

Expt. No. 3

NAME : _____ **BATCH :** _____

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Synthesis of Hexamminenickel (II) Chloride

AIM

To synthesize hexamminenickel(II) chloride, using nickel chloride hexahydrate ($\text{NiCl}_2 \cdot 6\text{H}_2\text{O}$) and concentrated aqueous ammonia.

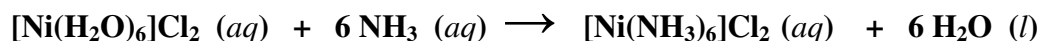
THEORY

In aqueous solution, nickel ion Ni^{2+} is surrounded by six water molecules which are actually bonded to the central metal ion.

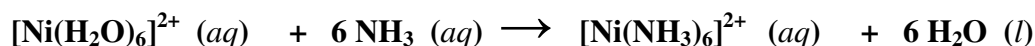
This complex is called the hexaquaonickel (II) ion.

When aqueous nickel chloride is precipitated from solution, the nickel ions carry their six water molecules into the crystals, and hence solid nickel (II) chloride is hydrated. It has the formula $[\text{Ni}(\text{H}_2\text{O})_6]\text{Cl}_2$, and is more properly called hexaquaonickel (II) chloride.

When ammonia is added to a solution of this salt, the ammonia molecules compete with the water in bonding Ni^{2+} , and because the ammonia forms a stronger bond than water, the ammonia replaces the water according to :



or, as a net ionic equation :



In this net ionic equation, the product $[\text{Ni}(\text{NH}_3)_6]^{2+}$ is called the hexamminenickel (II) ion.

MATERIALS REQUIRED

Nickel chloride hexahydrate, concentrated aqueous ammonia, beakers.

PROCEDURE

1. Take 5 ml of a solution of nickel chloride hexahydrate (containing about 6 g of nickel chloride) in a 100 ml beaker. Stir this solution.
2. Add 12 ml of concentrated aqueous ammonia, **slowly**, to a rapidly stirred solution of nickel chloride.
3. Make sure that the color of the solution has changed from pale green to intense violet (if not, add more ammonia).
4. Allow the solution to stand at room temperature for 5 minutes. Cool in an ice-bath, **without disturbance**, for about 15 minutes.
5. If violet crystals of $[\text{Ni}(\text{NH}_3)_6] \text{Cl}_2$ have not formed, try initiating the process of crystallization by gently scratching the sides of the beaker, using a glass rod.
6. Filter the solution, and wash the crystals with concentrated aqueous ammonia solution (~ 5 ml).
7. Dry the crystals by placing them between pieces of filter paper.
8. Determine the **weight**. **Report the yield and percentage yield.**

RESULTS

Yield = g

Percent Yield = %