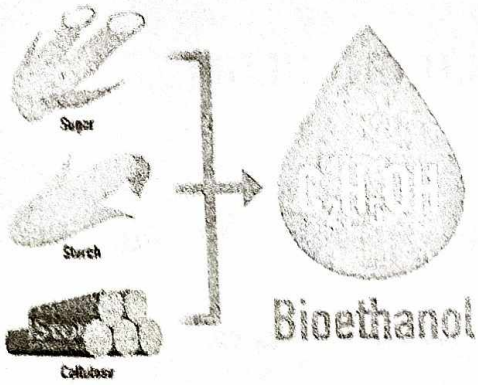
545/1
Chemistry
Paper 1
FEB 2024

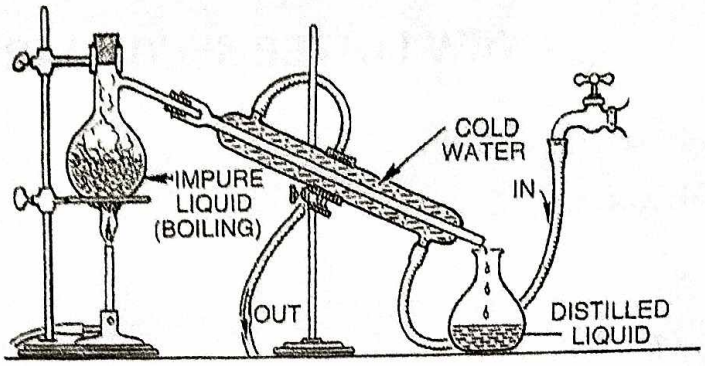
CHEMISTRY DEPARTMENT
CHEMISTRY
END YEAR EXAMINATION
FORM FOUR
2 HOURS

Instructions to item takers
This paper consists of four extended scenario items.
Attempt all the items
Write your responses in the spaces provided.

For official use only					
Item No.	**1**	**2**	**3**	**4**	**Total score**
Score					

1. Carbohydrates are always consumed as food in our homes but also have other uses. Kampala metropolitan area is infested by bacteria that causes typhoid. Typhoid spreads through contaminated water and food. The District health officer advised washing hands using sanitizers to kill the bacteria. Commercial sanitizer is expensive and the community members wish to produce their own sanitizer but do not know how it can be produced.

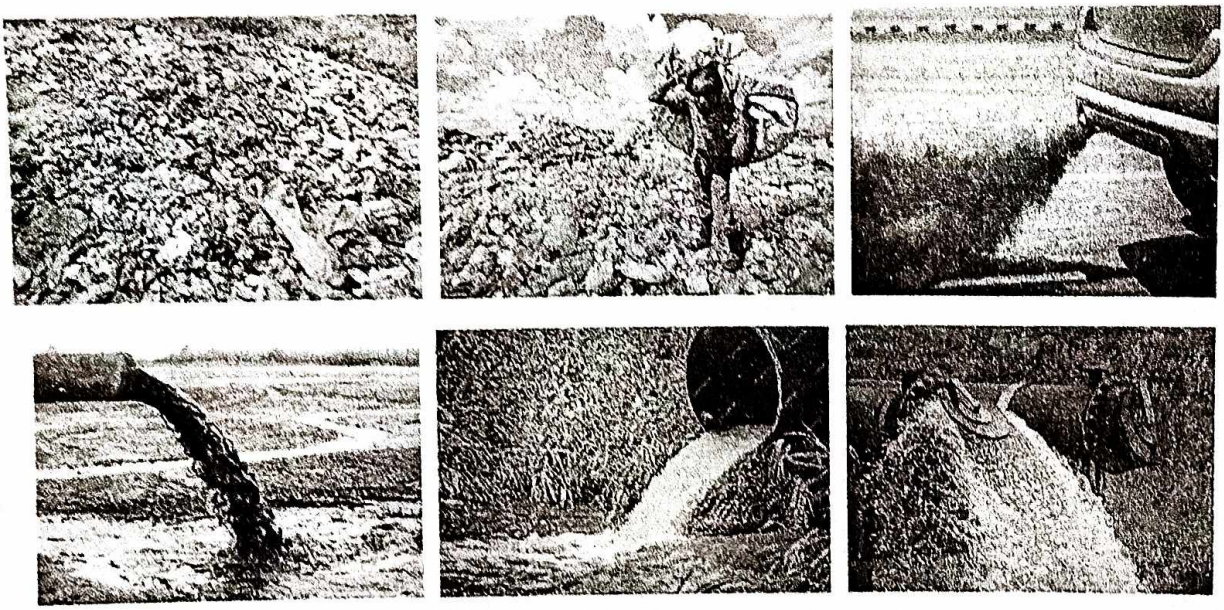




TASK:

As a student of Chemistry, educate the community members on how to go about it.

2. Urban areas in Uganda face growing challenges related to waste management and pollution. The improper disposal of wastes has contributed to environmental degradation and health hazards.



Task: Create an article in your school magazine to address the problem.

3. Common salt (sodium chloride) is an additive in food to make it tasty. A student of senior one expressed the interest in making common salt from its elements as his project but lacks the knowledge. The student approached the laboratory technician who promised to help her the next day. Unfortunately, the laboratory technician did not appear to school the next day.

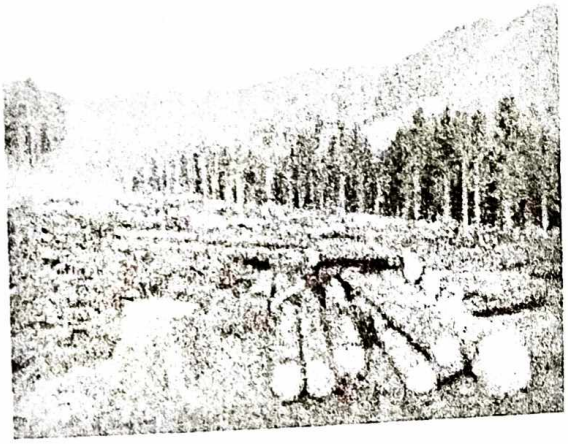
PERIODIC TABLE ELEMENTS 1–20

HYDROGEN 1 H 1.01							HELIUM 2 He 4.00
LITHIUM 3 Li 6.94	BERYLLIUM 4 Be 9.01	BORON 5 B 10.81	CARBON 6 C 12.01	NITROGEN 7 N 14.01	OXYGEN 8 O 16.00	FLUORINE 9 F 19.00	NEON 10 Ne 20.18
SODIUM 11 Na 22.99	MAGNESIUM 12 Mg 24.31	ALUMINUM 13 Al 26.98	SILICON 14 Si 28.09	PHOSPHORUS 15 P 30.97	SULFUR 16 S 32.07	CHLORINE 17 Cl 35.45	ARGON 18 Ar 39.95
POTASSIUM 19 K 39.10	CALCIUM 20 Ca 40.08						

Task

Act as the laboratory technician and help the student to achieve her aim.

4. In rural village in Uganda, traditional cooking methods such open fires and inefficient local stoves requires a lot of fuel to prepare small quantities of food. This increases the cost of house hold energy consumption, in addition, it has many health and environment effects.



Task

Advise the community on how the resource can sustainably be used.

END

Question I.	Mark allocation Grid	Code	Mark Max.
1	Introduction - Should include linky ethanol to being a key component of the sanitizer	I — 01	
2	Body. a) Process of production - should include fermentation process definition or description.	P.P — 02	
	b) Coherent procedure/process Includes the flow of the description ie Starch containing material named → (technical term - hydrolysis or catalysis) → Maltose → Glucose Malting for adding enzyme diastase Yeast for enzyme and Zymase enzyme Ethanol (Crude).	C.P — 12	
	c) Purification Should include distilation process/ diagrams to form pure ethanol as distilate.	Pr — 02	
	d) Conversion to desired product. Should include addition of Calculated amounts of any two or more additives eg. perfumes, soaps, glycerol aloevele gell. etc.	Cdp — 03	

on I

Sample Scoring

I. Sanitizer has one of its main component as ethanol. (1)

ethanol can be made locally using a process called fermentation. P.P reaction which is always catalyzed by various enzymes.

Any named (Cassava) raw material is cooked to release starch which is treated with malt at a temperature of about 60°c, Malt supplies enzyme diastase which hydrolyses starch to maltose.

$$C_6H_{10}O_5 + H_2O_{(l)} \longrightarrow C_{12}H_{22}O_{11(aq)}$$

At room temperature, yeast is added, it supplies enzyme maltase which catalyses the hydrolysis of maltose to glucose.

$$C_{12}H_{22}O_{11} + H_2O \longrightarrow C_6H_{12}O_6$$

Zymase enzyme from yeast also catalyses decomposition of glucose to ethanol and carbondioxide

$$C_6H_{12}O_{6(aq)} \longrightarrow 2C_2H_5OH_{(l)} + 2CO_{2(g)}$$

The resultant ethanol is crude ethanol by distillation to obtain pure ethanol as distillate

To make the sanitizer, a calculated amount of liquid soap and perfume Choice can be added to the resultant pure ethanol.

I - 01
CP - 12
Pr - 02
Cdp - 03
P.P - 02
20
Sco