• Most common oxidation states: +3, +5
• M.P. 271°
• B.P. 1560°
• Density 9.75 g/cm³
• Characteristics: Bismuth is hard and brittle, with a reddish cast. Rather inactive, but will dissolve in nitric acid or hot sulfuric acid.

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**Characteristic reactions of Bi³⁺**

The +3 oxidation state is the more stable one.

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**Aqueous Ammonia**

Aqueous ammonia reacts with bismuth(III) ion to precipitate white bismuth hydroxide:

\[
\text{Bi}^{3+}(aq) + 3\text{NH}_3(aq) + 3\text{H}_2\text{O}(aq) \rightleftharpoons \text{Bi(OH)}_3(s) + 3\text{NH}_4^+(aq)
\]

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**Sodium Hydroxide**

Sodium hydroxide reacts with bismuth(III) ion to produce a precipitate of Bi(OH)₃.

\[
\text{Bi}^{3+}(aq) + 3\text{OH}^-(aq) \rightleftharpoons \text{Bi(OH)}_3(s)
\]
Bi(OH)_3 does not dissolve in excess ammonia or sodium hydroxide, but does dissolve in acids:

$$\text{Bi(OH)}_3(s) + 3\text{H}^+(aq) \rightleftharpoons \text{Bi}^{3+}(aq) + 3\text{H}_2\text{O}(l)$$

Water

Compounds of Bi^{3+} hydrolyze readily in dilute solutions, especially when chloride ion is present, to form a white precipitate of BiOCl:

$$\text{Bi}^{3+}(aq) + \text{Cl}^-(aq) + \text{H}_2\text{O}(l) \rightleftharpoons \text{BiOCl(s)} + 2\text{H}^+(aq)$$
An acid should be added to aqueous solutions of bismuth(III) salts to prevent this precipitation.

**Stannite Ion**

Stannite ion reduces bismuth hydroxide to small black particles of metallic bismuth:

\[
2\text{Bi(OH)}_3(s) + 3\text{Sn(OH)}_4^{2-}(aq) \rightleftharpoons 2\text{Bi}(s) + 3\text{Sn(OH)}_6^{2-}(aq)
\]

The solution of stannite ion must be prepared just prior to use, by treating a solution of tin(II) chloride with excess sodium hydroxide:

\[
\text{Sn}^{2+}(aq) + 2\text{OH}^-(aq) \rightleftharpoons \text{Sn(OH)}_2(s) \text{ (white)}
\]

\[
\text{Sn(OH)}_2(s) + 2\text{OH}^-(aq) \rightleftharpoons \text{Sn(OH)}_4^{2-}(aq)
\]

**No Reaction**

\[
\text{Cl}^-, \text{SO}_4^{2-}
\]