

Chemistry [DPP]
Chemical Equilibrium

1. Which of the following reaction goes in forward direction :-
- (A) $\text{Fe}_2\text{O}_3 + 6\text{HCl} \rightarrow 2\text{FeCl}_3 + 3\text{H}_2\text{O}$
- (B) $\text{NH}_3 + \text{H}_2\text{O} + \text{NaCl} \rightleftharpoons \text{NH}_4\text{Cl} + \text{NaOH}$
- (C) $\text{SnCl}_4 + \text{Hg}_2\text{Cl}_2 \rightleftharpoons \text{SnCl}_2 + 2\text{HgCl}_2$
- (D) $2\text{Cu} + 2\text{I}_2 + 4\text{K}^+ \rightleftharpoons 2\text{Cu}^{+2} + 4\text{KI}$
2. Which of the following is a characteristic of a reversible reaction:
- (A) Number of moles of reactants and products are equal.
- (B) It can be influenced by a catalyst
- (C) It can never proceed to completion
- (D) None of the above

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3. All reactions which have chemical disintegration
- (A) Is reversible
 - (B) Is reversible and endothermic
 - (C) is exothermic
 - (D) Is reversible or irreversible and endothermic or exothermic
4. $x \rightleftharpoons y$ reaction is said to be in equilibrium, when :-
- (A) Only 10% conversion x to y is just
 - (B) Complete conversion of x to y has taken place
 - (C) Conversion of x to y is only 50% complete
 - (D) The rate of change of x to y is just equal to the rate of change of y to x in the system

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5. In the chemical reaction $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$ at equilibrium, state whether :-
- (A) Equal volumes of N_2 & H_2 are reacting
 - (B) Equal masses of N_2 & H_2 are reacting
 - (C) The reaction has stopped
 - (D) The same amount of ammonia is formed as is decomposed into N_2 and H_2
6. The role of catalyst in a chemical reaction is :-
- (A) To help attain equilibrium in a shorter time.
 - (B) To lower the activation energy.
 - (C) To shift the equilibrium in such a way as to increase the concentration of the product
 - (D) Both A & B

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7. Active mass of 5 g CaO :-
(A) 56 (B) 1
(C) 3.5 (D) 2
8. Ratio of active masses of 22g CO₂,
3g H₂ and 7g N₂ in a gaseous
mixture:-
(A) 22 : 3 : 7 (B) 0.5 : 3 : 7
(C) 1 : 3 : 1 (D) 1 : 3 : 0.5
9. The equilibrium concentration of [B]_e
for the reversible reaction $A \rightleftharpoons B$
can be evaluated by the expression:-
(A) $K_c[A]_e^{-1}$ (B) $\frac{k_f}{k_b}[A]_e^{-1}$
(C) $k_f k_b^{-1} [A]_e$ (D) $k_f k_b [A]^{-1}$

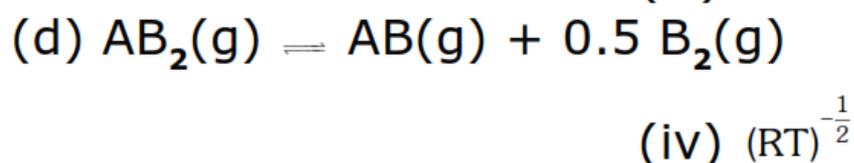
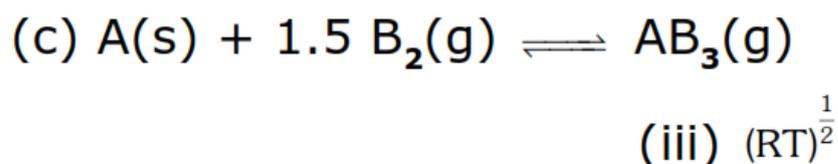
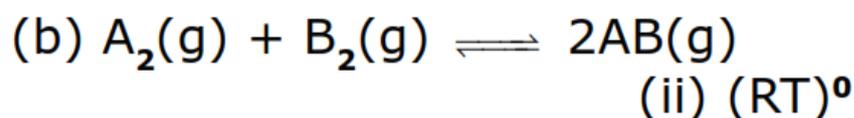
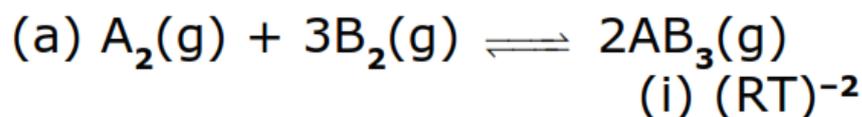
10. At 1000 K, the value of K_p for the reaction :



is 0.05 atm. The value of K_c in terms of R would be

- (A) 20000 R (B) 0.02 R
(C) 5×10^{-5} R (D) $5 \times 10^{-5} \times R^{-1}$

11. Match List -I (hypothetical reactions) with List-II (ratio $\frac{K_p}{K_c}$ for the given reactions) and select the correct answer using the code given below the lists :-



CODES :

	a	b	c	d
(A)	(i)	(ii)	(iii)	(iv)
(B)	(ii)	(i)	(iv)	(iii)
(C)	(i)	(iv)	(iii)	(ii)
(D)	(i)	(ii)	(iv)	(iii)

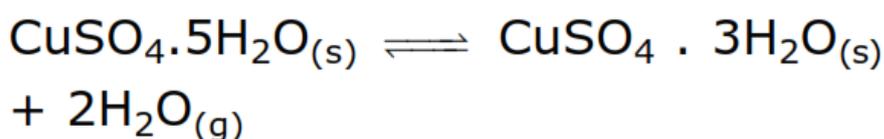
12. In a chemical equilibrium, the rate constant for the backward reaction is 7.5×10^{-4} and the equilibrium constant is 1.5. The rate constant for the forward reaction is:-

- (A) 2×10^{-3} (B) 5×10^{-4}
(C) 1.12×10^{-3} (D) 9.0×10^{-4}

13. For which reaction is $K_p = K_c$:-

- (A) $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$
(B) $\text{N}_2(\text{g}) + 3\text{H}_2(\text{g}) \rightleftharpoons 2\text{NH}_3(\text{g})$
(C) $\text{H}_2(\text{g}) + \text{Cl}_2(\text{g}) \rightleftharpoons 2\text{HCl}(\text{g})$
(D) $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g})$

14. For the reaction



Which one is correct representation:-

- (A) $K_p = p_{(\text{H}_2\text{O})}^2$
- (B) $K_c = [\text{H}_2\text{O}]^2$
- (C) $K_p = K_c(RT)^2$
- (D) All

15. $\log \frac{K_p}{K_c} + \log RT = 0$ is true

relationship for the following reaction:-

- (A) $\text{PCl}_5 \rightleftharpoons \text{PCl}_3 + \text{Cl}_2$
- (B) $2\text{SO}_2 + \text{O}_2 \rightleftharpoons 2\text{SO}_3$
- (C) $\text{N}_2 + 3\text{H}_2 \rightleftharpoons 2\text{NH}_3$
- (D) (B) and (C) both

16. For the reaction $C(s) + CO_2(g) \rightleftharpoons 2CO(g)$ the partial pressure of CO and CO_2 are 2.0 and 4.0 atm. respectively at equilibrium. The K_p for the reaction is

- (A) 0.5 (B) 4.0
(C) 8.0 (D) 1

17. For which reaction at 298 K, the value of $\frac{K_p}{K_c}$ is maximum and minimum respectively:-

- (a) $N_2O_4 \rightleftharpoons 2NO_2$
(b) $2SO_2 + O_2 \rightleftharpoons 2SO_3$
(c) $X + Y \rightleftharpoons 4Z$
(d) $A + 3B \rightleftharpoons 7C$
- (A) d, c (B) d, b
(C) c, b (D) d, a

- 18.** In this reaction $\text{Ag}^+ + 2\text{NH}_3 \rightleftharpoons \text{Ag}(\text{NH}_3)_2^+$ at 298K molar concentration of Ag^+ , $\text{Ag}(\text{NH}_3)_2^+$ and NH_3 is 10^{-1} , 10^{-1} , and 10^3 . The value of K_C at 298K for this equilibrium :-
(A) 10^{-6} (B) 10^6
(C) 2×10^{-3} (D) 2×10^6
- 19.** For reaction $2\text{NOCl}(\text{g}) \rightleftharpoons 2\text{NO}(\text{g}) + \text{Cl}_2(\text{g})$, K_C at 427°C is $3 \times 10^{-6} \text{ L}^{-1} \text{ mol}$. The value of K_p is nearly :-
(A) 7.50×10^{-5} (B) 2.50×10^{-5}
(C) 2.50×10^{-4} (D) 1.75×10^{-4}
- 20.** In which of the following equilibrium K_C and K_p are not equal ?
(A) $2\text{C}_{(\text{s})} + \text{O}_{2(\text{g})} \rightleftharpoons 2\text{CO}_{2(\text{g})}$
(B) $2\text{NO}_{(\text{g})} \rightleftharpoons \text{N}_{2(\text{g})} + \text{O}_{2(\text{g})}$
(C) $\text{SO}_{2(\text{g})} + \text{NO}_{2(\text{g})} \rightleftharpoons \text{SO}_{3(\text{g})} + \text{NO}_{(\text{g})}$
(D) $\text{H}_{2(\text{g})} + \text{I}_{2(\text{g})} \rightleftharpoons 2\text{HI}_{(\text{g})}$

ANSWER KEY

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|------------|---|------------|---|------------|---|
| 1. | A | 2. | C | 3. | D |
| 4. | D | 5. | D | 6. | D |
| 7. | B | 8. | D | 9. | C |
| 10. | D | 11. | D | 12. | C |
| 13. | C | 14. | D | 15. | B |
| 16. | D | 17. | B | 18. | A |
| 19. | D | 20. | A | | |