CLASS 11 CHEMISTRY EXTRA QUESTIONS

Class 11 Chemistry Chapter 6 Equilibrium – Extra Questions with Answers

Extra practice questions for Class 11 Chemistry Chapter 6 (Equilibrium), beyond the textbook. These Class 11 Chemistry Chapter 6 important questions are handy for last-minute exam practice.

Contents

Extra practice questions for Class 11 Chemistry Chapter 6 (Equilibrium), beyond the textbook. These Class 11 Chemistry Chapter 6 important questions are handy for last-minute exam practice.

Very Short Answer Questions (1 mark)

Q1. What is the formula for pH?
Ans: $pH=-\log[H^+]$.

Q2. Define equilibrium constant K_c.
Ans: The ratio of the product of equilibrium concentrations of products to reactants, each raised to their stoichiometric coefficients.

Q3. According to Brønsted-Lowry theory, what is an acid?
Ans: A proton (H^+) donor.

Q4. What happens to equilibrium if pressure is increased in a gaseous reaction with fewer moles of product?
Ans: Equilibrium shifts toward the side with fewer moles of gas (the product side, in this case).

Q5. What is the pH of a neutral solution at 25°C?
Ans: 7.

Short Answer Questions (2–3 marks)

Q6. Calculate the pH of a solution with $[H^+]=10^{-3}$ M.
Ans: $pH=-\log(10^{-3})=3$.

Q7. If $[H^+]=10^{-5}$ M in a solution, find $[OH^-]$ ($K_w=10^{-14}$).
Ans: $[OH^-]=K_w/[H^+]=10^{-14}/10^{-5}=10^{-9}$ M.

Q8. For the reaction $N_2+3H_2 \leftrightarrow 2NH_3$, if $[N_2]=1$ M, $[H_2]=2$ M, $[NH_3]=4$ M at equilibrium, calculate K_c.
Ans: $K_c=[NH_3]^2/([N_2][H_2]^3)=16/(1\times8)=2$.

Higher-Order Thinking / Application Questions

Q9. For the exothermic reaction $N_2+3H_2 \leftrightarrow 2NH_3$ (Haber process), explain, using Le Chatelier's principle, why industrial ammonia production uses moderately high pressure but only a moderate (not very high) temperature, even though the reaction is exothermic.
Ans: Since the forward reaction produces fewer moles of gas (2 mol NH_3 from 4 mol total reactants), increasing pressure shifts the equilibrium toward the product side (fewer moles), favouring higher NH_3 yield — hence high pressure is used. However, since the reaction is exothermic (releases heat), Le Chatelier's principle predicts that increasing temperature would shift equilibrium backward (toward reactants), reducing yield. Yet some heat is still needed because at very low temperatures, the reaction rate becomes too slow to be practical. So a moderate (not very high) temperature is chosen as a compromise: high enough for a reasonably fast reaction rate, but not so high that it excessively shifts equilibrium away from the desired product, illustrating the practical balance between thermodynamic equilibrium position and reaction kinetics in industrial processes.

Q10. Explain, using the concept of a buffer solution and the common ion effect, why a mixture of acetic acid (CH_3COOH) and sodium acetate (CH_3COONa) resists significant pH change when a small amount of strong acid (like HCl) is added.

Ans: The buffer solution contains a large reservoir of both the weak acid (CH_3COOH) and its conjugate base (CH_3COO^-, from sodium acetate). When a small amount of strong acid (H^+ from HCl) is added, the excess H^+ ions are consumed by reacting with the conjugate base already present: $CH_3COO^- + H^+ \rightarrow CH_3COOH$, converting some acetate ion into acetic acid rather than allowing free H^+ to accumulate and drastically lower the pH. Because the buffer contains a substantial amount of CH_3COO^- (from the common ion effect of sodium acetate suppressing acetic acid's own ionization and maintaining a large acetate reservoir), this neutralization reaction can absorb a considerable amount of added acid while only slightly shifting the ratio of $[CH_3COOH]/[CH_3COO^-]$, which (via the Henderson-Hasselbalch relationship) keeps the pH relatively stable rather than changing dramatically as it would in an unbuffered solution.

Class 11 Chemistry Chapter 6 – Solutions and Notes

For complete step-by-step answers and a quick summary, check the Class 11 Chemistry Chapter 6 Solutions and Class 11 Chemistry Chapter 6 Revision Notes.

See also: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5 | Chapter 6

Practice more: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5

Quick revision: Chapter 1 | Chapter 2 | Chapter 3 | Chapter 4 | Chapter 5