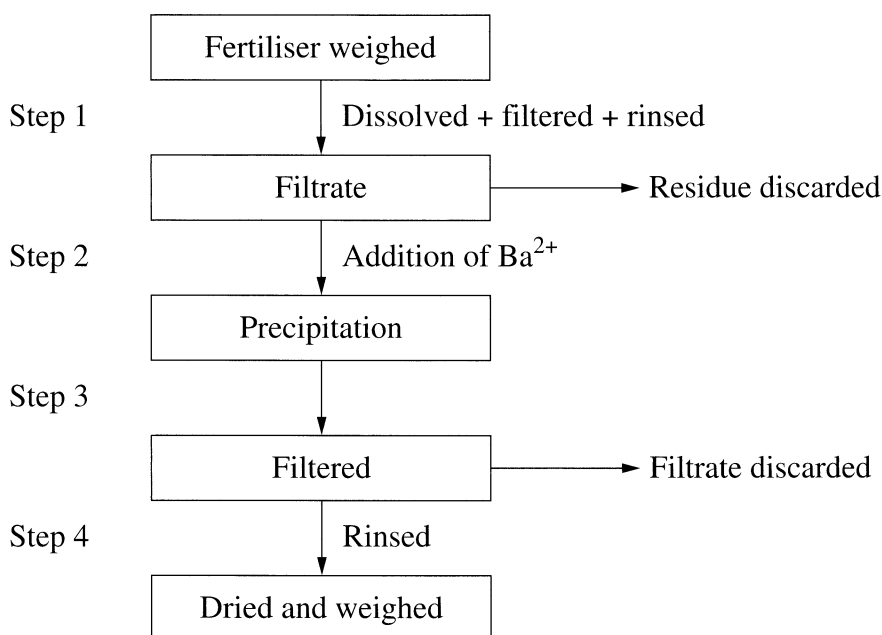


Question 29 (6 marks)

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?

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An assumption was made that all the ~~base~~ SO_4^{2-} ions were completely precipitated. Another assumption was made that ~~only~~ the Ba^{2+} only precipitated the SO_4^{2-} . There may have been CO_3^{2-} to precipitate with. Finally, there was large assumption that all the BaSO_4 precipitate was caught as residue ~~on~~ during filtration. There are large assumptions to be making, which lower the validity.

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

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

$4.25 \text{ g} \times 35\% = 1.4875 \text{ g}$
 $\therefore n(\text{SO}_4^{2-}) = \frac{m}{M} = \frac{1.4875}{32.07 + 16 \times 4}$
 $= 0.015483502 \text{ moles}$
 ~~$\rightarrow \text{BaSO}_4$~~
 Since $\text{BaSO}_4 \rightarrow \text{Ba}^{2+} + \text{SO}_4^{2-}$

$n(\text{BaSO}_4) = 0.01548$
 $- 20 - \therefore m(\text{BaSO}_4) = (0.01548) (137.3 + 32.07 + 4 \times 16)$
 $= 3.61 \text{ g} \text{ (3 sig fig)}$

the answer will not be accurately and reliably achieved. It will always be too high or too low (the % of SO_4^{2-})