CHAPTER 8

CHEMICAL EQUILIBRIUM

MCQs

Q.1 A reaction is reversible because
(a) reactants are reactive (b) products are reactive
(c) products are stable (d) reactants are stable

Q.2 A large value of Ka means that at equilibrium
(a) less reactants and more products
(b) more reactants and less product
(c) same amount
(d) none

Q.3 Extent to H2 + I2 → 2HI can be increased by
(a) increasing pressure (b) increasing product
(c) increasing temp (d) adding a catalyst

Q.4 Strength of an acid can be determined by
(a) PKa (b) PKp
(c) POH (d) PKw

Q.5 In an exothermic reversible reaction increase in temp shifts the equilibrium to
(a) reactant side (b) product side
(c) remains unchanged (d) none

Q.6 Units of Kw are
(a) mole dm–3 (b) mole2 dm–3
(c) mole2 dm–6 (d) mole2 dm–3

Q.7 A basic Buffer solution can be prepared by mixing
(a) weak acid and its salt with strong base
(b) strong acid and its salt with weak base
(c) weak base and its salt with strong acid
(d) strong base and its salt with weak acid

Q.8 Buffer action can be explained by
(a) common ion effect (b) law of mass action

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Q.9 Ionization of weak acid is expressed in term of following constant
(a) Kw  (b) Kn  (c) Ka  (d) Kb
Q.10 Solubility of Ca(OH)2 is exothermic. If solubility will increase
(a) at high temp  (b) at low temp  (c) temp independent  (d) none
Q.11 For which system does the equilibrium constant, Kc has units of concentration
(a) N2 + 3H2  2NH3  (b) H2 + I2  2 HI  
(c) 2NO2  N2O4  (d) 2HF  H2 + F2
Q.12 Which statement about the following equilibrium is correct
2SO2(g) + O2(g)  2SO3(g)  \( \Delta H = -188.3 \text{ kJ mol}^{-1} \)
(a) the value of Kp falls with a rise in temp  
(b) the value of Kp falls with increasing pressure  
(c) adding V2O5 catalyst increase the equilibrium yield of sulphur trioxide  
(d) the value of Kp is equal to Kc
Q.13 The PH of 10–3 mole dm–3 of an aqueous solution of H2SO4 is
(a) 3.0  (b) 2.7  (c) 2.0  (d) 1.5
Q.14 The solubility product of AgCl is 2.0 x 10–10 mole2 dm–6. The max concentration of Ag+ ions in the solution is
(a) 2.0 x 10–10 mol dm–3  (b) 1.41 x 10–5 mol dm–3  
(c) 1.0 x 10–10 mol dm–3  (d) 4.0 x 10–20 mol dm–3
Q.15 An excess of aqueous silver nitrate to added to aqueous barium chloride and precipitate is removed by filtration what are the main ions in the filtrate
(a) Ag+ and NO only  (b) Ag+ and Ba2+ and NO3  
(c) Ba2+ and NO only  (d) Ba+2 and NO and Cl–
Q.16 For N2 + 3H2  2NH3
(a) Kc = Kp  (b) Kp = Kc RT
Q.17 H₂ + I₂ → 2HI
In the above equilibrium system, if the conc. of reactants of 25°C is increased, the value of $K_c$ will
(a) increase  (b) decrease  
(c) remains constant  (d) depends upon nature of reactants
Q.18 In a chemical reaction, equilibrium is said to have established when
(a) opposing reactions stops  
(b) concentrations of reactants and products are equal  
(c) rate constants of opposing reactions are equal
Q.19 The relation between $K_c$ and $K_p$ is
(a) $K_c = K_p (RT) \Delta n$  (b) $K_p = K_c (RT) \Delta n$
(c) $K_p = K_c (RT) \Delta n$  (d) $K_p = K_c$
Q.20 The precipitation occurs if the ionic concentration is
(a) less than $K_{sp}$  (b) more than $K_{sp}$  
(c) equal to $K_{sp}$  (d) is present at any moment
Q.21 The PH of oranges is
(a) 3.5  (b) 3.1  
(c) 4.6  (d) 4.2
Q.22 Which one of following solution have zero PH
(a) 1 M HCl  (b) 0.5 MH₂SO₄  
(c) 0.1 M HNO₃  (d) 1 M CH₃COOH
Q.23 The solubility product expression for BaF₂ can be written as
(a) $[\text{Ba}^2+] [\text{F}^-]$  (b) $[\text{Ba}^2+] [2\text{F}]$
(c) $[\text{Ba}^2+] [\text{F}^-]_2$  (d) $[\text{Ba}^+] [\text{F}^-]_2$
Q.24 To prepare a buffer with PH close to 9.0, you could use a mixture of
(a) NH₄OH and NH₄Cl  
(b) CH₃COOH and CH₃COONa  
(c) HNO₂ + NaNO₂  
(d) NaHCO₃ + H₂CO₃
Q.25 For which reaction the numerical value of $K_c$ and $K_p$ are same
(a) $N_2 + 3H_2 \rightarrow 2NH_3$ (b) $2SO_2 + O_2 \rightarrow 2SO_3$
(c) $H_2 + Cl_2 \rightarrow 2HCl$ (d) $N_2O_4 \rightarrow 2NO_2$

Q.26 For which system does the equilibrium constant $K_c$ have units (mole dm$^{-3}$)$^{-1}$
(a) $H_2 + I_2 \rightarrow 2HI$ (b) $N_2 + 3H_2 \rightarrow 2NH_3$
(c) $2NO_2 \rightarrow N_2O_4$ (d) $CH_3COOH + C_2H_5OH \rightarrow CH_3COOC_2H_5 + H_2O$

Q.27 What can affect the magnitude of equilibrium constant $K_p$ of a reversible gaseous reaction
(a) temperature (b) pressure
(c) catalyst (d) none of above

Q.28 Which gas can change the PH towards acidic
(a) argon (b) carbon dioxide
(c) nitrogen (d) oxygen

Q.29 The solution having zero PH will be
(a) basic (b) high basic
(c) neutral (d) highly acidic

Q.30 A solution have $H^+$ ions concentration $1 \times 10^{-7}$ its PH will be
(a) acid (b) basic
(c) neutral (d) zero

Q.31 Which one of the following has highest PH
(a) $0.1$ M $HCl$ (b) $1.0$ M $HCl$
(c) gastric juice (d) lemons

Q.32 Which PH is considered as basic
(a) $1$ (b) $7$
(c) $2$ (d) $11$

Q.33 The sum of PH and POH is
(a) $2$ (b) $7$
(c) $14$ (d) $13.5$

Q.34 A buffer solution can be prepared by mixing
(a) a strong acid and weak base
(b) a weak acid and weak base  
(c) a strong acid and its salt  
(d) a weak base and its salt with strong acid

Q.35 Law of mass action was presented by  
(a) Henderson  
(b) Lewis  
(c) Guldberg and Waage  
(d) Arrehenius

Q.36 The unit of $K_c$ for reaction  
$N_2 + O_2 \rightarrow 2NO$  
(a) mol dm$^{-3}$  
(b) mol$^{-1}$ dm$^3$  
(c) mol$^{-2}$ dm$^6$  
(d) no units

Q.37 PH of pure water is  
(a) 3.2  
(b) 4.2  
(c) 7.0  
(d) 0

Q.38 Which of following change will favour the formation of more $SO_3$ at equilibrium  
$2SO_2 + O_2 \rightarrow 2SO_3 + \text{heat}$  
(a) by adding $SO_3$ at equilibrium  
(b) by increasing temp  
(c) by decreasing temp  
(d) by decreasing pressure

Q.39 When pressure is applied to the given equilibrium  
$\text{ice} \rightarrow \text{water}$ which of the following will happen  
(a) more ice will be formed  
(b) more water will be formed  
(c) equilibrium will not be disturbed  
(d) water will formed

Q.40 Which of following change will favour the formation of more $HI$ in the given reaction  
$H_2 + I_2 \rightarrow 2HI$  
(a) increasing pressure  
(b) decreasing pressure  
(c) by adding more HI
(d) by adding more H2 and I2

**ANSWERS**

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