

Class: XI
Subject: Chemistry
Topic: Equilibrium
No. of Questions: 27

Q1. Species acting as both bronsted acid and bronsted base are

- A. HSO_4^{-1}
- B. Na_2CO_3
- C. NH_3
- D. None of these

Q2. The solubility of $\text{Mg}(\text{OH})_2$ is S moles/ litre. The solubility product under the same condition is

- A. $4S^3$
- B. $3S^4$
- C. $4S^2$
- D. S^3

Q3. What is the pH of a solution, whose hydronium ion concentration is $6.2 \times 10^{-9} \text{ mol L}^{-1}$

- A. 8.31
- B. 8.41
- C. 8.34
- D. 8.21

Q4. NH_4OH is a weak base because

- A. it has low vapour pressure
- B. it is only slightly ionized
- C. it has low density
- D. none of these

- Q5. Reaction between silver nitrate and sodium chloride goes to completion because
- the reaction is instantaneous
 - silver nitrate is insoluble in water
 - silver chloride is sparingly soluble in water
 - solubility of silver nitrate increases with sodium chloride
6. For the following equilibrium, $K_c = 6.3 \times 10^{14}$ at 1000K
 $\text{NO(g)} + \text{O}_3\text{(g)} \leftrightarrow \text{NO}_2\text{(g)} + \text{O}_2\text{(g)}$
Both the forward and reverse reactions in the equilibrium are elementary bimolecular reactions.
What is K_c for the reverse reaction?
7. Write the equilibrium equation for each of the following reactions:
- $\text{CO}_2\text{(g)} + \text{C(s)} \rightleftharpoons 2 \text{CO(g)}$
 - $\text{Hg(l)} + \text{Hg}^{2+}\text{(aq)} \rightleftharpoons \text{Hg}_2^{2+}\text{(aq)}$
8. In a reversible reaction, two substances are in equilibrium. If the concentration of each one is doubled, the equilibrium constant will be
- Reduced to half its original value
 - Reduced to one fourth of its original value
 - Doubled
 - Constant.
9. Explain why pure liquids and solids can be ignored while writing the equilibrium constant expression?
10. Does the number of moles of reaction products increase, decrease, or remain the same when each of the following equilibria is subjected to a decrease in pressure by increasing the volume?
- $\text{PCl}_5\text{(g)} \rightleftharpoons \text{PCl}_3\text{(g)} + \text{Cl}_2\text{(g)}$
 - $\text{CaO(s)} + \text{CO}_2\text{(g)} \rightleftharpoons \text{CaCO}_3\text{(s)}$
 - $3 \text{Fe(s)} + 4 \text{H}_2\text{O(g)} \rightleftharpoons \text{Fe}_3\text{O}_4\text{(s)} + 4 \text{H}_2\text{(g)}$

11. Which of the following statements is correct about the equilibrium constant?
- Its value increases by increase in temperature
 - Its value decreases by decrease in temperature
 - Its value may increase or decrease with increase in temperature
 - Its value is constant at all temperature.
12. Sulphanilic acid is a/an
- Arrhenius acid
 - Lewis base
 - Neither (a) nor (b)
 - Both (a) and (b).
13. A sample of $\text{HI}_{(g)}$ is placed in flask at a pressure of 0.2 atm. At equilibrium the partial pressure of $\text{HI}_{(g)}$ is 0.04 atm. What is K_p for the given equilibrium?
 $2\text{HI} (g) \leftrightarrow \text{H}_2 (g) + \text{I}_2 (g)$
14. In the first step of the Ostwald process for the synthesis of nitric acid, ammonia is oxidized to nitric oxide by the reaction
 $4 \text{NH}_3(g) + 5 \text{O}_2 (g) \rightleftharpoons 4 \text{NO} (g) + 6 \text{H}_2\text{O} (g) \Delta H^\circ = - 901.2 \text{ KJ}$ How does the equilibrium amount of NO vary with an increase in temperature?
15. To a solution equimolar mixture of sodium acetate solution is added. The pH of mixture solution
- increase
 - decreases
 - remains unchanged
 - unpredictable.

16. The equilibrium constant expression for a gas reaction is, $K_c = \frac{[NH_3]^4 [O_2]^3}{[NO]^4 [H_2O]^6}$
Write the balanced chemical equation corresponding to this expression.
17. Equilibrium constant changes with
- A. time
 - B. temperature
 - C. pressure
 - D. both temperature and concentration
18. One mole of H_2O and one mole of CO are taken in 10 L vessel and heated to 725 K. At equilibrium 40% of water (by mass) reacts with CO according to the equation,
 $H_2O(g) + CO(g) \leftrightarrow H_2(g) + CO_2(g)$ Calculate the equilibrium constant for the reaction.
19. Under what conditions of temperature and pressure the formation of atomic hydrogen from molecular hydrogen will be favoured most.
- A. High temperature and high pressure
 - B. High temperature and low pressure
 - C. Low temperature and low pressure
 - D. Low temperature and high pressure
20. The chemical system in equilibrium is not affected by
- A. change in the concentration of products
 - B. increase in the concentration of reactants
 - C. addition of a catalyst
 - D. changing the temperature

21. Does the number of moles of reaction products increase, decrease or remain same when each of the following equilibria is subjected to a decrease in pressure by increasing the volume?
- A. $\text{PCl}_5 (\text{g}) \leftrightarrow \text{PCl}_3 (\text{g}) + \text{Cl}_2 (\text{g})$
 - B. $\text{CaO} (\text{s}) + \text{CO}_2 (\text{g}) \leftrightarrow \text{CaCO}_3 (\text{s})$
 - C. $3\text{Fe} (\text{s}) + 4\text{H}_2\text{O} (\text{g}) \leftrightarrow \text{Fe}_3\text{O}_4 (\text{s}) + 4\text{H}_2 (\text{g})$
22. Following gaseous reaction is undergoing in a vessel $\text{C}_2\text{H}_4 + \text{H}_2 \rightleftharpoons \text{C}_2\text{H}_6$ $\Delta H = -32.7 \text{ Kcal}$; Which will increase the equilibrium concentration of C_2H_6
- A. Increase of temperature
 - B. By removing some hydrogen
 - C. By reducing temperature
 - D. By adding some C_2H_6
23. A substance X dissolves in water with a decrease in volume and absorption of heat solubility of X will be favoured by
- A. low pressure high temp.
 - B. low temp. high pressure
 - C. low temp. low pressure
 - D. high temperature, high pressure
24. Write the conjugate acids for the following bronsted bases: NH_2^- , NH_3 and HCOO^- ,
25. 3.2 moles of hydrogen iodide were heated in a sealed bulb at 444°C till the equilibrium state was reached. Its degree of dissociation at this temperature was found to be 22%. The number of moles of hydrogen iodide present at equilibrium are . [BHU 1982]
- A. 2.496
 - B. 2
 - C. 1.87
 - D. 4

26. Which of the following aqueous solutions will have highest pH?

- A. Sodium acetate
- B. Sodium chloride
- C. Ammonium phosphate
- D. Calcium chloride.

27. The pH of a sample of vinegar is 3.76. Calculate the concentration of hydrogen ion in it.

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