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Kazan National Research Technological University

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How to Present a Research Project?

Study Guide

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The Study Guide is intended for practical courses in EAP (English for Academic Purposes) for training students to present research projects in the English language.

The Study Guide is designed for doctoral students in Science and Engineering at Kazan National Research Technological University. It can also be used for Bachelor's and Master's degree students majoring in Chemical Technology and Engineering, as well as the students getting a minor degree in the English language.

The study guide has been developed at the Department of Foreign Languages for Professional Communication.

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INTRODUCTION

This study guide is designed to accompany the course in *English for Academic Purposes* for doctoral students at the Department of Foreign Languages for Professional Communication at Kazan National Research Technological University. The study guide aims at providing general information and useful tips together with the English language rules for preparing a successful presentation on research projects in Science and Engineering. The information given in the study guide will definitely be useful for doctoral students and young researchers.

Presentations are a form of communication in the academic community. For a doctoral student, public speaking is one of the opportunities to present the results of their research to the academic community and demonstrate their readiness for cooperation. Preparing and practicing presentations is a good way to develop and show communication skills.

There are three key elements to any presentation: understanding the presentation requirements, organizing your information and knowing what you can do to be a successful presenter.

A typical format of a presentation has a certain structure. First, your title tells people what your presentation is about. Second, you need to explain what your research is about, in other words what you studied and why. Third, you need to explain what data you gathered and how you collected it. Fourth, you have to include some of the important data you collected usually presented in charts and graphs. Then you explain what the data mean in the context of your research toward the end of the presentation. It is important to talk about the meaning of your research findings for the field you are studying. Finally, to wrap up your presentation say what you learned, and what comes next for your research. In general, typical presentations use this format:

- Title
- Research topic
- Research methods
- Data collected
- Research findings

- Implications
- Conclusions

Delivery of the presentation is as important as its content and design. Successful presenters are able to tell people about their research and provide appropriate pictures, videos, graphs and other media. They do it carefully not to overwhelm the audience with too much visuals. Brilliant speakers use gestures and make eye contact with the audience. In summary, skillful presenters are interested in their research and enjoy talking about their research most of all. After all, it is their own project, sharing research should be fun and not stressful.

We hope that the developed teaching and learning materials will be useful and interesting to everyone who plans to present the results of their research projects in the English language.

UNIT 1

PREPARING A PRESENTATION

To make a good presentation you need to plan it carefully. Before starting a presentation, ask yourself who you are and why you are going to tell the audience about your research. These are the basic questions to answer. In addition, there are some more important points to consider when planning a presentation:

Purpose. Define the purpose clearly. The typical reasons for giving a presentation are to inform, to report (e.g. on the results of your research) or to persuade. So ask yourself: why are you going to present this material? What are you going to speak about?

Audience. Know your audience. Assume you're delivering a presentation on your research to the audience who are not experts in your specific field of science. So, take it into account and make your presentation interesting and understandable for non-professionals.

Place and equipment. Check the room in which you are going to present preferably in advance in order to get an idea where and how you are presenting best. How many people can you expect at the event? Check the microphones, headsets, remotes, projection screen and so on. You have to know beforehand whether it will be a small classroom or a big conference hall.

Time limits. Timing is very important because you need to fit into the time limits.

Visual effects. Visuals supplement your words with pictures, charts and graphs. They help audience be involved, entertained, and remember you.

Introduction. Presenting yourself is one of the most important parts because here you have to plan how you are going to perform: your appearance, tone of voice, face expression, body language and so on.

Content. Content is an essential part of the presentation. It is the material that you are going to share, so it needs to be well organized. Therefore, you need to think about the structure and the design of your presentation. Content is traditionally arranged as follows: Introduction, Main Body, and Conclusion.

Style and language

While preparing for your presentation, remember that the style and language are to be suitable for research reports. Since there is a big difference between a business presentation and an academic presentation, the style and content are different. Moreover, the style of a research paper and presentation are different, too. Therefore, you cannot merely cut and paste the paragraphs from your articles. Adrian Wallwork gives the following two examples to compare:

Original paper	Presentation
The period of the Union of Soviet Socialist Republics (1922-1991) provided ample opportunities for women to enter higher education in all fields and sectors, including natural or physical sciences (e.g. chemistry, biology, physics, or astronomy). In 1985 the number of female undergraduate students stood at 40%, with 10% undertaking a doctorate. The post-Soviet period is witnessing a so-called feminization of science, in which there has been an emigration of highly trained or qualified scientists. Notable individuals who decided to leave Russia include Pavel Durov (the founder of VKontakte Russia's version of Facebook), and the economist Sergei Guriyev. In contrast, female Russian scientists have remained in Russia and the number of female researchers in such underrepresented areas of sciences as physics, maths, and life sciences has shown a marked tendency to increase.	The Soviet period was not all bad news. Women were able to get into higher education in all fields, including hard sciences, in a way that was unimaginable in Western Europe. In 1985, six years before the breakup of the USSR, the number of female students was 40%. What is changing in the post-Soviet period is the feminization of science. There has been a brain drain with male researchers going abroad. And it's not just the academics who leave. Chessmaster Garry Kasparov left in 2013. He was followed the next year by the founder of Russia's version of Facebook. But the women tend to stick with the motherland. Consequently, the number of female researchers in previously underrepresented areas of sciences such as physics, maths, and the life sciences is growing.

Adrian Wallwork (2016) *English for Presentations at International Conferences*, Springer International Publishing, Switzerland, 284 p.

From these examples you can see that the content and style are different. Besides, the presentation version uses shorter sentences, narrative style, less formal language and less difficult facts to understand. So, it is easier to listen and to understand.

Organizing the content

It has already been mentioned, that a typical format of a presentation consists of the following elements:

- Title
- Research topic
- Research methods
- Data collected
- Research findings
- Implications
- Conclusions

These elements are generally organized in your presentation into three main parts: introduction, main body and conclusion.

Presentation title

The title of your presentation will probably correspond to the topic of your research and your supervisor may definitely help you with constructing the title.

Traditionally, the title summarizes the main ideas and the aim of your research. A good title should be short but not too general. With fewer words it should give an adequate description of your study.

The first slide of the presentation is to contain the title of a research project, the names, positions and places of work or study of reporters. Also, it may include the signs or symbols of the organization and places where the report will be presented.

Other language difficulties that Russian-speaking students may face are related to the rules of transliteration, translation and processing scientific texts and documents.

When preparing the presentation title in English, it is very important to correctly represent yourself and your organization.

When writing proper names, it is recommended to use generally accepted transliteration rules, which can be found on the website: <http://translit.ru> or in Table 1.1.

It should be remembered that the first name comes first, then the last name, and not vice versa. This rule can be easily verified if we recall such famous names as Donald Trump, Michael Jackson, James Bond, George Washington, Harry Potter.

In case you have an international passport, write your name as it is given in it.

Examples:

Иванов Сергей Федорович

Степанова Лариса

Лаврова Ю.В.

Sergey F. Ivanov

Larisa Stepanova

Yu.V. Lavrova

Yu. Lavrova

Table 1.1. Transliteration from Cyrillic to Latin

Cyrillic	Latin	Cyrillic	Latin
А	A	Р	R
Б	B	С	S
В	V	Т	T
Г	G	У	U
Д	D	Ф	F
Е	E	Х	KH
Ж	ZH	Ц	TS
З	Z	Ч	CH
И	I	Ш	SH
Й	J / Y	Щ	SHCH
К	K	Ъ	опускается
Л	L	Ы	Y
М	M	Ь	' (апостроф)
Н	N	Э	E
О	O	Ю	YU
П	P	Я	YA

If it is necessary to write the academic degree of a scientific adviser, then Dr. (Doctor) is written before the name which is suitable for both PhD in science and Doctors of Science. Remember that the system of academic degrees in Russian universities differs from foreign counterparts, therefore, when translating a degree, you can put Dr. before the first and last name, which means that you have a PhD. In the absence of an academic title and degree, Mr. for men or Ms. for women, which means referring to a woman regardless to her marital status. See the examples in Table 1.2 to indicate the position and academic degree of a supervisor.

Examples:

Dr. Oleg Stolyarov

Dr. Stolyarov

Mr. Sergey Fedotov

Mr. Fedotov

Ms. Natalia Pavlova

Ms. Pavlova

When translating the name of the affiliation, use English versions of official websites of organizations. Please note that in the English language name of organization, department, or laboratory every word, except for conjunctions and prepositions, is capitalized. You can find the official names of institutes, faculties and departments of Kazan National Research Technological University in English on the website: <http://www.kstu.ru>.

Examples:

Kazan National Research
Technological University

Казанский национальный
исследовательский
технологический университет

Faculty of Petroleum and
Petrochemistry

Факультет нефти и нефтехимии

Faculty of Chemical Technology

Факультет химической
технологии

Department of Organic Chemistry

Кафедра органической химии

Laboratory of Analytical Chemistry

Лаборатория аналитической
химии

Table 1.2. The main positions and academic degrees of researchers and professors at a university

Position	Должность
Rector	<i>Ректор</i>
Vice-Rector	<i>Проректор</i>
Vice Rector for Research	<i>Проректор по науке</i>
Vice Rector for Academic Affairs	<i>Проректор по учебной работе</i>
Instructor	<i>Ассистент</i>
Assistant Professor	<i>Старший преподаватель</i>
Associate Professor	<i>Доцент</i>
Full Professor	<i>Профессор</i>
Academician	<i>Академик</i>
Department Chair (Head)	<i>Заведующий кафедрой</i>
Dean	<i>Декан</i>
Director of Institute	<i>Директор института</i>
Head of Laboratory	<i>Начальник лаборатории</i>
Laboratory Assistant	<i>Лаборант</i>
Engineer	<i>Инженер</i>
Junior Research Scientist	<i>Младший научный сотрудник</i>
Senior Research Scientist	<i>Старший научный сотрудник</i>
Leading Research Scientist	<i>Ведущий научный сотрудник</i>
PhD student / doctoral student	<i>Аспирант</i>
Academic degree	Научная степень
PhD in Education	<i>доктор / кандидат пед. наук</i>
PhD in Engineering	<i>доктор / кандидат тех. наук</i>
PhD in Chemistry	<i>доктор / кандидат хим. наук</i>
PhD in Physics and Mathematics	<i>доктор / кандидат физ.-мат. наук</i>
Doctor of Science (D.Sc.)	<i>доктор наук</i>
Doctor of Science in Engineering	<i>доктор технических наук</i>
Doctor of Science in Education	<i>доктор педагогических наук</i>
Doctor of Science in Chemistry	<i>доктор химических наук</i>
Doctor of Science in Physics and Mathematics	<i>доктор физико-математических наук</i>

When writing an address in English, follow this sequence:

1. organization;
2. house number;
3. street name;
4. apartment number;
5. city;
6. ZIP code;
7. country.

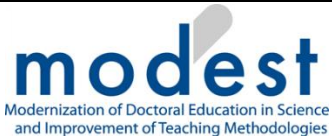
Example:

Kazan National Research Technological University
68 K. Marks str., Kazan 420015, Russian Federation

The template of the presentation title:

	
Presentation Title	
Name Surname Position Organization	
Year	

The example of the presentation title:



HOW TO PRESENT A RESEARCH PROJECT?

**Elvira Valeeva
Julia Ziyatdinova
Liliya Gazizullina**

**Kazan National Research Technological University
Department of Foreign Languages for Professional Communication
2020**

Introduction

In this part of the presentation, you need to welcome the audience, introduce yourself and your coauthors, make a short overview of what you are planning to tell in the presentation and give suggestions about the questions. If you plan to give a presentation to an audience that is not familiar with you, your affiliation, and the city or country where you live, please provide people with this information. This will brighten up your presentation and allow the audience to know you better.

Introduction usually contains

Greetings:

- Good morning/afternoon/evening, my name is... and I am a...
- Hello everyone, my name is...
- Let me introduce myself
- Welcome everybody

Introducing the topic

- I would like to give you a short presentation about...
- Today I am going to talk about...
- The topic of my talk is...
- What I am going to talk about today is...
- I would like to take this opportunity to present...

Purpose

- The purpose of this presentation is...
- My objective today is...

Plan

- I'd like to give you a brief outline of my presentation...
- Here is the plan for the meeting...
- My presentation consists of the following parts...
- The presentation is divided into three main sections...

Main body

In the main body, you need to present the entire course of the study, materials, methods, and the results obtained. Data can be displayed as lists, tables, or charts with statistics. This part should be the largest and most informative, and be a logical continuation of the questions identified by the author in the introduction. In this part of the presentation the topic of the speech will be developed and supported by the necessary evidence and arguments. Main points should be supported one by one with evidence and examples. Before presenting the next idea you should make up a summary. Transitions should be used to link ideas. Follow the audience reactions and give them time to take notes.

When you present the results or the main points of your research, the arrangement of the material corresponds with the structure of the thesis. Traditionally, presenters introduce the topic of their research, aim, relevance, materials and methods, data collection, conclusions and perspectives. Each main idea should be supported by details, reasons and examples. However, an excessive amount of supporting details may overload your speech and distract the attention of the audience.

To start a new part, to add an idea or to draw the audience's attention you may use the following phrases:

Drawing attention to slides

- This chart/graph/table illustrates...
- If you look up at the screen...
- I would like to show you this...

- On your handout, you may see...
- To give you an example,...
- To illustrate this point...

Transitions

- I would like to shift focus now to...
- Next, we need to consider...
- This leads me to my next point...
- I'd like to move on to another part of the presentation...
- Now I'd like to look at...

Adding ideas

- In addition to this, I'd like to say that
- As well as
- Another significant point is that...
- Furthermore
- Besides

Make sure that you only write down the key points in your slide. Some experts say, it is good to use bullet points instead of full sentences. This is true, however, too many bullet points make the slide boring and overloaded.

This slide is quite good as it is easy to read and it just supports the speaker's words.

Bullet Points

- Use short sentences.
- Keep the same grammatical structure across all bullet points.
- Be consistent.

The following slide is overloaded with the text, though it is a list of bullet points. It is boring and demands a lot of time to read.

Bullet Points Bullet points are used to break up a text into a list, making it easier to understand. • Make sure that you only write down the key points in your slide. • Some experts say, it is good to use bullet points instead of full sentences. • However, too many bullet points make the slide boring and overloaded. • Make sure that you start every bullet with a verb in the same tense: present, past or future. Keep the same grammatical structure across all bullet points. • Use the same punctuation for all points on the slide.
--

Conclusion

In conclusion you can summarize your ideas, ask for questions from the audience and thank the audience. To summarize your ideas you may use the following word combinations and phrases:

- To summarize...
- In conclusion...
- I would like to recap...
- To sum up what has been said...
- Let's summarize briefly what we've looked at...
- I'd like to sum up the main points...

Questions at the end of a presentation

- I'll gladly answer any of your questions at the end
- I'd be grateful if you could ask your questions after the presentation.
- I am happy to answer your questions now.
- Do you have any questions?

Thanking

- Thank you for your attention!
- Thank you for your listening!
- It has been a pleasure talking to you!
- I'd like to thank you all for your attention and interest!

Impression management

Delivery is one of the most important parts of giving a presentation, because here you have to think how you are going to perform. According to the experts the following tips may help you make an effective presentation:

- be entertaining, informative and enthusiastic;
- speak clearly, face the audience, do not read, avoid monotone voice;
- make eye contact to connect with the audience;
- do not read the slides, do not look over the people's heads, do not look at your notes; try to look at every single person in the room;
- include anecdotes or personal stories; personal stories may help the audience feel connected to you and help you be memorable.

If you present your report in English and you are not an English speaker it may be really challenging for you. In this case you will need more preparation and a lot of practice. Avoid grammar and vocabulary mistakes, check the pronunciation. Make important words stronger and louder. Practice problem words many times using dictionaries and asking your teacher for help. Pay attention to stress and intonation. Plan when to pause.

Mind your body language, since it is important. When people feel nervous they may behave in a certain way showing the nervousness. But your gestures need to be an extension of your message, not your nervousness. Since planned gestures tend to look false, try to be natural. Eye contact is really important, but challenging. Pay attention to everyone and try to get some feedback from them. So, eye contact helps people in the room feel connected to you.

Dress neatly and tidily. It is good if you wear smart clothes, but make sure, that you feel comfortable. Carry yourself in a confident and professional manner. This is easier if you are prepared and know your topic perfectly.

Acknowledgements

It is considered good practice to mention all the people and organizations that took part in the project or provided financial support for the research. To do this, at the beginning or end of the presentation, authors can say words of gratitude (acknowledgments). In English, there are certain phrases for expressing appreciation:

to thank	<i>благодарить</i>
thankful	<i>благодарный, признательный</i>
to appreciate	<i>быть признательным</i>
gratitude	<i>благодарность</i>
grateful	<i>благодарный, признательный</i>
appreciation	<i>признательность</i>
to acknowledge	<i>благодарить, выражать признательность</i>
acknowledgement	<i>благодарность</i>
acknowledgements	<i>слова благодарности</i>
to express one's gratitude to somebody	<i>выражать благодарность кому-то</i>
to express one's appreciation to somebody	<i>выражать благодарность кому-то</i>
to be grateful to somebody for something	<i>быть признательным кому-то за что-то</i>
to be thankful to somebody for something	<i>быть благодарным кому-то за что-то</i>

Examples:

- We **are grateful to** Dr. John Adams from New York State University, who coordinated the research project, and contributed to the experimental part of the research.
- We **thank** the editors of Journal of Physical Chemistry for their advice regarding the content of this study.
- The authors **are pleased to acknowledge** financial support from Roger Company in conducting research.
- We **are thankful to** our colleagues who provided samples for testing that greatly assisted the research.

- The author **is grateful to** Dr. John Elter for his assistance with experimental equipment and Dr. Edgar Shults who helped to improve the project results significantly.
- We **express our gratitude and appreciation to** Dr. James Cotton for sharing his pearls of wisdom with us during the course of this research.
- We **express our greatest appreciation to** our colleagues from the Laboratory of Nanotechnology and Nanomaterials for their assistance with the collection of data.
- The authors **gratefully acknowledge** the support and generosity of Australian Research Foundation without which the present research project could not have been completed.
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PRACTICAL EXERCISES

1. Answer the question:

1. What are the main principles which can be used for preparing a successful presentation?
2. What is the most important principle for you?
3. What is the main aim of a scientific presentation?
4. What are the main parts of a presentation?
5. What are the differences between academic papers and presentations?

2. Read and translate the texts and decide whether they refer to an academic paper or an oral presentation.

Text 1. Our scientific team develops new methods for measuring physical and chemical properties of organic substances. We work in the modern laboratory at University of Latvia. The laboratory is equipped with all necessary experimental facilities of high quality. It will allow us to test a great number of organic compounds. Our methods will be used to measure such properties as: melting point, boiling point, water solubility, and various chemical constants. We would like to invite you to take part in our work for creating a database for physical and chemical properties of organic compounds.

Text 2. The research project aims at developing new advanced methods for measuring physical and chemical properties of organic substances, such as melting point, boiling point, water solubility, and various chemical constants. The experimental part of the study is carried out in the Laboratory of Analytical Chemistry at University of Latvia. The obtained experimental results will be used for creating a database for chemical and physical properties of organic compounds.

3. Think about the presentation of your research project. Write answers to the following questions:

1. What is your purpose?
2. Who is your audience?
3. How will you engage your audience?

4. Prepare a title slide of the presentation. Make a list of at least three versions of the title for your presentation. Make them different in length. Choose one and explain why it is the best version.

5. Introduce yourself as a doctoral student and prepare the presentation slides for the introduction. The introduction should include answers to the following questions:

1. What is your name?
2. Where are you from?
3. What university do you study at?
4. What is your department?
5. What is your major?
6. What was your Bachelor's and Master's degree program?
7. Why did you decide to get a PhD?
8. Who is your research supervisor?
9. What is the topic of your research?

6. Find an equivalent ending for the phrase from column A to column B.

- | A | B |
|-------------------------------------|-------------------------------------|
| 1. I don't see... | a. I can't answer that... |
| 2. Can I get back to you...? | b. to comment on that... |
| 3. I'm not in a position... | c. about that? |
| 4. I'm afraid... | d. a very different issue. |
| 5. I'm sorry... | e. the connection. |
| 6. I think that is... | f. catch that. |
| 7. I'm sorry, but I didn't... | g. I don't follow you. |
| 8. I see things... | h. rather differently. |
| 9. I'd like to move on... | i. to my previous point. |
| 10. Going back... | j. for a moment. |
| 11. I'd like to digress here... | k. to the next point. |
| 12. So, just to give you... | l. questions, we can stop there. |
| 13. This brings me... | m. when I have finished. |
| 14. I would like to give you... | n. the main points. |
| 15. Perhaps we can talk about it... | o. to the end of the presentation. |
| 16. Can you give us...? | p. to make it quite clear. |
| 17. If there are no more... | q. a brief overview of the subject. |
| 18. Let me rephrase that... | r. an example to illustrate that? |

7. Translate the following English phrases into Russian and determine which part of the presentation they might refer to:

- a. Introducing yourself*
- b. Preparing the audience*
- c. Delivering the message*
- d. Conclusion*

1. If you have any questions, I'll be happy to answer them.
2. Let's summarize the main points again.
3. I'd like to report on my study into oil production.
4. In conclusion, I'd like to thank the audience.
5. I'd like to turn to something completely different.
6. Could you come back to point 2 again?
7. I'm sorry but I don't have that information to hand.
8. The presentation is not going to take long.
9. I'm glad you asked this question.
10. If you don't mind we'll leave questions to the end.
11. Dear ladies and gentlemen, let me introduce myself.
12. I think I'm not the right person to answer your question.
13. If you look at the diagram you can see interesting things.
14. We will come back to this point later.
15. Let's move on to the next point of my presentation.
16. There is a couple of points I'd like to add.
17. Could you speak up, please?
18. I will quickly recap the main points of my presentation.
19. I don't share your opinion on this question.
20. Feel free to ask any questions.
21. I'd like to tell you about our new distillation column.
22. I can't but agree with you.
23. Let's turn now to our plans for next year.
24. Unfortunately, I'm already short of time.
25. I'm going to talk to you about the results of our survey.
26. The goal is to show you how to put theory into practice.
27. Let's take a look at what we have achieved so far.
28. If I could summarize a few points from John's report.
29. I'd like to turn your attention to this question.

8. Complete the sentences:

Greetings:

- Good morning/afternoon/evening, my name is ... and I am a ...
- Hello everyone, my name is ... I study ...
- Let me introduce myself ...
- Welcome everybody ...
- I would like to tell you a few words about my University ...
- Today, I would like to present you the research project which was conducted in the Department ...
- I would like to introduce you my research supervisor ...

Introducing the topic:

- I would like to make you a short presentation about...
- Today, I am going to talk about ...
- The topic of my talk is ...
- What I am going to talk about today is ...
- I would like to take this opportunity to present ...

Purpose:

- The purpose of this presentation is ...
- My objective today is ...
- My presentation aim at ...
- My research project focuses on ...
- The study deals with ...

Plan:

- I'd like to give you a brief outline of my presentation...
- Here is the plan for the meeting...
- My presentation consists of the following parts...
- The presentation is divided into three main sections...

Conclusion:

- If you have any questions, I'll be happy ...
- I will quickly recap the main points of my presentation. They are ...
- Thank you ...

9. Rewrite the texts using bullet points and prepare slides. You may create more than one slide for a text.

Text 1:

Analytical chemistry consists of classical, wet chemical methods and modern, instrumental methods. Classical qualitative methods use separations such as precipitation, extraction, and distillation. Identification may be based on differences in color, odor, melting point, boiling point, radioactivity or reactivity. Classical quantitative analysis uses mass or volume changes to quantify amount. Instrumental methods may be used to separate samples using chromatography, electrophoresis or field flow fractionation.

https://en.wikipedia.org/wiki/Analytical_chemistry

Text 2:

According to their physical and chemical properties, the elements can be classified into the major categories of metals, metalloids and nonmetals. Metals are generally shiny, highly conducting solids that form alloys with one another and salt-like ionic compounds with nonmetals (other than noble gases). A majority of nonmetals are colored or colorless insulating gases; nonmetals that form compounds with other nonmetals feature covalent bonding. In between metals and nonmetals are metalloids, which have intermediate or mixed properties.

https://en.wikipedia.org/wiki/Periodic_table

Text 3:

Research is creative and systematic work undertaken to increase the stock of knowledge. It involves the collection, organization, and analysis of information to increase understanding of a topic or issue. A research project may be an expansion on past work in the field. Research projects can be used to develop further knowledge on a topic, or for education. To test the validity of instruments, procedures, or experiments, research may replicate elements of prior projects or the project as a whole. The primary purposes of basic research (as opposed to applied research) are documentation, discovery, interpretation, and the research and development (R&D) of methods and systems for the advancement of human knowledge. There are several forms of research: scientific, humanities, artistic, economic, social, business, marketing, practitioner research, life, technological, etc.

<https://en.wikipedia.org/wiki/Research>

10. Make up texts based on the following slides and present each slide:

Slide 1:

My educational background

Kazan National Research Technological University



- **2018:** Bachelor's degree in Chemical Technology.
- **2020:** Master's degree in Mechanical Engineering.
- **Since 2020:** Doctoral program (Department of Chemical Technology).

Slide 2:

Department of Inorganic Chemistry

Academics:

- **general chemistry courses;**
- **inorganic chemistry courses.**

Research:

- **theoretical chemistry;**
- **electrochemistry;**
- **quantum chemistry.**

11. Prepare the presentation focusing on your research project according to the tips and rules presented in Unit 1. The presentation should follow the structure:

- Title
- Research topic
- Research methods
- Data collected
- Research findings
- Implications
- Conclusions

UNIT 2

PRESENTING EXPERIMENTAL EQUIPMENT AND ANALYTICAL METHODS

Experiments and analytical methods are the essential components of any presentation focusing on physical or chemical research. This part of the lectures will demonstrate you some grammar rules and vocabulary, including special physical and chemical terms, which are widely used for presenting experimental methods of research.

Figures

To present experimental equipment and processes, diagrams and figures should be used. They make your description of complex scientific methods easier to understand.

The example of an experimental setup is presented in Figure 1.

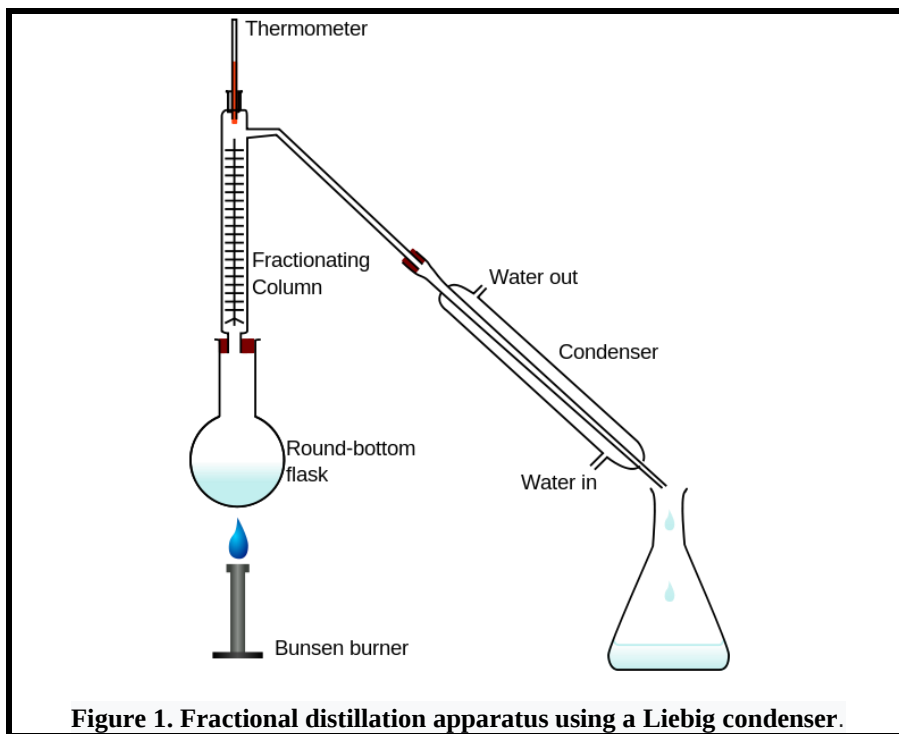
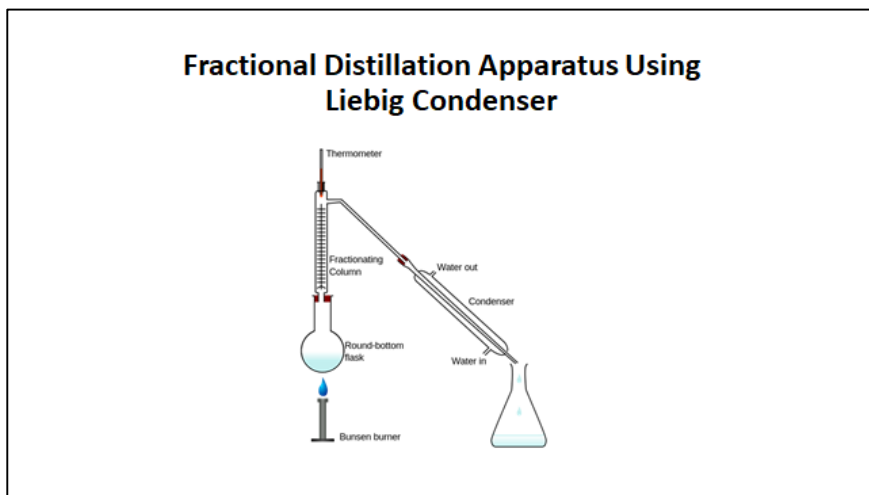


Figure 1. Fractional distillation apparatus using a Liebig condenser.

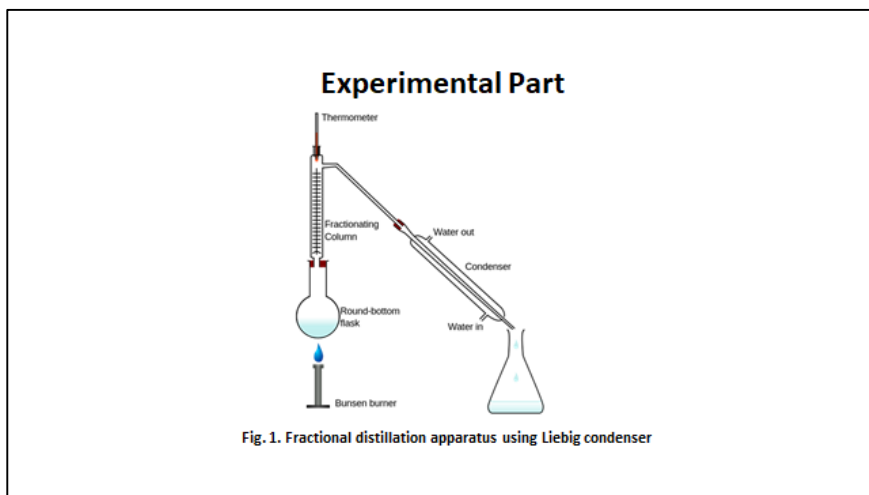
https://en.wikipedia.org/wiki/Fractional_distillation

To represent this setup in a slide, you may use the following examples:

Example 1:



Example 2:



Special attention should be paid to the captions. You may write the word ‘figure’ (‘fig.’) before the name of your experimental unit or you may not write. Also, you may use such words as picture, diagram, flow sheet, etc.

For an oral description of the picture (slide), you can use the active or passive voices of the present simple tense of an English verb (Appendix 1):

Active voice:

Figure 1 **shows** the experimental setup of fractional distillation.

Examples:

the picture presents	<i>на рисунке представлено</i>
the figure depicts	<i>на рисунке изображено</i>
the graph indicates	<i>на графике отображено</i>
the flow sheet demonstrates	<i>на поточной схеме показано</i>
the diagram illustrates	<i>на рисунке продемонстрировано</i>
the scheme explains	<i>на схеме показано объяснение</i>
the slide shows	<i>на слайде показано</i>

Passive voice:

The experimental setup of fractional distillation **is shown** in figure 1.

Examples:

The scheme of the device is presented in the figure.	<i>Схема устройства представлена на рисунке.</i>
The technological process is indicated in the picture.	<i>Технологический процесс представлен на рисунке.</i>

The choice of the voice depends on what you want to put forward to draw the attention of the audience.

If the figure is indicated without a number, then the definite article must be used. No article is required if the figure is indicated by a number.

Examples:

Figure 1 shows the experimental setup of fractional distillation.

The figure shows the experimental setup of fractional distillation.

The experimental setup of fractional distillation is shown in **figure 1**.

The experimental setup of fractional distillation is shown in **the figure**.

Process parameters and their units

Process parameters and material properties as well as their units play an important role in describing the scientific experiments and methods. Table 2.1 shows the most common parameters and their units:

Table 2.1. Process parameters and material properties

PARAMETER ПАРАМЕТР	
Unit Единица измерения	Abbreviation аббревиатура
LENGTH ДЛИНА	
nanometer	nm
micrometer	μm
centimeter	cm
meter	m
kilometer	km
AREA ПЛОЩАДЬ	
square centimeter	cm^2
square meter	m^2
square kilometer	km^2
WEIGHT (MASS) ВЕС (МАССА)	
milligram	mg
gram	g
kilogram	kg
ton	t
MOLECULAR WEIGHT МОЛЕКУЛЯРНАЯ МАССА	
gram per (to) mole	g/mol
kilogram per (to) kilo mole	kg/kmol
VOLUME AND CAPACITY (ОБЪЕМ ДЛЯ ЖИДКОСТЕЙ И СЫПУЧИХ МАТЕРИАЛОВ)	
cubic centimeter	cm^3
cubic meter	m^3
milliliter	ml
liter	l

TIME ВРЕМЯ	
second	s
minute	min
hour	hr
VELOCITY СКОРОСТЬ	
meter per (to) second	m/s
kilometer per (to) second	km/s
kilometer per (to) hour	km/h
MASS FLOW RATE МАССОВЫЙ РАСХОД	
kilogram per (to) second	kg/s
TEMPERATURE ТЕМПЕРАТУРА	
degree Celsius	°C
Kelvin degree	K
degree Fahrenheit	°F
DENSITY ПЛОТНОСТЬ	
gram per (to) cubic centimeter	g/cm ³
kilogram per (to) cubic meter	kg/m ³
DYNAMIC VISCOSITY ДИНАМИЧЕСКАЯ ВЯЗКОСТЬ	
Pascal multiplied by second	Pa s
KINEMATIC VISCOSITY КИНЕМАТИЧЕСКАЯ ВЯЗКОСТЬ	
square meter per (to) second	m ² /s
PRESSURE ДАВЛЕНИЕ	
Pascal	Pa
Newton per (to) square meter	N/m ²
kilogram divided by meter multiplied by square second	kg/m s ²
kilogram force per (to) square centimeter	kgf/cm ²
standard atmosphere	atm
Bar	bar

ENERGY ЭНЕРГИЯ	
Joule	J
calorie	cal
Newton per (to) meter	N/m
HEAT CAPACITY ТЕПЛОЕМКОСТЬ	
Joule per (to) Kelvin degree	J/K
HEAT CONDUCTION ТЕПЛОПРОВОДНОСТЬ	
Watt divided by meter multiplied by Kelvin degree	W/(m K)
SURFACE TENSION ПОВЕРХНОСТНОЕ НАТЯЖЕНИЕ	
Joule per square meter	J/m
ENTROPY ЭНТРОПИЯ	
Joule divided by mole multiplied by Kelvin degree	J/(mol K)
ENTHALPY ЭНТАЛЬПИЯ	
kilo Joule	kJ
STRENGTH OF CURRENT СИЛА ТОКА	
Ampere	A
VOLTAGE ЭЛЕКТРИЧЕСКОЕ НАПРЯЖЕНИЕ	
volt	V
ELECTRICAL RESISTANCE ЭЛЕКТРОСОПРОТИВЛЕНИЕ	
Ohm	Ω
ELECTRICAL CONDUCTIVITY ЭЛЕКТРОПРОВОДНОСТЬ	
siemens	S

Prepositions

It is very important to use English prepositions correctly when describing the conditions and parameters of scientific experiments, characteristics and properties of various methods for chemical and physical analysis of materials and substances:

about (around) 70MPa	<i>около 70МПа</i>
at 50K	<i>при 50К</i>
at temperature of 50 K	<i>при температуре 50 К</i>
between 50 kg and 70 kg	<i>между 50 кг и 70 кг</i>
for 2 hours	<i>в течение 2 часов</i>
from 50 K to 70 K	<i>с 50 К до 70 К</i>
in a wide range of densities	<i>в широком диапазоне плотностей</i>
over a wide range of temperatures	<i>в широком диапазоне температур</i>
to room temperature	<i>до комнатной температуры</i>
under conditions	<i>в / при условиях</i>
under the pressure of 20MPa	<i>при давлении 20 МПа</i>
under vacuum	<i>под вакуумом</i>
up to 100 °C	<i>до 100 °C</i>

Example:

The sample is heated **up to 150 °C** and held **at this temperature for 2 hours**, and then it is cooled **to room temperature**.

When describing chemical or physical processes occurring in experimental installations, the prepositions of place are used:

at the bottom of the column	<i>на дне колонны</i>
above the valve	<i>над клапаном</i>
after the distillation unit	<i>после дистиляционной установки</i>
before the pump	<i>до насоса</i>
behind the device	<i>позади устройства</i>
in the system	<i>в системе</i>
inside the chamber	<i>внутри камеры</i>
near the instrument	<i>около прибора</i>
on the surface	<i>на поверхности</i>
outside the vessel	<i>снаружи сосуда</i>
under the plant	<i>под установкой</i>

Example:

The initial compound is mixed with the products of the reaction **inside the chamber** which is installed **before the pump**.

To describe the movement of materials and substances in the equipment, it is necessary to use prepositions of direction:

to go to	<i>поступать / проходить в</i>
to flow down	<i>течь вниз</i>
to go up	<i>поступать вверх</i>
to exit from	<i>выходить из</i>
to go out of	<i>выходить из</i>
to put into	<i>помещать в</i>
to pass over	<i>проходить над</i>
to travel through	<i>проходить через</i>
to flow towards	<i>течь по направлению к</i>
to add to	<i>добавлять в</i>
to convert into	<i>превращать в</i>

Example:

The mixture **passes through** the heat exchanger to be heated to its boiling temperature. Its vapors **go up** and **exit from** the top of the reactor.

Parenthetical words and prepositions are used to present the sequence of actions:

firstly	<i>сначала</i>
at the beginning	<i>в начале</i>
following	<i>следующий</i>
next	<i>следующий</i>
then	<i>затем</i>
after	<i>после</i>
before	<i>до</i>
subsequently	<i>впоследствии, затем</i>
finally	<i>в конце</i>

Example:

Before being mixed in the stirrer, the product is cooled to room temperature. **Then** it is compressed at 1100 Pa. **After** that it goes to the reactor for further treatment.

PRACTICAL EXERCISES

1. Read and translate the description of the distillation process presented in Figure 1 into Russian.

Fractionation Distillation Apparatus Using Liebig Condenser

The experimental installation for fractionation distillation of multicomponent mixture **is presented in Figure 1**. The main units of the installation are:

- Bunsen burner;
- round-bottom flask;
- fractionating column;
- thermometer;
- Liebig condenser.

The mixture **is placed into** the round bottomed flask, where it is heated **up to its boiling temperature**. The formed vapors **go up to the fractionating column**. **Inside the column** the vapors condense **on the surface** of glass trays. The obtained distillate **goes down** and mixes with upflowing vapors. The hottest tray is **at the bottom** and the coolest is **at the top**. At steady state conditions, the vapor and liquid **on each** tray are at equilibrium. **Finally**, the most volatile component of the mixture exits as a gas **at the top of the column**. The vapor **at the top** of the column **then passes into** the condenser, which cools it down until it liquefies.

https://en.wikipedia.org/wiki/Fractional_distillation

2. Translate the Russian sentences into English using the Active or Passive Present Simple tense of the English verbs

Example:

<i>На рисунке показана экспериментальная установка для измерения вязкости жидких сплавов.</i>	
Active voice:	Passive voice:
<i>The figure shows the experimental setup for measuring viscosity of liquid alloys.</i>	<i>The experimental setup for measuring viscosity of liquid alloys is presented in the figure.</i>

- Технологическая схема процесса дистилляции под вакуумом **представлена** на рисунке 2.
- Конструкция механического насоса для перекачки высоковязких жидкостей **показана** на рисунке 3.
- На рисунке 5 **приведены** схемы пластинчатого и кожухотрубчатого теплообменных аппаратов.
- Лабораторный стенд для исследования теплофизических свойств металлов **представлен** на рисунке.
- На рисунке **изображена** конструкция спектрометра.
- Аппарат для анализа кислотности веществ **показан** на рисунке 6.
- На схеме отображены основные потоки нефтеперерабатывающего завода.

3. Match the properties of substances and systems in column A to their units in column B

A	B
1. dynamic viscosity	a. Ω m
2. density	b. Pa
3. temperature	c. J/kg K
4. surface tension	d. kg/m^3
5. pressure	e. W/mK
6. thermal conduction	f. J/m^2
7. heat capacity	g. $^{\circ}\text{C}$
8. electrical resistivity	h. m^2/s
9. kinematic viscosity	k. Pa s
10. time	l. s

4. Translate parameters and their units into English

Динамическая вязкость, Па сек	<i>Dynamic viscosity, Pa s</i>
Площадь, см ²	
Масса, кг	
Длина, м	
Скорость м/сек	
Плотность, кг/м ³	
Температура, °С	
Поверхностное натяжение, Дж/м ²	
Давление, Па	
Теплопроводность, Вт/м К	
Электросопротивление, Ом м	
Кинетическая вязкость, м ² /сек	
Сила тока, А	
Теплоемкость, Дж/(моль К)	

5. Describe the flowsheet of petroleum stabilization using the following English terms:

crude oil	<i>сырая нефть</i>
heat exchanger	<i>теплообменник</i>
furnace	<i>печь</i>
flash tower	<i>испарительная колонна</i>
petroleum gas	<i>нефтяной газ</i>
remaining liquid	<i>оставшиеся жидкие фракции нефти</i>
to go to	<i>поступать в</i>
to pass through	<i>проходить через</i>
to exit from	<i>выходить из</i>
to go up	<i>поступать вверх</i>
to flow down	<i>стекать вниз</i>
to heat up to 200°C	<i>нагреваться до 200°C</i>
to separate into	<i>разделять на</i>
at the beginning	<i>сначала</i>
after	<i>после</i>
finally	<i>в результате</i>
top of the tower	<i>верх колонны</i>
bottom of the tower	<i>низ колонны</i>

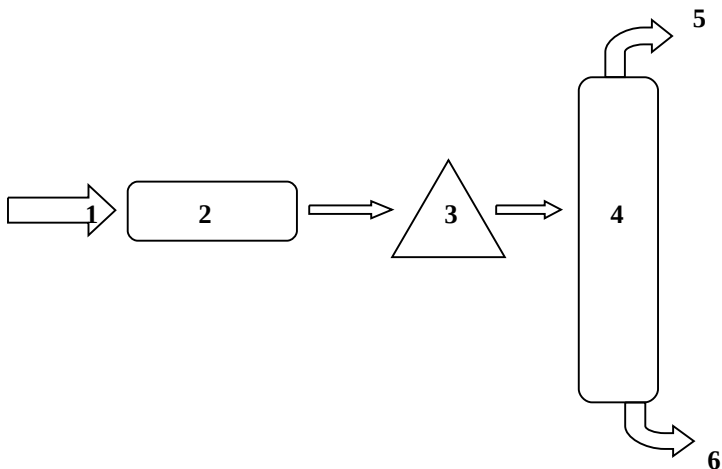


Fig. Petroleum stabilization (1 – crude oil; 2 – heat exchanger; 3 – furnace; 4 – flash tower; 5 – petroleum gas; 6 – remaining liquid).

6. Prepare a slide with experimental equipment which is used in your research. Describe the flowsheet according to the rules presented in this unit.

UNIT 3

PRESENTING MATHEMATICAL EXPRESSIONS AND PHYSICAL EQUATIONS

Most physical and chemical research is based on mathematical and physical equations and formulas. In this unit, you can find information on presenting mathematical relationships in English.

Mathematical expressions

There are simple and complex mathematical operations. You can find some of them in Table 3.1.

Table 3.1. Mathematical expressions

Mathematical expression	Description in English
$a = b$	a is b a is equal to b a equals b
$a + b$	a plus b the sum of a and b
$a - b$	a minus b the subtraction of b from a
$a \times b$	a multiplied by b a times b the product of a and b
$\frac{a}{b}$	a divided by b the division of a to b the ratio of a to b
$a < b$	a is greater than b
$a > b$	a is less than b
$a \leq b$	a is less than or equal to b
$a \approx b$	a is approximately equal to b
$a \neq b$	a is not b a does not equal b a is not equal to b
$\sqrt{a}$	the square root of a
$\sqrt[3]{a}$	the cubic root of a
$\sqrt[5]{a}$	the 5 th root of a

$ b $	the absolute value of b number
a^2	a to the second power a squared
a^3	a to the third power a cubed
a^5	a to the 5 th power a to the power of 5
a^{-5}	a to the power of negative 5 a to the power of minus 5
a_i	a sub i
$\int_b^c a$	the integral of a from b to c the integral of a between limits b and c
$\sum_{i=b}^c a_i$	the sum of a sub i from b to c
$\sin x$	the sine of x
$\cos x$	the cosine of x
$\tan x$	the tangent of x
$\text{ctg } x$	the cotangent of x
$y = f(x)$	y is a function of x
$a - (b - c)$	a minus the difference b minus c a minus the quantity b minus c a minus open parenthesis b minus c close parenthesis
$a - (b + c)$	a minus open parenthesis b plus c close parenthesis a minus the sum of b and c a minus the quantity b plus c

Example:

$$\sqrt{a^2 + b^2}$$

The square root of the sum of a to the second power and b to the second power

$$y = 2x - 10^5$$

y is equal to 2 multiplied by x minus 10 to the 5th power

Cardinal and ordinal numbers

Mathematics deals with numbers. There are cardinal and ordinal numbers. Cardinal numbers are used for counting. Ordinal numbers are used to describe the position or order of an object. The examples of cardinal and ordinal numbers are shown in Table 3.2.

Table 3.2. Cardinal and ordinal numbers

Число	Cardinal number	Порядковое число	Ordinal number
1	one	первый	first
2	two	второй	second
3	three	третий	third
4	four	четвертый	fourth
5	five	пятый	fifth
6	six	шестой	sixth
7	seven	седьмой	seventh
8	eight	восьмой	eighth
9	nine	девятый	ninth
10	ten	десятый	tenth
11	eleven	одиннадцатый	eleventh
12	twelve	двенадцатый	twelfth
13	thirteen	тринадцатый	thirteenth
14	fourteen	четырнадцатый	fourteenth
15	fifteen	пятнадцатый	fifteenth
16	sixteen	шестнадцатый	sixteenth
17	seventeen	семнадцатый	seventeenth
18	eighteen	восемнадцатый	eighteenth
19	nineteen	девятнадцатый	nineteenth
20	twenty	двадцатый	twentieth
21	twenty-one	двадцать первый	twenty first
32	thirty-two	тридцать второй	thirty second
43	forty-three	сорок третий	forty third
54	fifty-four	пятьдесят четвертый	fifty fourth
65	sixty-five	шестьдесят пятый	sixty fifth
76	seventy-six	семьдесят шестой	seventy sixth
87	eighty-seven	восемьдесят седьмой	eighty seventh
98	ninety-eight	девяносто восьмой	ninety eighth
100	hundred	сотый	hundredth
1000	thousand	тысячный	thousandth

If an ordinal number is used as an adjective in an English sentence, a definite article is always used.

Examples:

I would like to present you **the second part** of my research.

The scheme of the experimental setup is presented in **the third slide**.

The fourth power of two is thirty-two.

Fractions

Let's consider the rules of reading fractions in English. Fractions consist of a cardinal numerator and an ordinal denominator.

Examples:

$\frac{1}{8}$ one-eighth

$\frac{1}{3}$ one-third

The exceptions are $\frac{1}{2}$ and $\frac{1}{4}$, which are read "one half" and "one quarter".

If the numerator is more than one, the denominator is read in plural form.

Examples:

$\frac{2}{8}$ two-eighths

$\frac{3}{10}$ three-tenths

In mixed numbers, the fractional part is added to the whole number using 'and'.

Examples:

$2\frac{1}{8}$ two and one-eighth

$5\frac{3}{10}$ five and three-tenths

$3\frac{1}{4}$ three and one quarter

Units after fractional numbers are read with the preposition ‘of’ in the singular form.

Examples:

$\frac{1}{8}$ kg one-eighth of a kilogram

$\frac{3}{10}$ m three-tenths of a meter

Units after mixed numbers are read without the preposition ‘of’ in the plural form.

Examples:

$2\frac{1}{8}$ kg two and one-eighth kilograms

$5\frac{3}{10}$ m five and three-tenths meters

Decimal fractions

We often use decimal fractions such as 0.5; 1.25; 10.569. In the Russian language, a comma is used to indicate a decimal number. In English, a point is used to indicate a decimal fraction. Each number is read separately after the decimal point.

Examples:

1.25	one point two five
10.569	ten point five six nine
344.9865	three hundred forty-four point nine eight six five

If a decimal fraction starts with zero you may use the following versions of reading:

0.5	zero point five
	point five

Mathematical equations

The words and phrases indicating addition, subtraction, multiplication, and division for presenting mathematical operations may be used:

Mathematical operation	English words and phrases	Examples
Addition Суммирование	plus the sum of to add to	$5 + 2$ five plus two the sum of five and two add five to two
Subtraction Вычитание	minus the difference of to subtract from	$5 - 2$ five minus two the difference of five and two subtract two from five
Multiplication Умножение	times cross multiplied by the product of to multiply by	$5 * 2$ five times two five cross two five multiplied by two the product of five and two multiply five by two
Division Деление	divided by the ratio of to divide by	$5 / 2$ five divided by two the ratio of five to two divide five by two

Example:

Let's solve this system of equations by addition:

$$\begin{cases} x + 5y = 7 \\ 3x - 2y = 4 \end{cases}$$

If we add these two equations together, neither of the variables will cancel out. Notice that we have three 'eks' in our second equation. To cancel out 'eks', we need to have negative three 'eks' in our first equation. To create a negative three 'eks' in the first equation, we multiply both sides of the first equation by negative three:

$$\begin{cases} -3x - 15y = -21 \\ 3x - 2y = 4 \end{cases}$$

Now we have: negative three ‘eks’ minus fifteen ‘wai’ is equal to negative twenty-one in our first equation; and three ‘eks’ plus minus two ‘wai’ equals four in the second equation.

If we add two equations together, the variable x will cancel out:

$$-17y = -17$$

We get negative seventeen ‘wai’ equals negative seventeen.

Dividing both sides of the equation by negative seventeen, we find that ‘wai’ is equal to one.

$$y = 1$$

To solve for ‘eks’ we plug ‘wai’ back into one of our original equations. Let’s use our first original equation. We get ‘eks’ plus five multiplied by one equals seven.

$$x + 5 * 1 = 7$$

Subtracting five from both sides of the equation we find that ‘eks’ is equal to two.

$$x = 7 - 5 = 2$$

We can write our answer in the form of ordered pair:

$$(2; 1),$$

where ‘eks’ equals two and ‘wai’ equals one. Notice that ‘eks’ comes before ‘wai’ in our answer, because we write the answer in the alphabetical order.

Physical and chemical formulas

In chemistry and physics, a formula is a way of presenting information about relationships between different quantities or parameters. Any research presentation contains such formulas. The example of description for the world's most famous equation is presented below.

Example:

$$E=mc^2$$

The energy E is equal to the product of the mass m and the speed of light c to the 2nd power.

Energy equals mass times the speed of light squared.

Greek alphabet

Physical and chemical formulas may contain Greek letters. The Greek alphabet is the basis for international language of mathematics, chemistry and physics. Greek letters are used as symbols for constants, variables for physical and chemical parameters. In mathematics, the most famous mathematical constant is number π . In physics, the kinematic viscosity is usually denoted by the Greek letter ν .

There is a difference in pronunciation of the Greek letters between the English and Russian languages. Table 3.4 presents all Greek letters and their pronunciations both in English and Russian.

Table 3.4. Greek alphabet.

Greek	English	Russian	Greek	English	Russian
A α	alpha 'æɪ.fə	альфа	N ν	nu njuː	ню
B β	beta 'biː.tə	бета	Ξ ξ	xi sai	кси
Γ γ	gamma 'gæm.ə	гамма	O o	omicron əʊ'maɪ.krən	омикрон
Δ δ	delta 'del.tə	дельта	Π π	pi pai	пи
E ε	epsilon ep'sai.lən	эпсилон	P ρ	rho rəʊ	ро
Z ζ	zeta 'ziː.tə	дзета	Σ σ	sigma 'sig.mə	сигма
Η η	eta 'iː.tə	эта	Τ τ	tau taʊ	тау
Θ θ	theta 'θiː.tə	тэта	Υ υ	upsilon juːp'sai.lən	ипсилон
I ι	iota aɪ'əʊ.tə	йота	Φ φ	phi faɪ	фи
Κ κ	kappa 'kæp.ə	каппа	Χ χ	chi tʃiː	хи
Λ λ	lambda 'læm.də	ламбда	Ψ ψ	psi psai	пси
Μ μ	mu mjuː	мю	Ω ω	omega 'əʊ.mi.gə	омега

The table presents the pronunciation of Greek letters in the British English. The American English pronunciation is available on the website: <https://dictionary.cambridge.org/dictionary/english>

PRACTICAL EXERCISES

1. Read and translate the description of mathematical expressions into Russian.

- Two times two is four.
- Ten to the third power is equal to one thousand.
- One hundred fifty divided by three equals fifty.
- Fifty-five is greater than fifty-four.
- The sine of 45 degrees is equal to one divided by the square root of two.
- Negative five plus five equals zero.
- The sum of a and b equals c.
- The cotangent of 45 is one.
- The product of nine and nine is equal to eighty-one.
- The ratio of one hundred fifty to three is equal to fifty.
- Negative twenty is equal to five minus open parentheses twenty plus five close parentheses.
- The integral of ten from one to five.
- Sixty-nine minus nine and plus ten is seventy.
- The subtraction of nineteen from thirty-nine is twenty.
- This variable is approximately equal to negative seven.
- Two to the power of five is thirty-two.
- One hundred multiplied by negative one equals negative one hundred.
- Forty-one minus the sum of forty and two equals negative one.
- The cubic root of eight is two.

2. Think of your mathematical expression, read it in English to your groupmates so they can write it on the board.

3. Solve the mathematical tasks.

- Add fifteen to ten and multiply the answer by six.
- Divide one hundred fifty by three and multiply the answer by ten.
- Add seventy to sixty-five and subtract the answer from one hundred thirty-five.
- Multiply eight by six and divide the answer by two.
- Subtract nine hundred ninety from thousand.
- Add ninety to fifty, and subtract the answer from two hundred.
- Subtract forty-four from fifty and divide the answer by three.

4. Read the following fractions and fractions with units in English.

$\frac{1}{2}$; $\frac{1}{3} m$; $1\frac{3}{4}$; $\frac{2}{5} kg$; $\frac{8}{9}$; $\frac{1}{4}$; $3\frac{2}{7} cm$; $\frac{10}{18}$; $5\frac{6}{9} s$; $\frac{5}{8} m^3$

5. Read the following decimal fractions in English.

- 1.2569
- 0.999
- 25.6987
- 2.55
- 1.02489
- 125.560987
- 0.55489
- 133.1008967
- 0.321

6. Solve the system of equations by addition and describe the solution in English.

$$\begin{cases} 2x + y = 6 \\ 4x - 2y = 4 \end{cases}$$

7. Read numbers in the English language.

-25; 125; 1000; 17; -35; 0.5; 100,000; $\frac{1}{3}$; 1.5689; $\frac{3}{4}$; 150,000,000; 1st; 5th; 26th; -0.56895; $\frac{2}{9}$; 796,000; 15; 63; 5968; $\frac{1}{4}$; $\frac{1}{2}$; 6.56987; 3rd; 1569; 2nd.

8. Pronounce the Greek letters both in English and Russian.

α	π	β	ω	θ
ψ	λ	τ	σ	$\omicron$
δ	γ	κ	μ	ν
ρ	υ	ϵ	ϕ	ι

9. Read the mathematical formulas in the English language.

- $a + 5b = c$
- $35x - 69 = -3y$
- $\frac{1}{2}a + (33b - c) = 3\frac{4}{5}$
- $2 * 2 = 4$
- $\frac{4}{-2x} = 0.567y$
- $(25x + 36) * (46y - 15) = 1567$
- $\sin(b - 65) = \sqrt{(4a + 5)}$
- $\sqrt[3]{x} + \sqrt[5]{y} = -44$
- $y = \int_0^{100} f(x)$
- $\sum_0^{15} f(x) = 10^{-5}$
- $A = \pi r^2$
- $5x^2 + 3y^3 - 10\sqrt{z} \geq 0$
- $\frac{(2a+b)^5}{100c^{-3}} \leq 1$

- $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$
- $\cos \alpha + \cos \beta = 2 \cos \frac{1}{2}(\alpha + \beta) \cos \frac{1}{2}(\alpha - \beta)$
- $a^2 + b^2 = c^2$
- $2\frac{1}{3}x - y \approx 0$

10. Describe the following physical relationships in English.

- Уравнение для расчета теплоемкости $c = \Delta Q / \Delta T$, где ΔQ – количество теплоты (the amount of heat), ΔT – разность температур.
- Уравнение для определения давления $P = \rho gh$, где h – высота, ρ – плотность, g – ускорение силы тяжести (gravity), равное $9,8 \text{ м/с}^2$.
- Формулу, определяющую электросопротивление $\rho = E/J$, в которой E – энергия электрического поля, J – плотность тока.
- Уравнение для расчета числа Рейнольдса $Re = \frac{v_s L \rho}{\mu} = \frac{v_s L}{\nu}$, где v_s – средняя скорость (м/с), L – характерный линейный размер (м), μ – динамическая вязкость (Н с/м²), ν – кинематическая вязкость (м²/с), ρ – плотность (кг/м³).

11. Prepare a slide describing your mathematical, physical or physical-chemical relationship and present it in English.

UNIT 4

PRESENTING CHEMICAL ELEMENTS, COMPOUNDS AND REACTIONS

Chemistry is one of the fundamental sciences studying chemical elements, compounds and the interactions between them. Here you will find the examples of the English pronunciation of chemical elements, compounds and learn how to read chemical reactions in English.

In the periodic table, all elements are classified according to their chemical and physical properties. The most widespread version of the classification divides chemical elements into actinides, alkali metals, alkaline earth metals, halogens, lanthanides, metals, metalloids, noble gases, nonmetals, and transition metals.

1 H Hydrogen	Periodic Table of the Elements																2 He Helium
3 Li Lithium	4 Be Beryllium											5 B Boron	6 C Carbon	7 N Nitrogen	8 O Oxygen	9 F Fluorine	10 Ne Neon
11 Na Sodium	12 Mg Magnesium											13 Al Aluminum	14 Si Silicon	15 P Phosphorus	16 S Sulfur	17 Cl Chlorine	18 Ar Argon
19 K Potassium	20 Ca Calcium	21 Sc Scandium	22 Ti Titanium	23 V Vanadium	24 Cr Chromium	25 Mn Manganese	26 Fe Iron	27 Co Cobalt	28 Ni Nickel	29 Cu Copper	30 Zn Zinc	31 Ga Gallium	32 Ge Germanium	33 As Arsenic	34 Se Selenium	35 Br Bromine	36 Kr Krypton
37 Rb Rubidium	38 Sr Strontium	39 Y Yttrium	40 Zr Zirconium	41 Nb Niobium	42 Mo Molybdenum	43 Tc Technetium	44 Ru Ruthenium	45 Rh Rhodium	46 Pd Palladium	47 Ag Silver	48 Cd Cadmium	49 In Indium	50 Sn Tin	51 Sb Antimony	52 Te Tellurium	53 I Iodine	54 Xe Xenon
55 Cs Cesium	56 Ba Barium	57 La Lanthanum	72 Hf Hafnium	73 Ta Tantalum	74 W Tungsten	75 Re Rhenium	76 Os Osmium	77 Ir Iridium	78 Pt Platinum	79 Au Gold	80 Hg Mercury	81 Tl Thallium	82 Pb Lead	83 Bi Bismuth	84 Po Polonium	85 At Astatine	86 Rn Radon
87 Fr Francium	88 Ra Radium	89 Ac Actinium	104 Rf Rutherfordium	105 Db Dubnium	106 Sg Seaborgium	107 Bh Bohrium	108 Hs Hassium	109 Mt Meitnerium	110	111	112	113	114				

58 Ce Cerium	59 Pr Praseodymium	60 Nd Neodymium	61 Pm Promethium	62 Sm Samarium	63 Eu Europium	64 Gd Gadolinium	65 Tb Terbium	66 Dy Dysprosium	67 Ho Holmium	68 Er Erbium	69 Tm Thulium	70 Yb Ytterbium	71 Lu Lutetium
90 Th Thorium	91 Pa Protactinium	92 U Uranium	93 Np Neptunium	94 Pu Plutonium	95 Am Americium	96 Cm Curium	97 Bk Berkelium	98 Cf Californium	99 Es Einsteinium	100 Fm Fermium	101 Md Mendelevium	102 No Nobelium	103 Lr Lawrencium

Chemical elements

In the periodic table, you can see the symbols of the elements. In the English language, these symbols can be pronounced as the letters of the English alphabet.

Examples:

H – [ɜrtʃ]

Li – [el] [aɪ]

Fe – [ef] [i:]

Al – [ei] [el]

The name of some chemical element in the English language you can find in Table 4.1.

Table 4.1. Chemical elements.

Chemical element	English	Russian	Chemical element	English	Russian
Ag	silver	серебро	Li	lithium	литий
Al	aluminium	алюминий	Mg	magnesium	магний
Ar	argon	аргон	Mn	manganese	марганец
As	arsenic	мышьяк	Mo	molybdenum	молибден
Au	gold	золото	N	nitrogen	азот
B	boron	бор	Na	sodium	натрий
Bi	bismuth	висмут	Ni	nickel	никель
C	carbon	углерод	O	oxygen	кислород
Ca	calcium	кальций	P	phosphorus	фосфор
Cl	chlorine	хлор	Pb	lead	свинец
Co	cobalt	кобальт	Pt	platinum	платина
Cu	copper	медь	S	sulphur	сера
F	fluorine	фтор	Si	silicon	кремний
Fe	iron	железо	Sn	tin	олово
H	hydrogen	водород	Ti	titanium	титан
He	helium	гелий	U	uranium	уран
Hg	mercury	ртуть	W	tungsten	вольфрам
I	iodine	йод	Xe	xenon	ксенон
K	potassium	калий	Zn	zinc	цинк

There are some differences in the pronunciation and spelling of some element names between British (BE) and American English (AE). Table 4.2 presents the differences between British and American pronunciation.

**Table 4.2. Chemical elements.
British and American English pronunciation differences.**

Element	BE	AE	Element	BE	AE
Ag	'sɪl.və	'sɪl.və	Li	'lɪθ.i.əm	'lɪθ.i.əm
Al	æljə'mɪn.i.əm	æljə'mɪn.i.əm ə'lu:.mə.nəm	Mg	mæg'ni:.zi.əm	mæg'ni:.zi.əm
Ar	'ɑ:.gʊn	'ɑ:r.gɑ:n	Mn	'mæŋ.gə.ni:z	'mæŋ.gə.ni:z
As	'ɑ:.sən.ɪk	'ɑ:r.sən.ɪk	Mo	mɒl'rb.də.nəm	mɑ:'lɪb.də.nəm
Au	gəʊld	goʊld	N	'naɪ.trə.dʒən	'naɪ.trə.dʒən
B	'bɔ:rn	'bɔ:r.ɑ:n	Na	'səʊ.di.əm	'səʊ.di.əm
Bi	'bɪz.məθ	'bɪz.məθ	Ni	'nɪk.əl	'nɪk.əl
C	'kɑ:.bən	'kɑ:r.bən	O	'ɒk.sɪ.dʒən	'ɑ:k.sɪ.dʒən
Ca	'kæl.si.əm	'kæl.si.əm	P	'fɒs.fɪr.əs	'fɑ:s.fə.əs
Cl	'klɔ:ri:n	'klɔ:r.i:n	Pb	led	led
Co	'kəʊ.bɒlt	'koʊ.bɑ:lt	Pt	'plæt.i.nəm	'plæt.nəm
Cu	'kʊp.ər	'kɑ:.pə	S	'sʌl.fə	'sʌl.fə
F	'flɔ:ri:n	'flɔ:r.i:n	Si	'sɪl.i.kən	'sɪl.ə.kən
Fe	aɪən	aɪrən	Sn	tɪn	tɪn
H	'haɪ.drə.dʒən	'haɪ.drə.dʒən	Ti	trɪ'teɪ.ni.əm	taɪ'teɪ.ni.əm
He	'hi:.li.əm	'hi:.li.əm	U	juə'reɪ.ni.əm	ju'reɪ.ni.əm
Hg	'mɜ:.kjə.ri	'mɜ:.kjə.ri	W	'tʌŋ.stən	'tʌŋ.stən
I	'aɪ.ə.di:n	'aɪ.ə.dam	Xe	'zen.ən	'zen.ɑ:n
K	pə'tæs.i.əm	pə'tæs.i.əm	Zn	zɪŋk	zɪŋk

There are differences in the spelling of some element names between British and American English. In American English, the chemical element Al is spelled aluminum, the chemical element S is spelled sulfur.

Chemical compounds

In English, chemical compounds are read in three ways:

1. spelling the name of the chemical compound;
2. pronouncing each element of the compound individually;
3. using the name of the compound.

Examples:

H₂O	1. [ɛtʃ] two [ou] 2. hydrogen two oxygen 3. water
NaCl	1. [en] [ei] [si:] [el] 2. Sodium chlorine 3. Sodium chloride
NaBr	1. [en] [ei] [bi:] [a:] 2. Sodium bromine 3. Sodium bromide
Fe₄N	1. [ef] [i:] four [en] 2. Iron four nitrogen 3. Iron nitride
KNO₃	1. [kei] [en] [ou] three 2. Potassium nitrogen oxygen three 3. Potassium nitrate
Al₂O₃	1. [ei] [el] two [ou] three 2. Aluminum two oxygen three 3. Aluminum oxide
ZnS	1. [zed] [en] [es] 2. Zink sulfur 3. Zink sulfide
MgSO₄	1. [em] [dʒi:] [es] [ou] four 2. Magnezium sulfur oxygen four 3. Magnesium sulfate
AlF₃	1. [ei] [el] [ef] three 2. Aluminum fluorine three 3. Aluminum fluoride

The second way of pronouncing chemical compounds is not as common as the first or third ones. Latin versions of chemical compound names are also used. For example, ferrum oxide.

To describe numbers of atoms for chemical elements in compounds, various prefixes are used:

mono – one atom;

di – two atoms

tri – three atoms

tetra – four atoms

penta – five atoms

hexa – six atoms

hepta – seven atoms;

octo – eight atoms;

nona – nine atoms;

deca – ten atoms.

Examples:

CO	Carbon monoxide
CO ₂	Carbon dioxide
Fe ₂ (SO ₄) ₃	Iron two triple sulfur oxygen four Ferric sulfate or Iron (III) sulfate
SnF ₄	Lead tetra fluoride Lead (IV) fluoride
PCl ₅	Phosphorus pentachloride Phosphorus (V) chloride
SF ₆	Sulfur hexa fluoride Sulfur (VI) fluoride

Chemical reactions

There are five main types of chemical reactions: synthesis, decomposition, single displacement, double displacement and combustion.

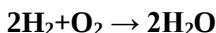
Synthesis	$A + B \rightarrow AB$
Decomposition	$AB \rightarrow A + B$
Single displacement	$A + BC \rightarrow AC + B$
Double displacement	$AB + CD \rightarrow AC + BD$

Elements and compounds involved in chemical reactions are read according to the rules given above. Moreover, you can mix different ways of reading chemical elements and compounds in a single reaction.

The sign “+” may be read as “plus” or “react with”. To describe the sign “→” you may use such verbs as “to form”, “to lead to”, “to yield”, “to result in”.

The coefficients before the chemical elements define molecules or moles. For example, 2H_2 is read as “two molecules of hydrogen” or “two moles of hydrogen”.

Examples:

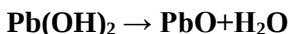


Two molecules of H two plus one molecule of O two yields two molecules of H two O.

Two molecules of hydrogen plus oxygen yields two molecules of water.



One molecule of copper plus two molecules of sulfuric acid forms one molecule of copper sulfate plus two molecules of water plus one molecule of sulfur oxide.



Heating of lead hydroxide leads to the formation of lead oxide and water.



The reaction between zinc carbonate and two molecules of nitric acid results in the formation of zinc nitrite, carbon dioxide and water.

PRACTICAL EXERCISES

1. Listen to the song “Chemical Elements”
(https://www.youtube.com/watch?v=zGM-wSKFBpo&ab_channel=TimwiHeizmann)
and sing it together with your friends.

2. Give the English equivalents for the following chemical elements.

Li	Ca	H	Ti	Zn	Ni
O	Cu	Au	Fe	Na	Co
Al	He	K	Pt	Ag	Hg
Mn	Pb	Cl	Si	N	P
F	I	Xe	Ar	C	Sn
W	Mg	U	Mo	As	B

3. Read the following chemical compounds.

- AlF_6Li_3
- AuCN
- $\text{Ba}(\text{CHO}_2)_2$
- Bi_2S_3
- CH_3COCH_3
- $\text{Ca}(\text{NO}_2)_2$
- $\text{Co}(\text{NO}_3)_3$
- FeCl_3
- H_2SiO_3
- Li_2TiO_3
- H_2O
- CO_2
- SnF_4

4. Read the following chemical reactions.

- $\text{C} + \text{O}_2 \rightarrow \text{CO}_2$
- $2\text{Mg} + \text{CO}_2 \rightarrow 2\text{MgO} + \text{C}$
- $\text{Ca}(\text{OH})_2 + \text{CO}_2 \rightarrow \text{CaCO}_3 + \text{H}_2\text{O}$
- $\text{KOH} + \text{CO}_2 \rightarrow \text{KHCO}_3$
- $2\text{NH}_3 + \text{H}_2\text{SO}_4 \rightarrow (\text{NH}_4)_2\text{SO}_4$
- $\text{Zn} + 2\text{N}_2\text{O}_4 \rightarrow \text{Zn}(\text{NO}_3)_2 + 2\text{NO}$
- $\text{Pb}(\text{NO}_3)_2 + 2\text{KI} \rightarrow \text{PbI}_2 + 2\text{KNO}_3$
- $\text{C}_{10}\text{H}_8 + 12\text{O}_2 \rightarrow 10\text{CO}_2 + 4\text{H}_2\text{O}$
- $\text{SnO}_2 + \text{H}_2 \rightarrow \text{Sn} + \text{H}_2\text{O}$
- $\text{Fe}_2\text{O}_3 + 3\text{H}_2\text{SO}_4 \rightarrow \text{Fe}_2(\text{SO}_4)_3 + 3\text{H}_2\text{O}$

5. Make a slide describing chemical elements, compounds and reactions and present it in English.

UNIT 5

PRESENTING GRAPHS

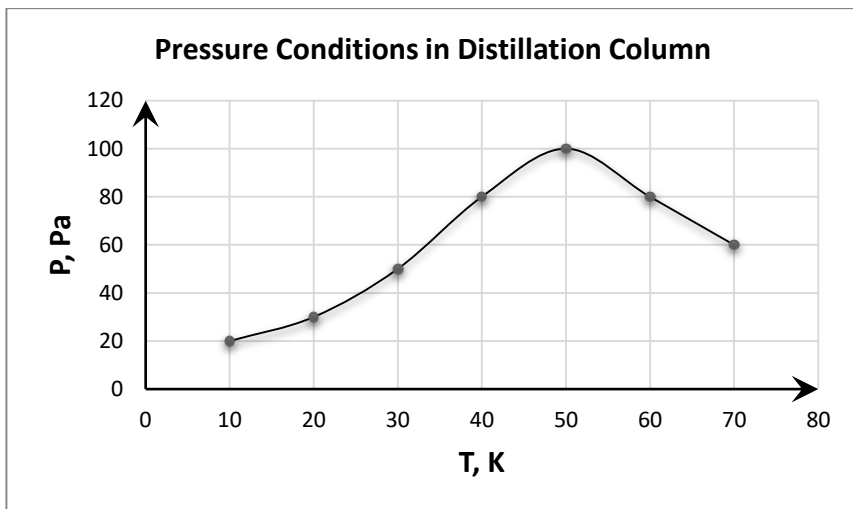
Graphs, charts and tables are the most effective forms for presenting complex scientific results clearly and logically.

The rules and examples of writing captions were shown in Unit 2 of the study guide.

To describe successfully graphs, you need to answer the following three questions:

1. What is shown in the graph? (Introduction)
2. How do the values of the described parameters change? (Main part)
3. What are the main results or findings? (Conclusion)

Example:



Introduction: The graph shows the linear temperature-pressure function in the distillation column. The temperature is expressed in K, and the pressure is expressed in Pa.

Main part: The pressure increases slowly and steadily from 20 Pa to 100 Pa in the range of temperatures from 10 K to 50 K. Then it decreases to 60 Pa, and there is a peak at 50 K.

Conclusion: The growth of the pressure in the range of temperatures between 10 and 50 K proves the unstable reaction in the column.

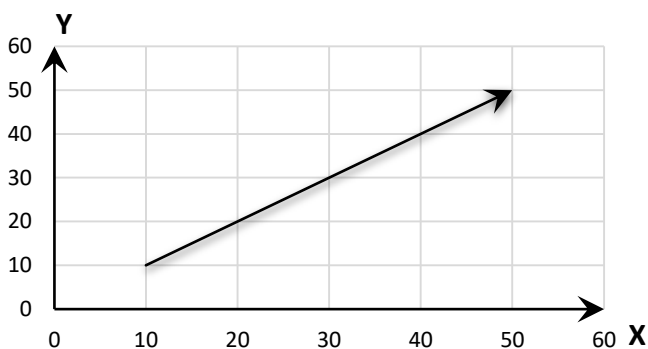
There are different types of graphs. Here we will consider two types: linear graphs and pie charts.

Linear graphs

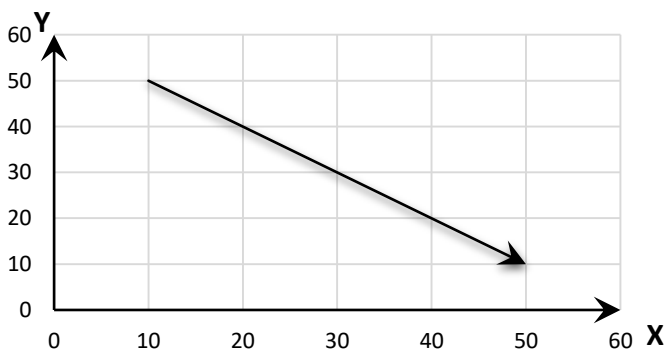
Linear graphs present one of the ways for expressing physical and chemical relationships. You see linear graphs in scientific papers and presentations most often.

The following English verbs and phrases may be used for describing linear functions.

Increasing linear function: to increase; to go up; to rise; to ascend; to gain; to grow; to climb.



Decreasing linear function: to decrease; to go down; to fall; to drop; to decline; to descend; to reduce.

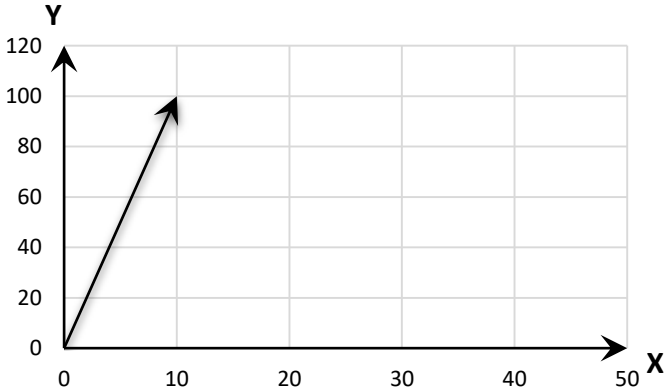


Examples:

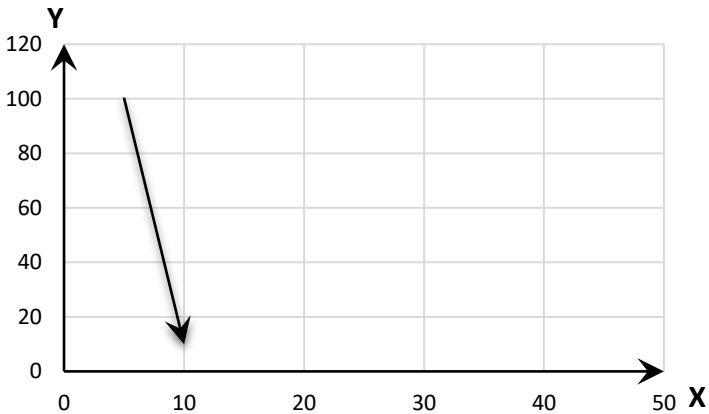
The function **increases**.

The line **goes down**.

Rapid increasing linear function: to rocket; to jump; to surge;
to shoot up.



Rapid decreasing linear function: to plummet; to slump; to collapse.

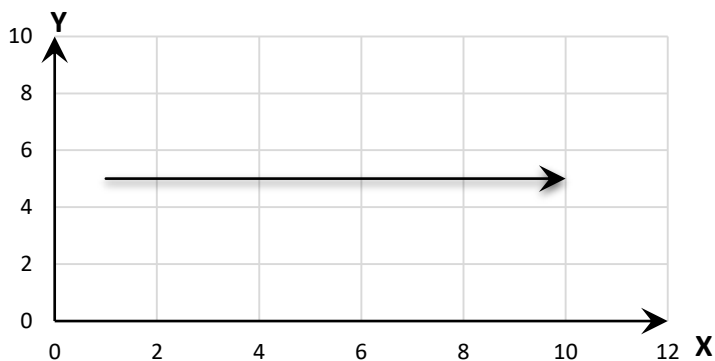


Examples:

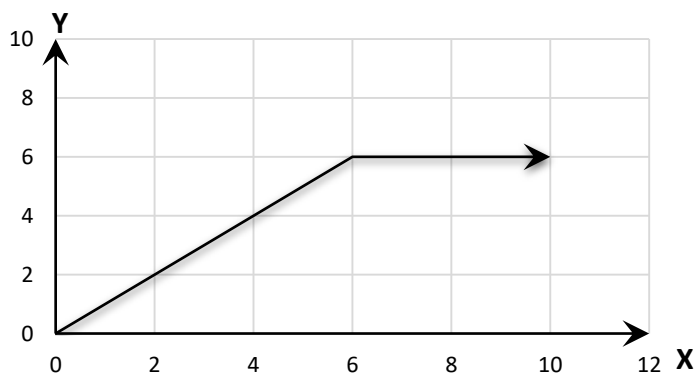
The function **rockets**.

The line **plummets**.

Steady-state function: to remain stable; to remain steady; to remain constant; to remain flat; do not change; to stay the same; to maintain at the same level.



Example:



The function levels off and **remains constant**.

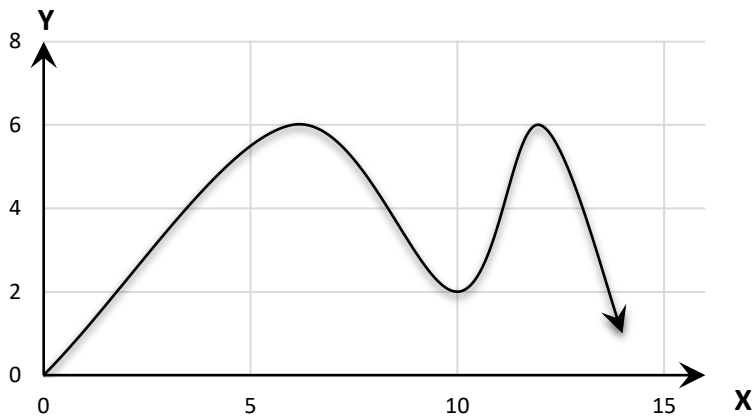
The line increases and **stays at the same level**.

The line goes up and then **does not change**.

The function rises and **remains steady**.

The line flattens out and then **stays the same**.

Fluctuating function: to rise and fall; to fluctuate; to undulate; to vary.



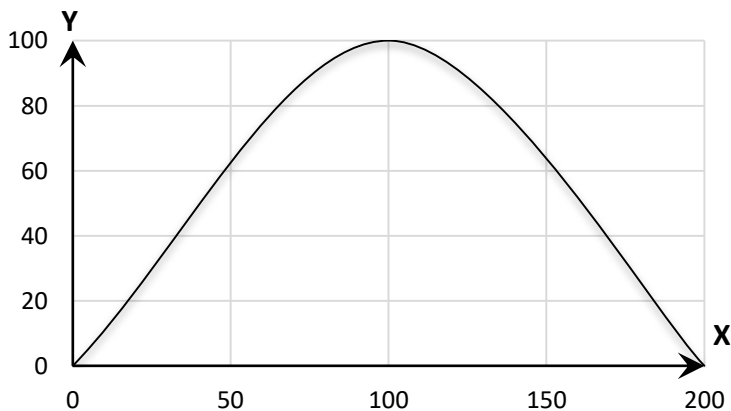
Examples:

The function **rises and falls**.

The curve **fluctuates**.

The line **undulates**.

Maximums and minimums of functions: to bottom, to peak.



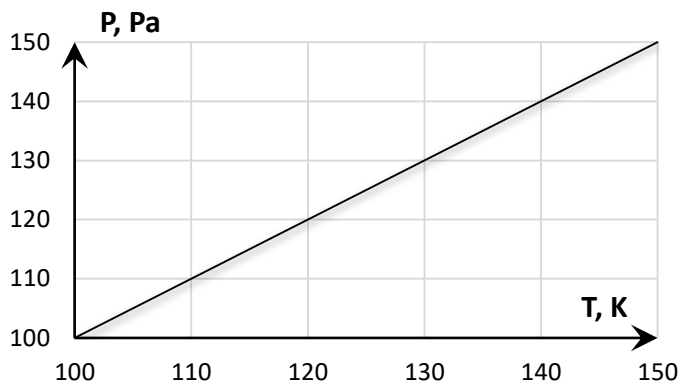
Example:

The curve **peaks**.

Graphs include numbers for indicating physical and chemical parameters of experimental processes and equipment. Prepositions (*from*; *to*; *by*; *at*; *of*) are used to describe parameter changes. Let's consider the examples of using these prepositions.

Prepositions *from* and *to* are used to show the function movement direction.

Example:



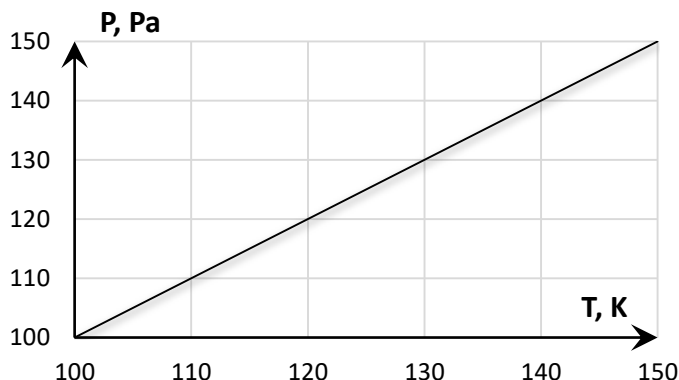
There is an increase in pressure **from** 100 Pa **to** 150 Pa.

The pressure rises **from** 100 Pa **to** 150 Pa.

The line goes up in the range of temperatures **from** 100 K **to** 150 K.

To indicate a difference in values, the preposition *by* may be used.

Example:

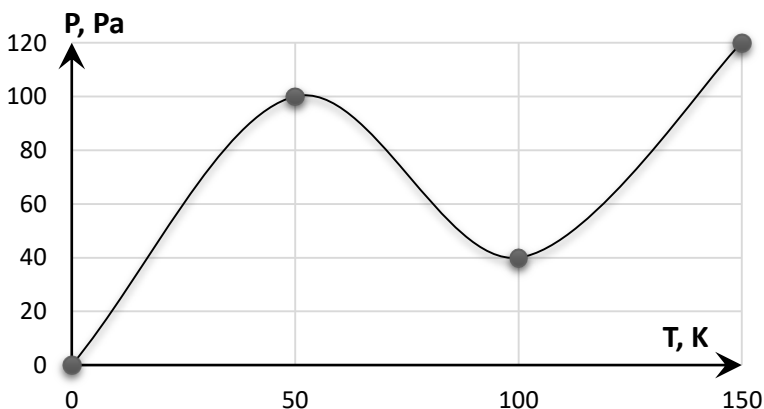


There is an increase in pressure **by** 50 Pa in the range of temperatures from 100 K to 150 K.

The pressure increases **by** 50 Pa in the range of temperatures from 100 K to 150 K.

To indicate a point on the graph, the preposition *at* is used.

Example:



The temperature-pressure function peaks **at** 50 K and 100 Pa.

The curve bottoms **at** 100 K and 40 Pa.

To indicate a parameter on the graph, the preposition *of* is placed after nouns before the numerical value.

Examples:

There is a maximum of 100 Pa at 50 K.

There is a minimum of 40 Pa at 100 K.

To describe linear graphs, the English collocations consisting of a combination of a verb and an adverb or a combination of an adjective and a noun may be used. Such stylistic techniques will diversify the English speech style and make it more emotional and impassioned. These word combinations allow you to describe function changes in more detail. Some examples of the word combinations are given in Table 5.1.

Table 5.1. Word combinations for describing linear graphs

Adjective	Adjective + noun	Verb + adverb
spectacular <i>быстрый</i>	a spectacular fall <i>быстрое падение</i>	to fall spectacularly <i>падать быстро</i>
dramatic <i>резкий</i>	a dramatic rise <i>резкий подъем</i>	to rise dramatically <i>возрастать резко</i>
substantial <i>значительный</i>	a substantial increase <i>значительный рост</i>	to increase substantially <i>возрастать значительно</i>
significant <i>значительный</i>	a significant fall <i>значительное уменьшение</i>	to fall significantly <i>уменьшаться значительно</i>
sudden <i>резкий и крутой</i>	a sudden fall <i>резкое снижение</i>	to fall suddenly <i>снижаться резко</i>
sharp <i>резкий и крутой</i>	a sharp decrease <i>резкое уменьшение</i>	to decrease sharply <i>уменьшаться резко</i>
steady <i>равномерный</i>	a steady increase <i>равномерное увеличение</i>	to increase steadily <i>увеличиваться равномерно</i>
consistent <i>стабильный и устойчивый</i>	a consistent decrease <i>стабильное уменьшение</i>	to decrease consistently <i>уменьшаться стабильно</i>
gradual <i>постепенный и плавный</i>	a gradual increase <i>постепенное увеличение</i>	to increase gradually <i>увеличиваться постепенно</i>
modest <i>незначительный</i>	a modest increase <i>незначительное увеличение</i>	to increase modestly <i>увеличиваться незначительно</i>
slight <i>слабый</i>	a slight rise <i>слабый рост</i>	to rise slightly <i>возрастать слабо</i>
marginal <i>минимальный и очень слабый</i>	a marginal fall <i>минимальное падение (очень незначительное)</i>	to fall marginally <i>падать минимально (очень незначительно)</i>

Pie charts

Pie charts are the most popular diagrams widely used for describing economic information. But in academic papers and presentations, pie charts describe the percentage of mixture components, extraction of natural resources, statistical analysis of the study of any scientific problem, etc.

The rules of describing pie charts are the same as the ones presented earlier for linear graphs.

Example:

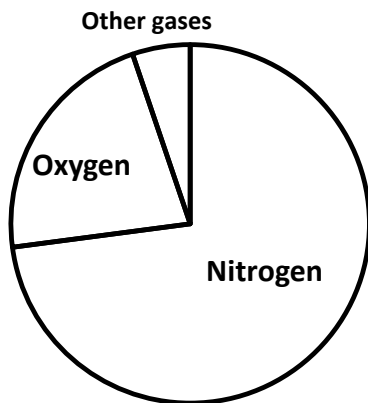


Figure. Chemical elements in the Earth's atmosphere
(N – 78.08 wt.%; O – 20.95 wt.%; noble gases – 0.94 wt.%; CO₂ – 0.03 wt.%;
aqueous vapor, impurities – 0.01 wt. %).

Introduction: The pie chart shows the distribution of chemical elements in the Earth's atmosphere. The content of the chemical elements is expressed in weight percent.

Main part: Nitrogen takes the largest part of the Earth's atmosphere, 78.08 wt. % of the total content. The second place is taken by oxygen, 20.95 wt. %. The content of other gases is less than 5 wt. %. Noble gases and carbon dioxide occupy just 0.94 and 0.03 wt. %, respectively. About 0.01 wt. % of the atmospheric content is shared between aqueous vapors and impurities.

Conclusion: Almost 90% of the Earth's atmosphere is made up of two elements: nitrogen and oxygen. Such a combination of gases is very important for all living organisms on our planet.

A pie chart is divided into pieces the areas of which illustrate numerical proportion. Typically, the parameters in a pie chart are expressed in percent

or fractions. It is important to know that the word 'percent' is a collective noun and it may be either singular or plural.

Examples:

1% – one **percent**

10% – ten **percent**

There is a grammatical rule for how to determine which English verb is to be used with the word 'percent'. It depends on a noun which is referred to the word 'percent'. If a noun is singular, a singular verb is used. If a noun is in plural form, a plural verb is used.

Examples:

Almost **90% of the Earth's atmosphere is made up** of two elements.

Almost **10% of impurities** in the atmosphere **are produced** from industrial companies.

The most common English phrases for description of a pie chart are 'the proportion of ...', 'the percentage of ...', 'the content of ...', 'the distribution of ...'.

Examples:

The pie chart shows **the percentage (proportion) of** energy consumption in 2007.

The distribution of chemical elements in the Earth's crust is shown in the pie chart.

The pie chart presents **the content of** main hydrocarbons in crude oil.

In order to enrich the English language, when describing percentages, use the following expressions:

80%	four-fifths (<i>четыре пятых</i>)
75%	three-quarters (<i>три четверти</i>)
70%	seven in ten (<i>семь десятых</i>)
65%	two-thirds (<i>две третьих</i>)
60%	three-fifths (<i>три пятых</i>)
53%	more than half (<i>больше половины</i>)
50%	half (<i>половина</i>)
45%	more than two fifths (<i>больше чем две пятых</i>)
40%	<i>two-fifths</i> (<i>две пятых</i>)
38%	<i>more than a third</i> (<i>более трети</i>)

30%	<i>less than a third (меньше чем одна треть)</i>
25%	<i>a quarter (четверть)</i>
20%	<i>a fifth (одна пятая)</i>
15%	<i>less than a fifth (менее одной пятой)</i>
10%	<i>one in ten (одна десятая)</i>
5%	<i>one in twenty (одна двадцатая)</i>
78%	<i>just over three quarters (немного больше, чем три четверти)</i>
76%	<i>approximately three quarters (приблизительно три четверти)</i>
48%	<i>just under a half (чуть меньше половины)</i>
49%	<i>nearly a half (почти половина)</i>
32%	<i>almost a third (почти треть)</i>
90%	<i>a very large majority of (большинство)</i>
90%	<i>a significant proportion of (значительная часть)</i>
90%	<i>a great amount of (большое количество)</i>
90%	<i>a great number of (большое количество)</i>
15%	<i>a minority of (меньшинство)</i>
10%	<i>a small amount of (небольшое количество)</i>
5%	<i>a very small number of (очень небольшое количество)</i>

PRACTICAL EXERCISES

1. Translate the English sentences into Russian paying attention to word combinations in bold.

1. There is a **rapid increase** in temperature by 50 °C.
2. There was a **slow drop** in pressure from 1,000 Pa to 2,500 Pa.
3. The graph shows a **slow, steady fall** in dynamic viscosity of liquid aluminum.
4. The diagram presents a **gradual rise** in density of the petroleum fractions inside the distillation column.
5. We observe a **continuous drop** in temperature to 150 °C.

2. Translate the English sentences into Russian paying attention to word combinations in bold.

1. Temperature **increases gradually** up to 160 °C.
2. Internal pressure **dropped continuously** over the process time.
3. Kinematic viscosity **rose erratically** and then remained constant.
4. Sulfur concentration in crude oil **went down slowly and steadily** from 60 to 20%.
5. Density of liquid **fell sharply** in the temperature range of 100-200 °C.

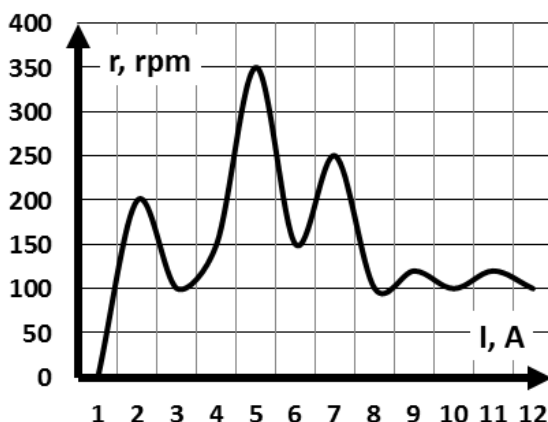
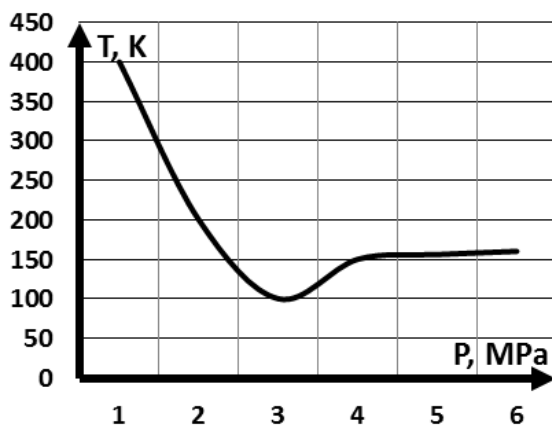
3. Convert word combinations "Verb + adverb" into word combinations "adjective + noun".

to fall spectacularly <i>падать быстро</i>	a spectacular fall <i>быстрое падение</i>
to rise dramatically	
to increase substantially	
to fall significantly	
to drop suddenly	
to decrease sharply	
to go up steadily	
to go down consistently	
to decline gradually	
to ascend modestly	
to descend slightly	
to fall marginally	

4. Translate English sentences into Russian paying attention to the prepositions of, by, at, from, to.

1. The process temperature plummeted **from** 150 to 50 °C.
2. We observed a continuous drop in flow rate **by** 2 m³/s.
3. The line decreased **by** 5 mm and bottomed **at** 10 mm.
4. Pressure rocketed in the range of temperatures from 50 K to 100 K and peaked **at** 10⁵ Pa.
5. The curve reached its minimum **of** 1000 m/s.

5. Name the graphs and describe them in English according to the examples presented earlier in Unit 5.



6. Think of your linear graph, describe it in English to your groupmates so they can draw it on the board.

7. Read the description of the pie chart in English and draw the diagram.

The pie chart shows the distribution of chemical elements in the Earth's crust. The content of the chemical elements is expressed in weight percent.

Oxygen takes the largest part of the Earth's crust, 49.4% of the total content. The second place is taken by silicon, 25.8%. The content of aluminum is 7.5%. Iron, calcium, sodium, and potassium occupy just 4.7, 3.4, 2.6, and 2.4%, respectively, while the content of magnesium, hydrogen and titanium together is less than 2%. 0.8% of the content is shared between all other chemical elements.

Almost 99% of the Earth's crust minerals are made up of ten elements. Most of these elements are found combined with other elements as compounds.

8. Think of your pie chart, describe it in English to your groupmates so they can draw it on the board.

9. Make a slide containing a linear graph or pie chart and present it in English.

English verb tenses
Active voice

Tense	Present	Past	Future
Indefinite	V₁ (V_{s/es}) I / you / they / we make a report every year. He / she makes a report every week. Вспомогательные глаголы: do / does	V₂ I / you / they / we / he / she made a report last year. Вспомогательный глагол: did	will / shall + V₁ You / they / he / she will make a report next year. I / we shall make a report next year. Вспомогательные глаголы: will / shall
Continuous	to be (am, is, are) + V_{ing} I am making a report now. He / she is making a report now. You / they / we are writing a paper now. Вспомогательные глаголы: am / is / are	was / were + V_{ing} I / he / she was making a report yesterday at 6 p.m. You / we / they were making a report yesterday at 6 p.m. Вспомогательные глаголы: was / were	will be + V_{ing} I / you / they / we / he / she will be making a report tomorrow at 6 p.m. Вспомогательный глагол: will
Perfect	have / has + V₃ I / you / we / they have just made a report. He / she has just made a report. Вспомогательные глаголы: have / has	had + V₃ I / you / we / they / he / she had made a report yesterday by 6 p.m. Вспомогательный глагол: had	will have + V₃ I / you / we / they / he / she will have made a report tomorrow by 6 p.m. Вспомогательный глагол: will
Perfect Continuous	have / has + been + V_{ing} I / you / we / they have been making a report for 2 hours. He / she has been making a report for 2 hours. Вспомогательные глаголы: have / has	had + been + V_{ing} I / you / we / they / he / she had been making a report for 2 hours. Вспомогательный глагол: had	will have + been + V_{ing} I / you / we / they / he / she will have been making a report for 2 hours. Вспомогательный глагол: will

V – глагол (verb);

V₂ – вторая форма глагола;

V₃ – третья форма глагола.

English verb tenses

Passive voice

Tense	Present	Past	Future
Indefinite	to be (am, is, are) + V₃ The project is presented . I am asked to make a report. The report is made . The paper is received . Proceedings are published . Вспомогательные глаголы: am / is / are	was / were + V₃ The project was presented . I was asked to make a report. The report was made . The paper was received . Proceedings were published . Вспомогательные глаголы: was / were	will be + V₃ The project will be presented . I will be asked to make a report. The report will be made . The paper will be received . Proceedings will be published . Вспомогательные глаголы: will / shall
Continuous	am / is / are + being + V₃ The abstract is being written . The report is being made . The paper is being received . Proceedings are being published . Вспомогательные глаголы: am / is / are	was / were + being + V₃ The abstract was being written . The report was being made . The paper was being received . Proceedings were being published . Вспомогательные глаголы: was / were	
Perfect	have / has + been + V₃ The abstract has been written . The report has been made . The paper has been received . Proceedings have been published . Вспомогательные глаголы: have / has	had + been + V₃ The abstract had been written . The report had been made . The paper had been received . Proceedings had been published . Вспомогательный глагол: had	will have + been + V₃ The abstract will have been written . The report will have been made . The paper will have been received . Proceedings will have been published . Вспомогательный глагол: will

V – глагол (verb);

V₃ – третья форма глагола.

Parenthetic words**Sequences**

first / firstly	<i>сначала / во-первых</i>
second / secondly	<i>во-вторых</i>
third / thirdly	<i>в-третьих</i>
next	<i>следующий</i>
finally	<i>в конце, в заключении, в итоге</i>
in addition	<i>дополнительно, в дополнение, кроме того</i>
moreover	<i>кроме того, более того</i>
further	<i>также, к тому же, в дальнейшем</i>
furthermore	<i>также, более того, при этом</i>
also	<i>также</i>
in conclusion	<i>в заключении</i>

Describing a result

so	<i>таким образом, также, следовательно</i>
as a result	<i>вследствие этого, в результате этого</i>
as a consequence of	<i>вследствие, в результате</i>
therefore	<i>следовательно, поэтому</i>
thus	<i>таким образом</i>
consequently	<i>следовательно, поэтому</i>
hence	<i>следовательно, исходя из этого</i>

Focusing attention

undoubtedly	<i>бесспорно</i>
obviously	<i>очевидно</i>
generally	<i>в основном</i>
admittedly	<i>нужно признать, что</i>
in fact	<i>фактически</i>
particularly / in particular	<i>в особенности</i>
especially	<i>особенно</i>
clearly	<i>очевидно / совершенно ясно, что</i>
importantly	<i>важно / важно отметить, что</i>

Addition

and	<i>и</i>
in addition / additionally	<i>в дополнение / кроме того / дополнительно</i>
furthermore	<i>также / кроме того / к тому же</i>
also	<i>также</i>
too	<i>тоже</i>
as well as	<i>так же как / кроме того</i>

Reasons

for	<i>из-за</i>
because	<i>потому что</i>
since	<i>из-за того, что</i>
as	<i>поскольку</i>
due to	<i>благодаря, из-за</i>
because of	<i>благодаря, из-за</i>

Examples

for example	<i>например</i>
for instance	<i>например</i>
that is (i.e.)	<i>то есть</i>
such as	<i>такой как</i>
including	<i>включая</i>
namely	<i>а именно / то есть</i>

Comparisons

similarly	<i>так же, аналогично</i>
likewise	<i>подобно, тоже</i>
also	<i>тоже</i>
like	<i>подобное, похожее</i>
similar to	<i>как и в случае с, по аналогии с</i>
same as	<i>такой же, наряду с</i>
compared to / with	<i>по сравнению с</i>
not only ... but also	<i>не только ..., но и</i>

Opposition

however	<i>однако</i>
nevertheless	<i>тем не менее</i>
nonetheless	<i>несмотря на это</i>
still	<i>тем не менее, все еще</i>
although	<i>несмотря на, хотя</i>
though	<i>несмотря на, хотя</i>
but	<i>но</i>
yet	<i>все еще</i>
despite	<i>несмотря на</i>
in spite of	<i>несмотря на то, что</i>
in contrast to	<i>в отличие от</i>
in comparison	<i>по сравнению</i>
while	<i>в то время как</i>
whereas	<i>тогда как</i>
on the other hand	<i>с другой стороны</i>
on the contrary	<i>наоборот, напротив</i>

Conclusions

in conclusion	<i>в заключение</i>
to conclude	<i>в заключение</i>
in brief	<i>вкратце</i>
to summarize	<i>подводя итог</i>
overall	<i>в целом</i>
therefore	<i>поэтому</i>

REFERENCES

1. Валеева Э.Э. Подготовка материалов для публикации в международных научных изданиях : учеб.-метод. пособие / Э.Э. Валеева, Ю.Н. Зиятдинова, А.Н. Безруков.— Казань : Изд-во КНИТУ, 2016 .— 118 с.
2. Валеева, Э. Э. English for Chemical Engineers (Английский язык для инженеров-химиков) : учебное пособие / Э. Э. Валеева, Ю. Н. Зиятдинова, А. Н. Безруков. — Казань : Изд-во КНИТУ, 2015. — 104 с.
3. Валеева, Э. Э. Petroleum Refining (Технологии и продукты переработки нефти) : учебное пособие / Э. Э. Валеева, Д. А. Романов, Ю. Н. Зиятдинова, Н. А. Терентьева. — Казань : Изд-во КНИТУ, 2010. — 129 с.
4. Зиятдинова, Ю. Н. Основы технологических процессов (The Basics of Process Technology) : учебное пособие / Ю. Н. Зиятдинова, Э. Э. Валеева, А. Н. Безруков. — Казань : Изд-во Казан. гос. технол. ун-та, 2008. — 80 с.
5. Зиятдинова, Ю. Н. Теория перевода : курс лекций : учебное пособие / Ю. Н. Зиятдинова, Э. Э. Валеева. — Казань : Изд-во Казан. гос. технол. ун-та, 2009. — 110 с.
6. Комиссаров, В. Н. Теория перевода (лингвистические аспекты) : Учеб. для ин-тов и фак. иностр. яз. – М.: Высш. шк., 1990. – 253 с.
7. Сангер, Ф. Пишем на английском для международных конференций / Ф. Сангер, Ю. Н. Зиятдинова // Высшее образование в России. – 2013. – № 12. – С. 95–99.
8. Высшее образование в России. Научно-педагогический журнал [Электронный ресурс], website. – Electronic data. – <http://www.vovr.ru/onas.html> – (12.10.2016).
9. Nature. Еженедельный международный журнал [Электронный ресурс], website. – Electronic data. – <http://www.nature.com> – (25.09.2016).

10. Elsevier [Электронный ресурс], website. – Electronic data. – <https://www.elsevier.com> – (25.10.2020).
11. Электронная энциклопедия [Электронный ресурс], website. – Wikipedia. – <https://en.wikipedia.org> – (25.10.2020).

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