TM review

Note: Iron → Ferrate, Copper → Cupate, Sn → stannate, Ag → argentate, Pb → plumbate, Au → Aurate

1. Name the following complexes, identify the central ion, the ligands, and the coordinate number

    a) $Cu(NH_3)_4^{2+}$
    b) $Co(OH)_2(H_2O)_4$
    c) $CrCl(H_2O)_5^{2+}$
    d) $CuCl_4^{2-}$
    e) $Ag(CN)_2^{1-}$
    f) $Pt(NH_3)_2Cl_2^{2-}$
    g) $Fe(Co)_5$
    h) $Co(NO_3)_3(NH_3)_3$
    i) $Co(No_2)_6^{3-}$

2. Given the central ion, the ligand and the coordinate number, write the complexes.

a) Cu^{2+}	H_2O	CN=4
b) Ni^{2+}	Cl^-	CN=4
c) Fe^{3+}	CN^{1-}	CN=6
d) Ag^{1+}	NH_3	CN=2

3. Name three types of boding present in $CuSO_4 \cdot 5H_2O$

4. Name the following:

    a) $[Co(NH_3)_4(H_2O)CN]Cl_2$
    b) $Na[Al(OH)_4]$
    c) $K_4[Fe(CN)_6]$
    d) $K_4[Ni(CN)_4]$

5. Write the electron configuration for:
    a) Cu
    b) Cu^+
    c) Cu^{2+}
    d) Fe
    e) Fe^{2+}
    f) Fe^{3+}
    g) Cr

6. State the shape of:
    a) Hexaaqua iron(II) ion: $[Fe(H_2O)_6]^{2+}$
    b) Tetraamino copper(II) ion: $[Cu(NH_3)_4]^{2+}$

c) Pentacarbonze iron(0) ion: $Fe(CO)_5$

7. Explain why Sc^{3+} complexes are colourless whereas complexes containing Co^{2+} are coloured.

8. Explain why $Co(H_2O)_6^{2+}$ and $Co(H_2O)_6^{3+}$ are different in colour.

ANSWERS:

1. a) tetraamine copper(II) copper NH_3 CN=4
   b) dihydroxotetraquo cobalt(II) Cobalt OH^-, H_2O CN=6
   c) chloropentaaquo chromium(III) Chromium H_2O, Cl CN=6
   d) tetrachloro cupperate (II) copper Cl CN=4
   e) dicyano silverate(I)
   f) dichlorodiamine platinum(II)
   g) pentacarbonyl iron(O)
   h) trinitro triaminate cobalt(III)
   i) hexanitro cobaltate (III)

2. a) $Cu(H_2O)_4^{2+}$
   b) $NiCl_4^{2-}$
   c) $Fe(CN)_6^{3-}$
   d) $Ag(NH_3)_2^{1+}$

3. Ionic, covalent, and hydrogen bonding

4. a) tetraamaineaquacyano cobalt(III) chloride
   b) sodium tetrahydroxo aluminate
   c) potassium hexacyanoferrate (II)
   d) potassium tetracyanonickelate (0)