

AS 90305 Version 2 (2.1) expired
Carry out qualitative analysis
Level 2 3 Credits
(Internally Assessed)

This achievement standard involves carrying out procedures and using knowledge of precipitation reactions to determine ions present in solution.

Achievement	Achievement with Merit	Achievement with Excellence
Carry out given procedures to determine ions present in solution.	Carry out given procedures to determine ions present in solution, and justify the identification.	Carry out given procedures, involving the formation of complex ion(s), to determine ions present in solution, and justify the identification.

- Use a flow chart to determine unknown ions
- Identification of the cations:
 - Ag^+ silver
 - Al^{3+} aluminium
 - Ba^{2+} barium
 - Cu^{2+} copper
 - Fe^{2+} iron(II)
 - Fe^{3+} iron(III)
 - Mg^{2+} magnesium
 - Na^+ sodium
 - NH_4^+ ammonium
 - Pb^{2+} lead
 - Zn^{2+} zinc
- Identification of the anions:
 - Cl^- chloride
 - CO_3^{2-} carbonate
 - I^- iodide
 - NO_3^- nitrate
 - OH^- hydroxide
 - SO_4^{2-} sulfate
- Identification of Na^+ and NO_3^- by a process of elimination.
- Identification of NH_4^+ using its reaction with NaOH to produce NH_3 gas
- Distinguishing between named pairs of anions or pairs of cations.
- Ion determination supported by experimental observations and identification of precipitates formed.
- Justification of ions includes balanced equations for the reactions where precipitates are formed.
- Justification of ions includes balanced equations for the formation of complex ions. Complex ions may include
 - FeSCN^{2+} formed when Fe^{3+} reacts with $\text{SCN}^-(\text{aq})$
 - Those formed when $\text{OH}^-(\text{aq})$ reacts with Al^{3+} , Pb^{2+} and Zn^{2+} cations to form $[\text{Al}(\text{OH})_4]^-$, $[\text{Pb}(\text{OH})_4]^{2-}$, and $[\text{Zn}(\text{OH})_4]^{2-}$.
 - Those formed when $\text{NH}_3(\text{aq})$ reacts with Ag^+ , Zn^{2+} and Cu^{2+} cations to form $[\text{Ag}(\text{NH}_3)_2]^+$, $[\text{Zn}(\text{NH}_3)_4]^{2+}$ and $[\text{Cu}(\text{NH}_3)_4]^{2+}$.