1. Standardization of NaOH Solution

$$\underbrace{(C_8H_4O_4K)H}_{\text{KHP}} + NaOH \rightarrow (C_8H_4O_4K)Na + H_2O$$

At the equivalence point: Moles of KHP = Moles of NaOH

Known: Mass of KHP (g)
Volume of NaOH used in titration (ml)

To be determined: Molarity of NaOH (mole/L)

Calculations: 1. $\text{Moles KHP} = \dfrac{\text{g of KHP}}{\text{MW (KHP)}}$

2. Moles NaOH = Moles KHP

3. $M_{NaOH} = \dfrac{\text{Moles NaOH}}{V_{NaOH}\ (L)}$

2. Determination of the Unknown Acid Concentration

Example: $HCl + NaOH \rightarrow NaCl + H_2O$

At the equivalence point: Moles HCl = Moles NaOH

Known: Molarity of NaOH from Part 1 (mole/L)
Volume of NaOH used in titration (ml)
Volume of the unknown acid (ml)

To be determined: Molarity of HCl (mole/L)

Calculations: 1. $\text{Moles NaOH} = M_{NaOH}\,(\text{mole/L}) \times V_{NaOH}\,(L)$

2. Moles HCl = Moles NaOH (this equation will be different for H_2SO_4)

3. $M_{HCl} = \dfrac{\text{Moles HCl}}{V_{HCl}\ (L)}$

3. Determination of an Acid Content of a Fruit Juice

$C_3H_5O(COOH)_3 + 3\ NaOH \rightarrow C_3H_5O(COO)_3Na_3 + 3\ H_2O$

At the equivalence point: Moles $C_3H_5O(COOH)_3 = \frac{1}{3} \times$ Moles NaOH

Known: Molarity of NaOH from Part 1 (mole/L)
Volume of NaOH used in titration (ml)
Volume of the juice sample (ml)

To be determined: g of $C_3H_5O(COOH)_3$ per 100 g of juice

Calculations:

1. $\text{Moles NaOH} = M_{NaOH}\,(\text{mole/L}) \times V_{NaOH}\,(\text{L})$

2. $\text{Moles}\ C_3H_5O(COOH)_3 = \frac{1}{3} \times \text{Moles NaOH}$

3. Mass (g) of $C_3H_5O(COOH)_3$ = Moles $C_3H_5O(COOH)_3 \times$ MW (g/mole)

4. $\text{Mass (g)}\ C_3H_5O(COOH)_3\ \text{per 100 g juice} = \frac{\text{Mass (g)}\ C_3H_5O(COOH)_3 \times 100\ \text{ml}}{V_{juice}\ (\text{ml})}$