



Select a single answer. For each correct answer you get 2 points. Usage of pencil, selecting more than 1 answer and crossing over the answer is not allowed and will not be evaluated.

MULTIPLE CHOICE QUESTIONS TEST WITH ONE CORRECT ANSWER

(Select just one answer A, B, C or D)

1. Classify the following statements as physical or chemical changes.
- I. Moth balls gradually vaporize in a closet.
II. Hydrofluoric acid attacks glass, and is used to etch calibration marks on glass laboratory utensils.
III. A French chef making a sauce with brandy is able to burn off the alcohol from the brandy, leaving just the brandy flavoring.
IV. Chemistry majors sometimes get holes in the cotton jeans they wear in lab because of acid spills.
- A. I physical change, II, III and IV chemical changes.
B. I and III physical changes, II and IV chemical changes.
C. III physical change, I, II и IV chemical changes.
D. All statements describe chemical changes.
2. Wine is a complex mixture of chemical compounds. Regardless of how much it costs, most wines comprise almost 98% of water and ethanol. But each bottle also contains 2% of different molecules, ranging from organic acids and sugars to aromatic compounds, pigments and tannins. What separation procedure would you use if you only wanted to separate alcohol from wine?
- A. Extraction.
B. Filtration.
C. Titration.
D. Distillation.
3. A sample of H_2SO_4 contains 2.02 g of hydrogen, 32.07 g of sulfur and 64.00 g of oxygen. How many grams of sulfur and oxygen are present in a second sample of H_2SO_4 containing 7.27 g of hydrogen?
- A. 230,4 g S; 116 g O
B. 233 g S; 465,3 g O
C. 116 g S; 230,4 g O
D. 32,07 g S; 64,00 g O
4. Determine the chemical formula of the compound in which the molar ratio of antimony and oxygen is 2: 3
- A. As_2O_3 B. Sb_2O_3
C. Sn_2O_3 D. An_2O_3
5. Will ^{35}Cl and ^{37}Cl have same valences?
- A. No, ^{35}Cl is monovalent, while ^{37}Cl is divalent.
B. No, ^{35}Cl is divalent, while ^{37}Cl is monovalent.
C. Yes, because ^{35}Cl and ^{37}Cl are isobars of the same element.
D. Yes, because ^{35}Cl and ^{37}Cl are isotopes of the same element.
6. Magnesium exists naturally as three isotopes: ^{24}Mg (79 %), ^{25}Mg (10 %) и ^{26}Mg (11 %). Calculate the relative atomic mass of magnesium.
- A. 24,32 B. 24,53
C. 24,00 D. 24,78
7. A sample of $\text{Ni}_3(\text{PO}_4)_2 \cdot 7\text{H}_2\text{O}$ contains 0,125 mol phosphorus. What is the amount of water in the sample?
- A. 0,0357 mol B. 0,438 mol
C. 0,875 mol D. 1,75 mol
8. In the outer electron shell of the atom of element Z there are 5 electrons. When reacted with Na it will form:
- A. Na_3Z B. NaZ_3
C. Na_5Z D. NaZ_5
9. Xylose is a compound that has five carbon atoms in each molecule and contains 40 % carbon by mass. What is the molar mass of xylose? $A_r(\text{C}) = 12,00$.
- A. 130 g/mol B. 140 g/mol
C. 150 g/mol D. 160 g/mol



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10. Indium oxide contains 4.784 g of indium for every 1.000 g of oxygen. In 1869, when Mendeleev first presented his version of the periodic table, he proposed the formula In_2O_3 for indium oxide. Before that time, it was thought that the formula was InO . What is the relative atomic mass of indium in both cases? Assume that oxygen has an atomic mass of 16.00.

- A. 76,54 (for InO) and 114,82 (for In_2O_3)
- B. 76,54 (for InO) and 51,03 (for In_2O_3)
- C. 114,82 (for InO) and 153,14 (for In_2O_3)
- D. 51,03 (for InO) and 76,54 (for In_2O_3)

11. An element X has 7 protons, 6 neutrons and 10 electrons. What is the charge of its ion?

- A. 4-
- B. 3+
- C. 3-
- D. 4+

12. The isotope of an unknown element, X, has a mass number of 79. The most stable ion of the isotope has 36 electrons and forms a binary compound with sodium having a formula of Na_2X . Which of the following statements is true?

- A. The binary compound formed between X and fluorine will be a covalent compound.
- B. The binary compound formed between X and fluorine will be an ionic compound.
- C. The isotope of X contains 38 protons.
- D. The isotope of X contains 41 neutrons.

13. What is the maximum number of electrons in an atom for all of which the following applies: $n = 5$, $m_l = +1$?

- A. 10
- B. 4
- C. 8
- D. 2

14. Which of the following ions have noble gas electron configurations? (${}_{25}\text{Mn}$, ${}_{26}\text{Fe}$)

- A. Mn^{2+}
- B. Mn^{7+}
- C. Fe^{2+}
- D. Fe^{3+}

15. A student in the lab compared the properties of two unknown substances, with the following results:

	Substance A	Substance B
melting point	low	high
water solubility	practically insoluble	soluble
hardness	low, wax crystals	hard crystals
electrical conductivity	low, in both solid and solution	low in solid state, but good conductor in solution

Based on the data obtained in the table it can be concluded that the bonds in:

- A. substance A are nonpolar covalent, and in substance B are polar covalent.
- B. substance A are covalent, and in substance B are metallic.
- C. substance A are covalent, and in substance B are ionic.
- D. substance A are ionic, and in substance B are covalent.

16. How many σ and π bonds are present in a molecule of SO_2 ?

- A. The molecule has 4 σ , and has no π bonds.
- B. The molecule has no σ , and has 4 π bonds.
- C. The molecule has 2 σ and 2 π bonds.
- D. The molecule has no σ , and has only 2 π bonds.

17. Which molecule/ion out of the following does not contain unpaired electrons?

(${}^5\text{B}$, ${}^7\text{N}$, ${}^8\text{O}$)

- A. N_2^+
- B. O_2
- C. O_2^{2-}
- D. B_2

18. The electronegativity of hydrogen is about 2.2. Therefore, in some hydrogen compounds the bond has to a certain extent an ionic character (besides the covalent one). Which of the following types of bonds would have the most pronounced ionic character?

- A. H-F
- B. H-I
- C. H-Br
- D. H-Cl

19. The electronic configuration of the outer shell of the most electronegative element is:

- A. $2s^22p^5$
- B. $3s^23p^5$
- C. $4s^24p^5$
- D. $5s^25p^5$



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20. Arrange the elements by increasing the ionization energy.

- A. $\text{Sb} < \text{As} < \text{Cl} < \text{P}$
- B. $\text{Sb} < \text{As} < \text{P} < \text{Cl}$
- C. $\text{As} < \text{Cl} < \text{P} < \text{Sb}$
- D. $\text{Cl} < \text{Sb} < \text{P} < \text{As}$

21. Which of the following substances produce golden yellow colour during the flame test?

- A. Chalk.
- B. Marble.
- C. Limestone.
- D. Cooking salt.

22. Which of the following substance is made of molecular crystals?

- A. Ice.
- B. Sodium iodide.
- C. Diamond.
- D. Gold.

23. The best location of hydrogen in the periodic table of elements is in the first group because:

- A. Hydrogen, as the other elements of the first group, is electronegative and has a similar electron configuration to the outer electron shell of the elements in the first group.
- B. Hydrogen, as the other elements in the first group, is electropositive and has a similar electron configuration to the outer electron shell of the elements in the first group.
- C. Hydrogen, as the other elements in the first group form only ionic compounds.
- D. Hydrogen as the other elements of the first group form only covalent compounds.

24. Which of following statements is true?

- A. All *p* elements are nonmetals.
- B. The elements of 17th group are name chalcogens.
- C. All *p* elements have completely filled *ns* orbitals.
- D. All statements are true.

25. In which of the following answers only *d* elements are listed?

- A. Au, Al, As, Ag
- B. Cr, Co, Cu, Cd
- C. Ti, Tl, Te, Ta
- D. Rb, Ru, Rh, Rf

**КЛУЧ ЗА ОПШТИНСКИ НАТПРЕВАР ПО ХЕМИЈА ЗА СРЕДНО ОБРАЗОВАНИЕ
2020**

I КАТЕГОРИЈА

1	B
2	D
3	C
4	B
5	D
6	A
7	B
8	A
9	C
10	A
11	C
12	A
13	C
14	B
15	C
16	C
17	D C
18	A
19	A
20	B
21	D
22	A
23	B
24	C
25	B