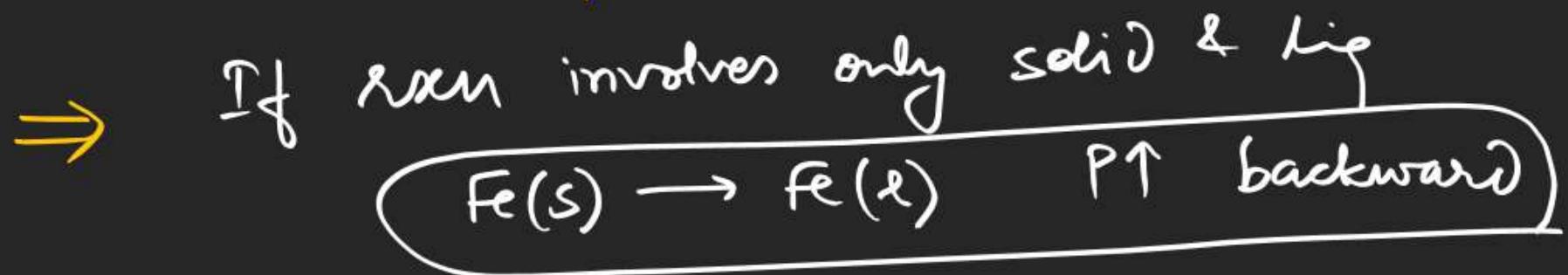


An increase in pressure (by decreasing volume) results in increase in partial pressure

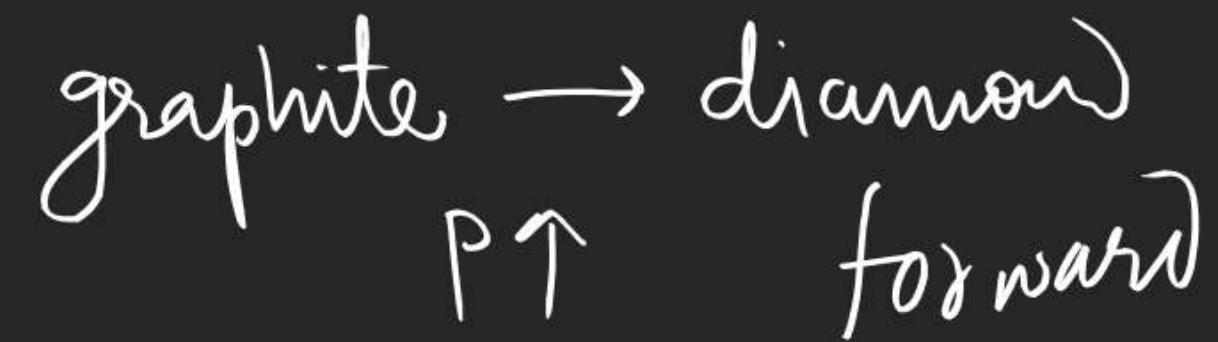


density  $\downarrow$  Pressure  $\uparrow$

less dense  $\rightarrow$  more pressure

more dense  $\rightarrow$  less pressure

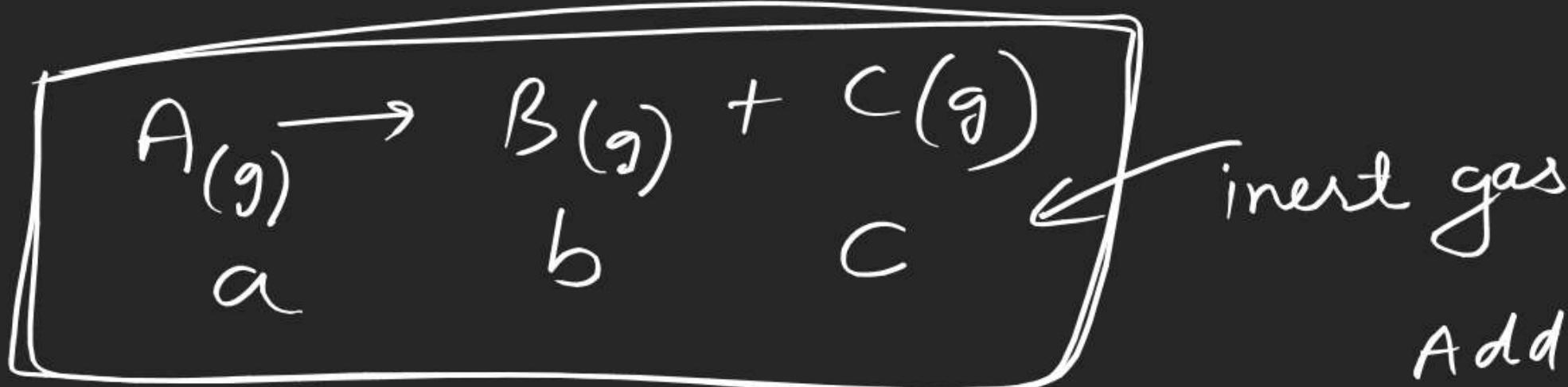
An increase in pressure favours more dense substance



$P \uparrow$  forward

### ③ Effect of addition of inert gas

a) At constant volume



$$K_c = \frac{b \times c}{a} \times \left( \frac{1}{V} \right)$$

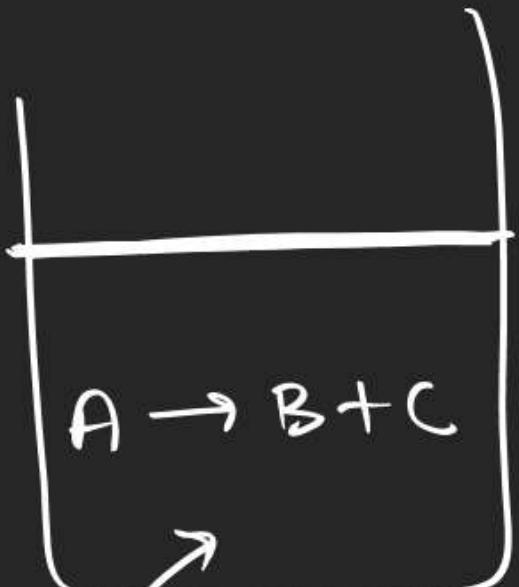
$$K_p = \frac{P_B \times P_C}{P_A}$$

$P_C = \frac{n_c R T}{V}$

Add<sup>n</sup> inert gas at  
constant <sup>volume</sup> has no effect  
on eq<sup>lib</sup> state because  
partial pressures remain  
unchanged

⑤ At constant pressure:

Volume will increase

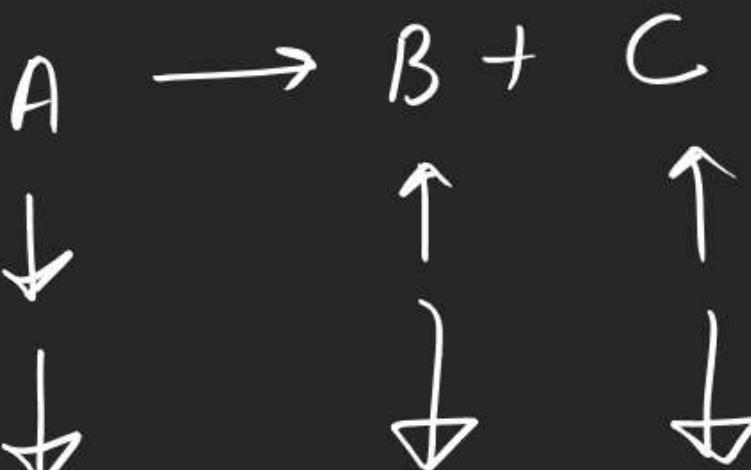


$$K_c = \frac{b \times c}{a} \times \frac{1}{V^T}$$

Rxn moves in the direction  
which more no of moles of gases

forward dirn

moles  
↓  
Pressure ↓



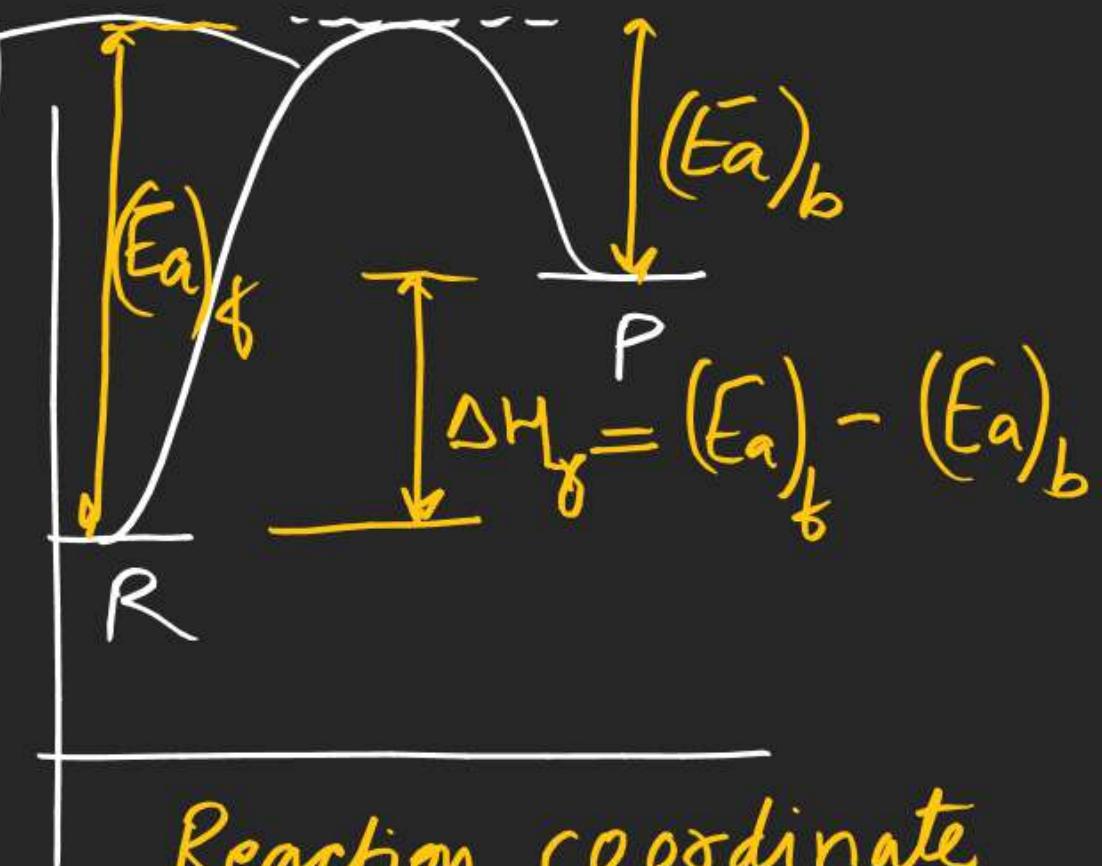
# ④ Effect of temperature :-



$$\underline{K_c} = \frac{b \times c}{a} \times \nu$$

$$K_{eq} = \frac{k_f}{k_b} = \frac{\text{forward rate}}{\text{backward rate}}$$

transition state



According to Arrhenius

$$k = A e^{-E_a/RT}$$

rate const

Arrhenius constant

Activation energy

Activated complex

PE

$R$

$A$  &  $E_a$  are temperature independent

$$\Delta H_r = (E_a)_f - (E_a)_b$$

$$k = A e^{-E_a/RT}$$

$$k_f = A_f e^{-(E_a)_f/RT}$$

$$k_b = A_b e^{-(E_a)_b/RT}$$

$$\frac{k_f}{k_b} = \frac{A_f}{A_b} e^{-[(E_a)_f - (E_a)_b]/RT}$$

$$K_{eq} = \frac{A_f}{A_b} e^{-\Delta H_r/RT}$$

$$\ln K_{eq} = \ln \frac{A_f}{A_b} - \frac{\Delta H_r}{R} \left( \frac{1}{T} \right).$$

$$\ln K_{T_1} = \ln \frac{A_f}{A_b} - \frac{\Delta H_r}{R} \left( \frac{1}{T_1} \right)$$

$$\ln K_{T_2} = \ln \frac{A_f}{A_b} - \frac{\Delta H_r}{R} \left( \frac{1}{T_2} \right)$$

$$\ln \frac{K_{T_2}}{K_{T_1}} = \frac{\Delta H_r}{R} \left( \frac{1}{T_1} - \frac{1}{T_2} \right)$$

Van't Hoff eqn

$$\text{endo } \Delta H > 0 \quad T \uparrow \quad \ln \frac{K_{T_2}}{K_{T_1}} > 0 \quad K_{T_2} > K_{T_1}, \quad K_{eq} \uparrow$$

$$\text{exo } \Delta H < 0 \quad T \uparrow \quad \ln \frac{K_{T_2}}{K_{T_1}} < 0 \quad K_{T_2} < K_{T_1}, \quad K_{eq} \downarrow$$

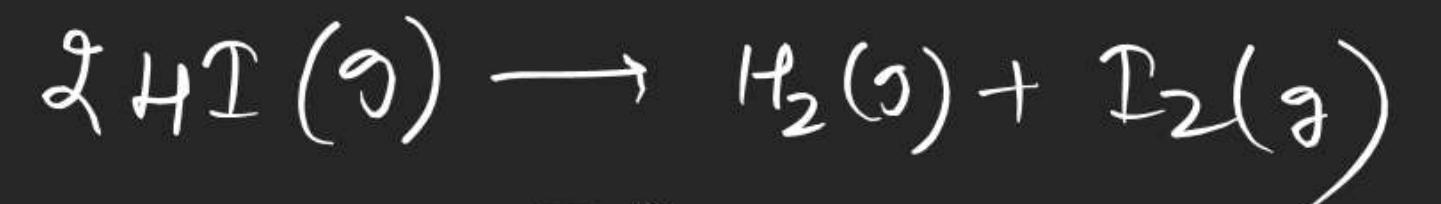


$\Delta H_r < 0$  exo

$T \uparrow$   $K_{eq} \downarrow$  backward



$T \uparrow K_{eq} \uparrow$  forward



endo  $T \uparrow$  forward

$$\begin{array}{r} 0-1 \quad 63 - 77 \\ S-1 \quad 32 - 40 \end{array}$$

**JEE MAIN PAPER CLASS 11<sup>th</sup>**

1. Two solid compounds X and Y dissociates at a certain temperature as follows



The total pressure of gases over a mixture of X and Y is:

(A) 4.5 atm

(B) 0.45 atm

(C) 0.6 atm

(D) 0.2 atm

2. The temperature of an ideal gas is increased from  $27^{\circ}\text{C}$  to  $327^{\circ}\text{C}$ . Calculate ratio of de-broglie wavelength of ideal at  $27^{\circ}\text{C}$  to  $327^{\circ}\text{C}$ .

(A)  $\frac{2}{1}$

(B)  $\frac{1}{2}$

(C)  $\frac{\sqrt{2}}{1}$

(D)  $\frac{1}{1}$

$$\lambda = \frac{h}{m \sqrt{\frac{3RT}{M}}}$$

29/1/19 48

500 gm

0.05/2

3. 10.1 g of  $\text{KNO}_3$  is dissolved in 500 mL of  $\text{H}_2\text{O}$ . Mass of  $\text{Ba}(\text{NO}_3)_2$  that should be added to this solution to get molality (m) of 0.3 to  $\text{NO}_3^-$  ion is:  
 (A)  $\approx 1.3\text{g}$     (B)  $\approx 13\text{g}$     (C)  $\approx 6.5\text{g}$     (D)  $\approx 65\text{g}$

$$\frac{10.1}{101} = \underline{\underline{0.1 \text{ } \text{NO}_3^-}}$$

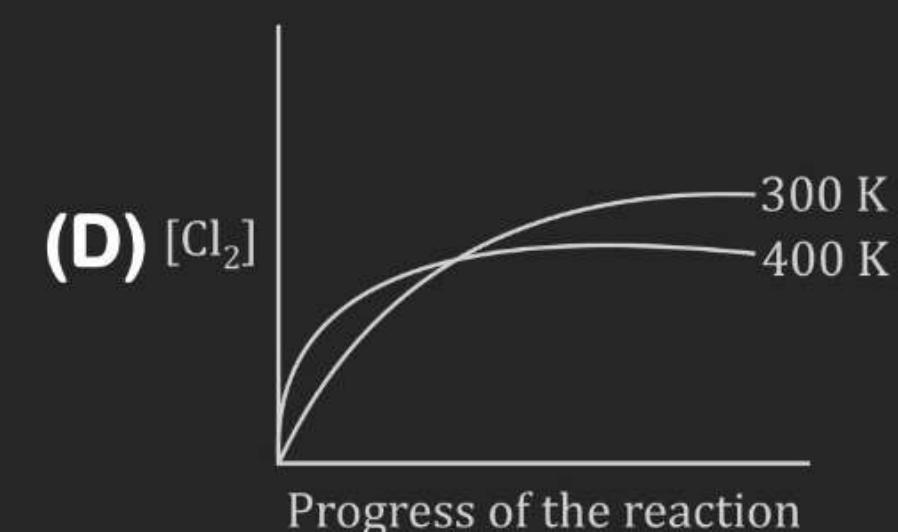
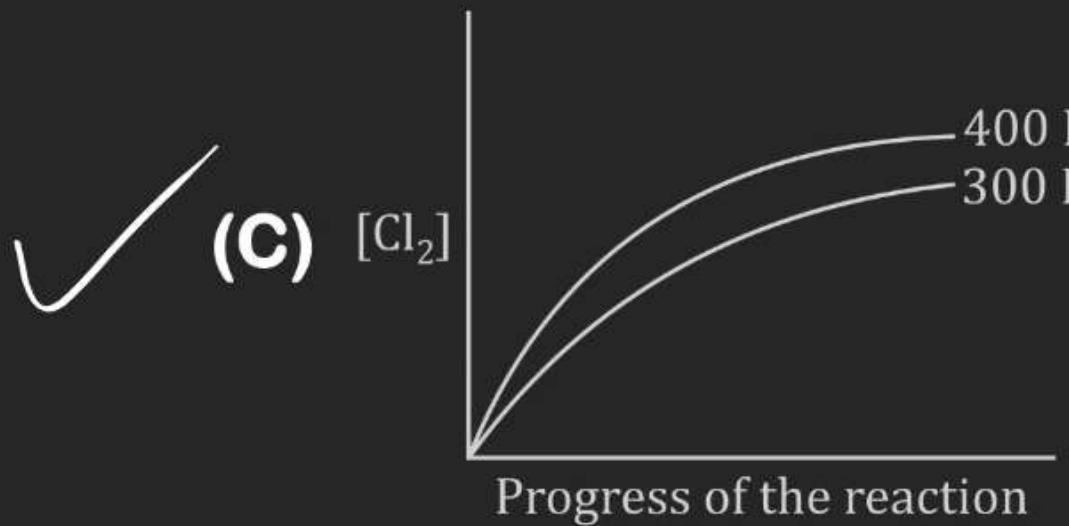
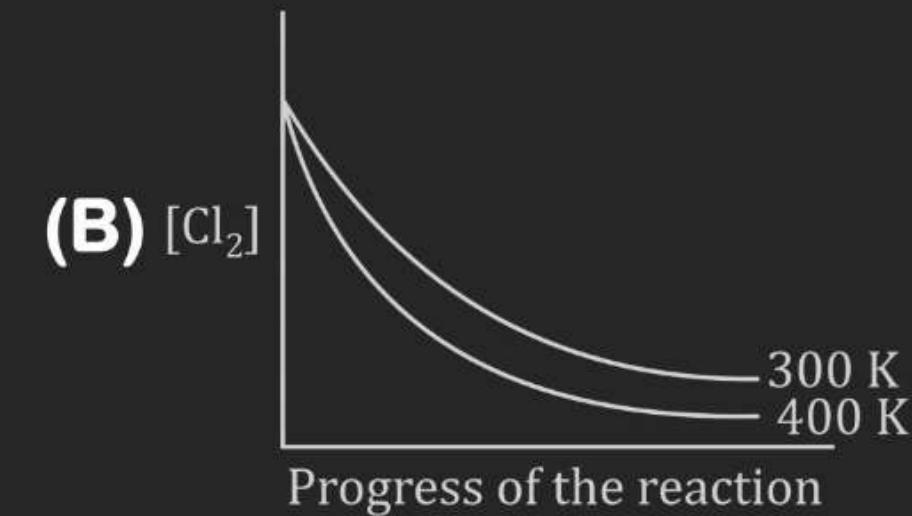
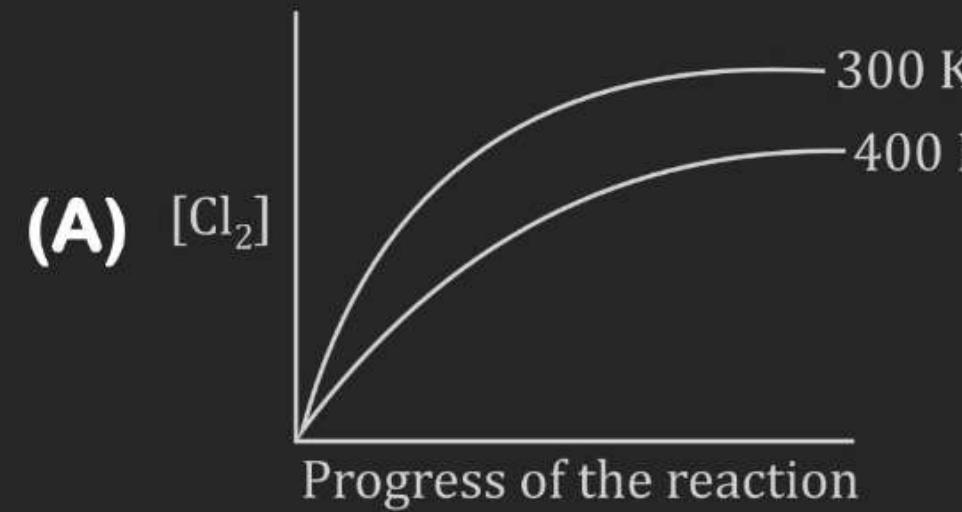
$$\frac{\eta}{500} \times 1000 = 0.3$$

$$\eta = \frac{0.3}{2} = 0.15$$

4. Which of the following graphical representation is correct for the chemical reaction?



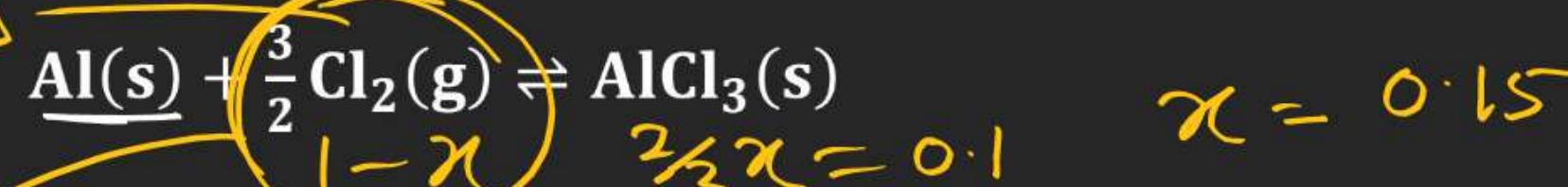
end O



$$\frac{5 \times 5}{25} = 1 \text{ mol}$$

5.  $\text{Cl}_2$  was introduced in a container made up of aluminium of 5L capacity at 5 atm pressure at 300K. When temperature was raised to 600K then a reaction will start between the  $\text{Cl}_2(\text{g})$  and  $\text{Al}(\text{s})$  as follows:

0.85



$$1 - \chi \quad \frac{2}{3} \chi = 0.1$$

If after some time the reaction stops and mass of  $\text{AlCl}_3(\text{s})$  formed is 13.35

0.1 mol

grams then  $K_p$  of the above reaction assuming no change in volume is :

$$[\text{Al} = 27 \frac{\text{g}}{\text{mol}}, \text{Cl} = 35.5 \text{ g/mole}]$$

$$[\text{RT} = 25 \text{ L atm/mole at } 300\text{K}]$$

$$(\text{A}) (5.5)$$

$$(\text{B}) (8.5)^{-\frac{3}{2}}$$

$$(\text{C}) (6.5)^{-\frac{3}{2}}$$

$$(\text{D}) (4.5)^{-\frac{3}{2}}$$

$$K_p = \frac{1}{P_{\text{Cl}_2}^{3/2}}$$

*ST3*

6.  $Z_2$  undergo disproportion in an alkaline medium into a mixture of  $Z^-$  and  $ZO_3^-$ .

Equivalent mass of  $Z_2$  in the reaction is: [given that atomic mass of Z is 80gm/mol ]

- (A) 96      (B) 48      (C) 64      (D) 32



$$n_f = 5/3$$

$$\frac{160}{5} \times 3$$

7. For the reaction  $2\text{NOCl(g)} \rightleftharpoons 2\text{NO(g)} + \text{Cl}_2\text{(g)}$ ,  $K_p = 3.5 \times 10^{-3}$  atm at  $27^\circ\text{C}$ . Value of  $K_c$  at this temperature will be : [R = 0.0821 L – atm/mole – Kelvin]
- (A)  $1.42 \times 10^{-4}$     (B)  $1.42 \times 10^{-3}$     (C)  $1.42 \times 10^{-5}$     (D)  $1.42 \times 10^{-6}$

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

$$\Delta n_g = 1$$

8. At equilibrium, a solution contains 1.0 mol each of  $\text{Cd}^{2+}$ (aq),  $\text{SCN}^-$ (aq) and  $\text{Cd}(\text{SCN})_4^{2-}$ . What is the solution's volume?



$$K_c = \frac{1}{1 \times 1^4} \times \left( \frac{1}{V} \right)^4$$

10. First and second ionization energies of magnesium atom are 7.646 and 15.035 eV respectively. The amount of energy in kJ needed to convert all the atoms of magnesium into  $Mg^{2+}$  ions present in 12 mg of magnesium vapours is: [Given : 1 eV = 100 kJ mol<sup>-1</sup>] (Report your answer to the nearest whole number) [Molar mass of Mg = 24/mol]

$$\frac{12 \times 10^{-3}}{24} = \frac{1}{2} \times 10^{-3} \text{ mol}$$

$$\left( \frac{1}{2} \times 10^{-3} \right) \times (15.035 + 7.646) \times 100 \text{ kJ/mol}$$