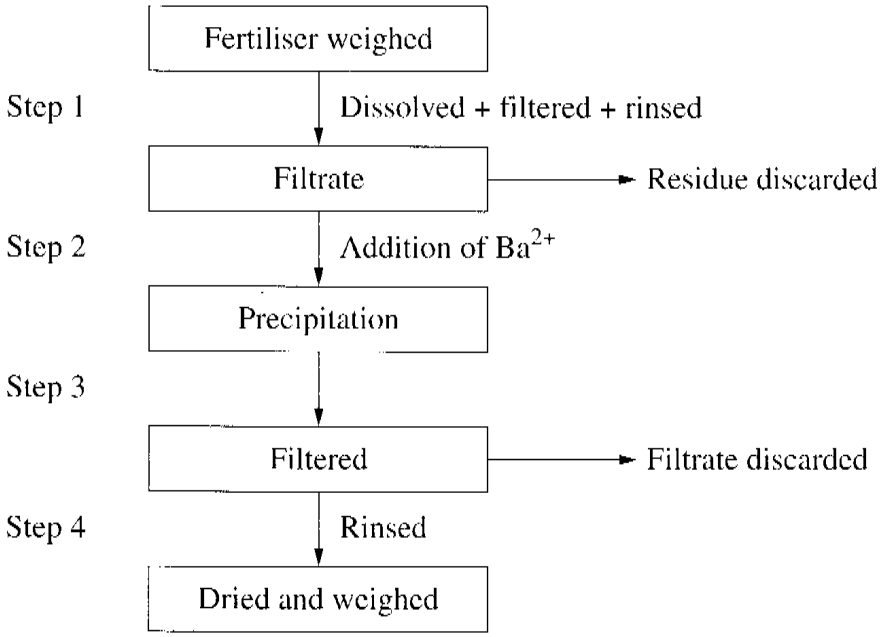
Question 29 (6 marks)

The flowchart shown outlines the process used to determine the amount of sulfate present in a sample of lawn fertiliser.



(a) What assumptions were made and how do these affect the validity of this process? **3**

Assumptions were made that the Ba^{2+} was completely insoluble, however small amounts of it may have been soluble (sparingly soluble) and reduced the amount that precipitated out. Also assumed was the complete dryness of the & sulfate and lossless filtering of the precipitate.

This has decreased the validity of the experiment as these multiple steps and minor uncertainties may cause major changes to the final result and deviate from published results.

(b) It was found that 4.25 g had a sulfate content of 35%. **3**

What is the mass of the dried precipitate at Step 4? Include a chemical equation in your answer.

$Ba^{2+}_{(aq)} + SO_4^{2-}_{(aq)} \rightleftharpoons BaSO_{4(s)}$

let x be the amount of sulfate

$\frac{x}{4.25} \times 100 = 35\%$ w/w

$\therefore x = 1.4875$ g

The dried precipitate is $BaSO_4$ $n(SO_4^{2-}) = 1.4875$

$\rightarrow \therefore$ mass $(Ba^{2+}) = 0.015 \times 137.3$ $32.07 + (16 \times 4)$

$\therefore$ mass of dried ppt $= 2.12$ g $= 0.015$ mol

in step 4 is: $2.12 + 1.4875$ $\leftarrow$ $\therefore 0.015$ mol Ba^{2+}

$= 5.10$ g (3 sf)