Equilibrium

Q.No.1: Which of the following salts is the most basic in aqueous solution? **JEE 2018**

A. $FeCl_3$

B. $Pb(CH_3COO)_2$

C. $Al(CN)_3$

D. CH_3COOK

Q.No.2: An alkali is titrated against an acid with methyl orange as indicator, which of the following is a correct combination? **JEE 2018**

A.

Base	**Acid**	**End point**
Weak	Strong	Yellow to pinkish red

B.

Base	**Acid**	**End point**
Strong	Strong	Pink to colourless

C.

Base	**Acid**	**End point**
Weak	Strong	Colourless to pink

D.

Base	**Acid**	**End point**
Strong	Strong	Pinkish red to yellow

Q.No.3: An aqueous solution contains 0.10 M H_2S and 0.20 M HCl. If the equilibrium constants for the formation of HS^- from H_2S is 1.0×10^{-7} and that of S^{2-} from HS^- ions is 1.2×10^{-13} then the concentration of S^{2-} ions in aqueous solution is : **JEE 2018**

A. 6×10^{-21}

B. 5×10^{-19}

C. 5×10^{-8}

D. 3×10^{-20}

Q.No.4: 20 mL of 0.1 M H_2SO_4 solution is added to 30 mL of 0.2 M NH_4OH solution. The pH of the resultant mixture is: [pk_b of NH_4OH = 4.7]. **JEE 2019**

A. 5.2

B. 9.0

C. 5.0

D. 9.4

Q.No.5: Consider the following reversible chemical reactions:

$$A_2(g) + B_2(g) \underset{}{\overset{K_1}{\rightleftharpoons}} 2AB(g) \ldots \quad (1)$$

$$6AB(g) \underset{}{\overset{K_2}{\rightleftharpoons}} 3A_2(g) + 3B_2(g) \ldots \quad (2)$$

The relation between K_1 and K_2 is: **JEE 2019**

A. $K_1K_2 = \frac{1}{3}$

B. $K_2 = K_1^3$

C. $K_2 = K_1^{-3}$

D. $K_1K_2 = 3$

Q.No.6: The values of K_p/K_c for the following reactions at 300 K are, respectively:
(At 300 K, RT = 24.62 dm^3 atm mol^{-1})
$N_2(g) + O_2(g) \rightleftharpoons 2NO(g)$
$N_2O_4(g) \rightleftharpoons 2NO_2(g)$
$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$ **JEE 2019**

A. 1, 24.62 dm^3 atm mol^{-1}, 606.0 dm^6 atm^2 mol^{-2}

B. 1, 24.62 dm^3 atm mol^{-1}, 1.65 × 10^{-3} dm^{-6} atm^{-2} mol^2

C. 1, 4.1 × 10^{-2} dm^{-3} atm^{-1} mol, 606 dm^6 atm^2 mol^{-2}

D. 24.62 dm^3 atm mol^{-1}, 606.0 dm^6 atm^2 mol^{-2}, 1.65 × 10^{-3} dm^{-6} atm^{-2} mol^2

Q.No.7: 5.1 g NH_4SH is introduced in 3.0 L evacuated flask at 327°C. 30% of the solid NH_4SH decomposed to NH_3 and H_2S as gases. The K_p of the reaction at 327°C is (R = 0.082 L atm mol^{-1} K^{-1}, Molar mass of S = 32 g mol^{-1}, molar mass of N = 14 g mol^{-1}) **JEE 2019**

A. 0.242 × 10^{-4} atm^2

B. 1×10^{-4} atm^2

C. 4.9×10^{-3} atm^2

D. 0.242 atm^2

Q.No.8: For an elementary chemical reaction, $A_2 \underset{k_{-1}}{\overset{k_1}{\rightleftharpoons}} 2A$, the expression for $\frac{d[A]}{dt}$ is: **JEE 2019**

A. $k_1[A_2] - k_{-1}[A]^2$

B. $2k_1[A_2] - k_{-1}[A]^2$

C. $k_1[A_2] + k_{-1}[A]^2$

D. $2k_1[A_2] - 2k_{-1}[A]^2$

Q.No.9: For the equilibrium, $2H_2O \rightleftharpoons H_3O^+ + OH^-$, the value of $\Delta G°$ at 298 K is approximately: **JEE 2019**

A. 100 kJ mol^{-1}

B. –80 kJ mol^{-1}

C. 80 kJ mol^{-1}

D. –100 kJ mol^{-1}

Q.No.10: Consider the reaction

$N_2(g) + 3H_2(g) \rightleftharpoons 2NH_3(g)$

The equilibrium constant of the above reaction is K_p. If pure ammonia is left to dissociate, the partial pressure of ammonia at equilibrium is given by (Assume that $p_{NH_3} \ll p_{total}$ at equilibrium) **JEE 2019**

A. $\frac{3^{\frac{3}{2}} K_p^{\frac{1}{2}} P^2}{16}$

B. $\frac{K_p^{\frac{1}{2}} P^2}{16}$

C. $\frac{K_p^{\frac{1}{2}} P^2}{4}$

D. $\frac{3^{\frac{3}{2}} K_p^{\frac{1}{2}} P^2}{4}$