NEATH PORT TALBOT COLLEGE
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School of Maths & Science
Science Practical

Inorganic Plan 2

◆ Aim

Devise and execute a suitable plan to identify five solutions.

◆ Introduction

This task tests your knowledge of qualitative inorganic chemistry and your ability to use this information to devise a testing strategy to identify five solutions. You will be provided with the four solutions and their labels which have fallen off. Your task is to reattach the labels to the correct bottle. The first activity you will have to carry out is to device a suitable plan to enable to identify the solutions.

◆ Safety

Control Measures

- The wearing of safety glasses 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.
- You are reminded of the need of good laboratory practice in order to maintain a safe working environment.

Hazards

Harmful/ Irritant — Treat all solutions as potentially harmful solutions

◆ Procedure

You are provided with five solutions from which the labels have become detached. The five solutions are: sodium hydroxide, magnesium sulphate, potassium iodide, barium chloride and lead nitrate. You are not allowed to use any other reagents other than the solutions themselves. Devise a suitable plan that will allow you to identify each solution. When your plan has been checked you may use it to identify the solutions.

◆ Questions

1. Write ionic equations for all reactions leading to the formation of a precipitate.

2. Are there any potential problems with the testing methods? e.g. solutions of borderline solubility.

◆ PLAN

We will mix 1 cm^3 of each solution with 1 cm^3 of the remaining solutions and record the observations, in particular any precipitates and their colour. Beneath is a table which shows what we would expect to observe with each solution.

	$BaCl_2$	$MgSO_4$	$Pb(NO_3)_2$	KI	NaOH
$BaCl_2$		white ppt	white ppt	No ppt	No ppt
$MgSO_4$			white ppt	No ppt	white ppt
$Pb(NO_3)_2$				Yellow ppt	white ppt
KI					No ppt
NaOH					

With each solution we expect to make the following observations:

$BaCl_2$	2 white ppts,	2 No ppt	
$MgSO_4$	3 white ppts,	1 No ppt	
$Pb(NO_3)_2$	3 white ppts,	0 No ppt,	1 Yellow ppt
KI	1 Yellow ppts,	4 No ppt	
NaOH	2 white ppts,	2 No ppt	

We can identify the solutions of KI, $Pb(NO_3)_2$ and $MgSO_4$ from the unique combination of observations: 1 Yellow ppts, 4 No ppt; 3 white ppts, 0 No ppt, 1 Yellow ppt and 3 white ppts, 1 No ppt respectively.

We now need to distinguish between the solutions of $BaCl_2$ and NaOH. To do this we will add to separate 1 cm^3 portions of $Pb(NO_3)_2$ each of $BaCl_2$ and NaOH solutions dropwise until in excess. $BaCl_2$ will give a white ppt which is insoluble in excess. NaOH will give a white ppt that is soluble in excess. We will hence be able to differentiate between the solutions.