

Name ..... Stream .....

L.I.N.....Signature .....

## BROADWAY HIGH SCHOOL – KAMPALA

### Uganda Certificate of Lower Secondary Education

END OF YEAR EXAMINATIONS, 2023

S2. Chemistry Paper I

2h 30 min

#### INSTRUCTIONS TO LEARNERS

*This question paper consists of two sections, **A** and **B***

*Attempt all questions in section A and **any** 2 questions from **section B***

*Responses for section A must be written in the spaces provided and those of section B on the separate answer sheets provided.*

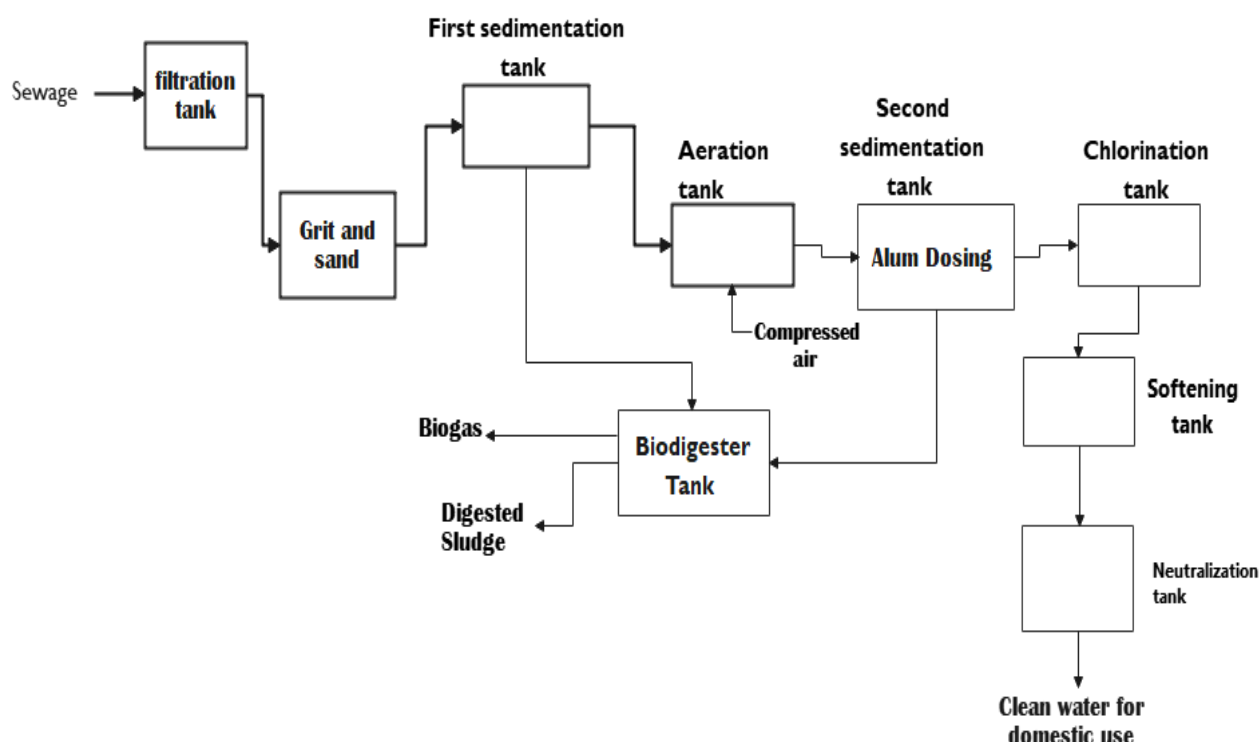
*Use a blue or black ball point pen.*

*Where necessary, illustrate your answers with relevant, well balanced equations. All drawings made **must** be in pencil.*

| For examiners use only |   |   |   |   |   |           |   |   |       |
|------------------------|---|---|---|---|---|-----------|---|---|-------|
| Section A              |   |   |   |   |   | Section B |   |   | TOTAL |
| 1                      | 2 | 3 | 4 | 5 | 6 | 7         | 8 | 9 |       |
|                        |   |   |   |   |   |           |   |   |       |

## SECTION A

- I. The flow chart below was drawn by a group of senior two learners who had a study trip to Lubigi Water Treatment Plant.



You have been approached by the learners and you are required to answer the following questions;

- a) Explain what is meant by the term **sewage**. (02 scores)

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- b) During sewage treatment, the sewage is brought into contact with appropriate bacteria under controlled conditions. What is the role of bacteria in sewage treatment? (02 scores)

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- c) What is the role of the following

- (i) Alum dosing in the second sedimentation tank (01 score)

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(ii) Chlorination

(01 score)

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d) Briefly describe what takes place in the softening tank and explain why the water is softened. (02 scores)

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e) Using relevant equations, describe the importance of neutralisation of water before domestic use. (02 scores )

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2. Sarah, a form I chemistry poet composed the following poem. Read the poem and attempt the questions that follow.

"Deep in the Earth;  
From there I came.  
Volcano erupted;  
Now I'm not the  
same.

Magma to lava;  
The thought is ingenious.  
Rock experts now;  
Classify me as igneous.  
Pounded by sea;  
The tyrannical waves;  
A bit of my substance;  
Occasionally saves.  
Now please don't go too far;  
On your sentiment.  
I've merely become;  
What is called 'sediment.'



I might scrape up the toe:  
Of an unaware jock.  
Once I harden to be;  
Sedimentary Rock.  
Add heat and some  
pressure;

I'll show you one more trick.  
When suddenly;  
My name is Metamorphic.  
The heat then grew greater;  
I melted inside.  
And back into the Earth;  
As magma I ride.  
Some doubt if I ever;  
Will see you again.  
However the Rock Cycle;  
Determines when..."

a) Suggest a suitable title for the poem.

(01 score)

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b) Briefly describe the rock cycle. (04 scores)

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c) How would you distinguish between the three types of rocks? (03 marks)

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d) Outline any three importance of rocks in our daily lives. (02 scores)

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3. Zinc sulphate is a common, soluble salt found in Orazinc™ tablets given to patients with zinc deficient symptoms. As an expert pharmacist at Cipla Pharmaceuticals, you have been assigned to guide newly employed

pharmacists on how to prepare the pure dry crystals of zinc sulphate salt that will be used in the tablets. In your guidance you are required to;



a) State two substances from which Orazinc™ can be prepared?  
(02 scores)

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b) Mention the type of reaction that occurs during the preparation. (01 score)

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c) Write a well-balanced equation for the reaction that occurs. (01 score)

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d) How can the Orazinc™ tablets be prepared in the laboratory from dilute sulphuric acid. (04 scores)

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e) With an example, mention of any other three uses of salts in our daily lives. (02 scores)

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4. Complete the following paragraph using the most suitable terms regarding organic chemistry. (10 scores)

Alkenes are .....hydrocarbons with a .....as their functional group. They have a general formula of ..... Ethene is the simplest alkene which can be obtained in the laboratory by ..... of ethanol using .....sulphuric acid at a temperature of ..... During the preparation, the gas is bubbled through sodium hydroxide solution to ..... and collected over water because it ..... ethene gas prepared can be tested by bubbling it through ..... which turns from a ..... solution to a ..... Solution.

5. In a move toward building sustainable cities that have cleaner air, Ugandan chemists have proposed the use of ethanol as opposed to fossil fuel. Ethanol is one of the cleaner fuels used in developed countries to run car engines as an



alternative to fossil fuels. It is majorly prepared from carbohydrates such as starch found in maize. The maize flour is mixed with yeast which produces catalytic enzymes.

- a) What is meant by the term **fuel**? (01 score)

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b) By which process can the fuel above be obtained from maize? (01 score)

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c) What is the role of the different enzymes secreted by yeast during the formation of the fuel above? (04 ½ scores)

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d) Write an equation for the complete combustion of the above fuel in the car engine. (01 ½ scores )

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e) Briefly explain how the fuel can be purified to avoid engine breakdown. (02 scores)

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6. Below are some views of some learners discussing about the use of soapy and soapless detergents. Read the dialogue carefully and answer the questions that follow.

**Sarah** : I think soapy detergents are the best because they are natural substances which do not dry out the skin. Soapless detergents take away natural grease and can irritate ones skin.

**Hashim** : My soapless shower gel is the best. It gets rid of sweat and grease after playing volleyball. It is important to keep really clean.

**Waiga** : we don't need to use soapy detergents and soapless detergents on a daily basis. This is just a habit. Washing with water is enough to keep clean unless you get really dirty.

**Yasin** : I prefer soapy detergents to soapless detergents. Soapless detergents do not break down easily so cause problems in the soil, streams and rivers. Soaps are much better for the environment. But how are the two different?

**Deng** : we should all use soapless detergents because they don't form scum with hard water. I'm still puzzled on how soaps and detergents remove stains from a cotton fabric.

**Edrine** : I go fishing a lot and I see froth floating on rivers and lakes. I think we should use less soapy and soapless detergents. But I don't like feeling dirty!

a) Whose point of view do you

(i) Most agree with?

(01 score)

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(ii) Least agree with?

(01 score)

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b) As an expert, suggest a suitable response to Yasin's question. (02 scores)

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c) How best would you respond to Deng's puzzle?

(04 scores)

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d) What would happen if soapless detergents are released to the environment?  
(02 scores)

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## SECTION B

Attempt **only two** questions from this section.

7. Copper, an element whose discovery dates back as early as 9000BC with its many desirable properties, make it a popular choice for numerous applications, ranging from electronics and electric motors, architectural elements, renewable energy production, making school bells, water storage tanks, alloyed with other elements as a coinage material, and more. Copper exists naturally in malachite rocks as copper(II) carbonate. In Uganda, largest deposits of malachite are found in Kilembe. As a chemical engineer, you have been invited to the Mineral Wealth Conference as a Chief Guest to (i) explain how pure copper can be obtained from Malachite rocks and (ii) the different properties of copper metal that make it a popular and useful element.



Write a speech that you would present to the audience in the Conference.  
(10 scores)

8. To agriculturalists, weeds are a menace since they drastically lower the crop yields. Some farmers however, have discovered that the use of polyethene mulches has proven to be very effective in weed control as shown in the figure. As an expert in polymer chemistry,



- a) How can maize grains be converted to be the mulch used in the figure beside?

*[Your explanation must include relevant conditions and equations for the reactions that occur]* (07 scores)

- b) What would happen to the environment if the mulches shown above are used for a long time? (03 scores)

9. Mr. Kamau is a dairy farmer who sells 200 litres of milk on a daily basis. Milk contains lactose which is broken down by bacteria to form lactic acid which makes the milk go bad. His customers do not like the taste of the milk which has gone bad. Occasionally Kamau checks the pH of the milk before taking it to the market. If the pH is low, he adds small amounts of sodium carbonate. The milk is then transported in plastic containers instead of aluminium cans.



- a) Suggest an explanation as to why customers do not prefer milk which has gone bad. (02 scores)  
b) Explain why Kamau uses the sodium carbonate salt. (02 scores)  
c) Kamau prefers plastic containers to aluminium can. Explain. (02 scores)  
d) Briefly describe how Kamau determines the pH of the milk. (02 scores)  
e) With reasons, suggest any other way Kamau can use to prevent milk from going bad. (02 scores)

**END**

*...Wishing you Success & Happy Holidays ...*