DPP SOLUTION

- Subject – Physical Chemistry
- Chapter – Chemical Equilibrium

DPP No.- 01

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Question-

In lime kiln, reversible reaction: $CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$
Proceeds to completion because

1. High temperature
2. CO_2 escapes
3. CaO removed
4. Low temperature

$$CaCO_3(s) \rightleftharpoons CaO(s) + CO_2(g)$$

$CaCO_3(s)$

Ans. (2)

Question-

Which is a reversible reaction

1. $H_2^{(g)} + I_2^{(g)} \rightarrow 2HI(g)$

2. $H_2SO_4 + Ba(OH)_2 \longrightarrow BaSO_4\downarrow + 2H_2O$

3. $NaCl + AgNO_3 \longrightarrow NaNO_3 + AgCl\downarrow$ ⇒ p.p.t.

4. $2KClO_3 \xrightarrow{\Delta} 2KCl + 3O_2\uparrow$

Ans. (1)

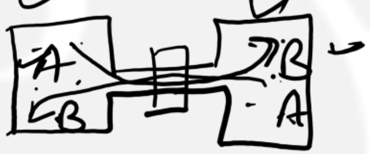
Question-

Which one is reversible process

1. X Melting of ice at 10°C

$$\underset{0^\circ C}{H_2O(s)} \rightleftharpoons \underset{0^\circ C}{H_2O(l)}$$

2. X Mixing of two gases by diffusion



3. Evaporation of water at 100°C and 1 atm pressure

$$\underset{100^\circ C}{H_2O(l)} \xrightleftharpoons[\text{condensation}]{\text{evaporation}} \underset{100^\circ C}{H_2O(g)}$$

4. None of these

Ans. (3)

Question-

The active mass of 64 gm of HI in a two litre flask would be

$M_{HI} = 1 + 127$
$= 128\,g$

64g HI (g)

(1) 2

(2) 1

(3) 5

(4) 0.25

$$\text{active mass} = [HI] = \frac{n_{HI}}{V} = \frac{64}{128 \times 2} = \frac{1}{4} = 0.25$$

Ans. (4)

Question-

A chemical reaction is at equilibrium when

$A + B \rightleftharpoons C + D$

1. Equal amounts of reactants and products are present
2. Formation of products is minimized
3. Reactants are completely transformed into products
4. Rates of forward and backward reactions are equal

Ans. (4)

Question-

For the system 3 $A_{(g)}$ + 2 $B_{(g)}$ ⇌ $C_{(g)}$, the expression for equilibrium constant is

$$K_C = \frac{[C]^1}{[A]^3[B]^2}$$

1. $\frac{[3A][2B]}{[C]}$

2. $\frac{[C]}{[3A][2B]}$

3. $\frac{[A]^3[B]^2}{[C]}$

4. $\frac{[C]}{[A]^3[B]^2}$ ✓

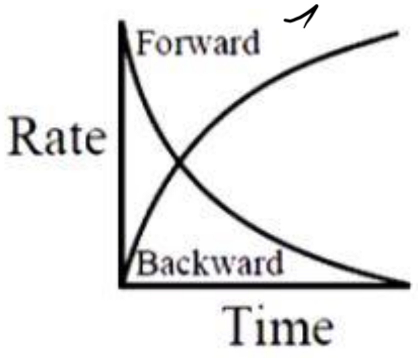
Ans. (4)

Question-

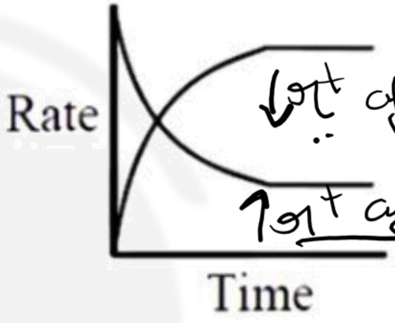
Which of the following graph correctly represents a relation between rate of reaction w.r.t. time

$$A(g) + B(g) \rightleftharpoons C(g) + D(g) \longrightarrow$$

(1)



(2)



↓ rate of forward rxn $= k_f [A][B]$ ↓

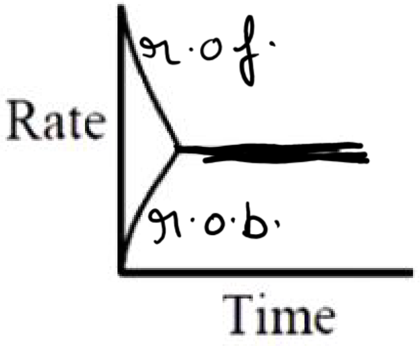
↑ rate of backward rxn $= k_b [C][D]$ ↑

at eq.

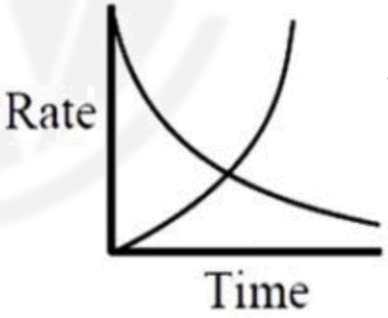
rate of forward rxn

= rate of backward rxn.

(3)



(4)



Ans. (3)

Question-

A reversible reaction having two reactants in equilibrium if the concentration of reactants are doubled, the equilibrium constant will

1. Become 4 times
2. Become $1/4^{th}$ times
3. Become $1/16^{th}$ times
4. Remains the same

K_c or K_p Change when Temp. Change

no effect of Changing Conc. of reactant on K_c or K_p

Ans. (4)

Question-

For the hypothetical reaction, the equilibrium constant (K) values are given

$A \rightleftharpoons B$, 1 K_1 **$B \rightleftharpoons C$, K_2 – 2** **$C \rightleftharpoons D$, 3 K_3**

The equilibrium constant (K) for the reaction $A \rightleftharpoons D$ is

add eq. 1 & 2 & 3

$A + \cancel{B} + \cancel{C} \rightleftharpoons \cancel{B} + \cancel{C} + D$

$A \rightleftharpoons D$

$K = K_1 \times K_2 \times K_3$

1. $K_1 + K_2 + K_3$
2. $K_1 \cdot K_2 \cdot K_3$
3. $K_1 + K_2 - K_3$
4. $\dfrac{K_1 + K_2}{K_3}$

Ans. (2)

Question-

In the reversible reaction $2HI(g) \rightleftharpoons H_2(g) + I_2(g)$, K_p is

$\Delta n_g = (1+1) - 2$
$= 0$

$K_p = K_c (RT)^{\Delta n_g}$

$K_p = K_c (RT)^0$

$K_p = K_c$

1. Greater than K_C
2. Less than K_C
3. Equal to K_C
4. Zero

Ans. (3)

Question-

For the reaction $CO(g) + Cl_2(g) \rightleftharpoons COCl_2(g)$, the fraction K_p/K_c is equal to

$\frac{K_p}{K_c} = ?$

$\Delta n_g = 1 - (2) = -1$

1. $1/RT$
2. RT
3. $\sqrt{RT}$
4. 1

$K_p = K_c (RT)^{\Delta n_g}$

$\frac{K_p}{K_c} = (RT)^{\Delta n_g}$

$= (RT)^{-1}$

$\frac{K_p}{K_c} = \frac{1}{RT}$

Ans. (1)

Question-

$NH_4COONH_2(s) \rightleftharpoons 2NH_3(g) + CO_2(g)$

If equilibrium pressure of gaseous mixture is 3 atm then K_p will be

(1) 4

(2) 27

(3) 4/27

(4) 1/27

$NH_4COONH_2(s) \rightleftharpoons 2NH_3(g) + 1CO_2(g)$

$y \quad\quad 0 \quad\quad 0$

$y - x \quad\quad 2x \quad\quad x$

$P_{NH_3} = 2P_{CO_2} \quad\quad P_{CO_2}$

Total P at eq. $= P_{NH_3} + P_{CO_2}$

$3 = 2P_{CO_2} + P_{CO_2}$

$P_{CO_2} = \frac{3}{3} = 1\,atm$

$P_{NH_3} = x_{NH_3} \times P_T$

$P_{CO_2} = x_{CO_2} \times P_T$

$K_p = (P_{NH_3})^2 (P_{CO_2})^1$

$= (2)^2 (1)^1$

$K_p = 4$

Ans. (1)

Thank You...