

# Chemistry Project on Study of Diffusion of solids in Liquids

## Study of Diffusion of solids in Liquids

### INDEX

- Aim
- Introduction
- Objective
- Experiment 1
- Experiment 2
- Experiment 3
- Result

### AIM

Study of Diffusion of solids in liquids

### INTRODUCTION

When substances are brought in contact with each other they intermix, this property is known as **Diffusion**. This property of diffusion takes place very rapidly in case of gases and to a lesser extent in case of liquids, whereas solids do not show this process of diffusion with each other. But what we can observe in case of solids is that the diffusion of solids in liquids takes place at a very slow rate.

If a solid is kept in contact with an excess of solvent in which it is soluble, some portion of the solid gets dissolved. We know that this process is known as **dissolution** of a solid in liquid and this process has taken place due to the diffusion of solid particles into liquid.

Molecules of solute are in constant random motion due to the collision between molecules of solute and that of the solvent.

### OBJECTIVE

Rate of diffusion depends upon:-

**Temperature:** As temperature increases, the kinetic energy of the particles increases so the speed of particles also increases which thus increases the rate of diffusion.

**Size of the particle:** As the size of particle increases, rate of diffusion decreases.

**Mass of the particle:** As the mass of the particle increases the rate of diffusion decreases.

### **EXPERIMENT 1**

***To study diffusion when copper sulphate is brought in contact with water (liquid)***

#### **REQUIREMENTS:**

Copper sulphate crystals, 100ml beaker.

#### **PROCEDURE:**

- Ø Take about 2g of copper sulphate crystals in 100ml beaker.
- Ø Add about 50ml of water and allow it to stand for few minutes.
- Ø Note the development of blue colour in water.
- Ø Allow to stand further till it is observed that all copper sulphate disappears.
- Ø Note the blue colour change in water.

#### **CONCLUSION:**

When solids such as copper sulphate, potassium permanganate are brought in contact with liquids such as water, intermixing of substances, i.e. *diffusion* takes place.

### **EXPERIMENT 2**

***To study the effect of temperature on the rate of diffusion of solids in liquids***

#### **REQUIREMENTS:**

Copper sulphate crystals, 200ml beaker, watch glass, wire gauge, burner, tripod stand, thermometer and stop watch.

#### **PROCEDURE:**

- Ø Take 5g of copper sulphate each in three beakers.
- Ø Pour 100ml of distilled water slowly in one of the beakers.
- Ø Cover this beaker with a watch glass.
- Ø Pour 100ml of cold water in a second beaker slowly.
- Ø Place a third beaker containing 100ml of water on a tripod stand for heating.
- Ø Observe the diffusion process which begins in all the beakers.
- Ø Record the time taken for the dissolution of copper sulphate in all the three cases.

#### **OBSERVATIONS:**

| <b>S.No.</b> | <b>Temperature of water</b> | <b>Time Taken in Minutes</b> |
|--------------|-----------------------------|------------------------------|
| <b>1.</b>    | <b>25 °C</b>                | <b>15 Min.</b>               |
| <b>2.</b>    | <b>10 °C</b>                | <b>20 Min.</b>               |
| <b>3.</b>    | <b>70 °C</b>                | <b>10 Min.</b>               |

#### **CONCLUSION:**

The Rate of diffusion of copper sulphate in water is in the order of *Beaker 3 > Beaker 1 > Beaker 2*. Thus, the rate of diffusion varies directly with temperature.

#### **EXPERIMENT 3**

***To study the effect of size of particles on the rate of diffusion of solids in liquids***

#### **REQUIREMENTS:**

Graduated 100ml measuring cylinders, copper sulphate crystals of different sizes, stop watch

#### **PROCEDURE:**

- Ø Add 50ml of water to each of the three cylinders.
- Ø Take 5g each of big size, medium size, small size crystals of copper sulphate and add them separately in three cylinders.
- Ø Allow to stand for sometime.
- Ø Note the time taken for blue colour to reach any fixed mark in each of the cylinders and note the observations.

#### **OBSERVATION:**

| S.No. | Crystal size | Time Taken in Minutes |
|-------|--------------|-----------------------|
| 1.    | Big          | 20 Min.               |
| 2.    | Medium       | 15 Min.               |
| 3.    | Small        | 10 Min.               |

### CONCLUSION:

Small particles undergo diffusion more quickly than bigger particles.

### RESULT

- Ø When solids such as copper sulphate, potassium permanganate are brought in contact with liquid such as water, intermixing of the substances, i.e. *diffusion* takes place.
- Ø The rate of diffusion varies *directly* with temperature.
- Ø Small particles undergo diffusion more quickly than bigger particles.