4. DETERMINATION OF PARTITION COEFFICIENT OF IODINE BETWEEN CARBON TETRA CHLORIDE AND WATER

Aim: To determine the partition coefficient of iodine between carbon tetra chloride and distilled water.

Requirements: Iodine, carbon tetra chloride, 0.1N sodium thiosulphate solution, 0.005N sodium thiosulphate solution, starch mucilage as an indicator, separating funnel, tripod stand, reagent bottles, two small beakers, measuring cylinder, conical flask, burette, burette stand, tile and digital balance.

Principle: When a substance is added to a system containing two immiscible liquids, it distributes between them in a definite ratio." This is called Nernst distribution law. The added substance should have solubility in the two liquids for distribution. This is known as the partition coefficient K of a substance between two liquids, given by the formula.

K = Concentration of substance in organic layer/ The concentration of substance in aqueous layer = C1/C2

Where K is known as the partition coefficient or distribution coefficient, C1 and C2 are the total concentrations of the solute in the two layers of organic and aqueous phases.

Procedure:

Preparation of saturated Iodine solution: Dissolve enough iodine in carbon tetra chloride until some solid remains undissolved.

Preparation of 0.1N sodium thiosulphate solution: 26 gm of sodium thiosulphate and 0.2 gm of sodium carbonate was dissolved in 1000 ml of distilled water and make up the final volume in volumetric flask.

Preparation of 0.005N sodium thiosulphate solution: 1.3 gm of sodium thiosulphate and 0.01 gm of sodium carbonate was dissolved in 1000 ml of distilled water and make up the final volume in volumetric flask.

1. Using a graduated pipette, about 30ml, and 15ml of a saturated iodine solution in carbon tetra chloride were prepared (stock solution) and properly labeled for glass stoppered bottles.

2. add 100 ml of distilled water to these bottles and shake them for 20 minutes while keeping them in a water bath at room temperature. Keep it aside and allow them to separate as two phases of solution.

3. Withdraw 10 ml of the organic layer from first bottle carefully and titrate against 0.1 N sodium thiosulphate using starch solution as indicator.

4. Withdraw 10 ml of the organic layer from second bottle carefully and titrate against 0.1 N sodium thiosulphate using starch solution as indicator.

5. Similarly, carefully withdraw 10 ml of the aqueous layer from the first bottle and titrate against 0.005 N sodium thiosulphate using starch solution as an indicator.

6. Similarly, carefully withdraw 10 ml of the aqueous layer from the second bottle and titrate against 0.005 N sodium thiosulphate using starch solution as an indicator.

7. Calculate the partition coefficient of Iodine between carbon tetra chloride and water

Observations and Calculations:

Titration of an organic layer

S. No	**Container**	**The volume of 0.1N sodium thiosulphate consumed in ml V1**	**Concentration of iodine in organic layer N2= N1V1/ V2**
1	Bottle 1		
2	Bottle 2		

N1= Normality of the sodium thiosulfate = 0.1N

V1= volume of the sodium thiosulfate consumed =?

V2= Volume of the organic layer = 10 ml

N2= Normality (concentration) of the iodine =?

Titration of aqueous layer

S. No	**Container**	**Volume of 0.005N sodium thiosulphate consumed in ml V1**	**The concentration of iodine in aqueous layer N2= N1V1/ V2**

1	Bottle 1		
2	Bottle 2		

N1= Normality of the sodium thiosulphate = 0.005N

V1= volume of the sodium thiosulphate consumed =?

V2= Volume of the aqueous layer = 10 ml

N2= Normality (concentration) of the iodine =?

For bottle 1:

K = Concentration of substance in organic layer/Concentration of substance in aqueous layer = C1/C2

For bottle 2:

K = Concentration of substance in organic layer/Concentration of substance in aqueous layer = C1/C2

Report: The partition coefficient of iodine between carbon tetra chloride and distilled water was found to be ----------.