

3 A student prepares a sample of the insoluble salt barium sulfate, BaSO_4 . The student adds aqueous sodium sulfate, $\text{Na}_2\text{SO}_4(\text{aq})$, to aqueous barium chloride, $\text{BaCl}_2(\text{aq})$.

The student carries out the following steps.

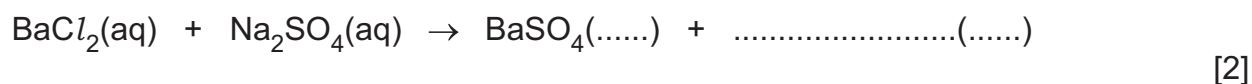
step 1 Dissolve 0.100 moles of solid BaCl_2 in 100cm^3 of distilled water in a beaker to form $\text{BaCl}_2(\text{aq})$.

step 2 Add an aqueous solution which contains 0.100 moles of $\text{Na}_2\text{SO}_4(\text{aq})$ to the beaker containing the $\text{BaCl}_2(\text{aq})$ from **step 1**.

step 3 Stir the mixture and then filter it.

step 4 Dry the solid left in the filter paper.

(a) Complete the symbol equation for the reaction. Include state symbols.



(b) Calculate the mass of solid BaCl_2 dissolved in **step 1**.

mass = g [2]

(c) The concentration of $\text{Na}_2\text{SO}_4(\text{aq})$ in **step 2** is 1.25mol/dm^3 .

Calculate the volume, in cm^3 , of 1.25mol/dm^3 $\text{Na}_2\text{SO}_4(\text{aq})$ added in **step 2** which contains 0.100 moles of Na_2SO_4 .

volume = cm^3 [1]

(d) State the colour of the solid formed in **step 2**.

..... [1]

(e) The mixture is filtered in **step 3**.

State the general term given to a solid left in the filter paper after filtration.

..... [1]

(f) The actual mass of dry BaSO_4 collected in **step 4** is greater than the expected mass. This is because the student should do an additional step between **step 3** and **step 4**.

Suggest what the student should do in this additional step, and explain why the actual mass collected is greater than the expected mass.

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.....
.....
..... [2]

(g) State the name of this method of salt preparation.

..... [1]

(h) State the name of a different:

- barium salt that can be used in place of BaCl_2
 - sulfate salt that can be used in place of Na_2SO_4
 - barium salt that can be made by this method.
- [3]