EXPERIMENT NUMBER	7
THE NAME OF THE EXPERIMENT	TETRAAMMINECOPPER(II) SULFATE
FORMULA	$[Cu(NH_3)_4]SO_4.H_2O$

REACTION EQUATION

$$CuSO_4.5H_2O + 4\,NH_3 \longrightarrow [Cu(NH_3)_4]SO_4.H_2O + 4H_2O$$

EXPERIMENTAL PROCEDURE

10 g of $CuSO_4.5H_2O$ is dissolved in 10 mL of water. Concentrated ammonia is added dropwise to the solution. During the addition, a light blue precipitate is formed first. The addition of ammonia is continued until this precipitate is completely dissolved (approximately 20 mL). The resulting solution is filtered through the filter paper. 15 mL of ethyl alcohol is slowly added to the filtrate. The product is precipitated. After the product is kept in the cold for two hours, the crystals obtained are filtered off from the funnel. The crystals are washed sequentially with alcohol and concentrated ammonia solution (1:1), and then with alcohol and ether. The dark blue colored crystals are dried in the air. The complex is unstable in the air.

QUESTIONS

1. *Explain the structure of the complex by writing the electron configurations of copper and copper(II).*
2. *What should be done to enlarge the crystals obtained. What should be the solvent system to be used for this purpose.*
3. *Provide information about tetrahedral and square planar complexes.*
4. *Inform about the geometric isomerism in complexes.*

EXPERIMENT NUMBER	***8***
THE NAME OF THE EXPERIMENT	***HEXAAMMINENICKEL(II) CHLORIDE***
FORMULA	***$[Ni(NH_3)_6]Cl_2$***

EXPERIMENTAL PROCEDURE

6 g of nickel chloride hexahydrate are dissolved in 10 mL of warm water. Ammonia is added to this solution. Addition of ammonia is continued until the precipitate formed is dissolved. The dark violet solution is cooled on ice. The crystalline product is separated. Approximately 25 mL of cold alcohol is added to complete the precipitation. The resulting product is washed with alcohol, filtered off and dried in the air.

QUESTIONS

1. *Write and balance the chemical equation.*
2. *Explain the structure of the complex by writing the electron configurations of nickel and nickel(II).*
3. *Provide information about octahedral complexes.*
4. *Indicate possible geometric isomers of the complex.*
5. *Write the electron configurations of Pd and Pt and compare them with the electron configuration of nickel.*

Working rate: 1/6

GENERAL INFORMATION

Nomenclature of Coordination Compounds

$[Ru(HSO_3)_2(NH_3)_4]$	Tetraamminebis(hydrogensulfito)ruthenium(II)
$[CuCl_2(NH_3)_2]$	Diamminedichlorocopper(II)
$K_3[Fe(CN)_6]$	Potassium hexacyanoferrate(III)
$[Ti(H_2O)_6][CoCl_6]$	Hexaaquatitanium(III) hexachlorocobaltate(III)
$K_2[Ni(CN)_4]$	Potassium tetracyanonickelate(II)
$[Zn(NCS)_4]^{2-}$	Tetraisothiocyanatozincate(II)
$[Co(SCN)_2(NH_3)_4]_2SO_4$	Tetraamminedithiocyanatocobalt(III) sulfate
$[Au(CN)_4]^-$	Tetracyanoaurate(III)
$[PtCl(NH_2CH_3)(NH_3)_2]Cl$	Tetraamminechloro(methylamine)platinum(II) chloride
$[CuCl_2\{O=C(NH_2)_2\}_2]$	Dichlorobis(urea)copper(II)
$K_2[PdCl_4]$	Potassium tetrachloropalladate(II)
$[Co(OH_2)_2(NH_3)_4]Cl_3$	Diakuatetraamminecobalt(III) chloride
$[Pt(H_2NCH_2CH_2NH_2)_2Cl_2]Cl_2$	Dichlorobis(ethylenediamine)platinum(IV) chloride
$[Co(H_2NCH_2CH_2NH_2)_3]_2(SO_4)_3$	Tris(ethylenediamine)cobalt(III) sulfate
$(NH_4)_2[Ni(C_2O_4)_2(H_2O)_2]$	Ammonium diaquabis(oxalato)nickelate(II)
$[Ag(NH_3)_2][Ag(CN)_2]$	Diamminesilver(I) dicyanoargentate(I)
$[Fe(NH_3)_6][Cr(CN)_6]$	Hexaammineiron(III) hexacyanochromate (III)
$[CoBr(NH_3)_5]SO_4$	Pentaamminebromocobalt(III) sulfate

Triaquatriamminechromium(III) chloride	$[Cr(NH_3)_3(H_2O)_3]Cl_3$
Diaquabromofloroiodochlorochromate(III)	$[CrBrFICl(H_2O)_2]^-$
Hexaamminechromium(III) hexachloroiridate(III)	$[Cr(NH_3)_6][IrCl_6]$
Potassium amminedioxoperoxodicyanochromate(VI)	$K_2[Cr(CN)_2O_2(O_2)NH_3]$
Lithium tetrahydroaluminate(III)	$Li[AlH_4]$
Potassium pentacyanonitrosilferrate(II)	$K_3[Fe(CN)_5NO]$
Sodium pentachloronitridoosmate(VI)	$Na[OsCl_5N]$
Sodium bis(thiosulfato)arjentate(I)	$Na_3[Ag(S_2O_3)_2]$
Dichlorobis(methylamine)cupper(II)	$[CuCl_2(CH_3NH_2)_2]$
Hexaammineiron(III) nitrate	$[Fe(NH_3)_6](NO_3)_3$
Ammonium tetrachlorocuprate(II)	$(NH_4)_2[CuCl_4]$