



Equilibrium

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

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- A. FeCl_3
- B. $\text{Pb}(\text{CH}_3\text{COO})_2$
- C. $\text{Al}(\text{CN})_3$
- 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?

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- 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 :

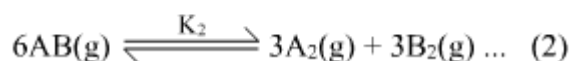
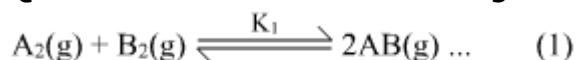
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- A. 6×10^{-21}
- B. 5×10^{-19}
- C. 5×10^{-8}
- D. 3×10^{-20}

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 $\text{NH}_4\text{OH} = 4.7$]. **JEE 2019**

- A. 5.2
- B. 9.0
- C. 5.0
- D. 9.4

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



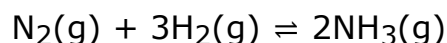
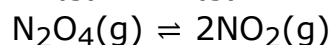
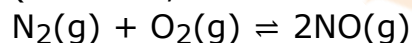
The relation between K_1 and K_2 is:

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- A. $K_1 K_2 = \frac{1}{3}$
- B. $K_2 = K_1^3$
- C. $K_2 = K_1^{-3}$
- D. $K_1 K_2 = 3$

Q.No.6: The values of K_p/K_c for the following reactions at 300 K are, respectively:

(At 300 K, $RT = 24.62 \text{ dm}^3 \text{ atm mol}^{-1}$)



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- A. 1, $24.62 \text{ dm}^3 \text{ atm mol}^{-1}$, $606.0 \text{ dm}^6 \text{ atm}^2 \text{ mol}^{-2}$
- B. 1, $24.62 \text{ dm}^3 \text{ atm mol}^{-1}$, $1.65 \times 10^{-3} \text{ dm}^{-6} \text{ atm}^{-2} \text{ mol}^2$
- C. 1, $4.1 \times 10^{-2} \text{ dm}^{-3} \text{ atm}^{-1} \text{ mol}$, $606 \text{ dm}^6 \text{ atm}^2 \text{ mol}^{-2}$
- D. $24.62 \text{ dm}^3 \text{ atm mol}^{-1}$, $606.0 \text{ dm}^6 \text{ atm}^2 \text{ mol}^{-2}$, $1.65 \times 10^{-3} \text{ dm}^{-6} \text{ atm}^{-2} \text{ mol}^2$

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 ($R = 0.082 \text{ L atm mol}^{-1} \text{ K}^{-1}$, Molar mass of S = 32 g mol^{-1} , molar mass of N = 14 g mol^{-1}) **JEE 2019**

- A. $0.242 \times 10^{-4} \text{ atm}^2$

- B. $1 \times 10^{-4} \text{ atm}^2$
- C. $4.9 \times 10^{-3} \text{ atm}^2$
- D. 0.242 atm^2

Q.No.8: For an elementary chemical reaction, $A_2 \xrightleftharpoons[k_{-1}]{k_1} 2A$, the expression for

$\frac{d[A]}{dt}$ is:

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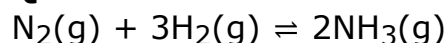
- A. $k_1[A_2] - k_{-1} [A]^2$
- B. $2k_1[A_2] - k_{-1} [A]^2$
- C. $k_1[A_2] + k_{-1} [A]^2$
- D. $2k_1[A_2] - 2k_{-1} [A]^2$

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

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- 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



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 $p_{NH_3} \ll p_{\text{total}}$ at equilibrium)

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