E-ISSN: 2788-9270
P-ISSN: 2788-9262
NJPS 2021; 1(2): 38-39
Received: 10-05-2021
Accepted: 11-06-2021

Mohammad Yasin Shaikh
Student of Sigma Institute of Pharmacy, Ajwa-Nimeta Road, Vadodara, Gujarat, India

Dr. Jigar Vyas
Sigma Institute of Pharmacy, Ajwa-Nimeta Road, Vadodara, Gujarat, India

Dr. UM Upadhyay
Sigma Institute of Pharmacy, Ajwa-Nimeta Road, Vadodara, Gujarat, India

Correspondence
Mohammad Yasin Shaikh
Student of Sigma Institute of Pharmacy, Ajwa-Nimeta Road, Vadodara, Gujarat, India

To determination a Partion coefficient of benzoic acid in benzene and water: A brief review

Mohammad Yasin Shaikh, Dr. Jigar Vyas and Dr. UM Upadhyay

Abstract
The ratio of the concentrations of a solute in two immiscible or slightly miscible liquids, or in two solids, when it is in equilibrium across the interface between them. In a Simple Word, when an excess amount of solute is added to two immiscible liquid Phase, it distributes itself between this place if mixed by shaking vigorously. If insufficient amount of solid is added it distributes in a define ratio.

Keywords: Separating funnel, benzoic acid, benzene, partition coefficient

1. Introduction
Partition Coefficient is also known as distribution law. Distribution law was helpful to find out what amount of solid distributes in two immiscible solvent. When we find out partition coefficient that time we must know some limits (1) the temperature must remain constant throughout the experiment. (ii) The two liquids (solvents) should be mutually immiscible. (iii) The amount of the solute added should be small ie the solution should be dilute [1].

1.1 History
Distribution law or the Nernst's distribution lawgives a generalization which governs the distribution of a solute between two non-miscible solvents. This law was first given by Nernst who studied the distribution of several solutes between different appropriate pairs of solvents.

$$\frac{C1}{C2} = K_d$$

Where Kd is called the distribution coefficient or the partition coefficient. Concentration of X in solvent A/concentration of X in solvent B=Kd' If C1 denotes the concentration of solute X in solvent A & C2 denotes the concentration of solute X in solvent B; Nernst's distribution law can be expressed as C1/C2 = Kd. This law is only valid if the solute is in the same molecular form in both the solvents. Sometimes the solute dissociates or associates in the solvent. In such cases the law is modified as, D (Distribution factor)=Concentration of solute in all forms in solvent 1/concentration of solute in all forms in solvent 2 [1].

1.2 Principal
If, in one solvent, the solute exists as normal molecular species while in other it is associated or dissociated, then the simple concentration ratio is no longer constant. If association occurs in one phase and n molecules of the solute combine together to form a complex molecule; then the distribution coefficient calculation the nth root of concentration of associated form is used. Benzoic acid exists in water as monomer and in benzene as dimer (association). The concentration ratio between water and benzene can be written as and similarly the ratio between benzene and water would be:

$$\frac{\sqrt{\text{Concentration}}\ \text{In benzene}}{\text{Concentration in water}}$$

(This ratio is partition coefficient and Constant)

Reaction

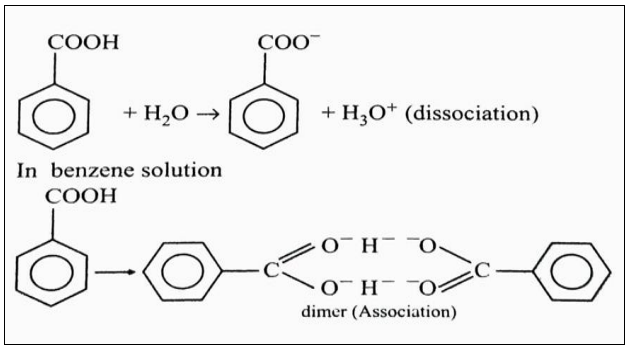

Fig 1: Reaction for dimer formation in benzene solution

2. Procedure for determination of partition coefficient

About 1, 2 and 3 g quantities of benzoic acid are transferred into three Separating Funnel. In Every Separating funnel, added equal amount Water and benzene. After adding the Water and Benzene Make Sure the Separating Funnel Close Properly and, they are vigorously shaken for one hour. Note you have to the removed stoppers to release the pressure. Put the Separating funnel steady for some time. (2) Funnel for a Few Minutes in Stable Position so the Both Immiscible Layer Can be Separate .The lower layer is aqueous and upper layer is organic (benzene). 10 ml of the benzene layer is pipetted out into a conical flask containing around water. The solution is then titrated against N/I0 sodium hydroxide using phenolphthalein as indicator. (During titration the contents should be shaken vigorously to ensure rapid and complete extraction of benzoic acid from benzene).Similarly benzene layer of other seprating funnel are also titrated. 10 ml of aqueous layer is petted out into a conical flask and titrated against N/50 sodium hydroxide using phenolphthalein as Phenolphthalein as a indicator.(2)

Calculation

Normality of Aqueous Phase	Normality of Organic Phase
N1V1 = N2V2 $N1 = \frac{N2V2}{V1}$ N2 = Normality Of NaOH V2 = Burette Reading In ml V1 = 10 ml Aqueous Phase	N1V1 = N2V2 $N1 = \frac{N2V2}{V1}$ N2 = Normality Of NaOH V2 = Burette Reading In ml V1 = 10 ml Organic Phase
Concentration of Aqueous Phase C aq = N1 * Molecular Weight of Benzoic Acid N1 = Normality Aqueous phase	Concentration of organic phase. C org = N1 * Molecular Weight of Benzoic Acid N1 = Normality Organic phase

$$\frac{\sqrt{\text{Concentration In benzene}}}{\text{Concentration in water}}$$

Partition coefficient for benzoic acid in benzene and water system range 0.63 to 0.66

Reference

1. Patrick Sinko J. Martin's Physical Pharmacy and Pharmaceutical Science, edition 5, 29.
2. Guru Prasad Mohanta, Prabal Kumar Manna, physical pharmacy practical text, Pharma Book Syndicate, Hyderabad, 2006, 30.