# EXPERIMENT

## AIM

To prepare 250 ml of the standard solution of $\frac{N}{10}$ oxalic acid taking pure crystalline oxalic acid.
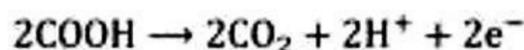
## MATERIAL REQUIRED

Chemical balance, dropper, weight box, weight bottle, measuring flask, funnel

## THEORY

Crystalline oxalic acid is a primary standard, its standard solution can be prepared directly.

The formula for crystalline oxalic acid is $\begin{matrix} COOH \\ | \\ COOH \end{matrix} . 2H_2O$. The ionic equation for the oxidation of oxalic acid is:

$$2COOH \longrightarrow 2CO_2 + 2H^+ + 2e^-$$

It is clear from the above equation that two electrons are given out during the oxidation of one molecule of oxalic acid.

$$\text{Equivalent mass of oxalic acid} = \frac{\text{Mol. mass of oxalic acid}}{\text{No of electron lost by one molecule of it}}$$

$$= \frac{126}{2} = 63$$

$$\text{Strength (g/equiv)} = \text{Normality} \times \text{Equivalent mass}$$

$$= \frac{1}{10} \times 63 = 6.3 \text{ g/equiv}$$

For preparing 1 litre of $\frac{N}{10}$ oxalic acid solution 6.3 g of it has to be dissolved.

For preparing 250 ml of $\frac{N}{10}$ oxalic acid, oxalic acid crystals required

$$= \frac{6.3}{1000} \times 250 = 1.575 \text{ g}.$$

## PROCEDURE

(i) Take a watch glass, wash it with distilled water and then dry it.

(ii) Weigh the clean and dried watch glass accurately and record its weight in the notebook.

(iii) Weigh 1.575 g oxalic acid on the watch glass accurately and record this weight in the notebook.

(iv) Transfer gently and carefully the oxalic acid from the watch glass into a clean 250 ml beaker. Wash the watch glass with distilled water with the help of a wash bottle to transfer the particles sticking to it into the beaker. The volume of distilled water for this purpose should not be more than 50 ml.

(v) Dissolve oxalic acid crystals in the beaker by gently stirring with a clean glass rod.

(vi) When the oxalic acid in the beaker is completely dissolved, carefully transfer the entire solution from the beaker into a 250 ml measuring flask (volumetric flask) with the help of a funnel.

(vii) Wash the beaker with distilled water. Transfer the washings into the measuring flask.

**(viii)** Finally wash the funnel well with distilled water with the help of a wash bottle to transfer the solution sticking to the funnel into the measuring flask.

**(ix)** Add enough distilled water to the measuring flask carefully, up to just below the etched mark on it, with the help of a wash bottle.

## PRECAUTIONS

**(i)** Weighing should be done accurately.

**(ii)** Use distilled water to prepare the solution.

**(iii)** The last few drops should be very carefully added using a dropper such that the volume should not exceed the mark.

**(iv)** A lower meniscus should be observed since the oxalic acid solution is a colourless solution.

## VIVA VOCE

**Q 1.** **What is the significance of preparing a standard solution in chemistry?**
**Ans.** A standard solution serves as a reference solution with precisely known concentration, used for titrations and calibrating instruments.

**Q 2.** **Why are oxalic acid chosen for the preparation of a standard solution?**
**Ans.** Oxalic acid is commonly used due to its stability, ease of drying to a constant weight, and availability in pure crystalline form.

**Q 3.** **What is the molecular formula of oxalic acid, and what are its properties?**
**Ans.** The molecular formula of oxalic acid is $C_2H_2O_4$. It is a dicarboxylic acid, crystalline, and highly soluble in water.

**Q 4.** **Why is it important to use a volumetric flask for preparing the standard solution?**
**Ans.** Volumetric flasks are designed to hold a specific volume precisely. This ensures accurate and reproducible concentrations in standard solutions.

**Q 5.** **Describe the steps involved in dissolving oxalic acid in water to prepare the solution.**
**Ans.** Add a portion of distilled water to a clean beaker, carefully add the weighed oxalic acid, dissolve completely, and then transfer the solution quantitatively to a volumetric flask.

**Q 6.** **Why is it necessary to rinse the weighing container and transferring tools with distilled water during the preparation process?**
**Ans.** Rinsing prevents any remaining oxalic acid from being lost, ensuring that the correct amount is transferred to the volumetric flask.

**Q 7.** **Can you explain the concept of primary standard and why oxalic acid is considered one?**
**Ans.** A primary standard is a highly pure compound that can be used to prepare a standard solution directly. Oxalic acid meets these criteria due to its purity.

**Q 8.** **Why is it crucial to use a clean and dry pipette for transferring the solution into the volumetric flask?**
**Ans.** Any moisture or impurities on the pipette could affect the accuracy of the standard solution. Cleaning and drying ensure precision.