Name: __Back Titration — Suggested Solution__ Date: _____

Reaction Equations:

$$NH_4Cl_{(aq)} + NaOH_{(aq)} \xrightarrow{\Delta} NaCl_{(aq)} + H_2O_{(l)} + NH_{3(g)}$$
$$2NaOH_{(aq)} + H_2SO_{4(aq)} \longrightarrow Na_2SO_{4(aq)} + 2H_2O_{(l)}$$
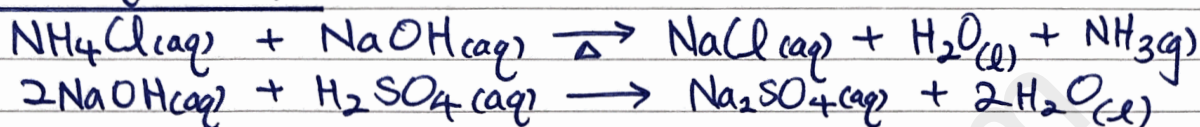
Key Concepts:

known excess amount of NaOH added initially
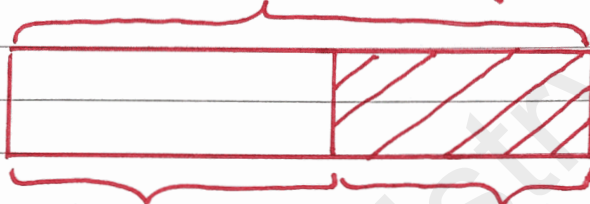
amount of NaOH that has reacted with NH_4Cl in first reaction

amount of NaOH that has reacted with H_2SO_4 in second reaction i.e. unreacted excess amount of NaOH after first reaction.

Calculations:

Amount of $H_2SO_4 = \frac{50}{1000} \times 0.250 = 0.0125$ mol

Amount of NaOH = Amount of $H_2SO_4 \times 2$
(unreacted excess) $= 0.0125 \times 2 = 0.025$ mol

Amount of NaOH added initially $= \frac{100}{1000} \times 1.00$
$= 0.1$ mol

Amount of NaOH that has reacted with NH_4Cl
= Amount of NaOH added initially − Amount of unreacted excess NaOH
$= 0.1 - 0.025 = 0.075$ mol

∴ Amount of $NH_4Cl = 0.075$ mol ⟹ Mass of $NH_4Cl = 0.075 \times 53.5$
$= 4.0$ lg (3 s.f.)

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