Physical Pharmacy

Lab-Partition coefficient

Dr.Khalid T Maaroof

2023

Partition [Distribution] Coefficient

- If an excess liquid or solid is added to a mixture of two immiscible, or partially miscible liquids it will distribute itself between the two phases so that each become saturated.
- If the substance Is added in an amount insufficient to saturate the solution it still become distributed between the two layers in a definite concentration ratio.

- The equilibrium expression is:

$$K = C_1 / C_2$$

Where C_1 & C_2 are equilibrium conc.

- K is equilibrium constant also known as distribution ratio, distribution coefficient or partition coefficient at constant temp.

✓**What is the importance of knowledge about Partition coefficient?**

✓**What is the difference between Partition coefficient and Apparent Partition coefficient**

Exp: Determination of the partition coefficient of iodine between water and chloroform.

1. In dry stoppered separatory funnel, put 20 ml of 0.5 % iodine in chloroform.
2. Add 50 ml distilled water to the funnel.
3. Shake the flask for some time until equilibrium is established, allow to stand for few mins until the phases are completely separated.
4. Separate the organic layer form the aqueous layer.

   A. Withdraw 10 ml of the aqueous layer and titrate against 0**.02 N sodium thiosulfate** until the light brownish color disappear.

   B. Withdraw 5 ml of the organic layer, **add 5 ml of 10 % potassium iodide with vigorous shaking**, and then titrate against **0.1 N sodium thiosulfate** until the light brownish color disappear.

5. calculate the concentration of I_2 in both solutions and from it calculate the K.

Calculations

- **Aqueous phase:-**the no. of ml of sodium thiosulphate (0.02N) consumed in the titration is equivalent to the amount of Iodine present.

($Na_2S_2O_3$) V1 X C1 = V2 X C2 (iodine)

E.P X 0.02 N =10 X N2

N2 =conc. of iodine in water

- **Chloroformic phase:-**the no. of ml of sodium thiosulphate(0. 1N) consumed in the titration is equivalent to the amount of Iodine present.

($Na_2S_2O_3$) V1 X C1 = V2 X C2 (iodine)

$E.P_2$ X 0.1N = 5 X N2

N2 =conc. of iodine in chloroform

$$\text{Partition coefficient} = \frac{\text{Conc. Of iodine in } CHCl_3}{\text{Conc. Of iodine in water}}$$