

**Task 11: Conductivity of Acids Validation**

**Question/Answer Booklet**

**CHEMISTRY UNIT 2**

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

Teacher’s Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

# TIME ALLOWED FOR THIS PAPER

Reading time for the paper: 3 minutes

Working time for the paper: 22 minutes

# 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

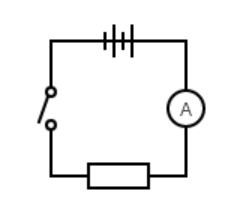
# IMPORTANT NOTE TO CANDIDATES

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

Mark and Sarina were running a physics experiment to determine the resistivity of a circuit in a car battery. However, they noticed different brands of car batteries were giving drastically different results! They did some research and determined that most car batteries used sulfuric acid as a medium, however discovered that the Betta brand was actually using sulfurous acid as a medium.

To try and replicate the design to check the validity of their experiments, Mark and Sarina set up a simple circuit as shown below. They then ran an experiment in which they measured the current through a sulfurous acid resistor and sulfuric acid resistor and got the results in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0.05M | 0.1M | 0.2M | 0.5M | 1.0M |
| Sulfuric Acid | 0.02mA | 130mA | 370mA | 430mA | 780mA |
| Sulfurous Acid | 0.02mA | 120mA | 340mA | 390mA | 650mA |



1. What are the independent variables in this experiment?(2 marks)
2. What is the dependent variable in this experiment?(1 mark)
3. Identify 3 variables that would need to be controlled.(3 marks)
4. Write a method below that Mark and Sarina might have followed.(3 marks)
5. On the set of axes below, draw a graph for Mark’s and Sarina’s results.(4 marks)

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

1. Giving a reason why, determine which of the two acids is the stronger acid.(2 marks)

Sarina and Mark decided to repeat the experiment to see if they could determine the strength of different acids. They decided to compare HF, HCl, and HBr to each other.

1. Explain why conductivity can be used to determine the strength of an acid.(3 marks)
2. It is known that HF is a weaker acid than HCl, and HCl is a weaker acid than HBr. Using your understanding of electronegativity, explain why this is the case.(2 marks)

Sarina and Mark got the results shown below for each unknown:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | 0.05M | 0.1M | 0.2M | 0.5M | 1.0M |
| Acid X | 0.01mA | 240mA | 350mA | 540mA | 1,110mA |
| Acid Y | 0.01mA | 200mA | 310mA | 490mA | 1,010mA |
| Acid Z | 0.02mA | 250mA | 370mA | 600mA | 1,170mA |

1. Determine the identity of each acid.(2 marks)