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Кафедра иностранных языков

CHEMISTRY ХИМИЯ

Учебно - методическая разработка для развития иноязычной компетенции (английский язык) для студентов 2 курса

направление подготовки «Химия 020100».

Учебно-методическая разработка для развития иноязычной компетенции (английский язык) предназначена для студентов II курса направления «Химия». Учебно-методическая разработка включает в себя комплекс обучающих и контролирующих упражнений на закрепление ранее изученного грамматического материала. Лексические упражнения направлены на развитие у студентов речевой и языковой компетенции в профессинальной сфере.

При составлении упражнений использовалась современная английская литература, периодические издания по химии.

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PART I UNIT I

1. Grammar: Infinitive. Forms and functions

2. Revision: There + to be, Plural of nouns (special cases)

1. Прочтите и переведите следующие интернациональные слова

Chemical, reaction, anilin, synthetic, natural, structure, fact, convert, form, principle, system, gas, atom, atomic, characteristic, thermal, conversion, metal, technological, production, universal, period, experiment.

2.Запомните значения следующих префиксов и переведите

anti (= against) – antibodies, antioxidant, antisepsis, antitoxic, antirust auto (= self) – autonomous, autobiography, automobile bi (= two) – bicycle, bifrontal, bilevel, bisection, bimetal co (= with) – cooperate, coordinate, coowner de (= remove) – deregulate, deselect, detrain, decode, declassed, defame dis (= not) – disappear, disaffirm, disadjust, discharge, disbar ir (= not) – irregular, irrelation, irreversible, irreality, irrelevant in (=not) – inability, inaccurate, incorrect, incomplete, inconstant il (= not) – illegal, illogical, illimitable, illiquid, illiterate im (= not) – inmaterial, immature, immobile, immovable, imbalance inter (= between) – international, interatomic, interchange, interface, interlink mis (= badly/wrongly) – misinform, misbehave, misunderstand, miscalculate multi (= many) – ultinational, multilevel, multivalent, multistage, multivalued

Text I

Прочтите текст и выберите наиболее подходящий заголовок из данных ниже:

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

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

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

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

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

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

Vocabulary:

to deal with – рассматривать to undergo – подвергаться neither...nor – ни тот, ни другой entirely – вполне, полностью to relate to – относиться to concern – затрагивать, касаться to govern – влиять; руководить behaviour – поведение, свойство to occur – происходить, случаться to wither – сохнуть, увядать carbon monoxide – окись углерода frontier - предел

1. Прочтите текст снова и скажите, правильны ли следующие утверждения, выражая свое мнение через фразы It's true / It's false

1. We can infer that physics is a fundamental branch of knowledge. 2. In Paragraph 2, the study of energy is said to be a part of chemistry. 3. The author writes that every animate and inanimate thing in the universe is governed by general principles. 4. The author believes that if chemists "advance the frontiers of knowledge", they will "contribute to the well-being of humanity". 5. To truly enjoy nature, the author thinks, we must have some knowledge of chemistry.

2. Ответьте на вопросы по тексту:

- 1. What does Chemistry deal with?
- 2. Is Chemistry concerned only with the composition of matter?

3. Who can appreciate nature and its beauty: a professional chemist or an ordinary man?

4. Can chemical researches contribute to the well-being of humanity?

5. Chemical knowledge is necessary to many professionals, isn't it?

Грамматические упражнения

1. Переведите предложения на русский язык и определите форму и функцию инфинитива в каждом из них

1. To think of a molecule is to think of the atom which it contains and their proportion. 2. To make accurate measurements requires great care. 3. Selenium may be found in various ores. 4. Matter and its transformations must be studied by specialists. 5. Halogens may have interested chemists since early times. 6. The problem to consider next is concerned with the ionization of gases. 7. We shall study minerals to be obtained in these mountains. 8. Professor N was the first to prepare this kind of glass electrodes in our laboratory. 9. We observed the evaporation of water, a phenomenon to be more fully described later. 10. Alpha- X radiation was the first radiation to be studied in detail. 11. There were problems to be solved. 12. The samples obtained in such a way are used to continue the experimental work. 13. To obtain good results in the experiment one must work hard.

2. Выучите, как образуют форму множественного числа слова латинского и греческого происхождения

Singular		Plural	
-a	Formula	-ae Formulae	
-um	Datum	-a Data	
-on	Phenomenon	-a Phenomena	
-us	Radius	-i Radii	
-is	Hypothesis	-es Hypotheses	
-X	Index	-ces Indices	

3. Поставьте следующие слова, заимствованные из латинского языка во множественное число и переведите их:

quantum, basis, thesis, synthesis, analysis, criterion, medium, maximum, vacuum, crisis, thesis, synthesis, nucleus, matrix, stratum, axis.

4. Переведите, обращая внимание на конструкцию there + be

1. There are some elements which don't exist on earth. 2. There have been two schemes to compensate for this effect. 3. There still remained much work.

4. There exists an efficient algorithm to solve any of these problems.5. There followed a new series of experiments.6. There resulted a number of alternatives.7. There were problems to be solved.8. There is not much acid in this flask.9. There is no need for laying railway tracks to these reserves.

Разговорная практика

1. Прочтите и выучите диалоги

A. – Why didn't you come to the seminar yesterday?

- Because I missed Dr. N's lecture.

– I see. Having missed the lecture, you couldn't take part in the discussion.

B. – What kind of equipment do students learn to use in your lab?

- First of all, we learn to handle test-tubes, beakers, funnels, burners and so on.

- It's quite natural. You can't do without all these things if you are a chemist.

2. Переведите на английский язык диалог и разыграйте его

– Почему Петя не пришёл на лекцию вчера?

– Потому что он проспал (to oversleep).

– Пропустив лекцию, он не сможет принять участие в обсуждении данной проблемы.

UNIT II

1. Grammar: Complex object, Complex Subject

2. Revision: Comparison, Fractional numerals

1. Прочтите и переведите следующие интернациональные слова:

classification, economics, horizontal, practical, metrology, publication, theory, theoretical, vertical, physical, demonstrate, problem, laboratories, progress, period, reactor, communication, material, mass, technology.

2. Запомните значения следующих префиксов и дайте перевод слов

non (= opposite) – non-profit, non-metallic, non-moral, non-conductor, out (= more than) – outperform, outdone, outcome, outflow, outdated, over (= too much) – oversleep, overwork, overbalance, overcharge, overdelicate, post (= after) – postpone, postnatal, postgraduate, post-operative, post-surgical, re (= again) – relive, repass, replace, repay, reform, resale, reacting, recurrent, sub (= under) – submarine, subtext, subsystem, subway, subclass, subcool, super (= higher/improved) – superspeed, superconductor, supersensitive, trans (= across) – transatlantic, transform, transplace, transplantation, un (= not) – unequal, unable, unknown, uncover, unlink, unsatisfactory, under (= not enough) – underpaid, underfed, undertake, underdone.

Text II Fields of Chemistry

The field of chemistry is now a very large one. There are more than 30 different branches of chemistry. Some of the better known fields are inorganic chemistry, organic chemistry, physical chemistry, analytical chemistry, biological chemistry, pharmaceutical chemistry, nuclear chemistry, industrial chemistry, colloidal chemistry, and electrochemistry.

Inorganic chemistry. It was originally considered that the field of inorganic chemistry consists of the study of materials not derived from living organisms. Now it includes all substances other than the hydrocarbons and their derivatives. Organic chemistry. At one time it was thought that all substances found in plants and animals could be made only by using part of a living plant or animal. The study of these substances, most of which contain carbon was therefore called organic chemistry. It is now known that this idea is quite wrong, for in 1828 F. Wohler made an "organic" substance using a simple laboratory process.

Organic chemistry now merely means the chemistry of carbon compounds. Physical chemistry is concerned with those parts of chemistry which are closely linked with physics as, for instance, the behaviour of substances when a current of electricity is passed through them.

Electrochemistry is concerned with the relation between electrical energy and chemical change. Electrolysis is the process whereby electrical energy causes a chemical change in the conducting medium, which usually is a solution or a molten substance. The process is generally used as a method of deposition metals from a solution.

Magnetochemistry is the study of behaviour of a chemical substance in the presence of a magnetic field. A paramagnetic substance, i.e. one having unpaired electrons is drawn into a magnetic field. Diamagnetic substances, i.e. those having no unpaired electrons, are repelled by a magnetic field.

Biochemistry. Just as the physical chemist works on the boundaries between physics and chemistry, so the biochemist works on the boundaries between biology and chemistry. Much of the work of the biochemist is concerned with foodstuffs and, medicines. The medicines known as antibiotics, of which penicillin is an early example, were prepared by biochemists.

Vocabulary:

nuclear chemistry – ядерная химия	relation – отношение,
to be considered (thought) –	whereby – посредством которого
предполагают, считают	to cause – вызывать
to consist of – состоять из	conducting medium – проводящая
to derive – происходить от	среда
to include – включать	realm – сфера, область

hydrocarbon – углеводород	molten – расплавленный
to contain – содержать	deposition – осаждение
i.e. $=$ id est $=$ that is	to repel – отталкиваться
electricity current – электрический ток	boundary – граница

1. Ответьте на вопросы

1. Which branch of chemistry deals with the study of materials not derived from living organisms?

2. Which branch of chemistry studies the behaviour of a chemical substance in the presence of a magnetic field?

3. What is the study of substances containing carbon called?

4. What other branches of chemistry do you know?

5. What realm of science do antibiotics come from?

2. Заполните пропуски следующими словами: production, repelled, unpaired, solution, foodstuffs, compounds, enabled, branches, electrolysis, chain.Переведите предложения на русский язык.

1. Diamagnetic substances are ... by a magnetic field. 2. Much of the work of the biochemist is concerned with.... and medicines. 3. ... is the process whereby electrical energy causes a chemical change in the conducting medium. 4. Electrolysis is generally used as a method of deposition of metals from 5. The theory of ... reactions is a major discovery of our time. 6. The close links between the science and industry ... the chemical industry to make great progress. 7. Zelinsky's works formed the basis for the synthesizing of a large number of new chemical 8. Scientists are making a major contribution to ... of aniline dyes. 9. There are more than 30 different of chemistry. 10. Diamagnetic substances have no ... electrons.

Грамматические упражнения

1.Составьте предложения, согласно правилу английского предложения

1. And, phenol, an original method, acetone, our scientists, simultaneously, benzene, and, evolved, from, extracting, propylene, of. 2. Substance, field, the study, in the presence, behaviour, chemical, magneto chemistry, of, of, is, a, of, a, magnetic. 3. World-wide, this, to, scientists, recognition, much, due, research, credit, our, is, whose, won, has. 4. Other, needed, manufacture, textile fibers, plastics, acetone, and, are, organic glass, for, the, products, of, and, chemical, phenol. 5. Physics, chemistry, parts, linked, which, concerned, are, closely, with, with, physical, chemistry, is, those, of.

2. Переведите на русский язык предложения, обращая внимание на конструкции Complex Object и Complex Subject

A. 1. Mendeleev believed some elements to be missing in his periodic table and he even predicted their properties. 2. Dalton thought a water molecule to consist

of one hydrogen and one oxygen atom. 3. Sometimes the presence of the catalyst causes the two elements to unite and form a compound. 4. They saw him pour the liquid into the test-tube and then heat the tube over the burner. 5. Seeing the gases accumulate in the space above water we had to stop the reaction. 7. Coming up to him for the second time I found his experiment finished. 8. We saw the solution turning blue as the reaction proceeded. 9. They watched the sugar crystals disappearing in water. 10. The ancient scientists believed earth, water, air and fire to be elements.

B. 1. The molecule is considered to be composed of more than a single structural unit. 2. This phenomenon is expected to occur at a very high temperature. 3. This substance is believed not to exhibit radiation. 4. This substance may easily be demonstrated to be a compound. 5. This element was isolated and found to possess valuable properties. 6. Fundamental particles are no longer considered to be non- existent. 7. Hydrogen does not appear to react quickly with chlorine in the dark. 8. Under certain conditions an atom of hydrogen may be regarded to be acting as a bond. 9. Acids are usually thought of as being liquids. 10. Substances are usually defined as having a definite composition.

3. Выучите, как читаются простые и десятичные дроби и проценты

1/2 - a (one) half	0.01 – nought point nought one
1/3 - a (one) third	(point nought one)
2/3 - two thirds	2.54 – two point five four
$1^{1/2}$ – one and a half	3% – three per cent
$2^{2}/_{3}$ – two and two thirds	2/5% – two fifths per cent
0.1 – nought point one	0.1 – nought point one per cent

Прочтите следующие простые и десятичные дроби и проценты согласно примерам:

1. ${}^{1}/4$; 2/5; 1 ${}^{2}/6$; 10 ${}^{1}/_3$; 7 ${}^{6}/_7$; 12 ${}^{1}/_3$; 15 ${}^{3}/_4$; 3 ${}^{2}/_5$; 6 ${}^{1}/_{12}$; 4 ${}^{1}/_{10}$ 2. 0.2; 0.15; 1.25; 0.001; 3.42; 52.03; 0.14; 0.7 3. 1%; 7%; 25%; 0,2%; 1%; 27.3%; 81.357%; 16.5%.

4. Переведите предложения на русский язык, обращая внимание на степени сравнения и сравнительные конструкции прилагательных и наречий

1. Iodine is much heavier than bromine. 2. Studies of crystal chemistry have attracted much greater interest during the last decade than ever before. 3. Steel is far less brittle than cast iron. 4. Fluorine is a great deal more active than the other halogens. 5. A surface coating protects some compounds from still further oxidation. 6. The longer a candle stands the shorter it grows. 7. The larger the molecule the less is the chance for the shift to occur. 8. The more readily molecules can carry momentum from point to point the greater is the viscosity. 9. The boiling point will be lower the lower is the atmospheric pressure. 10. At

any instant most of the molecules have orientations in the slower speed region, this tendency being greater the stronger the force of gravitation.

Разговорная практика

1. Прочтите, переведите и разыграйте диалог

- I don't quite catch the difference between these theories.
- Look here, it's very simple. The main point is the difference in the behavior of ions.
- Oh, now I see. Thanks a lot.

2. Переведите на английский язык:

- Я не могу уловить разницу между двумя этими правилами.
- После лекций я тебе объясню. Ты увидишь, что всё очень просто.
- Спасибо.
- 3. Расположите фразы диалога в правильной последовательности. Выучите наизусть
- Where is it?
- Is there any canteen at the department?
- That`s all right.
- Yes?
- Not very far, just downstairs and round the corner.
- Excuse me!
- Yes, there is.
- Thank you very much.

UNIT III

1. Grammar. For-infinitive construction. Modal verbs and Perfect Infinitive

2. Revision. Some, any, no; 8one / ones, that / those; little/a little, few / a few

1. Прочтите и переведите следующие интернациональные слова и переведите их на русский язык

Organic, inorganic, alcohol, energy, activity, general, thesis, aqua, laboratory, meeting, atmosphere, mineral, radium, uranium, mass, nature, visit, theory, technician, patient, biochemistry, plastic rocket, type, mechanical, vacuum, identical, proportion, absolutely.

2. Запомните значения следующих суффиксов. Переведите слова на русский язык

Nouns

-er /- or (= a person who does something) – adviser / advisor, teacher, learner -ian - optician, mathematician, academician, musician, Russian, tactician -ent, -ant (= result of action) – improvement, absorbent, equivalent, reagent
-ism (= name of system or belief) – realism, optimism, mechanism, criticism
-ist (= the person who believes in the system) – realist, optimist, pianist
-ion – confusion, apparition, action, collision, attraction, direction, reaction
-ness – happiness, kindness, usefulness, darkness, quickness, illness
-ship – leadership, friendship, comradeship, relationship, membeship
-ence / ance – permanence, appearance, difference, assistance, ignorance
-ity – annuity, ability, flexibility, speciality, superiority, falsity, electricity
-ment – movement, development, equipment, achievement, measurement
-ure – failure, pressure, temperature, structure, literature, mixture, pressure
-th – growth, strength, truth, length, depth, health, ingrowth, birth, breath

3. Подберите синонимы:

1. stuff	a) to delete
2. suddenly	b) unexpectedly
3. spontaneously	c) matter
4. burning	d) impulsively
5. rusting	e) little by little
6. unreactive	f) amalgam
7. to remove	g) inert
8. mixture	h) corrosion
9. gradually	i) combustion

Text III

Symbols, Formulas and Equations

Each of the 105 presently known chemical elements is given a symbol which usually is derived from the name of the element. The symbol of oxygen is O, of hydrogen is H, of helium He, of copper Cu, of sodium Na, of plutonium Pu. Groups of symbols called formulas are used to designate compounds. The formula for water is H₂O, for carbon dioxide CO₂, for sulphuric acid H₂SO₄. These symbols and formulas are used to indicate chemical fractions. For example: $2H_2O \rightarrow 2H_2 + O_2$ (statement: water decomposes to form hydrogen and oxygen).

Inorganic Molecules and Compounds

Simple diatomic molecules of a single element are designated by the symbol for the element with a subscript 2, indicating that it contains 2 atoms. Thus the hydrogen molecule is H_2 ; the nitrogen molecule, N_2 ; and the oxygen molecule, O_2 . Polyatomic molecules of a single element are designated by the symbol for the element with a numerical subscript corresponding to the number of atoms in the molecule. Examples are the phosphorus molecule, P_4 , and the sulphur molecule, S_8 .

Diatomic covalent molecules, containing unlike elements are given similar designation. The formula for hydrogen chloride is HCl. The more electropositive element is always designated first in the formula.

For polyatomic covalent molecules containing unlike elements, numerical subscriptions are used to designate number of atoms of each element present in the molecule, for example, water, H_2O . Again, as in diatomic molecules, more electropositive element is placed first in the formula.

Periodic Law

One of the cornerstones of modern chemical theory is the Periodic Law. It can be simply stated as follows: The properties of the elements are a periodic function of the nuclear charges of their atoms.

In 1869 Mendeleyev arrived at the conclusion that by the arrangement of the elements in order of increasing atomic weight the similarity and periodicity of properties of various, valence groups of the elements were clearly delineated.

There were several vacant spaces in Mendeleyev's table which led him to predict the existence of six undiscovered elements, (scandium, germanium, polonium, etc). His confidence in the new classification was clearly expressed in the predictions which he made of the chemical properties of these missing elements. And within fifteen years gallium, scandium and germanium were discovered.

Although this table has been modified hundreds of times, it has withstood the onslaught of all new facts. Isotopes, rare gases, atomic numbers, and electron configurations have only strengthened the idea of the periodicity of the properties of the elements.

Vocabulary:

еquation – уравнение to designate – обозначать carbon dioxide CO_2 – двуокись углерода sulphuric acid H_2SO_4 – серная кислота statement – формулировка to decompose – разлагаться (на составные части) diatomic – двухатомный subscript – подстрочный индекс corresponding – соответствующий similar – подобный hydrogen chloride – хлористый водород cornerstone – краеугольный камень as follows – следующим образом nuclear charge – ядерный заряд to arrive at – прийти к arrangement – расположение to delineate – очерчивать vacant space – свободное место to predict – предсказывать existence – существование confidence – уверенность missing – отсутствующий within – в течение to modify – видоизменять to withstand – выдерживать onslaught – появление

1. Ответьте на вопросы

- 1. How many chemical elements are there now?
- 2. What is the symbol of Manganese?
- 3. What is a symbol usually derived from?
- 4. What does a subscript show?
- 5. What element is always designated first in the formula?
- 6. When did Mendeleyev discover the periodic law?
- 7. How can the Periodic Law be simply stated?
- 8. What elements were discovered after Mendeleyev modified the table?
- 9. Give some examples of polyatomic molecules of single elements.
- 10. What are simple diatomic molecules of a single element designated by?

2. Прочтите текст снова и скажите, правильны ли следующие утверждения, выражая своё мнение через фразы: It's true / It's false

1. Symbols and formulas are used to indicate chemical reactions. 2. Groups of symbols are called equations. 3. Groups of symbols are called formulas. 4. There are 102 chemical elements now. 5. The more electropositive element is always designated last in the formula. 6. Subscriptions are used to designate the number of atoms of each element present in the molecule. 7. Mendeleyev made his discovery in 1879. 8. There were several vacant spaces in Mendeleyev's table which led him to predict the existence of six undiscovered elements. 9. The table wasn't modified. 10. Properties of the elements are periodic functions of their atoms' nuclear charges.

Грамматические упражнения

1. Переведите предложения на русский язык, обращая внимание на For-Infinitive-Construction

1. For hydrogen to be obtained from water electrolysis may be used. 2. For the remarkable properties of rubber to be carefully examined one has to carry out long series of experiments. 3. For the desired properties of the substance to be prepared some preliminary indication should be given. 4. The problem I spoke to you about is too difficult for the designers to solve in a year or so. 5. We applied heat for water to expand. 6. In order for two molecules to react with each other they must, first of all be in presence of each other. 7. It is necessary for us to memorize one by one the formulas of thousands of substances. 8. For uranium minerals to be used in industry is not a usual thing. 9. For atoms to have the same chemical properties is to be the atoms of one element. 10. Rusting represents the natural tendency for the iron to revert from the unstable condition.

2. Заполните пропуски some, апу, по

There is ... acid in the glass. 2. Have ... tea, will you. 3. Sorry, but I have ... pen here. 4. Have ... students come already. 5. They haven't read ... text yet.
 Is there ... difference between oxidation and combustion? 7. There is gas in

this container, it has escape. 8. She has ... work to do in the evening.

3. Переведите предложения, обращая внимание на (a) little и (a) few

1. We have little time. 2. We have a little time. 3. There are few moving parts in this unit. 4. There are a few moving parts in this unit. 5. We have little information on this subject. 6. There are few papers dealing with this subject. 7. The few who opposed this new trend were forced to agree. 8. The little that is known of this argument is false.

4. Переведите предложения, обращая внимание на слова - заместители 1.Collisions between unlike molecules are the important ones. 2. The result, like the one just described, is in no way surprising. 3. The atomic weight of oxygen is greater than that of carbon. 4. Unlike molecules can be determined by methods like those used earlier for like molecules. 5. Gas molecules move faster than liquid molecules. They are more agitated than these. 6. The assertion is one which can be justified by a detailed proof. 7. Two other very suitable temperatures are always generally available, those of melting ice and of boiling water —the former, constant under all conditions, the latter depending on the atmospheric pressure. 8. Fahrenheit's construction is the one most often used for household thermometers. 9. Sugar dissolves in water. So does common salt. 10. The pressure changed, so did the temperature. 11. The pressure did not change, nor did the temperature. 12. Suppose water is heated in a kettle. As the temperature rises, so does the pressure of water vapour required to stop further evaporation. 13. If a body is at rest and starts to move, its velocity is changed.

Разговорная практика

1. Прочтите диалоги и выучите их наизусть. Составьте свой по образцу

- Could you help me with my homework?
- What is the difficulty?
- I can't understand this rule.
- I'll try to explain it to you.
- I hear some students are engaged in scientific work.
- As I know, almost every undergraduate does a more or less serious research.
- Who helps them?
- Their supervisor does.

UNIT IV

1 Grammar. Modal verbs and perfect infinitive

2. Revision

1. Прочтите и переведите на русский язык интернациональные слова

Hypothesis, test, result, experiment, substance, crystal, systematic, argument,

vertical, horizontal, operate, modern, inert, liter, oxide, negatively, proportion, process, temperature, medicine, pharmaceutical, corrosion, discomfort, attract.

2. Запомните значения следующих суффиксов

Verbs

-ify – falsify, modify, electrify, qualify, classify, purify, simplify

-ise – modernize, equalize, realize, economize, privatize, apologize

-en – deepen, fasten, shorten, widen, gladden, worsen, blacken, sharpen *Adjectives*

-ic – idiotic, periodic, atomic, economic, historic, systematic

-ful – awful, wonderful, peaceful, careful

-able / ible – comfortable, terrible, movable, flexible, limitable, sensible

-proof / resistant – waterproof, childproof, stallproof, fireproof

-free – alcohol free, nuclear free zone, duty free, sugar free, trouble free, ran free -less (= without) – hopeless, childless, wireless, useless, lifeless

-ous – dangerous, poisonous, courageous, glorious, famous, virtuous, ambitious -ant, -ent – resistant, different, dependent, observant, relevant, current

Прочтите, обращая внимание на ударения следующих слов. Переведите слова на русский язык

`extract - ex`tract, `progress - pog`ress, `import - im`port, `export - ex`port, `increase - in`crease, `present - pre`sent, `compound - com`pound

Text IV Why Study Chemistry

Planning your future career direction, you might well be concerned with some of the following questions. What is the point of training as a chemist in the 21st century? What are the prospects of fulfilling work after taking a Chemistry degree? How can I make a difference?

The employment potential of a Chemistry graduate is very high, both in Chemistry-related areas and elsewhere. Chemistry is the basis of the most economically important industries in Russia, and these companies require a supply of high quality graduate chemists. Almost all our graduates gain immediate employment or continue to a higher degree.

Chemistry furnishes much of the material base of modern civilization, and chemists are a constant source of innovation for its further benefit. It is hard to imagine any product introduced in recent times that did not require the creative efforts of a chemist at some stage in its development. From the formulation of petrol, through the materials and colouring of your clothes, to antibiotics and other pharmaceuticals, chemists have played a key role in shaping our modern world. The 20th century saw several industrial revolutions resulting from new materials created by chemists, for example plastics, the liquid crystal display on your computer, the etching process that made microchip technology possible, and many developments in medicine antibiotics, DNA technology. The list is endless and we can expect many more civilization changing discoveries in this century: molecular machines, new magnetic and superconducting materials, smart materials, molecular medicine, fuel cells, the hydrogen economy.

Not all chemical technology has been an unqualified success, of course. The commercial exploitation of some discoveries in Chemistry, poor containment and industrial accidents have had disturbing effects on the environment. Again, chemists play a key role in identifying and analyzing the problem and in proposing solutions whether this be environmental impact assessment, cleaning up, new ecologically sustainable procedures or, as in the case of CFC's, a complete ban.

Research chemists perform many roles: some provide and evaluate new compounds and materials; some devise new and cleaner methods of synthesis develop investigative techniques manufacture: some new and and instrumentation; some participate in the design and marketing of new products; some are involved in analysis, forensic science, quality control and environmental protection; some build and operate models of large and complex systems, such as the atmosphere. Because of the great economic importance of Chemistry chemists have important roles high up in the decision-making processes, both in Russia and abroad: on the boards of chemical companies (they need to understand their processes and products); in parliament and the civil service; in the law (particularly patent law).

Chemistry occupies a central position among the sciences. It has important interfaces with mathematics and physics, engineering, biology and medicine. The study of Chemistry, with its uniquely wide span within the scientific spectrum is an excellent way to develop your intellect. You acquire not only a powerful battery of analytical skills for problem solving, but also the ability to analyze critically and to ask the questions. These skills are transferable to almost any context and are highly valued in the world of commerce and finance.

Vocabulary:

to be concerned with – быть обеспокоенным, интересоваться to gain – добиваться, получать to furnish – снабжать etching process – травление DNA – дезоксирибонуклеиновая кислота, ДНК fuel cells = FC – топливный элемент exploitation – использование

containment – сдерживание, меры предосторожности impact assessment – определение воздействия sustainable – устойчивый, CFC – (chlorofluorocarbon) фреон forensic – судебный complete ban – полное запрещение pertinent – уместный, относящийся к делу

1. Найдите в тексте эквиваленты следующим словосочетаниям:

возможность трудоустройства, основа большинства экономически важных отраслей промышленности, экологически рациональные действия, руководство химических компаний, в юриспруденции (особенно патентное право), государственная гражданская служба (чиновничий аппарат), процессы принятия решений, широкий диапазон, могущественный комплекс аналитических навыков, этот опыт может быть использован практически при любых обстоятельствах, относящиеся к делу вопросы.

2. Прочтите текст еще раз и скажите, правильны ли следующие утверждения. Начинайте предложения с фраз It's true / It's false

1. Chemistry is the foundation of the most important industries in Russia.

2. Any product introduced now require the superhuman efforts of a chemist.

3. All chemical technology has disturbing effects on the environment.

4. Chemists play a main role in identifying and analyzing the problem of the environmental protection and in proposing solutions to it.

5. Because of the little economic importance of Chemistry chemists have insignificant roles high up in the decision-making processes.

6. Chemistry is interlinked with many sciences.

Грамматические упражнения

1. Прочтите и переведите следующие предложения, обращая внимание на конструкцию Modal verb + Perfect Infinitive»

1. Everyone must have noticed a blue-violet vapour when iodine was being warmed. 2. You should have paid more attention to theoretical course before starting your practice. 3. This student can't have started the reaction before learning the properties of the substance. 4. Mendeleev could have presented his periodic system himself but he was ill. 5. The researches would have tested their results by experiment but they had no all the necessary apparatus. 6. The teacher may have spoken about such reaction but I don't remember. 7. Some mistakes must have been made in the programme. 8. This method may have been followed in reactions 4, 5, 6. 9. He ought to have attended the meeting. 10. They need to have carried out the test once more. 11. This line should have been put into operation long ago. 12. His name might have been added to the list.

2. Переводите словосочетание с левым определением (цепочка существительных):

speed calculation, calculation speed, a mercury thermometer, the thermometer mercury, heat dissipation constrains, a 135mm diameter, high energy people, perturbation theory, conservation law, energy transfer, transfer energy, laser beam diameter, charge transfer mechanism, electron beam current distribution, electron beam current density, regulation speed, regulation of speed crude production, crude production volumes, oil production, oil production growth, crude production growth rates (темп), offshore production platform, oil companies gas field, the leading oil producers, gas turbine power stations, crude recovery, gas-filling station (нефтебаза), dispersion term.

3. Переведите предложения на русский язык

1. To measure the temperature a mercury thermometer was employed. 2. Following the change in pressure the thermometer mercury dropped. 3. In Eq.(5) we can neglect the flow entropy source term. 4. In contrast to Ar and Kr, the Xe electron energy spectrum exhibits a dramatic change with increasing intensity. 5. The energy loss rate must remain the same. 6. This approach gives insight into the nature end cause of the image imperfection. 7. The energy transfer rate was reduced at the longer wave lengths. 8. The Moscow region state farm horse exhibition is in St. Petersburg. 9. Argument force rather than force argument should dominate. 10. The approach is used for time and money saving purposes.11. They have used the temperature controlled system.

Разговорная практика

1. Прочитайте диалог, выучите его. Составьте свой диалог по образцу

- My supervisor has published a new article.
- What is the subject of this investigation?
- Ion-selective electrodes.
- It's a very promising field.

PART II

A. Famous Chemists

- 1. Прочитайте и переведите тексты
- 2. Ответьте на вопросы
- 3. Подготовьте сообщение о любом ученом-химике

Antoine Lavoisier

Antoine Laurent Lavoisier is a French chemist, was the founder of modern chemistry.

Lavoisier carefully measured the weights of substances involved in chemical reactions. In 1772 he began a series of experiments that demonstrated the nature of combustion. He concluded that combustion results from the union of a flammable material with a newly discovered gas, which he called oxygen. Lavoisier published his findings in his Elementary Treatise on Chemistry. With French astronomer and mathematician Pierre Simon Laplace, Lavoisier carried out the experiments on respiration in animals. Their studies demonstrated a similarity between common chemical reactions and the processes that occur in living organisms. These experiments provided the foundation for the science now known as biochemistry. Lavoisier also helped to develop a system for

naming chemical substances based on their composition. This system is in use.

Lavoisier was born in Paris. He received an excellent education and developed an interest in all branches of science, especially chemistry. He was elected to the French Academy of Sciences in 1768.

Lavoisier was arrested in 1793 by the leaders of the French Revolution. Many years earlier, he had become a partner in a firm that collected a number of taxes for the government. In spite of his achievements, Lavoisier was found guilty of conspiracy with the enemies of France because of his involvement in tax collection. He was executed by guillotine.

Ответьте на вопросы:

- 1. What famous scientist did Lavoisier work with?
- 2. What experiments did they conduct?
- 3. The foundation of what science did their experiments provide?
- 4. Why was he arrested?
- 5. What series of experiments did Lavoisier begin in 1772?

Alfred Nobel

Alfred Nobel was born on October, 21, 1833 in Stockholm. He was the son of an inventor. He was educated in St. Petersburg, Russia, and later studied engineering in the United States.

Alfred Bernard Nobel, a Swedish chemist, invented dynamite and founded the Nobel Prizes. As a young man, Nobel experimented with nitroglycerin in his father's factory. He hoped to make this dangerous substance into a safe and useful explosive. He prepared a nitroglycerin explosive, but so many accidents occurred when it was put on the market that for a number of years many people considered Nobel almost a public enemy.

Finally in 1867 Nobel combined niter with an absorbent substance. This explosive could be handled and shipped safely. Nobel named it dynamite. Within a few years he became one of the world's richest men. He set up factories throughout the world and bought the large Bofors armament plant in Sweden. He worked on synthetic rubber, artificial silk and many other products.

Nobel was never in good health. In later years he became increasingly ill and nervous. He suffered from a feeling of guilt at having created a substance that caused so much death and injury. He hated the thought that dynamite could be used in war when he had invented it for peace. Nobel set up a fund of about \$ US 9 million. The interest from the fund was to be used to award annual prizes, one of which was for the most effective work in promoting international peace.

Ответьте на вопросы:

1. Who was Nobel's father?

- 2. What was Nobel's chief invention?
- 3. Why did people consider him a public enemy for a number of years?
- 4. What kind of Prizes did he set up?
- 5. What was the interest from these fund?

D.I. Mendeleyev – Pride of Russian Science

The list of spheres of knowledge which Mendeleyev's genius touched upon is enormous: cchemistry, physics, earth sciences, metrology, economics, metallurgy and much else1. Mendle1eyev's legacy comprises 25 volumes, a third of them devoted to chemistry.

D.I. Mendeleyev, the outstanding Russian scientist, was born in Tobolsk in 1834. In 1850 at the age of 16 he entered the Pedagogical Institute in St. Petersburg to study chemistry. Five years later he graduated from it with a gold medal and was invited to lecture on theoretical and organic chemistry at St. Petersburg University. To continue his studies and research Mendeleyev was sent to Germany in 1859. While living abroad he made a number of important investigations.

The year 1868 was the beginning of his highly important work "Fundamentals of Chemistry". When working at the subject Mendeleyev analyzed an enormous amount of literature, made thousands of experiments and calculations. This tremendous work resulted in the Table of Elements consisting of vertical groups and horizontal periods. Mendeleyev was the first to suggest a system of classification in which the elements are arranged in the order of increasing atomic weights. The main idea of the Periodic, System is the idea of periodic repetition of properties with the increase of the atomic weights.

Arranging all the existing elements in the Table Mendeleyev had to overcome great difficulties, as a considerable number of elements were unknown at that time and the atomic weights of 9 elements (out of 63) were wrongly determined. Thanks to his investigations Mendeleyev was able to predict not only the existence of a few unknown elements but their properties as well. Later the elements predicted were discovered.

More than 350 works created by Mendeleyev deal with a great many subjects. Combining theory with practical activities he carried out enormous research in coal, iron and steel industries in Russia. He died in 1907 at the age of 73.

The achievements in chemistry and physics at the end of the 19th and the beginning of the 20th century made it necessary to reconstruct the Periodic Table taking into account 2 new discoveries.

Time is the severest judge in science. After more than 100 years of its existence, the Periodic Law has preserved its full value and is being constantly developed with each new discovery.

Vocabulary:

and much else – многое другое to take into account – принимать во внимание

Ответьте на вопросы:

- 1. What fields of science did D.I. Mendeleyev touch upon?
- 2. Where and when was he born?
- 3. What institute did he enter?
- 4. What subjects did he study at the institute?
- 5. When did he graduate from it?
- 6. When was he sent abroad?
- 7. What is the main idea of the Periodic Law?
- 8. What could the scientist predict thanks to his investigations?
- 9. Were these unknown elements discovered?
- 10. In what spheres of science did Mendeleyev carry out research?
- 11. Why was the Periodic Table reconstructed?
- **B.** My Future Speciality
- 1. Прочитайте и переведите тексты
- 2. Ответьте на вопросы
- 3. Подготовьте сообщение о своей будущей профессии

Pharmacology

I am a second-year student of the Chemistry and Technology Department of Tver State Technical University. My speciality is pharmacology. Pharmacologist is a scientist who studies the complex interactions between chemicals and living things. Any chemical that has an effect on a creature is considered to be a drug, and much of a pharmacologist's time is spent studying the effects that different drugs have on tissues, organs and their functions. Pharmacologists are not to be confused with pharmacists, who are mainly concerned with the distribution of drugs.

Pharmacology has several different fields, and a pharmacologist may be involved with one or many of them. One of these fields is pharmacodynamics, which involves the relationships between living things and drugs. This branch not only studies how drugs may affect the body, but also how they may affect the organisms and microorganisms that are living inside the body.

Another field that a pharmacologist may be concerned with is toxicology. In this field, the scientist examines the bad effects that poisons have on a body alongside the treatment of these toxic chemicals. The most important factor that a toxicologist must examine is the amount, or dose, of the chemical and how badly the body reacts to different amounts of poison.

Humans, for many thousands of years, have used and experimented with different kinds of plants and chemicals for their effects and for their ability to cure various ailments and diseases. In the early 20th century, the field of pharmacology was developed as advances made in chemistry allowed for detailed study of these substances. It was because of these many technological breakthroughs that scientists could finally extract the effective chemicals from their sources and make drugs. Pharmacologists are still concerned with not only extracting these useful chemicals, but they are also responsible for ensuring their safety as well as their effectiveness.

A pharmacologist must be educated in the complex biology associated with the body and its many different types of cells to know their relationships with chemicals. He or she is many times concerned with how a chemical is disintegrated or absorbed within the body. Another issue is the way that a particular chemical can travel throughout a biological system and which organs are or are not affected. Often, the pharmacologist will also study how drugs are metabolized within the body and whether or not they have the potential to be transformed into a different, possibly toxic, chemical. Finally, pharmacologists must also concern themselves with the ways that chemicals exit the body, what amounts remain, and for how long.

Specialists in the field of pharmacology can find job at the research and development establishments, design bureaus, chemical industries, medicine and other branches of chemical engineering.

Vocabulary:

to ensure – гарантировать,
обеспечивать
to disintegrate – разделять на
составные элементы
to absorb – всасывать, поглощать

Дайте краткий пересказ текста, используя выражения:

- 1) It's generally believed that (принято считать, что)
- 2) it is no wonder that (неудивительно, что)
- 3) to exert an influence on (оказывать влияние на)
- 4) in passing (мимоходом, мельком)
- 5) against all odds (несмотря ни на что)
- 6) on top of it all = to crown it all (в довершении ко всему)
- 7) to feel in one's element (чувствовать себя в своей тарелке)
- 8) food for thought/reflection (пища для размышления)
- 9) put another way (иначе говоря)
- 10) in a nutshell (вкратце, в двух словах)
- 11) in all honesty (честно говоря)

High-Molecular Compounds

I am a second-year student of the Chemistry and Technology Department of Tver State Technical University. My speciality is high-molecular compounds. In other words, it is a chemistry of polymers which holds a remarkable place among the other branches of chemistry. Polymers have been put to many particular uses, ranging from children's toys to spaceships.

The science of chemistry today is a tool of progress in the hands of mankind. So modern scientists are developing the new materials improving the properties of the existing ones and extending the field of their application.

Plastics are made up from very simple raw materials – water, air, coal with the help of natural gas or petroleum. Plastics may be divided into two main groups according to their properties: thermosetting plastics and thermoplastics. The former can be got by heat and pressure, but cannot be remelted. The phenolics are important thermosetting plastics. The latter are soft when heated, hard when cooled. They can be remelted repeatedly. The polyethylenes, polystyrenes, vinyls and acrylies are in thermoplastics group.

One of the ways of improving the quality of plastics and obtaining the new ones is the method of co-polymerization. In this case two or more components are subject to polymerization. As a result the product combines the most valuable properties of the initial substances.

It was established that the properties of polymers and plastics are largely determined by the pattern of their big molecules. Our scientists are searching all possible variants of structural patterns of different polymers. I hope when being experts in this field we will contribute to developing polymers.

After graduating from the University we will surely find jobs at the research institutes, design bureaus, chemical or fuel industry, medicine and so on.

Vocabulary:

initial – начальный establish – устанавливать pattern – форма, образец to search – искать, разрабатывать thermosetting – термореактивный to contribute – вносить вклад the former – первый (из 2-х упомянутых)

Ответьте на вопросы:

- 1. What is your speciality?
- 2. Where are polymers used now?

the latter – последний (из 2-х упомянутых) to distinguish – различать repeatedly – неоднократно approach – приближение, подход to proceed – продолжать to combine – объединять forward – выдвигать 3. What are modern scientists doing to develop the science of chemistry?

- 4. What are plastics made up from?
- 5. How many groups may plastics be divided into? What are they?

6. What are the distinguishing features of thermosetting plastics and thermoplastics?

7. What is polymerization?

8. What are the properties of polymers and plastics determined by?

Chemistry

I am a second year student of Tver State Technical University. I study at the Chemistry and Technology Department. My future specialty is chemistry.

Chemistry is the science of matter and the changes it undergoes. Chemistry is a more specialized field of science in comparison with physics. It is concerned with the composition, behavior (or reaction), structure, and properties of matter, as well as the changes it undergoes during chemical reactions.

It is a very interesting branch of science which studies various substances, atoms, molecules, crystals and other aggregates of matter whether in isolation or combination. Disciplines within chemistry include inorganic chemistry, organic chemistry, biochemistry, physical chemistry.

Actually, the chemical industry began to develop in the pre-war period. The nitrogen, coke-chemical, forest chemistry, apatite branches were set up at that time. At the same time the foundation was laid for synthetic rubber, synthetic fibre, plastics. Now chemical industry has begun to use on a wide scale the production waste of metallurgical and coke plants.

The development of any branch of industry is impossible without the development of science. The science of chemistry today is a tool of progress in the hands of mankind. Modern scientists are searching for modern methods of producing new substances noted for their properties. They develop new effective techniques and processes in the field of chemical engineering.

Our scientists achieved much progress in the fields of kinetics, biochemistry and structural chemistry. Chemistry affects all aspects of human life ranging from houseware to the design and construction of spaceships. After completing the course of studies the students get qualification of a chemical engineer. Specialists in the field of chemistry can find job at the research and development establishments, design bureaus, chemical or fuel industries, medicine and other branches of chemical engineering.

Vocabulary :

nitrogen – азот, азотный coke-chemical – химический кокс synthetic rubber – синтетический

каучук; fibre – волокно

Ответьте на вопросы:

- 1. What is your future speciality?
- 2. What does this branch of science study?
- 3. When did chemical industry begin to develop?
- 4. What are modern scientists searching for?
- 5. What field did our scientists achieve much progress in?
- 6. What does chemistry affect?
- 7. In what branches of science and industry can future specialists find job?

PART III General Revision

1. Прочтите, переведите на русский язык, обращая внимание на грамматические конструкции

1. Having examined it carefully, we found out that the gas under investigation exhibited anomalous behaviour. 2. To conclude, there are two features of high abnormal chemical reactivity. 3. Other conditions being equal, the dissociation theory is in good agreement with these observations. 4. The results of several methods to be described later are in satisfactory agreement. 5. Returning to van't Hoff's argument, it will be remembered that the striking feature of his argument is that he actually calculated the normal constant for substances dissolved in a given solvent. 6. The gas law has been seen to apply only to dilute solutions. 7. With the help of the kinetic theory applied to the thermal expansion, one can calculate that the absolute zero is -273°C. 8. Applying the law of mass action, the following equation was obtained. 9. This assumption is shown to be quite inadequate. 10. Further assumptions were made about the electrical work required for the vibration of the particles. 11. One has to make separate assumption in each single case. 12. One should never forget that the Phase Rule is based on thermodynamical considerations. 13. The behaviour of several gases has been investigated but no definite conclusion could be drawn. 14. It is not unlikely that when mercury and water are brought together the two liquids will remain side by side. 15. Let us now calculate the equilibrium constant for the above case. 16. It is essential that the case of mixed crystals of thallium nitrate and potassium nitrate should be taken here. 17. Take the case of iodine and benzene. 18. Whatever reasons may be given, Henry's law is a particular case of the distribution law. 19. Whatever considerations may be presented, the case is different with organic colloids. 20. If the experiment be carried out at a very low temperature, hydrogen is found to behave like other gases. 21. The work carried out is based on certain relationships which proved to be incorrect. 22. A further addition of phenol causes a second liquid phase to be formed. 23. One has to make separate assumption in each single case. 24. The substance obtained is believed to be either an impure form of Ag203 or a basic sulphate of tripositive

silver. 25. To obtain phosphoric acid, one must dissolve the oxide of phosphorus in water. 26. To balance an equation, the formulas of all reactants and products must be known. 27. The acidity of solutions is often expressed in terms of pH; the lower the pH, the more acid in the solution. 28. Having added the necessary amount of sulphur to bromine and mixed the solution obtained with ice, we obtained hydrogen bromide. 29. Compounds of phosphorus are likely to be reduced by hot carbon. 30. Catalyst accelerate the reactions that otherwise would be too slow. 31. Soon after hearing of the discovery of argon, Lecoq de Boisbaudran predicted that it might belong to a family of absolutely inert elements, all of which were then unknown. 32. These striking properties made him suspect the presence of a new element. 33. The first step in the reaction appears to be the formation of ferrite, which is followed by atmospheric oxidation of the iron. 34. Upon washing these plates with a little distilled water, one obtains the substance in the pure state. 35. For one substance to dissolve in another their molecules must attract each other strongly. 36. The liquid a substance dissolves in is called a solvent. 37. The discovery of spectral analysis increased Bunsen's fame enormously and led to his being called to Berlin. 38. Having cooled the concentrated solution of naphthalene in hexane we obtained white precipitate of pure naphthalene. 39. It was Berthelot who, starting from the, synthesized the various hydrocarbons. 40. Let me now explain the way in which a wave is to be imagined. 41. Johnson has found the effect to be much greater at higher than at lower altitudes. 42. The amount of scattering to be expected on the basis of the formula given above was computed by Einstein. 43. Work is the result of energy, the latter usually being defined as capacity for doing work. 44. He was the first to determine the exact weight proportions of the components of water. 45. Once formed, bubbles rise because of the vapor being less dense than the liquid in which it is suspended. 46. It seems reasonable that the relations found to hold so well for these films should be true in general. 47.Simple substances consist of atoms, each substance having its own special kind of atom. 48. The question is how closely these data represent the results likely to be obtained in practice.

1. Используя слова Приложения 3, переведите следующие предложения на русский язык

1. Gas pressure regulators are used to regulate the gas pressure and are not appropriate for measuring flow rates.

2. Funnels are usually made of stainless steel, aluminum, glass or plastic.

3. Test tubes are widely used by chemists to hold, mix or heat small quantities of solid or liquid chemicals, especially for qualitative experiments and assays.

4. Laboratory apparatus will vary from lab to lab depending on the lab's expense and sophistication, and the nature of the experiments done there.

5. Burettes measure from the top since they are used to measure liquids dispensed out the bottom.

Приложение 1

Важнейших химических элементов (к таблице Менделеева)

Ag – argentum [a:'dʒent ∂ m] = silver ['silvə] cepeopo Al – aluminium [,æljə'mınıəm] алюминий Ar – argon ['ɑ:gɔn] aproн As – arsenic ['a:s(ə)nik] мышьяк Au – aurum [' \mathfrak{g} :r ∂m] = gold [geuld] золото B – boron ['bɔ:rɔn] бор Ba – barium ['beəriəm] барий Be – beryllium [be'rllom] бериллий Bi – bismuth [bizməθ] висмут Br – bromine [broumin] бром C – carbon ['kɑːb(ə)n] углерод Ca – calcium ['kælsıəm] кальций Ce – cerium ['slərləm] церий Cd - cadmium ['kædmıəm] кадмий Cl – chlorine ['kb:ri:n] хлор Co-cobalt ['kəubɔ:lt] кобальт Cr – chromium ['krəumıəm] хром Cs - caesium ['si:ziəm] цезий Cu – copper [kэpə] медь F – fluorine ['flɔ:ri:n] фтор Fe – ferrum ['fer ∂m] = iron ['al ∂n] железо Ga – gallium ['gæliəm] галлий Ge – germanium [dʒ:'meiniəm] германий H-hydrogen ['haidrədʒən] водород He – helium [^{'hi:liəm}] гелий Hg - hydrargyrum [hai'dra:dynam] =mercury ['ms:kjəri, 'ms:kjuri] ртуть I – iodine ['аюdi:n] йод Ir – iridium [I'ridiəm], [ан-]иридий K – kalium ['keIII∂m] калий = potassium [pə'tæsıəm] калий Li – lithium [^{'liθiəm}] литий Mg – magnesium [mæg'ni:ziem] магний

['mæŋgəni:z] Mn manganese марганец Mo – molybdenum [mə'lıbdənəm] молибден N – nitrogen [' 'naıtrədʒən] азот Na - natrium ['neitriem] = sodium ['səudıəm] натрий Ne – neon ['ni:ɔn] неон Ni – nickel ['nikl] никель O-oxygen ['ɔksıdʒən] кислород P – phosphorus ['fɔsf(ə)rəs] фосфор Pb – plumbum ['plʌmbəm] = lead [led] свинец Pt – platinum ['plætinəm] платина plutonium plu:'təuniəm Pu – плутоний Ra – radium ['reidiəm] радий рубидий S – sulphur ['sʌlfə] cepa Sb – antimony ['æntiməni] сурьма scandium 'skændiem Sc – ſ скандий Se – selenium [sı'li:nıəm] селен Si – silicone ['slllkoun] кремний $Sn - stanum ['stæn \partial m] = tin [tIn]$ олово strontium 'strontiem Sr ſ стронций Te – tellurium [te'luərıəm] теллур Th – thorium ['өэ:riəm] торий Ti – titanium [ti'teiniəm, tai'teiniəm] титан U – uranium [juə'reiniəm] уран W – wolfram ['wulfrəm] = tungsten ['tʌŋstən] вольфрам Zn – zinc [**z**ŋk] цинк zirconium Zr – zs:'kəuniəm цирконий

Правила чтения химических формул

Буквы латинского алфавита, обозначающие название элементов, читаются согласно английским названиям букв алфавита.

Знак + читается plus, and, together, with, react with.

Знак — обозначает одну связь или единицу родства и не читается.

Знак = читается give, form или produce.

Знак \rightarrow читается give, pass over to, lead to.

Знак \leftrightarrow читается forms and is formed from.

Цифра перед названием элемента обозначает число молекул.

Примеры:

 $C+O_2 \rightarrow CO_2$

1 atom of carbon reacts with 1 two-atom molecule of oxygen and produces 1 molecule of carbon dioxide.

 $2H_2 + O_2 \rightarrow 2H_2O$

Two molecules of H two plus O two give two molecules of H two O.

или Two two-atom molecules of hydrogen react with 1 two-atom molecule of oxygen and produce two molecules of water.

 $N_2 + 3H_2 \leftrightarrow 2NH_3$

N two plus three molecules of H two form and are formed from two molecules of NH three

или 1 two-atom molecule of nitrogen plus three two-atom molecules of hydrogen form and are formed from two molecules of ammonia.

 $Na_2CO_3 + CaSO_4 \rightarrow Na_2SO_4 + CaCO_3$

Na two CO three plus CaSO four form Na two SO four plus CaCO three

или The sodium (Na) and the calcium (Ca) switch places. The sodium combines with the sulphate radical (SO₄), forming sodium sulphate (Na₂SO₄) which dissolves in water. The calcium combines with the carbonate radical (CO₃), forming calcium carbonate (CaCO₃). Calcium carbonate does not dissolve in water, and so settles to the bottom of the solution.

Приложение 3



1)1-63 laboratory apparatus (laboratory equipment) – лабораторное оборудование

- 2) Bunsen burner горелка Бунзена
- 3) gas inlet (gas inlet pipe) подвод газа (газовая подводящая труба)

4) air regulator – регулятор подвода воздуха

5) Teclu burner – горелка Теклю

6) pipe union – присоединение газовой трубы

7) gas regulator – регулятор поступления газа

8) stem – трубка горелки

9) air regulator – регулятор поступления воздуха

10) bench torch – настольная горелка

11) oxygen inlet – подвод кислорода

12) hydrogen inlet – подвод водорода

13) oxygen jet – струя кислорода

14) tripod – треножник, тренога

15) ring (retort ring) – кольцо для реторты

16) funnel – воронка

17) pipe clay triangle – трубчатый глиняный треугольник

18) wire gauze – проволочная сетка

19) wire gauze with asbestos centre (Am. center) – проволочная сетка с асбестовым центром

20) beaker – стакан

21) burette (for delivering measured quantities of liquid) – бюретка (для выпуска измеренных объемов жидкости)

- 22) burette stand штатив для бюреток
- 23) burette clamp зажим для бюреток

24) graduated pipette – градуированная пипетка

25) pipette – пипетка

26) measuring cylinder (measuring glass) – мерный цилиндр (измерительный стакан)

27) measuring flask – мерная колба

28) volumetric flask – мерная колба

29) evaporating dish (evaporating basin), made of porcelain – выпарная чашка, выполненная из форфора

30) tube clamp (tube clip, pinchcock) – зажим для трубок

31) clay crucible with lid – глиняный тигель с крышкой

- 32) crucible tongs тигельные щипцы
- 33) clamp струбцина
- 34) test tube пробирка
- 35) test tube rack штатив для пробирок
- 36) flat-bottomed flask плоскодонная колба
- 37) ground glass neck горлышко с притертой стеклянной пробкой

38) long-necked round-bottomed flask – длинногорлая круглодонная колба

39) Erlenmeyer flask (conical flask) – колба Эрленмайера (коническая колба)

40) filter flask – колба для фильтрования под вакуумом

41) fluted filter – гофрированный фильтр

42) one-way tap – одноходовый кран

- 43) calcium chloride tube трубка с хлоридом кальция
- 44) stopper with tap пробка с краном
- 45) cylinder цилиндр
- 46) distillation apparatus (distilling apparatus) перегонный аппарат
- 47) distillation flask (distilling flask) перегонная колба
- 48) condenser конденсатор
- 49) return tap, a two-way tap возвратный кран, двухходовой кран
- 50) distillation flask (distilling flask, Claisen flask) перегонная колба (вакуум-перегонная колба, колба Кляйзена)
- 51) desiccator эксикатор (сушилка)
- 52) lid with fitted tube крышка с вставленной трубкой
- 53) tap кран
- 54) desiccator insert made of porcelain фарфоровый вкладыш в эксикаторе
- 55) three-necked flask трехгорлая колба
- 56) connecting piece (Y-tube) соединительная (Y-образная) трубка
- 57) three-necked bottle трехгорлая склянка
- 58) gas-washing bottle склянка
- 59) gas generator (Kipp's apparatus, Am Kipp generator) генератор газа аппарат Кипа, генератор Кипа)
- 60) overflow container переточный сосуд
- 61) container for the solid сосуд для засыпки реагента
- 62) acid container сосуд для кислоты
- 63) gas outlet трубка для выпуска газа

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Библиографический список:

1. Михельсон, Т.Н., Успенская, Н.В. Практический курс грамматики английского языка. Пособие для понимания научной литературы на английском языке. СПб: Специальная литература, 1995. 255с.

2. Степанова Т.А., Ступина И. Ю. Английский язык для химических специальностей. Практический курс Т. А. Степанова, И. Ю. Ступина М.: Издательство: Академия, 2006. 288с.

3. Longman Exams Dictionary / Summers Della (dir). Pearson Longman. 2006. 1836 p.