

**Insert School Logo**

**Semester Two**

**Task 8 2023**

**Question/Answer booklet**

**CHEMISTRY**

**UNIT 2**

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Teacher: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

***TIME ALLOWED FOR THIS PAPER***

Working time for the paper: Fifty minutes

# MARKS ALLOWED FOR EACH SECTION

Section One: Investigation 8 marks

Section Two: Discussion 23 marks

Total: 31 marks

***MATERIALS REQUIRED/RECOMMENDED FOR THIS PAPER***

**To be provided by the supervisor:**

This Question/Answer Booklet

Chemistry Data Book

**To be provided by the candidate:**

Standard items: pens (blue/black preferred), pencils (including coloured), sharpener, eraser, correction tape/fluid, ruler, highlighters

Special items: up to three non-programmable calculators approved for use in the WACE examinations

***IMPORTANT NOTE TO CANDIDATES***

No other items may be taken into the examination room. It is **your** responsibility to ensure that you do not have any unauthorised notes or other items of a non-personal nature in the examination room. If you have any unauthorised material with you, hand it to the supervisor **before** reading any further

**SECTION ONE – INVESTIGATION(8 marks)**

In many industries it is useful for scientists to be able to identify unknown substances. You can measure several unknown properties of a substance to help identify it, or some properties may need to be tested against a known substance.

For this task you will be provided with samples of barium chloride, zinc nitrate, sodium carbonate, and calcium carbonate that have been randomly labelled A, B, C, and D. Your task is to perform a variety of wet tests to determine which chemical is which. In order to aid you in this deduction, you will also be provided with distilled water and lime water (an aqueous solution of Ca(OH)­2).

1. In the space below, draw up a flowchart, dichotomous key, or similar diagram that may be used to identify each unknown. Make sure to clearly identify the observations you would expect to see for each inference.(3 marks)
2. Complete the following table of results based on your experiment, as well as the identity for each unknown. You do not need to fill-in all cells – only the ones for a test which you completed.(5 marks)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Test** | **A** | **B** | **C** | **D** |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
| **Identity** |  |  |  |  |

**SECTION TWO – DISCUSSION (23 marks)**

1. Describe the test you used to determine the identity of zinc nitrate. Explain why this test identifies zinc nitrate, using a chemical equation as appropriate.(3 marks)
2. In the space below, draw how you would expect barium chloride to appear in solution. Make sure to label any important interactions.(4 marks)
3. One method that can be used to differentiate sodium carbonate and calcium carbonate is a flame test.
   1. Why can a flame test be used to differentiate these salts?(1 mark)
   2. What is one risk associated with differentiating these salts using this method?(1 mark)
   3. How could this risk be mitigated?(1 mark)
4. A group of students performed a similar experiment in which they had to differentiate between 4 unknown chemicals – Pb(NO3)2, CaCl2, CuSO4, and Sr(OH)2. The results they got are shown in the table below:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  | **A** | **B** | **C** | **D** |
| **Addition of water** | Blue solution | Colourless solution | Colourless solution | Colourless solution |
| **Addition of NaI** |  | No change | Yellow precipitate | No change |
| **Addition of Na2SO4** |  | White precipitate |  | No change |

1. Giving a reason why, give the chemical formula for chemical A.(2 marks)
2. Identify the products you would expect to see for combining Pb(NO3)2 with NaI, CaCl2 with NaI, and Sr(OH)2 with NaI.(3 marks)
3. Hence, identify (with a reason) the chemical formula for chemical C.(2 marks)
4. Identify the products you would expect to see for the reaction of CaCl2 with Na2SO4 and Sr(OH)2 with Na2SO4.(2 marks)
5. Hence, identify the chemical formula for chemicals B and D.(2 marks)