Candidate's name……..

Signature……

Random No						Personal No		

545/2
CHEMISTRY
Paper 2
Jun/July 2024

UGANDA CERTIFICATE OF LOWER SECONDARY EDUCATION
CHEMISTRY
PAPER 2
PRACTICAL

TIME :2 HOURS

INSTRUCTIONS TO CANDIDATES:

- *This paper consists of* **one compulsory** examination *item. Answers to this item are to be written in the spaces provided in this booklet. Use* **blue** *or* **black** *ink.*
- *All working must be clearly shown. Graph paper will be provided.*
- *Mathematical table and silent non-programmable scientific calculators may be used.*
- *You are* **not** *allowed to use reference books* (*i.e. text books, booklets on qualitative analysis etc.*)
- *Candidates are advised to carefully read the item, make sure they have all the apparatus and chemicals they may need and then* **plan** *appropriately before starting.*

Item

Jane runs a laundry mart. She washes peoples' clothes for money. Due to water shortages in her area, there are three available water sources in the neighboring village, she wants to understand which of the three water sources would be better to use when washing clothes. You are provided with a sample of each of the water sources labelled **A**, **B** and **C** and a soap solution labelled **S**

Task

Plan and carry out an investigation to find out which of the three water samples easily forms lather with soap and use your results to recommend jane appropriately.

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ADVANCE INFORMATION (TO THE TEACHER/FACILITATOR)

Water samples;

- A is Bore hole water or a solution of 0.5M $CaSO_4$
- B is well water or a solution of 0.2M $CaSO_4$
- C is rain water or distilled water.

Solution S is soap solution. Made by dissolving 50 grams of a bar soap in 1 liter (5%w/v) of hot water, stir until all soap is dissolved and leave to cool.

Also provide each candidate with the following;

- Retort stand
- Pipette
- Burette
- 2 conical flasks

SCORING GRID

AIM: (2 scores)

To determine which of the three water samples easily forms lather with soap. **or**

To determine which if the three water samples is better for washing clothes

Variables. (3 scores)

Dependent variable	Formation of lather
Independent variable	Volume of soap solution
Controlled variable	Volume of water sample measured

Hypothesis (2 scores)

Soap reacts with hard water forming an insoluble substance. In the absence of ions responsible for hardness, soap with water to form lather.

Procedures (03)

- ✧ Pipette 20 or 25 cm^3 of water sample **A** into a clean conical flask.
- ✧ Titrate the water with the soap solution from the burette until permanent lather is formed.
- ✧ Repeat the procedures to obtain consistent results.
- ✧ Repeat the procedures for each of the water sample **B** and **C**

Risk and mitigations. (02 scores)

Pouring soap solution on clothes or paper.

Mitigated by use of a funnel when pouring soap solution into the burette.

Presentation of data (04 scores)

Water sample A. volume of pipette used $20.0cm^3$

	1	2	3
Final burette reading (cm^3)	35.00	34.50	34.50
Initial burette reading (cm^3)	0.00	0.00	0.00
Volume of soap solution (cm^3)	35.00	34.50	34.50

Water sample **B**.

	1	2	3
Final burette reading (cm^3)	23.00	23.00	23.00
Initial burette reading (cm^3)	0.00	0.00	0.00
Volume of soap solution (cm^3)	23.00	23.00	23.00

Water sample **C**.

	1	2	3
Final burette reading (cm^3)	15.00	14.50	14.50
Initial burette reading (cm^3)	0.00	0.00	0.00
Volume of soap solution (cm^3)	15.00	14.50	14.50

Data analysis and interpretation. (03 scores)

Average Volume of soap required to form lather.

For sample **A** $\frac{35+34.5\ 34.5}{3}$ = $^{104}/_{3}$ = **34.6666cm^3**

For sample **B** $\frac{23+23+23}{3}$ = $\frac{69}{3}$ = **23.00 cm^3**

For sample **C** $\frac{15+14.50+14.50}{3}$ = $\frac{44}{3}$ = **14.6667cm^3**

Conclusion. (01 score)

Water sample C requires the least amount of soap to form lather. Therefore it is the best water sample to use when washing since it saves soap.