**UNIT 5 PRACTICAL 7 - CHEMISTRY OF TRANSITION METAL COMPLEX IONS**

(d) describe, including ionic equations, the simple precipitation reactions and the accompanying colour changes of Cu2+(aq), Co2+(aq), Fe2+(aq) and Fe3+(aq) with aqueous sodium hydroxide;

(k) describe the process of ligand substitution and the accompanying colour changes in the formation of: (i) [Cu(NH3)4(H2O)2]2+ and [CuCl4]2– from [Cu(H2O)6]2+, (ii) [CoCl4]2– from [Co(H2O)6]2+;

**Precipitation reactions**

1. Pour 1 cm3 of copper sulphate solution into a test tube
2. Add 1 cm3 of sodium hydroxide solution
3. Repeat steps 1 – 2 using cobalt nitrate solution instead of copper sulphate
4. Repeat steps 1 – 2 using iron (II) sulphate solution instead of copper sulphate
5. Repeat steps 1 – 2 using iron (III) nitrate solution instead of copper sulphate
6. Record your observations clearly in a table
7. Write equations for any reactions taking place

**Ligand Exchange Reactions**

1. Pour 1 cm3 of copper sulphate solution into a test tube
2. Add concentrated hydrochloric acid until there is no further change in colour
3. Repeat steps 1 – 2 using cobalt nitrate solution instead of copper sulphate
4. Record your observations clearly in a table
5. Write equations for any reactions taking place

**Combination reactions**

1. Pour 1 cm3 of copper sulphate solution into a test tube
2. Add 1 cm3 of ammonia solution
3. Add another 5 cm3 of ammonia solution and shake the mixture well
4. Repeat steps 1 – 3 using cobalt nitrate solution instead of copper sulphate
5. Repeat steps 1 – 3 using iron (II) sulphate solution instead of copper sulphate
6. Repeat steps 1 – 3 using iron (III) nitrate solution instead of copper sulphate
7. Record your observations clearly in a table
8. Write equations for any reactions taking place