

NEATH PORT TALBOT COLLEGE COLEG CASTELL NEDD PORT TALBOT

School of Maths & Science Science Practical

Soluble And Insoluble Compounds

◆ Aim

In the following exercise you are provided with solutions containing named ions. By the end of the practical you should be able to;

- (1) Write the formula for a range of compounds
- (2) Test the solubility of a number of compounds by observing the colour of some test tube reactions.

◆ Introduction

A knowledge of the solubility and colour of compounds is useful in the identification of ions. Different compounds have different types of solubility because of the ions that they consist of. For example sodium sulfate is soluble because it contains Na^+ cations. This practical will allow you to produce a set of rules which characterises the solubility of certain cations and anions.

◆ Safety



Control Measures

- The wearing of safety glasses, gloves and a laboratory coat at all times will be sufficient to take account of most hazards and significant risks.
- Keep stoppers on bottles as much as is possible.
- Keep flammable liquids away from flames
- All waste is to be placed in the labelled container immediately after use.
- You are reminded of the need of good laboratory practise in order to maintain a safe working environment.



Hazards

Harmful/Irritant

**Copper Sulfate solution, Iron(II) Iron(III) salts,
Barium Carbonate, Barium Nitrate, Zinc Sulfate,
Copper salts, Aluminium Nitrate.**



Oxidising Toxic

**Sodium/potassium/Zinc nitrate.
Lead salts.**



◆ Procedure

Add dropwise each anion solution to 1 cm³ of each cation solution until no further change is observed.

Fill in the table below by;

- (i.) Giving the formula
 - (ii.) Giving the colour
 - (iii) Shading in the insoluble compounds.
- (N.B. Some in the table has been completed as examples)

◆ Results

Anion Cation	Sulfate	Nitrate	Chloride	Carbonate	Hydroxide	Iodide
Sodium	ALL OF THESE ARE SOLUBLE AND COLOURLESS					
Potassium						
Ammonium						
Magnesium	MgSO ₄ (colourless)	Mg(NO ₃) ₂ (colourless)	MgCl ₂ (colourless)			
Calcium	CaSO ₄ (partial ppt)	Ca(NO ₃) ₂ (colourless)	CaCl ₂ (colourless)	CaCO ₃ (white)		
Barium			BaCl ₂ (colourless)			
Iron(II)						
Iron(III)						
Copper	CuSO ₄ (Blue)	Cu(NO ₃) ₂ (Blue)	CuCl ₂ (Blue/green)			
Silver	Ag ₂ SO ₄ (colourless)	Ag(NO ₃) (colourless)				
Zinc	ZnSO ₄ (colourless)	Zn(NO ₃) ₂ (colourless)	ZnCl ₂ (colourless)			
Aluminium	Al ₂ (SO ₄) ₃ (colourless)	Al(NO ₃) ₃ (colourless)	AlCl ₃ (colourless)			
Lead						

Exercises on Soluble/Insoluble Table

General statements can be written about the solubility of various compounds e.g. 'all sulfates except those of Ca, Ba and Pb are soluble'.

Write statements for

(a.) Nitrates

(b.) Carbonates

(c.) Chlorides

(d.) Hydroxides

(e.) Sodium, potassium and ammonium salts

2. What trends, if any, can be seen in the solubility of Ca, Ba and Mg salts?

3. Can a statement be made about the solubility of Group I compounds?

4. What information in the table enables you to distinguish between Iron(II) and Iron(III) compounds.

(N.B. the formation of metal 'hydroxides' is often used in the identification of metal ions)