room temperature should be included.

a) After looking for
b) Before looking for
c) In looking for
d) Being looked for

14. A new technique ... , the yields rose.

a) was worked out
b) was being worked out
c) to be worked out
d) having been worked out

Section 3

Put C if the sentence is correct. Put X if there is a mistake in the use of the conditional.

15. If he had not tried to make the experiment, he would not have discovered this phenomenon.

16. If he would be more intelligent, he would be invited to join the team of investigators.

17. If our laboratory would be larger, I would not have to work in the other one.

18. If he was ready, we would begin our discussion.

19. If my paper had been ready, I would go to the conference last month.

20. If they had been very careful with this substance, they would not have had that explosion in the laboratory.

21. If I will finish the work in time, I will join you at the lecture.

22. If the professor had known the truth, he would have been very angry.

23. If they had worked in the laboratory more, they will not have broken so much glassware.

24. If Pete had been at the lesson, I would have saw him.

25. If I had seen him, I would have reminded him about his promise.

26. If you will join us, where will you like to go?

27. If she had told me the truth, I would have helped her with her work.

28. If I would have a degree from the University, I would have a good job.

29. If he had been on time, we would have asked him many interesting questions.

Section 4

Each problem in this section consists of a sentence in which one word or phrase has been italicized. From the four choices given, you should choose the one word or phrase which could be substituted for the italicized word or phrase without changing the meaning of the sentence.

Example: Gases mix together *spontaneously.*

a) unexpectedly
b) impulsively
c) essentially
d) basically

The correct answer is (b), so you should mark (b).

30. **It may seem *strange** that man came rather late to the *investigation*** of organic polymers.**

* a) unique
b) odd
c) peculiar
d) singular

** a) examination
b) creation
c) discovery
d) invention

31. **The special processes were *fundamental* for the formation of compounds.**

a) vital
b) cardinal
c) essential
d) critical

32. ***At present,* however, we use the term "organic compounds" to mean carbon compounds.**

a) recently
b) lately
c) nowadays
d) originally

33. Most of the organic chemicals we have are *man-made*.

a) artificial
b) false
c) unreal
d) assumed

34. There's a simple *reason* for keeping carbon compounds separate: there're just too many of them.

a) objective
b) aim
c) purpose
d) cause

Section 5

In each of the following sentences, four words or phrases have been italicized. You should choose the one word or phrase that would *not* be appropriate in standard written English. Mark and write the correct word or phrase.

35. *Shortly* (a) after Galileo's time, Newton invented another *kind of* (b) telescope *which* (c) he installed mirrors *in place of* (d) lenses.

36. *From* (a) Greek philosophy *was devised* (b) Aristotle's theory *that* (c) four qualities could be ascribed to all matter — *heat* (d), dry, wet and cold.

37. The development of alchemy *can have traced* (a) through various texts, although the *authenticity* (b) of early books *is* (c) sometimes *in question* (d).

38. Both isotopes of uranium are *naturally* (a) radioactive, *that is* (b), their *large, unstable* (c) atoms slowly desintegrated *into* (d) a short period of time.

39. In *the* (a) Chapter 1 of that book there *is* (b) a *really* (c) good explanation of photosynthesis, *complete with* (d) illustrations.

Section 6

You will be given three reading passages. Each passage is followed by questions concerning its content. You are to choose the one answer to each question from the four choices given.

TEXT 1

Students beginning a study of organic chemistry learn that there are officially approved ways of naming many individual compounds, and they may even learn that the author of their textbook misdirects them in connection with such names. They are less likely, however, to learn as much history of the official nomenclature as of the reactions and theories included in the course. Yet a look at the history of official nomenclature provides some interesting insights into how chemists go about their work, how emphases and influences shift during the development of a field. Perhaps surprisingly, the characteristic of chemists that seems to persist through the history of organic nomenclature is their resistance to change — this is a group whose excitement is often associated with logical trains of thought and new reactions schemes and theoretical concepts.

Names of compounds are now based on structure, but names were coined before structures were known or even acknowledged. In a landmark paper in 1832, Justus Liebig and Friedrich Wöhler used *benzoyl* as the name for the molecular fragment that persisted in a series of reactions. The name was not associated with structure, but just with the C_7H_5O fragment; it continues in official use today for the same fragment and now also for a particular structure. The need for names always outturns the prescribing of rules for names. Some of the first-formed names like benzoyl found such wide acceptance and use that systematization, when it came, had to accommodate them. Frequently, these early, persistent names, such as formic acid (Latin *formica*, or "ant"), reflected a first or significant source of the compound. Similar practice continues today, especially with natural products of unknown structure.

40. This passage indicates that students of organic chemistry learn... .

a) most about the ways of naming compounds;
b) nothing about the ways of naming compounds;
c) little about the reactions and theories in the course;
d) more about theories than about methods of naming compounds.

41. The passage suggests that chemists... .

a) all follow officially approved ways of naming compounds;
b) do not want to change;
c) are often illogical;
d) get excited about naming compounds

42. The example of the naming of *benzoyl* was used to show... .

a) that names were not always based on structure;
b) that naming of compounds began as early as 1832;
c) that *benzoyl* was named for a molecular structure;
d) that *benzoyl* was the name for a molecular fragment

43. The passage suggests that formic acid... .

a) was originally obtained from ants;
b) has recently been renamed;
c) is not a natural compound;
d) has an unknown structure

44. Naming of compounds... .

a) has always been associated with structure;
b) is a completely logical rule-based procedure;
c) began before the "rules" for naming were established;
d) was systematized by renaming all earlier names for compounds

TEXT 2

Water on the Earth is being recycled continuously in a process known as the hydrologic cycle. The first step of the cycle is the evaporation of water in the oceans. Evaporation is the process of water turning into vapour, which then forms clouds in the sky. The second step is the water returning to the Earth in the form of precipitation: either rain, snow, or ice. When the water reaches the Earth's surface, it runs off into the rivers, lakes, and the ocean, where the cycle begins again.

Not all water, however, stays on the surface of the Earth in the hydrologic cycle. Some of it seeps into the ground through infiltration and collects under the Earth's surface as ground water. This ground water is extremely important to life on the Earth, since 95 percent of the Earth's water is in the oceans and too salty for human beings or

plants. Of the five percent on land, only .05 percent is above ground in rivers or lakes. The rest is underground water. This ground water is plentiful and dependable, because it doesn't depend on seasonal rain or snow. It is the major source of water for many cities. But as the population increases and the need for water also increases, the underground water in some areas is getting dangerously low. Added to this problem is an increasing amount of pollution that seeps into the ground water. In the future, with a growing population and more toxic wastes, the hydrologic cycle we depend on could become dangerously unbalanced.

45. Clouds are formed from... .

a) water vapour
b) evaporation
c) the hydrologic cycle
d) ground water

46. Water returns to the Earth by... .

a) infiltration
b) pollution
c) precipitation
d) evaporation

47. Ground water... .

a) depends on seasonal rain
b) comes from toxic waste
c) is .05 percent of all water
d) collects under the earth

48. The amount of ground water is... .

a) about 95 percent of all water
b) less than five percent of all water
c) .05 percent of above-ground water
d) 95 percent of above-ground water

49. The supply of ground water is getting lower because of... .

a) conservation
b) toxic waste
c) pollution
d) population increase

50. The best title for this passage is... .

a) Water Conservation
b) The Hydrologic Cycle
c) Underground Water
d) Polluted Groundwater

TEXT 3

Petroleum products, such as gasolene, kerosene, home heating oil, residual fuel oil, and lubricating oils, come from one source — crude oil found below the Earth's surface, as well as under large bodies of water, from a few hundred feet below the surface to as deep as 25,000 feet into the Earth's interior. Sometimes crude oil is secured by drilling a hole through the Earth, but more dry holes are drilled than those producing oil. Pressure at the source or pumping forces crude oil to the surface.

Crude oil wells flow at varying rates, from ten to thousands of barrels per hour. Petroleum products are always measured in 42-gallon barrels.

Petroleum products vary in physical appearance: thin, thick, transparent or opaque, but regardless, their chemical composition is made up of only two elements: carbon and hydrogen, which form compounds called hydrocarbons. Other chemical elements found in union with hydrocarbons are few and are classified as impurities. Trace elements are also found, but these are such minute quantities that they are disregarded. The combination of carbon and hydrogen forms many thousands of compounds which are possible because of the various positions and joinings of these two atoms in the hydrocarbon molecule.

The various petroleum products are refined from the crude oil by heating and condensing the vapors. These products are the so-called light oils, such as gasolene, kerosene, and distillate oil. The residue remaining after the light oils are distilled is known as heavy or residual fuel oil and is used mostly for burning under boilers. Additional complicated refining processes rearrange the chemical structure of the hydrocarbons to produce other products, some of which are used to upgrade and increase the octane rating of various types of gasolenes.

51. Which of the following is *not* true?

a) Crude oil is found below land and water;
b) Crude oil is always found a few hundred feet below the surface;
c) Pumping and pressure force crude oil to the surface;
d) A variety of petroleum products is obtained from crude oil.

52. Many thousands of hydrocarbons compounds are possible because... .

a) the petroleum products vary greatly in physical appearance;
b) complicated refining processes rearrange the chemical structure;
c) the two atoms in the molecule assume many positions;
d) the pressure needed to force it to the surface causes molecular transformation.

53. Which of the following is true?

a) The various petroleum products are produced by filtration;
b) Heating and condensation produce the various products;
c) Chemical separation is used to produce the various products;
d) Mechanical means such as the centrifuge are used to produce the various products.

54. Crude oil is brought to the surface by... .

a) expansion of hydrocarbons;
b) pressure and pumping;
c) vacuum created in the drilling pipe;
d) expansion and contraction of the Earth's surface.

55. Which of the following is *not* listed as a light oil?

a) distillate oil
b) gasolene
c) lubricating oil
d) kerosene

Appendix 1

Grammar Material

UNIT 1

Finite tense-aspect forms of the verb have the function of the predicate (сказуемое) in the sentence and are characterized by the following categories: tense-aspect, person, number, voice and mood.

They show the connection of the subject (подлежащее) and the predicate (сказуемое).

The System of English Tenses

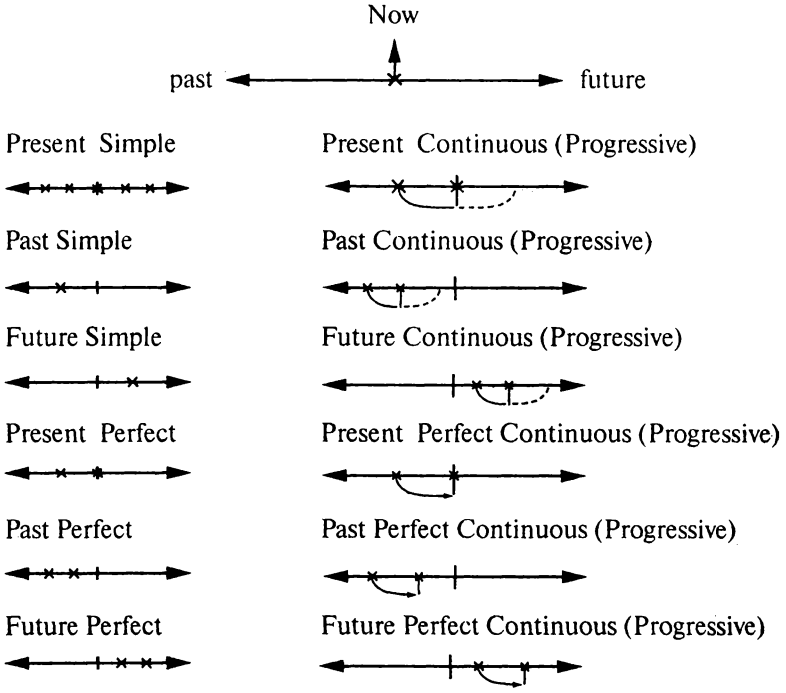
Table 1

Aspects or groups and voice infinitives	Past Actions preceding the moment of speaking	Present From speaker's point of view	Future Actions following the moment of speaking
Simple Act. **to solve** — решать Pass. **to be solved** — решаться	He **solved** the problem *yesterday*. The problem **was solved** *yesterday*.	He *always* **solves** problems in chemistry. Problems **are** *always* **solved** in chemistry.	He **will solve** the problem *tomorrow*. The problem **will be solved** *tomorrow*.
Continuous (Progressive) Act. **to be solving** — решать в определенный момент Pass. **to be being solved** — решаться в определенный момент	He **was solving** the problem *yesterday at that time*. The problem **was being solved** *at that time*.	He **is solving** the problem *now*. The problem **is being solved** *now*.	He **will be solving** the problem *at this time tomorrow*. —
Perfect Act. **to have solved** — (уже) (раз)решить Pass. **to have been solved** — (уже) было решено	He **had solved** the problem *before we came*. The problem **had been solved** *by that time*.	He **has** *already* **solved** the problem. The problem **has** *already* **been solved**.	He **will have solved** the problem *by this time tomorrow*. The problem **will have been solved**.
Perfect Continuous (Progressive) Act. **to have been solving** — решать в течение определенного отрезка времени Pass. —	He **had been solving** the problem *for 2 hours when we came*. —	He **has been solving** the problem *for an hour*. —	He **will have been solving** the problem *for a long time when we come*. —

Summary Chart of Verb Tenses

Table 1 A

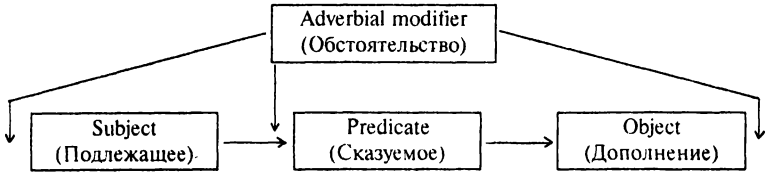
The moment of speaking



UNIT 2

English Sentence Structure

Table 2



Questions Formation

Table 3

Sentence Type			Subject	Predicate	Object or Adverbial Modifier
Affirmative sentence (Утвердительное предложение)			Alchemy The facts The book People Chemistry	**began to decline** **can be observed** **was published** **have long had** **studies**	in 1539. by us. in England. a lust for gold. compounds.
General questions (Общие вопросы)		**Did** **Can** **Was** **Have** **Does**	alchemy the facts the book people chemistry	**begin to decline** **be observed** **published** **long had** **study**	in 1539? by us? in England? a lust for gold? compounds?
Special questions	*When* *How* *Where*	**did** **can** **was**	alchemy the facts the book	**begin to decline?** **be observed?** **published?**	–
Questions to the subject	*What* *Who* *What*		 science	**began to decline** **was published** **can observe** **studies**	in 1539? in England? the facts? compounds?
Disjunctive questions (Разделительные вопросы) *Note:* *Example:*	Alchemy **began to decline** in 1539, **didn't** it? The facts **can be observed** by us, **can't** they? The book **was published** in England, **wasn't** it? People **have long had** a lust for gold, **haven't** they? Chemistry **studies** compounds, **doesn't** it? If the sentence is negative, the end of the disjunctive question is positive. (Если предложение отрицательное, «хвостик» разделительного вопроса – положительный.) Physics **doesn't study** chemical changes, **does** it?				
Alternative questions (Вопросы выбора)	**Did** alchemy **begin to decline** in 1539 *or* **did** it **begin to decline** earlier? **Can** the facts **be observed** by us *or* by you? **Was** the book **published** in England *or* **was** it **published** in Germany? **Does** chemistry **study** chemical *or* physical changes?				

UNIT 3

Sequence of Tenses

Table 4

It **is known** that *Известно*, что	a) they always **make** such experiments. они всегда *проводят* такие опыты. b) they **made** such experiments last year. они *проводили* такие опыты в прошлом году. c) they **will make** such experiments next year. они *будут проводить* такие опыты в будущем году.
It **was known** that *Было известно*, что	a) they always **made** such experiments at that time. они всегда *проводят* опыты в это время. b) they **had made** such experiments the year before. они *проводили* такие опыты в прошлом году. c) they **would make** such experiments the next year. они *проведут* такие опыты в следующем году.

No Sequence of Tenses in Russian

Известно, что	a) они всегда *проводят* такие опыты.
	b) они *проводили* такие опыты в прошлом году.
Было известно, что	c) они *будут проводить* такие опыты в следующем году.

UNIT 4

Modal verbs are used to show the speaker's attitude toward the action or state indicated by the infinitive, i. e. they denote that the action indicated by the infinitive is considered as:

— possible,
— impossible,
— probable,
— improbable,
— obligatory,
— necessary,
— advisable,
— doubtful,
— uncertain, etc.

Modal Verbs and Similar Expressions

Table 5

Modal Verbs	Examples	Meaning
can	**Can** I **stay** in the laboratory?	Permission
	Я могу остаться в лаборатории?	(Разрешение)
	Can you **explain** to me the formula?	Request
	Ты *можешь объяснить* мне эту формулу?	(Просьба)
	Students **can attend** any lecture.	Possibility
	Студенты *могут посещать* любую лекцию.	(Возможность)
	I can't find the book I need.	Inability
	Я не могу найти нужную книгу.	(Невозможность)
	I **can do** it in no time.	Potency
	Я могу сделать это моментально.	(Способность)
be able to	**I'm able to do** it in no time.	
could	**Could I borrow** your notes?	Permission
	Можно взять твои записи?	
	Could you **give** an example?	Request
	Дайте пример, пожалуйста.	
	We **could ask** Dr. Black for help.	Suggestion
	Мы *могли бы обратиться* к д-ру Блеку за помощью.	(Предложение)
	We **could do** it in no time.	Potency
	Мы *могли делать* это моментально.	
were able to	We **were able to do** it in no time.	
may	**May** I **borrow** your notes?	Permission
	Могу я (*Можно* мне) взять твои записи?	
	(более официально, чем **could**)	
	The acid rain **may spoil** the crop.	Chance (Шанс/
	Кислотный дождь *может испортить* урожай.	Возможность)
might	It **might be** possible to make the experiment.	Future possibility
	Есть возможность провести эксперимент.	(Возможность в будущем)
	He **might be** wrong, but he was open to reason.	Chance
	Он *бывал неправ*, но его можно было убедить.	
will	How many people **will work** here?	Future fact
	Сколько людей *будет* здесь *работать?*	(Факт в будущем)
	There **won't be** much space.	Prediction
	Будет мало места.	(Предсказание)
	I'll give you my notes.	Promise
	Я *дам* тебе свои записи.	(Обещание)
	Under these conditions the process **will be irreversible.**	Property
	При этих условиях процесс всегда *будет (бывает) необратимым.*	(Свойство или его отсутствие)
	The door **won't open.**	
	Дверь *не открывается.*	

(continued)

Modal Verbs	Examples	Meaning
would	**Would** you **speak** louder, please? *Говорите*, пожалуйста, громче. What book **would** you **like** to have? Какую книгу вы бы *хотели?* **Would** you **like** to join us? *Не хотите* к нам присоединиться? What time **would suit** you? Какое время вам *подходит?* **Would** you **do** this if we help you? Вы *сделаете* это, если мы вам поможем? Man **would** ever **ask** questions. Человеку всегда *свойственно задавать* вопросы. Nature **would** never **be exhausted** to challenge man with more riddles. Природа *неистощима* в своей способности ставить перед человеком все новые вопросы.	Request Offer (Предложение) Invitation (Приглашение) Suggestion Property
shall	**Shall I do** this for you? Мне *сделать* это для вас? **Shall** we **ask** for volunteers? Нам *позвать* добровольцев? You **shall do** it as I say. Ты *сделаешь* так, как я говорю. We **shall let** you **know** our decision. Мы *дадим* вам *знать* о нашем решении.	Offer Suggestion Insistence (Restricted use) (Настоятельность) Intention on the part of the speaker, only in the 1st person
should	I think we **should do** this in time. Я думаю, что мы *должны* это *сделать* вовремя. It's an English journal, so you **should use** a dictionary. Это английский журнал, так что вам *следует пользоваться* словарем.	Recommendation (Рекомендация) Saying what is right or correct (Констатация того, что правильно)
must **be to** **have to**	Students **must attend** seminars. Студенты *должны посещать* семинары. Students **mustn't work** in the lab without the instructor. Студенты *не должны работать* в лаборатории без инструктора. This metal **is to be found** in nature in a free state. Этот металл *находят (можно найти)* в природе в свободном состоянии. He **has to attend** lectures. Он *вынужден посещать* лекции.	Obligation (Обязательность) Prohibition (Запрет) Arrangement (Запрограммированность) Circumstances (Обстоятельства)

(continued)

Modal Verbs	Examples	Meaning
ought to	You **ought to start** at once. Тебе *надо начать* немедленно. They **ought to be** here by now. Они уже *должны быть* здесь.	Obligation (Logical necessity or expectation) (Логическая необходимость или ожидание)
Note: **Ought** in denoting obligation and logical necessity is less categorical than **must.**		

The Use of Modal Verbs in Different Types of Sentences

Table 6

Verbs with **not** and **n't**		In a question	Describing what someone said
can	She **can't/cannot do** this.	**Can** she **do** this?	She *said* she **could do** that.
could	I **couldn't/could not do** that when I was a child.	**Could** you **do** that when you were a child?	He *said* he **could do** that when he was a child.
may	You **may not attend** this lecture.	**May I attend** this lecture?	I *said* you **may not attend** this lecture.
might	He **might not be** in this laboratory.	Where **might** he **be**?	He *said* he **might be** in the laboratory.
shall	We **shall not do** this work.	**Shall** we **do** this work?	They *said* we **should do** that work.
must	You **must not come** in here.	**Must** you **go** there?	They *said* they **must go** there.
have to	You **don't/do not have to go** there.	**Do** you **have to go** there?	They *said* they **had to go** there.
are to	You **aren't/are not to record** the data.	**Are** you **to record** the data?	They *said* they **were to record** the data.
should	He **shoudn't/should not record** the data.	**Should** he **record** the data?	They *said* he **should record** the data.
ought	You **oughtn't/ought not to go** there.	**Ought** you **to go** there?	They *said* you **ought to go** there.
will	It **won't/will not take** two hours to do the work.	**Will** it **take** two hours to do the work?	They *said* it **would take** two hours to do the work.
used to	I **didn't use to work** there.	**Did** you **use to work** there?	They *said* they **used to work** there.
would	I **wouldn't/would not go** there.	**Would** you **go** there?	They *said* they **would** often **go** there.
Note: Questions with **might** are rare. **Could** is more often used. E. g.: Where **could** he be?			

UNIT 5

Direct and Indirect Speech

Table 7

Affirmative Sentences (Повествовательные предложения)		
He **says** He **tells** me (I **am told**)	that he	1) **will make** experiments tomorrow. 2) **makes** experiments every day. 2) **is making** an experiment now. 3) **has** already **made** the experiment. 3) **made** an experiment yesterday.
He **said** He **told** me (I **was told**)	that he	1) **would made** experiments... 2) **made** experiments... 2) **was making** an experiment... 3) **had** already **made** the experiment. 3) **had made** an experiment...
Indirect Questions (Косвенные вопросы)		
a) General Questions		
We **ask** him He **is asked**	if he whether	1) **will make** an experiment. 2) **makes** experiments... 2) **is making** an experiment... 3) **has** already **made** the experiment... 3) **made** an experiment...
We **asked** him He **was asked**	if he whether	1) **would make** an experiment... 2) **made** an experiment... 2) **was making** an experiment... 3) **had** already **made** the experiment... 3) **had made** an experiment...
b) Special Questions		
We **ask** him (He **is asked**)	what how he where when*	1) **will make** experiments... 2) **makes** experiments... 2) **is making** an experiment... 3) **has** already **made** the experiment... 3) **made** the experiment...
* After **when** you can't use Present Perfect and Present Continuous (Progressive).		

UNIT 6

Verbals

Table 8

	Active	Passive
Infinitive Simple	**to ask**	**to be asked**
Infinitive Continuous (Progressive)	**to be asking**	—
Infinitive Perfect	**to have asked**	**to have been asked**
Infinitive Perfect Continuous (Progressive)	**to have been asking**	—
Gerund Simple	**asking**	**being asked**
Gerund Perfect	**having asked**	**having been asked**
Participle Present	**asking**	**being asked**
Participle Past	—	**asked**
Participle Perfect	**having asked**	**having been asked**

Note: Negation **not** is placed before the infinitive and participle: **to do — not to do, having done — not having done.** Gerund is used with the preposition **without: saying — without saying.**

Infinitive and Its Translation into Russian

Table 9

Examples	Translation
1. **To make** experiments is useful.	*Проводить* эксперименты — полезно.
2. a) The problem was — **to understand** the procedure.	Задача состояла в том, чтобы *понять* процедуру.
b) He was **to make** the solution.	Он должен был *приготовить* раствор.
c) He began **to experiment** in his early childhood.	Он начал *экспериментировать* в раннем детстве.
3. She wanted **to speak** with the lecturer.	Она хотела *поговорить* с лектором.
4. The method **to be used** is being discussed now.	Метод, который должен *быть использован*, сейчас обсуждается.
5. There was only one method **to be discussed.**	Существовал только один метод, *который можно было обсуждать.*
6. He was the first **to write** the test.	Он был первым, кто *написал* тест.
7. We must work hard (in order, so as) **to master** chemistry.	Мы должны упорно работать, чтобы *овладеть* химией.
8. Materials thrown out by volcanoes are spread over the surface **to form** fertile soils.	Материалы, выбрасываемые вулканами, распространяются по поверхности, *образуя* плодородные почвы.

Gerund and Its Translation into Russian

Table 10

Examples	Translation
1. **Attending** lectures is not obligatory.	*Посещение* лекций не обязательно.
2. Her greatest pleasure was **working** in the laboratory.	Самое большое удовольствие для нее — *работа (работать)* в лаборатории.
3. He began **making** the experiment yesterday.	Он начал *проводить* эксперимент вчера.
4. We remember **having discussed** this problem two days ago.	Мы помним, что *обсуждали* этот вопрос два дня назад.
5. The professor was pleased with Tom's **studying** organic chemistry.	Профессор был доволен тем, что Том *изучает* органическую химию.
6. They insisted on the conference **being put off.**	Они настояли на том, чтобы конференция *была отложена.*
7. I don't like his manner of **lecturing.**	Мне не нравится его манера *читать* лекции.
8. The barometer is an instrument for **measuring** pressure.	Барометр — это инструмент для *измерения* давления.
9. After **having read** the article, she wrote a letter to Dr. Brown.	*Прочитав* статью, она написала письмо д-ру Брауну.
10. They worked **without stopping** for rest.	Они работали, *не останавливаясь* для отдыха.
11. **In copying** the formula, he made a few mistakes.	*Переписывая* формулу, он сделал несколько ошибок.
12. We enrich our knowledge of chemistry **by making** experiments.	Мы обогащаем наши знания по химии, *проводя* эксперименты.

Participle, Its Functions and Translation into Russian

Table 11

Functions	Examples	Translation
Participle I doing expresses simultaneous action with the main verb (выражает одновременное действие с действием, выраженным основным глаголом)		
1. Adverbial modifier (Обстоятельство)		
a) of time (времени)	(While) **making** the experiment, he broke some glassware.	*Проводя* опыт, он разбил посуду.
b) of reason (причины)	**Knowing** the subject well, he helped his fellow students.	Хорошо *зная* предмет, он помогал своим однокурсникам.
c) of manner (образа действия)	**Not knowing** what the matter was, we couldn't help her.	*Не зная*, что с ней, мы не могли ей помочь.
2. Attribute (Определение)	I like books **describing** scientific discoveries.	Мне нравятся книги, *описывающие* научные открытия.
Perfect Participle having done expresses the action preceding the action expressed by the main verb (выражает действие, предшествующее действию, выраженному основным глаголом)		
Functions	Examples	Translation
1. Adverbial modifier		
a) of reason	**Having lost** his notes, he couldn't get ready for the seminar.	*Потеряв* свои записи, он не смог подготовиться к семинару.
b) of time	**Having conducted** the experiment, he handed in the results to the teacher.	*Проведя* эксперимент, он сдал результаты преподавателю.
Note: Perfect Participle is not used as an attribute. Перфектное причастие не употребляется в качестве определения.		
	Everybody knows the name of the man **who made** this discovery.	Все знают имя человека, *сделавшего* это открытие.
Participle II worked, done has the meaning of the passive voice (имеет значение страдательного залога)		
1. Attribute	We were impressed by the discovery **described** in the article.	Открытие, *описанное* в статье, произвело на нас большое впечатление.
2. Adverbial modifier	(When) **asked** to make the experiment, he refused.	Когда его *попросили* провести опыт, он отказался.

UNIT 7

The Use of the Complex Object

Table 12

1. After the verbs denoting *desire*, and the verbs **to like** and **to hate**	They *wanted* **me to make** the experiment.	Они *хотели, чтобы я провел* эксперимент.
2. After the verbs denoting *sense perception:* **to hear, to notice, to observe, to feel** and after **to make** and **to let**	I *saw* **him make** the experiment. I *saw* **him making** the experiment.	*Я видел, что он проводил* эксперимент. *Я видел, как он проводил* эксперимент.
3. After the verbs denoting *mental activity:* **to know, to think, to consider, to believe, to suppose, to expect,** etc.	I *consider* **him to be right.** We *expected* **him to write** an article.	*Я считаю, что он прав.* Мы *ожидали, что он напишет* статью.
4. After the verbs denoting *order, request, permission* (infinitive is passive)	The instructor *ordered* **the goggles to be worn.**	Инструктор *приказал носить очки.*
5. After the verbs requiring prepositional object: **to wait for, to count on** and others	I *rely* **on you to make the experiment.**	Я рассчитываю *на то, что вы проведете опыт.*

The Use of the Complex Subject

Table 13

1. When the predicate is in the passive voice and is expressed by the verbs **to say, to state, to report, to announce, to believe, to expect, to know** and others.	**He is said to take part** in the conference.	*Говорят,* что *он примет участие* в конференции.
2. When the predicate is in the active voice and is expressed by the verbs **to seem, to appear, to happen, to prove, to chance, to turn out.**	**She seems to have missed** the lecture.	*Кажется, она пропустила* лекцию.
3. When the predicate is expressed by adjectives **likely, unlikely, certain, sure** with the verb **to be.**	**They are likely to take part** in the experiment.	*Они, вероятно, примут участие* в эксперименте.

Absolute Participle Construction

Table 14

1. Nowadays we use the term "organic compound" to mean "carbon compounds", **there being some exceptions to the rules.** В настоящее время мы используем термин «органические соединения» для обозначения «соединения углерода», *хотя существуют некоторые исключения из этих правил.*
2. **The carbon chain being practically of any length,** the number of possible hydrocarbons is enormous. *Поскольку (так как) существует цепь углерода практически любой длины,* количество возможных углеродов — огромно.

Gerundial Constructions

Table 15

1. Non-chemist **can't help being surprised** to learn that many chemical compounds are obtained from living matter. Неспециалист в химии *не может не удивляться тому,* что многие химические соединения получают из живой материи.
2. These experiments are **worth conducting (being conducted).** Эти опыты *стоит проводить.*
3. We insisted **on the students' participating** in the discussion. Мы настояли на том, *чтобы студенты приняли участие* в обсуждении.
4. There was no hope **of his being invited** to the conference. Не было никакой надежды на то, *что его пригласят* на конференцию.
5. **On the lecturer's appearing** in the hall, there was a loud applause. Когда *лектор появился* в зале, раздались громкие аплодисменты.
6. He stopped **recording** the data and started **speaking** with his supervisor. Он перестал *записывать* данные и начал *беседовать* со своим руководителем.

UNIT 8

1. SUBJUNCTIVE MOOD

SIMPLE SENTENCE (ПРОСТОЕ ПРЕДЛОЖЕНИЕ)

should, would, could, might	+	Present Future Past	a) Simple Infinitive b) Perfect Infinitive

They **would like** to make another experiment.
We **should call** this substance by a different name. } Present / Future
He is in the laboratory now. He **could (would, might)** help us.

Why didn't he come yesterday?
We **could have made** the experiment together. } Past
The work **might have taken** less time.

} Desirable, problematic, doubtful actions.

COMPOUND SENTENCES (СЛОЖНЫЕ ПРЕДЛОЖЕНИЯ)

Conditional Clauses (Условные придаточные предложения)

Present, Future	**be, were, could, had, spoke, knew**
Past	**had been, had spoken, had known**

if, unless, in case, provided (providing) (that), on condition (that), even though, suppose, if it were not for, but for, granting

1. *If* she comes tomorrow, I **shall give** her my notes. (real conditions) — No subjunctive mood is used.

2. *If* she **came,**
   If she **should come,**
   Should she **come,**
   If she **were to come,**
   Were she **to come,**
   } I **should (could, might)** **give** her my notes.

3. *If* she **had come** last night,
   Had she **come** last night, } I **should (could, might)** **have given** her my notes.

} Action contrary to reality.

Emphatic Constructions

Emphatic If-Clauses

If he **(be) were** here, he **would help** us.
If I **had** time, I **could help** you.
If it **had not been** for their assistance, she **would not have completed** the work.

Were he here, he **would help** us.
Had I time, I **could help** you.
Had not it **been** for their assistance, she **would not have completed** the work.
But for their assistance she **would not have completed** the work.

Emphasis with It

It is these properties of crystals **that** are the most important.
It was the Dutch physicist, Christian Huygens, **who** first offered an explanation for that phenomena.
It was in the laboratory **where** all this started.

Именно эти свойства кристаллов наиболее важны.
Именно голландский физик Кристиан Хиггинс первым предложил объяснение этих явлений.
Именно в лаборатории все это началось.

2. SUPPOSITIONAL MOOD
(Предположительное наклонение)

Subject Clause		**should** + Infinitive	
a) It is	*necessary, important, essential, recommended*	that you **(should)*** **make** the report.	Suppostion, Necessity, Probability
	advisable, likely, probable, strange	that this law **(should)** **be observed.**	
b) I	*demand, command, order, advise, insist, suggest, require, propose*	that they **(should)** **work** together.	Requirement, Order, Purpose, Advice

* Note that **should** is often omitted.

UNIT 9

Incomplete Clauses with the Participle. Emphatic Concessive Clauses. Elliptical Sentences

1. Participle constructions introduced by preposition **with** are widely used in English scientific and technical literature. They are similar to absolute participle construction (see grammar tables to Unit 7) and express accompanying circumstances or a reason and are translated in the same way:

With the isomerization preceding the reaction, the yields were very low.	*Поскольку до реакции происходила изомеризация,* выходы были очень низкие.

You may often come across participle constructions with preposition **with** missing **being**.

There is a rather high temperature coefficient for activation **with a temperature optimum at about 35°C.**	Температурный коэффициент процесса активации довольно высок, *а температурный оптимум находится около 35°С.*

2. a) In *emphatic concessive clauses* the compound nominal predicate occupies the first place and is expressed by an adjective or an adverb followed by conjunction **as, though** or with preceding **however**:

Hard as it is, the experiment should be made.	*Как ни трудно,* эксперимент должен быть сделан.
Late though it was, the laboratory was open.	*Хотя и поздно,* лаборатория была открыта.
However difficult this experiment is, the one made last week was more difficult.	*Как бы ни был труден этот эксперимент,* тот, который был сделан на прошлой неделе, был более трудным.

b) Concessive clauses expressing additional nuance of possibility begins with a pronoun or adverb with **ever**. They may be used with verbs **may/might** or without them. In translation into Russian these verbs are usually omitted.

You are a great specialist, **whatever other people (may) say.**	Вы — большой специалист, *что бы люди ни говорили.*

3. *Elliptical sentences* and their translation into Russian:

The rock contains little, **if any,** ground water.	Скальная порода содержит мало, *если вообще содержит,* почвенной воды.
This relationship seldom, **if ever,** occurs in the actual atmosphere.	Эта взаимосвязь редко встречается в атмосфере, *если вообще встречается.*
The observations provide evidence that the atmosphere on the Mercury must be of extreme rarity, **if any at all.**	Наблюдения свидетельствуют о том, что атмосфера на Меркурии — явление исключительно редкое, *если она вообще существует.*

4. Inverted word order is widely used in scientific literature to emphasize structural part of a sentence. The first place is occupied by the part of the sentence being emphasized, and this leads to the *inverted word order.* Inverted word order in the sentence may be due to some adverbs and conjunctions: **only, hardly... when, scarcely... when, no sooner than, not only... but also, nowhere, neither... nor, never.**

Only yesterday **was he told** about the exam.
Never does she come in time.
Only with this substance **can this compound be tasted.**
No sooner had he started the experiment **than** he was interrupted.
Never had I listened to such an interesting lecture.
Hardly had I begun the experiment **when** the baker was broken.
Not only did he explain the law again, **but** he **also** helped us to write the formula.
So little did she say that none could follow her.
Nowhere could I find the book on this subject.
Neither the students nor the teachers were allowed to enter the laboratory after the explosion.

UNIT 10

Construction *there is (there are)*. Use of the Attribute. Comparative Construction. Object Clauses and Adverbial Clauses in Subjunctive Mood

1. The translation of the sentences with the construction **there is (there are)** or **there** + **verb** should be started with an adverbial modifier of place, if there is one. The construction **there is (there are)** is translated as *есть, существует, находится:*

There is some discrepancy in the results obtained.	*Существуют (есть)* некоторые расхождения в полученных результатах.

Some other intransitive verbs may be used with this construction: **exist**, **come** and some other, and verbs in the passive voice as well:

There exist many different ways to liquefy gases.	*Существует (есть)* много различных способов сжижения газов.
There has been recently **developed** a new method in the laboratory of ultrasound.	В лаборатории ультразвука недавно *был разработан* новый метод.

If in the sentence with the construction **there is** the subject is characterized by participle I, this participle is translated by a finite form of the verb, i. e. by predicate:

There is some force **acting** on the particle.	На эту частицу *действует* какая-то сила.

If in the sentence with the construction **there is** the subject is characterized by the infinitive, then the infinitive is translated by a finite form of the verb, i. e. by predicate with modal meaning:

There are many measurements **to be made.**	*Следует сделать* много измерений.

2. The attribute does not have a definite place in the sentence. It may characterize any part of the sentence which is expressed by a noun. One of the important attributes is the so-called "right-hand attribute" which is expressed by a noun with a preposition. The meanings

of these word combinations are not always easily understood from the meanings of the noun and preposition, that is why it is necessary to memorize them and use the methods of translation given below:

The problem **under consideration.**	Проблема (вопрос), *которая(ый) рассматривается.*

Some other examples of the phenomenon are given:

the method **in use;** the program **under development/discussion;** the theory **in existence;** the equipment **in operation;** the chemicals **in production;** the work **of great importance/significance/interest;** the glassware **in common use;** the paper **in question** (*статья, о которой идет речь*)

3. The comparative construction with **the... the.**

a) The construction **the** + adjective/adverb in the comparative degree is translated into Russian using *чем* + adjective/adverb in the comparative degree, *тем* + adjective/adverb in the comparative degree:

The sooner **the** better.	*Чем* скорее, *тем* лучше.
The more we learn, **the** more we know.	*Чем* больше мы учим, *тем* больше мы знаем.

b) If the construction with **the... the** follows the subject, it is translated by *тем* + adjective/adverb in the comparative degree, *чем* + adjective/adverb in the comparative degree:

The reaction proceeds **the quicker, the finer** are the reactants divided.	Реакция протекает *тем быстрее, чем тоньше* измельченные реагенты.

4. Some additional phenomena of English syntax in subjunctive mood:

a) Object clauses (after **to wish**) express the action as desirable, suppositional, doubtful or contradicting the reality.

I **wish** they **would** go to the conference.	Мне *хотелось бы, чтобы* они *поехали* на конференцию.

The action in this case refers to the present or future (desirable and suppositional):

I **wish I had made** the experiment two days ago.	*Как жаль,* что я *не провел* эксперимент два дня назад.

This action refers to the past.

b) Adverbial clauses beginning with the conjunction **as if (as though):**

He speaks **as if** he **knew** the subject very well.	Он говорит так, как будто *знает* этот предмет очень хорошо.

This action refers to the present.

He speaks about it **as if** he **had seen** the experiment himself.	Он говорит об этом так, как будто *видел* этот опыт сам.

This action refers to the past.

Lexical Material

FIRST YEAR

UNIT 1

achieve — достигать
adequate — адекватный
advance — выдвигать; продвижение вперед
ancient — древний
application — применение
appreciate — ценить
arrange — организовать
associate — связывать
behaviour — поведение
branch — ветвь, отрасль
change — менять; изменение
complexity — сложность
composition — состав
concept — понятие
concern — иметь дело; участие, интерес, обеспокоенность
contribute — вносить вклад
convert — преобразовывать, превращать
create — создавать
credit with — приписывать
deal with — иметь дело с
definition — определение
developments — развитие; события
devise — разрабатывать
difficult — трудный
enjoy — пользоваться; наслаждаться
enormous — огромный
entirely — полностью
error — ошибка
essentially — существенно
even though — даже хотя
goal — цель
govern — руководить; руководствоваться
growth — рост
humanity — человечество
improve — улучшать
in addition — в дополнение
include — включать
interpret — объяснять
invent — изобретать
it was not until — только
knowledge — знание(я)
master — осваивать; улучшать
matter — материя
nutritionist — диетолог
observe — наблюдать, замечать
occupy — занимать
physician — врач
poisonous — ядовитый
produce — производить
prolong — продлевать
property — свойство
range — область, сфера
rapid — быстрый
ratio — отношение
relate — соотносить, связывать

require — требовать
reveal — открывать
seek — искать
significant — значительный
simplicity — простота
space — пространство
substance — вещество
sweet — сладкий
to name just a few — назвать лишь нескольких
trait — черта
trial — проба
ultimate/ly — конечный/в конечном счете
unique — уникальный
universe — вселенная
valid — имеющий силу
variety — многообразие
vast — огромный
well-being — благо
wither — стареть

UNIT 2

ability — способность
achievement — достижение
acid — кислота; кислотный
advocate — защищать
ageing — старение
ailment — болезнь
appear — появляться; оказываться
apply — применять
as early as — уже
attempt — пытаться; попытка
bear — выносить; носить
benefit — выгода; выиграть
break down — разбивать(ся)
carry out — выполнять
chemical balance — весы
condemn — осуждать
cure — вылечивать; лекарство
damage — наносить ущерб; ущерб, урон
datum (*pl.* **data**) — данная (данные)
decay — приходить в упадок; упадок
decline — умирать; упадок
dependent on — зависящий от
desire — желание
determine — определить
disease — болезнь
distinguish — различать
effort — попытка, усилие
equipment — оборудование
evidence — свидетельство
evolve — развиваться
extensive — усиленный
fight — сражаться; борьба
founder — основатель
great strides — семимильные шаги
guide — руководить; вести
herb — трава
indefinitely — бесконечно; неопределенно
internally — внутренне
law — закон
lay the foundation — заложить основу
loosely — свободно
lust — страсть, желание
measurement — измерение

mercenary — корыстный; наемный
objective — задача
occur — появиться
outspoken — откровенный
outstanding — выдающийся
pave the way — проложить путь
performance — выполнение
prescribe — предписывать
purpose — цель
rare — редкий
raw — сырой
reasoning — рассуждение
recognition — признание
record — записывать; запись
reliance — доверие
remedy — лекарство
Renaissance — эпоха Возрождения
resist — сопротивляться, противостоять
rid of — избавить(ся) от
scholar — ученый
search — искать; поиск
shroud — окутывать; покров
solvent — растворитель; растворяющий
sound — здравый
spirit — дух; настроение; спирт
spread — распространять(ся)
steam — пар
subject to — предмет; подвергать(ся)
The Mediterranean — Средиземное море
through — через, посредством
transmit — передавать
transmute — преобразовать
treatment — лечение; рассмотрение; отношение
tremendous/ly — потрясающий/потрясающе
unfortunately — к сожалению
urge — убеждать, настаивать
value — величина, значение; ценность
weight — вес
worthwhile — стóящий

REVISION AND DEVELOPMENT

UNITS 1 AND 2

acceptance — принятие, признание
affair — дело
art — искусство
bead — бусинка
clay — глина
decline — падение, упадок
dye — краситель
ebb — упадок
enameling — покрытие эмалью
establish — установить
excavation — выкапывание
failure — неудача, провал
gain — получать; завоевание
in particular — в частности
keen — острый; ищущий
main — главный
paint — краска

pottery-making — гончарное дело
remarkable/ly — замечательный/замечательно
rest on — лежать на, базироваться
shape — формировать; форма
shortcoming — недостаток
similar — аналогичный
speculation — рассуждение
succeed — сменять
tomb — гробница
well-preserved — хорошо сохранившийся
wine-making — виноделие

UNIT 3

according — в соответствии
agreement — согласие; соглашение
appoint — назначать
arrangement — организация
comparison — сравнение
comprehensive — обширный
convince — убедить
density — плотность
description — описание
differ — отличаться
experience — испытывать; опыт
express — выражать
faith — вера
familiar — знакомый
far from — далеко
firmly — твердо, жестко
honour — чтить; честь
important — важный
in general — в общем
in no way — никоим образом
in terms of — на языке
increasing — возрастающий
independent — независимый
influence — влиять
insight — внутреннее ви́дение
justification — оправдание
lucidly — ясно
majority — большинство
necessary — необходимый
opinion — мнение
particle — частица
point out — указать, отметить
predict — предсказать
proud — гордый
realize — понимать
represent — представлять
row — ряд
similarity — схожесть
subsequent — последующий
suffer — страдать
tool — инструмент
undoubtedly — без сомнения
well-ordered — упорядоченный
without doubt — без сомнения

UNIT 4

aftermath — последствие
blood-soaked — пропитанный кровью
brilliant — блестящий
combustion — горение
commence — начинать

compose — составлять
condition — обусловливать; условие
decompose — разлагать(ся)
definite — определенный
degree — градус, степень
deliver — доставлять
despite — несмотря на
devote — посвящать
disprove — опровергать
entire — полный
erroneous — ошибочный
evaporate — испаряться
exact/ly — точный/точно
exist — существовать
expand — расширять
extraordinary — чрезвычайный
foot — подножие
for instance — например
former — бывший
government — правительство
lawyer — юрист
licence — лицензия
liquid — жидкость
liquefy — сжижать
means — средство
melt — таять
obtain — получить
participation — участие
prematurely — преждевременно
primarily — первым делом, первоначально
prove — доказывать
pursue — заниматься, проводить
relative — относительный
respiration — дыхание
salt — соль
service — служба
solid — твердое тело
state — состояние
suppression — подавление
tax — налог
tell — узнавать, различать
vanquish — побеждать, преодолевать
vaporize — выпаривать
vapour — пар
volume — объем
wealth/y — богатство/богатый
welfare — благосостояние

REVISION AND DEVELOPMENT

UNITS 3 AND 4

acceleration — ускорение
affinity — слабость
alloy — сплав
bitter — горький; огорченный
clamp — скреплять
clue — ключ
comprise — включать, охватывать
consequently — следовательно
dangerous — опасный
decipher — расшифровать
dilute — разбавлять

dimension — измерение
distribution — распределение
dramatically — резко
emit — испускать
genius — гений
go ahead — продолжай
harmful — вредный
I guess — я думаю
in experienced hands — в умелых руках
in honour of — в честь
income reducer — сократитель расходов
irritate — раздражать
jewellery — драгоценность
layer — слой
low spirits — плохое настроение
lustrous — блестящий
meaning — значение
moist — сырой, влажный
nearly — почти
ornamental — служащий украшением
pale — бледный
pattern — модель
pitchblende — уранинит
plenty of — много
precious — драгоценный
probe — исследовать
randomly — наугад
regarding — принимая во внимание, считая
render — предоставлять
residue — осадок, отстой
sharp — острый, резкий
smell — запах
specimen — особь
stannate — соль оловянной кислоты
tableware — посуда (*вилки, ложки, ножи*)
throat — гортань
tissue — ткань
treat — рассматривать, относиться
violent — яростный
volatile — летучий

UNIT 5

abundance — избыточность
advantage — преимущество
artificial — искусственный
as well as — также
attention — внимание
boiler — котел
brook — ручей
burn — гореть
cause — вызывать; причина
commonly — обычно, обыкновенно
compound — соединение
cool — охлаждать; прохладный; *слэнг* модный
cover — покрывать; покрытие
creek — залив, бухта
current — течение, ток; настоящий
depend on — зависеть от
fail — терпеть неудачу
fit — подходить; подходящий
former — *букв.* образователь (*воды*)
frost — мороз

frozen — замороженный
ground water — грунтовая вода
heat — нагревать; жара
imagination — воображение
implication — значение, подтекст
importance — важность
impossible — невозможный
impurity — примесь
mark — отмечать; отметка
observation — наблюдение
outlook — точка зрения; кругозор
point of view — точка зрения
pond — пруд
puddle — лужа
pure — чистый
purification — очищение
release — высвобождать
remove — удалять
scale — окалина; накипь
settle — решать, устанавливать
sleet — дождь со снегом
slush — талый снег
soap — мыло
soluble — растворимый
state — утверждать
sufficient/ly — достаточный/достаточно
tap — кран
thorium nitrate — нитрат тория
thunderstorm — гроза
undesirable — нежелательный
visibly — явно; видимо
wave — волна

REVISION AND DEVELOPMENT

UNITS 1–5

comply — уступать, соглашаться
destroy — разрушать
division — деление
dull-red — бледно-красный
equal — равный
evasive — неуловимый, уклончивый
How smart you are! — Умница!
mention — упоминать
mercury oxide — окись ртути
presentation — доклад
primary — имеющий первостепенное значение
quantity — количество
recognize — признавать; узнавать
relatively — относительно
resolve — решать; решение
scientific establishment — научное сообщество
separate — разделять, выделять
starch — крахмал
suspect — подозревать
though — хотя
wood — дерево; лес
wrong — неправильный, ошибочный

SECOND YEAR

UNIT 6

altogether — в общем, в целом
apart (from) — в стороне, отдельно, не говоря уже о
available — доступный
be worth — стоить
bottom — дно, подножие
breathe — дышать
bulb — пузырек, лампочка
capacity — способность
conclusion — заключение, завершение
constituent — составная часть
contaminate — загрязнять
convincing — убедительный
deserve — заслуживать
either... or — или... или
escape — улетучиваться
ignite — зажигать
kindling T — температура горения
liberate — высвобождать
maintenance — поддержка; сохранение
minor — незначительный
mutual — взаимный
obligation — обязательство
pity — жалость
previous — предыдущий
reviewer — обозреватель; рецензент
rust/ing — ржаветь/ржавение
spontaneously — стихийно
stuff — материал, вещество
the only — единственный
unlike — в отличие

UNIT 7

account for — объяснять
aid — помощь
approximately — приблизительно
bond — связь
chain — цепь
constitute — составлять
cut — резать
determine — определять
directly — непосредственно, напрямую
exception — исключение
extreme — крайняя степень, крайность; чрезвычайный
furnish — обеспечивать, снабжать
gradually — постепенно
have in common — иметь общее
hence — следовательно
indicate — указывать
inside — внутри
join — соединять, присоединяться
marine — морской
on the contrary — напротив
plane — плоскость
put together — соединять вместе
rank — приравнивать
striking/ly — поразительный/поразительно
transparent — прозрачный
urea — мочевина

REVISION AND DEVELOPMENT

UNITS 6 AND 7

algae — водоросли
average — средний
bog — трясина
coal — уголь
crops — технические культуры
crust — земная кора
decomposition — разложение
deposit — отложение, осадок; давать осадок
destruction — разрушение
disinfect — обеззараживать
due to — благодаря, из-за
estimate — оценивать
exhale — выдыхать
expel — удалять, выгонять
extremely — чрезвычайно, исключительно
fossil fuel — природное топливо
health — здоровье
inhale — вдыхать
injurious — вредный
interference — вмешательство
limestone — известь
seeds — семена
submerge — погружаться; затоплять
substantial — существенный
swamp — болото; заливать
threat — угроза
trace — проследить; след
trap — поймать в ловушку; ловушка
vegetable — овощ
wastes — отходы
well — очень, значительно

UNIT 8

abrasion — трение; шлифовка
adhesive — липкий, клейкий, вязкий
ancestor — предок
as late as — уже
assist — помогать
attack — браться (*энергично*)
binder — связующее вещество
but for — без; кроме; если бы не
cast — отливать
catalyst — катализатор
coating — покрытие
compete — конкурировать
defy — отвергать
desirable — желательный
diffract — преломлять(ся)
dissolve — растворять
dominate — преобладать, доминировать
durability — прочность, стойкость
enhance — увеличивать, усиливать
existence — существование
feeble — слабый
fibre — волокно
flammability — воспламеняемость
flour — мука, порошок
fragility — хрупкость

fur — мех
furthermore — далее
incredibly — невероятно
injection — вдувание
intricacy — запутанность
moisture — влажность
moulded — свернутый, согнутый
odd — странный
precipitate — осаждаться
protein — белок
repair — ремонтировать; ремонт
resin — смола
resistant — стойкий, прочный
rigidity — твердость
rubber — резина
sheet — простыня
shelter — убежище
silk — шелк
supply — снабжать, поставлять
thread — нить
viscosimeter — вискозиметр
wool — шерсть

UNIT 9

accumulative — накопительный
adverse — враждебный
advocacy — защита
barrier — преграда
bring about — вызвать
brink — край
chlorofluorocarbon — фреон
come into the picture — появиться
complain — жаловаться; жалоба
compulsory — обязательный
confidence — уверенность
confuse — запутывать
conquistador — захватчик; грабитель
contrive — умудряться
cope with — справиться с
courage — храбрость
deterioration — ухудшение
discrepancy — расхождение, разногласие
doomsday — день страшного суда
droplet — капелька
endeavour — пытаться
esoteric — тайный; особенный
eventually — в конечном счете
exceed — превышать
exhaustive — исчерпывающий, истощающий
extinction — вымирание
fairly — достаточно
foregoing — предшествующий
foremost — передний; выдающийся; главный
furious — разгневанный
hazard/ous — опасность/опасный
hell — ад
honestly — честно
hurriedly — поспешно
impact — влияние
impinge — сталкиваться
inescapable — неотвратимый
inevitably — неизбежно
instant — мгновение; мгновенный
intricately — запутанно
involvement — вовлечение

irreversible — необратимый
irrevocable — безвозвратный
joint — объединенный
long-range — долговременный
noble — благородный
novel — новый
overlook — не заметить
peculiar — особый
persuasive — убедительный
profound — глубокий
provided — если, при условии
provoke — вызывать, возбуждать
quarrel — ссориться
radiochemical dating — радиохимические вычисления
running order — рабочее состояние
scary — жуткий
serene — ясный, спокойный
set in motion — привести в движение
sewer — сточная труба
single out — выделять(ся)
sinking of the heart — тоска; уныние
split — расщеплять
stable — устойчивый
steady state — устойчивое состояние
straightforward — прямой, честный
suggestion — предложение
take into account — принять во внимание
topsoil — верхний слой почвы
troublesome — трудный
wisdom — мудрость
witty — остроумный
wonder — удивление, удивляться
worlds apart — очень разные
yield — давать, производить

REVISION AND DEVELOPMENT

UNITS 8 AND 9

a priori — заранее (знать, судить)
alter — менять
arise from — происходить
assault — нападать; нападение
bloom — цветение
cell — клетка
come into being — появиться
decade — десятилетие
deplet/e/ion — истощать/истощение
disturbance — нарушение
driving force — движущая сила
exceed — превышать
excessive — чрезмерный
find out — выяснить
go on — продолжать
go with — согласовываться
gossamer — тонкая ткань, газ
hold in balance — удерживать в равновесии
incineration — сжигание
infinitesimally — бесконечно мало
interaction — взаимодействие

leakage — утечка
mist — легкий туман, дымка
perpetuation — увековечивание
presumably — возможно
result from — происходить
run-offs — отходы, остатки
see to — присматривать
smelter — плавильня
smoothly — гладко
stretch — царапина
turn out — оказываться
undergo — претерпеть
utilization — использование
variable — переменная

UNIT 10

abolish — отменить; уничтожить
abound — изобиловать
accomplish — завершить
accustomed — привычный
alarm — тревожить, волновать
arms race — гонка вооружений
at the expense of — за счет
avalanche — лавина
awe — восхищаться
back then — в прошлом
benevolent — доброжелательный
bind — связывать
cave — пещера
claim — заявлять, претендовать; заявление
confer — даровать
consequence — последствие, последовательность
cool — модный
defeatist — пораженческий
destiny — судьба
exaggerate — преувеличивать
exclusively — исключительно
exponentially — показательно
extinct — вымирать
fascination — очарование
fate — судьба
fear — страх
fibre optics — стекловолокно
gap — пробел
glaze over — тускнеть; стекленеть
halt — останавливать(ся)
handful — горсть
headline — заголовок (*газеты*)
heritage — наследство
homo sapiens — человек
ignorance — невежество
indissolubly — неразрывно
induce — склонять
innocence — невиновность
ivory tower — башня из слоновой кости
journey — путешествие
magnificent — великолепный, величественный
make-up — строение; состав (*вещества*)
malfunction — ошибаться; ошибка
map — карта
matter — значить
mature — взрослеть
mere/ly — простой/просто
momentum — толчок, импульс
outmode — выходить из моды

pervasive — проникающий (*повсюду*)
plead — защищать
poise — уравновешивать(ся); равновесие
prophesy — пророчить, предсказывать; предсказание
quest — запрос; просьба
relevance — отношение
resounding — громкий
security — безопасность
short-sighted — близорукий
spell — означать
stem from — происходить от
strive — стремиться
survival — выживание
sustain — поддерживать
sweep — убрать, вымести
tackle — (*энергично*) браться
The Age of Enlightment — Век Просвещения
virtually — фактически

REVISION AND DEVELOPMENT

UNITS 6–10

adjust — приспособить
annual — ежегодный
appraisal — оценка
at least — по крайней мере
bowl — таз
bury — закапывать, хоронить
can — бидон
cautious — осторожный
chip — скалывать(ся)
composting — удобрение растительным перегноем с землей
crown — увенчать
deforestation — вырубка (*леса*)
drastic/ally — крутой/круто
dread — опасаться; опасение
endangered — находящиеся в опасности
entirety — полнота
eve — канун
exhaust — выхлоп
frequently — часто
garbage — мусор
get underway — начать
greening — озеленение
insulating — изоляционный
knock against — ударить о
landfill — обогатитель почвы
lethal — смертоносный
manure — навоз
medium — среда
modesty — скромность
nutrient — питательное вещество
particularly — особенно, определенно
precipitation — выпадение осадков
predecessor — предшественник
undermine — разрушать, подрывать
whereby — посредством чего
withstand — выдержать

Appendix 2

KEYS TO THE EXERCISES

UNIT I

3. 1, 4, 7, 9.

6. a) 1. include, define, arrange, credit with, control, create, improve, deal with, observe, explain, invent

2. phenomena, knowledge, definition, development(s), goal, application, scope/range, activity, variety, growth, error, universe, space

3. valid, interrelated, enormous, rapid, basic, required, animate, inanimate

4. it is not until, rather than, in addition, that is, in brief, basically, however, in fact, through, sometimes, even though, to make contribution to

5. matter, substance, change, property, experiment, chemistry, law, science, scientific method, composition, structure, branch, ratio

b) phenomena, bases, theses, indices, foci, criteria, data, equilibria, media, syntheses, analyses, curricula, symposia, spectra, maxima, vacua, strata, hypotheses, phases, nuclei.

7. a) (1) chemistry; (2) composition; (3) properties; (4) matter; (5) changes; (6) branch; (7) science; (8) scientific method; (9) experiments; (10) law

b) 1g, 2m, 3h, 4d, 5i, 6c, 7l, 8j, 9o, 10k, 11a, 12n, 13e, 14b, 15f.

13. 2.

14. 1T, 2T, 3T, 4F, 5T, 6F, 7T.

18. D. I. Mendeleyev.

21. 1c, 2j, 3h, 4i, 5e, 6l, 7f, 8k, 9a, 10d, 11g, 12b.

UNIT 2

5. 1(14), 2(19), 3(25), 4(32), 5(2), 6(33), 7(10), 8(22), 9(15), 10(26), 11(3), 12(30), 13(11), 14(5), 15(21), 16(7), 17(28), 18(6), 19(31), 20(17), 21(8), 22(13), 23(18), 24(27), 25(9), 26(29), 27(1), 28(24), 29(12), 30(20), 31(16), 32(23), 33(4), 34(34).

6. a) 1i, 2n, 3k, 4g, 5j, 6c, 7o, 8m, 9d, 10e, 11h, 12l, 13b, 14a, 15f, 16t, 17p, 18q, 19r, 20s.

b) ferrum, copper, sulphur, mercury/hydrargyrum, lead/plumbum, gold/aurum.

10. 1c, 2a, 3b, 4d, 5c, 6a, 7c, 8a.

20. Nesmeyanov Alexander Nikolayevich.

REVISION AND DEVELOPMENT

UNITS 1 AND 2

1. 2(physics), 6(biology), 9(botany).

2. 1c, 2e, 3d, 4f, 5g, 6a, 7b, 8j, 9h, 10i.

3. 1NO, 2YES, 3YES, 4YES, 5NO, 6NO, 7YES.

4. 1. includes; 2. define; 3. properties; 4. law; 5. branch; 6. create; 7. improve; 8. development.

9. a)

Declarative	Negative	Interrogative	Imperative
1, 4, 6	5, 8	3, 7	2, 9

b) 1c, 2d, 3b.

UNIT 3

4. 1b, 2c, 3a, 4b, 5a.

6. 1b, 2r, 3z, 4e, 5c, 6k, 7f, 8l, 9d, 10m, 11a, 12v, 13g, 14n, 15q, 16s, 17o, 18u, 19p, 20w, 21i, 22x, 23h, 24j, 25y, 26t.

11. 1F, 2NM, 3NM, 4NM, 5F, 6F, 7T, 8NM, 9F.

13. 4.

14. 4, 3, 1, 2.

UNIT 4

6. 1b, 2m, 3g, 4p, 5f, 6r, 7c, 8o, 9d, 10s, 11a, 12j, 13u, 14t, 15q, 16h, 17k, 18l, 19i, 20n, 21e.

8. 1. should; 2. must; 3. must/should; 4. have; 5. can; 6. have; 7. may; 8. have/should; 9. can; 10. could; 11. cannot; 12. must.

9. 1b, 2c.

13. 1NM, 2T, 3T, 4F, 5F, 6NM, 7T, 8T, 9T, 10T, 11F, 12NM, 13NM, 14NM.

REVISION AND DEVELOPMENT

UNITS 3 AND 4

6. 8+7+1 =114 7+4+7=114
8+(7+1)=128 7+(4+7)=128
8-(7+1)=56 7+(7+0)=56
128+56=184 128+56=184

10. a) 1. zinc; 2. tin; 3. silver; 4. oxygen; 5. hydrogen; 6. helium; 7. bromine; 8. chlorine; 9. copper; 10. carbon.
b) silver.

UNIT 5

3. 1. Water can exist as a liquid, as a gas, or as a solid.
2. This makes water the commonest material on the Earth.
3. Decomposition of water can be made by electric current.
4. Water is a compound of two volumes of hydrogen, and one volume of oxygen.
5. When hydrogen is burnt, water is formed.

7. 1i, 2c, 3k, 4q, 5l, 6g, 7r, 8d, 9n, 10e, 11p, 12a, 13m, 14f, 15h, 16o, 17b, 18s, 19j.

8. 1b, 2i, 3k, 4f, 5c, 6d, 7e, 8j, 9g, 10a, 11n, 12l, 13h, 14m.

10. 3.

11. 2.

REVISION AND DEVELOPMENT

UNITS 1–5

6. clarification: 2, 12; agreement: 11; disagreement: 9; opinion: 8; certainty: 6; surprise: 3, 5; emphasis: 4, 7, 10.

7. 3.

FINAL EXAMINATION PAPER 1

1b, 2c, 3b, 4c, 5c, 6a, 7d, 8b, 9a, 10b, 11a, 12c, 13b, 14a, 15c, 16b, 17X, 18C, 19C, 20X, 21C, 22C, 23X, 24C, 25X, 26C, 27C, 28X, 29C, 30C, 31b, 32a, 33d, 34b, 35c, 36d, 37a, 38b, 39d, 40c, 41c, 42a, 43c, 44c, 45c, 46c, 47c, 48a, 49d, 50c.

UNIT 6

4. 5, 3, 1, 4, 2.

5. 1P, 2N, 3N, 4P, 5P, 6N, 7P, 8N, 9N, 10N.

8. 1h, 2d, 3k, 4f, 5b, 6m, 7c, 8j, 9o, 10g, 11i, 12l, 13a, 14e, 15n.

9. 1. evidence, atmosphere; 2. leading, density, nitrogen; 3. layer, blanket, atmosphere; 4. mentioned, oxygen, nitrogen; 5. level; 6. contaminates, nitrogen, argon; 7. spontaneously; 8. escapes, atmosphere; 9. gradually, oxygen, atmosphere; 10. oxygen, nitrogen, sorted out; 11. bottom, 12. top.

10. 1. rusting; 2. nitrogen; 3. combustion, substance, oxygen; 4. carbon dioxide; 5. rusting, oxygen; 6. combustion, hydrogen; 7. carbon dioxide; 8. nitrogen, atmosphere; 9. hydrogen; 10. rusting; 11. mixture, combustion; 12. carbon dioxide.

13. student 2.

17. a) 1F, 2T, 3NM, 4T, 5F, 6NM.
b) 1(–) group V; 2(+); 3(–) 78%; 4(–) everybody knows; 5(+); 6(–) 50 mln. t; 7(–) one of; all the living organisms; 8(+); 9(+); 10(–) some of them.

UNIT 7

1. Frederic Wöhler, a German chemist (1800–1882).

7. 1a, 2b, 3b, 4a, 5b, 6b, 7a, 8b, 9b, 10a, 11b, 12a, 13a, 14a.

10. 1a, 2c, 3b.

REVISION AND DEVELOPMENT

UNITS 6 AND 7

8. 2.

16. a) 1. BoCl; 2. I group; 3. ionic; 4. Cl_2 and Bo (chlorine and bodium); 5. $Bo+H_2O \rightarrow BoOH+H_2$ (bodium hydroxide hydrogen); 6. $BoNO_3$ (1) Bo_2CO_3 (2).
b) 4. The diamond.

UNIT 8

1. Possible answers:
1. Polymer is a substance having large molecules consisting of repeated units (the monomers); Polymer is a molecule of very high molecular weight formed by the repeated chemical linking of a great many simpler molecules.
2. A plastic.

3. The combination of Greek words *poly* meaning "many" and *meros* – "parts".
4. Plastics.
5. The answer should be based on the definitions.
6. Starch, cellulose, and proteins.
7. Open-ended question.

3. 3.

4. 5, 2, 4, 6, 7, 1, 3.

7. 1. needs; 2. fragility; 3. means; 4. intricacy; 5. defy; 6. require; 7. supply; 8. list; 9. uncover; 10. available; 11. moisture; 12. compete; 13. resistant; 14. odd; 15. feeble; 16. giant; 17. flexible; 18. recently; 19. superior.

8. 1. protein; 2. resin (cellulose); 3. cellulose (starch); 4. solvent; 5. distillation; 6. precipitate; 7. solution.

UNIT 9

6. rate, cause, lack, attempt, intervention, search, intricately, demanding, inevitably, profound, annihilation, urgent, obvious, realm, discrepancy, take into account, preserve, consequently, adverse, menacing, peculiar, noble.

7. 1l, 2d, 3q, 4g, 5r, 6t, 7n, 8o, 9x, 10m, 11h, 12v, 13u, 14c, 15e, 16f, 17i, 18j, 19k, 20s, 21w, 22a, 23y, 24b, 25p.

10. 2.

11. 2, 3, 6.

14. 1P, 2P, 3N, 4P, 5P, 6N, 7P, 8N, 9N, 10P.

15. 2, 4, 1, 5, 6, 3.

REVISION AND DEVELOPMENT

UNITS 8 AND 9

7. 1. Under-Secretary of Energy.
2. Department of Energy.

UNIT 10

4. 3.

7. 1. heart transplants; 2. DNA code; 3. to accomplish the goal; 4. is indissolubly bound up; 5. were curious; 6. a matter; 7. an average person; 8. head into the; 9. survival; 10. destiny.

8. a)5, b)6, c)9, d)7, e)1, f)13, g)2, h)15, i)19, j)22, k)20, l)25, m)23, n)4, o)8, p)28, q)31, r)30, s)12, t)29, u)21, v)3, w)14, x)27, y)24, z)32.

REVISION AND DEVELOPMENT

UNITS 6–10

5. 1y, 2v, 3x, 4w, 5a, 6b, 7c, 8e, 9d, 10f, 11g, 12h, 13j, 14i, 15k, 16l, 17o, 18m, 19n, 20p, 21q, 22r, 23s, 24t, 25u.

8. 2, 4, 6, 5, 1, 3.

10. a) c;
b) 1c, 2a, 3b, 4b, 5b, 6c.

14. b) Atmosphere — the mixture of gases that surrounds any heavenly body, especially the Earth; hydrosphere — the aqueous envelope of the Earth including bodies of water and aqueous vapour in the atmosphere; lithosphere — the solid part of the Earth (crust), the source of all mineral resources; biosphere — the part of the world in which life can exist; noosphere (biotechnosphere) — the envelope of mind (man's attempts to regulate and control the biosphere to his own benefit and in accordance with the laws of nature).

FINAL EXAMINATION PAPER 2

1b, 2a, 3c, 4a, 5b, 6d, 7c, 8c, 9d, 10a, 11a, 12a, 13b, 14b, 15C, 16X, 17X, 18C, 19X, 20C, 21X, 22C, 23X, 24X, 25C, 26X, 27C, 28X, 29C, 30*b, **a, 31c, 32c, 33a, 34d, 35c (in which), 36d (hot), 37a (can be traced), 38d (in or within), 39a (no article), 40d, 41b, 42a, 43a, 44d, 45a, 46c, 47d, 48b, 49d, 50b, 51b, 52c, 53b, 54b, 55c.

Appendix 3

THE LIST OF CHEMICAL ELEMENTS WITH TRANSCRIPTION*

Ag — argentum [ɑː´dʒentəm] = silver [´sɪlvə] серебро
Al — aluminium [ˌæljuˊmɪnɪəm] алюминий
Ar — argon [´ɑːgɔn] аргон
As — arsenic [´ɑːs(ə)nɪk] мышьяк
Au — aurum [´ɔːrəm] = gold [gould] золото
B — boron [´bɔːrɔn] бор
Ba — barium [´bɛ(ə)rɪəm] барий
Be — beryllium [bə´rɪlɪəm] бериллий
Bi — bismuth [´bɪzməθ] висмут
Br — bromine [´broumiːn] бром
C — carbon [´kɑːbən] углерод
Ca — calcium [´kælsɪəm] кальций
Ce — cerium [´sɪ(ə)rɪəm] церий
Cd — cadmium [´kædmɪəm] кадмий
Cl — chlorine [´klɔːriːn] хлор
Co — cobalt [´koubɔːlt] кобальт
Cr — chromium [´kroumɪəm] хром
Cs — caesium [´siːzɪəm] цезий
Cu — copper [´kɔpə] медь
F — fluorine [´flu(ə)riːn] фтор
Fe — ferrum [´ferəm] = iron [´aɪən] железо
Ga — gallium [´gælɪəm] галлий
Ge — germanium [dʒəː´meɪnɪəm] германий
H — hydrogen [´haɪdrədʒən] водород
He — helium [´hiːlɪəm] гелий
Hg — hydrargyrum [haɪ´draːdʒɪrəm] = mercury [´məːkjurɪ] ртуть
I — iodine [´aɪədiːn] йод
Ir — iridium [ɪ´rɪdɪəm] иридий
K — kalium [´keɪlɪəm] калий = potassium [pə´tæsɪəm] калий

* В список входят наиболее распространенные химические элементы.

Li — lithium [ˈlɪθɪəm] литий
Mg — magnesium [mægˈniːzɪəm] магний
Mn — manganese [ˌmæŋgəˈniːz] марганец
Mo — molybdenum [məˈlɪbdənəm] молибден
N — nitrogen [ˈnaɪtrədʒ(ə)n] азот
Na — natrium [ˈneɪtrɪəm] = sodium [ˈsoudɪəm] натрий
Ne — neon [ˈniːɔn] неон
Ni — nickel [ˈnɪk(ə)l] никель
O — oxygen [ˈɔksɪdʒ(ə)n] кислород
P — phosphorus [ˈfɔsf(ə)rəs] фосфор
Pb — plumbum [ˈplʌmbəm] = lead [led] свинец
Pt — platinum [ˈplætɪnəm] платина
Pu — plutonium [pluːˈtounɪəm] плутоний
Ra — radium [ˈreɪdɪəm] радий
Rb — rubidium [ruːˈbɪdɪəm] рубидий
S — sulphur [ˈsʌlfə] сера
Sb — antimony [ˈæntɪmənɪ] сурьма
Sc — scandium [ˈskændɪəm] скандий
Se — selenium [sɪˈliːnɪəm] селен
Si — silicone [ˈsɪlɪkoun] кремний
Sn — stannum [ˈstænəm] = tin [tɪn] олово
Sr — strontium [ˈstrɔntɪəm] стронций
Te — tellurium [təˈl(j)u(ə)rɪəm] теллур
Th — thorium [ˈθɔːrɪəm] торий
Ti — titanium [t(a)ɪˈteɪnɪəm] титан
U — uranium [juˈreɪnɪəm] уран
W — wolfram [ˈwulfrəm] = tungsten [ˈtʌŋstən] вольфрам
Zn — zinc [zɪŋk] цинк
Zr — zirconium [zəːˈkounɪəm] цирконий

$CH_4 + 2O_2 \rightarrow CO + 2H_2O$ [ˊsi: ˊeɪtʃ ˊfɔ: ˊplʌs ˊtu: ˊmɔlɪkju:lz əv ˊou ˊtu: ˊgɪvz ˊsi: ˊou ˊplʌs ˊtu: ˊmɔlɪkju:lz əv ˊeɪtʃ ˊtu: ˊou]

$H^+ + NaHCO_3 \rightarrow Na^+ + H_2CO_3 \rightarrow Na^+ + H_2O + CO_2$ [ˊhaɪdrədʒən ˊaɪən ˊplʌs ˊen ˊeɪ ˊeɪtʃ ˊsi: ˊou ˊθri: ˊgɪvz ˊneɪtrɪəm ˊaɪən ˊplʌs ˊeɪtʃ ˊtu: ˊsi: ˊou ˊθri: ˊgɪvz ˊneɪtrɪəm ˊaɪən ˊplʌs ˊeɪtʃ ˊtu: ˊou ˊplʌs ˊsi: ˊou ˊtu:]

$4HCl + O_2 = 2Cl_2 + 2H_2O$ [ˊfɔ: ˊmɔlɪkju:lz əv ˊeɪtʃ ˊsi: ˊel ˊplʌs ˊou ˊtu: ˊgɪvz ˊtu: ˊmɔlɪkju:lz əv ˊsi: ˊel ˊənd ˊtu: ˊmɔlɪkju:lz əv ˊeɪtʃ ˊtu: ˊou]

$AcOH \leftrightarrow AcO^- + H^+$ [ˊeɪ ˊsi: ˊou ˊeɪtʃ ˊfɔ:mz ənd ɪz ˊfɔ:md frəmˊeɪ ˊsi: ˊɔksɪdʒən ˊaɪən ˊplʌs ˊhaɪdrɪdʒən ˊaɪən]

AcO^- — acyloxy ion

ОБРАЗЦЫ ДОКУМЕНТОВ

Примерная форма регистрационного бланка участника конференции

1991 Microwave Conference,
8–12 September

REGISTRATION FORM

To be completed and returned to (address, telephone, telex)
(Заполняется и высылается (адрес, телефон, телекс))
Please print
(Пожалуйста, напечатайте)

ACTIVE PARTICIPANT

Surname (Фамилия) _____
First Name(s) (Имя) _____
Description or title (Должность, звание, титул)

_____

Name of organization (Название организации)

_____

Address (Адрес) _____
City/State (Город/Штат) _____
Country (Страна) _____
Business telephone (Служебный телефон) _____
Telex (Телекс) _____

ACCOMPANYING PERSON (СОПРОВОЖДАЮЩЕЕ ЛИЦО)

Title (Mr., Mrs., Miss) _____
Name _____
Address _____
City/State _____
Country _____

REGISTRATION FEES (РЕГИСТРАЦИОННАЯ ПЛАТА):

Active participant $...

Accompanying person $...

I wish to attend sessions as indicated below. (Please specify number of tickets required.)

Monday, 8 September

Sessions A1 _____ B1 _____

Sessions A2 _____ B2 _____

Tuesday, 9 September

Sessions A3 _____ B3 _____

Sessions A4 _____ B4 _____

Wednesday, 10 September

Sessions A5 _____ B5 _____

Sessions A6 _____ B6 _____

I should like to participate in (Я хотел бы принять участие в)

River trip (Речная прогулка) _____ ($... per person)

Cocktail party (Коктейль) _____ ($... per person)

Conference dinner (Обед) _____ ($... per person)

Closing banquet with party (Заключительный банкет) _____ ($... per person)

Please mark out 1 for one person, 2 — for two persons, etc. (Поставьте цифру 1 для одного человека, 2 — для двух и т. д.)

Return, please, this form before (*date*) and send the registration fee not later than (*date*). Просим выслать нам заполненный бланк не позднее (*дата*) и регистрационную плату не позднее (*дата*).

If a remittance is not enclosed with the registration form, please indicate in which of the following ways payment will be made (Если квитанция об оплате не будет приложена к регистрационному бланку, укажите один из следующих способов оплаты):

By direct payment at the Conference _____

By cheque made payable to (...) Bank _____

By direct credit transfer made payable to (...) Bank.

Please tick if appropriate. (Пожалуйста, пометьте удобный для Вас способ.)

Date (Дата)_____ Signature (Подпись) _____

Примерная форма бланка
для бронирования номера в гостинице

HOTEL RESERVATION FORM

Hotel (*name*) has the following accommodation facilities:
double room category A ($...), category B ($...)
single room category A ($...), category B ($...)

Отель (*название*) предоставляет следующие номера:
двухкомнатный номер категории А ($...), категории Б ($...)
однокомнатный номер категории А ($...), категории Б ($...)

Prices are for accommodation with breakfast (service and tax included).
(В стоимость номера включен завтрак, а также обслуживание и налоги.)

As the number of single rooms is very limited, sharing a room with another person may be possible.
(Поскольку количество одноместных номеров ограничено, возможно подселение в двухместный номер.)

Dead line for reservation (Предельный срок бронирования) _____
I order a room from (с) _____ to (по) _____
Number of nights (Число суток) _____
Double room category A _____
Double room category B _____
Single room category A _____
Single room category B _____
Age (Возраст) _____ (when sharing a room with someone else, my age is preferable)
Name: _____

I will arrive by private car (YES, NO)
If booking cannot be made in the requested price, please reserve in the next available (higher, lower) category.

Date _____ Signature _____

Примерная форма анкеты
для получения визы на въезд в страну

VISA APPLICATION FORM FOR FOREIGNERS,
WISHING TO ENTER OR TRANSIT (*THE COUNTRY*)

This form must be completed in duplicate with two recent photographs attached. Full answers to all questions should be typed or clearly written in black ink.

(Эта анкета должна быть заполнена в двух экземплярах с приложением недавних фотографий. Полные ответы на все вопросы должны быть напечатаны или ясно написаны черными чернилами.)

It is recommended that applications be forwarded at least two weeks before the proposed date of departure.

(Рекомендуется сдать анкету по крайней мере за две недели до предполагаемой даты выезда.)

Country for which visa is required (Страна, на въезд в которую требуется виза) _____

1. Name of any sponsoring Ministry or Organization (or "Private") _____

(Название вызывающего министерства, организации или частная поездка)

2. Surname (in capital letters) _____

(Фамилия заглавными буквами)

First name(s) _____

(Имя/Имена)

Patronimic, if any _____

(Отчество, если есть)

Full maiden name (in the case of women who are or have been married) _____

(Полная девичья фамилия для замужних или бывших замужем женщин)

State any other names you use or have used _____

(Укажите другие имена, которыми вы пользуетесь или пользовались)

Day, month, year and place of birth _____

(День, месяц, год и место рождения)

Present citizenship (Give also former citizenship if different) _____

(Гражданство в настоящее время, укажите также предыдущее гражданство, если оно менялось)

State sex, and whether married, widowed, single or divorced _____

(Укажите пол и семейное положение, женат, вдовец, одинок, разведен)

What is your profession or rank? _____

(Какова Ваша профессия, звание?)

Where are you employed (Give exact address)? _____

(Где Вы работаете, укажите точный адрес)

What type of work do you do? _____

(Какую работу Вы выполняете?)

3. How long do you wish to stay in (country)? _____

(Как долго Вы собираетесь пробыть в (*страна*)?)

4. What is the purpose of your visit? _____

(Какова цель Вашего визита?)

Do you intend to seek (a) employment, (b) permanent residence? (Answer both questions) _____

(Собираетесь ли Вы искать (а) работу, (б) постоянное место жительства?) (Ответьте на оба вопроса.)

5. If a business or professional visit, give names, and addresses of persons to be visited. If a firm is large, give the names of individuals, departments or sponsoring organizations who are aware of your visit _____

(В случае деловой поездки укажите имена и адреса людей и фирм, которые Вы собираетесь посетить. Если фирма большая, укажите имена и названия отделений, спонсоров, которые знают о Вашем визите.)

If a private visit, give (a) name (b) address (ç) occupation (d) relationship of host(s). How long have they been residents? _____

(В случае частного визита укажите (а) имя, (б) адрес, (в) род занятия, (г) степень родства с пригласившими Вас. Как долго они проживают в стране?)

If you are going to stay in a hotel, give the name and address

_____

(Если Вы собираетесь остановиться в гостинице, укажите название и адрес.)

6. Date of departure, rout and date of arrival in (*country*)

_____

(Дата отправления, маршрут и дата прибытия в (*страна*))

7. How much money is available for your visit (Evidence of this may be required) _____

(Какими деньгами Вы располагаете для поездки, могут потребоваться доказательства)

8. Have you ever visited (*country*)? If so, give dates of visits and say in what capacity _____

(Бывали ли Вы раньше в (*страна*)? Если да, укажите даты и продолжительность визитов.)

9. If married, give the full name, date and place of birth of:

(Если состоите в браке, укажите полное имя, дату и место рождения):

Husband/Wife (as appropriate) _____

(Мужа/Жены)

Any children _____

(Всех детей)

Which of them, if any is/are accompanying you?_____

(Кто из них сопровождает Вас?)

10. Give the full names, date and place of birth of:

(Укажите полные имена, дату и место рождения):

Your father _____

(Вашего отца)

Your mother _____

(Вашей матери)

What is their address? _____

(По какому адресу они живут?)

11. If you are not born in the USSR, when did you arrive and where do you live before? _____

(Если Вы родились не в СССР, откуда Вы приехали и где жили раньше?)

12. State your present address _____
(Укажите Ваш нынешний адрес)

Telephone number _____
(Номер телефона)

Give your permanent address if different from above

_____

(Укажите адрес Вашего постоянного местожительства, если он отличен от предыдущего.)

13. Passport number _____
(Номер паспорта)

Place and date of issue _____
(Место и дата выдачи)

Date of expiry _____
(Действителен до)

Exit visa number _____
(Номер выездной визы)

Date of issue _____
(Дата выдачи)

Period of validity _____
(Срок действия)

Re-entry visa number _____
(Номер обратной визы)

Date of issue _____
(Дата выдачи)

Date of expiry _____
(Действительна до)

I declare the above to be a full and true statement
(Я утверждаю, что это полные и правдивые сведения)

Date _____ Personal signature _____

RECOMMENDATIONS ON BUSINESS LETTER WRITING

1. There are two kinds of letters: personal letters and business letters. Business letters should be written in a simple, clear and concise style. Personal letters are written in a colloquial style. A successful letter is the one written in a natural way, just as if the writer were actually in conversation with the recipient.
2. The order of the address should be the following: name of the person, number of the house, name of the street, town, country.
3. The main parts in a letter are: 1) the sender's name and address; 2) the date; 3) the recipient's name and address (in business letters); 4) the greeting; 5) the body of the letter; 6) the complimentary close; 7) the signature.
4. If the sender's address is not already printed on the paper, we must write it together with the date in the top right-hand corner. A little lower on the left, we begin:

   Dear Sir, (:)
   Dear Mądam(e), (:)
   Dear Colleague, (:)
   Dear Dr. B., (:)
   Dear Prof. N., (:)
   Dear Mr. (Ms.) Brown, (:) etc.

   Notice that in England the name is followed by a comma, but in the United States it may be followed by a colon. Under the comma, or colon we begin with a capital letter.
5. The letter should be written legibly, well punctuated and divided into short paragraphs.
6. Some phrases used in ending the letters (the complimentary close):

With best wishes and regards, I remain...
Waiting for your prompt reply...
I hope to hear from you soon and remain with kindest regards...
We look forward to hearing from you soon...
In anticipation of your reply, we remain...
We would greatly appreciate your answer.
A prompt (early) reply will be appreciated.
It would be very much appreciated if you could reply at your earliest convenience.

We finish a letter with *"Yours sincerely"* if the letter began with a person's name or *"Yours faithfully"* if it began *"Dear Sir"* or *"Dear Madam"*. The letter may also be finished with *"Yours truly"*, *"Sincerely"*, *"Yours"*.

USEFUL EXPRESSIONS TO BE USED IN LETTERS

Questions, Inquiries

I'm anxious to know...
I would be glad to know of...
Could you please tell me...
Please let me know if...
I should be glad to know if...
Would you be kind enough to let me know...
Would it be possible for you to tell me...
Would you be good enough to let me know in due course what...
May I hope for...
We suggest you let us know as soon as you can.
I would be very much obliged if you could acknowledge me...
I shall be interested to hear what you think about...
I would be grateful if you could let me know what... and inform me when...
I will be most interested to hear your reaction to this.
I would be very much obliged if you could give me a short explanation...
I wonder if you could give me some information...
It would be greatly appreciated if you would kindly inform me at your earliest convenience of your opinion and decision concerning.

Information, Notification

I have the pleasure to inform/in informing you that...
We beg to inform you that...
This is to inform you that...
This is to certify that...
Please take due note of...
I am just writing to confirm that...
As you know from previous correspondence...
This is hereby confirmed that...
I shall of course let you know if the situation changes.
Enclosed please find...
Herewith please find...

Assurance, Offers of Help

Please rest assured that...
We (I) shall do our (my) best to...
I trust you will not hesitate to contact me.
Please do not hesitate to let us know if you require any other information...
Should any questions arise during... please do not hesitate to contact us.
Should you require further details, we would of course be happy to supply this upon request.
Should you have any problems regarding... please do not hesitate to contact me.

Expressing Hope

I hope that all is going well with...
I hope that you are keeping well.
We very much hope that you will come on a positive decision on...
We trust your kind attention to the matter...
I hope to have further news for you before long.
I do hope I am not putting you to too much trouble if...
I sincerely hope you will be able to help me in this matter.
I believe that... does not pose a problem for you.

Requests

Please let me know...
Please inform me about...
Please forgive me for troubling you, but I should be very grateful if you could...
Would you do me a great kindness and...
I am writing to ask you a very great favour...
I wonder if you could do me a favour...
I would very much appreciate hearing from you so that I may...

Satisfaction

I take pleasure of...
We are delighted that...
I shall be happy to discuss with you...
We were pleased to learn your interest in...
We were very pleased to hear that you have decided to undertake...
I am glad to learn of your decision...
It would be truly wonderful.

Excuses

Apologizing for...
My apologies for...
We offer an apology for...
Please accept my apologies for...
I wish to offer my sincere apologies for...
With my repeated apologies for...
...taking so long to answer your letter.
...the trouble it may have caused you.

I am sorry that...
I must apologize that...
I sincerely regret that...
I was extremely sorry that...
I am sorry to have taken so long to reply to your letter.

RECOMMENDATIONS FOR SCIENTIFIC REPORT WRITING

Students often need to write reports on their research; in an extended form these become dissertations or theses. The framework or structure of research reports is as follows.

1. Basic Framework for a Research Report

Preliminaries:

1. The title	The fewest words possible that adequately describe the paper.
2. Acknowledgements	Thanking colleagues, supervisors, sponsors, etc. for their assistance.
3. List of contents	The sections, in sequence, included in the report.
4. List of figures/ tables	The sequence of charts or diagrams that appear in the text.

Introduction:

5. The abstract	An extremely concise summary of the contents of the report, including the conclusions. It provides an overview of the whole report for the reader.
6. Statement of the problem	A brief discussion of the nature of the research and the reasons for undertaking it. A clear declaration of proposals and hypotheses.

Main body:

7. Review of the literature	A survey of selective, relevant and appropriate reading, both of primary and secondary source materials. Evidence of original and critical thought applied to books and journals.
8. Design of the investigation	A statement and discussion of the hypotheses, and the theoretical structure in which they will be tested and examined, together with the methods used.
9. Measurement techniques used	Detailed descriptions and discussion of testing devices used. Presentation of data supporting validity and reliability. A discussion of the analysis to be applied to the results to test the hypotheses.

10. Results	The presentation in a logical order of information and data on which a decision can be made to accept or reject the hypotheses.

Conclusion:

11. Discussion and conclusion	The presentation of principles, relationships, correlations and generalizations shown by the results. The interpretation of the results and their relationship to the research problem and hypotheses. The making of deductions and inferences, and the implications for the research. The making of recommendations.
12. Summary of conclusions	A concise account of the main findings, and the inferences drawn from them.

Extras:

13. Bibliography	An accurate listing in strict alphabetical order of all the sources cited in the text.
14. Appendices	A complication of important data and explanatory and illustrative material, placed outside the main body of the text.

Notes: 1. There may be slight variations to the above. For example, the abstract may be separate and appear at the very beginning of the report. In its place there may be a section entitled "Outline of the research". 9 may be called "Methods and procedures". 11 may include "Recommendations and suggestions for further research".

2. In abbreviated form, the traditional structure of a scientific or technical report is IMRAD = Introduction, Methods, Results and Discussion.

2. Headings, Sub-headings and Numbering

The sections and sub-sections of reports are usually headed and numbered according to the decimal numbering system. Notice how the numbering is used below together with indentation (starting writing further away from the left margin). e. g.

5. **SECTION HEADING** (bold or underlined)
5.1 Sub-section heading (often underlined)
5.2.1. sub-section
5.2.2. sub-section
5.2.3. sub-section

Note: It is best not to use more than a total of three decimal numbers in the sections, otherwise it becomes too complicated to read. Not every paragraph is numbered – just sections or sub-sections. Lists within a sub-section can be numbered simply: e.g. 1. 2. 3.

3. Checklists

When writing any kind of report, it is important that none of the items, contents or procedures are forgotten and omitted. To help in this, a checklist of the details needed is extremely useful: they can be referred to and ticked off as they are covered or included. Some of the kinds of items to include are as follows:

— the aim of the report;
— collecting information/data;
— noting all references;
— analysis of questionnaires;
— organizing the information;
— providing appropriate diagrams and tables;
— layout of the report.

RECOMMENDATION FOR AN ORAL SCIENTIFIC REPORT PRESENTATION

The escalation of all scientific activities has resulted not only in a vast increase in scientific publications but also in meetings, symposia, international conferences and lectures. With the ever increasing pressure on the time of all professional people it is obviously important that the *time spent* at such meetings *should be used as efficiently as possible.* This can only be achieved if *the lectures and communications are given effectively.* But it is surprising how many scientists, even quite senior ones, go on making the most elementary blunders when giving their talks.

1. Preparation

If you aim at achieving success, read your paper in front of a mirror even if you dislike doing it.

Many people are nervous about speaking in front of an audience. Before you begin, try to relax. Breathe deeply, and speak with authority. When you appear confident, you will make your audience feel comfortable. They will relax and enjoy your enthusiasm.

Some criticism of those responsible for general organization. Is it too much to ask someone who knows where the light switches are, and how to work the auxiliary aids?

Nothing is more annoying than to find that the lecturer wishes to show his first slide when no one knows how to switch off the lights, or how to switch on projector.

A time limit should always be emphasized to speakers.

2. Speaking Strategy

The classical advice *"Stand up, speak up, shut up"* could be put in front of some speakers.

The most important thing is that the audience *should be able to hear* what the speaker is saying. Some lecturers appear to think that they are confiding a deadly secret to a few people around them and speak so that those in the front rows can hardly hear what is being said.

While reading or speaking in front of an audience:

- **Control your voice.**

Speak loudly and clearly so that your audience can hear you.

Don't rush. Take time to pause between sentences to give meaning to your words.

Use an upbeat and moderate pace. You may want to vary your pace to enhance certain portions of your review and to keep your audience interested.

If you try to speak as monotonously as you can, the listeners will start thinking of their own affairs or dozing off.

You may want to raise or lower your voice to represent different characters, to show emotions, or to enliven descriptive language.

- **Try to behave properly.**

Even if you cannot help feeling excited, stop swinging the pointer over the heads of the listeners, keep from waving hands, abstain from shouting and blowing your nose loudly.

Do not hide your head in your paper. Look up from time to time and make eye contact with your audience.

Concentrate on looking relaxed and self-confident. Don't shuffle your feet, move your paper excessively, or sway from side to side.

- **Use visual aids.**

such as charts, diagrams, photographs, and transparencies to make difficult information clear to your audience. Proceed demonstrating slides, tables, graphs and you will succeed in hitting the target.

3. What Should a Slide Do?

Many people fail to realize what a slide should do. Some think that it is only necessary to photograph a few tables (usually very extensive ones) and sections of text, and give a talk round them. Slides can be used for an excellent talk if the speaker is experienced and knows how to select and design the material on the slides. Unfortunately, what happens is that a slide containing a vast amount of information in tab-

ular or graphical form is projected on the screen and when the audience has understood about half of it the lecturer moves on to the next.

We expect not only scientific knowledge from a lecturer but also intelligence, but this is often lacking.

A slide should never attempt to make more than one point, the number of figures or statements should be strictly limited, and the matter should be clearly seen at the back of the theater.

Placards pinned up on the wall have the advantage that those seriously interested can go up afterwards and inspect them.

Why should slides so often be shown upside down or sideways? This may be the fault of the person who has made the slide, but there is no excuse for any of these annoying interruptions to the flow of the speaker's ideas. It should be regularly duty of the organizers of any lecture or meeting to check all this before the meeting in order to ensure that everything should go smoothly once the meeting has started.

4. Summing up

Summing up, express your appreciation and gratitude to all the people present, keeping strictly to the table of ranks.

When the formal procedure is over, providing you were a success, do not forget to invite everybody for refreshment and a cup of coffee or tea.

5. Listening strategy

If you are in the audience:

- *Listen carefully to learn all you can about the speaker's topic. You will make the speaker feel at ease if you are attentive and show interest in what is being said.*
- *Remember to watch the speaker, to show the speaker that you're listening, and to help to concentrate on what is being said. Maintain eye contact with the speaker.*
- *Listen whether the review has supported the opinions in the evaluation and the recommendation.*
- *Allow yourself to become involved in the report being made. Discover what does and doesn't work for you in the report.*
- *Listen carefully, take notes quietly, imagine how you would respond.*

List of references

Britten N. Who Knows? Edinburgh,1990.

Brody A. R., Brody D. E. The Science Class You Wish You Had. New York, 1997.

Chaplen F. A. Course in Intermediate Scientific English. London, 1981.

A Concise Dictionary of Chemistry. Oxford University Press, 1990.

Jordan R. R. Academic Writing Course. Cambridge University Press, 1999.

Powell M. Presenting in English. London, 1997.

Snyder C. H. The Extraordinary Chemistry of Ordinary Things. New York, 1995.

Stewart B. Start with Chemistry. Kent., DP Press, 1995.

Stewart B. Progress with Chemistry 2. Kent., DP Press, 1995.

Umland J. B. General Chemistry. Minneapolis / St. Paul, 1993.

Альбов А. С. Письмо зарубежному партнеру. Л., 1991.

Близниченко К. Л. Пособие для химико-технологических вузов. М., 1998.

Васильева Л. Деловая переписка на английском языке. М., 1999.

Власова Е. П., Лапшина Е. Г., Фролькис Э. Д. Everyday English for Scientists. M., 1986.

Выгонская Л. Н., Миндели Е. И. Грамматический справочник (*Приложение к учебному пособию* English for Students of Mathematics and Mechanics). М., 1998.

Разговорный язык для научных работников. М., 1972.

Фримантл М. Химия в действии. М., 1998.

Шахова Н. И. и др. Learn to Read Science. Курс английского языка для аспирантов и научных работников. М., 1980.

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Вышли в свет

С. Д. Комаровская

Modern English Grammar. Practical Course. Современная английская грамматика. Практический курс (Вслед за Мерфи)

Учебник по грамматике английского языка для слушателей подготовительных отделений вузов, учащихся старших классов специальных школ, лицеев и гимназий, студентов первых курсов гуманитарных и технических вузов

Учебник по грамматике английского языка разработан как развитие системы упражнений, представленных в известной книге R. Murphy "English Grammar in Use" и предназначен для слушателей подготовительных отделений вузов, учащихся старших классов специальных школ, лицеев и гимназий, студентов первых курсов неязыковых и языковых вузов, а также для лиц, изучающих английский язык самостоятельно. Практикум построен на принципах единой методологии подачи грамматических явлений, содержит свыше 6 000 упражнений-предложений, подлежащих переводу на английский язык, обеспечивает высокую рекуррентность всех видов речевой деятельности. Впервые осуществлена концепция подбора материала для юнитов — упражнений по многим грамматическим явлениям по тематическому принципу основных англоязычных стран — Англии, Шотландии, Ирландии, Уэльса, Канады, США, Австралии, Новой Зеландии с использованием богатства общеупотребительной лексики живого русского языка: примеры для тем, взятые из многих отраслей науки и техники, истории и литературы, культуры и философии, экономики и юриспруденции обыгрываются и подаются в виде законченных микродиалогов. Все это интенсифицирует овладение грамматикой языка и позволяет сделать учебный процесс увлекательным и мотивированным.

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English for Special Purposes

С. Д. Комаровская

Правосудие и закон в Великобритании

Учебник + Практикум

Учебник английского языка для студентов юридических вузов, факультетов и специальных учебных заведений. 4-е изд.

Учебник **«Правосудие и закон в Великобритании»** по юридическому страноведению носит чисто практический характер, рассчитан как на студентов юридических вузов, факультетов и специальных учебных заведений с разным уровнем языковой подготовки, так и на специалистов-юристов широкого профиля, самостоятельно изучающих английский язык.

Особое внимание автор уделяет заданиям для самостоятельной работы студентов по совершенствованию навыка юридического перевода, а также различным видам аудиторских занятий: устные информации на английском и русском языках (монологическая речь), ролевые игры, групповая работа и работа в парах.

Учебник содержит иллюстрации к ролевым играм, глоссарий, упражнения и ключи к ним. Может быть использован в комплексе с другими учебниками и учебными пособиями, отвечающими конечным целям обучения.

В практикуме акцент сделан на отработку сложных грамматических явлений английского языка с использованием профессиональной лексики и игровых методов обучения.

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А. П. Миньяр-Белоручева,
Г. Н. Фукс, Л. В. Шейнина

АНГЛИЙСКИЙ для историков
Civilizations. History. State

Учебное пособие по английскому языку
для гуманитарных факультетов. 2-е изд.

Тексты настоящего пособия на английском языке охватывают социально-политические аспекты развития человеческого общества. Данное пособие дает возможность обучаемым приобрести не только лингвистические знания, но и культурологические, поскольку последовательный хронологический переход текстов от одного к другому позволяет создать относительно целостную картину развития западноевропейской цивилизации. Упражнения направлены на усвоение фонетического, лексического материала и развитие навыков чтения и устной речи.

Данное пособие предназначено для преподавателей и студентов гуманитарных факультетов университетов и институтов: историков, социологов, психологов, философов. Пособие можно выборочно использовать также для работы с учащимися старших классов классических гимназий и лицеев. Оно также будет интересно и полезно всем, кто интересуется развитием человеческой цивилизации и становлением государства.

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А. Ф. Артемова, О. А. Леонович

АНГЛИЙСКИЙ для путешественников

Новые материалы для обучения чтению на АНГЛИЙСКОМ языке

Учебное пособие для вузов.

В этом нетрадиционном учебном пособии изучающим английский язык предлагаются оригинальные страноведческие материалы типа рекламы, объявлений, афиш, информационных бюллетеней, описаний бытовых приборов и т. п., которые отражают различные стороны жизни в современной Великобритании — от выборов в местные органы власти и текста присяги британских полицейских до правил пользования общественным транспортом, общественными библиотеками и др. Пособие содержит страноведческие комментарии и ключи ко многим упражнениям.

Пособие удостоено диплома победителя конкурса учебников и компьютерных программ в рамках программы «Обновление гуманитарного образования».

Для студентов языковых вузов, лингвистических факультетов университетов, а также старшеклассников средних школ с углубленным изучением английского языка и всех, кто хотел бы усовершенствовать навыки чтения на английском языке.

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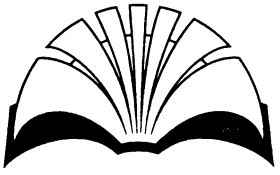

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для студентов-химиков

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