EXPERIMENT-1

PREPARATION OF STANDARD SOLUTION OF OXALIC ACID:

AIM:

Preparation of 250 mL of 0.1M standard solution* of oxalic acid.

THEORY:

A solution of exactly known concentration is considered to be a standard solution. There are various ways of expressing the concentration of a standard solution. Standard solution of an acid/base is used to determine the unknown concentration of a solution of bases / acids by volumetric analysis. For example, a standard solution of oxalic acid can be used to determine the unknown concentration of an alkali solution. The strength of a standard solution is usually expressed in moles per litre. The formula of hydrated crystalline oxalic acid is

$$\begin{matrix}COOH\\|\\COOH\end{matrix} \cdot 2H_2O$$

and its molar mass is 126 g. If 126 g of oxalic acid is present in one litre of the solution, it is known as one molar (1.0 M) solution.

For the preparation of one litre of 0.1 M oxalic acid solution, we require $\frac{126}{10} = 12.6\text{g}$ of hydrated oxalic acid. Therefore, for preparing 250 mL of 0.1 M oxalic acid solution, we require:

$$\frac{12.6\text{ g} \times 250\text{ mL}}{1000\text{ mL}} = 3.1500\text{ g of hydrated oxalic acid.}$$

In general for preparing a solution of required molarity, the amount of substance to be weighed can be calculated by using the formula given below :

$$\text{Molarity (M)} = \frac{\text{Mass of solute is grams} \times 1000}{\text{Molar mass of solute} \times \text{(volume of solution to be prepared in mL)}}$$

MATERIAL REQUIRED:

- Measuring flask (250 mL) : One
- Funnel : One
- Weighing tube/Watch glass : One
- Wash bottle : One
- Iron stand with ring clamp : One

- Oxalic acid : As per need

PROCEDURE:

(i) Weigh an empty, clean and dry watch glass/weighing tube accurately (Weight 1).

(ii) Weigh 3.1500 g oxalic acid by placing it on the above watch glass/in a weighing tube (Weight 2). Always note weight up to the fourth decimal place and clean the balance before and after weighing the chemical.

(iii) Transfer oxalic acid carefully from the watch glass/weighing tube into a clean and dry measuring flask using a funnel. Weigh the empty watch glass again (Weight 3) and find out the mass of oxalic acid transferred to the measuring flask by substracting this mass (Weight 3) from the combined mass of watch glass and oxalic acid (Weight 2). Calculate the exact molarity of solution from this mass. Wash funnel several times with distilled water by using a wash bottle to transfer the sticking particles if any into the measuring flask. While washing the funnel, add water in small amounts so that its volume in the flask does not exceed ¼ th of the volume of the measuring flask as shown in Fig. 2.27 a, b.

(iv) Swirl the measuring flask till solid oxalic acid is completely dissolved. Add more distilled water with shaking. Make up the volume with distilled water to the etched mark by adding last few mL dropwise. Stopper the flask and shake it thoroughly to make the solution uniform throughout (Fig. 2.27 c, d). Label it as 0.1 M oxalic acid solution.

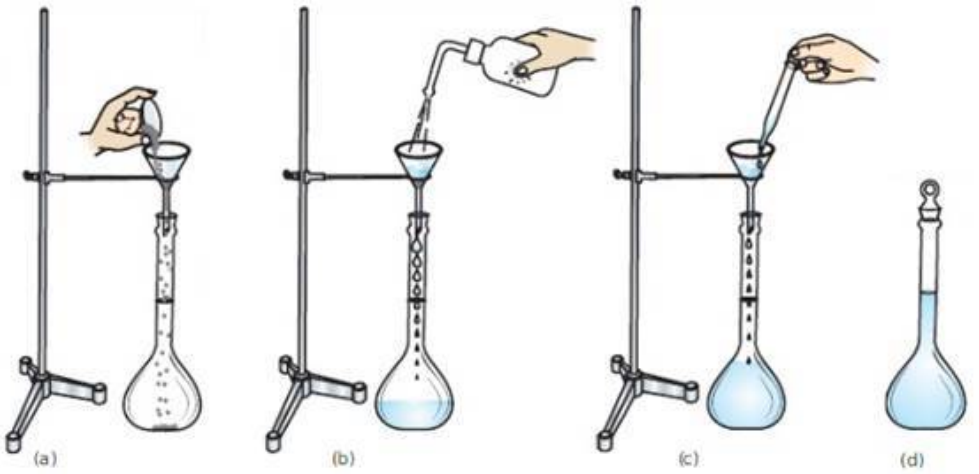

Fig. 2.27 : Making standard a solution
(a) Transfering oxalic acid (b) Diluting the solution
(c) Adding last few mL dropwise (d) Standard solution

PRECAUTIONS:

(a) The pan of the balance should be cleaned before and after weighing.

(b) Never touch the weights with hand. Use forceps to transfer weights from the weight-box to the pan of the balance.

(c) Always use spatula to transfer the reagent from the bottle on to the watch glass.

(d) Stopper the reagent bottle immediately after withdrawing the substance.

(e) Always use distilled water to prepare the standard solution.

(f) Always check the adjustment of the balance before weighing the substance.

(g) Care should be taken while weighing the chemicals. These should not be spilled on the pan of the balance.

(h) Watch glass/weighing bottle and funnel should be washed several times by using small amounts of distilled water each time.

(i) While making the solution, water should be added carefully so that the lower part of the meniscus just touches the etched mark of the measuring flask.

(j) To ensure uniform composition of the solution, stopper the flask and shake it carefully and thoroughly.