**ANSWER\_KEY**

**TASK 14**  **(answers in bold)**

**CHEMISTRY** **ATAR Units 1 & 2**

Practical Investigation 2

**“Identify the Unknowns”**

**Background**

Different substances dissolve in water to varying extents. The different solubilities of these substances have several applications. Chemists can use the knowledge of solubilities to identify the presence of certain ions, to prepare compounds, in electrolytic processes, horticulture and in rehydration. It also helps in various forensic tests and separation methods.

**Equipment required**

Test tube rack

6 Test tubes

3 popsticks

dropper bottles of : sulfuric acid [H2SO4] 2.0 mol L-1

distilled water

calcium hydroxide (limewater) [Ca(OH)2)]

three samples of white powders labelled – (any combination of A,B,C,D,E or F)

distilled water bottles

**Planning the investigation**

Plan an investigation to determine the identity of the unknowns.

Your investigation should be carried out on a small scale using 1 – 2 g of samples.

Write your aim, list the chemicals and the equipment you need, the procedure you used to identify the samples and state any safety requirements identified.

Draw a flow diagram to show what you expect to observe when you conduct the experiment.

**Conducting the investigation**

Conduct the investigation, collecting and recording your observations in a table as you proceed.

**Processing the data and Evaluating the investigation**

Match the compound to the correct sample letter.

Provide the evidence to explain why you chose that compound.

Write Ionic equations for **all reactions or changes** you observed.

If no reaction or change state No Reaction.

**TASK 14 ANSWER\_KEY\_\_**

**(answers in bold)**

**CHEMISTRY** **ATAR Units 1 & 2**

Practical Investigation 2

**“Identify the Unknowns”**

Safety Glasses (2 marks)

AIM: \_\_\_\_\_\_**To Identify the three unknown samples**\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

(1 mark)

PROCEDURE: **1. Start your 1st sample (record its letter on the answer sheet)**

**2. put a small amount of sample into a test tube and add 2 mLs of distilled water**

**3. observe and record**

**4. into a second test tube add another small amount of sample and add 2 mLs of sulfuric acid**

**5. observe and record**

**6. into a third test tube add another small amount of sample and add**

**2 mLs of calcium hydroxide**

**7. observe and record**

**8. repeat this procedure with the three other samples** (1 mark)

PROCESSING and EVALUATING: (12 marks)

|  |  |
| --- | --- |
| Sample | Evidence and Ionic Equations |
| A | Chemical Name and Formula: **Barium Chloride [BaCl2] (1 location ½ formula)**  Evidence: **dissolves in H2O and Ca(OH)2**  **white ppt with H2SO4  (1 mark)**  Ionic Equations:  (with H2O)  **BaCl2** ****  **Ba2+ + 2 Cl - (½ mark)**  (with H2SO4) **BaCl2 + SO4 2-  BaSO4 + 2 Cl – (½ mark)**  (with Ca(OH)2) **BaCl2  Ba2+ + 2 Cl – (½ mark)** |
| B | Chemical Name and Formula: **Sodium Carbonate [Na2CO3] (1 location ½ formula)**  Evidence: **dissolves in H2O**  **colourless gas evolved with H2SO4 (1 mark)**  **white ppt with Ca(OH)2**  Ionic Equations:  (with H2O)  **Na2CO3   2 Na+ + CO32- (½ mark)**  (with H2SO4) **Na2CO3 + 2H +  2 Na+ + H2O + CO2 (½ mark)**  (with Ca(OH)2) **Na2CO3** **+ Ca2+** ** 2 Na+ + CaCO3** **(½ mark)** |

|  |  |
| --- | --- |
| Sample | Evidence and Ionic Equations |
| C | Chemical Name and Formula: **Zinc Nitrate [Zn(NO3)2] (1 location ½ formula)**  Evidence: **dissolves in H2O and H2SO4**  **white ppt with Ca(OH)2 (1 mark)**  Ionic Equations:  (with H2O) **Zn(NO3)2  Zn2+ + 2 NO3 - (½ mark)**  (with H2SO4) **Zn(NO3)2  Zn2+ + 2 NO3 -  (½ mark)**  (with Ca(OH)2) **Zn(NO3)2 + 2 OH - Zn(OH)2 + 2 NO3 -  (½ mark)** |
| D | Chemical Name and Formula: **Calcium Carbonate [CaCO3] (1 location ½ formula)**  Evidence: **does not dissolves in H2O**  **colourless gas evolved with H2SO4**  **white ppt with Ca(OH)2  (1 mark)**  Ionic Equations:  (with H2O)  **CaCO3  No Reaction (½ mark)**  (with H2SO4) **CaCO3 + 2H + + SO42-  CaSO4  + H2O + CO2 (½ mark)**  (with Ca(OH)2)  **CaCO3** ** No Reaction**  **(½ mark)** |
| E | Chemical Name and Formula: **Sodium Choride [NaCl]** (**1 location ½ formula)**  Evidence: **substance dissolves** **with all solutions** **(1 mark**  Ionic Equations:  (with H2O)  **NaCl Na +  + Cl - (½ mark)**  (with H2SO4) **NaCl Na +  + Cl - (½ mark)**  (with Ca(OH)2)**NaClNa +  + Cl- (½ mark)** |
| F | Chemical Name and Formula: **Barium Sulfate [BaSO3] (1 location ½ formula)**  Evidence: **does not dissolves with H2O and H2SO4**  **white ppt with Ca(OH)2 ( 1 mark)**  Ionic Equations:  (with H2O)  **BaSO4  No Reaction (½ mark)**  (with H2SO4) **BaSO4   No Reaction(½ mark)**  (with Ca(OH)2)**BaSO4  + Ca2+ Ba2+ + CaSO4 (½ mark)** |

**TOTAL 16 marks**