

METHODOLOGICAL RECOMMENDATIONS FOR TEACHING THE SUBJECT OF OXIDES IN ADVANCED CLASSES

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ABSTRACT

This article discusses effective methodical methods for teaching the topic of oxides in advanced classes. Recommendations for interactive teaching methods, laboratory work and the use of technologies are given to explain the topic to students in depth. The article presents sample forms of independent work and test tasks to study the classification of oxides, chemical properties, methods of their preparation and practical reactions. These methods help students to master the subject more deeply, to strengthen their theoretical and practical knowledge.

INTRODUCTION

Oxides are one of the important branches of chemistry, and their structure, properties and applications are of fundamental importance in many fields of science. Teaching this subject in advanced classes should be aimed not only at imparting theoretical knowledge, but also at forming practical skills. This article discusses the effective methodical methods used in the transition to advanced students of the topic of oxides.

1. Lesson planning and goal setting

Before studying the topic of oxides, it is necessary to determine the specific goals and objectives of the lesson. The following goals can be set:

- Introducing the general definition and types of oxides;
- Providing knowledge about the chemical properties, production and use of oxides;
- Formation of logical analysis and problem solving skills of students on the topic of oxides.

2. Interactive teaching methods

Because of the advanced level of students in immersion classrooms, traditional approaches may not be sufficient. Therefore, it is recommended to use the following interactive methods:

- Cluster method: Ask students to fill in tables or diagrams on the classification and types of oxides. For example, distinguish types of oxides depending on the valence of oxygen, and explain chemical formulas and properties for each group.
- Work in small groups: Divide students into small groups and assign them to carry out experiments and research related to various oxides. For example, each group can analyze the properties of a certain oxide and make a presentation to other groups.
- Analytical discussion: Arranging discussions on acid-neutral, basic and amphoteric properties of oxides. Students should conduct a detailed analysis of the properties and reactions of each type of oxide.

3. Practical training and laboratory work

Students should strengthen theoretical knowledge with practical experiences. For advanced classes, laboratory work on the topic of oxides takes an important place. The following experiments can be carried out:

- Obtaining oxides: Experiments on obtaining oxides from metal or metalloid. For example, obtaining iron or magnesium oxide and studying their properties.
- Chemical reactions: Observing the reaction of various oxides with water and acids. These experiments explain to students the basic and acidic properties of oxides.

4. Use of technologies

Using information and communication technologies, the topic of oxides can be taught in a more in-depth and interesting way:

- Multimedia presentations: Slides and video lessons on the topic will interest students and help them understand the topic better.
- Simulation software: Through software that simulates chemical experiments, students can safely consider complex processes involving oxides.

5. Independent work and test assignments

In advanced classes, it is important to give students independent work and assignments. Tests and problems that they can do independently will improve their analytical thinking skills. For example, it is possible to write chemical equations of different oxides and create problems on their classification.

SUMMARY

The use of modern methodological methods in the process of teaching the topic of oxides in advanced classes allows students to master the topic in depth. Through the use of interactive methods, laboratory work and technology, the interest of students increases, and their knowledge and skills in chemistry are strengthened. These methods not only help students understand the subject, but also develop their scientific research and logical analysis skills. Independent work and test tasks on the topic of oxides can be created on the basis of the following samples. These assignments are aimed at strengthening students' theoretical knowledge and developing their practical skills.

1. Tasks for independent work

Assignment 1: Classification and chemical formulas of oxides

1. Identify oxides among the following substances and divide them into acid, base and amphoteric oxides:

- CO_2
- Na_2O
- Al_2O_3
- SO_3
- ZnO
- MgO
- SiO_2

2. Write reactions for oxides belonging to each group:

- What compounds are formed when acid oxides react with water?
- How do basic oxides react with water?
- How do amphoteric oxides react with acids and bases?

Task 2: Methods of obtaining oxides

Write the equations for obtaining the respective oxides from the following metals and metalloids:

- Sodium
- Iron
- Gold
- Sulfur

For experience: What method is used in the extraction of oxides? Which method is more effective in obtaining metal oxides?

Task 3: Practical reactions

Analyze the reactions of various oxides with water, acids and bases. Complete the equations for the following reactions:

- $\text{CO}_2 + \text{H}_2\text{O} \rightarrow$
- $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow$
- $\text{ZnO} + \text{HCl} \rightarrow$
- $\text{Al}_2\text{O}_3 + \text{NaOH} \rightarrow$

2. Test assignments

Option 1

1. Choose acid oxides from the following substances:

- a) CaO
- b) CO_2
- c) SO_3
- d) Al_2O_3

2. Find the correct reaction for oxides:

- a) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow \text{NaOH}$
- b) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{HCl}$
- c) $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$
- d) $\text{ZnO} + \text{NaOH} \rightarrow \text{Zn(OH)}_2$

3. Which definition is correct for amphoteric oxides?

- a) It reacts only with acid
- b) Only reacts with water
- c) It reacts with both base and acid
- d) Does not react with water

4. Which oxide does not react with air or oxygen?

- a) Al_2O_3
- b) ZnO
- c) Na_2O
- d) Au_2O_3

Option 2

1. Which of the following reactions represents the method of obtaining an oxide?

- a) $\text{Mg} + \text{O}_2 \rightarrow \text{MgO}$
- b) $\text{H}_2 + \text{O}_2 \rightarrow \text{H}_2\text{O}$
- c) $\text{NaOH} + \text{CO}_2 \rightarrow \text{Na}_2\text{CO}_3$
- d) $\text{Na}_2\text{SO}_4 + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{SO}_4$

2. Acid oxide reacts with the following substances:

- a) Basis
- b) Acid
- c) Oxide
- d) Hydride

3. Which of the following is an amphoteric oxide?

- a) CaO
- b) ZnO
- c) SO_2
- d) CO_2

4. Determine the chemical formulas of oxides:

- a) Iron (III) oxide
- b) Aluminum oxide
- c) Sulfur oxide
- d) Phosphorus (V) oxide

Option 3

1. The following reactions represent the reaction of which oxide with water?

- a) $\text{CO}_2 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{CO}_3$
- b) $\text{Na}_2\text{O} + \text{H}_2\text{O} \rightarrow 2\text{NaOH}$
- c) $\text{Al}_2\text{O}_3 + \text{NaOH} \rightarrow \text{Na}[\text{Al}(\text{OH})_4]$
- d) $\text{SO}_3 + \text{H}_2\text{O} \rightarrow \text{H}_2\text{SO}_4$

2. Choose a group of oxides from the following substances:

- a) SiO_2 , P_2O_5 , SO_3
- b) NaCl , H_2O , H_2SO_4
- c) Al_2O_3 , KOH , ZnO
- d) NaOH , MgO , CO_2

3. Which type of oxide reacts with a base to form salt and water?

- a) Acid oxides
- b) Basic oxides
- c) Amphoteric oxides
- d) Neutral oxides

4. Identify the product of the following reaction:



- a) $\text{Zn} + \text{SO}_2$
- b) $\text{ZnSO}_4 + \text{H}_2\text{O}$
- c) $\text{ZnSO}_4 + \text{O}_2$
- d) $\text{Zn}_2\text{SO}_4 + \text{H}_2$

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