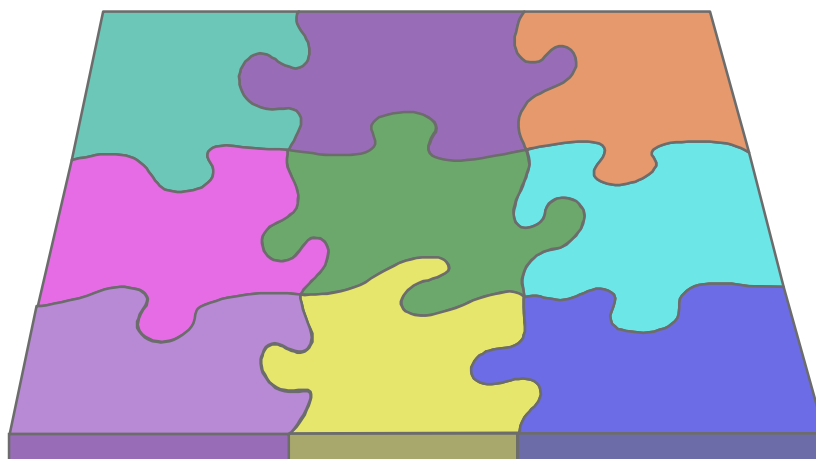


**ОБУЧЕНИЕ РАЗЛИЧНЫМ ВИДАМ ЧТЕНИЯ
НА НАЧАЛЬНОМ ЭТАПЕ ИЗУЧЕНИЯ АНГЛИЙСКОГО ЯЗЫКА**

УЧЕБНОЕ ПОСОБИЕ



Министерство образования Российской Федерации
Ивановский государственный химико-технологический университет

**ОБУЧЕНИЕ РАЗЛИЧНЫМ ВИДАМ ЧТЕНИЯ
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Учебное пособие

Под редакцией Н.К.Иванова

Иваново 2002

Обучение различным видам чтения на начальном этапе изучения английского языка: учебное пособие по английскому языку для студентов 1 курса химико-технологических специальностей: Учеб. пособие/ Л.К. Гостикина, Н.К. Иванова, В.В.Ганина, Н.В. Привезенцева. Под ред. Н.К. Ивановой; Иван. гос. хим.-технол. ун-т. – Иваново, 2002. – 88 с.

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Учебное пособие предназначено для студентов 1 курса технологических специальностей ИГХТУ и имеет целью обучение различным видам профессионально-ориентированного чтения – изучающего, ознакомительного, просмотрового и поискового.

Пособие включает 8 уроков: 4 для изучения в 1-м семестре и 3 для изучения во 2-м семестре. Структура каждого урока идентична: предтекстовые упражнения для снятия фонетических, лексических и грамматических трудностей, три текста (А, В, С), послетекстовые упражнения для развития навыков чтения, разговорной речи и интерпретации полученной информации. Материал каждого семестра завершается лексическими и грамматическими тестовыми заданиями и текстами для проверки навыков чтения, аудирования и перевода.

Текст А каждого урока предназначается для изучающего чтения и предполагает: выписывание из текста незнакомых слов, анализ и заучивание новых лексических единиц, анализ грамматических явлений, встречающихся в тексте, выполнение всех до- и послетекстовых упражнений. Работа над текстом завершается полным устным или частичным письменным переводом текста, ответами на вопросы, пересказом.

Текст В предназначен для формирования навыков ознакомительного чтения. Работа над ним включает: неподготовленное чтение про себя (1-2 раза) для выяснения общего смысла текста, выделение основной мысли каждого абзаца, ключевых слов и абзацев, составление плана текста или его логико-понятийной схемы, передача основных положений текста в логической последовательности по-русски и по-английски, оценка информации текста (основная, второстепенная, новая) и выражение собственного мнения о содержании текста.

Текст С направлен на формирование и развитие навыков просмотрового и поискового чтения. Этапы работы над ним включают: определение его темы и основной идеи, поиск предложений с определенной информацией, описанием свойств, фактов и т.д.

В конце каждого урока содержатся упражнения на повторение пройденных и закрепление изучаемых лексических и грамматических явлений, а также список лексических единиц, подлежащих обязательному заучиванию.

В приложение данного учебного пособия входят списки сокращений, принятых в английской научной литературе, разговорных клише и выражений, необходимых для пересказа текста и ведения беседы по его содержанию, и небольшой англо-русский словарь.

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LESSON 1

GRAMMAR: Parts of Speech, Sentence Structure, Active Voice
There + be (для самостоятельной работы)

PRETEXT EXERCISES

Exercise 1. Определите по суффиксу, к какой части речи относятся следующие слова. Переведите их.

Chemist, chemistry, chemical, simpler, older, substance, united, proportion, tasteless, greenish, approximately, ordinary, temperature, odourless, moderately, pressure, greater, conversely, property, broadly, reaction, catalyst, decomposition, addition, quantity, suitable, readily, exception.

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Exercise 2. Послушайте и прочитайте следующие слова:

a). Formed, attended, considered, classified, finished, worked, played, lived, indicated, needed, waited.

b). Element, properties, property, quite, decompose, substance, hydrogen, oxygen, proportion, approximately, ordinary, liquid, layer, moderately, appears, greenish-blue, one hundred degrees Centigrade, millimetres pressure, viewed, conversely, crystalline, vapour, hoar frost, main, headings, undergoes, decomposition, catalyst, compound, evolution, attended, quantity, equation, steam, alkali, sodium, potassium, et cetera, non-metals, exceptions, silicon, fluorine, chlorine.

Exercise 3. Дайте начальную форму следующих глаголов.

Considered, were, known, is, appears, freezes, attended, will decompose, indicated.

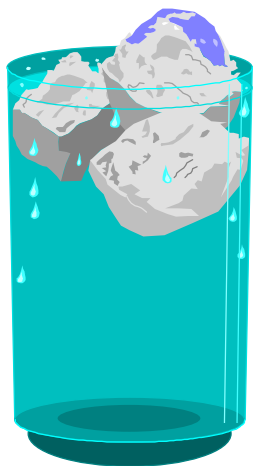
Exercise 4. Переведите без словаря слова:

Chemist, chemical, element, proportion, temperature, millimetre, metal, catalyst, potassium, carbon, silicon, fluorine, chlorine, oxygen, hydrogen, crystalline, sodium, reaction, act, action.

TEXT A. PROPERTIES OF WATER

The older chemists considered water to be an element. They were quite right because they did not know how to decompose it into simpler substances. Now it is known that water consists of hydrogen and oxygen only, united in

the proportions of two to one by volume approximately.



At ordinary temperatures pure water is a tasteless and odourless liquid; it is colorless in moderately thin layers, but appears greenish-blue when viewed in thick layers. Water boils at 100°C under 760 mm. pressure. The greater is the pressure, the higher is the boiling point; and conversely, the less is the pressure, the lower is the boiling point. Liquid water freezes at 0°C into crystalline ice. Water vapour freezes into hoar frost and snow.

The chemical properties of water can be classified broadly under three main headings, viz.:

- 1) reactions in which water undergoes decomposition;
- 2) reactions in which water acts as a catalyst;
- 3) reactions in which water forms addition compounds.

The combination of hydrogen and oxygen to form water is attended by evolution of a large quantity of heat as indicated in the equation $2\text{H}_2 + \text{O}_2 = 2\text{H}_2\text{O} + 116.2\text{ Cals}$, the water formed remains as steam.

Many elements will decompose water at a suitable temperature. The alkali metals (sodium, potassium, etc.) attack water readily at the ordinary temperature. Non-metals for the most part do not react with water, the exceptions being carbon and silicon, fluorine and chlorine.

Words:

100°C – one hundred degrees Centigrade.

The ..., the ... – чем, ... тем

Viz. – а именно

EXERCISES AND ASSIGNMENTS

1. Прочитайте текст за 4-5 минут, не пользуясь словарем. Скажите, о какой проблеме идет речь, и как она может быть решена.
2. Составьте резюме, используя информацию прочитанных текстов А, В, С.
3. Составьте подробный план вашего резюме.

Exercise 1. Заполните пропуски соответствующими предлогами.

1. The older chemists didn't know how to decompose water ...simpler substances.
2. Water consists ... hydrogen and oxygen united in the proportion of 2:1 ... volume approximately.

3. Water boils ... 100⁰ C ... mm pressure.
4. Pure water is colourless ... thin layers.
5. Liquid water freezes ... 0⁰ C ... crystalline ice.
6. Non-metals do not react ... water.
7. Many elements will decompose water ... suitable temperature.

Exercise 2. Найдите в тексте следующие словосочетания:

Быть правым, более простые вещества, состоять из водорода и кислорода, при обычной температуре, безвкусная жидкость, при температуре 100⁰ C, подвергаться разложению, действовать как катализатор, образовывать добавочные соединения, при соответствующей температуре, щелочные металлы, неметаллы, сопровождается выделением, легко разлагают воду.

Exercise 3. Заполните пропуски словами, подходящими по смыслу.

1. Water consists of and
2. Pure water is a and liquid.
3. Water is in thin layers and appears in thick layers.
4. Water at 100⁰ C and at 0⁰ C.
5. Water acts as a
6. Water decomposition.
7. Alkali metals attack water at a temperature.
8. Many elements decompose water at a temperature.

decompose, attack, undergo, hydrogen, suitable, colourless, oxygen, ordinary, boil, odourless, freeze, addition

Exercise 4. Составьте предложения.

- 1) hydrogen, of, water, consists, oxygen, and.
- 2) ordinary, water, tasteless, at, odourless, is, pure, liquid, and, temperature, the.
- 3) water, non-metals, do, react, not, with.
- 4) ordinary, water, the alkali, the, attack, readily, at, metals, temperature.
- 5) Vapour, water, into, freezes, and, snow, hoar frost.

Exercise 5. Ответьте на вопросы.

1. What does water consist of ?
2. What kind of liquid is water ?
3. What temperature does it boil at?

4. What temperature does it freeze at?
5. What metals attack water at the ordinary temperature ?
6. Do non-metals react with water ?

Exercise 6. Выразите свое согласие или несогласие со следующими утверждениями. Пользуйтесь клише.

1. The older chemists considered water to be a compound.
2. Hydrogen and oxygen are united in the proportion of 1:2 by volume
3. approximately.
4. At ordinary temperatures pure water is a tasteless and odourless liquid.
5. Water appears greyish-blue when viewed in thick layers.
6. The greater the pressure, the higher the boiling point.
7. The combination of hydrogen and oxygen to form water is not attended by the evolution of a large quantity of heat.
8. Sodium and potassium attack water readily at the ordinary temperature.
9. Most of non-metals react with water readily.

I think it's right.	Думаю, это верно.
It seems to be wrong.	Кажется, это неверно.
I can't agree with it.	Я не могу с этим согласиться.
As far as I know ...	Насколько я знаю ...
To my mind ...	По-моему ...
On the contrary ...	Наоборот ...

Exercise 7. Разделите текст на логические части. Озаглавьте их.

Exercise 8. Поставьте ключевые вопросы к каждой части.

Exercise 9. Составьте перечень свойств воды, описанных в тексте. Разделите их на химические и физические. Помните, что каждое вещество обладает химическими и физическими свойствами.

Physical properties: colour, odour, solubility, density, hardness, lustre, melting-point, boiling-point, freezing-point, size, weight.

Chemical properties: reactions with other materials when transformation of one substance into another takes place.

Exercise 10. Кратко опишите свойства воды. Укажите, какие знакомые вам сведения содержатся в тексте. Какие факты узнали впервые?

TEXT B. THE MOST IMPORTANT CHEMICAL SUBSTANCE

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

Most of the world's water is liquid but an important fraction is solid, as ice or snow. Many mineral substances contain water of crystallization (e.g. copper sulfate) 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 it is the most important solvent. It does not dissolve greasy, fatty substances or most plastics. It was established that ordinary water is impure, it contains dissolved salts and gases and sometimes organic matter.

For chemical work water is to be purified by distillation. Pure water is colourless, tasteless, and odourless. Rain water is nearly pure water, containing only small proportions of dust and dissolved gases.

When the chemists had examined the properties of water, they found that physical properties of water could be used in many physical constants and units. The freezing point of water (saturated with air at 1 atm pressure) is taken as 0°C and the boiling point is of water at 1 atm is taken at 100°C . The unit of volume in metric system is chosen so that 1 ml of water at 3.98°C (the temperature of its maximum density) weighs 1.0000 g/cm^3 .

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

Words:

droplet – капелька

greasy – жирный, сальный

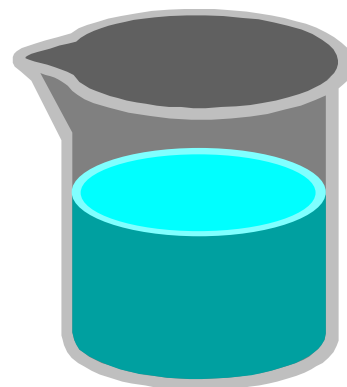
fatty – жирный

dust – пыль

saturate – насыщать

define – определять

environment – среда окружение



EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст и ответьте на вопросы.

1. What is water?
2. How is water made in the lab?
3. Where can water be found in nature?
4. What is pure water? What is rain water?
5. Where can the physical properties of water be used?

Exercise 2. Выразите свое согласие или несогласие с данными утверждениями.

1. Water dissolves greasy, fatty substances and most plastics.
2. Ordinary water is not pure.
3. Water is the most important chemical substance.
4. Water is a hydrogen oxide.

Exercise 3. Найдите и переведите предложения, в которых говорится о:

- 1) способе получения воды в лаборатории;
- 2) распространении воды в природе;
- 3) о физических свойствах воды.

Exercise 4. Какая новая информация о воде содержится в тексте ?

TEXT C. THE WATER PROBLEM

Water is the most common of all liquids and the most useful. Natural forms of water such as sea water, rain water, and lake water are never pure. Consumption of water increases annually, millions of tons are used each day in industry, so there exists a water problem. The solution of this problem will be using sea water, because seas cover about 70 percent of Earth's surface.



Sea water varies in composition, it contains many solids dissolved in water. Sodium chloride, common salt, is the most abundant of the solids present. We can easily understand that distillation of sea water will give pure water and leave the solids in the distillation vessel which can be also used. The difficulty is to carry out this operation

economically. To satisfy the great demands of industry, much fuel will be needed for making this distillation. However, using the Sun as the source of heat sea water has successfully been purified in some countries in recent years.

Words:

consumption – потребление

annually – ежегодно

vessel – сосуд

to satisfy the demands – удовлетворять потребности

fuel – топливо

vary – изменяться, но **very** – очень

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст за 4-5 минут, не пользуясь словарем.

Скажите, о какой проблеме идет речь и как она может быть решена?

Exercise 2. Расскажите о других способах очистки воды, известных вам.

Какие новые сведения о воде вы получили, прочитав тексты А, В, С ?

* * *

Exercise 1. Переведите.

1. There are all kinds of various test tubes in the chemical laboratory.
2. There was some but not much water in the glass.
3. There will be still more new synthetic materials in future.
4. Is there any dust in pure hydrogen peroxide?
5. There exist more compounds of hydrogen than of any other element.
6. There were many interesting events (события) at our University last year.
7. There were no mistakes at their works.
8. Are there English books at your library?
9. There are many interesting subjects at our curriculum.
10. There will be tests and examinations in winter.
11. There are several laboratory tables with chemical glassware at the laboratory of inorganic chemistry.
12. What glassware is on every laboratory bench?

Exercise 2. Переведите данные сочетания, обращая внимание на существительное в функции определения.

Radio wave length, electricity generation methods, steel plate, oxidation states, hydrogen preparation method, thermonuclear fusion reaction, boiling-point determination, atmosphere pressure determination, rain water composition, hydrogen chloride dissolution, non-metal oxides, acid anhydrides application, alkali water solutions, glass production, metal surface treatment, computer simulation method, Solutions Chemistry Institute.

Exercise 3. Найдите в словаре значения следующих пар слов:

Form (n), to form (v.) Change (n) , to change (v) light (adj.), light (n)

Переведите предложения, обращая внимание на перевод выделенных слов в зависимости от части речи. Определите время сказуемого.

1. They found quartz in the **form** of large, nearly perfect crystals.
2. Quartz, silicates and aluminosilicates together with other minerals **form** a great amount of ceramic raw materials.
3. Among ceramic products, alumina in both **forms** possesses the highest mechanical strength and hardness.
4. This is an example of chemical **change**, since a chemical **change** results in permanent **changes** of properties.
5. The properties of this substance **change** when we heat it.
6. He studies the **change** from one state to another.
7. The colour of the solution **changed** after the reaction.
8. The experimental temperature **changed** between room temperature and 1.4000⁰ C.
9. Great **changes** took place at our laboratory.
10. Antimony does not react with nitric acid **to form** oxides.
11. The article dealt with the **changes** which took place during the reaction.
12. Ceramic products are **light** in weight.
13. The velocity of **light** is very high.
14. Aluminium is a very **light** metal.
15. Our laboratory is very big and **light**.

Exercise 4. Составьте предложения из следующих слов. Скажите, чем выражены в них подлежащее и сказуемое. Определите время глаголов.

- 1) the, of, these, students, two, attend, the, departments, lectures, same.
- 2) Will, it, does, not, we, employ, method, what, our, in, work, matter.
- 3) Matter, varieties, is, of, the, branch, which, science, deals, with, different, or, substances, chemistry.

- 4) Are, the, reactions, chemical, that, processes, the, into, substance, substances, other.
- 5) A.Lavoiser, later, concept, the, introduced, the, of, elements, chemical.
- 6) Our, products, recently, produced, have, synthetic, product, many, new.
- 7) Your, in, chemistry, study, of, learn, will, you, things, many, substances, about, compounds, chemical, materials, and, physical, properties, changes, chemical, reactions, many, and interesting, other, things, important, and.
- 8) Russian, science, M. Lomonosov, devoted, to, his, life, development, the, of.

Exercise 5. Найдите в данном тексте все глаголы и определите их временную форму.

THE ONSET OF COLOUR TELEVISION

In 1940, Peter Carl Goldmark, an engineer for Columbia Broadcasting System, demonstrated a colour television system that used a rotating three-colour disk. Coldmark thus proved the practicability of colour television, although his system was later replaced by an all-electronic colour television that was compatible with black-and-white transmission.

In spite of all these successes, television did not come into its own as a medium until 1948. Since then, television has had a tremendous influence on industrialized societies. As a source news and entertainment, it is the centrepiece of the expanding market of consumer electronics.



Проверьте себя. Знаете ли вы следующие слова?

Chemist, chemistry, to consider, water, element, to decompose, substance, to consist of, hydrogen, oxygen, to unite, pure, proportion, property, volume, ordinary, temperature, liquid, colour, colourless, thin, thick, layer, to boil, boiling-point, pressure, high, low, to freeze, to undergo, to act, to influence, compound, form, to form, change, to change, catalyst, to combine, combination, to attend, to evolve, evolution, quantity, steam, alkali metals, sodium, potassium, to attack, non-metals, to react, reaction, carbon, silicon, fluorine, chlorine, steam, vapour.

LESSON 2

GRAMMAR: Passive Voice;

Some, any, no; word-building (для самостоятельной работы)

PRETEXT EXERCISES

Exercise 1. Определите по суффиксу, к каким частям слова относятся следующие слова:

remarkable	quantity	variety
reaction	electrolysis	sulfuric
density	exposure	combustion
detected	moisture	temperature
substance	oxidize	ordinarily
solution	mixer	mixture
convenient	easily	decompose
aqueous	treatment	presence

2

Exercise 2. Послушайте и правильно прочитайте слова и словосочетания.

a) formed, bubbled, evolved, oxidized, obtained, confined, decomposed, produced, symbolized, heated, impinged, floated, detected, produced, treated, prepared, exposed, passed, chilled, mixed.

b) hydrogen peroxide, compound, quantity, quantities, variety, electrode, electrolysis, dilute acid, anode, sulfuric acid, current, density, confined, quartz, vessel, exposure, mercury, etc, combustion, for instance, impinge, surface, floating, either, sunlight, ozone, current, moist, through, issue, issuing gases, moisture, zinc, copper, lead, ordinarily, certain, barium peroxide, aqueous, hydrochloric, chloride, convenient.

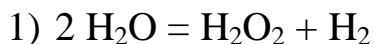
Exercise 3. Дайте начальную форму следующих слов.

Detected, is, impinges, shaken, quantities, symbolized, made, passes, obtained, exposed, issuing, decomposes.

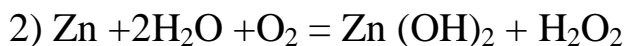
Exercise 4. Переведите без словаря, проанализируйте суффиксы и префиксы.

Peroxide, reaction, reactive, reactivity, electrode, zinc, electrolysis, anode, ether, barium, detect, detective, detector, evolution, symbol, symbolize, aqueous, produce, production, ultra-violet.

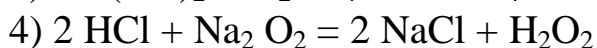
Exercise 5. Прочитайте по модели:



two molecules of /eɪtʃ tu:/ give /eɪtʃ tu: əʊ tu:/ plus /eɪtʃ tu:/



/zed en/ plus two molecules of /eɪtʃ tu: əʊ/ plus /əʊ tu:/ give /zed en eɪtʃ əʊ/
twice plus /eɪtʃ tu: əʊ tu:/

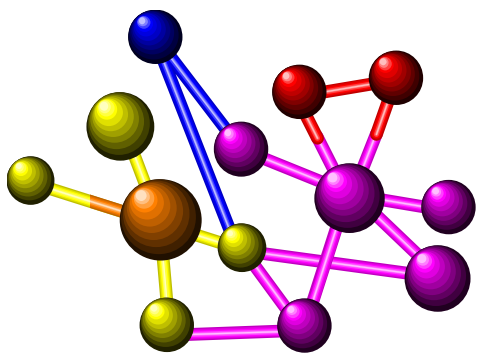


TEXT A. HYDROGEN PEROXIDE

Hydrogen peroxide is a remarkable compound. It is formed in small quantities in a variety of reactions. For example, it is formed when oxygen is bubbled about the electrode from which hydrogen is being evolved during the electrolysis of dilute acid, and also at the anode during the electrolysis of dilute sulfuric acid by a current of high density. Water confined in a quartz vessel is decomposed by exposure to ultra-violet light rays from a mercury lamp, sunlight, etc., and hydrogen peroxide and hydrogen are formed.



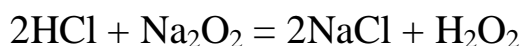
Hydrogen peroxide is produced during the combustion of hydrogen in air. For instance, when a jet of burning hydrogen impinges on the surface of cold water, in which ice is floating, or on ice itself, hydrogen peroxide can be



detected in the water; and is formed when moist ether is exposed to sunlight. Like ozone, hydrogen peroxide can be formed at a high temperature by passing a current of moist oxygen through a tube at about 2.000^0 and rapidly chilling the issuing gases. It is often formed when a substance is oxidized in the presence of moisture. For instance, when zinc, copper or lead is shaken up with air and dilute sulfuric acid the reaction symbolized:



Hydrogen peroxide is ordinary made by the action of acids on certain peroxide, such as sodium peroxide or barium peroxide. By treating a cold aqueous solution of sodium peroxide with dilute and cold hydrochloric acid, a solution of hydrogen peroxide mixed with sodium chloride is obtained:



This is convenient on account of the ease with which hydrogen peroxide decomposes when heated.

EXERCISES AND ASSIGNMENTS

Exercise 1. Вставьте пропущенные слова.

1. Hydrogen peroxide is a ... compound.
2. Hydrogen is evolved from
3. Hydrogen peroxide is produced during the ... of hydrogen in air.
4. It is also formed by the ... of acids on some peroxides.
5. We obtained a solution of hydrogen peroxide ... with sodium chloride.
6. Hydrogen peroxide is decomposed when

Exercise 2. Найдите в тексте следующие словосочетания:

Перекись водорода, небольшие количества, в процессе электролиза, разбавленная кислота, ток высокой частоты, кварцевый сосуд, горящий водород, холодная вода, высокая температура, поток влажного кислорода, в присутствии влаги, разбавленная серная кислота, холодный, водный раствор, хлористый натрий, при нагревании, при обработке холодного водного раствора, это удобно вследствие легкости, например, выходящие газы.

Exercise 3. Соедините части предложения.

- 1) Decomposed, water, by, exposure, is, rays, ultra-violet.
- 2) Burning, hydrogen, a jet, exposure, water, cold, of, the, surface, of, impinges, on.
- 3) Peroxide, in, hydrogen, detected, be, can, the, water.
- 4) Easily, decomposed, hydrogen, peroxide, is, when heated.
- 5) Compound, remarkable, a, hydrogen, is, peroxide.

Exercise 4. Выразите свое согласие или несогласие с данными утверждениями. Пользуйтесь клише:

As far as I know ...

It seems to be wrong (right) ...

I can't agree with you ...

I'm afraid you are mistaken ...

On the contrary ...

That's right ...

1. Water confined in a quartz vessel is not decomposed by exposure to ultra-violet rays.
2. Hydrogen is produced during the combustion of hydrogen in air.
3. Hydrogen peroxide is not made by action of acids on certain peroxides.
4. H_2O_2 is obtained when a substance is oxidized in the absence of moisture.
5. H_2O_2 is formed when dry ether is exposed to sunlight.
6. Hydrogen peroxide is an ordinary chemical compound.

Exercise 5. Проверьте свое понимание текста по вопросам.

1. Hydrogen peroxide is a remarkable compound, isn't it ?
2. How is hydrogen peroxide formed ?
3. Is hydrogen peroxide evolved during the electrolysis of dilute sulfuric acid?
4. What substance is produced during the combustion of hydrogen in air?
5. What other methods of obtaining hydrogen peroxide do you know?

Exercise 6. Какой способ получения перекиси водорода вы используете в лаборатории?

Exercise 7. Передайте кратко содержание текста, закончив следующие предложения:

Hydrogen peroxide is ...

H_2O_2 is formed ...

H_2O_2 is produced...

H_2O_2 is made...

Exercise 8. Найдите в тексте все предложения, в которых сказуемое выражено в пассивной форме. Установите время глагола.

Exercise 9. Найдите в тексте производные слова, образованные от следующих глаголов. Проверьте себя, знаете ли вы их значение.

To vary _____

To evolve _____

To decompose _____

To expose _____

To float _____

To pass _____

To present _____

To treat _____

To act _____

To moist _____

To bubble _____

To light _____

To burn _____

To remark _____

TEXT B. PROPERTIES OF HYDROGEN PEROXIDE

Hydrogen peroxide is a remarkable compound. It was discovered by L.Y. Thenard in 1818. It occurs in nature in rain, snow, dew, air.

Pure hydrogen peroxide is a viscous liquid: it is colourless, when viewed in thin layers but appears bluish in thick layers. The liquid has no odour. Dilute aqueous solution has a peculiar metallic lustre. If concentrated sulfuric acid is mixed with hydrogen peroxide at low temperature, oxygen rich in ozone will be evolved.

The liquid decomposes rapidly when heated at ordinary atmospheric pressure, but under reduced pressure it can readily be distilled. It boils at 68-69^o C under pressure of about 26 mm. The liquid crystallizes in needle-like prisms at -2^o C. It is soluble in water in all proportions.



Pure hydrogen peroxide is fairly stable. Dilute aqueous solutions are kept well. A 3% solution showed no appreciable change when kept a year. Alkali solutions are not kept well. If alcohol or ether is added, the aqueous solutions will become more stable. Pure H₂O₂ is decomposed very rapidly if any dust is present.

Like ozone hydrogen peroxide possesses strong oxidizing properties. It can act as an oxidizing as well as reducing agent.

Dilute aqueous solutions of hydrogen peroxide are used for bleaching (silk, feathers, straw, hair, ivory, teeth). It can be used in medicine as an antiseptic. Hydrogen peroxide is employed in analytical work for the oxidation of sulfites to sulfates, ferrous to ferric salts, nitrites to nitrates, etc.

Words:

dew – роса

needle – игла

silk – шелк

ivory – слоновая кость

feathers – перья

straw – солома

EXERCISES AND ASSIGNMENTS

Exercise 1. Проверьте свое понимание текста по вопросам:

1. When was hydrogen peroxide discovered ?
2. Where does it occur ?
3. What liquid is pure hydrogen peroxide?
4. What is its boiling-point ?
5. How stable is hydrogen peroxide ?
6. What properties does hydrogen peroxide possess?

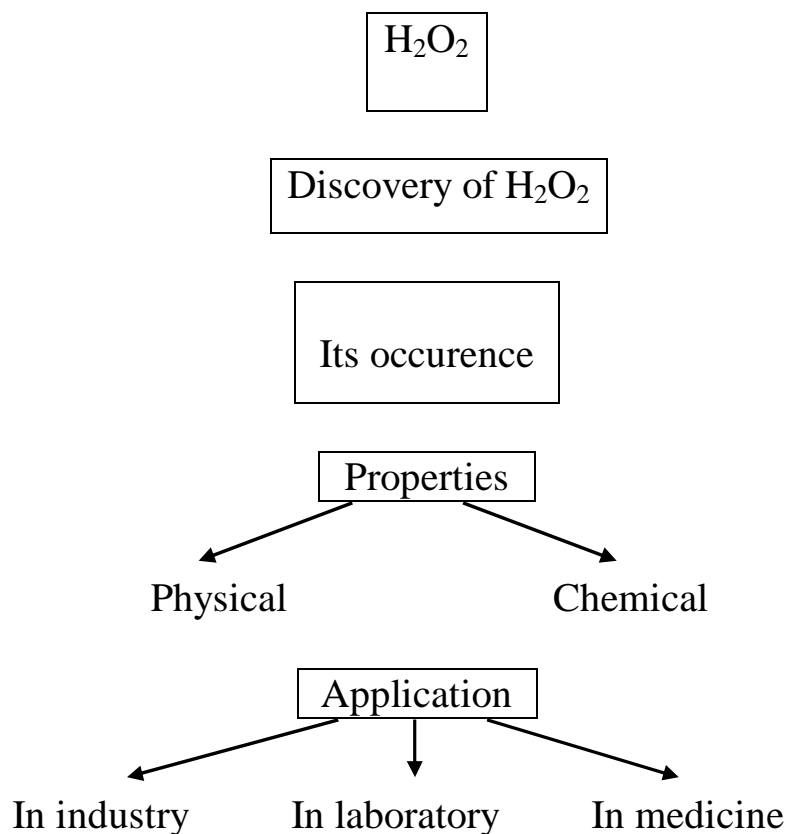
Exercise 2. Выразите свое согласие или несогласие со следующими утверждениями:

1. Hydrogen peroxide is not found in nature.
2. Pure hydrogen peroxide is a colourless and odourless solid.
3. The liquid decomposes slowly when heated.
4. It does not act as a reducing agent.

Exercise 3. Скажите, какие свойства перекиси водорода описаны в тексте?

Exercise 4. Выделите основную мысль каждой части и ключевые слова.

Exercise 5. Расположите информацию текста согласно предлагаемой логико-понятийной схеме:



Exercise 6. Передайте содержание текста по-английски, конкретизируя каждый блок схемы.

Exercise 7. Какие новые факты о перекиси водорода вы узнали, прочитав тексты А, В. При ответе используйте фразы:

Now I know that...

According to the text ...

It is said that...

TEXT C. HYDROGEN

Hydrogen was obtained in sixteenth century by the action of sulfuric acid on iron. R. Boyle at the end of the seventeenth century proved that unlike air the gas was inflammable. Lavoisier suggested the name hydrogen (water producer) in 1783, because when the gas burnt in air water was formed.

Hydrogen compounds are abundant and widely distributed. Water contains about 11% of hydrogen. Hydrogen is present in different proportions in all animal and vegetable matter. Spectroscopic work has shown that hydrogen is present in the atmosphere of the sun.

In the laboratory hydrogen is prepared from water, acids and alkalis. It can



be prepared by electrolysis, by the action of metals on water, on acids, on alkalis, by the action of water on the hydrides of the alkali or alkali metals.

Hydrogen is used commercially in the oxy-hydrogen blowpipes, for filling balloons, where helium is not available, and in the processes for manufacturing ammonia. It is also used in the hardening of oils. In this case hydrogen is passed through oils which contain unsaturated carbon compounds, containing nickel as a catalyst, and some hydrogen unites with unsaturated compound to form a saturated compound

of higher melting-point than the original oil, so that the product is solid and not a liquid.

Words:

inflammable – легко воспламеняющийся

commercially – в промышленности

available – имеющийся в распоряжении

saturated – насыщенный

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст, не пользуясь словарем.

Exercise 2. Найдите в тексте информацию о том, КТО и КОГДА изучал свойства водорода. В ЧЕМ и ГДЕ содержится водород?

Exercise 3. Опишите на основе текста лабораторные способы получения водорода.

Exercise 4. Найдите информацию о техническом применении водорода.

* * *

Exercise 1. Определите по суффиксу, к каким частям речи относятся следующие слова. Работайте парами. Проверьте, кто напишет за 5 минут больше производных от данных слов:

scientist	activity	solidify
fraction	comparable	lengthen
depth	quantity	importance
different	useful	uselessness
useless	equal	equation
purify	crystallize	remarkable
combustion	exposure	television
reactive	picture	electrify

Exercise 2. Переведите, обращая внимание на тип предложения и значение слов **some, any, no**.

1. He put some solid into the flask and then added some water.
2. There is something in the flask . Is there anything in the flask ?
3. Did he put any substance to the flask ?
4. No solid is seen in the test-tube.
5. There is no solid in this retort but solution possesses some colour.
6. Any student can make this simple experiment and analyze the solution in question.
7. We have just read some facts about atoms.
8. The substance no longer remains unchanged.
9. Some substances occur in the form of large crystals.
10. There were no physical changes in both cases.
11. Any body when heated to a sufficient high temperature becomes a source of light.
12. They could not get any papers about commercial application of hydrogen.
13. There is no answer to this question.
14. I noticed some mistakes in your translation.
15. I do not notice any mistakes in your translation.

Exercise 3. Найдите в текстах В, С предложения с глаголами в страдательном залоге. Проанализируйте и переведите их.

Exercise 4. Определите часть речи, проанализируйте состав слов и переведите:

Oxide – peroxide – dioxide – trioxide - oxidation – oxidizing – oxygen.

Stable – unstable – stabilize – stability- stabilization.

Soluble – insoluble – solubility – solvent – solubilization.

Sulfur – sulfite – sulfate – sulfuric – sulfurious.

Ferrum – ferrous – ferric.

Apply – application.

Exercise 5 . Подберите синонимы и антонимы.

Liquid, thin, to evolve, rapidly, ordinarily, thick, soluble, stable, to oxidize, to use, solid, insoluble, suitable, to make, to reduce, to liberate, quickly, slowly, unstable, to apply.

Exercise 6. Переведите.

1. If concentrated H_2SO_4 is mixed with H_2O_2 at low temperature, oxygen rich in ozone will be evolved.
2. Dilute aqueous solutions of hydrogen peroxide are used for bleaching.
3. On account of its inertness it is difficult to make nitrogen combine with other elements.
4. The Periodic Law of chemical elements discovered by Mendeleev created a new era in the history of chemistry.
5. The research of the unknown element was undertaken by a Polish woman living in France, M. Curie, who together with her husband, Pierre Curie, discovered the element she was searching for.

Exercise 7. Вставьте пропущенные слова.

Hydrogen Peroxide. Properties

There exist a number of peroxy The simplest of them is It contains twice as much (вдвое больше) ... for the same weight of ... as the simple ... , water. Since it readily decomposes, yielding ... , hydrogen peroxide is an active It also acts as a

oxygen (2), hydrogen peroxide, compound, hydrogen, reducing agent, oxide, oxidizing agent

Exercise 8. Составьте как можно больше словосочетаний
прилагательное + существительное

acid	moist
substance	dilute
solution	chemical
density	physical
light rays	alkaline
water	moist
surface	metallic
lustre	hydrochloric
metal	high
properties	ultraviolet

Проверьте себя. Знаете ли вы следующие слова?

Quantity, variety, to evolve, dilute, sulfuric acid, current, density, vessel, to expose, exposure, ultraviolet light, mercury, to produce, production, combustion, for instance, surface, moist, moisture, ether, hydrogen peroxide, to pass, tube, rapidly, to issue, zinc, copper, lead, to shake, to treat, treatment, aqueous, solution, hydrochloric acid, to mix, mixture, chloride, on account of.

LESSON 3

GRAMMAR: Passive Voice; Degrees of Comparison (для самостоятельной работы)

PRETEXT EXERCISES

Exercise 1. Определите по суффиксу, к какой части речи относятся следующие слова. Прочитайте и переведите их.

Important, readily, oxidation, practically, combination, electrical, chemist, manifold, synthesis, synthesize, equipment, formation, higher, possible, stable, successful, different, oxidize, reliable, foundation, uselessly, electrify, mixture, mixed, miscible, mixer, analysis, analyses, analyze, largest, bigger.

Exercise 2. Прочитайте правильно следующие глаголы. Дайте их начальную форму.

Indicated, passed, reacted, manufactured, fixed, possessed, estimated, regarded, fixes, is, were, taken up, found, been, existing, made, took, decomposed, required, combined, reacts, passing, cooled.

Exercise 3. Переведите следующие слова, не пользуясь словарем.

Oxide, dioxide, oxidation, react, reactor, practically, combination, combine, process, electrical, total, mixer, mixture, stable, quantitative, manufacture, direct, equilibrium, application, arc.

Exercise 4. Переведите предложения, обращая внимание на многозначность слова **for**:

в течение

FOR для того, чтобы; для
так как; поскольку

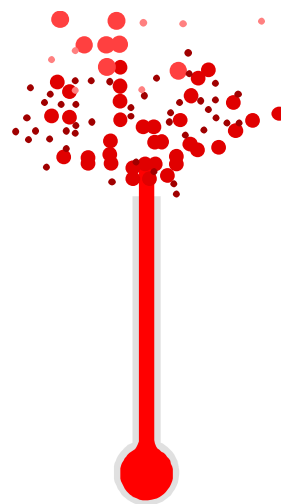
1. For many centuries there existed an atomic theory.
2. Water is the greatest chemical compound for it enters many chemical reactions.
3. For a reaction to take place, a catalyst must be used.
4. The task was given for me and you.
5. What are pipettes used for ?

TEXT A. OXIDES OF NITROGEN

The two most important *oxides* of nitrogen are *nitric oxide*, NO, and *nitrogen dioxide*, NO₂. Nitric oxide reacts readily with *oxygen* of the air to form nitrogen dioxide at temperatures below 700⁰ C, and at room temperature oxidation is *quantitative*. Nitric oxide is thus the only oxide that is *manufactured* directly. All other nitrogen oxides and their *derivatives* are made from it.

Practically all nitric oxide is now made by oxidation of *ammonia*, but for a number of years most nitrogen was fixed by the direct combination of nitrogen and *oxygen* when the air was passed through an electric arc. This process required a great deal of electrical energy and is now entirely obsolete. Since the arc process was the first successful nitrogen-fixation method, it possesses sufficient historical interest.

Arc Process. A study of the nitrogen-oxygen equilibrium indicates that the formation of nitric oxide is favoured by the application of heat. Less than 3% of the total energy is taken up in the reaction. Above 2.300⁰ C the time required to reach equilibrium is very short. The higher the temperature, the greater are the yields. The temperature at which the gas is heated in the arc, as it has been estimated, is from 3 200⁰ C to 3 500⁰ C. The reaction mixture must



be cooled as quickly as possible after it passes through the electric arc, but the decomposition below 1.200°C is so slow that nitric oxide may be regarded as stable.

EXERCISES AND ASSIGNMENTS

2 Exercise 1. Послушайте чтение текста и прочитайте его.

Exercise 2. Найдите в тексте:

А) *глаголы в страдательном залоге*, определите время, дайте перевод предложений с *Passive Voice*.

Б) *словосочетания*: диоксид азота, единственный оксид, окисление аммиака, в течение ряда лет, большая часть азота, успешный метод, связывание азота, чем выше..., тем больше..., как можно быстрее;

В) *ответы на следующие вопросы*:

1. What oxides of nitrogen are the most important?
2. What is formed when NO reacts with oxygen of the air?
3. How is nitric oxide made now?
4. Why is the arc process obsolete now?

Exercise 3. Составьте предложения.

1. is, oxide, nitrogen, in, important, chemistry, of.
2. oxide, ammonia, nitric, is, made, of, by, now, oxidation.
3. manufactured, nitric, directly, is, oxide.

Exercise 4. Заполните пропуски словами, подходящими по смыслу.

1. Nitric oxide reacts ... with oxygen of the air.
2. Nitric oxide is the only oxide that is ... directly.
3. Nitric oxide is now made by the ... of
4. Above 2.300°C the time ... to reach equilibrium is very
5. The must be cooled as soon as possible.

Exercise 5. Выразите свое согласие или несогласие с данными утверждениями. Пользуйтесь клише:

1. Nitric oxide does not react with oxygen of the air.
2. Practically all nitric oxide is now made by the oxidation of ammonia.
3. The arc process requires a great deal of electric energy.
4. The arc process doesn't possess historical interest.
5. The formation of nitric oxide is favoured by the application of heat.

It seems to be wrong (right) ...	Кажется, это неправильно (верно).
I can't agree with you ...	Не могу согласиться ...
As far as I know ...	Насколько я знаю, ...
I am afraid, you are mistaken ...	Боюсь, что ты ошибаешься.

Exercise 6. Найдите синонимы и антонимы:

Readily, employ, to produce, slowly, to apply, decomposition, stable, to obtain, to liberate, before, to get, to give off, unstable, directly, above, fast, to make, to use, cool, totally, hot, entirely, composition, after.

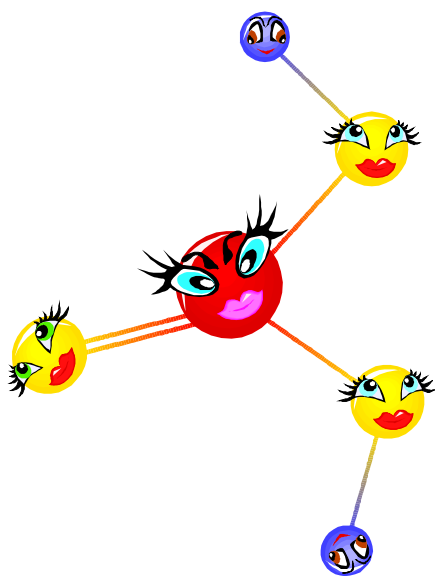
Exercise 7. Передайте основные положения текста, закончив следующие предложения:

1. There are two important oxides of nitrogen ...
2. Nitrogen dioxide is obtained when ...
3. Nitric oxide is now made by ...
4. Arc process possesses historical interest for it...

TEXT B. OXIDES

The compounds of the elements with oxygen are called oxides. They can be classified into six main groups: neutral, acidic, basic, amphoteric, compound oxides, peroxides.

Neutral oxides – exhibit no tendency to form salts either with acids or bases. The example is nitrous oxide.



Acidic oxides are oxides which combine with bases to form salts. An example of such an oxide is carbon dioxide which reacts with sodium hydroxide solution forming sodium carbonate. Such oxides often react with water forming acids. A good example is sulfur trioxide which combines with water forming sulfuric acid. Oxides which form acids with water are called anhydrides. Thus, SO_2 is not only called sulfur dioxide but also sulfurous anhydride.

Basic oxides are the oxides which combine with acids to form salts and water. If they are soluble in water they are known as alkalis.

Important examples of basic oxides are the oxides of calcium, copper and iron. Basic oxides are always the oxides of metals.

Amphoteric oxides behave as an acidic oxide in alkaline solutions and as basic oxide in acid solutions. The examples are oxides of zinc, arsenic, antimony, stannous oxide and lead monoxide.

Peroxides. A true peroxide is an oxide which when treated with dilute acids yields hydrogen peroxide. Peroxides may be thought of as salts of hydrogen peroxide which is known as a weak acid.

Compound oxides – are oxides which behave as though they are compounds of two oxides. Familiar examples are Pb_3O_4 , Fe_3O_4 , Mn_3O_4 . The oxides of the elements are among the most important of their compounds. Their properties are very important in relation to the classification of the elements. Thus, boron, carbon, nitrogen, chlorine, etc. form only acidic oxides, whilst sodium, potassium, strontium, calcium, barium, copper, silver, cadmium, mercury, cobalt, nickel, platinum, etc. have oxides with basic properties only. Zinc, aluminium, tin, lead and gold yield amphoteric oxides.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст и проверьте себя по вопросам:

1. What is called an oxide?
2. What groups of oxides do you know?
3. What are neutral, acidic, basic oxides?

Exercise 2. Запомните произношение следующих слов. Прочитайте их самостоятельно.

Oxide, classify, basic, amphoteric, nitrous, hydroxide, carbonate, trioxide, anhydride, sulphurous, arsenic, zinc, antimony, neutral, cobalt, nickel, platinum, alkali, lead, yield, boron, sodium, potassium, strontium, calcium, mercury, cadmium, aluminium, chlorine, nitrogen, peroxide.

Exercise 3. Приведите примеры нейтрального оксида, кислотного, основного, перекиси, сложного оксида.

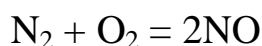
Exercise 4. Выразите свое согласие или несогласие с данными утверждениями. Пользуйтесь клише:

1. Neutral oxides exhibit tendency to form salts with acids and bases.
2. Oxide which does not form acid with water is called anhydride.
3. Sulfur trioxide when combining with water forms H_2SO_4 .
4. Compound oxides are oxides which contain many oxides.

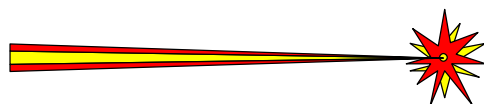
TEXT C. PROPERTIES OF NITROGEN

If a *glowing splint*, burning phosphorous, sulfur or sodium or a *stream* of burning hydrogen is *introduced* into a vessel filled with nitrogen, the flame goes out at once, *as if* the burning substance had been immersed in water. Nitrogen doesn't support combustion and it doesn't burn. In this respect it *resembles* carbon dioxide. But nitrogen doesn't make *lime water turbid*.

We pass *electric sparks* through air. A yellow «flame» appears between the ends of the wires, and a gas with a *pungent odour* is formed in a vessel. At the temperature of the spark nitrogen combines with oxygen forming nitric oxide NO:



When the current is switched off, the flame goes out. This is because the oxidation of nitrogen is an endothermic reaction (a reaction in which energy is not evolved but is absorbed). The energy for the oxidation of nitrogen is supplied by the electric current. Therefore, when the current is *switched off*, the reaction of nitrogen oxidation stops too. The reaction of the combination of nitrogen and oxygen takes place only at a very high temperature such as an electric spark.



Words:

glowing splint – горящая (тлеющая) щепка

stream – струя

as if – как будто

like – известь

turbid – мутный

electric spark – электрическая искра

introduce – вводить

a pungent odour – едкий запах

resemble – быть похожим

switch off – выключать

Быстро просмотрите текст и скажите, какие свойства азота описываются в нем. Подтвердите свое мнение предложениями из текста.

EXERCISES AND ASSIGNMENTS

Exercise 1. Сравните сказуемые данных предложений. Переведите.

1. They asked to translate the text. They were asked to translate the text.

2. He tells some fact about metals. He is told some facts about metals.
3. He will refer to the data of her research. The data of her research will be referred to.

Exercise 2. Составьте все возможные варианты предложений.

The articles	is spoken about	into English
Some questions	will be answered	at the conference
His lecture	are translated	by all the students
Gold	were discussed	by moisture
These data	is not acted upon	by acid
	is attended	by a discussion
	were referred to	
	will be followed	

Exercise 3. Напишите несколько предложений по предлагаемому образцу:

What is your shirt made of ? – My shirt is made of cotton.

shoes	gold
socks	cotton
pullover	leather
belt	nylon
ring	silk
necktie	wool

Exercise 4. Проанализируйте форму сказуемого и переведите.

1. The paper will be published in the journal «Inorganic Chemistry».
2. The conference was attended by many foreign scientists.
3. The composition of the product is affected by addition of chlorine and chloride.
4. The rate of reduction of the amount of oxygen was affected by the oxidizing conditions.
5. The method of preparation of oxygen by the decomposition of potassium chloride was described in chapter 5.
6. Many experiments are carried out at the laboratory of inorganic chemistry.
7. The importance of D.I. Mendeleev's discovery is not limited to chemistry alone.
8. At the time when D.I. Mendeleev published his Table only 63 elements were known.

9. The substance was examined under the microscope.
10. Some new results were obtained by a group of research workers.
11. Physics and chemistry are taught at school.
12. Some of the properties of this substance will be predicted.

Exercise 5. Проанализируйте и переведите следующие предложения.
Пользуйтесь словарем.

1. The periodic law of chemical elements (to discover) by D.I. Mendeleev.
2. The equivalent weight of radium (to determine) and found to be 113.
3. A substance (to undergo) ignition when it (to heat) without direct access of flame.
4. More recently copper salts (to investigate) by many chemists whose papers correct the earlier observations.
5. The first compound of chlorine we (to study) in detail is its compounds with hydrogen.
6. The products of oxidation (to call) the oxides of the elements the compound was composed of.
7. That matter (to exist) in three physical states – solid, liquids, or gaseous is common knowledge.
8. He (to prove) that red phosphorus is less chemically active than the yellow one.
9. Chlorine (to refer to) as diatomic, hence its formula is Cl_2 .
10. Gold is hardly (to affect) by nitric acid, sulfuric and hydrochloric acids.
11. The qualitative examination of those compounds (to follow) by the quantitative analysis.
12. Nitrogen does not (to burn), nor does it support burning.
13. The element phosphorus (to locate) below nitrogen in group V of the Periodic Table.
14. At present potassium nitrite (to manufacture) widely at the plants.
15. The changes in these parameters during decomposition (to follow) by a number of other changes. His work in this field (to examine) by the experts next spring.
16. Everybody (to speak) about this new method of product.
17. I (to ask) to attend his lecture on chemistry.

Exercise 6. Образуйте сравнительную степень следующих прилагательных. Составьте с ними собственные предложения.

Interesting, good, comfortable, warm, fresh, bad, young, slow, weak, difficult, old.

Exercise 7. Напишите несколько предложений по предлагаемому образцу.

<i>fast</i>	<i>slow</i>	<i>good</i>	<i>important</i>
<i>careful</i>	<i>bad</i>	<i>short</i>	
<i>long</i>	<i>industrious</i>	<i>interesting</i>	<i>near</i>

Nick works harder than Ann.

Nick's job is more difficult than Ann's.

Exercise 8. Напишите по образцу несколько предложений:

He is very busy. He is one of the busiest persons in the world.

1) She is very intelligent ...

2) He is very tall...

3) She is very beautiful...

Exercise 9. Переведите предложения и словосочетания.

The....., the	чем..., тем
(The) most	большинство, большая часть, самый, очень
Mostly	больше всего, главным образом

A.

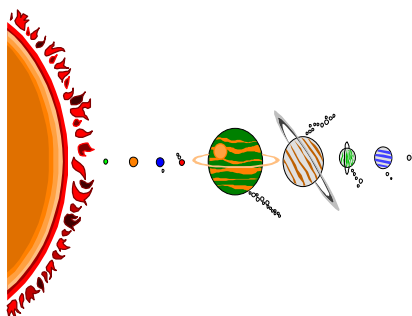
1. The stronger is the acid, the greater is the tendency to lose protons.
2. The faster the object moves, the greater is the air resistance.
3. The bigger the mass, the bigger the weight of the body.
4. Most elements exist in different forms.
5. Iron is the most important material in industry.
6. Most of all the scientists investigated radioactive elements.
7. We need mostly the polymers which withstand high temperatures.
8. The lower the temperature, the more easily the gas is liquefied.

B.

Самая низкая температура, самая высокая точка, самое большое число, самый интересный проект, самый современный метод исследования, самое трудное слово, наиболее полезный словарь, самое современное производство, самая блестящая идея, более ранние результаты.

Exercise 10. Поставьте прилагательные и наречья в соответствующие степени сравнения. Переведите письменно на русский язык, а затем свой текст – на английский. Сравните его с оригиналом.

Mercury



Mercury is the (small) planet in our solar system. It is the (close) planet to the Sun. Apart from the Sun itself the Sunny side of Mercury is the (hot) place in the solar system. But the dark side of Mercury is probably even (cold) than the (far) planet, Pluto. It is strange to find the (hot) and the (cold) parts of the solar system on the same planet. The (good) time to see Mercury is spring.

Exercise 10. Составьте английские предложения по модели:

№ 1 is the least difficult.

Mathematical Examination

1) $48 : 4 =$

2) $\frac{1.672}{0.348} \times \frac{1.73}{0.211} =$

3) $x^3 - \frac{748}{4} \times \frac{y^2}{x} \times 3^7 =$

4) $\frac{2.341}{1.789} : \frac{1}{16} \times 0.1785 + \frac{11}{12} =$

5) $\frac{496}{7} - \frac{12}{5} =$

LESSON 4

GRAMMAR: Passive Voice; Modal Verbs and their Equivalents;
Verbs «to be», «to have»; Word formation (для
самостоятельного повторения)

PRETEXT EXERCISES

Exercise 1. Переведите слова, обращая внимание на суффиксы и префиксы.

Greatest, nature, natural, transform, transformer, transformation, desirable, hardly, application, apply, applicable, purify, pure, impure, purification, impurity, soluble, insoluble, solubility, treatment, produce, product, production, productivity, react, reactive, reactivity, decompose, decomposition, contain, container, desire, desirable, wide, widely, condense, condensing, boiler.

Exercise 2. Укажите начальную форму глаголов.

Takes place, used, known, dissolved, washing, purified, affected.

2

Exercise 3. Послушайте, повторите за диктором и прочитайте:

a) influenced, used, purified, referred, filtered, boiled, affected, dissolved, condense;

b) process, microbes, laboratory, distillation, transformation, industry, influence, thoroughly, except, volatile.

Exercise 4. Переведите предложения, обращая внимание на функции глаголов *to have* и *to be*.

1. Water is a compound substance.
2. The students were carrying out the experiments for many hours.
3. Every student is to know safety rules.
4. Water is colourless when viewed in thin layers.
5. We are five in our family.
6. Our aim was to identify the reaction.
7. All the questions were answered at the lecture.
8. It is to be remembered that analytical balances should be kept in a special room.
9. All the acids have a sour taste.
10. Since iron is expensive, it has to be used very carefully.
11. It has been found that metallic conductors do not undergo chemical change.
12. The students will have to make experiments.
13. After the temperature have been raised, the decomposition accelerated.
14. They had finished their work by 10 o'clock and then had a rest for two hours.

TEXT A. PURIFICATION OF WATER

Water is the greatest chemist in the world. No natural process takes place without it. Chemists could hardly do anything in their laboratories without water. It is impossible to study the properties of substances or their transformations, to prepare new compounds without water. Water is one of the best solvents. It is known that many substances must be dissolved before they can enter some reactions. Not only does water react with many substances, but many chemical reactions may be influenced by it.



For many processes it is desirable that water should be pure. The choice of the process, which is to be used for purification of water, depends on the application of water and on the impurities which it may contain. For instance, water for washing should not contain substances that react with soap. When water is to be used for drinking it is necessary that the microbes should be killed. 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 used for producing pure water in the chemical sense, since most of soluble salts are not affected by the treatment. Here we shall have to remember the fact that water is easily changed into steam while most of the dissolved substances are not volatile. By condensing the steam we shall be able to remove all the impurities except volatile ones. This process is referred to as distillation. Distilled water is widely used both in the laboratory and in industry.

Water used for steam boilers should be free from substances which cause corrosion and scale formation.

EXERCISES AND ASSIGNMENTS

Exercise 1. Сгруппируйте синонимы и антонимы.

Natural, without, study, prepare, vapour, before, artificial, pure, application, smallest, with, insoluble, greatest, obtain, examine, impure, after, use, contain, desirable, way, slightly, include, manner, undesirable, thoroughly, soluble, steam.

Exercise 2. Заполните пропуски словами, подходящими по смыслу.

1. Water is the greatest ... in the world.
2. Many chemical reactions by water.
3. Chemists cannot ... without water.
4. Water for washing should not contain substances which react with
5. Water for drinking should not contain
6. To purify water, it is to be ... and
7. By condensing the steam we are able to remove ... except
8. Distilled water is used both in ... and in

Exercise 3. Найдите в тексте ответы на вопросы.

1. When cannot the chemists do without water?
2. Why is water the best solvent?
3. What does the process of purification of water depend on?
4. What should water for washing not contain?
5. What is it necessary to do when water is to be used for drinking?
6. What ways to purify water do you know?
7. Why is filtration not used for producing chemically pure water?
8. What shall we be able to do by condensing the steam?
9. Where is distilled water used?

Exercise 4. Выразите свое согласие или несогласие с данными утверждениями. Пользуйтесь клише:

1. Water is the greatest physicist in the world.
2. Many substances must be mixed with water before they enter the reaction.
3. Pure water in the chemical sense is to be produced by the process of filtration.
4. It is possible to purify water by boiling.
5. Water used for steam boilers should be pure.

As far as I know ... – Насколько я знаю ...

Far from it. – Совсем не так.

You are right (wrong). – Ты прав (не прав).

On the contrary. – Наоборот.

I can't agree with you. – Не могу согласиться.

I am afraid, you are mistaken. – Боюсь, что ты ошибаешься.

TEXT B. WATER

Water is one of the commonest of all substances and without it life would be impossible. The seas and oceans cover about seven tenths of the Earth's surface but water is also contained in the soil, in the atmosphere and in all living things. More than half of the human body consists of water, which also form a large part of the food we eat, especially vegetables and fruits. Man can live for ninety days or a little more without food, but he cannot live long without water.

Water exists as a substance in three states: ice, which melts at 0° Centigrade; liquid water and steam, the latter is formed when water boils at 100 degrees Centigrade.

Water differs from other liquids in that

- 1) it expands when cooled from 0° C,
- 2) contracts when heated from 0° to 4° C and
- 3) reaches its maximum density at 4° C. No other liquid possesses this property.

Pure water is rarely found in nature. This is because water is able to dissolve many substances from the air, the soil and the rocks. The saltiness of sea water is caused by the mineral substances which are dissolved from the Earth's surface by rivers and carried down to the sea. The Sun's heat causes the surface sea water to evaporate or to change into vapour, leaving behind the salt and other minerals. That is why the seas are so much more salty than rivers flowing into them.

Fresh water which is accumulated on the earth's surface is known as surface water. Lakes, rivers, reservoirs, streams, swamps and any other natural storage basin contain surface water. Not all surface water areas are natural as there are many man-made lakes and reservoirs. On the other hand, fresh water (from rain, melting snow or ice) which soaks into the soil is known as ground water.

It was long known that there is no life without water. Man can live without clothes, without shelter and for some time without food. But he soon perishes without water. All his food contains water, from about 60% in lean meat to 95% in watery fruit. His body is about 70% of water. The air surrounding him contains enormous quantities of water in the form of vapour. The surface of the earth is 70% water to an



average depth of over 4 kilometers. And yet man often does not have enough water.

First of all water is needed by the industry. It is necessary 100 litres of water to produce one kilogram of paper; 600 litres to produce one kilogram of woolen cloth; 3 500 litres for producing one ton of dry cements and 20 000 litres in order to produce one ton of steel. It was established that the needs in water are greatest in India, Indonesia, Nigeria, Brazil, Pakistan, Korea, China and Philadelphia. The total amount of water in existence is about 326 million cubic miles. Every man gets along with less than one per cent of the world's water. But the total population of the world is growing at a rate of 1.7 % annually. So man began treating raw water, filtrating and chlorinating it. He has devised modern methods of collecting, pumping, storing and distributing water. There are the grand enterprises of taming the rivers, of harnessing their strength to produce power for man's use, preventing floods and using the water for increasing the harvest of the land and providing food for the growing family of man. Perhaps a practical way will be found of making the rain fall where it is most needed. And yet the human suffering and economic loss resulting from inadequate water supplies are so great that bold measures are required. Many diseases are associated with lack of clean water and contaminated water and unsafe water supplies. World water supply is the major concern now.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст. Выберите из каждого абзаца предложения, которые передают его основное содержание.

Exercise 2. Озаглавьте абзацы текста.

Exercise 3. Составьте план текста и перескажите его по-русски и по-английски.

Exercise 4. Скажите, какие новые сведения вы узнали, прочитав тексты из урока 4.

Exercise 5. Выскажите свое мнение относительно следующих утверждений:

Pure water is rare found in nature.

There is no life without water.

World water supply is the major concern now.

TEXT C. CHEMISTRY

Chemistry is a science which deals with substances, their composition and structure, their properties and mutual conversation. Man began to use chemical processes in ancient times for glass making, dyeing, preparation of pigments, poisons and drugs. But theory lagged behind and was neither connected with practice, nor supported by experiment.

The first theoretical chemistry was the chemistry of Greek chemists Aristotle, Hippocrates, Democritus, Plato and others.

Modern chemistry began with the work of Robert Boyle. He studied the relationship between the volume of a gas and the pressure. In 1748 M. Lomonosov discovered the law of conservation of substance. In 1777 Lavoisier formulated the basis of the process of combustion. He introduced the concept of the chemical elements.

At the beginning of the 19th century John Dalton carried out his work on the atomic theory. A. Avogadro stated that equal volumes of gases under the same temperature and pressure contain the same number of molecules. F. Kekule and A. Butlerov introduced the structural theory of organic chemistry. In 1869 D.I. Mendeleev discovered regularities in the properties of the elements. The Periodic System of D.I. Mendeleev was the greatest and the most important achievement of the 19th century.

Many great scientists devoted their life to the development of chemistry. N. Bohr developed the theory of the hydrogen atom, the Curies prepared artificially radio-active elements, Marie Curie discovered radium and polonium, N. Semenov discovered chain reactions, N. Zelinsky made a basis for synthesizing many new compounds and so on.

The future of chemistry is practically unlimited. Rapid development of chemistry will help to create many new goods, machines, plastics, polymers, drugs, fertilizers, etc.

Modern chemistry is divided into several important branches:

- 1) inorganic chemistry which studies the properties of chemical elements and their mixtures;
- 2) organic chemistry which deals with the compounds of carbon;
- 3) physical chemistry which uses physics in studying chemical processes;
- 4) analytical chemistry which defines the qualitative and quantitative chemical composition of substances;



- 5) colloidal chemistry which deals with special properties of substances in a finely dispersed condition;
- 6) electrochemistry which studies the relation between electrical energy and chemical change;
- 7) nuclear chemistry which studies the transformation of atomic nuclei and reaction between them;
- 8) biochemistry which studies the process in living organisms.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст и проверьте свое понимание текста по вопросам:

1. What does chemistry deal with?
2. For what purpose did man use chemical processes in ancient times?
3. What Greek chemists are known to you?
4. What discoveries were made by the chemists of the 18th century?
5. What great scientists devoted their lives to the development of chemistry?
6. What branches of chemistry will you study at the University?

Exercise 2. Закончите следующие предложения:

1. Inorganic chemistry studies ...
2. Organic chemistry deals with ...
3. Analytical chemistry defines ...
4. Physical chemistry uses ...
5. Electrochemistry studies ...

Exercise 3. Расскажите о вкладе отечественных и зарубежных ученых в развитие химии. Пользуйтесь моделью в страдательном залоге:

The first theoretical chemistry was founded by Greek scientists.

1. Modern chemistry (to begin) by Robert Boyle.
2. The law of conservation of substance (to discover) by M. Lomonosov in 1748.
3. The basis of the process of combustion (to formulate) by Lavoisier in
4. The research on atomic theory (to carry out) by J. Dalton.
5. The structural chemistry of organic chemistry (to introduce) by ... and ...
6. Regularities in the properties of the elements (to discover) by ... in 1869.

7. The theory of the hydrogen atom (to develop) by
8. Radium and polonium (to discover) by the

* * *

Exercise 1. Переведите предложения, обращая внимание на способы выражения сказуемого.

1. Such question can not be answered at once.
2. The rate of the reaction is to be influenced by gas temperature.
3. Einstein's theory of relativity has to be referred to by many researchers.
4. All the instruments should be looked at with great interest for they are widely used in the lab.
5. The liquid was to be allowed to evaporate.
6. This insoluble compound should not be affected by acids.
7. It must be noted that this huge automatic unit is operated by only a few men.
8. It is to be remembered that concentrated acids are very dangerous.
9. All the devices and glassware are to be kept in good order in the laboratory.
10. Nitric acid may be obtained by the reaction of concentrated sulfuric acid with sodium nitrate.

Exercise 2. Вставьте модальные глаголы или их заменители, подходящие по смыслу.

1. ... I take this test-tube?
2. A first-year student carry out many experiments in the laboratory of inorganic chemistry.
3. You ... use this glassware for your experiments.
4. In this experiment we find out all the properties of this substance.
5. Hot water to poured in a flask.
6. You ... carry out this experiment again for getting better results.
7. His experiment ... help our researchers to finish their work.
8. He knows very much and ... make various experiments very well.
9. The gas be passed through a glass tube at a low temperature.
10. A good order ... be kept at the laboratory.
11. ... you measure pressure?
12. Nitric acid ... be prepared by the reaction of concentrated sulfuric acid with sodium nitrite.

Exercise 3. Прочитайте и проанализируйте текст. Найдите предложения со сказуемым в страдательном залоге и с модальными глаголами. Переведите эти предложения. Составьте вопросы по содержанию текста.

Industrial Uses of Gold

Gold (Au) is a metallic chemical element. Atomic number 79. Atomic weight 197.2. Gold has a number of industrial uses. About 10% of the annual production is used for industrial processes.



Gold is measured in troy ounces (31.1 grams). One ounce can be drawn into 80 kilometres of wire. Between 20 and 30 ounces are needed for every jet engine. Gold coatings, 0.000024 mm thick, are used to reflect heat from jet engine exhausts. The windscreens of Concorde, other high speed aircraft, and some express trains have a gold electric heating

element, 0.000005 mm thick, which is used to prevent icing. Spacecraft are protected against radiation by a thin layer of the metal.

As it conducts electricity well and does not tarnish, gold is used extensively in computers and electric consumer goods. For many years it has been blended with oils and applied as decoration to china and glass. Because it is so reflective, it is employed in the manufacture of some roof tiles and glass.

Exercise 4. Составьте предложения и переведите их.

Gold	was produced	to produce an ounce of
It	is used	gold
New deposits	has been used	in ancient times
Three tons of rock	can be used	in industrial processes
	may be seen	in museums
	have to be mined	for 6000 years
	are being found	for many purposes

ТЕКСТЫ ДЛЯ КОНТРОЛЯ НАВЫКОВ ЧТЕНИЯ, АУДИРОВАНИЯ И ПЕРЕВОДА

I. DECOMPOSITION REACTIONS OF WATER

Many elements decompose water at a suitable temperature. The alkali-earth metals and alkali metals attack water at the ordinary temperature. Magnesium is only slightly affected by cold water, but it reacts readily with hot water. Magnesium, zinc, iron react with steam. Aluminium doesn't react with water since it is protected by surface oxide film. But if this film is removed, aluminium will decompose water in the cold. Carbon, silicon, fluorine and chlorine combine with water. Carbon can be dissolved when passed into water, forming a green solution. On standing it combines with water, giving hydrochloric acid. Fluorine acts in a similar way, forming hydrofluoric acid.

II. PROPERTIES OF HYDROGEN PEROXIDE

Pure hydrogen peroxide is a viscid liquid. It is colourless when viewed in thick layers. The liquid is odourless. Dilute aqueous solution has a bitter metallic taste. The liquid decomposes rapidly when heated at ordinary atmospheric pressure. It boils at 68-69⁰ C under about 28 mm pressure. The liquid is soluble in water in all proportions. Pure hydrogen peroxide is stable. Dilute aqueous solutions may be kept for a year with no appreciable change. Alkaline solutions are not kept very well. Pure H₂O₂ is decomposed rapidly if any dust is present. Hydrogen peroxide possesses strong oxidizing properties. It liberates iodine from solutions of potassium iodide. It converts lead sulfite into lead sulfate.

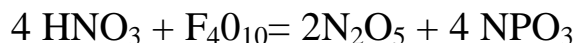
III. NITRIC ACID

Nitric acid is a colourless liquid, which fumes strongly in air. The pure acid rapidly absorbs moisture from the air. It mixes in proportions with water. It boils at 86⁰ C and freezes to a white solid melting at -42⁰ C. An aqueous solution containing 68% of nitric acid boils at 120,5⁰ C. The concentrated solutions and the more dilute solutions, the lower their boiling points. Nitric acid is readily decomposed by heat. The main chemical properties can be classified as follows: it acts as an acid and as oxidizing and nitrating agent. It reacts with basic oxides, hydroxides and carbonates forming the corresponding salts. It is a powerful oxidizing agent. By means of nitric acid sulfur is oxidized to sulfuric acid and phosphorus to phosphoric acid. Many metallic sulfides are oxidized to sulfates. Nitric acid is used for the preparation of

metallic oxides, oxyacids. It is an important reagent in organic chemistry. It is widely used in industry.

IV. NITROGEN PENTOXIDE

Nitrogen pentoxide may be obtained when phosphorus pentoxide is added to pure, well cooled nitric acid. The temperature rises to 60-70°C. The reaction symbolized:

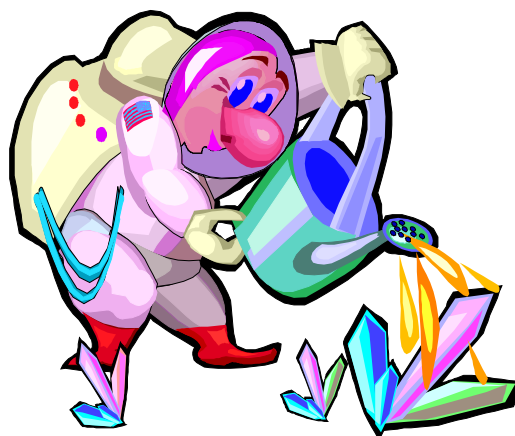


Nitrogen pentoxide is produced by the action of ozone or nitrogen peroxide and by the action of chlorine on dry silver nitrate.

Nitrogen pentoxide is manufactured in the form of white crystals. Its melting point is 30°C and above this point it decomposes. If nitrogen is rapidly heated, it explodes.

Nitrogen pentoxide reacts with water, yielding nitric acid, and hence it may be regarded as nitric anhydride.

It is indicated by means of analysis that its empirical formula is N_2O_5 . The vapour density and the molecular weight have not been determined, hence the molecular formula is not known.



LESSON 5

GRAMMAR: Participle

PRETEXT EXERCISES

Exercise 1. Запомните значения данных слов и словосочетаний.
Переведите предложения.

1. **On account of** its oxidizing properties moist chlorine will bleach (отбеливать) many substances.
2. **Owing to** its low acidity boric acid is widely used in medicine.
3. Bromine does not unite with hydrogen in sunlight **unless heated**.
4. Nearly all mercuric compounds sublime **at once** when heated.
5. **Thus** sodium acts energetically with water.
6. The substance tarnishes **at once** in the air.
7. These factors are important **enough** for our understanding of the nature of the phenomenon.

8. **Owing to** its properties ozone is readily distinguished (отличается) from oxygen.
9. The presence of a catalyst is not **sufficient** for the reaction to be started.

On account of – из-за, вследствие, по причине

At once – сразу, тотчас

Owing to – благодаря, по причине

Thus – так, таким образом

Unless – если не

Enough, sufficient – довольно, достаточно

Exercise 2. Проанализируйте и переведите группы родственных слов.

Active – activity; conduct – conductor – conductivity; react – reactive – reaction – reactivity – reactor; oxide – oxidize – oxidation – oxidizing agent – peroxide; direct – directly – direction – indirect – indirectly; lustre – lustrous; vigour – vigorous – vigorously; combine – combination; burn – burner – burning.

Exercise 3. Переведите без словаря.

Intense, chemical, formation, monatomic, conductor, chemically, reactive, mixture, halogen, phosphorus, act, hydroxide, ordinary, globe, globule, brilliant, element, energetically, ammonia.

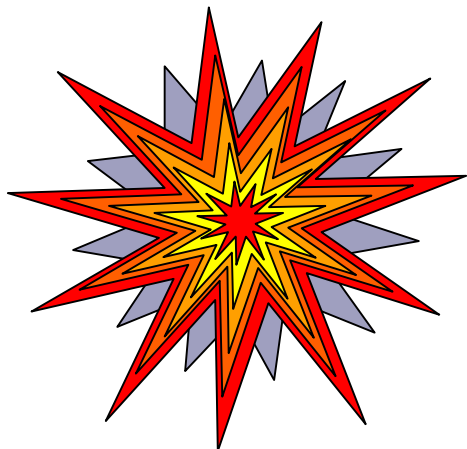
Exercise 4. Установите начальную форму.

Found, oxidized, kept, cut, seen, forming, combines, will dissolve, evolved, burning, widely, lighter, most.

TEXT A. SODIUM

Sodium in the form of compound is widely distributed and abundant element but on account of its intense chemical activity it is never found free. Sodium is a silvery-white, lustrous metal which tarnishes at once when exposed to the air owing to the formation of a film of oxide. On account of the ease with which it is oxidized, it must be kept immersed in a liquid containing no oxygen. It is lighter than water (sp. gr. 0.93); it is soft, so that it can be cut

with knife, and at ordinary temperature it can be moulded between the fingers. Sodium melts at 97.5°C and boils at 880° . The vapour, which is purple when seen in thick layers, has a density of 12.85 ($\text{H}_2= 1$) indicating that



it is probably almost entirely monatomic. Sodium is a good conductor of electricity. Chemically sodium is a very reactive element. It combines vigorously with oxygen, burning readily in air with brilliant, yellow flame, and forming a mixture of the oxide and peroxide. It combines directly with the halogens and with phosphorus taking fire when heated with these elements. It also combines with hydrogen when heated to 360° . The vigour of its combination

with oxygen is such that sodium will react with most oxides liberating the element previously combined with the oxygen. Thus, it acts energetically with water, forming sodium hydroxide and hydrogen and the heat of the reaction is sufficient to melt the sodium which swims, as a globule on the surface of the water. The heat evolved is, however, not great enough to ignite the hydrogen unless large pieces of sodium will dissolve in liquid ammonia forming a blue solution.

EXERCISES AND ASSIGNMENTS

2 Exercise 1. Послушайте и правильно прочитайте слова и словосочетания.

Sodium, compound, widely distributed, abundant, element, intense, silvery-white, tarnish, immerse, specific gravity, knife, to mould, finger, purple, indicate, monatomic, entirely, brilliant, halogens, sodium hydroxide, liberating, previously, sufficient, to ignite.

Exercise 2. Найдите и выпишите из текста все обозначения цвета. Дополните сочетания прилагательными, обозначающими цвет:

_____ solution
_____ metal
_____ flame
_____ vapour

Exercise 3. Найдите в тексте следующие слова и словосочетания:

В виде соединений, жидкость, не содержащая кислорода, удельный вес, почти полностью одноатомный, оксидная пленка, в толстых слоях, загораться, хороший проводник электричества, элемент, заранее соединенный с кислородом, на поверхности воды, жидкий аммиак.

Exercise 4. Вставьте пропущенные слова.

Widely ... and ... element

Silvery-white, ... metal

Almost ... monatomic

A very ... element

Liquid ... no oxygen

The formation of the ... of oxide

The element ... combined with oxygen

The ... of the reaction

... pieces of sodium

Exercise 5. Найдите в тексте все предложения с причастиями.

Определите их форму и функцию в предложении.

Exercise 6. Продолжите предложения, пользуясь информацией из текста.

Sodium is ...

It tarnishes when ...

It must be kept in a liquid...

It combines with oxygen forming...

It reacts with hydrogen ...

Exercise 7. Выразите свое согласие или несогласие со следующими утверждениями. Используйте формулы.

1. Sodium is not a widely distributed element.
2. When exposed to the air it does not tarnish.
3. Sodium combines directly with phosphorus.
4. It must be kept immersed in a liquid containing oxygen.
5. Sodium is so soft that it can be moulded between the fingers.

Exercise 8. Опишите физические свойства натрия, используя следующие глаголы, существительные и прилагательные:

light	to boil	conductor
soft	to melt	specific gravity
silvery-white		element
lustrous		substance

Exercise 9. Задайте друг другу по 5 вопросов о натрии. Например,

Is sodium a ... ?

Does it react with ... ?

Exercise 10. Обобщите химические свойства натрия, закончив следующие предложения:

1. Sodium combines vigorously with ...
2. It combines directly with ...
3. It acts energetically with ...
4. It tarnishes at once when ...

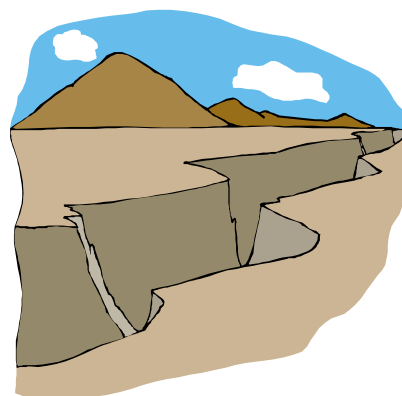
TEXT B. FLUORINE

Fluorine doesn't occur in nature. The compounds of fluorine are widely distributed in such minerals as cryolite, fluorspar, etc., and small quantities occur in some micas. It is found in all rocks, thermal waters and vapours coming from beneath the earth's crust.

For many years the isolation of fluorine was one of the main problems in chemistry. Nobody doubted the existence of fluorine but it withstood every attempted method of isolation.

Having electrolyzed the solution of potassium fluoride in anhydrous hydrogen fluoride, Moissan finally solved this problem in 1886.

Fluorine is a light canary-yellow gas condensed to a clear yellow liquid boiling at -187° . It freezes to a pale yellow solid melting at -223° . When cooled at -252° , the solid becomes colorless. Fluorine is the most active element known. It combines with hydrogen when exploding. While



decomposing water, it forms hydrogen fluoride and liberates oxygen. All metals are acted upon by the gas.

Silicon, phosphorus and glass are not influenced by liquid fluorine. It never reacts with nitrogen, oxygen and chlorine even at high temperatures. Glass is not attacked by fluorine. Fluorine is a very powerful agent. It decomposes water, evolving oxygen and ozone. Being combined with halogens, fluorine forms a variety of interhalogen compounds.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст и найдите в нем ответы на следующие вопросы:

1. In what minerals are the compounds of fluorine widely distributed?
2. Why was the isolation of fluorine one of the main problems for many years?
3. What method did Moissan use for obtaining fluorine ?
4. What solution did he electrolyze?
5. What kind of gas is fluorine?
6. Why is chlorine the most active element known?

Exercise 2. Выделите основную информацию каждого абзаца. Озаглавьте их.

Exercise 3. Выпишите ключевые слова.

Exercise 4. Передайте основные положения текста в логической последовательности.

Exercise 5. Найдите в тексте предложения с причастиями. Проанализируйте и переведите их.

DISCUSSION:

1. The elements chlorine, bromine, and iodine form one of the best defined families of elements – halogens. The name was given by G.J. Berzelius. What do you know about this scientist and his discoveries?
2. In 1886 A. Moissan obtained fluorine by means of electrolysis of the solution of potassium fluoride in anhydrous hydrogen fluoride. What do you know about this discovery?

TEXT C. A. MOISSAN (1852-1907)

A. Moissan is one of the famous French chemists, a professor of the University of Paris.

He was a skilful experimentator. He managed to evolve fluorine after the attempts of other chemists had failed. He simplified an electric arc furnace that made it possible to study many reactions which usually take place only at high temperature. Moissan found that if potassium fluoride was dissolved in the liquid hydrogen fluoride at -23°C , hydrogen was evolved at the cathode and fluorine at the anode. The primary products of electrolysis are fluorine at the anode and potassium at the cathode. The potassium reacts with hydrogen fluoride reforming potassium fluoride and liberating hydrogen.



A. Moissan investigated carbides of many metals. His results were summarized in the monographs «Fluorine and its Compounds» (1900) and «Electric Arc Furnace» (1897).

He published the «Course of Mineral Chemistry». In 1906 Moissan was awarded the Nobel prize for his method of evolving fluorine and for using electric furnace in science. Later on electric furnace was named after him.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст за минимальный отрезок времени и перечислите открытия, сделанные А. Муассаном.

Exercise 2. Используйте полученную информацию и закончите следующие предложения:

A. Moissan managed to evolve ...

He simplified ...

He investigated ...

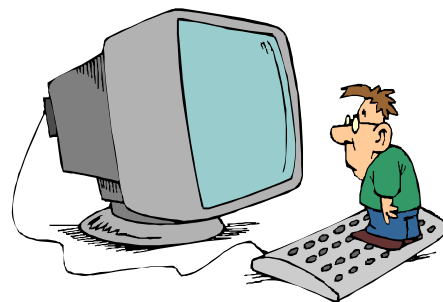
He published..

He was awarded ...

Exercise 3. Каких лауреатов Нобелевской премии вы знаете ?

Exercise 4. Прочитайте текст и передайте по-русски его содержание. Составьте краткие диалоги на английском о лауреатах Нобелевской премии в области физики (химии, литературы).

The 2000 Nobel Prize for physics went to Jaures Alfyorov, a Russian scientist, vice president of the Russian Academy of Sciences and director of the St.Petersburg-based Ioffe Institute of Physics and Engineering. He shared the prize with two Americans: Herbert Kromer and Jack Kilby. The Swedish Royal Academy of Sciences awarded the physicists for their work in modern information technology, which, in particular, led to the microchip, laser diodes, and super-fast semiconductors, mobile phones and satellite links. Due to their researchers small electronic apparatuses, anything from electronic watchers and TV games to mini-calculators and personal computers, appeared in our every day life.



Jaures Alfyorov is the eighth Soviet/Russian Nobel laureate in physics. In 1958, Pavel Cherenkov, Igor Tamm, and Ilya Frank were awarded the Nobel Prize for discovery and interpretation of the Cherenkov effect. In 1962, the prize went to Lev Landau for developing fundamental theories of condensed matter, in particular liquid helium. In 1964, Nikolai Basov and Alexander Prokhorov shared the prize with Charles Townes for fundamental work in the sphere of quantum electronics, leading to maser-laser-based generators and amplifiers. And finally, in 1978, the Nobel prize was awarded to Pyotr Kapitsa, Arno Penzias, and Robert Wilson for fundamental inventions and discoveries in low temperature physics.

* * *

Exercise 1. Изучите предложения, переведите их и составьте собственные. Пользуйтесь сочетаниями to wash the glassware, to cool the substance, to evaporate the liquid, to control the temperature, etc.

1. The mixture heating in a vessel will soon boil.
2. When heating this mixture we were very careful.
3. Heating this mixture they used a gas burner.
4. When heated, the mixture changes its colour.
5. Having heated the mixture, they were to measure its temperature again.
6. Having compared these two substances ...
7. When comparing these substances ...
8. Comparing these substances ...
9. Having compared this element ...
10. Examining this liquid ...

Exercise 2. Сравните два предложения, переведите:

- A. Being heated, the gas increased in volume.
- B. The gas being heated considerably increased in volume.

Exercise 3. Переведите на русский. Обратите внимание на перевод слов с **-ed**.

1. Any material studied should be first purified.
2. When dissolved in cold water, the acid reacted slowly.
3. The substance influenced by heat decomposed.
4. The increased concentration of the ions of water increased the affects caused by these ions.
5. The compound heated melted slowly.

Exercise 4. Переведите по образцу.

The experiment followed by a lecture lasted 2 hours.

Эксперимент, за **которым последовала лекция**, длился два часа.

1. The state of water affected by cooling and heating is greatly changed.
2. The questions answered at the lecture were summarized and discussed.
3. The substance acted on by magnetic field must be a metal.
4. The data referred to in the report were of great importance.
5. The changes in a state or a form of a substance spoken of as physical changes are called physical properties of this substance.
6. The analysis followed by an examination gave unexpected results.
7. Radioactivity is the property uninfluenced by any known catalyst.
8. Owing to their experiments chlorine was referred to as diatomic.

Exercise 5. Переведите и поставьте слова в скобках в соответствующую форму причастия.

1. The work (выполненная) in time was very important.
2. (При охлаждении) to the original temperature the substance becomes solid.
3. The new experiment (о котором говорили) so much will be carried out again very soon.
4. The piece of ice (помещенный) in the water began to melt.
5. (При нагревании) ice melts.

6. The text (переведенный) by him was very useful for our work.
7. The new device (показанный) by our professor was very interesting.
8. (При охлаждении) the steam turns back to water.
9. (Открыв) these and many other similar substances, the researchers could answer the question.
10. Most atoms contain (незаряженные) particles (называемые) atoms.

Exercise 6. Переведите части предложений.

1. When heated sufficiently, ...
2. If cooled to 20⁰C, ...
3. Translated into Russian, ...
4. Unless heated, ...
5. The question involved... ,
6. When removed... ,
7. Produced at the plant ... ,
8. If examined under a microscope...,
9. When produced at the plant...,
10. If moulded between the fingers...,
11. When changed greatly... ,
12. Having cooled the substance

Exercise 7. Переведите.

1. The density, the concentration of dissolved gases and the temperature studies established the optimum conditions for this process.
2. We passed the gases through the mixer spoken of and then measured the pressure obtained.
3. Being treated with certain chemicals wood can be used instead of metal.
4. Having investigated the influence of temperature we came to a conclusion mentioned in the article.
5. When separating a pure substance from a mixture you should provide for possible mistakes concerning the purity of the substance.
6. Having been separated from a mixture, a pure substance was investigated under microscope.
7. The experiments carried out at our laboratory resulted in many new investigations in the field of ceramics.
8. A change accompanied by the evolution of heat is described as exothermic, while a change in which heat is absorbed is called endothermic.
9. Having examined the new work carried out by our research workers we could say that various lines of technological progress, ranging from the invention of new devices to the development of some industrial chemical

- processes were characterized by a steady improvement.
10. The results obtained were in good agreement with the values involved.
11. Having learned the weight of hydrogen and oxygen, the research-workers could determine the ratio of two elements.
12. The number of papers dealing with the electro-oxidation of the element is very limited.

LESSON 6

GRAMMAR: Absolute Participle Construction

PRETEXT EXERCISES

Exercise 1. Запомните значения данных слов и словосочетаний.
Переведите предложения.

According to – согласно, в соответствии,
In excess – в избытке
By means of – посредством, при помощи
To stand – выдерживать, выносить
In contact with – при взаимодействии
To the extent of – в количестве, в размере

1. The formation of these red fumes in contact with oxygen is characteristic of these gas.
2. Nitric oxide is able to stand a dull red heat without decomposition.
3. By means of this reaction nitric oxide may be separated from other gases.
4. According to P. Jolibois, this process takes place at a very high temperature.
5. The trioxide is formed to the extend of 34 % in 20 seconds.
6. Even if oxygen is supplied in excess, the time required for the formation of the peroxide is of the same order.

Exercise 2. Переведите слова, не пользуясь словарем.

Atmospheric, combination, stable, separate, regeneration, trioxide, proportion, ferrous sulphate, critical temperature, partial, seconds, transformation, equilibrium.

2 Exercise 3. Послушайте, запомните и прочитайте:

Nitric oxide, colourless gas, specific gravity, atmospheric oxygen, red-

brown vapours, nitrogen dioxide, rise of temperature, red fumes, characteristic, thereby, distinguishing, sparingly, dull red heat, ferrous sulfate, dark-brown solution, separated, difficultly, liquefiable, critical temperature, is required, partial regeneration, instantaneous, stage, subsequently, complete, supply, supplied, excess, submitted.

Exercise 4 Проанализируйте состав следующих слов:

Colour – colourless; soluble – insoluble – solution – solubility; stable – unstable – stability; liquid – liquefy – liquefiable – liquefaction; subsequent – subsequently; decompose – decomposition; regeneration – reduction; nitric – nitrous; equa l– equilibrium – equilizer.

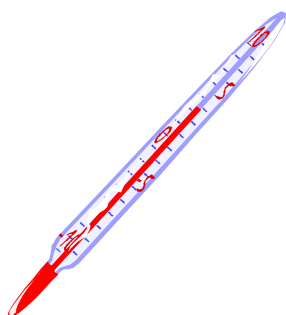
Exercise 5. Найдите пары синонимов, антонимов:

Vapour, readily, similar, sparingly, stable, reduction, absence, total, slowly, changes, steam, evolve, require, unstable, steady, same, fairly, demand, partial, presence, rapidly, oxidation, transformations, liberate.

TEXT A. NITRIC OXIDE, NO

Nitric oxide is a colourless gas, having a specific gravity of 1.39. When brought into the air it combines with the atmospheric oxygen, forming red-brown vapours, consisting of nitrogen dioxide, the combination being attended by a rise of temperature. The formation of these red fumes in contact with the oxygen is the characteristic of this gas, thereby distinguishing it from all other gases.

Nitric oxide is only very sparingly soluble in water. It is the most stable of all the oxides of nitrogen, being able to stand a dull red heat without decomposition. It is soluble in a solution of ferrous sulfate, forming a dark-brown solution, containing an unstable compound of ferrous sulfate and nitric oxide being evolved. By means of this reaction nitric oxide may be separated from other gases. Nitric oxide is a difficultly liquefiable gas, its critical temperature being – 93.5⁰ C; at this temperature a pressure of 71.2 atmospheres is required to liquify it.



In the presence of water nitric oxide is oxidized to nitrogen trioxide, the trioxide then being decomposed by water with formation of nitric acid and partial regeneration of nitric oxide.

According to P. Jolibois, when nitric oxide and oxygen are mixed in the

proportion of 4:1 by volume, combination is instantaneous at the ordinary temperature, nitrogen trioxide N_2O_3 being formed and remaining stable. If the gases are mixed in the proportion of 2:1, the combination very rapidly reaches the stage N_2O_3 and subsequently the trioxide is formed to the extent of 34 % in 20 seconds, transformation being complete after 100 seconds; even if oxygen is supplied in excess the time required for the formation of the peroxide is of the same order. If the nitrous vapours are submitted to a temperature of 400^0 C, the equilibrium tends towards N_2O_3 .

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст и найдите в нем ответы на следующие вопросы:

1. What is characteristic of NO in contact with oxygen ?
2. Why is NO the most stable of all the oxides of nitrogen ?
3. What solution is NO soluble in ?
4. What reaction may be used to separate NO from other gases?
5. What is formed when NO combines with O_2 in the proportion 4:1?

Exercise 2 . Вставьте слова, подходящие по смыслу.

Nitric oxide is a ... gas. Its specific ... is 1.39. When brought into the ... it combines with ... oxygen, forming red-brown Nitric oxide is only sparingly ... in water. It is the most ... of all oxides of nitrogen. It is soluble in a solution of ... , forming an ... compound of ferrous sulfate and nitric oxide. Nitric oxide is at -93.5^0 C. A ... of 72.2 atmospheres is required to ... it.

Exercise 3. Вставьте пропущенные глаголы.

1. At the presence of water nitric oxide _____ to nitrogen trioxide, the trioxide then _____ by water.
2. Even if oxygen _____ in excess, the time _____ for the formation of the peroxide _____ of the same order.
3. When nitric oxide and oxygen _____ in the proportion of 4:1 by volume, combination _____ instantaneous at the ordinary temperature.
4. If the gases _____ in the proportion of 2:1, the combination very rapidly _____ the stage of H_2O_3 .

Exercise 4. Найдите в тексте все предложения с причастиями и самостоятельным причастным оборотом. Проанализируйте и переведите их.

Exercise 5. Выразите свое согласие или несогласие с данными утверждениями. Дайте правильный ответ. Используйте фразы:

Sorry, I do not know.

I can't agree with you.

It's correct.

It's wrong.

I'm not sure ...

Извините, не знаю.

Не могу согласиться.

Правильно.

Неправильно.

Я не уверен (а) ...

1. The first paragraph speaks about the chemical properties of NO oxidation.
2. The second paragraph describes the physical properties of NO – stability, decomposition and liquefaction.
3. The third and the fourth paragraphs deal only with chemical properties of NO, such as miscibility and oxidation.

Exercise 6. Закончите предложения.

1. Summarizing the information of the text we can say that the 1st paragraph speaks about ...
2. The second paragraph is about
3. The third paragraph deals with ...
4. Such properties of NO as are described in the text.

oxidation, solubility, regeneration, odour, lustre, melting point, boiling point, density, colour, specific gravity, decomposition, liquefaction, size, weight, miscibility, hardness

Exercise 7. Опишите по-английски.

Situation:

1. A student should dissolve NO.
2. A student should distinguish NO from other gases.
3. A student describes NO properties.

TEXT B. NITRIC ACID, HNO_3

Nitric acid is formed in the atmosphere by lightening causing combination of the oxygen and nitrogen of the air. J. Priestly (1775) first noticed that an acid is formed when electric sparks are sent through the air, but he thought that the acidity was due to carbonic acid. H. Cavendish (1785) proved that the product of the action was nitric acid while Berthelot showed that nitric oxide (NO) was an intermediate stage in the process.

HNO_3 is now manufactured in three ways, viz:

- (a) from sulfuric acid and sodium nitrate;
- (b) by the combination of the nitrogen and oxygen in the air;
- (c) by the oxidation of ammonia.

Nitric acid is a colourless mobile liquid which fumes strongly in air. It has a peculiar odour. The pure acid being hygroscopic, it absorbs moisture from the air. The pure acid boils at 86° and freezes at -42° . Nitric acid is readily decomposed by heat.

The principal chemical properties of HNO_3 are divided into three main groups. It can act in its reactions as

- (a) an acid;
- (b) an oxidizing agent;
- (c) a nitrating agent.

It is a very strong acid. It exhibits the usual general properties of acids; it reacts with basic oxides, hydroxides, carbonates, the corresponding salts being formed. Nitric oxide is a powerful oxidizing agent. It oxidizes sulfur to sulfuric acid, phosphorus to phosphoric acid. Nitric acid reacts with many organic compounds, oxidizing them to carbon dioxide and water. But in many cases it causes the replacement of one or more hydrogen atoms of the organic compound by the $-\text{NO}_2$ radical which is known as nitro-group. This process is known as nitration and is of great theoretical and practical importance.

Nitric oxide finds many applications both in the laboratory and in industry. In the former it is often employed as oxidizing agent; for example, in the preparation of metallic oxides, oxidative analysis. It is an important reagent in organic chemistry both for oxidation and nitration.

Industrially it is used in large quantities for the production of explosives of all kinds, many nitro compounds being used as intermediates, e.g., in the dye industry in the preparation of sulfuric acid, for cleaning metals. It is also an essential raw material for the production of many modern plastics and lacquers.



Words:

G. Priestly (1733-1804) – Джозеф Пристли, английский химик;

H. Cavendish (1731- 1810) – Генри Кавендиш, английский химик;

C. Berthelot (1827-1967) – Пьер Эжен Марселен Бертло, французский химик;

Viz. – а именно

The former – первый (из упомянутых)

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитав внимательно текст, составьте его план, расположив пункты, указанные ниже, в логической последовательности.

- Chemical properties.
- Application in industry.
- Preparation.
- Occurrence.
- Discovery.
- Application in a chemical lab.
- Formation.
- Physical properties.

Exercise 2. Подберите ключевые слова к каждому пункту плана.

Exercise 3. Опишите физические свойства азотной кислоты, используя:

глаголы: to be, to have, to possess, to boil, to absorb, to freeze, to melt, to decompose;

существительные и прилагательные: liquid, colour, odour, solid, hygroscopic, peculiar.

Exercise 4. Используйте полученную информацию и закончите следующие предложения:

1. Nitric acid is a ... acid.
2. It reacts with oxides and hydroxides forming
3. It combines with organic compounds oxidizing them to
4. It oxidizes sulfur to

Exercise 5. Расскажите о применении азотной кислоты, используя информацию из правой колонки.

Nitric acid is used as (in)
(applied, employed, finds application)

как важный реагент в органической
химии

как окислитель

для получения кислородных кислот
для окисления солей

для производства взрывчатых ве-
ществ

как сырьевой материал при получе-
нии лаков и красок

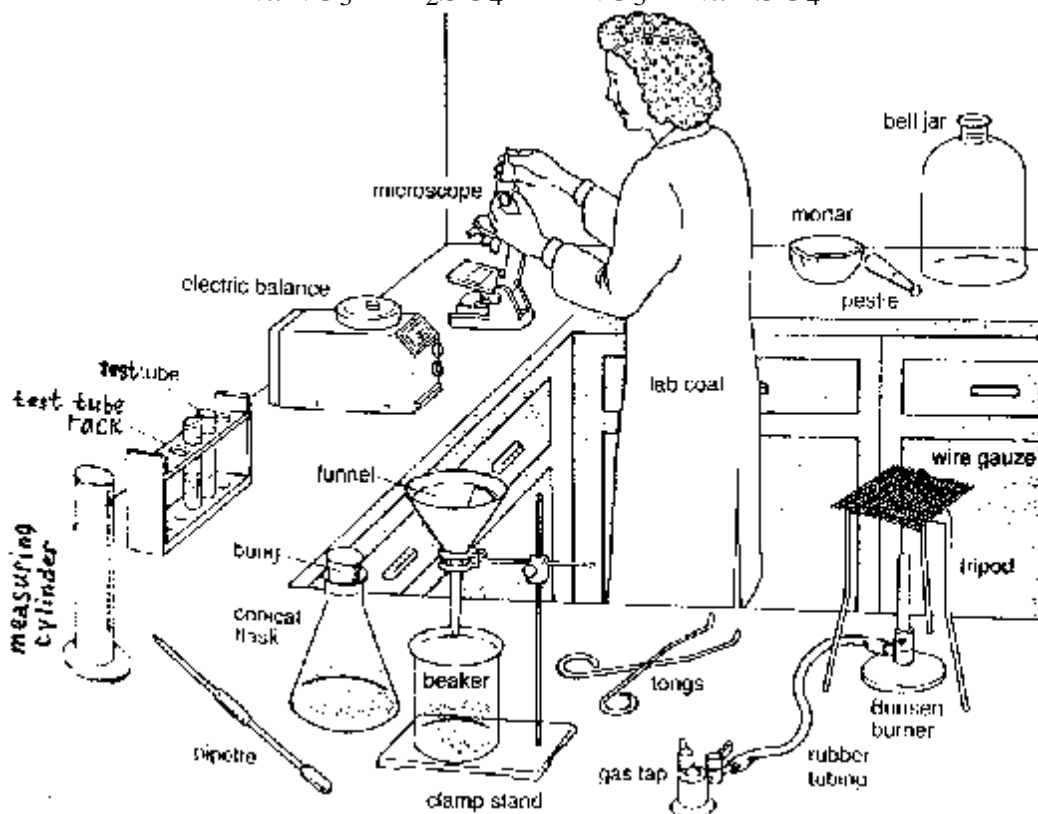
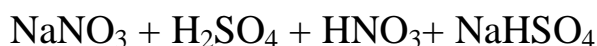
в красильной промышленности

Exercise 6. Скажите, с какими утверждениями вы не согласны.

1. HNO_3 is now made by the oxidation of ammonium.
2. HNO_3 cannot absorb moisture from the air.
3. It is used for oxidation of ferric to ferrous salts.
4. It is often employed as an oxidizing agent.

Exercise 7. Пользуясь рисунком, опишите один из способов получения азотной кислоты.

HNO_3 may be prepared in the lab by the reaction of concentrated sulfuric acid with sodium nitrate. This mixture is heated in a glass retort. Nitric acid is boiled out of the mixture and condensed.

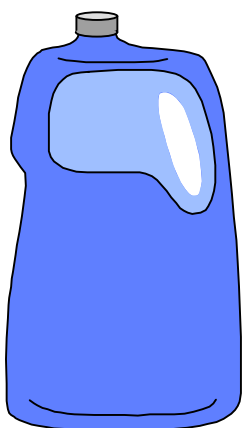


TEXT C. HYDROGEN

The element hydrogen occurs free in nature in comparatively small quantities. The atmosphere contains about one volume of H_2 per 15000 – 20000 volumes of air. H_2 is also present in volcanic gases. Combined hydrogen is common. Water contains 1/9 of its weight of hydrogen. Hydrogen together with O_2 is one of the main constituents of animal and vegetable tissue. Hydrogen is also present in nearly all organic compounds and in many gases.

For general laboratory work hydrogen is prepared by the action of dilute hydrochloric acid or sulfuric acid on granulated zinc. The most important industrial methods for making hydrogen are extracting from water gas by electrolysis.

Hydrogen is a colourless gas, tasteless and odourless. It is combustible, but non-supporter of combustion. Its specific gravity is very low in comparison with air being only 0.08987 gr. per litre. H_2 is not very soluble in water, 100 volumes of water at 0° absorbing about 2.15 volumes of gas. Hydrogen was once used as the standard for the atomic weights since it is the lightest element known. It is not poisonous. The critical temperature for hydrogen is -239° , it is a very difficultly liquefiable gas. The liquid hydrogen is clear and colourless, resembling water. It solidifies when a liquid is evaporated in a partial vacuum. The white solid is crystalline.



Hydrogen doesn't react at room temperature in the absence of catalysts. Hydrogen combines with many non-metals, but doesn't react with metals at all. The readiness with which hydrogen will combine with oxygen and certain other non-metals makes it able to remove oxygen and chlorine from their compounds with the other elements. Thus, when hydrogen is passed over hot ferric oxide, lead oxide, nickel oxide, etc., hydrogen combined with the oxygen of the oxide leaves behind the metal. In these experiments hydrogen is oxidized and the metallic oxide is reduced or dioxidized. At present hydrogen is employed in the manufacture of synthetic ammonia, for hydrogenation of oils. Large quantities are also used for filling balloons and airships. It is still employed for fusing quartz and silicas, for melting platinum, for autogenous soldering of lead and so on.

Words:

constituent – составная часть,

resemble – походить, быть похожим,

evaporate – выпаривать,
fuse – плавить,
silica – двуокись кремния,
soldering – пайка мягким припоем

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте весь текст за минимальный отрезок времени.
Найдите предложения, в которых говорится о:

- 1) промышленном получении водорода;
- 2) его применении;
- 3) распространении в природе;
- 4) свойствах.

* * *

Exercise 1. Определите название кислоты. При аргументации
пользуйтесь нижеприведенными клише:

This acid is an useful drying agent. It acts upon solid and liquid substances depriving them of water or even decomposing the substances. Wood, paper, sugar, starch (крахмал) are blackened by the concentrated acid owing to the separation of carbon which accompanies removing the elements of water. This property is used for preparation of carbon monoxide and ethylene.

Concentrated acid does not react with metals in the cold but when heated oxidizes them. This is due to the fact that this acid is an oxidizing agent when hot.

As far as I know

Насколько я знаю

If I am not mistaken

Если я не ошибаюсь

To my mind

По-моему

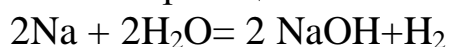
it is ... acid, because ...

Exercise 2. Переведите на английский следующий текст, пользуясь словами из правой колонки.

Если кусочек натрия *поместить* в химический стакан с водой, то произойдет *энергичная* реакция. Натрий будет *двигаться* по поверхности воды, *вытесняя* из нее газ. Натрий будет быстро *плавиться*, т.к. *выделяется* много тепла.

place
beaker
vigorous
move
displace
melt
evolve
according to

Взаимодействие натрия с водой идет *согласно* реакции:



Какой газ вытесняется из воды ?

* * *

Grammar Study: Absolute Participial Construction

Самостоятельный причастный оборот

1. **Water is** a chemical compound of oxygen and hydrogen, **the latter gas forming** two thirds of its volume.

Вода представляет собой химическое соединение кислорода и водорода, *причем* водород образует две трети ее объема.

2. **Rain falling** on the ground, **the soil absorbs** the water.

Когда дождь падает на землю, почва поглощает воду.

1. The salt separates from freezing water, *the ice* **being** quite pure.
2. Water is never absolutely pure in nature, the amount of impurities **depending** on the locality.
3. The experiments with water containing substances **being** very interesting, we worked readily.
4. The range of water application **being** very wide, the scientists are interested in them.
5. The experiment **being** very difficult, he has to spend much time in the laboratory.
6. Rain water **being examined** with a magnifying glass, they saw many impurities.
7. A gas can be dissolved in liquid, the latter **changing** its boiling point.

Exercise 1. Найдите предложения, в которых есть самостоятельный причастный оборот.

1. A solution containing no excess of an acid, we can call it a neutral one.
2. A solution containing no excess of an acid is known as neutral solution.
3. All the properties of the element having been described, it was easier to use it.
4. Having carried out a series of analyses, he could make some interesting conclusions.
5. A gas can be dissolved in a liquid, the liquid changing its boiling point.
6. Simple substances consist of atoms, each substance having its own special atom.
7. It being necessary to precipitate stannic sulfide SnS_2 , hydrogen sulfide is used in this case.

Exercise 2. Проанализируйте предложения и переведите их.

1. A long series of experiments having been carried out, they determined what equipment modifications would be necessary.
2. Oxygen combines with most elements, the product formed being called an oxide.
3. The gas being colourless, we did not notice its formation.
4. The specific heat of solid element being known, the approximate atom weight can be calculated.
5. There exist a number of peroxy compounds, hydrogen peroxide being the simplest.
6. Soluble barium salts being poisonous, care is taken to remove them.
7. In the process of chemical transformation the atoms are only rearranged, their number remaining the same.

Exercise 3. Переведите:

1. A mixture of two gases being exposed to the action of a solvent, the quantity of each gas dissolved by the liquid depends on the amount and the solubility of each gas that is present in the mixture, each gas behaving as if the others were absent.
2. A number of investigations have been carried out using a procedure in which no absolute values need be known, all the results being referred to an arbitrary chosen substance, such as benzoic acid.

Проверьте себя. Знаете ли вы следующие слова?

To consist of, to attend, to rise, rise, in contact, to be characteristic of, to distinguish, stable, to stand, to contain, by means of, to separate, to liquefy, to require, partial, to generate, to regenerate, regeneration, to mix, to remain, to reach, stage, complete, to supply, excess, to submit, equilibrium.

LESSON 7

GRAMMAR: Gerund

PRETEXT EXERCISES

Exercise 1. Переведите.

Most of + noun – большинство, большая часть

Most of the experiments, most of the metals, most of the reactions, most of the acids.

Most of the experiments were carried out successfully.

Owing to – благодаря, вследствие

Owing to its properties ozone is readily distinguished from oxygen.

By means of – посредством, при помощи

When H₂ is obtained by means of the reaction between water and a metal, iron is usually used.

A number of – целый ряд, определенное число

There is a number of gases differing from atmospheric air in their properties.

Except (for) – за исключением, исключая

Sodium is very unlike the metals, except that it has a metallic lustre.

To add on – присоединять, добавлять

Some compounds can react by adding on other elements or groups of elements.

Exercise 2. Переведите, не пользуясь словарем:

Constant, covalency, position, Periodic Table, atom, methane, group, ethane, propane, butane, pentane, hydrocarbons, aliphatic, series, formula, homologous, aromatic, heterocyclic, pyridine, products.

2 Exercise 3. Послушайте запись и повторите за диктором.

Compound, exhibit, peculiar, linkage, chain, respectively, straight, net increase, general, as follows, saturated, unsaturated, addition.

Exercise 4. Переведите.

Exhibit – exhibition; covalent – covalency; combine – combination; add – addition – additional; link – linkage; place – replace – replacement; similar – similarity; differ – different – difference; oxide – oxidize – oxidation – monoxide – peroxide – hydroxide.

Exercise 5. Определите начальную форму.

Exhibits, combining, replaced, is, higher, being, simplest, underwent, merely, unsaturated, namely.

Exercise 6. Подберите синонимы.

Large, similar, combine, exhibit.

Exercise 7. Установите по словарю значение омонимов и паронимов.

Вставьте в предложения английские слова в соответствии со смыслом.

Series	Name	Knew	Some	Letter, later, latter
Serious	Namely	New	Same	Single, signal
Than	Very	Form	How	
Then	Vary	From	Now	

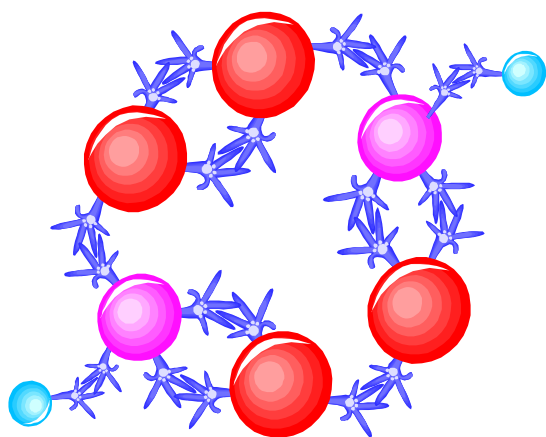
1. They plan to (изменить) (некоторые) of their experiments.
2. The (недавние) data were the (такими же).
3. He was (очень) interested in chemistry and wanted to be a (серьезным) researcher.
4. All the atoms of any element have the (одинаковые) properties.
5. This discovery is more important (чем) the previous one.
6. He (знал) many (сигналов), (а именно) for sea and for land.
7. (некоторые) English (буквы) were (образованы) (из) Greek (букв).
8. The simplest homologous (ряд) begins with pentane.

TEXT A. CLASSIFICATION OF ORGANIC COMPOUNDS

In most of its compounds carbon exhibits a constant covalency of four. Probably owing again to its peculiar position in the Periodic Table the carbon atom has the property of combining with other carbon atoms by means of one or more of its covalent linkages to form chains of atoms. Thus, one hydrogen atom of methane can be regarded as being replaced by a CH_3 group in ethane. Similarly chains of three, four, five, etc. carbon atoms may be obtained producing propane, butane, pentane, and the higher hydrocarbons respectively.

Compounds which contain straight chains of carbon atom are called aliphatic compounds. Introducing each carbon atom removes one hydrogen atom and replaces it by one carbon atom and three hydrogen atoms, the net increase being one atom of carbon and two of hydrogen. In this way a series of compounds is obtained, each number of which differs in formula from the member above or below it by a constant difference, namely CH_2 .

Such a series is called a homologue series. Every member of the series can be expressed by the general formula: $\text{C}_n\text{H}_{2n+2}$. The simplest homologue series begins with methane, CH_4 , and is as follows: methane, ethane, butane, pentane.



In a large number of organic compounds the carbon atoms instead of being straight chains form closed rings containing six carbon atoms. Such substances are called aromatic compounds and if they contain in the ring atoms other than carbon, they are called heterocyclic, for example, pyridine.

The hydrocarbon methane with its four covalent linkages can not undergo chemical reactions to form a covalent compound except by removing one or more hydrogen atoms and their replacement by other atoms or groups. A compound such as methane is called saturated. Compounds which can react merely by adding on other elements or groups of elements are called unsaturated and form addition products.

EXERCISES AND ASSIGNMENTS

Exercise 1. Найдите в тексте ответы на следующие вопросы:

1. What property does the carbon atom have owing to its position in the Periodic Table ?

2. What compounds are called aliphatic, aromatic?
3. What is the difference between saturated and unsaturated compounds ?

Exercise 2. Пользуясь фразой *I'd like to know*, узнайте:

1. Какую ковалентность проявляет углерод в своих соединениях
2. Какую формулу имеет каждый член гомологического ряда

Exercise 3. Выразите свое согласие или несогласие. Пользуйтесь фразами:

As far as I know ... – насколько мне известно, ...

Far from it. – Совсем не так.

You are right (wrong). – Ты прав (не прав).

On the contrary ... – Наоборот ...

I can't agree with you. – Не могу согласиться.

It's not true to the fact. – Не соответствует действительности.

I am afraid, you are mistaken. – Боюсь, ты ошибаешься.

1. One hydrogen atom of methane can be regarded as being replaced by CH_3 group in butane.
2. The simplest homologous series begins with pentane.
3. The carbon atom can form closed rings containing six carbon atoms.
4. The hydrocarbon methane can undergo chemical reactions forming covalent compound.
5. A compound such as methane is called saturated.

Exercise 4. Составьте предложения, дав определения различных органических соединений:

The compounds	1) which cannot undergo chemical reactions to form covalent compounds	are called	
	2) in which carbon atoms form closed rings		aromatic
	containing other atoms than carbon		aliphatic
	3) in which carbon atoms form closed rings containing six carbon atoms		heterocyclic
	4) which contain straight chains of carbon atoms		saturated
5) which react by adding on other elements or groups of elements	unsaturated		

Exercise 5. Заполните пропуски словами, подходящими по смыслу.

1. The hydrocarbon methane with its four covalent linkages cannot _____ chemical reactions to form a covalent compound except by _____ one or more hydrogen atoms.
2. Every member of the series can be _____ by the general formula.
3. In most of its compounds carbon _____ a constant covalency of four.
4. Chains of three, four, five, etc. carbon atoms may be _____.
5. Each member of the series _____ in formula from the member above or below it by a constant difference.

to produce, to exhibit, to differ, to undergo, to remove, to express

Exercise 6. Найдите и проанализируйте в тексте А все предложения с герундием и причастием.

TEXT B. MAGNESIUM

Magnesium occurs in nature combined in minerals, in sea-water. It is now manufactured on a large scale by the electrolysis in fused carnallite – a double magnesium potassium chloride or of a mixture of magnesium and sodium chlorides. It can also be made by the electrolysis of magnesia in a fused mixture of magnesium, barium, and sodium fluorides; and by the action of metallic sodium on magnesium chloride.

Magnesium is a silvery-white metal of low specific gravity (1.74). It melts at 659° and boils at 1110° . It is not affected by air at ordinary temperatures, but when heated it burns in air giving a brilliant white light of great actinic power.

It reacts readily with most non-metals, e.g. halogens, sulphur, phosphorus, etc. Magnesium reacts very slowly with water at ordinary temperature and rather less slowly at 100° C. It reacts readily with dilute acids, liberating hydrogen. It is not affected by the solutions of alkalis. Magnesium reduces most oxides, it will also reduce sodium and potassium oxides on heating.



Magnesium in the form of ribbon is familiar in laboratories; likewise the brilliant white light with which it burns. This property is used in the flashing photography. On account of its lightness it is used as an engineering metal particularly in the form of «light alloys». In the laboratory magnesium is used for the reduction of oxides such as silica, in the preparation of silicon, and as a reducing agent.

Words:

ribbon – лента

flashing – вспышка

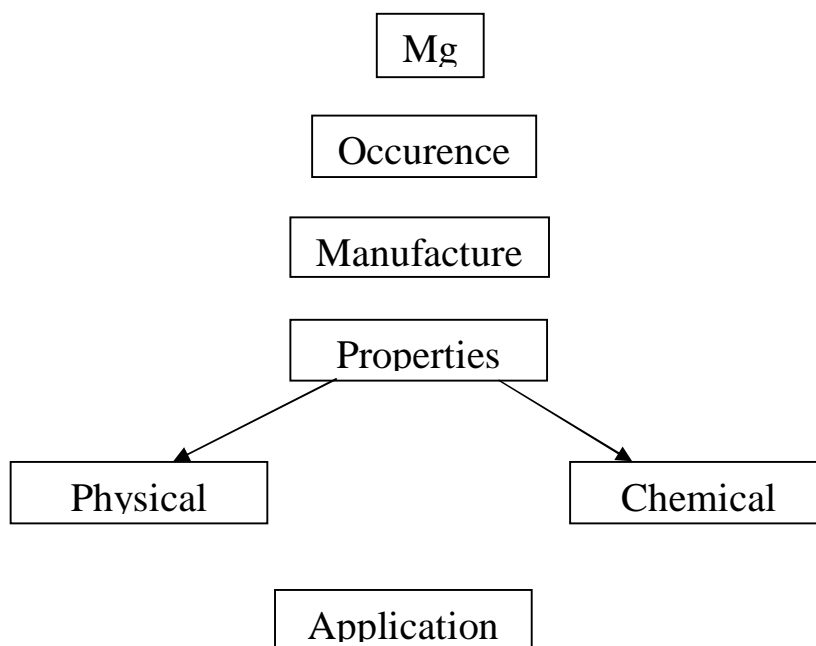
alloy – сплав

EXERCISES AND ASSIGNMENTS

Exercise 1. Просмотрите текст, дайте характеристику каждому абзацу. Озаглавьте их. Запишите заголовки в виде плана.

Exercise 2. Подберите ключевые слова к каждому пункту плана.

Exercise 3. Расположите информацию текста в виде схемы:



Exercise 4. Передайте содержание текста, описывая каждый блок схемы.

Exercise 5. Передайте основные положения текста, закончив предложения:

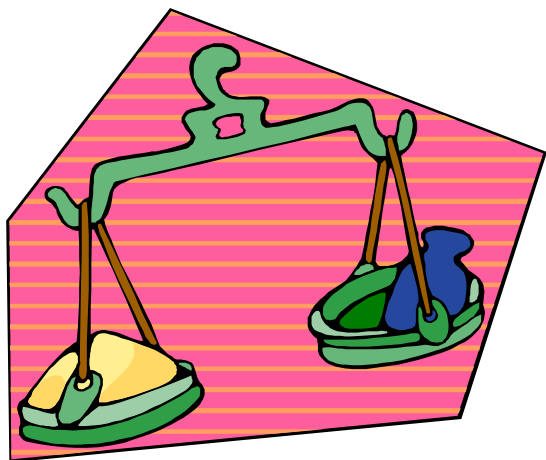
The text is about

... are spoken of in details.

... are discussed.

Much attention is paid to

TEXT C. DETERMINATION OF EQUIVALENT WEIGHT OF CALCIUM



Methods for finding the equivalent weight of an element involving the use of the oxide may be subdivided in such a way:

- (a) direct oxidation (direct synthesis);
- (b) indirect oxidation (indirect synthesis);
- (c) reduction of the oxide (analysis).

Direct Oxidation. The direct procedure which is to be followed depends on the nature of the element and on its oxide. If a solid element burns slowly to a solid oxide, the conversion can be carried out in a crucible. If a gaseous oxide is formed as in the case of carbon, a suitable means for discovering the weight of the oxide should be devised. For gaseous elements like hydrogen a special technique has to be employed. This method may be illustrated by experiments with calcium and with carbon.

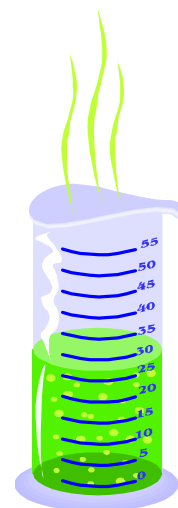
The equivalent weight of calcium is estimated by placing in a weighted crucible a known weight of calcium turnings and by heating gently until the calcium burns. Heating continues until all the process is over. The crucible is then allowed to cool and a few drops of water are added from the pipette, the addition being made very carefully in order to avoid any loss to the vigour of the reaction. The crucible is then heated, cooled in dessicator and reweighed. It is then repeatedly reheated, cooled and reweighed until a constant weight is attained.

From these weightings it is possible calculating the weight of O_2 that has combined with a known weight of calcium. Hence, the weight of calcium which would combine with 8 grams of oxygen (i.e. equivalent weight of calcium) can be calculated.

EXERCISES AND ASSIGNMENTS

Exercise 1. Прочитайте текст. Передайте его содержание по-русски.

The equivalent weight of calcium is calculated by placing a known weight of calcium in a weighed crucible and by heating gently until calcium burns. Heating continues until all the process



is over. The crucible is then allowed to cool and a few drops of water are added from a pipette very carefully. The crucible is then heated, cooled in a desiccator and reweighed. It should be repeatedly reheated, cooled and reweighed until a constant weight is attained.

From these weightings it is possible to calculate the weight of oxygen which has combined with a known weight of calcium. Hence, the weight of calcium which would combine 8 grams of oxygen (i.e. equivalent weight of calcium) can be calculated.

Words:

to weigh – взвешивать

weight – вес

crucible – тигель

a few drops – несколько капель

until – до тех пор, пока

desiccator – эксикатор

to attain – достигать

hence – следовательно

Exercise 2. Расскажите о своем эксперименте по определению эквивалентной массы металла.

* * *

Grammar Study: Gerund

Calculate + ing, experiment + ing, smoke + ing

Calculating the data...

In calculating the data.

By calculating the data.

For calculating the data

The method of experimenting.

No smoking.

Exercise 1. Проанализируйте и переведите.

1. **By + GERUND:** by processing – при обработке, обрабатывая
by boiling (кипятить)

by performing (выполнять)

by mixing (смешивать)
by producing (производить)
by obtaining (получать)
by discovering (открывать)
by reducing (восстанавливать)
by separating (отделять)

2. **For + GERUND**: for cooling – для охлаждения
for changing (изменять)
for saturating (насыщать)
for introducing (вводить)
for combining (соединять)
for employing (применять)
for replacing (замещать)
for showing (показывать)
for treating (обрабатывать)
for separating (отделять)

3. **Without + GERUND**: without heating – без нагревания, не нагревая
without precipitating (осаждать)
without drying (сушить)
without decomposing (разлагать)
without diminishing (уменьшать)
without displaying (проявлять)
without tarnishing (тускнеть)

4. Сравните причастие (1) и герундий (2). Дайте свои примеры.

(1) freezing water – замерзающая вода	(2) a freezing point – точка замерзания
a smoking man – курящий мужчина	a smoking room – курительная комната
a reading girl – читающая девушка	a reading room – читальный зал

Exercise 2. Проанализируйте функции герундия и его перевод.

Подлежащее:

Solving practical problems is a difficult job (решение, решать)

Часть сказуемого:

Our aim is solving practical problems (решение, решить).

Дополнение:

He likes solving difficult problems (решать, решение).

I know of the problem having been solved (о том, что задача была решена).

Определение:

The way of solving the problem is not easy (решения).

Обстоятельство:

In solving the problem we made some mistakes (решая, при решении).

On solving the problem he proceeded to make experiments (решив).

By solving the problem he got the required results (решая, решив).

You cannot make the experiment without solving the problem (без решения, не решив).

Exercise 3. Определите функцию герундия, переведите.

1. Conducting heat and electricity is the property of most metals.
2. Heat may be produced by burning coal, gas or any other fuel.
3. Their having overheated the gas, changed the results of the experiment.
4. The rate of speeding up is commonly called «acceleration».
5. We know of the atomic reactor being fed with uranium 235.
6. The reactor's job is controlling the chain reaction.
7. We know of Yablochkov's having used the electric arc for lighting.
8. After having seen Lodygin's lamp, Edison took great interest in the invention.
9. Before starting the reaction one must provide for low pressure.
10. There are other ways of producing heat besides that of combustion.
11. On separating the desired components the salts were acted upon by nitric acid.
12. The teacher insisted on the students carrying out the experiment on calculating the equivalent weight of calcium.
13. Our having changed the design of the electrode, helped us in avoiding many mistakes.
14. Some of the wet precipitates may be ignited without drying.

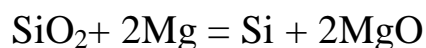
Exercise 4. Переведите, обращая внимание на причастие и герундий.

1. The process of overcoming the attractive forces between the molecules of a substance is called melting.
2. Adding heat to a substance will not always cause a rise of its temperature.
3. The fast moving molecules are able to escape from a liquid surface.
4. By increasing the pressure the substance can be obtained in a liquid state provided the change from a liquid to solid is accompanied by an expansion.

5. Having absorbed much heat aluminium when cooled can give up the same quantity of heat.
6. In the process of boiling heat is added to a liquid.
7. A solid body having been melted, the change of state took place at a definite temperature.
8. A liquid being cooled, its molecules lose energy.
9. We know of great changes being produced by changing the temperature.
10. Also outlined at that paper is the method of standardizing the hydrochloric acid solution.
11. Radium resembles barium in being precipitating as an insoluble sulfate.
12. We all know of sodium and potassium tarnishing rapidly in the air.
13. We know of Lebedev's having made the first synthetic rubber in the world.
14. Mendeleev's having created the Periodic Table made it possible to predict then undiscovered elements.
15. Aniline is a colourless oily liquid which on standing becomes dark in colour.

Exercise 5. Переведите на русский, обращая внимание на формы герундия.

Many ways are known now for preparing silicon. One of them is heating silicon dioxide with magnesium.



Reducing silicon dioxide with carbon in an electric furnace is an industrial method of obtaining silicon. There exists a difficulty in preventing silicon and carbon from reacting when carbide is formed. But by using this reaction it is possible to obtain the product containing up to 98 per cent of silicon.

Проверьте себя. Знаете ли вы следующие слова?

To exhibit, covalent, peculiar, to link, linkage, to regard, to introduce, to increase, an increase, straight, to saturate, saturated, unsaturated, to replace, replacement, to remove, series, to undergo, to add on, chain, by means of, a number of, owing to, to contain, to differ, addition products.

REVISION

ТЕКСТЫ ДЛЯ КОНТРОЛЯ НАВЫКОВ ЧТЕНИЯ, АУДИРОВАНИЯ И ПЕРЕВОДА

I. LIQUIDS



The liquid state occupies an intermediate position between the gaseous and solid states, liquid having a definite volume but no definite shape.

Like a gas a liquid can take the shape of any vessel in which it is placed but in contrast to a gas a definite quantity of liquid is required for filling the vessel. A liquid cannot be compressed so much as a gas because its molecules are already situated closely, large pressure producing small changes in volume.

Increasing the temperature increases the kinetic energy of all the molecules. The kinetic energy of the molecules depends on the change of a liquid into the gaseous or solid states; the kinetic energy in turn is influenced by the temperature. Therefore there are definite temperature characteristics for most liquids at which these changes occur. They are known as transition temperatures.

If we place one liquid layer on top of a layer of a denser liquid in which it is soluble and put the vessel where it will not be disturbed, we shall see that two liquids begin gradually mixing. It is to be taken into consideration that all liquids do not flow with the same rate; water, alcohol, gasoline flowing easily; heavy oil, glycerine flowing very slowly.

When a liquid flows, layers of molecules begin rubbing over each other, friction being generated by this rubbing of layers of particles. The greater is the friction, the slower is the flow. A liquid which resists flowing results in a homogeneous solution. This example shows that the molecules of a liquid diffuse. They diffuse more slowly than those of a gas.

The molecules of a liquid have the greater relative strength of attraction, the density of liquids being much greater. Naturally, as the volume of a liquid begins changing with temperature, its density will also start changing with temperature.

II. POTASSIUM, K

Potassium is a silvery white metal which rapidly tarnishes when exposed to air. It is lighter than water, specific gravity being 0,86. It melts at $62,3^{\circ}$ and

boils at 760° . The chemical properties of potassium very closely resemble those of sodium but its reactions are more vigorous. When dropped on water the hydrogen evolved even from very small pieces of potassium takes fire brilliantly. Potassium has been made by heating potassium carbonate with charcoal. It can be obtained by electrolysis of the fused hydroxide or by using the fused chloride alone or mixed with calcium chloride.

III. SULPHUR DIOXIDE

Sulphur dioxide is a colourless gas with a smell of burning sulphur. It is twice as heavy as air. It cannot be collected over water since it is easily soluble. One volume of water at 0° can dissolve 79,8 volumes of sulphur dioxide. The aqueous solution is strongly acid. The gas is readily liquefied. A pressure of 1,5 atmospheres is required for the condensation of the gas at 0° , at -10°C the gas being liquefied under ordinary pressure. Liquid sulphur dioxide is a good solvent for phosphorous, iodine, resins, etc. Sulphur dioxide is decomposed at high temperature and by light. It combines with oxygen when heated, sulphur trioxide being formed. In the presence of moisture sulphur dioxide is a well-known reducing agent.

IV. REACTIONS WITH OXYGEN

Oxygen is very reactive. When it combines with an element, the product formed is called an oxide. The process is called oxidation. There are only few elements not attacked by oxygen. We should mention inert gases among the elements unaffected by oxygen. Combinations with oxygen often liberate heat and light, this process being known as combustion. There are some elements which do not take fire unless heated. Some substances will ignite if very slightly heated. Other elements have to be heated to a high temperature before they take fire.

V. SILICON

Silicon does not occur free in nature. Its compounds make up 27,6% of the matter in the earth crust, this element being abundant. More methods for producing silicon are now known. One of them is heating silicon dioxide with magnesium. Industrially silicon may be obtained by reducing the dioxide (SiO_2) with carbon in an electric furnace. Silicon resembles carbon in having crystalline and amorphous form. They are alike in being very hard. Besides being employed in steel industry silicon and its compounds have a wide application in other branches of industry.

ЛЕКСИЧЕСКИЕ ТЕСТЫ

1) Подберите правильный перевод слова из правой колонки:

substance	натрий
property	кремний
oxygen	щелочь
hydrogen	калий
alkali	плотность
sodium	фтор
potassium	раствор
liquid	водород
silicon	медь
fluorine	кислород
chlorine	соль
acid	свинец
density	барий
mercury	жидкость
barium	окислять
treat	применять
mixture	смесь
oxidize	пленка
ether	обрабатывать
copper	пар
lead	растворять
obtain	в результате давать
apply	вещество
yield	получать
dissolve	эфир
film	ртуть
solution	хлор
vapour	свойство

2) Подберите английский эквивалент из правой колонки:

разлагаться	hydrochloric acid
азотная кислота	heat
окислять(ся)	freeze
объем	vapour
пар	volume
бесцветный	colourless
безвкусный	dissolve
кипеть	melt
замерзать	suitable
нагревать	decompose
разложение	stable
подходящий	treat
обычный	tarnish
устойчивый	take fire
плавиться	obtain
насыщать	apply
загораться	absorb
обрабатывать	tasteless
получать	saturate
тускнеть	oxidize
применять	ordinary
поглощать	decomposition
растворять	
boil	

3) Переведите на английский язык:

Галогены – это элементы фтор, хлор, бром и йод, находящиеся в седьмой группе периодической таблицы. Вследствие их огромной химической активности они находятся в природе в виде соединений.

Хлор – это газ желто-зеленого цвета, в 2,5 раза тяжелее воздуха. Хлор превращается в жидкость при давлении около шести атмосфер. Он имеет резкий запах, вызывает отравление организма. Хлор слабо растворим в воде, но лучше растворим во многих органических растворителях: спирте, эфире, хлороформе.

Хлор – чрезвычайно активный элемент, он реагирует со всеми простыми веществами и особенно быстро с металлами. Натрий, медь, железо, олово сгорают в хлоре, образуя соответствующие соли. Хлор является энергичным окислителем и восстановителем. При обычной температуре

хлор медленно соединяется с водородом, но при нагревании реакция происходит мгновенно со взрывом.

В промышленности хлор получают путем электролиза раствора поваренной соли. В лаборатории он получается действием различных окислителей на соляную кислоту.

Хлор имеет широкое применение в промышленности. Он используется для приготовления большого количества органических и неорганических соединений, в производстве соляной кислоты, хлорной извести. Хлор играет важную роль при получении промежуточных продуктов для синтеза красителей, для отбеливания тканей, целлюлозы, для очищения питьевой воды.

* * *

Список выражений, рекомендуемых для работы с текстом или статьей:

1. **The text** is about ...

is devoted to ...
deals with ...
touches upon ...
presents some results ...

2. **The aim (purpose, object) of the text**

is to give some information about ...
to determine ...
to compare two methods ...
to present some data about ...
to describe an element ...

3. **The text is divided** into 5 parts (paragraphs).

The first part deals with ...

second part is about the discovery of an element ...

third part touches upon the physical properties ...

fourth part describes the chemical properties ...

fifth part gives some information about the application ...

4. **In conclusion the text (the author) says that** ...

5. **To my mind (I found that), the text is** interesting (informative, important, of great value), because

I've got some facts about ...

**Список выражений, рекомендуемых для монологического
высказывания:**

It is described in short (in detail) – описывается кратко (подробно)
it is shown – показано
it is dealt with – рассматривается
it is examined (investigated) – исследуется
it is analyzed – анализируется
Much attention is paid to ... – обращается большое внимание на ...
Data are given about ... – приводятся данные о ...
Conclusions are drawn (made) – делаются выводы
Recommendations are given – даны рекомендации

Лексика необходимая для ведения беседы по тексту, статье:

Начало беседы:

I think (see) – я думаю
First of all – во-первых
The fact is that – дело в том, что
As far as I know – насколько я знаю
Look here! – Послушайте!

Конец беседы:

In conclusion – в заключение
That's all – это все
Summarizing – суммируя
On the whole – в целом

Точка зрения или мнение:

It's my opinion that ... – по-моему ...
I think (believe, suppose, hope) that ... – я думаю (верю, полагаю, надеюсь),
что ...
To my mind – по-моему
I want to press the point – я хочу подчеркнуть факт ...

Обсуждение:

I've got some questions – у меня несколько вопросов
I would like to ask you about – я хотел бы спросить вас о ...
Will you say a few words about – не скажете ли несколько слов о ...
I wonder – мне интересно знать
I should mention (emphasize, press the point) – я должен упомянуть
(подчеркнуть)
I'd like to add a few words ... – я хотел бы добавить несколько слов о ...

Согласие:

I agree that – я согласен

I think so – я думаю также

That's right – верно

How right you are! – Вы абсолютно правы.

Несогласие:

I cannot agree with you! – Я не могу согласиться.

I'm afraid you are mistaken – боюсь, вы ошибаетесь

It's a pity, but ... – жаль, но ...

Незнание фактов:

Sorry, I don't know – Простите, я не знаю

I'm afraid, I've no idea – Боюсь, что не имею представления об этом

Сокращения, принятые в английской литературе:

at. – atomic – атомный

b.p. – boiling point – точка кипения

C. – Centigrade – температурная шкала Цельсия

c.c. – cubic centimetre – см³

deg. – degree – градус

e.g. – for example – например

etc – so on – и так далее

F – Fahrenheit – шкала Фаренгейта

hr – hour – час

i.e. – that is – то есть

in. – inch – дюйм

km. – kilometre – км

l. – litre – литр

m.p. – melting point – точка плавления

sec. – second – секунда

sp. gr. – specific gravity – удельный вес

vis – namely – а именно

wt – weight – вес

fig. – figure – рисунок

at. wt. – atomic weight – атомный вес

g. – gram – грамм

lb – pound – фунт

mm – millimetre – миллиметр

sq – square – квадрат

v – volume – объем

Существительные, образующие мн. число не по правилу:

ед.ч.	мн.ч.
datum (данная величина)	data
phenomenon (явление)	phenomena
nucleus (ядро)	nuclei
radius (радиус)	radii
spectrum (спектр)	spectra
analysis (анализ)	analyses

VOCABULARY

A

Above	выше
Abundant	обильный
Act	действовать
Acid	кислота
Acidify	подкислять
Add	добавлять
Absorb	абсорбировать
Activity	активность
Accelerate	ускорять
Affect	воздействовать на
Alter	изменять (ся)
Allow	разрешать, дать + гл.
Ammonia	аммиак
Almost	почти
Anhydrous	безводный
Agent	агент
Attempt	попытка, пытаться
Article	статья, изделие
Attend	присутствовать на, сопровождать
Apply	применять
Approximately	приблизительно
Aqueous	водный
Arrange	располагать
As	т.к., когда, по мере того как, как
Attack	воздействовать, действовать
Attain	достигать
Avoid	избегать

B

Become (became, become)	стать, становиться
Below	ниже
Besides	кроме
Brilliant	яркий
Burn	гореть
Burner	горелка
Bring (brought, brought)	приносить
Boiling point	точка кипения
Boil	кипеть

C

Call	называть
Calculate	вычислять
Carry out	проводить, выполнять
Chain	цепь
Chlorine	хлор
Certain	определенный
Cause	причина, вызывать, заставлять
Change	изменять (ся), изменение
Charge	заряжать
Close	закрывать, близко
Combine	соединяться

Complete	полный, заканчивать
Compound	соединение
Condition	касаться
Colour	содержать
Concern	условие, состояние
Contain	цвет
Conductor	проводник
Cool	охлаждать
Cut	резать
Clean	чистый, чистить
Covalency	ковалентность
Combustion	горение
Compress	сжимать
Create	создавать
Crucible	тигель
D	
Decompose	разлагаться, разлагать
Density	плотность
Determine	определять
Desire	желание, желать
Decrease	уменьшать (ся), уменьшение
Depend on	зависеть от
Definite	определенный
Desiccator	эксикатор
Directly	непосредственно
Dissolve	растворять
Distribute	распределять
Dioxide	диоксид
Distinguish	различать
Divide	делить
Disturb	беспокоить
Drop	падать, капля
Doubt	сомневаться
Dye	красить, краситель
E	
Ease	легкость
Enough	достаточно
Employ	применять
Entirely	полностью
Excess	избыток
Except	за исключением
Exist	существовать
Exhibit	проявлять, показывать
Expose	подвергать действию
Expect	ожидать
Explode	взрываться
Explosive	взрывчатый
Express	выражать
Ethane	этан
Equilibrium	равновесие
Extent	степень, мера
Equipment	оборудование

Evolve	выделять
F	
Fail	не + глагол
Ferrous	железистый (соль 2 ^x вал. железа)
Ferric	железный (соль 3 ^x вал. железа)
Flame	пламя
Film	пленка
Finger	палец
Fluorine	фтор
Fluorspar	плавиковый шпат
Form	образовывать
Former	первый (из упомянутых)
Fluoride	фторид
Find (found, found)	находить (ся)
Freeze (froze, frozen)	замерзать
Fume	пар, дым, испаряться
Fuse	плавиться (ся)
Fill	наполнять
Flow	поток, течь
Fuel	топливо
G	
Glass	стекло
Globule	шарик
Glassware	химическая посуда
H	
Halogen	галоген
Heat	тепло, нагревать
Hydrogen	водород
Hydroxide	гидроксид
Hydrocarbon	углеводород
Hydrochloric acid HCl	соляная кислота, HCl
I	
If	если, ли
Ignite	воспламенять, прокалывать
Immerse	погружать
Impurity	примесь
Improve	улучшать
Indicate	указывать
Influence	влиять на
Intense	сильный
Investigate	исследовать
Instantaneous	мгновенный
Intermediate	промежуточный
Instead of	вместо
Increase	увеличивать (ся), увеличение
Invention	изобретение
K	
Keep (kept, kept)	хранить
Knife	нож
Know (knew, known)	знать
L	
Lustrous	блестящий

Latter	последний (из упомянутых)
Lacquer	лак
Layer	слой
Liberate	выделять
Light	светлый, легкий, свет, освещать
Link	связь, связывать
Linkage	связь
Liquid	жидкость
Liquefy	сжижать
M	
Make (made, made)	делать, получать, заставлять
Manufacture	получать, производить
Melt	плавиться
Melting point	точка плавления
Mica	слюда
Mention	упоминать
Mean	средний, означать
Means	способ, средство
By means of	посредством, при помощи
Mix	смешивать
Mixture	смесь
Mistake	ошибка
Mould	разминать, формовать
Moisture	влага
Most	самый, большинство
N	
Namely	(а) именно
Necessary	необходимый
Never	никогда
Nitrogen	азот
Nitration	нитрование
Nobody	никто
No	ни один, никакой
Notice	отмечать, замечать
O	
Occur	встречать, происходить
Odour	запах
Obtain	получать
On account of	из-за, вследствие, по причине
Oxide	оксид
Oxidize	окислять
Oxidation	окисление
Owing to	благодаря
Ordinary	обычный
Oxyacid	кислородная кислота
Oxygen	кислород
P	
Pass	проходить, пропускать
Peroxide	перекись
Peculiar	особый
Phosphorous	фосфор
Piece	кусок, часть

Plastics	пластмасса
Possible	возможный
Powerful	сильный
Place	помещать
Provide	снабжать, обеспечивать
Prove	доказывать
Pressure	давление
Prevent	предотвращать
Precipitate	осадок, осаждать (ся)
Pure	чистый
Purity	чистота
Purify	очищать
Produce	производить, получать
Poisonous	ядовитый
Q	
Quality	качество
Qualitative	качественный
Quantity	количество
Quantitative	количественный
R	
Rapidly	быстро
Rate	скорость
Raw	сырой, необработанный
Readily	легко
Reduce	уменьшать, восстанавливать
Relation	связь, отношение
Refer to	ссылаться на
Reach	достигать
React	реагировать
Remain	оставаться
Replace	заменять
Remove	удалять
Regard	рассматривать, считать за
Respectively	соответственно
Result in	приводить к...
Result from	являться результатом
Regeneration	восстановление
Require	требовать(ся)
Rise (rose, risen)	повышать
S	
Same	тот же самый
Salt	соль
Saturated	насыщенный
Scale, on a large scale	масштаб, в большом масштабе, широко
Separate	отделять
Series	ряд, серия
Silver	серебро
See (saw, seen)	видеть
Show (showed, shown)	показывать
Simple	простой
Soft	мягкий
Solve	решать

Solid	твердый, твердое вещество
Solution	раствор
Specific gravity(sp. gr.)	удельный вес
Soluble	растворимый
Specific heat	удельная теплоемкость
Spark	искра
Speed	скорость
Study	изучать
Straight	прямой
Speak (spoke, spoken)	говорить
Such	такой
Sulfate (sulphate)	сульфат
Supply	поставлять, снабжать
Submit	подчиняться
Subsequently	позже, впоследствии
Some	несколько, немного
Strong	сильный, прочный
Sulfuric acid	серная кислота
Stable	устойчивый
Sodium	натрий
Swim (swam, swum)	плавать
Steam	пар
State	состояние, утверждать
Stand (stood, stood)	стоять, выдерживать
T	
Take fire	загораться
Tarnish	тускнеть
Tend	стремиться
Term	термин, называться
Thereby	посредством этого
Trioxide	триоксид
Transition t°	переходная температура
Treat	обрабатывать; трактовать
Treatment	обработка, объяснение, трактовка
U	
Undergo (underwent, undergone)	подвергаться
Unit	единица
Unite	объединять, соединять
Unless	если не
Until	до тех пор, пока не + глагол
Use	применять, использовать
Utilize	применять, использовать
V	
Value	величина, ценность, число
Vary	менять, изменять (ся), варьировать
Variety	разнообразие, множество
Various	разнообразный
Vapour	пар
Vessel	сосуд
Vigorously	сильно, энергично
Volume	объем

W	
Water	вода
Weigh	взвешивать
Weight	вес
Wood	древесина
Withstand (withstood, withstood)	выдержать

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ОБУЧЕНИЕ РАЗЛИЧНЫМ ВИДАМ ЧТЕНИЯ НА НАЧАЛЬНОМ ЭТАПЕ ИЗУЧЕНИЯ АНГЛИЙСКОГО ЯЗЫКА

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