

AS Inorganic Tests

Tests for halide ions

Add HNO_3 then $\text{AgNO}_3 \rightarrow$ precipitate. Then add NH_3 if necessary.

Chloride: white precipitate that **dissolves** in **dilute NH_3**

Bromide: cream precipitate that **dissolves** in **concentrated NH_3**

Iodide: yellow precipitate that **does not dissolve** in any NH_3 solution

Ammonium NH_4^+

Add $\text{NaOH} \rightarrow \text{NH}_3$. Test for NH_3it turns red litmus paper blue

Carbonate CO_3^{2-}

Add HCl to the carbonate solution $\rightarrow \text{CO}_2$. Turns limewater cloudy. Or vice-versa. Add the carbonate to an acid

Sulphate SO_4^{2-}

Add $\text{BaCl}_2 \rightarrow$ a white precipitate, barium sulphate (BaSO_4).

AS Organic Tests

Alcohols: add $\text{K}_2\text{Cr}_2\text{O}_7/\text{H}^+$ orange \rightarrow green colour change for primary and secondary alcohols

Alkenes: Add bromine water. Orange \rightarrow colourless

Haloalkanes: Dissolve in ethanol, add water and then do the halide ion test (as above)

A-level Inorganic Tests

The transition metal complexes are often included in chemical test questions. It's a huge part of that topic and there are a lot of reactions. I have included all of them in the table below. It's debatable if these are chemical tests.

| Complex | Few drops NaOH or NH ₃ | excess NaOH | excess NH ₃ |
|--|--|---|--|
| pale green [Fe(H ₂ O) ₆] ²⁺ | Dirty green ppt Fe(OH) ₂ | No reaction | No reaction |
| Green/violet [Cr(H ₂ O) ₆] ³⁺ | Pale green ppt Cr(OH) ₃ | Deep green soln [Cr(OH) ₆] ³⁻ | Violet soln [Cr(NH ₃) ₆] ³⁺ |
| yellow [Fe(H ₂ O) ₆] ³⁺ | brown ppt Fe(OH) ₃ | No reaction | No reaction |
| blue [Cu(H ₂ O) ₆] ²⁺ | pale blue ppt Cu(OH) ₂ | No reaction | Deep blue soln [Cu(NH ₃) ₄ (H ₂ O) ₂] ²⁺ |
| pale pink [Mn(H ₂ O) ₆] ²⁺ | Light brown ppt Mn(OH) ₂ | No reaction | No reaction |

A-level Organic Tests

Aldehyde or ketone: add 2,4-DNPH (Brady's reagent) → orange precipitate

Aldehyde: add Tollen's → silver mirror or Fehling's → red precipitate

Carboxylic Acid: add carbonate as for AS inorganic → CO₂ or add PCl₅ → steamy white fumes

Benzene: add bromine water at room temp → no reaction. Not a good test! Or combustion → burns with a sooty flame.

Esters and Amides: no easy test

