

# KEY

## Quiz # 2

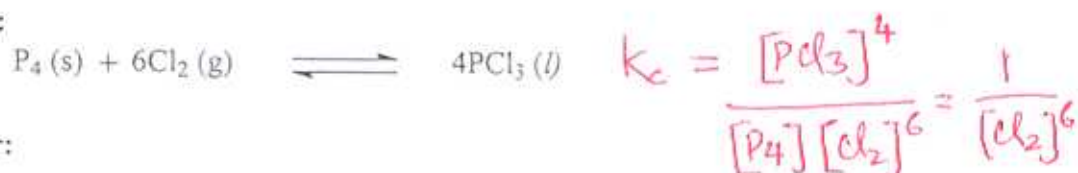
### Chapter -13

### CHEM-111

3.0

Q.1 Write the equilibrium expressions for the following reactions.

1.5  $K_c$  for:



1.5  $K_p$  for:



$$K_p = \frac{P_{PCl_3}^2 \times P_{Br_2}^3}{P_{PBr_3}^2 \times P_{Cl_2}^3}$$

4.0

Q.2 Consider the following heterogeneous equilibrium:



At 800 °C, the pressure of  $CO_2(g)$  is 0.236 atm. Calculate  $K_p$  and  $K_c$  for the reaction at this temperature.  $R = 0.08206 \text{ L}\cdot\text{atm}/\text{mol}\cdot\text{K}$ ,  $\Delta n = 1$

$$K_p = P_{CO_2} = 0.236 \text{ atm}, \quad K_p = K_c (RT)^{\Delta n(g)}$$

$$T = 800 + 273 = 1073 \text{ K}, \quad \Delta n(g) = 1$$

$$K_p = K_c (0.08206 \times 1073) = 0.236 = K_c (88.05038)$$

$$K_c = 2.68 \times 10^{-3}$$

3.0

Q.3 A system contain 0.81 mol of  $H_2$ , 0.44 mol of  $I_2$  and 0.58 mol of  $HI$  in an 1.0 L container. Is the system in equilibrium, if not



$$K = 7.1 \times 10^2 \text{ at } 25^\circ\text{C}$$

Predict the direction that the system will shift in order to reach equilibrium. Show calculation with formula.

$$Q = \frac{[HI]_0^2}{[H_2]_0 [I_2]_0} = \frac{[0.58]^2}{[0.81][0.44]} = \frac{0.94}{0.3564} = 2.64 \times 10^0$$

$Q < K$  mean, The ratio of initial concn. of product to reactant is too small. To reach equilibrium, reactants must be converted to products. The system proceed from left to right. to reach equil.