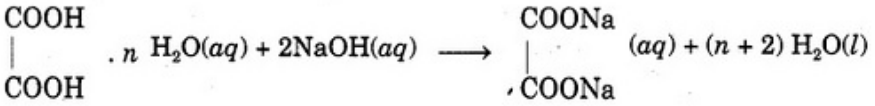
The given solution contains 6.3 g of hydrated oxalic acid, $\begin{matrix}COOH\\|\\COOH\end{matrix} . nH_2O$ crystals per litre. Determine the value of n(no. of molecules of water of crystallisation). Provided 0.1 M

Chemical Equation



Indicator. Phenolphthalein.
End Point. Colourless to light pink (NaOH solution in burette).

Procedure

1. Rinse and fill the burette with the given sodium hydroxide solution.
2. Rinse the pipette with the oxalic acid solution and pipette out 20 ml of this solution in a washed titration flask. '
3. Add 1-2 drops of phenolphthalein indicator to the titration flask.
4. Note the initial reading of the burette and run sodium hydroxide solution slowly in the titration flask till the faint permanent pink colour is obtained.
5. Note the final reading of the burette and find out the volume of oxalic acid solution used.
6. Repeat the procedure 4-5 times to get a set of at least three concordant readings.

Observations

Molarity of NaOH solution = 0.1 M.
Volume of oxalic acid solution taken in each titration = 20.0 ml.

S.No.	Initial reading of the burette	Final reading of the burette	Volume of the sodium hydroxide solution used
1.	—	–	— ml
2.	—	—	— ml
3.	—	—	— ml
4.	—	—	— ml

Concordant volume = x ml (say)

Calculations

The molarity of the standard NaOH solution = 0.1 M.
Since in the balanced equation two moles of NaOH and one mole of oxalic acid is involved.

$$\frac{M_{NaOH}V_{NaOH}}{M_{Oxalicacid}V_{Oxalicacid}} = \frac{2}{1}$$

$$\frac{0.1\times x}{M_{Oxalic\quad acid}\times 20.2} = \frac{2}{1}$$

$$M_{Oxalic\quad acid} = \frac{0.1\times x}{20.2\times 2} = \frac{x}{400}$$

$$M_{Oxalic\quad acid} = \frac{Streanth\quad per\quad litre}{Molar\quad mass\quad of\quad oxalic\quad acid}$$

$$Molar\quad mass\quad of\quad oxalic\quad acid = \frac{Streanth\quad per\quad litre}{M_{Oxalic\quad acid}}$$

$= \frac{6.3}{\frac{x}{400}} \quad gmol^{-1}$

But molecular mass of oxalic acid is = (90+18n) g mol^{-1}

therefore,

$\frac{6.3}{\frac{x}{400}} = 90 + 18n$

Knowing the titre value, x, the value of n can be calculated.