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ДАВАЙТЕ ИНТЕРЕСНО ПРОВЕРИМ ОРГАНИЧЕСКУЮ ХИМИЮ

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Аннотация. Глубокие и прочные знания невозможны без систематического повторения и закрепления изученного материала. Выполняя различные задания, учащиеся более активно участвуют в учебном процессе, приобретают умения самостоятельно мыслить, устанавливать взаимосвязи между изучаемыми понятиями, вникать в сущность разнообразных явлений природы [1].

В наше время учащиеся и студенты все большее количество времени проводят за компьютером, решая множество расчетных задач, предлагаемых как на занятиях в классе, так и при выполнении домашнего задания. Это замечательно! Но есть и обратная сторона – они перестают разговаривать, общаться. И как результат, теряют способность логически излагать свои мысли, доказывать, объяснять, используя терминологию предмета.

В этой статье мы предлагаем задания, которые требуют обобщения изученного материала, применение ранее полученных знаний. Но самое главное, практически все они требуют доказать или объяснить решение поставленной проблемы.

Ключевые слова: обобщение, закрепление, логическое изложение, доказательство.

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LET’S HAVE AN INTERESTING CHECK OF ORGANIC CHEMISTRY

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Abstract. Deep and solid knowledge is impossible without systematic repetition and consolidation of the studied material. While doing different tasks, students more actively take part in the class activity, acquire the ability to think independently, establish relationship between the concepts being studied, understand the essence of various natural phenomena.

At present time, students spend a lot of time working on the computer, solving problems both in class and at home. But, as a result of that, they stop communicating! They lose the ability to put their thoughts logically, prove and explain something using the subject terminology.

In this article we offer tasks which require to consolidate the previously obtained knowledge. But what is more important, they ask students to prove and explain the solution of the given problem.

Keywords: consolidation, proof, logical thinking, explanation.

Saturated hydrocarbons [1].

1. Explain from the point of view of chemical and electronic structure, why halogen derivatives of saturated hydrocarbons are more reactive, than the saturated hydrocarbons themselves.

2. Explain, why the number of hydrogen atoms in molecules of saturated hydrocarbons cannot be odd.

3. Ethane decomposes when the electric current is passed through it. Does the volume of the gas increase or decrease? How many times?

4. How does the percentage of hydrogen in saturated hydrocarbons change with increase in molecular mass?

5. Two substances, $CH_3 – CH_2 – CH_2 – CH_3$ and $(CH_3)_3 – CH$, react with bromine. Which one reacts faster? Why? Write down the equations of the reactions.

6. Which hydrocarbon particles have carbon atoms with an odd number of electrons? Why?

7. Explain the chemical resistance of saturated hydrocarbons and polyethylene.

8. How to purify methane from impurity of water and carbon dioxide? Write down the equations of the reactions in the structural form.

Unsaturated hydrocarbons.

1. Prove, that there is inequality between σ- and π- bonds. Give examples and write down the equations of the reactions in a structural and electronic form.

2. How to separate methane from ethylene impurities?

3. Will identical or different compounds be obtained by hydrogenation and bromine addition to the given hydrocarbons?

$$HC = \underset{\displaystyle Cl}{\underset{|}{C}} – \underset{\displaystyle C_2H_5}{\underset{|}{CH_3}} \qquad C_2H_5 – \underset{\displaystyle CH_3}{\underset{|}{C}} = \underset{\displaystyle Cl}{\underset{|}{CH}}$$

4. Which substance will add bromine more active? Prove your answer.

$$CH_2 = CH_2 \qquad H_3C – \underset{\displaystyle CH_3}{\underset{|}{C}} = CH_2$$

5. How can you distinguish two liquids: hexane and hexadiene – 1,2? Write down the equations of the reactions.

6. How to extract pentadiene from its mixture with pentane? Write down the equations of the reactions.

7. There are two vessels with methane and acetylene. How to distinguish these gases? Prove your answer with the equations of the reactions.

8. There is a mixture of three gases: butane, butane and ammonia. What substances do you need to use to extract each of the gases from the mixture?

9. Is it possible to extinguish a gas flame burning over calcium carbide with water? Prove your answer.

10. Think of the way to obtain ethyl bromide from acetylene. Write down the equations of the reactions.

11. Acetylene can be decomposed into carbon and hydrogen. Is the reaction of acetylene synthesis exothermic or endothermic? Explain your answer.

Oxygen – containing organic substances [1, 2].

1. Explain the greater mobility of the hydroxyl hydrogen atom in an alcohol molecule compared to other hydrogen atoms.

2. Explain why indicators show neutral medium in alcohols. Why don't alcohols conduct electricity?

3. Why are there no gaseous substances in the homologous series of saturated monohydric alcohols? Explain your answer.

4. How to separate a mixture of methyl and isoamyl alcohols without using chemical reactions?

5. Why does glycerin have weak acidic properties? Prove your answer with the equations of the reactions.

6. There are three vessels with glycerin, ethanol and dimethyl ether. No labels on them. You are given the substances: copper sulfate, sodium and a concentrated solution of sulfuric acid. Determine the substances in each vessel. Write down the equations of the reactions.

7. Distinguish glycerin and ethanol by their physical and chemical properties. Write down the equations of the reactions.

8. Is it possible to obtain sodium phenolate by the reaction between phenol and sodium bicarbonate?

9. Compare the electronic and structural formulas for ethanol, glycerin and phenol. How does the mobility of the hydrogen atom of the hydroxyl group change?

10. There are three vessels with solutions of phenol, glycerin and ethanol. Determine the substances in each vessel. Write down the equations of the reactions.

11. Sulfur dioxide is passed through a solution of potassium phenolate. Write down the equations of the reactions.

12. Write down in the structural form the equations of the reactions for acetaldehyde obtaining in three ways. Indicate the conditions for these reactions.

13. Distinguish glycerin, ethanol and formalin using only one reactant. Write down the equations of the reactions in the structural form.

14. Rank in order of degree of dissociation decreasing the following acids: acetic, oxalic, formic. Explain your answer.

15. What is common and different in the structure and properties of organic and inorganic acids?

16, Distinguish acetic and hydrochloric acids. Write down the equations of the reactions.

17. Distinguish acetic acid and phenol using only one reactant. Write down the equations of the reactions.

18. How to distinguish the following substances: glycerin, acetic acid, formic acid, oleic acid? Write down the equations of the reactions.

19. Distinguish formalin, glycerin and glucose using only one reactant. Write down the equations of the reactions.

Nitrogen – containing organic substances [3].

1. What is the medium of saturated amine solutions? Explain your answer.

2. Prove that the substance given is aniline nitrate. Write down the equations of the reactions.

3. Which solution is better to use for washing the test tubes after experiments with aniline: water, diluted solution of sodium hydroxide, diluted solution of hydrochloric acid? Explain your answer.

4. Distinguish benzene and aniline. Explain tour answer.

5. Which solution, neutral or acidic, is better to use to dissolve aniline? Explain your answer.

References

1. Р.П. Суровцева, С.Н. Савицкий, Р.Г. Иванова. Задания по химии для самостоятельной работы учащихся. Москва. Просвещение, 1977. – 175с.

2. И.П. Доронина, Р.И. Лобановский. Тестовые задания по органической химии. Минск, 1997. – 16с.

3. Applied Chemistry, Third Edition. Toronto, 1994. – 675p.