Daily Tutorial Sheet-10 | Level-2

116.(C) Low temperature and high pressure will be favourable condition.

117.(C) $H_2O_{(ice)} \rightleftharpoons H_2O_{(liquid)}$

When pressure is applied, equilibrium shifts in the direction where density is lower i.e. Towards the water

118.(C)

	3A	+	4B	$\rightleftharpoons$	2C + 3D	
$t = 0$	3		4		0	0
$t = t_{eq}$	$3 - 1.5$ $= 1.5$		$4 - 2$ $= 2$		1	1.5

Extent of equilibrium $= \dfrac{1.5}{3} = \dfrac{1}{2}$ or $\dfrac{2}{4} = \dfrac{1}{2}$

119.(AC) The equilibrium will shift in forward direction by adding inert gas in the system where there is an increase in number of gaseous moles (i.e. $\Delta n_g > 0$) in that direction. Note that in options (A) and (C), the value of $\Delta n_g > 0$.

120.(A) $NH_3 \rightleftharpoons NH_3(aq)$

The solubility increases

- By increasing the pressure
- By decreasing the temperature (since dissolution of a gas is an exothermic process)

Note : Solubility is the amount of a solute dissolution per litre of the solution. So, adding H_2O to a solution of NH_2 will increase its amount that can be dissolved but not its solubility.

121.(D) $H_2S(aq) \rightleftharpoons H^+(aq) + HS^-(aq)$

Adding of dilute $HCl(aq)$ will increase the concentration H^+ ions in the solution leading to a backward shift in the reaction to re-establish the equilibrium state. This means the concentration of $HS^-(aq)$ decreases.

122.(D) $I_2(g) \rightleftharpoons 2I(g)$

Moles	I_2	I
Initial	a	0
At equilibrium	$a - a\alpha$	$2a\alpha$

$\Rightarrow \quad n_T = a + a\alpha$

$$K_p = \frac{p_I^2}{p_{I_2}} = \frac{\left(\dfrac{2\alpha}{1+\alpha}P\right)^2}{\dfrac{1-\alpha}{1+\alpha}P} = \frac{4\alpha^2 P}{(1-\alpha^2)}$$

Given: $\alpha = 0.4$ at $P = 1.0\,\text{atm}$

Let P_{new} be the pressure when $\alpha = 0.2$

$$\Rightarrow \quad K_p = \frac{4 \times 0.16}{0.84} = \frac{4 \times 0.04}{0.96} P_{new} \quad \Rightarrow \quad P_{new} = \frac{4 \times 0.96}{0.84} = 4.57\,\text{atm}$$

123.(A) Stage-I (A to B) : The quantity of B is more than that of A. This means formation of B is favoured with increase in temperature, T. Thus stage-I must be endothermic.

State-II (B to C) : The quantity of C is less than that of B. Thus the formation of C is less favoured with an increase in temperature. Hence stage-II must be exothermic.

Stage-III (C to D) : Following from above, stage-III must be endothermic.

124.(C) $Au(s) + heat \rightleftharpoons Au(\ell)$

- There is an increase in volume in the forward direction, hence the melting is favoured at low pressure.
- Since melting is an endothermic process, it is favoured at high temperature.

125. **[A - P, S] [B - P, S] [C - Q, R] [D - Q]**

We have to determine the conditions favourable for system to move in forward direction.

Note : Low temperature favours the reactions to move in exothermic directions i.e., where heat is evolved.

High temperature favours the reactions to move in endothermic directions i.e., where heat is absorbed.

Low pressure shifts the reaction in a direction where there is an increase in number of gaseous moles $(\Delta n_g > 0)$. High pressure shifts the reaction in a direction where there is decrease in number of gaseous moles $(\Delta n_g < 0)$.

(A) The reaction is exothermic, which means at low temperature, it will shift to forward direction (P). There is a decrease in number of moles (gaseous) in the forward direction $(\Delta n_g < 0)$, so at high pressure, the reaction will shift in forward direction (S).

(B) Same as (A), since the reaction is exothermic and decrease in number of moles in forward direction.

(C) The reaction is endothermic which means at high temperature, it will shift to forward direction (Q). There is an increase in number of moles in forward direction, so at low pressure, the reaction will shift in forward direction (R).

(D) The reaction is endothermic which means at high temperature, it will shift to forward direction (Q). Note that, so no effect of change in pressure as