



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. Which of the following equations represents condensation reaction?

- A.  $\text{CaO} + \text{CO}_2 = \text{CaCO}_3$
- B.  $2\text{H}_2\text{CrO}_4 = \text{H}_2\text{Cr}_2\text{O}_7 + \text{H}_2\text{O}$
- C.  $\text{C}_2\text{H}_4 + \text{Cl}_2 = \text{C}_2\text{H}_4\text{Cl}_2$
- D.  $\text{Mg} + 2\text{HCl} = \text{MgCl}_2 + \text{H}_2$

2. Which of the following processes is exothermic?

- A. Ice melting.
- B. Ethanol evaporation.
- C. Steam condensation.
- D. Naphtalene sublimation.

3. Which of the following equations holds for enthalpy?

- A.  $H = q \cdot \zeta$
- B.  $H = U \cdot \zeta$
- C.  $H = U - PV$
- D.  $H = U + PV$

4. A substance for which the dissolution process is strongly endothermic dissolves in water in a glass cup. What temperature change can be felt if the glass wall is touched, before and during the dissolution?

- A. Increase of temperature.
- B. Decrease of temperature.
- C. No temperature change takes place.
- D. There is no temperature exchange between the solution and glass wall.

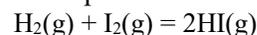
5. At the end of an irreversible reactions:

- A. the reaction extent obtains the minimal possible value.
- B. in the reaction system, at least one of the reactants is absent.
- C. there are no reaction products in the reaction system.
- D. in the reaction system, there are measurable quantities of all participants in the reaction.

6. Given the following thermochemical equation:



What is going to be the value of the reaction enthalpy, if the stoichiometric part of the thermochemical equation is written like this?



- A.  $\Delta_r H = -26,5 \text{ kJ/mol}$
- B.  $\Delta_r H = 13,25 \text{ kJ/mol}$
- C.  $\Delta_r H = -13,25 \text{ kJ/mol}$
- D.  $\Delta_r H = 53,00 \text{ kJ/mol}$

7. The rate of chemical reaction is expressed by the unit

- A. mol/s.
- B. mol·s.
- C. mol·dm<sup>3</sup>·s.
- D. mol·s/dm<sup>3</sup>.

8. The temperature coefficient for a certain chemical reaction is 3. What is the change of the reaction rate, if the temperature of the reaction system increases for 10 K?

- A. It increases for 3.
- B. It increases for 30.
- C. It increases 3 times.
- D. It increases 30 times.

9. The activation energy is:

- A. the difference between the energy of the activated complex and that of the reactants.
- B. the difference between the energy of the products and that of the reactants.
- C. the energy of the activated complex.
- D. the energy of transition state.

10. Which of the following statements about the catalyst is NOT correct?

- A. The catalyst participates in activated complex formation.
- B. The catalyst decreases the activation energy.
- C. In no case, can the catalyst change the reaction pathway.
- D. The catalyst cannot induce the impossible reaction to take place.

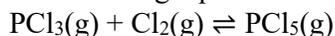


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11. The reaction proceeds spontaneously if:

- A.  $\Delta_r G = 0$
- B.  $\Delta_r G > 0$
- C.  $\Delta_r H > 0$
- D.  $\Delta_r G < 0$

12. The chemical equilibrium of the reaction given by the following equation



is shifted towards formation of the reactants if:

- A. the concentration of  $\text{PCl}_5$  decreases.
- B. the concentration of  $\text{PCl}_3$  increases.
- C. the concentration of  $\text{PCl}_5$  increases.
- D. a catalyst is added in the reaction system.

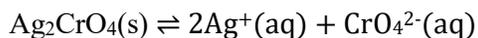
13. Which of the following statements about the chemical equilibrium constant ( $K_c$ ) is correct?

- A. For the very same reaction,  $K_c$  has different values at different temperatures.
- B. In the chemical equilibrium expression the initial concentrations of the reaction participants are written.
- C. For each reaction  $K_c$  is unitless quantity.
- D. The low value of  $K_c$  indicates that the amount of products exceeds the amount of reactants.

14. Which of the following equations represents an ionic reaction that does not effectively proceed?

- A.  $\text{NH}_4\text{Cl}(\text{aq}) + \text{NaOH}(\text{aq}) = \text{NaCl}(\text{aq}) + \text{H}_2\text{O}(\text{l}) + \text{NH}_3(\text{g})$
- B.  $2\text{AsCl}_3(\text{aq}) + 3\text{H}_2\text{S}(\text{aq}) = \text{As}_2\text{S}_3(\text{s}) + 6\text{HCl}(\text{aq})$
- C.  $\text{H}_2\text{SO}_4(\text{aq}) + 2\text{NaOH}(\text{aq}) = \text{Na}_2\text{SO}_4(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$
- D.  $\text{KCl}(\text{aq}) + \text{NaNO}_3(\text{aq}) = \text{KNO}_3(\text{aq}) + \text{NaCl}(\text{aq})$

15. What is the correct expression for the chemical equilibrium constant of the equilibrium process presented by the following equation:



- A.  $K_c = c(\text{Ag}^+)^2 \cdot c(\text{CrO}_4^{2-}) / c(\text{Ag}_2\text{CrO}_4)$
- B.  $K_c = c(\text{Ag}^+)^2 \cdot c(\text{CrO}_4^{2-})$
- B.  $K_c = c(\text{Ag}^+)^2 + c(\text{CrO}_4^{2-})$
- D.  $K_c = [c(\text{Ag}^+)^2 + c(\text{CrO}_4^{2-})] / c(\text{Ag}_2\text{CrO}_4)$

16. What is going to happen if an unsaturated solution of  $\text{Na}_2\text{SO}_4$  is added to a saturated solution of  $\text{Ag}_2\text{SO}_4$ ?

- A. Nothing is going to happen.
- B. The solution of  $\text{Ag}_2\text{SO}_4$  becomes unsaturated.
- C.  $\text{Ag}_2\text{SO}_4$  precipitates.
- D.  $\text{Na}_2\text{SO}_4$  precipitates.

17. Which of the following equations represents a protolytic reaction?

- A.  $\text{NO}(\text{g}) + \frac{1}{2} \text{O}_2(\text{g}) \rightleftharpoons \text{NO}_2(\text{g})$
- B.  $\text{CaO}(\text{s}) + \text{CO}_2(\text{g}) \rightleftharpoons \text{CaCO}_3(\text{s})$
- C.  $2\text{K}(\text{s}) + 2\text{H}_2\text{O}(\text{l}) = 2\text{KOH}(\text{aq}) + \text{H}_2(\text{g})$
- D.  $\text{HNO}_2(\text{aq}) + \text{NH}_3(\text{aq}) \rightleftharpoons \text{NH}_4^+(\text{aq}) + \text{NO}_2^-(\text{aq})$

18. The conjugate base of  $\text{H}_2\text{SO}_4$  is:

- A.  $\text{HSO}_4^-$
- B.  $\text{OH}^-$
- C.  $\text{S}^{2-}$
- D.  $\text{H}_3\text{O}^+$

19. If an acid is a strong protolyte, its conjugate protolyte is:

- A. weak conjugate acid.
- B. weak conjugate base.
- C. strong conjugate base.
- D. strong conjugate acid.

20. What is the concentration of  $\text{OH}^-$  ions, at 25 °C, if  $c(\text{H}_3\text{O}^+) = 1 \cdot 10^{-5} \text{ mol/L}$ ?

- A.  $c(\text{OH}^-) = 1 \cdot 10^{-5} \text{ mol/L}$
- B.  $c(\text{OH}^-) = 1 \cdot 10^{-7} \text{ mol/L}$
- C.  $c(\text{OH}^-) = 1 \cdot 10^{-9} \text{ mol/L}$
- D.  $c(\text{OH}^-) = 1 \cdot 10^{-10} \text{ mol/L}$

21. In acidic solutions at 25 °C:

- A.  $c(\text{H}_3\text{O}^+) < 1 \cdot 10^{-7} \text{ mol/L}$ .
- B.  $\text{pH} < 7$ .
- C.  $\text{pH} > 7$ .
- D.  $c(\text{H}_3\text{O}^+) = 1 \cdot 10^{-7} \text{ mol/L}$ .

22. What is the pH of KOH solution with  $c(\text{KOH}) = 10^{-3} \text{ mol/dm}^3$ , at 25 °C?

- A.  $10^{-11}$
- B. 3
- C. 11
- D.  $10^{-14}$



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23. Which of the following salts does not undergo hydrolysis?

- A.  $\text{Cs}_2\text{SO}_4$
- B.  $\text{K}_2\text{S}$
- C.  $\text{NH}_4\text{NO}_3$
- D.  $\text{NaCH}_3\text{COO}$

24. Which of the following salts undergo hydrolysis?

I.  $\text{NaCN}$  II.  $\text{KNO}_3$  III.  $\text{CaCl}_2$

IV.  $\text{Ca}(\text{CH}_3\text{COO})_2$

- A. All of them.
- B. Only IV.
- C. Only I and IV.
- D. None of them all.

25. At  $25\text{ }^\circ\text{C}$ , the pH of an aqueous solution of  $\text{NH}_4\text{Cl}$  is:

- A.  $\text{pH} < 7$
- B.  $\text{pH} = 7$
- C.  $\text{pH} > 7$
- D.  $\text{pH} = 0$

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

**II КАТЕГОРИЈА-ENG**

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