



**AL-Mustaqbal University College**

**Radiology Techniques Department**

**First Class**

**Liquid Mixture-Solutions**

# Liquid Mixture-Solutions

**CHAPTER OUTLINE: The student will be able to know:-**

- **Solutions percentage**
- **Preparation of Standards units' Formal solution**
- **Concentration Molar solution**
- **Normal solution**

**Solutions:** A solution is a homogenous mixture of two or more substances evenly distributed in each other.

**Solubility:** The quantity of **solute** that will dissolve in a definite quantity of **solvent**, the solubility of a substance is measured by the **concentration** of its saturated solution.

**Preparation of standard solution unit:**

**Standard solution:** is the solution that its concentration (the quantity of reagent in a given volume) is known. The concentration of a standard solution is usually expressed in grams or equivalents of the active constituent in each liter of the solution. The process by which the concentration of a solution is determined is called **standardization**

**Requirements of a primary standard substance:**

1. It must be of highest purity.
2. A primary standard substance should be stable, it should not be attracted by constituent of the atmosphere.
3. It should be readily available and not too expensive.
4. It should not be hygroscopic.
5. Finally, it should have a reasonably high equivalent weight. A high equivalent weight tend to minimize weighing errors.

Preparation a standard solution is always prepared by dissolving the standard material in a small volume. Generally, the standard substance

is weighed directly on to a clock-glass, or if hygroscopic, in a weighing bottle, and then transferred to the graduated flask. The volume is carefully adjusted to the mark, and the stopper flask is inverted 30-40 times to sure mixing of the contents.

### **Factors affecting solubility of a solute:**

#### **1. Temperature:**

Most solid solutes are more soluble in hot water than in cold water. There is variation of solubility of various substances in a water as a function of temperature.

For example- $\text{KNO}_3$  becomes much more soluble with an increase of temperature; however  $\text{Ce}_2(\text{SO}_4)_3$ , gases such as  $\text{HCl}$  and  $\text{SO}_2$  become less soluble with increasing temperature, and  $\text{NaCl}$  shows little change in solubility.

The solubility of  $\text{Br}_2$ , a liquid, is practically unaffected by temperature.

#### **2. Pressure:**

The pressure will affect the solubility of a gaseous solute. The greater the pressure, the greater the solubility of a gas in a liquid.

#### **3. Surface area:**

It does affect the rate of dissolution. The greater the amount of surface area, the quicker a solute will dissolve in a solvent.

#### **4. Stirring:**

The rate at which solute dissolves can also be increased by stirring the mixture. The process of stirring brings fresh solvent in contact with solute and so permits more rapid solution.

#### **5. Nature of solvent:**

In general, polar liquids dissolve polar compounds, and non-polar liquids dissolve non-polar compounds. Some polar liquids- $\text{H}_2\text{O}$ ,  $\text{CH}_3\text{OH}$ , and  $\text{C}_2\text{H}_5\text{OH}$ .

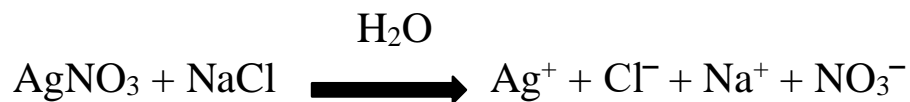
Some non-polar liquids-benzene, carbon tetrachloride ( $\text{CCl}_4$ ), and ether.

### **Importance of solutions:**

During digestion, foods are changed to soluble substances so that they may pass into the bloodstream and be carried to all parts of the body.

At the same time the waste products of the body are dissolved in the blood and carried to other parts of the body where they can be eliminated. Plants obtain minerals from the groundwater in which those minerals have dissolved.

Many chemical reactions take place in solution. This reaction occurs because the ions in the solution are free to move and react with other ions.



Many medications are administered orally, subcutaneously, or intravenously as solutions. Drugs must be in solution before they can be absorbed from the gastrointestinal (GI) tract. As you might expect, when drugs are taken in solution, such as syrups and elixirs, they are absorbed more rapidly than drugs in a solid form, such as tablets and capsules.