

RACE # 12

PHYSICAL CHEMISTRY

M.M. : 30

1. **Ans.(C)**

Sol. $\Delta_r H = E_{a_f} - E_{a_b}$. Both E_{a_f} & E_{a_b} decrease by same amount by using catalyst, $\therefore \Delta_r H$ remains unchanged.

2. **Ans.(A,D)**

Fact base

3. **Fact base**

4. **Ans.(B)**

Sol. On each body diagonal two tetrahedral void are present

5. **Ans.(C)**

Sol. Let radius of iron atom is r .

when α -iron (BCC structure) $\sqrt{3}a = 4r$

$$(\text{density}) \rho = \frac{ZM}{N_A \left(\frac{4r}{\sqrt{3}} \right)^3} \dots\dots\dots(1)$$

when γ -iron (fcc structure)

$$(\text{density}) \rho = \frac{4M}{N_A \left(\frac{4r}{\sqrt{2}} \right)^3} \dots\dots\dots(2)$$

$$\frac{(2)}{(1)} \frac{\rho'}{\rho} = \frac{4(2\sqrt{2})}{2(3\sqrt{2})} \Rightarrow \rho' = \frac{4}{3} \left(\sqrt{\frac{2}{3}} \right) \rho$$

$$\Rightarrow \rho' = \frac{4\rho}{3\sqrt{1.5}}$$

6. **Ans.(A)**

Fact base, higher the energy, lesser the stability.

7. **Ans.(B)**

Sol. (D) $P_A = C_A RT$ Rate = $K_1 P_A^2$

$$\frac{-dP_A}{dt} = K_1 P_A^2$$

$$\frac{-dC_A RT}{dt} = K_1 (C_A RT)^2$$

$$\Rightarrow \boxed{K_2 = K_1 (RT)}$$

8. Ans.(A)

Sol. (A) $A \xrightarrow{K_I} P$ from graph 1st order reaction

$$K_I = \frac{1}{30} \ln \left(\frac{1}{0.5} \right) \Rightarrow \frac{\ln 2}{30}$$

$$K_I = \frac{1}{60} \ln \left(\frac{1}{0.25} \right) \Rightarrow \frac{\ln 2}{30}$$

$B \xrightarrow{K_{II}} Q$ Zero order reaction

$$A_t = A_0 - K_{II}t$$

$$K_{II} = \frac{1}{120}$$

$$\frac{K_I}{K_{II}} = \frac{\frac{\ln 2}{30}}{\frac{1}{120}} \Rightarrow \frac{0.693}{30} \times 120 = 2.772$$

9. Ans. (B,D)

Sol. (B, D) As according to the eqn $K = Ae^{-E_a/RT}$

10. Ans. (A) S, (B) P, (C) R, T (D) Q

Sol. Acc. to the formulae of order of reaction