• Most common oxidation state: +2
• M.P. 1453°
• B.P. 2732°
• Density 9.91 g/cm³
• Characteristics: Nickel is a silvery-gray metal. Not oxidized by air under ordinary conditions. Easily dissolved in dilute nitric acid.

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**Characteristic Reactions of Ni²⁺**

Nickel(II) ion forms a large variety of complex ions, such as the green hydrated ion, \(\ce{[Ni(H2O)6]^{2+}}\).

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**Aqueous Ammonia**

Aqueous ammonia precipitates green gelatinous Ni(OH)₂:

\[
\ce{Ni^{2+}(aq) + 2NH3(aq) + 2H2O(l) <=> Ni(OH)2(s) + 2NH4^{+}(aq)}
\]

The nickel(II) hydroxide precipitate dissolves in excess ammonia to form a blue complex ion:

\[
\ce{Ni(OH)2(s) + 6NH3(aq) <=> [Ni(NH3)6]^{2+}(aq) + 2OH^{-}(aq)}
\]
**Sodium Hydroxide**

Sodium hydroxide also precipitates nickel(II) hydroxide:

\[
\ce{Ni^{2+}(aq) + 2OH^-(aq) <=> Ni(OH)2(s)}
\]

Nickel(II) hydroxide does not dissolve in excess \(\text{NaOH}\).

**Dimethylglyoxime**

Addition of an alcoholic solution of dimethylglyoxime to an ammoniacal solution of Ni(II) gives a rose-red precipitate, abbreviated \(\text{Ni(dmg)2}\):

\[
\ce{[Ni(NH3)6]^{2+}(aq) + 2(CH3CNOH)2(alc) <=> Ni[ONC(CH3)C(CH3)NOH]2(s) + 2NH4^+(aq) + 4NH3(aq)}}
\]
Sulfide

Black $\ce{NiS}$ is precipitated by basic solutions containing sulfide ion:

$$\ce{Ni^{2+}(aq) + S2^- (aq) <=> NiS(s)}$$

Nickel(II) sulfide is not precipitated by adding $\ce{H2S}$ in an acidic solution. In spite of this, $\ce{NiS}$ is only slightly soluble in $\ce{HCl}$ and has to be dissolved in hot nitric acid or aqua regia, because $\ce{NiS}$ changes to a different crystalline form with different properties.

No Reaction

$\ce{Cl^-}$, $\ce{SO4^{2-}}$