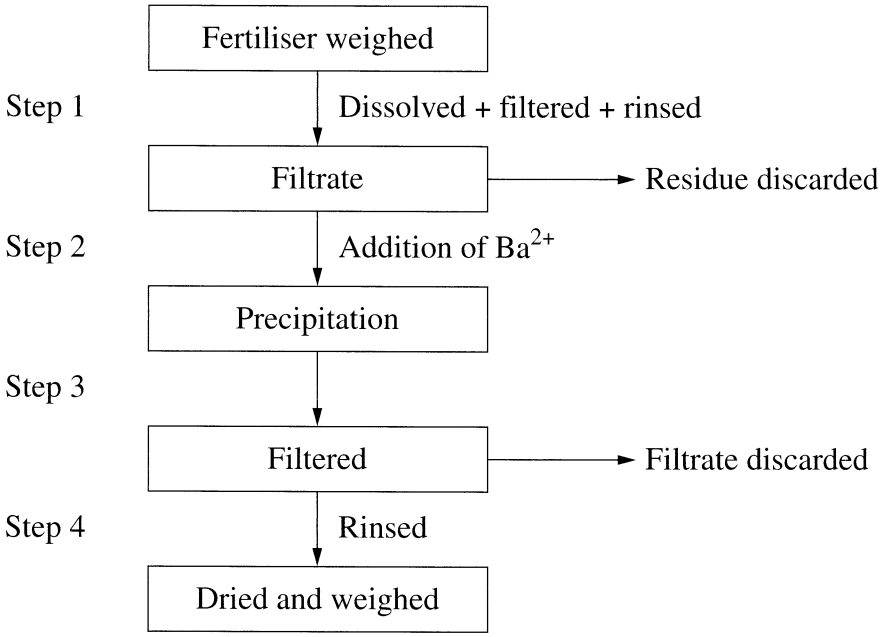
Question 29 (6 marks)

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**

~~That~~ One assumption made is that excess of Ba^{2+} was added to the filtrate so that all of the sulfate ions present in the filtrate has been precipitated out as a solid. Another assumption made is that solid precipitate is completely dry and that no water is present which increases the mass of the solid and thus effects the validity of the process.

(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.

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

1 : 1 : 1

~~$n(SO_4) = \frac{4.25}{64.07} = 0.066\text{mol}$~~

~~$n(BaSO_4) = n(SO_4) = 0.066$~~

$m(SO_4) = \frac{35}{100} \times 4.25 = 1.4875\text{g}$

$n(SO_4) = \frac{1.4875}{64.07} = 0.0155\text{mol}$ $n(BaSO_4) = n(SO_4) = 0.0155$

$m(BaSO_4) = 0.0155 \times 233.37$

$= 3.617$

∴ Mass of ~~$BaSO_4$~~ solid is ~~4.634~~ 3.617g