

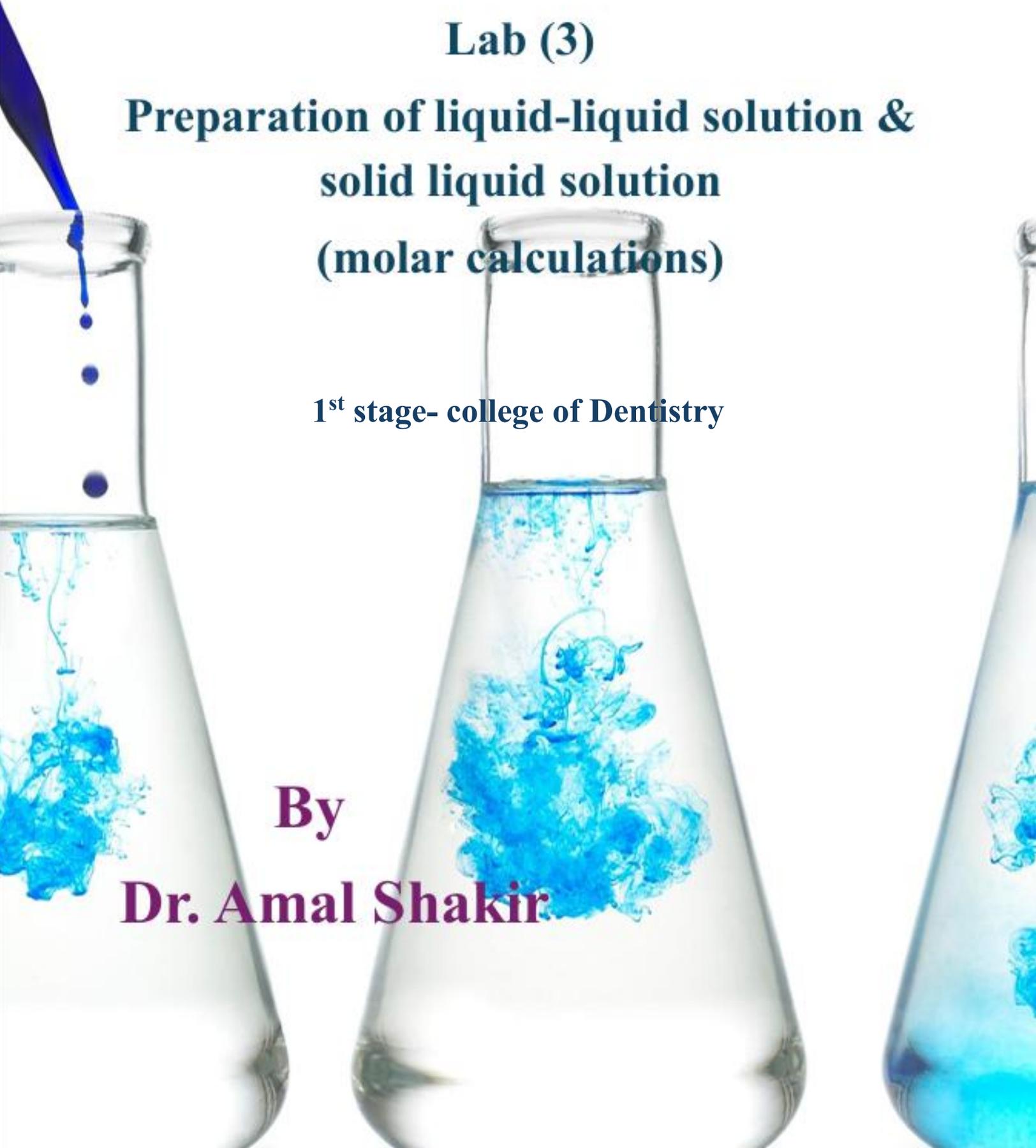
Lab (3)

Preparation of liquid-liquid solution & solid liquid solution (molar calculations)

1st stage- college of Dentistry

By

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Preparation of liquid-liquid solution & solid liquid solution (molar calculations)

Introduction:

Preparation of solutions differ from each other by the amount of dissolved substance in them, and this can be expressed in units of weight or volume, and there are several ways to express the concentration of solutions, including molarity, normality, parts per million (ppm) and others. To prepare a standard solution, the required volume must be known. Preparation of Solutions is not difficult to prepare the standard solutions if the substance to be prepared is solid, as a sensitive balance is used. But if the sample is liquid, such as one of the mineral acids, for example, the process becomes more difficult by using the sensitive scale because it is not recommended to weigh the concentrated acids, which leads to its damage, and for this we take a certain volume of it that is sufficient to prepare the required concentration.

It is known that there are two types of materials from which solutions can be prepared:

1. Solutions prepared from solid materials.
2. Solutions prepared from liquid materials.

1- Preparation of solutions from solid materials.

To prepare a solution of a certain concentration of a solid, the amount of the solid to be dissolved in a known volume of distilled water must be calculated in order to obtain the required degree of concentration.

$$M = \frac{\text{Wt.}}{\text{M.Wt}} \times \frac{1000}{v \text{ (mL)}}$$

or

$$\text{Wt.} = M \times \text{M.Wt.} \times \frac{v \text{ (mL)}}{1000}$$

$$N = \frac{\text{Wt.}}{\text{Eq.Wt}} \times \frac{1000}{v \text{ (mL)}}$$

or

$$\text{Wt.} = N \times \text{Eq.Wt.} \times \frac{v \text{ (mL)}}{1000}$$

whereas:

Wt.: Solid weight (gm)

V(mL): Required volume (in milliliters)

M: Molarity (mol/L)

M.Wt: Molecular weight of the solid to be prepared

N: Normality (Eq/L)

Eq.Wt: Equivalent weight of the solid to be prepared

2- Preparation of solutions from liquid materials.

We often need to prepare standard solutions for many materials in the laboratory, such as concentrated acids and bases. To prepare approximate standard solutions from their concentrated materials, the following must be followed:

1- We extract the molarity of the concentrated solution by applying the following law:

$$M = \frac{d \times \% \times 10}{\text{M.Wt}}$$

or

$$M = \frac{\text{Sp.gr} \times \% \times 1000}{\text{M.Wt}}$$

Whereas:

M: Molarity of the concentrated solution

Sp.gr: Specific gravity

?: Percentage

d: Density

M.Wt.: Molecular Weight

2- We apply the following dilution law:

$$M_1 \times V_1 = M_2 \times V_2$$

Experiment

	Chemicals	Quantity	Equipment and Instruments
1	Distilled water	100 mL	magnetic stirrer+ bar
2	Hydrochloric acid (HCl)	0.138	Electronic Balance
3	Sodium hydroxide (NaOH)	0.1 gm	Beaker
4			Glass rod
			Volumetric flask
			Cylinder
			Wash bottle
			Spatula
			Dropper

Procedure

- 1- We prepare 50 ml of concentrated (HCl) acid solution at a concentration of 0.1 M. (M of HCl = 36.46 g/mol)
- 2- We prepare 50 ml of Sodium hydroxide (NaOH) solution at a concentration of 0.05 M.