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**МЕДИЦИНСКИЙ АСПЕКТ В ПРЕПОДАВАНИИ ХИМИИ**

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**Аннотация.** Сегодня невозможно представить медицину без химии. В течении всей своей истории медицина была и остается тесно связанной с химией. Химические процессы и реакции делают возможным само существование жизни на нашей планете. Вот почему так важно использовать разнообразные методы и приемы, задания и задачи при обучении химии. Примеры таких задач, ориентированных на медицину, предлагает данная статья.

*Ключевые слова: медицина, химия, взаимосвязь, задачи.*

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**MEDICAL ASPECT IN CHEMISTRY TEACHING**

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**Abstract.** Today it is impossible to imagine medicine without chemistry. Throughout the history, medicine has been closely linked to chemistry. Chemical processes and reactions enable life itself on our planet. That's why it is very important to use various methods and techniques, problems and tasks in chemistry teaching. The examples of such medicine oriented problems are given in this article.

*Keywords: medicine oriented, problems, chemistry, importance, examples.*

In ancient times, in the time of the alchemists, chemistry was called “the handmaid of medicine”. Nowadays this relationship is not weaker, but rather much stronger. And today chemistry is often referred as the central science, as it is clear to everyone, that modern medicine cannot exist without chemistry. It is known, that our bodies are wholly built up of various chemical substances, and all the numerous functions of the living organism depend, on chemical reactions. Chemical processes enable us to digest our food, keep us warm, supply us with muscular energy. Without a doubt, we can prove, that even the impressions of our senses, our mood, the thoughts of our brains, the mode of conveying these through the nerves, are all concerned more or less intimately with chemical reactions [2].

If we are sick, we take medicines. But they are chemical substances. And again chemistry helps us in treating our diseases, staying healthy and active.

So, the object of the present article is to give examples of medicine oriented tasks and problems in chemistry teaching to prove the importance of chemistry in medicine. These problems may be used in everyday classroom activities as well as in different tests.

1. Botkin powder (Latin name – pulvis aerophoris Botkini) is used as a mild laxative. It consists of sodium hydrogen carbonate and sodium sulfate. Make up the formulas to these compounds [4].

2. *Mixtura Bechtereva* (Latin name) is used as a sedative. It consists of sodium, potassium, ammonium bromides. Make up the formulas to these compounds [4].

3. Bourget mixture (Latin name – *pulveres Burgee*) is used as a gastrointestinal. It contains sodium sulfate, magnesium sulfate, magnesium oxide, sodium hydrogen carbonate. Make up the formulas to these compounds [4].

4. *Hypersol* (Latin name) is used as an antibacterial agent. It contains sodium chloride, sodium sulfate, sodium phosphate, sodium iodide, potassium chloride. Make up the formulas to these compounds [4].

5. *Pasta Unna* (Latin name) is used to treat skin diseases. It consist of calcium carbonate, zink oxide, calcium hydroxide, linseed oil. Make up the formulas to the inorganic compounds. How many classes of inorganic substances are included in this medicine? Characterize these substances [4].

6. The approximate minimum daily dietary requirement of the amino acid leucine,  $C_6H_{13}NO_2$ , is 1.1g. What is this requirement in moles? [1]

7. Copper (I) iodide is often added to table salt as a dietary source of iodine. How many moles of  $CuI$  are contained in 454g of table salt containing 0.01% Cu by mass [1].

8. In case of fly agaric poisoning, we use  $MgSO_4 \cdot 7H_2O$ . What is the mass of 2 moles of this substance? [5]

9.  $Na_2SO_4 \cdot 10H_2O$  is used as a mild laxative. How many moles of this substance are contained in a package weighing 15 grams? [5]

10. Magnesium oxide is prescribed for increased acidity of the gastric juice, 1 gram per dose. Is 0.1 mole of this substance enough? [5]

11. A tube of toothpaste contains 0.76g of sodium monofluorophosphate,  $Na_2PO_3F$ , in 100 mL. What mass of fluorine atoms (in mg) is present? How many fluorine atoms are present? [1]

12. Mass fraction of zinc in the composition of cobra venom, a valuable medicine, is 0.5%. How many zinc atoms will the cobra need to produce 1 drop of its poison? [5]

13. Aspirin is a compound with a molecular formula  $C_9H_8O_4$ . What is its percent composition? [1]

14. Nicotine, an alkaloid that is mainly responsible for the addictive nature of cigarettes, contains 74.02% C, 8.71% H and 17.27% N. if 40.57g of nicotine contains 0.25 mol of nicotine, what is the molecular formula? [1]

15. A 55kg woman has  $7.5 \times 10^{-3}$  mol of hemoglobin ( $M = 64.456$  g/mol) in her blood. How many hemoglobin molecules is this? What is this quantity in grams? [1]

16. A 5.0g sample of spinal fluid contains 3.75mg of glucose. What is the percent by mass of glucose in spinal fluid? [1]

17. What is the mass of the solute in 0.5L of 0.3M glucose solution, used for intravenous injection? [1]

18. What volume of a 0.575M solution of glucose can be prepared from 50.00 mL of a 3.00M glucose solution? [1]

19. Calculate the number of moles and the mass of the solute in 100 mL of a  $3.8 \times 10^{-5} \text{M}$  NaCN solution, the minimum lethal concentration of sodium cyanide in blood serum [1].

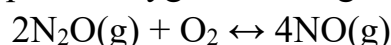
20. Calculate the molarity of cholesterol,  $\text{C}_{27}\text{H}_{46}\text{O}$ , in 0.1L of blood serum, the average concentration of cholesterol in human serum [1].

21. There is about 1.0g of calcium, as  $\text{Ca}^{2+}$ , in 1.0L of milk. What is the molarity of  $\text{Ca}^{2+}$  in milk? [1]

22. A throat spray is 1.4% by mass phenol,  $\text{C}_6\text{H}_5\text{OH}$ , in water. If the solution has a density of 0.995g/mL, calculate the molarity of the solution [1].

23. A cough syrup contains 5% ethyl alcohol,  $\text{C}_2\text{H}_5\text{OH}$ , by mass. If the density of the solution is 0.9928g/mL, determine the molarity of the alcohol in the cough syrup [1].

24. Nitrogen (I) oxide is used for anesthesia in medicine. It is oxidized by atmospheric oxygen to nitrogen (II) oxide, very toxic substance.



The equilibrium concentrations in the system are:  $[\text{N}_2\text{O}] = 0.2 \text{mol/L}$ ;  $[\text{O}_2] = 0.3 \text{mol/L}$ ;  $[\text{NO}] = 0.8 \text{mol/L}$ . Calculate the equilibrium constant. Determine the direction of the equilibrium shift [3].

25. How many times will the glucose oxidation rate increase during hyperthermia if the body temperature rises from  $36.6^\circ$  to  $40^\circ$ .  $Q_{10} = 1.3$  [3].

26. When ants bite us, we feel a burning sensation due to the action of formic acid. What mass of formic acid will be neutralized with 10 mL of a 2%  $\text{NaHCO}_3$  solution. The density is 1.013g/mL [3].

In conclusion, we would like to express an opinion that such tasks prove a deep connection between chemistry and medicine. and provide students with further interest in chemistry study.

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