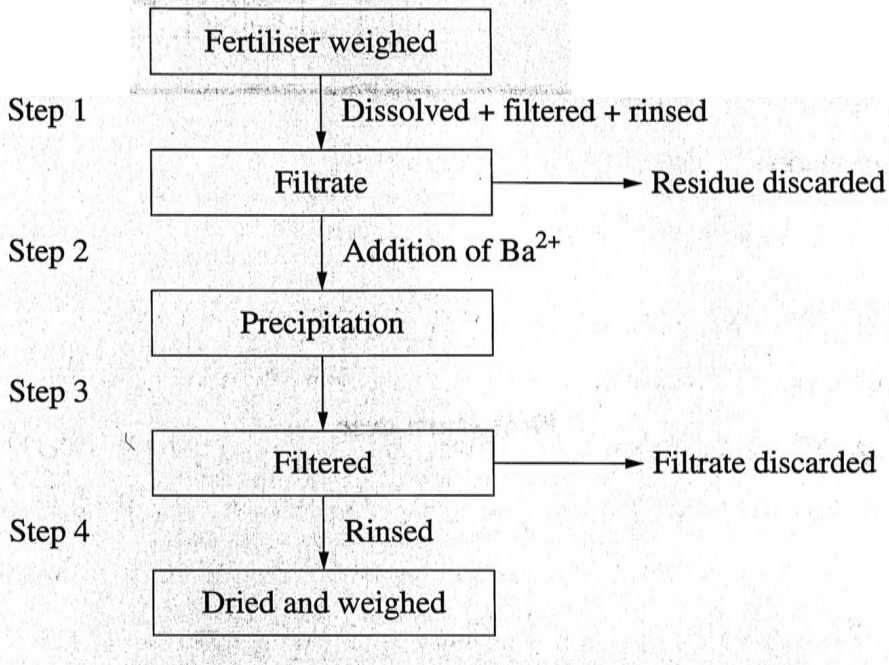
Question 29 (6 marks)

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**

The initial assumption is that all fertiliser is dissolved, this will reduce the % of sulfate result as there will be less sulfate to test. The next one is that all the sulfate precipitates with the Ba^{2+}, decreasing the ~~percentage~~ sulfate, decreasing the %. Finally it is assumed that all barium sulfate is captured by the ~~filter paper~~ while a lot will not be, decreasing the ~~filtrate~~ weighable barium sulfate ~~and~~ hence decreasing the %.

(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.

$4.25g \times 0.35 = 1.4875g$ of sulfate

$n = \frac{m}{M}$ $\therefore n = \frac{1.4875}{32.07+16\times4} = 0.01548$ moles

since Barium sulfate is $BaSO_4$, there will be 0.01548 moles of $BaSO_4$.

$\therefore n = nM = 0.01548 \times (137.3+32.07+16\times4)$

$= 3.613$ grams of $BaSO_4$.