Qualitative analysis of ions

OCR A Chemistry (H032 / H432) · AS and A level

Answer on your own paper. Show your working where needed.

1. Test an evolved gas

A solid contains carbonate, sulfate or chloride ions. Adding dilute acid gives effervescence. The gas turns limewater cloudy. Identify the gas and the anion in the solid.

2. A white precipitate

An unknown solution is acidified and then treated with aqueous barium ions. A white precipitate forms. Identify the anion and write the ionic equation including state symbols.

3. A halide test

A sample gives a yellow precipitate with acidified silver nitrate. It stays solid even in concentrated ammonia. Identify the ion and write its precipitation equation.

4. Warm sodium hydroxide

A sample is warmed with aqueous sodium hydroxide. A gas turns damp red litmus paper blue. Identify the gas and cation and write an ionic equation for the test.

5. An unreliable precipitate

A student acidifies a sample with hydrochloric acid before testing it with silver nitrate. Explain why a white precipitate is unreliable evidence for the original sample. Name a suitable acid.

6. Put the anion tests in order

A single sample may contain carbonate, sulfate and a halide. Put these additions in a suitable order: barium nitrate solution, dilute nitric acid, silver nitrate solution. Explain which two false positives the sequence prevents.

7. Select a barium reagent

A student uses one portion for sequential tests and has aqueous barium chloride or barium nitrate available. Which reagent should they choose? Name the separation step before the halide test.

8. Identify the salt

An unknown is one of potassium sulfate, ammonium sulfate, ammonium bromide and sodium carbonate. There is no fizzing with dilute acid, and barium ions form a white precipitate in the acidified sample. A fresh portion releases ammonia with warm NaOH. Identify the salt.

9. Extra challenge · Quantify a mixture from two tests

A 0.424 g mixture contains only Na_2CO_3, Na_2SO_4 and NaBr. Acid gives 24.0 cm^3 CO_2. Sulfate later gives 0.350 g $BaSO_4$. Use 24.0 dm^3 mol^{-1} for CO_2 and M_r values of 106, 142 and 233.4 for Na_2CO_3, Na_2SO_4 and $BaSO_4$.

Find the mass of NaBr. Explain why neither reagent can contain a halide if the same solution is used to confirm bromide.

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