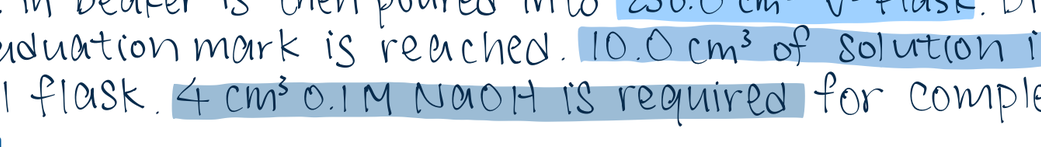
Titration (calculations)

1 Questions

LEVEL I

25.0 cm^3 CH_3COOH is withdrawn to 250.0 cm^3 v-flask.
Sol. in v-flask is withdrawn by 25.0 cm^3 pipette to conical flask, and titrated against 0.1M NaOH. 30 cm^3 NaOH is needed for complete reaction.
Find stock CH_3COOH concentration.

画图



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算数

CH_3COOH n : NaOH n = 1 : 1 = n : 0.003

$n = 0.003$ (CH_3COOH used in titration)

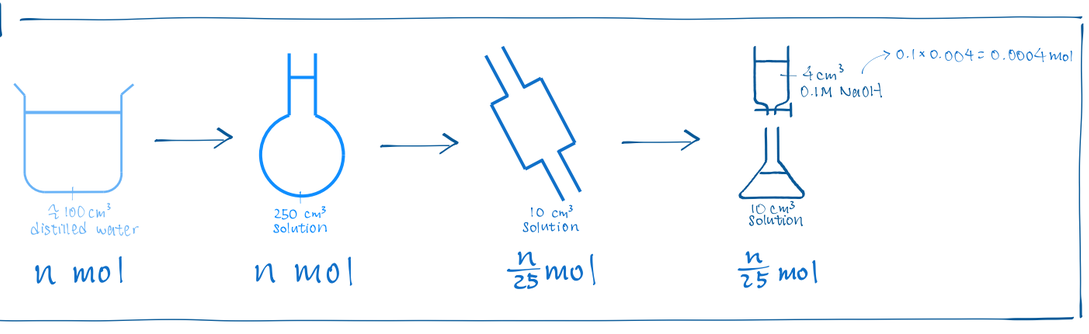
$\frac{x}{10} = \frac{0.003}{0.025}$

$x = 1.2$ mol dm^{-3}

LEVEL II

0.6 g monobasic acid is dissolved completely in a beaker w/ 100 cm^3 distilled water. The sol. in beaker is then poured into 250.0 cm^3 v-flask. Distilled water is added until the graduation mark is reached. 10.0 cm^3 of solution in v-flask is pipetted into conical flask. 4 cm^3 0.1 M NaOH is required for complete reaction. Find acid Mr.

画图



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算数

acid n (monobasic) : NaOH n = 1 : 1 = $\frac{n}{25}$: 0.0004

$n = 0.01$

$\frac{0.6g}{Mr} = 0.01$

$Mr = 60.0$ g mol^{-1}

LEVEL III

0.75 g of solid mixture (KOH & K_2CO_3) is dissolved in distilled water completely. It is titrated against 0.1M $HCl_{(aq)}$. An average of 120 cm^3 HCl is used. Find KOH % by mass.

$KOH + HCl \rightarrow KCl + H_2O$ $\Rightarrow$ KOH : HCl = 1 : 1

$K_2CO_3 + 2HCl \rightarrow 2KCl_2 + CO_2 + H_2O$ $\Rightarrow$ K_2CO_3 : HCl = 1 : 2

Let x g be KOH mass, (0.75 - x) g be K_2CO_3 mass.

HCl in KOH rx + HCl in K_2CO_3 rx = 0.1 x 0.12

$$\frac{x}{39.1+16+1} + \frac{0.75-x}{39.1\cdot2+12+16\cdot3} \cdot 2 = 0.012$$

$$\frac{x}{56.1} + \frac{0.75-x}{69.1} = 0.012$$

$$\frac{69.1x + 42.075 - 56.1x}{3876.51} = 0.012$$

$$13x = 46.51812 - 42.075$$

$$x = 0.342$$

KOH % by mass = $\frac{0.342}{0.75} \cdot 100\% = 45.6\%$