

RACE # 13

PHYSICAL CHEMISTRY

M.M. : 30

1. **Ans. (A,C)**

Fact base

2. **Ans. (D)**

3. **Ans. (A,B,C,D)**

Adjacent face centres atoms touches each other.

∴ 10th & 11th spheres are adjacent to 14th sphere.

10th & 12th sphere are at distance = a = 2√2r

Each opposite faces have two such planes passing through face diagonal.

∴ Total such planes = 2 × 3 = 6.

4. **Ans. (D)**

$$t_{1/2} \propto \frac{1}{a^{n-1}}$$

$$\frac{20}{40} = \left(\frac{10}{20}\right)^{n-1}$$

$$\frac{1}{2} = \left(\frac{1}{2}\right)^{n-1}$$

$$\Rightarrow n - 1 = 1 \Rightarrow n = 2$$

5. **Ans. (C)**



Given : k_0 = Rate constant for zero order
 k_1 = Rate constant for 1st order

$$(t_{1/2})_0 = \frac{[A]_0}{2k_0}, \quad (t_{1/2})_1 = \frac{0.693}{k_1}$$

$$\therefore \frac{[A]_0}{2k_0} = \frac{0.693}{k_1}$$

$$\frac{k_1[A]_0}{k_0} = 2 \times 0.693 \dots\dots\dots(1)$$

$$\frac{R_1(\text{Rate of 1st order reaction})}{R_0(\text{Rate of zero order reaction})} = \frac{k_1[A]_0^1}{k_0} = 2 \times 0.693$$

6. **Ans. (A)**

$$\text{Sol. } \log K = \log A - \frac{E_a}{2.303R} \times \frac{1}{T} \quad \dots(1)$$

\uparrow
y

\uparrow
C

$+$

\uparrow
m

\uparrow
n

$$C = \log A = 16 \Rightarrow \boxed{A = 10^{-16}}$$

$$\text{From eq(1)} \quad \log K_1 = \log A - \frac{E_a}{2.303R} \times \frac{1}{T}$$

$$\Rightarrow \log\left(\frac{0.693}{6930}\right) = \log A - \frac{E_a}{2.303} \times \frac{1}{T} \quad \dots(2)$$

$$\text{Also } \log\left(\frac{0.693}{0.693 \times 10^{-6}}\right) = \log A - \frac{E_a}{2.303} \times \frac{1}{T} \quad \dots(3)$$

From eq(2) and eq(3)

$$\boxed{\frac{T'}{T} = 2}$$

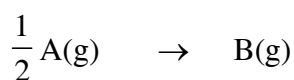
7. **Ans.(A,C,D)**

Sol. In 10 sec $A(g) \rightarrow B(g)$

$$\begin{array}{cc} \text{R.O.R} & \frac{8-6}{10} \quad \frac{4-0}{10} \\ & \frac{2}{10} \quad \frac{4}{10} \end{array}$$

(A) Rate of formation of B = 2 rate of disappearance of A

(B) Order of reaction is 0.5 (complex reaction)



$$P_0 = 8 \quad 0$$

$$O = P_0 - \frac{P}{2} \quad P$$

$$P = 2 \times 8 = 16 \text{ atm exerts after 40 min.}$$

8. **Ans.(A)**

$$\log k = \frac{-E_a}{2.303R} \left(\frac{1}{T} \right) + \log A$$

$$\text{slope} = \frac{-E_a}{2.303R} \Rightarrow -5000 = \frac{-E_a}{2.303R}$$

$$E_a = \frac{2.303 \times 8.314 \times 5000}{1000} \text{ kJ mol}^{-1} = 95.7 \text{ kJ K}^{-1} \text{ mol}^{-1}$$

10. **Ans.(A)**

$$\text{Sol. } K_{ov} = \frac{k_1 k_3}{k_2}$$

$$\begin{aligned} \therefore E_{ov} &= E_1 + E_3 - E_2 \\ &= 60 + 10 - 30 = 40 \text{ kJ.} \end{aligned}$$