

Министерство образования и науки Российской Федерации
Федеральное государственное бюджетное образовательное учреждение
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**УПРАЖНЕНИЯ ПО ГРАММАТИКЕ
АНГЛИЙСКОГО ЯЗЫКА И СПРАВОЧНЫЕ МАТЕРИАЛЫ
для самостоятельной работы студентов
1-2 курса химико-технологических специальностей**

Учебное пособие

Под редакцией Р.В. Кузьминой

Иваново 2017

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Под редакцией Р.В. Кузьминой.

Упражнения по грамматике английского языка и справочные материалы для самостоятельной работы студентов 1-2 курсов химико-технологических специальностей: учеб. пособие / [Р.В. Кузьмина, Е.Е. Орлова]; под ред. Р.В. Кузьминой; Иван. гос. хим.-технол. ун-т. – Иваново: ИГХТУ, 2017. – 84 с.

Учебное пособие предназначено для студентов 1-2 курсов дневного отделения химико-технологического вуза. Его цель – предоставить студентам необходимые сведения для повторения грамматики английского языка и подготовить их к переводу оригинальной технической литературы на основе закрепления навыков перевода трудных и часто встречающихся лексико-грамматических конструкций.

Пособие включает схемы и таблицы для краткого повторения основных грамматических тем, предусмотренных программой обучения на 1-2 курсах (глаголы *to be, to have*, степени сравнения прилагательных, неопределенные местоимения *some, any, no*, система времен действительного и страдательного залогов, модальные глаголы и их эквиваленты, причастия и абсолютный причастный оборот, герундий и герундиальный оборот, инфинитив и инфинитивные конструкции, функции *it, one, that*, условные предложения). После каждой таблицы, схемы или комментария даются упражнения для углубленной проработки грамматических явлений и конструкций, особенно часто встречающихся в технических текстах. В конце пособия предусмотрено несколько дополнительных текстов с заданиями для итогового контроля навыков перевода и понимания прочитанного.

При подборе упражнений, текстов учитывалась лексика, необходимая для дальнейших переводов литературы по химии. Расположенный в конце пособия словарь поможет снять лексические трудности, возникающие у студентов при переводе предложений.

Все предложения и итоговые тексты подобраны из современной оригинальной литературы и отвечают программным требованиям по английскому языку в неязыковом вузе.

Пособие может быть использовано как для аудиторной, так и самостоятельной работы студентов.

Печатается по решению редакционно-издательского совета
Ивановского государственного химико-технологического университета

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1. The Verb “to be”

To be – was / were – been (быть, есть, находиться, являться)

	Indefinite	Continuous	Perfect
Present	(I) am (he, she, it) is (we, you, they) are		have been (he, she, it) has been
Past	(I, he, she, it) was (we, you, they) were		had been
Future	(I, we) shall be (he, she, it, you, they) will be		(I, we) shall have been (he, she, it, you, they) will have been

Образование утвердительного, отрицательного и вопросительного предложений с глаголом “to be”

The Present Simple Tense	The Past Simple Tense
<i>Утвердительная форма</i>	
I am a student.	I was a student.
You are students.	You were a student.
He She is a student.	He She was a student.
We are students.	We were students.
You are students.	You were students.
They are students.	They were students.
<i>Вопросительная форма</i>	
Are you a student? – Yes, I am. / No, I am not.	Was I a student? – Yes, I was. / No, I wasn't.
<i>Отрицательная форма</i>	
I am not a student. etc.	I was not a student. etc.

Exercise 1

Translate the following sentences into Russian, paying attention to the verb "to be":

1. Chemistry is the science of substances and their transformations.
2. The first chemical laboratory was organized in 1806.
3. What are the most important things in chemistry?
4. The use of a water or steam bath is usually very satisfactory.
5. Next year they will be the students of Ivanovo State University of Chemistry and Technology.
6. The results of laboratory research are of great value for the chemical industry.
7. The raw materials are available in great quantities at our plant.
8. This discovery will be of great importance for our future work.
9. Our minor source of salt is water from salt lakes.
10. A great deal of naturally occurring calcium sulfate is in the form of the hydrate.
11. The solutions were in the copper flask.
12. The gas hydrogen is combustible, and non-supporter of combustion.
13. The discovery of steel was one of the important inventions of man, for it gave him one of the hardest materials.
14. An important method of purification is fractional crystallization from a solution.
15. Since iron was so scarce, it was expensive and was used very carefully.
16. The temperature at which a solid becomes a liquid is its melting point and the point at which a liquid becomes a gas is its boiling point.
17. Oxygen is the most common element on the Earth, and about one fifth of the Earth's atmosphere is gaseous oxygen.
18. The Earth's atmosphere was probably similar to that of Venus and Mars when the planets formed.
19. The first ionization energies of the noble gases are very high.
20. In future he'll be a PhD (Doctor of Philosophy) in chemistry.

2. The Verb “to have”

To have – had – had (ИМЕТЬ)

	Indefinite	Continuous	Perfect
Present	(I, we, you, they) have (he, she, it) has	(I) am having (he, she, it) is having (we, you, they) are having	(I, we, you, they) have had (he, she, it) has had
Past	had	(I, he, she, it) was having (we, you, they) were having	had had
Future	(I, we) shall have (he, she, it, you, they) will have	(I, we) shall be having (he, she, it, you, they) will be having	(I, we) shall have had (he, she, it, you, they) will have had

Образование утвердительного, отрицательного и вопросительного предложений с глаголом “to have”

The Present Simple Tense	The Past Simple Tense
<i>Утвердительная форма</i>	
I have a book. У меня есть книга.	I had a book. У меня была книга.
You have a book. У тебя есть книга.	You had a book. У тебя была книга.
She He has a book. It У нее / него есть книга.	She He had a book. It У нее / него была книга.
<i>Вопросительная форма</i>	
Do I have a book? – Yes, I do. / No, I don't.	Did I have a book? – Yes, I did. / No, I didn't.
<i>Отрицательная форма</i>	

I have no book. / I don't have a book.	I had no book. / I didn't have a book.
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Exercise 1

Translate the following sentences into Russian, paying attention to the verb "to have":

1. Most non-ferrous metals have better resistance to corrosion than steel.
2. This mixture has a sweet taste.
3. They made many experiments and then had a rest for an hour.
4. Compounds which have straight chains of carbon atoms are called aliphatic compounds.
5. Yesterday we had an interesting lecture on inorganic chemistry.
6. He has a great number of books on analytical chemistry.
7. Next year they will have practical classes at one of the largest plants of the city.
8. Every atom has the same number of electrons as well as protons.
9. The laboratory of general chemistry has many benches with a number of drawers.
10. This solution has an unpleasant odour, you must open the window.
11. The students of our group will have a difficult experiment in the chemical laboratory tomorrow.
12. Hydrogen peroxide has a lower vapour pressure than water.
13. Every nucleus has a positive electric charge.

3. Active Voice

В английской грамматике глагол имеет 16 времен. В рамках курса грамматики в вузе рассматриваются, главным образом, три группы времен – **Simple**, **Continuous (Progressive)** и **Perfect**.

	Indefinite	Continuous	Perfect
Present	(I, we, you, they) form (he, she, it) forms	(I) am forming (he, she, it) is forming (we, you, they) are forming	(I, we, you, they) have formed / written (V₃) (he, she, it) has formed / written (V₃)
Past	(со всеми местоим.) formed / wrote (V₂)	(I, he, she, it) was forming (we, you, they) were forming	(со всеми местоим.) had formed / written (V₃)
Future	(I, we) shall form (he, she, it, you, they) will form	(I, we) shall be forming (he, she, it, you, they) will be forming	(I, we) shall have formed / written (V₃) (he, she, it, you, they) will have formed / written (V₃)

Образование утвердительного, отрицательного и вопросительного предложений

Tenses	Simple	Continuous (Progressive)	Perfect
Present	P. S + V ₁ (he/she/it + V ₁ -s, -es) N. S + do/does + not + V ₁ . Q. Do/Does + S + V ₁ ?	P. S + am/is/are + V _{ing} . N. S + am/is/are + not + V _{ing} . Q. Am/Is/Are + S + V _{ing} ?	P. S + have/has + V ₃ . N. S + have/has + not + V ₃ . Q. Have/Has + S + V ₃ ?
	<i>Usually, often, always, seldom, sometimes, never, every (day, week, year etc.)</i>	<i>Now, at the moment, at 5 o'clock, from ... till ...</i>	<i>Already, just, ever, never, yet, by, for, since, today, this (week, year)</i>

<p>Past</p>	<p>P. S + V₂</p> <p>N. S + did + not + V₁.</p> <p>Q. Did + S + V₁ ?</p> <p><i>Yesterday, last (week, month, year), in 1945, ago</i></p>	<p>P. S + was/were + V_{ing}.</p> <p>N. S + was/were + not + V_{ing}.</p> <p>Q. Was/Were + S + V_{ing} ?</p> <p><i>At that moment</i></p>	<p>P. S + had + V₃.</p> <p>N. S + had + not + V₃.</p> <p>Q. Had + S + V₃ ?</p>
<p>Future</p>	<p>P. S + shall/will + V₁.</p> <p>N. S + shall/will + not + V₁.</p> <p>Q. Shall/Will + S + V₁ ?</p> <p><i>Tomorrow, next (week, year), in the future, in ... (через ...)</i></p>	<p>P. S + shall/will + be + V_{ing}.</p> <p>N. S + shall/will + not + be + V_{ing}.</p> <p>Q. Shall/Will + S + be + V_{ing} ?</p>	<p>P. S + shall/will + have + V₃.</p> <p>N. S + shall/will + not + have + V₃.</p> <p>Q. Shall/Will + S + have + V₃ ?</p>
<p>Rules of uses</p>	<p>1. Выражает обычное, регулярное действие в настоящем, прошедшем или будущем.</p> <p>2. Констатация факта.</p>	<p>1. Обозначает действие, происходящее в момент речи.</p> <p>2. Обозначает действие, которое происходит одновременно с другим действием.</p>	<p>1. Обозначает действие, завершившееся к моменту речи в настоящем, прошлом или будущем, и есть результат действия.</p>

Условные обозначения в таблице:

P. – Positive Sentence – Утвердительное предложение

N. – Negative Sentence – Отрицательное предложение

Q. – Question – Вопросительное предложение

S – Subject – подлежащее предложения

V₁ – Verb – английский глагол. Индекс указывает на то, что это основа глагола (инфинитив без частицы «to»), которую нужно смотреть в первой графе таблицы неправильных глаголов, а у правильных глаголов нужно взять основу.

V₂ – Глагол в прошедшем времени. Индекс указывает на то, что форму прошедшего времени неправильных глаголов нужно смотреть в таблице, во второй графе, а для правильных глаголов используется форма V+ed.

V₃ – Причастие прошедшего времени (Past Participle / Participle II). Индекс означает, что форму причастия прошедшего времени неправильных глаголов нужно смотреть в третьей графе таблицы неправильных глаголов, а для правильных глаголов используется форма V+ed.

V_{ing} – Причастие настоящего времени (Present Participle / Participle I). Образуется добавлением суффикса **-ing** к основе инфинитива любого глагола.

Exercise 1

Translate the following sentences into Russian, paying attention to the Active Voice Tenses:

1. The element hydrogen occurs free in nature in comparatively small quantities.
2. Practical chemistry includes many special techniques for the isolation and purification of substances.
3. Next week we shall get a new device for measuring the frequency of the sound.
4. In 1903 Henry Becquerel, a French physicist, discovered radioactivity.
5. The gas is evolving. I feel the odour.
6. The students of our group will have written a new chemical report by the end of this week.
7. Bromine unites slowly with hydrogen in sunlight or when heated.

8. They have solved recently many important problems in the field of artificial radioactivity.
9. In 1898 the Curies announced the discovery of chemical elements polonium and radium.
10. The alchemists were trying to transform substances into gold.
11. Biologists have discovered new kinds of microorganisms which produce a number of antibiotics.
12. Next year he will graduate from the University and go to his native town.

Exercise 2

Translate the following sentences into Russian, paying attention to the Active Voice Tenses:

1. Another problem which we had solved by that time was very important and interesting for the researchers.
2. We are heating the mixture now.
3. The discovery of radioactivity by Henry Becquerel in 1896 dispelled the belief that all atoms are permanent.
4. The gas also explodes readily on heating with a hot wire or glass rod.
5. I was carrying out chemical experiments from 3 to 5 o'clock yesterday.
6. Now he works at the Research Institute, but two years ago he worked at the chemical plant.
7. Chemists have discovered how to break down compounds which occur naturally.
8. By 1902 Rutherford had succeeded in establishing a new branch of physics called radioactivity.
9. We study the equipment used to purify various chemicals.
10. Our scientists have already solved many problems of nuclear physics.

4. Degrees of Comparison

<i>Положительная степень</i>	Прилагательное или наречие	Переводится: прилагательным и наречием в положительной степени	Strong – сильный High – высокий Useful – полезный Carefully – осторожно
<i>Сравнительная степень</i> односложные -ER многосложные MORE LESS		прилагательным, наречием с суффиксом -ее более (менее) + прилагательное, наречие	Stronger – сильнее Higher – выше More (less) useful – полезнее More (less) carefully – осторожнее
<i>Превосходная степень</i> односложные -EST многосложные (the) MOST LEAST		прилагательным с суффиксом -ейш(ий), наречием с суффиксом -ее всего (всех) самый / наиболее (наименее)+ прилагательное или наречие; наречием с суффиксом -ее всего (всех)	(the) strongest – самый сильный, сильнейший (the) highest – самый высокий, высочайший the most useful – самый полезный, полезнейший the most carefully – наиболее осторожно, осторожнее всего

Exercise 1

Find the adjectives and state their degrees of comparison:

Oxide, important, stronger, successfully, manufacture, derivative, the most possible, application, possesses, colder, the smallest, obsolete, estimated, more sufficient, indicating, the most special, the purest, more natural.

Exercise 2

Translate the following sentences:

1. Aluminium is as good for transmission lines as copper.
2. He works at his experiment not so much as he must.
3. Sulfuric acid is the most important of all commercial chemicals.
4. More dilute acid is employed for most other purposes.
5. The amount of iron oxide permitted in most colourless glass is less than 0.7%.
6. The experimental error is probably as large as ten per cent.
7. The more we evaporate brine, the more crystals of sodium chloride we obtain from it.
8. Substances burn more rapidly in oxygen than they do it in air.
9. The more air is present, the more complete will be the equilibrium.
10. The higher is the temperature, the less is the solubility of the gas.
11. The voltage of the battery varies from about 90 volts for small receiving tubes to as much as 100 volts for large transmitting tubes.

Exercise 3

Translate the following sentences:

1. The most important oxides of nitrogen are nitric oxide (NO), and nitrogen dioxide (NO₂).
2. Practically all nitric oxide now is made by the oxidation of ammonia.
3. Less than 3% of the total energy employed is taken up in the reaction.
4. The reaction mixture must be cooled as quickly as possible after it passes through the electric arc.
5. This process required a great deal of electrical energy and is now entirely obsolete.

6. Above 2.300°C the time required to reach equilibrium is very short.

5. Indefinite Pronouns *some, any, no*

Тип предложения	Местоимение	Исчисляемые существительные		Неисчисляемые существительные
		Ед. число	Мн. число	
Утвердительные	some	некоторая какая-то	несколько	не переводится
		some book	some books	some acid
	any	любая	любые	любая
		any book	any books	any acid
Вопросительные	any	какая-нибудь	какие-нибудь	сколько-нибудь
		any book	any books	any acid
Отрицательные	any	никакой	никакие	нисколько
		any book	any books	any acid
	no	никакой	никакие	нисколько
		no book	no books	no acid

Derivatives of *some, any, no*

some	-body, -one	-thing	-where
	кто-нибудь	что-нибудь	где (куда)-нибудь
	somebody, someone	something	somewhere
any	кто-нибудь	что-нибудь	где (куда)-нибудь
	anybody, anyone	anything	anywhere
no	никто	ничто	нигде, никуда
	nobody, no one (none)	nothing	nowhere

Exercise 1

*Translate the following sentences, paying attention to **some**, **any**, **no**:*

1. Because of the high concentration of ammonia no attempt was made to determine pH values.
2. This method eliminates any considerable change of temperature during the whole titration.
3. When employing dilute solution no precipitates are formed.
4. Any organic matter in the sample must be removed.
5. Helium belongs to the same category as argon since it combines with no other elements.
6. Any of the usual methods may be employed for comparison.
7. Thus triphenylmethyl radicals and iodine atoms show no tendency to attack hydrocarbon solvents at normal temperatures.
8. No interaction was found between the corresponding aquacations.
9. No preliminary treatment of the sample was employed in this method.
10. In any case where a definite potential difference is to be established at the electrode there must be two species in the system.
11. No appreciable change had taken place in a control tube even after half an hour.
12. No stable potential could be measured under such a circumstance.
13. In this ordinary case no preliminary separations are necessary, and the arsenic is reduced as described above.
14. The use of cement in this connection has already been discussed to some extent.
15. All the particles from any given radioactive substance have a definite velocity.
16. Some measurements were made to select phosphorus of various resistances for these tests.
17. Only a small proportion of an X-ray beam will be reflected from any given plane of atoms in the crystal.

18. The infrared spectrum showed no carbonyl adsorption.
19. No attempt was made to isolate any of the latter materials.
20. The formula is not limited to electrons, but can be applied to any body of the appropriate mass.
21. No evidence of the formation of such compounds has ever been found by us.
22. No accurate quantitative data as to the relative amounts of the substances present in the mixture were obtained.

Exercise 2

What would you say in the following situations?

Examples: You walk into the shop, but there is nobody there.

You wait a minute or two then you shout: "Hallo! Is...?"

Answer: Is **anyone** there?

Use compounds of "any", "some" or "no".

1. You are busy with your homework when the telephone rings. The other members of your family are in the living-room, but nobody goes to answer the telephone. You shout: "Can...?"
2. Your teacher asks you a question and neither you nor the others in the class can answer it. Your teacher is surprised and asks: "Can't ...?"
3. You have lost your English book, so you ask the other students in your class: "Has...?"
4. After classes your friends want to go for a picnic. They ask you where you would like to go, but you don't mind where. You say: "We can..."
5. Your bike has a flat tyre. Some friends come cycling by. You stop them and ask: "Could...?"
6. You are going to work in the laboratory after classes. You are not sure whether one of your friends will join you, so you will ask: "Will ... join me in the laboratory to finish our experiment?"

6. Passive Voice

Be + Participle II (Past Participle) (в соответств. времени, лице, числе)
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	Indefinite	Continuous	Perfect
present	am built is built are built строят (обычно, всегда, каждый день)	am being built is being built are being built строится (сейчас); строят (сейчас)	have been built has been built построен в этом году (результат); построили уже
past	was built were built построили (вчера, в прошлом году, 3 года назад)	was being built were being built строили (когда я приехал); строился	had been built был построен (прежде, чем я приехал); построили
future	shall be built will be built будет построен (завтра, в будущем году)		will have been built будет построен (к январю)

Compare:

ЗАЛОГ	подлежащее	сказуемое	дополнение	обстоятельство
действительный залог	The Curies	discovered	radium	in 1838
страдательный залог	Radium	was discovered	by the Curies	in 1838

Способы перевода пассивного сказуемого:

Сказуемое в страдательном залоге можно переводить на русский язык тремя способами:

1. Глаголом, оканчивающимся на -сь, -ся.
2. Глаголом «быть» в сочетании с краткой формой причастия страдательного залога (глагол «быть» в настоящем времени в русском языке не употребляется).
3. Глаголом в действительном залоге в 3-м лице множественного числа в составе неопределенно-личного предложения.

The resistance of the current is measured.	Сопротивление тока измеряется.
	Сопротивление тока измерено.
	Сопротивление тока измеряют.

Exercise 1

Translate into Russian, paying attention to the Passive Voice:

1. It is known that potassium permanganate and stannous chloride will react in acid solution.
2. His statement may be referred to as the opinion of a specialist.
3. This surface reaction is largely affected by the presence of protective colloids.
4. When it has been done compression is followed by liquefaction.
5. Copper is not affected by the pure acid; it is, however, attacked by the aqueous solution.
6. They were permitted to use the reference-book in their work.

7. It is recommended to use sulfuric acid in the preparation of carbon dioxide.
8. At all temperatures there was an initial rapid rate of oxidation, which was followed by an approximately constant rate of film growth.
9. The modification or the initiation of a reaction by a catalyst is referred to as positive catalysis when the reaction velocity is accelerated.
10. The catalytic action of iron in the formation of methane from carbon monoxide and hydrogen has been accounted for by assuming the formation of iron carbonyl.
11. The methane reaction occurs with a decrease in volume of 2 to 1, and is favourably affected by pressure.
12. Calculation of R for the reduction of mercuric oxide by methane to give methanol is favoured and less affected by temperature.
13. In all cases, the course of the oxidation was followed by exact gas analyses.
14. A great deal of titrations can be followed by potentiometric measurements.
15. A secondary amine yields an insoluble compound, which is unaffected by acid.
16. Phenols are often identified through bromination products and certain esters and ethers.
17. Throughout this book these quantities will be referred to as partial mole fractions.
18. The same is true for the case in which methane is acted on with steam or oxygen, where carbon dioxide and water are formed together with carbon monoxide and hydrogen.
19. Many of the investigations, particularly the earlier ones, were carried out by simply heating mixtures of air or oxygen and the hydrocarbons.
20. The excitation of the electrons of both the metal ion and the ligand is influenced by their interaction.
21. It must be taken into account that the potential is also influenced by the concentration of the amalgam.

22. Katzin and Gerbert have criticized these studies and attributed the changes in the absorption of light to the interaction between the metal ion and the counter-ion, which is influenced by the water content of the solvent.
23. The reductions with zinc are followed by titration with permanganate, whereby acetanilide is reduced and then reoxidized.
24. The fusion and extractions are preliminary steps, which may be followed by analyses of the residue and of the water extract by appropriate procedures.
25. Removing small quantities of the acid for test may be followed by the course of the separation.
26. The extent of evaporation is affected not only by geometric factors but also by two other phenomena: torpidity and thermal hazard.
27. Torpidity occurs primarily when distillation is effected from pot stills.
28. Chemical operations are carried out prior to molecular distillation.
29. Naturally the occurrence of foaming is also influenced by the properties of the material (viscosity, partial pressure, density).
30. Raw materials are directly subjected to molecular distillation.

7. Modal Verbs

<i>modal verbs</i>	<i>present</i>	<i>past</i>	<i>future</i>	<i>meaning</i>
can be able to	<i>can am/is/are able to</i>	<i>could was/were able to</i>	<i>----- will be able to</i>	<i>Физическая возможность (могу, умею)</i>
may be allowed to	<i>may am/is/are allowed to</i>	<i>might was/were allowed to</i>	<i>---- will be allowed to</i>	<i>Моральная возможность (могу, разрешаю)</i>
must have to ought to be to should	<i>must have/has to ought to am/is/are to should</i>	<i>----- had to ----- was/were to -----</i>	<i>----- will have to ----- ----- -----</i>	<i>Долженствование (должен, обязан)</i>

Образование страдательного залога с модальными глаголами

Пассивная форма с модальными глаголами образуется из модального глагола и инфинитива страдательного залога смыслового глагола, т.е. **модальный глагол + be + Past Participle** (Participle II). Модальный глагол ставится в соответствующем времени.

Liquid oxygen can be frozen to a bluish white solid. Жидкий кислород можно заморозить в голубовато-белое твердое вещество.

Exercise 1

Translate into Russian:

1. Pyrite may be burned with the raw material in the form of lumps.

2. Sulfuric acid is able to dissolve sulfur trioxide up to very high concentrations.
3. Pure nitrogen can be made by decomposition of nitrides.
4. The liquid was allowed to evaporate and went back into the pipe-lines.
5. Helium could be separated safely by liquefaction from the air.
6. The reaction mixture must be cooled as quickly as possible after it passes through the electric arc.
7. Zinc sulfide roasting requires careful control, since that compound had to be completely broken up for further treatment.
8. By reflecting light most crude oil has a greenish cast, which should not be confused with the blue fluorescence of some heavy petroleum distillates.
9. Since starch is to be broken down to sugars, ethyl alcohol may be regarded as a sugar product.
10. Such materials should not be confused with the silicate coatings fused on the surface of metals.

Exercise 2

Translate into Russian:

1. We are to study the equipment used to purify various chemicals.
2. We are asking the instructor to explain the general principles of purification.
3. We are asked by the instructor to explain this phenomenon.
4. Some good practical knowledge of chemistry is of great importance for the people working at this plant.
5. The results of laboratory research are of great value for our country.
6. It is necessary to make accurate measurements of the temperatures and pressures at the different stages of the process.

7. A new plant for producing fertilizers is now being designed. It is to be set up in the area where the raw materials are available in great quantities.
8. This discovery was of great importance for the future work.
9. One minor source of salt is water from salt lakes.
10. The method now most generally employed for making sodium carbonate was developed in 1863.
11. Salt is thus available in unlimited amounts.
12. A great deal of naturally occurring calcium sulfate is in the form of the hydrate.
13. The usual method of avoiding such an error is to remove iron by precipitation with ammonia.
14. The object of this reaction is to recover nitrogen peroxide.
15. It is to be expected, that the primary particles formed will be of colloidal dimensions.
16. Were you at home last night?
17. The solutions were in a copper flask.

8. Participles

Форма причастия	Залог		Примечание
	действительный Active	страдательный Passive	
Participle I = Present Participle	V-ing Heating <i>(нагревающий- ся), нагревая</i> Making	being V-ed/ V₃ Being heated <i>(нагреваемый, будучи нагретым)</i> Being made	Выражает действие одновременно с действием, выраженным глаголом-сказуемым.
Participle II = Past Participle		V-ed / V₃ Heated <i>(нагретый, нагреваемый)</i> Made	

Perfect Participle	having V-ed / V₃ Having heated (нагрев)	having been V-ed / V₃ Having been heated (после того, как нагрели)	Выражает действие, предшествующее действию глагола-сказуемого, указывает на завершенность действия.
	Having made	Having been made	

Функции причастия

Функции	Примеры	Перевод
<i>Participle I = Present Participle</i>		
1. Часть сказуемого	He <u>is warming</u> up this solution.	Он <u>подогревает</u> этот раствор.
2. Определение	a) Any <u>vibrating</u> object produces a sound. b) The compound <u>being treated</u> for several hours turned dark red.	Любой <u>колеблющийся</u> предмет производит звуки. Вещество, <u>обрабатываемое</u> в течение нескольких часов, стало темно-красным.
3. Обстоятельство (часто с союзами <i>when</i> или <i>while</i>)	a) (While) <u>making</u> the experiment, he broke some glassware. b) <u>Being started</u> last month, the calculations will be completed before the beginning of the test.	<u>Проводя</u> опыт, он разбил посуду. <u>Поскольку расчеты были начаты</u> в прошлом месяце, они будут закончены до начала испытаний.
<i>Participle II = Past Participle</i>		
1. Часть сказуемого	Heat <u>was transformed</u> into work.	Тепло <u>преобразовалось</u> в работу.
2. Определение	Atoms are composed of a positively <u>charged</u> central core, or nucleus, and electrons.	Атомы состоят из положительно <u>заряженной</u> сердцевины, или ядра, и электронов.
3. Обстоятельство	(When) <u>asked</u> to make	Когда его <u>попросили</u>

ство (часто с союзами <i>while</i> , <i>when</i> , <i>if</i> , <i>unless</i>)	the experiment, he refused. <u>While</u> used, precision instruments require very delicate handling.	провести опыт, он отказался. Точные приборы <u>при</u> <u>пользовании ими</u> тре- буют очень осторож- ного обращения.
<i>Perfect Participle</i>		
Обстоятель- ство	<u>Having considered</u> the matter, we arrived at a definite decision.	<u>Рассмотрев</u> вопрос, мы пришли к определен- ному решению.

Absolute Participial Construction

В научно-технической литературе часто встречаются причастные обороты, имеющие свое самостоятельное подлежащее, не зависящее от подлежащего главного предложения.

Структура

существительное в общем падеже или местоимение в именительном падеже	+ причастие + (...), ...
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Acids reacting with oxides of all the metals, a salt and water are formed.

В первой части предложения до запятой причастие **reacting** имеет подлежащее **acids**. После запятой сказуемое **are formed** имеет подлежащее **a salt and water**. Такой причастный оборот называют независимым причастным оборотом.

Формальные признаки такого оборота:

1. Перед причастием стоит существительное в общем падеже или местоимение в именительном падеже.
2. Независимый причастный оборот отделен запятой от основного предложения, в котором имеется свое подлежащее и сказуемое.

3. В независимом причастном обороте нет личной формы глагола. На русский язык этот оборот переводится целым предложением, где причастие переводится сказуемым, согласованным со своим подлежащим.

Если независимый причастный оборот стоит в начале предложения, то переводится обстоятельством придаточным предложением с союзами **«так как; когда; в виду того что; если»** – в зависимости от контекста.

The mixture having been cooled, some alcohol was added into it. Когда смесь охладил, в нее добавили спирт.

Если оборот стоит в конце предложения и между действиями, выраженными причастием и сказуемым нет причинной связи, то независимый причастный оборот переводится самостоятельным предложением с союзами **«а; и; но; причем»**.

This substance is decomposed by heat, **nitric oxide being evolved**. Это вещество разлагается при нагревании, причем выделяется окись азота.

Exercise 1

Translate into Russian, paying attention to the Participles:

1. The liquid remaining in the flask contains only a very small proportion of water.
2. The liquid decomposes rapidly when heated at ordinary atmospheric pressure.
3. When exposed to the atmosphere, boron trioxide absorbs moisture with which it combines.
4. Having cooled the solution we poured it into the flask.

5. Being heated magnetized steel loses its magnetism.
6. Having made a great number of experiments with different substances, the chemists found that most of them could be decomposed into other substances.
7. Having been tested the new apparatus was recommended for work in all the laboratories.
8. Gases are composed of a number of molecular particles moving at tremendous speed.
9. The heat required to start the reaction does not account for the amount of heat developed during the reaction.
10. Since a salt is generally less soluble in an acid having the same anion, the dissolving of cuprous chloride in hydrochloric acid requires a special explanation.
11. When treating cold aqueous solution of sodium peroxide with dilute and cold hydrochloric acid, a solution of hydrogen peroxide mixed with sodium chloride is obtained.
12. It is a familiar fact of observation that gases and vapours, if cooled sufficiently and subjected to sufficiently high pressures, condense into liquids.
13. A floating body displaces some water.
14. The atom contains a number of electrons revolving around the nucleus.
15. The test being carried out is of great significance.
16. Being placed in the open air iron rusts and deteriorates.
17. When speaking of water, we must remember that it is composed of only tiny particles – its molecules.
18. Being taken in proper proportion hydrogen and oxygen combine forming water.
19. The described method is widely used in electroplating.
20. When heated mercuric oxide decomposes rather rapidly.

Exercise 2

Translate into Russian, paying attention to the Participles:

1. The experiment followed by a lecture was carried out by our professor's assistant.

2. The method followed by us was accurate.
3. The data referred to in this paper are quite reliable.
4. The common feature of acids is the acidic hydrogen already referred to.
5. When a particle is moving along a plane curve, acted on by a force in that plane, the force may be thought of as broken into two compounds, one along the tangent, the other along the normal.
6. Since ozone is more active than oxygen it reacts with some substances not affected by oxygen at ordinary temperature.
7. Mercury is used in barometers, having a great specific gravity.
8. Reacting with a base an acid gives rise to a salt and water.
9. Having replaced the fuses I switched on the current.
10. Having been measured with unreliable instruments the data were incorrect.
11. Having been warmed to 0°C ice began to melt.
12. If heated to redness and plunged into cold water, steel becomes as hard as glass.
13. A piece of ice will melt if thrown into water.

Exercise 3

Translate into Russian, paying attention to the Absolute Participial Construction:

1. It is probable, however, that the substitution takes place, the resulting trihalogen compound combining with another molecule of ammonia.
2. Aluminium dissolves slowly in cold dilute hydrochloric acid, and rapidly in hot, the concentrated acid giving an aqueous solution of aluminium chloride and hydrogen gas.
3. The mixture is poured into ice-water, care being taken that no rise in temperature takes place when the intermediate product separates in dark violet flocks.

4. It is found that the solubility of a substance determined changes with temperature, a rise in temperature usually causing an increase in solubility.
5. Equilibrium having been established, equal volumes of two solids were completely coagulated by the addition of equal amounts of solid barium chloride.
6. A portion of this powder having been heated in a test tube, we obtained quite a new substance, iron sulfide.
7. Iron being treated with hydrochloric acid, we see that it goes into solution.
8. Both diamond and graphite being a pure form of a carbon, the former is the hardest substance known and latter is a very soft one.
9. The corresponding amide and anilide also crystallize in monosymmetric prisms, the former melting at 252°C , the latter at 241°C .
10. The concentrated solution of hydrogen peroxide obtained by evaporation at ordinary pressure is placed in the flask and heated to $30\text{-}40^{\circ}\text{C}$, the pressure being reduced to 15 mm.
11. These solutions vary in their colour, brown, white, blue, red and yellow being well known.
12. Chlorine substitution takes place, the four hydrogen atoms being replaced.
13. When steel is dissolved in nitric acid, a brown-coloured solution is obtained, the intensity of colour being proportional to the amount of carbon present.
14. The compressibility of the kerosene being known, the compressibility of the gas could be calculated.
15. This material being unsuitable on account of its brittle nature, they could not use it for these articles.
16. Castings of considerable strength being required, cast steel is used to replace cast-iron.
17. Chromium having been added, strength and hardness of the steel increased.
18. The mixture having been cooled, some alcohol was added into it.

19. Atomic radiation being harmful to living organisms, concrete walls six or seven feet thick must surround the reactor.
20. This equivalent number is not always the same, but is dependent on velocity of vapour and liquid in the column and the rate of diffusion of the components, these variables being affected in their turn by the temperature and pressure.
21. The solution being allowed to evaporate, the sulphur will again be deposited in the form of yellow crystals.

9. Gerund

	Active	Passive	Примечание
Indefinite	heating reading	being heated being read	одновременность с действием глагола-сказуемого
Perfect	having heated having read	having been heated having been read	предшествование действию глагола-сказуемого

В зависимости от функции в предложении герундий можно переводить на русский язык:

- а) именем существительным,
- б) инфинитивом,
- в) деепричастием,
- г) придаточным предложением с союзами: то, что; тем, что; о том, что; с тем, чтобы и т.д.

Рекомендуется во всех случаях сначала мысленно перевести герундий как существительное, тогда смысл слова станет ясным. Затем, если по-русски такое существительное не употребляется и не звучит, следует перевести его формой, подходящей по смыслу.

E.g. He spoke of studying small structures with the help of a microscope.

To study – изучать, т.е. studying – изучение.

Он говорил об изучении небольших структур с помощью микроскопа.

Функции герундия

Функции	Пример	Перевод
1. Подлежащее	<u>Reading</u> will help us to learn the language.	<u>Чтение</u> поможет нам изучить язык.
2. Именная часть сказуемого	Her favourite occupation is <u>reading</u> .	Его любимое занятие – <u>чтение</u> .
3. Часть сложного глагольного сказуемого	We began <u>reading</u> a new book.	Мы начали <u>читать</u> новую книгу.
4. Прямое дополнение	She likes <u>reading</u> English books.	Она любит <u>читать</u> английские книги.
5. Предложное дополнение	I didn't know <u>about her reading</u> English books.	Я не знал <u>о том, что она читает</u> английские книги.
6. Предложное определение	She never missed an opportunity <u>of reading</u> a new book.	Она никогда не упускала возможности <u>почитать</u> новую книгу.
7. Определение в составе сложного слова	There are two <u>reading-</u> rooms in our University.	В нашем университете два <u>читальных</u> зала.
8. Обстоятельство (всегда с предлогом)	We cannot speak about the author <u>without reading</u> his books.	Мы не можем говорить об авторе, <u>не читая</u> его книг.

Gerund Construction

<p>существительное в притяжат. падеже ПРЕДЛОГ + существительное в общем падеже + GERUND притяжательное местоимение</p>
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Exercise 1

Translate the sentences into Russian, paying attention to the Gerund:

1. Compressing a gas is, in fact, reducing the empty space of which it chiefly consists.
2. After being formed into shape, rubber sheets are vulcanized by applying heat and pressure, or heat only.
3. The teacher was against your being given this article to translate.
4. Friction between two bodies is called static friction if slipping does not occur.
5. This process of splitting up a single force into two or more parts is known as the resolution of forces.
6. The students did not know of this specimen having been measured before.
7. Rising the output, we must not forget the task of rising the quality at the same time.
8. Although the primary purpose in using accelerators was to shorten the time required for curing, they are now employed for the threefold purpose of shorting the time, improving the mechanical properties, and losing the tendency to deteriorate with age.
9. We were told of some samples containing traces of ozone.
10. It should be noted that under natural conditions the amount of mercury in the atmosphere is so small that extremely sensitive methods are required for detecting and measuring it.
11. We know of Mendelejev's having predicted the existence of elements unknown at his time.
12. By placing chlorine in the certain position, a polar polystyrene can be prepared.
13. Heating the polymer of methylvinylketene leads to a loss of water.
14. This solution, which is usually referred to as viscose, after being allowed to stand and partially decompose, is fabricated into threads or films.

15. We were informed of surface active materials having been examined.
16. Increasing the chain length of a given product will decrease the solubility and increase the melting or softening point.
17. Owing to cadmium salts added to the investigated solution, the rate of reaction is decreased.
18. Cooling the benzene solution precipitated unreacted glycol.
19. We know of ethylene being usually prepared by the action of concentrated sulphuric acid on alcohol.
20. He told me of having measured the strength of the bonds existing between the atoms of the metal.
21. Casehardening is hardening the surface of metal.
22. We know of the electric furnace being an ideal melting and refining unit for the steel industry.
23. Normalizing is uniform heating above the usual hardening temperatures followed by cooling freely in air.
24. In spite of its having been compressed, the gas returns to its original volume as soon as applied force is removed.
25. The problem of using thermonuclear reactions for the production of power is being studied by scientists.

10. Revision of Ing- forms

Exercise 1

Translate the sentences into Russian, identifying the ing- forms:

1. The molecules of gas are moving freely.
2. The energy of a body is its capacity for doing work.
3. Knowing the volume, the pressure, and the temperature of the gas, we can determine the states of its mass.
4. He is interested in collecting rare minerals.
5. Being taken in proper proportion hydrogen and oxygen combine forming water.
6. We know of wood having been used as structural material in prehistoric times.

7. The forces acting between atoms within a molecule are very strong.
8. A body may be at rest without being in equilibrium.
9. When speaking of water, we must remember that it is composed of tiny particles – its molecules.
10. Their doing it at once is absolutely imperative.
11. Having added an alkaline solution, we got a dark precipitate at the bottom of the vessel.
12. At the continued heating of a solid body the movement of its molecules becomes still faster.
13. Having been evaporated, the solution of the mother liquid of calcium chloride gave white precipitate.
14. Chromium having been added, strength and hardness of the steel increased.
15. When testing the properties of the gas evolved while heating mercuric oxide, we find that it is pure oxygen.
16. The article deals with microwaves, particular attention being paid to radio location.
17. Being heated magnetized steel loses its magnetism.
18. Induction is a method of charging a conductor from a charged object which does not require bringing the two into contact.
19. Warming water in a glass, we see that water gives off bubbles of air dissolved in it.
20. He began telling them about his experiments.

11. Infinitive

	Active	Passive	Примечание
Indefinite	to ask	to be asked	Выражает или действие вообще или действие, одновременное с действием гл.-сказуемого
Continuous	to be asking		Выражает действие, которое продолжается одновременно с действием гл.-сказуемого

Perfect	to have asked	to have been asked	Выражает действие, которое произошло ранее действия гл.-сказуемого
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Функции инфинитива

<i>Функции</i>	<i>Примеры</i>	<i>Перевод</i>
1.Подлежащее	a) <u>To evaporate</u> this solution was very difficult. b) It was necessary <u>to evaporate</u> this solution.	Выпарить этот раствор было очень трудно. Необходимо было выпарить этот раствор.
2.Именная часть сказуемого	Our task was <u>to evaporate</u> this solution.	Наша задача состояла в том, чтобы выпарить этот раствор.
3.Часть сложного глагольного сказуемого	a) You will have <u>to evaporate</u> this solution. b) They began <u>to evaporate</u> this solution.	Вы должны будете выпарить этот раствор. Они начали выпаривать этот раствор.
4.Дополнение	They helped us <u>to evaporate</u> this solution.	Они помогли нам выпарить этот раствор.
5.Определение	a) The solution <u>to be evaporated</u> was poured into a flask. b) Our wish <u>to evaporate</u> this solution was obtainable. c) This mixture is the first <u>to evaporate</u> . d) He spoke about the rate <u>to evaporate</u> this solution.	Раствор, который нужно выпарить, был вылит в колбу. Наше желание выпарить этот раствор было достижимо. Эта смесь испаряется первой. Он говорил о скорости испарения этого раствора.
6.Обстоятельство цели	In order to evaporate this solution we must heat it on a burner.	Чтобы выпарить этот раствор, мы должны нагреть его на горелке.
7. Обстоятельство следствия	The amount of heat was enough to evaporate this solution.	Количество тепла было достаточное, чтобы выпарить этот раствор.

Nominative with the Infinitive

(Именительный падеж с инфинитивом)

Личное местоимение в именительном падеже	+ сказуемое в + Infinitive пассивной (или активной) форме
Существительное в общем падеже	

Оборот «Именительный падеж с инфинитивом» переводится на русский язык дополнительным придаточным предложением с союзом «что», «чтобы», где подлежащим будет слово в именительном падеже, а сказуемым – инфинитив, переведенный как личная форма глагола.

Перевод же всего предложения следует начинать со сказуемого, которое переводится неопределенно-личным оборотом типа: «**говорят, считают, известно**», а затем уже идет придаточное предложение (дополнительное).

Предложение с данной конструкцией можно перевести на русский язык и простым предложением с неопределенно-личным оборотом в роли вводного предложения: «как известно», «как полагают», «как считают», «по-видимому».

<p><u>The elements are known to</u> <u>consist of atoms.</u></p>	<p>Известно, что элементы состоят из атомов. Элементы, как известно, состоят из атомов.</p>
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Objective with the Infinitive

(Объектный падеж с инфинитивом)

Личное местоимение в объектном падеже <i>(me, us, you, him, her, it, them)</i> или существительное в общем падеже	+ Infinitive
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На русский язык этот оборот переводится дополнительным придаточным предложением с союзами

«что, чтобы», в котором существительное или местоимение в объектном падеже переводится подлежащим, а инфинитив – сказуемым.

I expected you to heat this liquid. Я ожидал, что вы нагреете эту жидкость.

После глаголов, выражающих восприятие посредством органов чувств, частица «to» перед инфинитивом в этом обороте опускается.

I saw the dean enter the classroom. Я видел, что декан вошел в аудиторию.

Exercise 1

Translate the sentences into Russian, identifying the infinitives and their functions:

1. To measure atmospheric pressure is often very important.
2. To recognize a substance, it is not necessary to examine all its properties.
3. These solutions, which have to be heated, are prepared the day before.
4. The object is to recover the nitrogen peroxide produced by the decomposition of nitric acid.
5. Sodium amalgam is allowed to act on bromobenzene in benzene solution.
6. The mixture is treated with salt to obtain the dye.
7. The forms to be artificially imparted to matter will not be its properties.
8. Our desire to promote this reaction was obtainable.
9. He wished to be shown this experiment.
10. He remembered to have heard about new experiments with isotopes.
11. Gases differ in density, colour, combustibility, capacity to support combustion, and action on lime water.

12. It is sufficient to examine only a few properties in order to identify the material.
13. The magnetic method is used to separate minerals such as tinstone.
14. The name mass is therefore used to indicate to the property of the body to resist the action of forces tending to set it in motion.
15. In order to test the truth of Lavoisier's statement, it is obvious that the chemical reaction, as it is usually called, must be carried out in a closed space.
16. This process was to be brought about by a special substance.
17. In order to examine the nature of the dew, Cavendish performed an experiment similar to the following one.
18. The simplest molecules to satisfy these conditions are these of the homologous series of benzene, naphthalene.
19. Another interesting conclusion to be drawn from the above table is that the hypothesis is a true one.
20. The reagent was distributed on pieces of broken glass to expose a large surface.
21. The liquid to be purified should be kept in a well cleaned bottle.
22. Crooks was the first to recognize the cathode rays as negatively charged particles.
23. The copper was allowed to cool in the bulb in a stream of hydrogen.
24. Chlorides can be made by methods to be described later.
25. Heat the mixture to be distilled in the flask to gentle boiling with a very small flame.
26. It is necessary to determine whether or not an organic substance or an organic compound is contained in any sample to be analyzed.
27. If larger quantities of liquid are to be distilled, it is more convenient to use a Liebig's condenser.
28. The water used in the experiment must have been boiled to remove dissolved air, and cooled in a corked flask.

29. The function of the applied e. m. f. will be to direct the ions towards the appropriate electrode.
30. The object of these experiments was to find the connection between these secondary electrons and the primary beta rays.

Exercise 2

Translate the sentences into Russian, paying attention to the Nominative with the Infinitive Construction:

1. This compound was found to give an acid on oxidation.
2. The electrons are assumed to move in wide orbits round the positive nucleus.
3. It is quite permissible to add a moderate excess of barium chloride to reduce the solubility of the barium sulphate.
4. Cupric iodine appears to be unstable at ordinary temperature.
5. The cuprous compound seems to be formed in a similar way.
6. The vessel containing this mass must also be externally cooled to prevent overheating.
7. This substance proved to be a new element of the argon family, to which the name "neon" was given.
8. The automatic burette described here has been found to be very satisfactory and a great time saver in our control laboratories.
9. Such solids are said to be amorphous as distinguished from crystalline ones.
10. These solutions under the ultramicroscope, exhibit particles, which have been shown to be about 5 mm in diameter.
11. Material changes are found to be divisible into two large but not sharply defined classes.
12. The mass of a body is supposed to be an unalterable property of the body itself.
13. A red precipitate of mercury iodine is formed, but the weight will be found to be unchanged.
14. The name "Chemistry" occurs later, and is supposed to be derived from the word "chemi", meaning "block" or "burnt".

15. Modern chemistry may be said to have begun with Robert Boyle.
16. Oxygen seems to be the most abundant element.
17. The metals except gold and silver were found to change when heated in open crucibles.
18. The temperature is assumed to be maintained constant.
19. The mechanical mixture of ice and solid was supposed to be a compound and called a cryohydrate.
20. The vapour pressure proves to be slightly diminished.
21. This rule appears to have been connected with Newton's theory of the repulsion of atoms.
22. The volume of a gas proved to have contracted slightly.
23. Soft waters more than hard are likely to attack iron.
24. The nature of a neutron is unlikely to change.
25. The hydrogen therefore does not appear to be homogeneously distributed throughout the metal.
26. The effect is negative at room temperature for any pressure that is likely to be employed.
27. Positive electricity always appears to be associated with the atoms of matter.
28. This difference between positive and negative electricity seems to be fundamental.
29. Townsend found the number of ions produced by an electron moving in an electric field to be small.
30. In 1783 he decided to make the experiment of burning hydrogen in oxygen.
31. This was weighed after evacuation in order to remove the air.

Exercise 3

Translate the sentences into Russian, paying attention to the Objective with the Infinitive Construction:

1. They found the heat of reaction to be -21.4 k/cal./mole.
2. At the time of Cavendish people thought water to be an element.
3. Force must have been applied to generate acceleration.

4. To apply force to the particle, it has been necessary to change the pressure exerted on it.
5. We see substances possess different properties and forms characterizing them.
6. Loss of the material to be weighed may not only occur during precipitation, but may arise through the use of unsuitable temperature for ignition.
7. One such particle contains about 10 molecules, but is too small to settle out on standing.
8. He considered all materials to be derived from water.
9. We may assume the composition of the sun and stars to be similar to that of the earth.
10. Before collecting the hydrogen care must be taken to allow all the air to be displaced from the apparatus.
11. Scientists do not consider this effect to be an experimental error of any kind.
12. He found this ratio to have about the same large value as for cathode rays.
13. We expect the method to add a new domain to the technology of crystalline conductivity determination.
14. We knew pressure to be required for forcing water through a pipe.
15. If we assumed chlorine to be univalent in all its oxygen compounds, the latter would have the following formulae.
16. This reaction suggests the substance to be similar to chlorine.
17. The accuracy attained in these experiments is not sufficient to give the exact figure for the combining volumes of the gases.

12. Revision of Infinitives

Exercise 1

Translate the sentences into Russian, identifying the infinitives:

1. The glow will continue to spread through the entire content of the test tube and give off a great deal of heat.

2. The early methods of ore reduction to produce iron intermingled with particles of slag persisted for a very long period of time.
3. Many devices to measure different properties of substances are used in our laboratories.
4. This liquid was the first to be distilled.
5. Mendeleev even described some of the elements to be discovered in the nearest time.
6. Students know the plasticity at elevated temperature to be a natural property of glass.
7. One can watch the components of a mixture retain their properties.
8. They consider mixtures to be substances whose components are mostly distinguishable without great difficulty.
9. You will have to heat sulphates which will yield metallic oxides and sulphur dioxide.
10. This solution is believed to contain a certain amount of hydrochloric acid.
11. At a certain temperature the contents of the kettle again appear to be boiling.
12. To evaporate this solution was very difficult.
13. Some scientists assume the more easily meltable metal to have been used by man first.
14. Subhalides prove to be mixtures of the normal compound with the excess of the metal.
15. A mixture is assumed to contain no less than two ingredients.
16. The existence of different varieties of liquids may be appreciated by examining some specimens.
17. He was able to collect over mercury many gases which are very soluble in water.
18. On account of his attempts to find the cases of the acidity of the water, Cavendish delayed publication until 1784.

13. Functions of “It”

	<i>Функция, перевод</i>	<i>Примеры</i>
Указательное местоимение	Переводится словом «это».	<i>It is methane.</i> – Это метан.
Личное местоимение	Переводится «он, она, оно» в зависимости от рода неодушевленного существительного в русском языке в качестве подлежащего в предложении.	<i>Aluminium is a metal.</i> <i>It is light.</i> Алюминий – металл. Он легкий.
	Переводится «его, ее, ему, ей» в зависимости от рода неодушевленного существительного в русском языке в качестве дополнения в предложении.	<i>Chemistry is a very interesting subject.</i> <i>We study it.</i> Химия – очень интересный предмет. Мы изучаем ее.
Формальное подлежащее	Не переводится: 1. при сообщениях о явлениях природы, при обозначении времени и расстояния. 2. с глаголами to seem – казаться to chance – случаться to happen – случаться to turn out – оказываться to appear – казаться. 3. при наличии в предложении логического подлежащего, выраженного инфинитивом, герундиальным оборотом или придаточным предложением подлежащим, которые стоят после именного сказуемого.	<i>It is 5 o'clock.</i> <i>It <u>seems</u> that there is a great danger of contamination of the boron by the electrode material.</i> <i>It is never too late <u>to learn</u>.</i> <i>It was wonderful <u>seeing London</u>.</i> <i>It is quite evident that <u>titanium will be widely used in industry</u>.</i>

	<p>4. при смысловом выделении какого-либо члена предложения употребляется следующий оборот “It is (was) ... that (who, which, whom, etc.)”; при переводе перед выделяемым словом ставится «именно», “it” не переводится.</p> <p>5. при пассивном сказуемом.</p>	<p><u>It was</u> him <u>who</u> told me the truth.</p> <p>It <u>is seen</u> that on cooling sufficiently water forms ice.</p>
Формальное дополнение	при последующем логическом дополнении, выраженном инфинитивом или дополнительным придаточным предложением.	Modern methods have made it profitable <u>to extract</u> copper from ores.

Exercise 1

Translate into Russian, state the functions of “it”:

1. It was not known whether this substance was oxidized under the action of air.
2. It is important not to confuse the physical and the chemical properties of these materials.
3. It is the same substance – water, but it may exist in the three physical forms mentioned above.
4. In describing the materials used in chemistry it is common to refer to their properties.
5. In every above mentioned case, it is work that produces heat, directly or indirectly.
6. It must be said that according to this law any change in the temperature of a system in a state of equilibrium is followed by a reverse chemical change within the system.
7. It is probable that in the first place substitution takes place.
8. Lead nitrate, although it crystallizes in the same form as alum, is much heavier.

9. In general, it is sufficient to examine only a few properties in order to identify the material.
10. It is very difficult to fix any position where definite colour change occurs.
11. It is evident that of the volatile parts contained in the powder, water is only a small portion.
12. It was not until Roentgen discovered his mysterious rays that many diseases could be easily diagnosed.
13. From these experiments it is seen that chemical changes are often accompanied by an evolution of heat.
14. It follows from the definition of a compound that its composition is independent on the method of preparation.
15. Some of the recipes for its preparation show that it was a salt or an amalgam of gold, or a solution of gold in mercury.
16. It was noticed in the 16-th century that this oxide is heavier than the metal.
17. It appears, however, that the nature of the chemical action producing the hydrogen is very important.

14. Functions of “One”

	<i>Функция, перевод</i>	<i>Примеры</i>
Числительное	В значении «один».	There is <u>one more</u> distinction to be mentioned.
Неопределенное местоимение	1. Подлежащее (не переводится, а сказуемое переводится глаголом во 2 лице ед. ч. или в 3 лице мн. ч.)	One can assume that the mechanism of energy transfer is the same in the liquid as in the gas.
	2. Для замены существительного в ед. ч. или (ones) во мн. ч. Не переводится или переводится ранее упомянутым существит.	The electric cell is a device for converting chemical energy into electric one.

	3. “The one” для замены ранее упомянутого существительного в значении «тот, который».	An elementary substance is the one which consists of only one kind of atoms.
	4. “One’s” (в форме притяж. местоим.) переводится «свой».	One should write down the results of one’s experiments into a notebook.

Exercise 1

Translate into Russian, state the functions of “one”:

1. Over two hundred thousand compounds are known and new ones are being prepared.
2. One has to admit one’s mistakes.
3. One should pay more attention to the results of one’s experiments.
4. A large excess of ammonia gives a purple tint instead of the red one obtained when solution is just ammoniac.
5. There is one more problem to solve, the one which is of great importance to us.
6. If one attempts to carry out the reduction of sulphuric dioxide by means of hydrocarbon vapours in combination tubes, very complex and incomplete reactions occur.
7. The atom therefore retains its position in the Periodic Table, and the new element thus formed is isotopic with the original one.
8. The lead and mercurous compounds may be employed for a similar experiment if one substitutes hot sulphuric acid for water.
9. As examples of these one may point to the synthetic ammonia industry, the synthetic methanol industry, and the rapidly expanding development of the hydrogenation of coal and oil.

10. Polycondensation and polymerization processes of the type just described are the only ones which can be characterized by one single rate constant.
11. One more side reaction which occurs with certain residue in dimethylformamide remains to be mentioned.
12. If one stretches or rolls samples of polyvinyl chloride, one never obtains complete crystallization.

Exercise 2

Translate into Russian, state the functions of “one”:

1. There are many different forms of energy and one may convert energy of one kind into the energy of another kind.
2. One can't learn the language in one month.
3. One must plan one's work.
4. One can easily forget foreign words that one doesn't use.
5. These books are more difficult than the ones we read last week.
6. An ordinary solution such as one of salt in water, is homogeneous.
7. An elementary substance is the one which consists of only one kind of atoms.
8. Hot solutions filter more rapidly than cold ones.
9. Aluminium is one of the lightest metals.
10. There is one mistake in your exercise; one mustn't make such mistakes.

15. Functions of “That – Those”

<i>Функция</i>	<i>Примечание</i>	<i>Примеры</i>
<i>Указательное местоимение:</i> 1. подлежащее	Стоит перед сказуемым и переводится словом «ЭТО».	<u>This</u> is a red solution, and <u>that</u> is a colourless one. <u>Those</u> are chemical substances.

2. определение	Определяет существительное и переводится «этот, эта, это, эти» и т. д.	The boiling point of <u>that</u> liquid is 25 °C.
3. для замены ранее упомянутого существительного	Переводится тем словом, которое заменяет.	Some properties of air are similar to <u>those</u> of water.
Союз, вводит придаточное предложение: 1. подлежащее	Стоит перед подлежащим придаточного предложения и переводится словами «то, что».	<u>That</u> oxygen can be liquefied only under high pressure was proved by experiments.
2. сказуемое	Всегда стоит после глагола-связки и переводится «состоит в том, чтобы; заключается в том, чтобы».	The characteristic property of water is <u>that</u> it is a good solvent.
3. дополнительное	Всегда после сказуемого главного предложения и переводится союзом «что».	One can show <u>that</u> hydrogen doesn't support burning.
4. определительное	Стоит после определяемого слова и переводится словом «который».	A barometer is an instrument <u>that</u> measures air pressure.
5. обстоятельство	Сочетается со словами "so that", "in order that" и переводится словами «чтобы», «так что», «для того чтобы».	Alcohol boils at 78°C, water – at 100°C, <u>so that</u> the alcohol boils away first and is first collected in the condenser.

Exercise 1

Translate into Russian:

1. This metal is stronger and harder than that one.
2. The law of conservation of matter states that matter can neither be created nor destroyed.
3. That the conductivity of a solution is due to the ions it contains was first realized by Kohlrausch.
4. This point of view is that the metallic base enters into complex formation with the hydroxyl compound by uniting with the alcoholic groups.
5. This dye is identical with that produced as described above.
6. It is by means of the calcium salt that this separation can be effected.
7. We may see that there are certain groups that have very similar chemical properties.
8. Priestly showed that there were several gases differing from atmospheric air in their properties.
9. The fact that bodies may be arranged in such groups is the fundamental law of chemistry.
10. Changes of the first class are called physical changes; those of the second class, chemical changes.
11. The vapour pressures of solids are usually smaller than those of liquids.
12. The only result which may be deduced directly is that a molecule of carbon dioxide contains a molecule of oxygen.
13. This salt that contains one of the hydrogen atoms of the sulphuric acid has a strongly acid reaction in solution.
14. It is this energy that is defined as the ability to do work.
15. The extent of this effect was much smaller than that obtained with thiobenzoic acid.
16. It is known that radium is only one of a number of highly active substances that can be separated from uranium minerals.

16. IF-clauses

Тип условного предложения	<u>Главное предложение</u> – СЛЕДСТВИЕ	<u>Придаточное предложение</u> – УСЛОВИЕ
I тип выражает <u>реальные, осуществимые</u> предположения, <u>относящиеся к будущему (или к наст.) времени.</u>	<p>Future Simple (shall / will + V)</p> <p>I'll <u>give</u> you the book Я <u>дам</u> вам эту книгу,</p> <p>We'll <u>go</u> to the country Мы <u>поедем</u> за город,</p>	<p>Present Simple (V / V-s) (гл. "to be" имеет формы am/is/are)</p> <p><i>if</i> you <u>return</u> it next week. если вы <u>вернете</u> ее на следующей неделе.</p> <p><i>if</i> the weather <u>is</u> fine tomorrow. если завтра <u>будет</u> хорошая погода.</p>
II тип выражает <u>невероятные</u> или <u>маловероятные</u> предположения. Они относятся к <u>настоящему</u> или <u>будущему</u> времени.	<p>Future Simple-in-the Past (should / would / could / might + V)</p> <p>Helen <u>would write</u> to Andrew Елена <u>написала бы</u> Андрею, I <u>would ask</u> my friend about it Я <u>спросил бы</u> своего друга об этом,</p>	<p>Past Simple (V-ed / V2)</p> <p><i>if</i> she <u>knew</u> his address. если <u>бы</u> она <u>знала</u> его адрес.</p> <p><i>if</i> I <u>saw</u> him tomorrow. если <u>бы</u> <u>увидел</u> его завтра.</p> <p>NB! Гл. to be <i>употребляется в придат. предл. в форме were со всеми лицами ед. и множ. числа.</i></p>
III тип выражает предположения, относя-	<p>Future Perfect-in-the Past should/would/could/might + have + V3</p>	<p>Past Perfect (had + V-ed / V3)</p>

<p>щиеся к <u>прошедшему</u> времени и являющиеся <u>невыполни-</u> <u>мыми</u>.</p>	<p>I <u>would have asked</u> him about it Я <u>спросил бы</u> его об этом,</p>	<p><i>if</i> I <u>had seen</u> him yesterday. если <u>бы я видел</u> его вчера.</p>
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Exercise 1

Translate into Russian:

1. If a solid body or liquid is heated, it will usually expand.
2. The motor-car can move very quickly, provided it has a powerful motor.
3. If the atmospheric conditions had been better, we should have used long radio waves.
4. If platinum had not been so scarce in nature, it would have found much larger use in industry.
5. Had silver been less cost, it would have been widely used as conductor, its conductivity being very high.
6. If the positively charged electric pole is placed in one end of a pole of salt water and the negatively charged pole is placed in the other, the poles will attract the chloride and sodium ions, respectively.
7. Were I there, I would give them my considerations about the capacity of that machine.
8. If you do not know the rules of operating this particular machine tool, I will explain them to you.
9. Had he taken into account the properties of the substance under investigation, he would have been careful when working with it.
10. If one knew the dimensions of the body, one would easily calculate its volume.
11. Were the temperature raised, the evaporation would be accelerated.

17. General Revision

Exercise 1

Translate into Russian:

1. At the same temperature in ethylalcoholic solutions, the reaction velocity is about 540 times as fast.
2. Because of enormous surface exposed this catalyst was thought to be a very active one, but when tested was found to be inactive.
3. Oxidation of the formaldehyde decomposition products was assumed to be according to the following reaction.
4. These temperature fluctuations are supposed to be due to the transition of iron from one allotropic modification to another.
5. When treating blend in this way, the sulphide formed can be extracted by magnetic means.
6. A more concentrated solution is more convenient, if available, but is hard to keep owing to its action on glass bottles.
7. Columns 2 and 3 contain the experimental values of the energy of activation and effective mean frequency.
8. When the residue in heated test tube appears to undergo no further decomposition, allow the apparatus to cool.
9. After being allowed to stand overnight the mixture is filtered and the acid is washed thoroughly with water.
10. Instead of separating the substance to be estimated by chemical methods, electrochemical means may be used in a restricted number of cases.
11. These scientists showed that the route over which a reaction could be made to occur depended upon the presence of certain catalysts.
12. Natural gas may contain up to 10 even 30 per cent of hydrogen, the remainder being mainly methane and ethane.
13. It is easy to put a smooth plate on the copper alloy, but it is more likely to corrode in salt solutions and when exposed to moist atmosphere.

14. The commercial nickel-steels are of some interest from the standpoint of resistance to corrosion.
15. Continued work with an alkaline electrolyte failed to give more than a material yield of 50 per cent diamine.
16. The addition of 100 cc. of alcohol to 200 cc. of acid failed to accomplish complete solution of the dinitrophenol.
17. Undissolved dinitrophenol is frequently found in the catholyte that failed to remedy this situation.
18. Occasionally it was necessary to discard the first portion distilled, especially if the apparatus in question had been standing idle for a while.
19. As the voltage, and consequently the current, are increased, the relationship is no longer linear because of the products of electrolysis.
20. Iron resistors have been tried out and found to be satisfactory up to temperature 1 200°C.
21. Sodium chloride was added in considerable amount during each run, both to increase the volume of the bath and render it more fluid.
22. The formation of barium ferrite resulting from the heating of a mixture of barium carbonate and ferric oxide was studied at 720°C.
23. By grinding the mass and heating it again at the same temperature the reaction is made to continue, but extremely slowly.
24. Thanks to the methods of thermal analysis developed by Hedvall and Tamman reactions between solid phases have been studied in some detail.
25. The electroplates of H. C. Cocks, which were only one half as thick as those reported on in this paper, resisted a sea salt water for about one year.
26. The deposits obtained, whether on copper, mercury, brass or silver, were crystalline, non-adherent and usually black.
27. Potassium nitrate showed a tendency to increase the crystallinity of the deposits, whether in agitated or in unagitated solutions.

28. The literature examined failed to reveal any reference to the use of fluoborate solutions for silver deposition.
29. With certain important improvements the aluminum rectifier has met the requirements admirably.
30. Unlike the platinum, the graphite electrodes give results in air always as good and frequently better than in hydrogen.
31. A set of experiments with 19 cells was run to study the influence of the halogen ion on the discharge of the cell.
32. Fluorine will react with almost any organic substance, whether the latter conducts electricity or not.
33. Unlike the majority of radioactive bodies, potassium apparently emits only rays of penetrating power about equal to those of uranium.
34. In order to get the additives to adhere to the salt crystals, thorough mixing is required.
35. The natural mineral chlorate is thus about five times as active as the artificial one.
36. The analytical form of equation /I/ demonstrated for lithium perchlorate was assumed to hold in these cases as well.
37. Use of the nitrate rather than the sulphate results in a catalyst of great activity.
38. The spectra in the case of chromium, like that of iron, indicate the occurrence of more than one type of binding.
39. Unfortunately no data is available in benzene solution and was obtained by the following means from experiments.
40. All readings except in the two instances indicated were made by opposing the unknown electromotive force to that of a cell taken as standard.
41. Care was taken in trying to prevent breaking up crystals in making the paste.
42. The temperature gradually rose, and when it reached 17°C, the readings for the potential drops were taken.
43. The voltage and current waves shown in Fig. 1 and 2 were found to be in good agreement with those obtained experimentally.

Exercise 2

Translate into Russian:

1. This means that the pH corresponding to the minimum velocity has a negative temperature coefficient, which is nearly the same for all hydrolytic reactions.
2. In manufacturing alcohol by means of the process, which has just been described it was found that the yield depended upon the exclusion of oxygen, water, and acetic acid.
3. A low frequency field is defined with respect to a given physical system as one whose period is largely compared to the time of relaxation.
4. This holds true whether friction is or not involved.
5. Of course, this would not be expected to hold true for substituents, which can strongly conjugate with the furan nucleus.
6. Drying this solvent by means of calcium chloride, as was done in this experiment, is not sufficient to secure its purity for kinetic work.
7. If this were due to coordination of the solvent, the latter would be expected to be present in the precipitate only.
8. Another difficulty is that of bringing about so rapid a sedimentation as to make the diffusion negligible.
9. The second patent describes the conversion of ethylene into ethylene ozonide followed by the immediate decomposition of the latter into formaldehyde.
10. A solution of commercial chromium sulfate of the green form, which has a greater degree of hydrolysis than the former is the most suitable for the deposition of bright metallic chromium.
11. When a volatile solvent is used this evaporates readily on exposure to the air leaving the product which has to be washed with water only to remove the electrolyte.
12. These radiations from uranium are persistent and as far as observations have yet gone are unchanged either in intensity or character with lapse of time.

13. Exercise 3

Translate into Russian, analysing all grammar constructions:

1. This process is the one to be associated with reaction in alkaline solution.
2. It is important to observe that each electronic state can be associated with a large number of vibrational and rotational states.
3. It was not until 1962 that chemists succeeded in obtaining this compound.
4. Vinyl acetylene under pressure is readily polymerized to form viscous drying oils.
5. The higher the energy of the bombarding electrons, the greater the number of secondary electrons to be emitted.
6. To solve this problem one needs new methods.
7. If the reaction should proceed smoothly the end product might increase.
8. The problem was recognized to be of great importance.
9. This substance is oxidized by silver oxide to lose one hydrogen atom.
10. X-ray data indicated the crystal lattice to be highly uniform.
11. He is against carrying out a set of experiments.
12. It is seen that the method of geometric means leads to more satisfactory results than that of arithmetic means.
13. A new technique having been worked out, the yields rose.
14. They determined the density of the substance to be between 2.554 and 2.559.
15. If we raise the temperature the film will expand, allowing more hydroxyl groups to enter the water.
16. The reactions were concluded to be similar in their behaviour.
17. The rates and molecular weights are affected by lowering the temperature, the former being decreased and the latter increased.
18. The product tended to turn white on drying.
19. It is these scientists who have discovered a new procedure to synthesize propylene.

20. We can also write the heat energy absorbed in such a process to be as follows.
21. The data has been admitted to be incorrect.
22. The method to be described in the next section is very effective.
23. If we had not studied English we should not have known it.

Additional Tasks

Task 1

a). *Complete the text about chemistry using the words in the box.*

bind	charge	science
nucleus	interactions	shape
mass	particles	matter
density	substances	amounts
ions	molecules	

Chemistry is the _____ that systematically studies the composition, properties and activity of _____ and various elementary forms of _____ .

Chemistry is the study of matter and energy and interactions between them. Energy has no _____ or form. Matter is everything that occupies space and has _____. _____ refers to the amount of matter in a given amount of space and is defined as the mass per unit of a substance.

The fundamental building block of matter is the atom. It has a _____ at its centre consisting of protons, which have a positive electrical _____ , and neutrons which are uncharged. Negatively charged electrons circle around nuclei. There are super-small _____ inside the protons and neutrons called quarks.

Chemical reactions involve _____ between the electrons of one atom and the electrons of another atom. Atoms which have different _____ of electrons and protons have positive or negative electrical charge and are called _____. When atoms _____ together, they can make larger building blocks of matter called _____.

b). Find the Participles and identify their forms and functions.

c). Answer the following questions:

- 1) How would you define chemistry?
- 2) What was your first encounter with chemistry?
- 3) What is / isn't interesting about chemistry for you?
- 4) Which branch of chemistry would you like to specialize in?
- 5) Name some branches of applied chemistry.
- 6) Which sciences are closely connected to chemistry?
- 7) Do you know any Nobel laureate in chemistry?
- 8) Which skills should a chemist have?
- 9) Where can you find a job as a chemist?
- 10) Name some products which don't exist without chemistry.
- 11) What does organic / inorganic chemistry study?

d). Form the words and explain their meaning in English. Try to use all these words in one sentence. Name other words with the same root.

CHEM _____ (noun)
 _____ (noun)
 _____ (noun)
 _____ (adjective)

Task 2

a) Read the text about periodic table and then answer the questions.

People have known about elements like carbon and gold since ancient time. The elements couldn't be changed using any chemical method. Each element has a unique number of protons. If you examine samples of iron and silver, you can't tell how many protons the atoms have. However, you can tell the elements apart because they have different properties. You might notice there are more similarities between iron and silver than between iron and oxygen. Could there be a way to organize the elements so you could tell at a glance which ones had similar properties?

Dmitri Mendeleev was the first scientist to create a periodic table of the elements similar to the one we use today. This table showed that when the elements were ordered by increasing atomic weight, a pattern appeared where properties of the elements repeated periodically. This periodic table is a chart that groups the elements according to their similar properties.

Remember changing the number of protons changes the atomic number, which is the number of the element. When you look at the modern periodic table, do you see any skipped atomic numbers that would be undiscovered elements? New elements today aren't discovered. They are made. You can still use the periodic table to predict the properties of these new elements.

The periodic table helps predict some properties of the elements compared to each other. Atom size decreases as you move from left to right across the table and increases as you move down a column. The energy required to remove an electron from an atom increases as you move from left to right and decreases as you move down a column. The ability to form a chemical bond increases as you move from left to right and decreases as you move down a column.

The most important difference between Mendeleev's table and today's table is that the modern table is organized by increasing atomic number, not increasing atomic weight. Why

was the table changed? In 1914, Henry Moseley learned you could experimentally determine the atomic numbers of elements. Before that, atomic numbers were just the order of elements based on increasing atomic weight. Once atomic numbers had significance, the periodic table was reorganized.

Elements in the periodic table are arranged in periods (rows) and groups (columns). Atomic number increases as you move across a row or period.

Rows of elements are called periods. The period number of an element signifies the highest unexcited energy level for an electron in that element. The number of elements in a period increases as you move down the periodic table because there are more sublevels per level as the energy level of the atom increases.

Columns of elements help define element groups. Elements within a group share several common properties. Groups are elements which have the same outer electron arrangement. The outer electrons are called valence electrons. Because they have the same number of valence electrons, elements in a group share similar chemical properties. The Roman numerals listed above each group are the usual number of valence electrons. For example, a group VA element will have 5 valence electrons.

There are two sets of groups. The group A elements are called the representative elements. The group B elements are the nonrepresentative elements.

Each square on the periodic table gives information about an element. On many printed periodic tables you can find an element's symbol, atomic number, and atomic weight.

Elements are classified according to their properties. The major categories of elements are the metals, nonmetals, and metalloids (semi-metals).

You see metals every day. Aluminium foil is a metal. Gold and silver are metals. If someone asks you whether an element is a metal, metalloid, or non-metal and you don't know the answer, guess that it's a metal.

Metals share some common properties. They are lustrous (shiny), malleable (can be hammered), and are good conductors of heat and electricity. These properties result from the ability to easily move the electrons in the outer shells of metal atoms.

Most elements are metals. There are so many metals, they are divided into groups: alkali metals, alkaline earth metals, and transition metals. The transition metals can be divided into smaller groups, such as the lanthanides and actinides.

Questions:

1) Describe Mendeleev's periodic table. Do you know what he predicted?

2) How are the elements arranged in the modern-day periodic table?

3) What is the periodic table divided into?

4) What are group 1 elements called?

5) What are group 2 elements called?

6) What are group 17 elements called?

7) What are group 18 elements called?

8) Name some properties of metals.

9) Describe semi-metals.

10) Describe non-metals.

b) Find the Participles, Gerunds and Infinitives and define their functions. Try to identify the functions of "it", "one", "that" in the text above.

c). Discuss elements:

- Describe one element to your partner and let him/ her guess which one it is. Focus on the following points:

physical and chemical properties, occurrence in nature, laboratory preparation, industrial production, use of the element and its compounds

- Which element(s) do you consider the most important and why?

- Pronounce the following elements and think of their symbols:

bromine, calcium, carbon, chlorine, iodine, lead, magnesium, manganese, mercury, neon, nitrogen, oxygen, potassium, radium, sodium, uranium, xenon (*see pronunciation in: Иванова Н.К. Английский язык для химиков. Фонетика. www.mkl.isuct.ru, www.edu.isuct.ru*)

Task 3

a). Study the text “Lab Safety Rules” and underline the expressions you are not familiar with. Can you guess their meaning from the context? If not, consult the dictionary.

Did any of the rules surprise you?

LAB SAFETY RULES

1. When first entering a science room, do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.

2. Never work alone in the laboratory. No student may work in the science classroom without the presence of the instructor.

3. Perform only those experiments authorized by your teacher. Carefully follow all instructions, both written and oral. Unauthorized experiments are not allowed.

4. Do not eat food, drink beverages, or chew gum in the laboratory. Do not use laboratory glassware as containers for food or beverages.

5. Be prepared for your work in the laboratory. Read all procedures thoroughly before entering the laboratory. Never fool around in the laboratory.

6. Always work in a well-ventilated area.

7. Observe good housekeeping practices. Work areas should be kept clean and tidy at all times.

8. Proceed with caution at all times in the laboratory. Notify the teacher immediately of any unsafe conditions you observe.

9. Dispose of all chemical waste properly. Never mix chemicals in sink drains. Sinks are to be used only for water. Check with your teacher for disposal of chemicals and solutions.

10. Labels and equipment instructions must be read carefully before use. Set up and use the equipment as directed by your teacher.

11. Keep hands away from face, eyes, mouth, and body while using chemicals or lab equipment. Wash your hands with soap and water after performing all experiments.

12. Experiments must be personally monitored at all times. Do not distract other students or interfere with the laboratory experiments of others.

13. Know the locations and operating procedures of all safety equipment including: first aid kit(s) and fire extinguisher. Know where the fire alarm and the exits are located.

14. Know what to do if there is a fire drill during a laboratory period; containers must be closed, and any electrical equipment turned off.

15. Any time chemicals, heat, or glassware are used, students will wear safety goggles. **NO EXCEPTIONS TO THIS RULE!**

16. Contact lenses may not be worn in the laboratory.

17. Dress properly during a laboratory activity. Long hair, dangling jewellery, and loose or baggy clothing are a hazard in the laboratory. Long hair must be tied back, and dangling jewellery must be secured. Shoes must completely cover the foot. No sandals allowed on lab days.

18. A lab coat or smock should be worn during laboratory experiments.

19. Report any accident (spill, breakage, etc.) or injury (cut, burn, etc.) to the teacher immediately, no matter how trivial it seems. Do not panic.

20. If you or your lab partner is hurt, inform the teacher immediately. Do not panic.

21. If a chemical splashes in your eyes or on your skin, immediately flush with running water for at least 20 minutes.

22. All chemicals in the laboratory are to be considered dangerous. Avoid handling chemicals with fingers. Always use tweezers. When making an observation, keep at least 1 foot away from the specimen. Do not taste, or smell any chemicals. If you need to identify a smell, cup your hand and waft.

23. Check the label on all chemical bottles twice before removing any of the contents. Take only as much chemical as you need.

24. Never return unused chemicals to their original container.

25. Never remove chemicals or other materials from the laboratory area.

b) Find the Passive Voice forms, Modal Verbs and their Equivalents, Participles and Gerunds. Try to identify the forms and functions of the Participles and Gerunds:

c) TEAM WORK

Work in small groups and decide which of the rules are of the utmost importance. Make a TOP TEN list and reason your choice. Then report to the rest of the class.

d) Make a summary of the most important laboratory safety rules concerning the following facts:

- dress code for a laboratory worker
- refreshment during the lab period
- working with chemicals

- working with hot glassware
- what to do in case of injury
- what to do in case of fire

e) Read the Chemistry Poem. Do you know any poem, joke or anecdote about chemists, chemistry or labs?

Chemistry Poem

Poor Willie worked in chem lab. Poor Willie is no more.
For what he thought was H₂O was H₂SO₄!

Task 4

a). Read the following article.

Offshore Wind Energy

Offshore wind is one of the most promising and climate-friendly energy-producing technologies in the world. It is definitely the least-expensive energy source in many or even most regions now.

Offshore wind power refers to the construction of wind farms in water areas such as lakes, fjords and sheltered coastal areas to **generate** electricity from wind, utilizing traditional fixed-bottom wind turbine technologies, as well as deep-water areas **utilizing** floating wind turbines.

A range of spatial and temporal scales and external conditions limit the **potential** location of offshore wind plants. These data includes water depth, currents, seabed migration and wave action. There are also further factors such as marine growth, **salinity**, icing and definitely geotechnical characteristics of the sea or lake bed. Corrosion is also a serious problem and requires detailed design considerations.

Strong wind speeds are available offshore compared to on land, so offshore wind power's **contribution** in terms of electricity supplied is higher. Offshore wind is steadier, more

consistent and not blocked by mountains, trees, buildings, etc. Additionally, offshore wind farms can actually be built closer to most population centres than onshore wind ones. New systems allow to install turbines in deep waters, lift heavier weights, cope with bigger **swells** and carry more machines out to wind-farm sides.

The next **leap** is the technology of solar-wind hybrid power plants that are seemingly twice as efficient. This energy system uses two **renewable energy** sources used together to **provide** increased system efficiency as well as greater balance in energy supply. One of the strongest benefits is that the constructions of solar photovoltaic systems and wind turbines installed together do not require grid expansion since the plants generate solar and wind power at different intervals and during complementary seasons.

Some facts about offshore wind energy:

- The first US offshore wind turbine was launched in May 2013
- The EU installed more than 1 offshore wind turbine per working day in 2012
- Europe will install about 10.4 gigawatts offshore wind turbines, it will be more than 70% of the global total
- £35b offshore wind contribution by 2050
- \$232 – a megawatt per hour is power-generation production cost

b). Answer the following questions according to the text:

- 1) Which water bodies are commonly used for wind plants?
- 2) What are the types of turbines?
- 3) What are the factors which determine the location and the construction of offshore wind plants?
- 4) What is the efficiency of solar-wind hybrid power plants?
- 5) What are the main benefits of solar-wind hybrid power plants?

c) Make your own sentences using the words given in the text in bold.

d) Find Adjectives in the Comparative and Superlative Degree, translate them. Find Participles and Infinitives, define their functions. Identify the functions of “one” in the text above.

Task 5

a). Read the following text and fill it with appropriate forms of words given in brackets.

Facts about Drinking Water

Drinking water is such a vital and (fundamentalism) part of our lives that we have a tendency to take for granted that our water is safe to drink.

- Water (consume) has almost doubled in the last 50 years. A child born in the developed world consumes 30 to 50 times the water resources of one in the (develop) world.

- Water supplies are falling while the demand is (drama) growing at an unsustainable rate. Over the next 20 years, the average supply of water worldwide per person is expected to drop by a third.

- Over 1.5 billion people lack ready access to drinking water, and, if current consumption patterns continue, at least 3.5 billion people nearly half the world’s projected (populate) will live in water–stressed rivers basins in just 20 years.

- Drinking water (contaminate) is a growing problem worldwide and dwindling freshwater resources are under (increase) pressure due to pollution and population (grow).

- Water (purify) is necessary due to many factors of pollution such as manufacturing, (agriculture) accidental and consumer pollution. Some common sources of water pollution include:

- surface runoff from farms, businesses and paved surfaces
- excess of nutrients pumped into waters
- discharge of used water into waters
- acid rain
- underground storage tank (leak)
- discharge of used chemicals into waters
- discharge of industry by-products into waters
- toxic (contaminate) from underground storage

tanks

- bacteria, viruses and parasites
- wasteful use of water.

b). Create Adjectives or Present Participles from the following words:

- save -
- accident -
- environment -
- pollute -
- filter -
- grow -
- provide -
- response -
- purify -
- nature -

c). Create Nouns from the following verbs:

- purify -
- consume -
- produce -
- develop -
- expect -
- grow -
- contaminate -
- monitor -
- pollute -
- contribute -

THE LIST OF THE SET EXPRESSIONS

a number of	ряд
the former	первый (из упомянутых) или переводится словом, которое заменяет
the latter	последний (из упомянутых) или переводится словом, которое заменяет
as to, as for	что касается, в отношении
in terms of	исходя из, на основании, в виде, через
under investigation / under consideration in question	исследуемый / рассматриваемый рассматриваемый, о котором идет речь
above	вышеупомянутый
to bring about	осуществлять, вызывать
rather than	а не
according to	согласно, в соответствии с
by means of	посредством, при помощи
thanks to, owing to, due to	по причине, из-за, благодаря, вследствие
as compared with / to	по сравнению с
in favour of	в пользу, в защиту, за
on account of	из-за, вследствие, на основании
with respect to / in regard to	в отношении, что касается, относительно
bulk	основная часть, масса, объем
in bulk	в массе, в объеме, целиком
to deal (dealt) with	рассматривать, иметь дело с
involved / concerned	рассматриваемый, о котором идет речь, участвующий
on exposure	при действии
when exposed	подвергая действию
substitute by	замещать, вытеснять
no longer	больше не

Vocabulary

A

able	способный
absorb	впитывать
abundant	обильный, богатый
account for	объяснять (for – что-л.); составлять часть (for – чего-л.)
accuracy	точность
accomplish	совершать, заканчивать, выполнять; достигать
acetanilide	ацетанилид
acetate	ацетат
acetic acid	уксусная кислота
achieve	достичь
adsorb	адсорбировать
affect	воздействовать, влиять
aggregate	агрегат, совокупность
agitation	перемешивание
alcohol	этиловый спирт
aldehyde	альдегид
aliphatic	алифатический
aliquot	определенное кол-во; кратный
alkali	щелочь
alkaline	щелочной
allotropic	аллотропический, аллотропный
altitude	высота
alum	квасцы
alumina	окись алюминия, глинозем
aluminate	алюминат
aluminium	алюминий
amalgam	амальгама, сплав; смесь
amide	амид
amine	амин
ammonia	аммиак
ammonium	аммоний
amphoteric	амфотерный
anhydrous	безводный
anilide	анилид
anthracene	антрацен

appreciable	заметный, ощутимый
aqua regia	царская водка
article	предмет, изделие, вещь
artificial	искусственный
ascertain	установить, выяснить
attack	разрушать, разъедать
attain	доходить до, достигать
attribute	приписывать (<i>чему-л., кому-л.; to</i>); относить
available	доступный; имеющийся в распоряжении, наличный

В

barium	барий
barometer	барометр
beaker	мензурка
beam	луч; пучок лучей
benzene	бензол
benzine	бензин
benzoin	бензоин, бензойная смола
berillium	бериллий
binary	двойной, бинарный
bismuth	самородный висмут
blend	смесь
blowpipe	паяльная лампа
boric acid	борная кислота
boron	бор
brass	латунь
break down	делить, классифицировать
brine	рапа, соляной раствор; морская вода, рассол
bromide	бромид
bromination	бромирование
bromine	бром
bulb	баллон, сосуд; пузырек; лампа; шарик (термометра); колба
butane	бутан

С

cadmium	кадмий
caesium	цезий
calcite	кальцит
calcium	кальций
carbide	карбид
carbon	углерод; копировальная бумага
carbon disulphide	дисульфид углерода
carbonate	карбонат
carbonyl	карбонильный
casehardening	цементирование, закаливание (стали)
casting	литье, отливка
cathode	катод
cation	катион
cement	цемент
centrifugal	центробежный
centrifuge	центрифуга
cerium	церий
chalcocite	хальколит
chlorate	хлорат
chloride	хлорид
chlorine	хлор
chloroform	хлороформ
chromium	хром
cobalt	кобальт
collision	столкновение
column	столб(ик); колонна
combine	объединять(ся), смешивать(ся)
combustible	горючий, воспламеняемый
combustion	горение, сгорание
commercial	промышленный, технический
conjugate	соединяться
copper	медь
crucible	тигель
cryohydrate	криогидрат
cupric iodide	йодид меди
cure	<i>тех.</i> вулканизация (<i>резины</i>); вулканизировать

cyanide

соль цианисто-водородной
кислоты, цианистой кислоты,
цианид

D

decantation

фильтрация, декантация

decomposition

разложение

degas

дегазировать

degreasing

обезжиривание

dehydrate

обезвоживать

density

плотность

deoxidation

раскисление, восстановление

deposit

месторождение, осадок, отстой;
осаждать

design

чертеж

detergent

детергент, чистящее средство

deteriorate

ухудшать(ся)

device

устройство

diamond

алмаз

diazonium

диазоний

diffusion

рассеивание

dilute

разбавленный

dioxide

двуокись

discard

отбрасывать, отвергать

dish

посуда

dispel

разгонять; рассеивать

displace

переместить, вытеснить

dissociate

отделить

distill

дистиллировать

distillate

дистиллят

distinguish

отличать, выделять

divisible

делимый

domain

домен, область, среда

drying agent

высушивающее вещество

dull red heat

темно-красный накал

dye

краситель

Е

effect	производить; выполнять, совершать; осуществлять
electrolysis	электролиз
electroplating	гальванопокрытие
elevated	повышенный
eliminate	устранить, исключить
emit	испустить
employ	применять, использовать
emulsion	эмульсия
enclose	включить
engine	двигатель
enolate	производное металла энольного соединения
equation	уравнение
equilibrium	равновесие
equimolar	равномолярный
ester	сложный эфир
ethane	этан
ethanol	этанол, этиловый спирт
ether	эфир
ethyl	этил
ethylene	этилен
evaporate	испаряться
excess	избыток, излишек
excitation	возбуждение
exhibit	показывать; проявлять
expose	выставлять, подвергать действию (<i>солнца, ветра и т.п.</i>)

Ф

fall into	распадаться
fast	прочный, крепкий, твердый
ferric	железный (трехвалентный)
ferrous	железистый (двухвалентный)
ferrous sulphate	сульфат железа
fertilize	удобрять
fibre	стекловолокно, волокно

flask	фляга, колба
flint	камень, кремневая галька
flock	легкие осадки
fluctuation	колебание, неустойчивость
fluorescence	флуоресценция, свечение
fluorine	фтор
formamide	формаמיד
fuel	топливо
funnel	воронка
furnace	печь
fuse	плавить(ся); эл. плавкий предохранитель, пробка

G

gaseous	газообразный
generalization	обобщение
glow	накал, свечение; накалять, светиться
glycol	гликоль
gold	золото
gradual	постепенный
granite	гранит
graphite	графит
gravimetric	гравиметрический
gravity	сила тяжести

H

halogen	галоген, галоид; галогенный
hazard	риск, опасность
helium	гелий
heterocyclic	гетероциклический
heterogenous	гетерогенный
homogenous	гомогенный, однородный
homologous	гомологический
hydrate	гидрат
hydride	гидрид
hydrocarbon	углеводород

hydrochloric acid	соляная кислота
hydrofluoric acid	фтористоводородная кислота
hydrogenation	гидрирование
hydrogen ion	ион водорода
hydrolysis	гидролиз
hydroxide	гидроокись
hydroxyl	гидроксил
hydropscopic	гигроскопический
hypothesis	гипотеза

I

ignite	гореть, зажигать, прокалывать
immerse	поглотить, погружать, окунать
impart	давать, придавать
imperative	обязывающий; настоятельный
impinge	сталкиваться, ударяться (<i>о поверхность чего-л.</i>)
indium	индий
inert	инертный
insoluble	нерастворимый
instantaneous	мгновенный
intermediate	промежуточный; ~ product
intermingle	полупродукт; вспомогательный
iodate	смешивать(ся) (with)
iodide	йодат
iodine	йодид
iodometric	йод
isolate	йодометрический
isomerization	выделять (из смеси), отделять,
isotope	изолировать
	изомеризация
	изотоп

J

jet	струя
join	соединяться, вступать в

К

keep (kept)	держать, хранить
kerosene	керосин
kinetic	кинетический

Л

labile	неустойчивый
lattice	решетка
law	закон
layer	слой, пласт
lead	свинец
length	длина
liberate	выделять
ligand	лиганд
lime	известь
limestone	известняк
linkage	связь
liquefaction	сжижение
liquefy	сжижать
liquid	жидкость
litre	литр
lithium	литий
lump	комоч; крупный кусок
lustrous	блестящий

М

magnesium	магний
magnetism	магнетизм
magnetize	намагничивать
manganese	марганец
marble	мрамор
measure	мерить, измерять
mechanism	механизм, аппарат
medium	среда
melt	славить, плавиться
mercuric	ртутный
mercury	ртуть

methane	метан
methanol	метанол, метиловый спирт
methyl chloride	хлористый метил
moderate	умеренный
moist	влажный
moisture	влага
mole	грамм-молекула
molecular	молекулярный
molten	литой, расплавленный
molybdenum	молибден
monatomic	одноатомный
monomer	мономер
monoxide	одноокись
mould	формовать

N

naphthalene	нафталин
neon	неон
neutral	нейтральный
neutron	нейтрон
nickel	никель
niobium	ниобий
nitrate	нитрат, соль азотной кислоты
nitration	азотирование
nitric acid	азотная кислота
nitric oxide	окись азота
nitride	нитрид
nitrogen	азот
nitroso-sulfuric acid	нитрозилсерная кислота
nitrous anhydride	азотистый ангидрид
non-ferrous	цветной (о металле)
normalize	нормализовать; нормировать, стандартизировать
nucleus	ядро
nucleophilic	нуклеофильный

О

object-glass	объектив
obsolete	устаревший
odour	запах
oil	нефть, масло; смазывать
opaque	светонепроницаемый
oppose	противопоставлять; противиться, сопротивляться
ore	руда
oxalic acid	щавелевая кислота
oxidation	окисление
oxide	окись
oxidize	окислять
oxidizing agent	окислитель
oxygen	кислород
ozone	озон

Р

palladium	палладий
particle	частица
penetrate	пропитывать; проникать внутрь
pentane	пентан
perchlorate	соль хлорной кислоты
permanent	постоянный, неизменный
permanganate	перманганат
peroxide	перекись
persist	упорно продолжать; сохраняться, удерживаться
persistent	устойчивый; постоянный
persulphate	персульфат
phase	фаза, стадия
phenol	фенол
phosphate	фосфат
phosphine	фосфин
phosphorescence	фосфоресценция, свечение
phosphorus	фосфор
pitchblende	уранинит, смоляная обманка
plane	плоскость; грань (<i>кристалла</i>);

plasticity	плоский; плоскостной
platinum	гибкость
polyazoporphine	платина
polymer	полиазопорфин
polystyrene	полимер
porcelain	полистирол, полистрол
potassium	фарфор, фарфоровый
potassium chlorate	калий
pot still	хлорат калия
pressure	перегонный куб
prism	давление
propane	призма
proton	пропан
pyridine	протон
	пиридин

Q

quantum	доля, квант
quartz	кварц

R

radium	радий
rate	темп; ход; скорость
reading	показание, отсчёт (прибора)
reagent	реактив
recipe	способ; средство
recover	<i>хим.</i> восстанавливать; <i>тех.</i> регенерировать, извлекать
rectifier	<i>хим.</i> ректификатор, очиститель; <i>эл.</i> выпрямитель
reduce	понижать, сокращать; <i>хим.</i> восстанавливать
remedy	исправлять; <i>редк.</i> вылечивать
remove	устранять, удалять
render	приводить в какое-л. состояние; превращать во что-л.; делать

replace	вернуть; восстановить; заменять, замещать (by, with)
residue	осадок
resist	сопротивляться, не поддаваться
resistance	сопротивление, устойчивость
restriction	ограничение
retort	реторта
reveal	обнаруживать, показывать; открывать
revolve	вращать(ся)
roasting	обжиг; выжигание
roll	вращать; катать; свертывать(ся)
route	маршрут, курс, путь, дорога
rust	ржавчина, окалина

S

samarium	самарий
saturate	насыщать
save	экономить
saver	вещь, помогающая сберечь (деньги, труд, время и т.п.)
scale	шкала
scarce	недостаточный, скудный; редкий, редко встречающийся
secure	получать; гарантировать
sedimentation	осаждение; отложение осадка
selenium	селен
shell	оболочка
side reaction	побочная реакция
silica	диоксид кремния
silicon	кремний
silicate	силикат
silver	серебро
slip	скользить
sodium	натрий
sol	золь
solid	твердое вещество
solvent	растворитель

specific gravity	удельный вес
specimen	образец; экземпляр
split up	разделять(ся), раскалывать(ся)
stannous	двухвалентное олово
starch	крахмал
state	заявлять; строение, структура, форма; состояние, положение
steel	сталь
still	перегонный куб; дистиллятор; винокуренный завод
stretch	растягивать(ся), вытягивать(ся)
strontium	стронций
substitute	заменять, замещать
substitution	замена, замещение
sulphate	сульфат
sulphide	сульфид
sulphonate	сульфонат
sulphonic acid	сульфо кислота
sulphur	сера
sulphuric acid	серная кислота
suspension	взвесь, суспензия
synthesis	синтез

T

tarnish	тускнеть
technique	техника, метод, технич. приём
tellurium	теллур
terbium	тербий
test-tube	пробирка
thallium	таллий
thorium	торий
thread	нить, нитка; <u>тех.</u> резьба, нарезка
tin	олово
tinstone	касситерит
tint	тон, оттенок
tiny	крошечный, очень маленький
tire	шина
tissue	ткань

titanium	титан
titration	титрование
toluene	толуол
torpidity	бездеятельность, вялость
trace	след; незначительное количество, следы
tracer	индикатор, меченый атом
transmission line	эл. линия передачи
treatment	обработка (<i>чем-л.</i>); пропитка
trioxide	трехокись
triphenylmethyl	трифенилметил
tungsten	вольфрам

U

unit	единица; целое; единица измерения; агрегат, установка
unite	соединять(ся), объединять(ся)
univalent	одновалентный
unreacted	непрореагировавший
unstable	неустойчивый
uranium	уран
uranyl	уранил

V

vacuum	вакуум, пустота
vacuum-tube	вакуумная лампа
valence	валентность
vanadium	ванадий
variable	переменная (величина); изменчивый, непостоянный
vehicle	растворитель; связующее вещество
velocity	скорость
vessel	сосуд
viscose	вискоза
volatile	летучий
volcanic	вулканический

volt
voltage

эл. ВОЛЬТ
напряжение

W

wax
welding
wetting agent
white spirit
wire

ВОСК
сварка
увлажнитель
растворитель
проволока, провод

X

xenon
xylane

КСЕНОН
КСИЛОЛ

Y

yield
ytterbium
yttrium

ВЫХОД (*продукции*); давать
ИТТЕРБИЙ
ИТТРИЙ

Z

zink

ЦИНК

Список использованной литературы

1. Упражнения по грамматике английского языка для студентов 1-2 курсов химико-технологических специальностей / сост.: Кузьмина Р.В., Смирнова А.Н.; под ред. Р.В. Кузьминой; Иван. гос. хим.-технол. ун-т. – Иваново: ИГХТУ, 2008. – 48 с.
2. English for Chemistry Students 1. Version 5.1 от 11.02.2015. URL: <http://www.primat.cz/> (дата обращения: 05.04.2017).

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Под редакцией:

Кузьминой Риммы Владимировны

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ЯЗЫКА И СПРАВОЧНЫЕ МАТЕРИАЛЫ
для самостоятельной работы студентов 1-2 курсов
химико-технологических специальностей**

Учебное пособие

Технический редактор Г.В. Куликова

Подписано в печать 27.04.2017. Формат 60×84 1/16.
Усл. печ. л. 4,88.

ФГБОУ ВО «Ивановский государственный
химико-технологический университет»

153000, г. Иваново, Шереметевский проспект, 7