Name...Centre/ index No. ....

School...Signature ....

545/2

CHEMISTRY

(Theory)

Paper 2

July/ Aug 2022

2 Hours

CENTRAL REGION TEACHERS' ASSOCIATION

(CERETA) JOINT MOCK EXAMINATIONS 2022

Uganda Certificate of Education

CHEMISTRY THEORY

Paper 2

2 hours

INSTRUCTIONS TO CANDIDATES:

- Section A consists of 10 structured questions. Attempt **all** questions in this section. Answers to these questions must be written in the spaces provided.

- Sections B consists of 4 semi-structured questions. Attempt any **two** questions from this section. Answers to the questions **must** be written in the booklets provided.

- In both sections all working must be clearly shown.

  (C=12, Cu=64, O=16, Fe=56, S=32, H=1, Pb=207, N=14, Cl=35.5, 1mole of a gas occupies 22,4l at s.t.p or 24l at r.t.p.).

For Examiner's use only														
1	2	3	4	5	6	7	8	9	10	11	12	13	14	Total

SECTION A:

Attempt all questions in this section.

1. A mass of 25.0g of Copper II carbonate was heated strongly until there was no further change.

    a). State what was observed?   (01 mark)

    ....

    ....

    b). Write an equation for the reaction.   (01½ marks)

    ....

    c). Calculate the mass of the residue.   (02½ marks)

    ....

    ....

    ....

2. Nitric acid reacts with copper to form a colourless gas, which on exposure to air gives brown fumes, soluble in water.

    a). State the conditions under which nitric acid reacts with copper.   (01 mark)

    ....

    ....

    b). Name the colourless gas.   (0½ marks)

    ....

    c). Explain how the brown fumes are formed using equation.   (02½ marks)

    ....

    ....

d). Give one use of the colourless gas that re-lights a glowing splint. (01 mark)

....

....

3. The diagram below represents set up of apparatus used in the lab for preparation

of gas X.
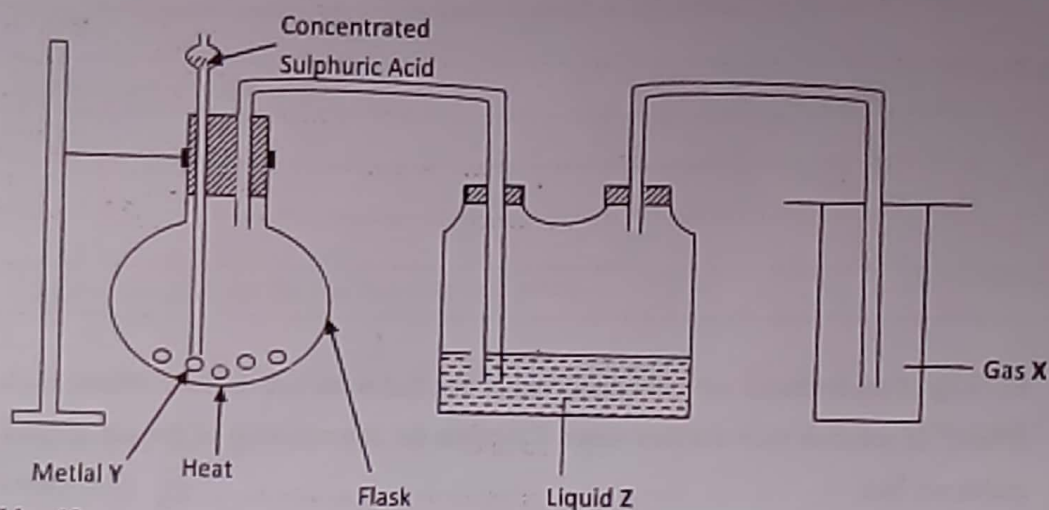
a) Identify. (01½ marks)

i) Y ....

ii) Z ....

iii) X ....

b). Write the equation for the reaction that took place in the flask. (01½ marks)

....

....

c). State what would be observed when gas X is passed through an aqueous solution of:
acidified potassium permanganate (1½ marks)

....

....

d). Name the process above (0½ marks)

....

4. A hydrated salt S has the following composition by mass, Iron 20.2%, Sulphur 11.5%, oxygen 23%, and water 45.3%. Its relative formula mass is 278.

i)   Determine the formula of the hydrated salt S.   (03½ marks)

....

....

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....

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....

ii).13.9g of the hydrated salt were dissolved in distilled water and the total volume made to 500cm³ of solution with distilled water. Calculate the concentration of the salt solution in moles per litre.   (01½ marks)

....

....

....

....

5.   Vinyl chloride undergoes addition polymerization to form polymer P.

    a) Define the term addition polymerization.   (01 mark)

....

....

    b) Write down the structures of Vinyl chloride and P.   (02 marks)

    (i).Structure of vinyl chloride

....

    (ii).Structure of polymer P

....

c) State what is observed when propene gas is bubbled through a solution of bromine water and write equation for the reaction. (02 marks)

....

....

....

6. Excess hydrogen chloride gas was bubbled through a solution of 10.8g of Silver nitrate.

a).State what was observed? (01½ marks)

....

....

b).Write equation for the reaction that took place. (01½ marks)

....

c).Calculate the mass of the solid formed. (03 marks)

....

....

....

....

7. Part of the periodic Table is shown below:

I							VIII
U	II	III	IV	V	VI	VII	
U							Q
V	X		Z		O		
W		Y				P	

a).Write the formulae of the compounds formed between the following pairs of elements and in each case state the type of bonding.

i).Z and P (01 mark)

....

ii).V and O (01 mark)

....

b). i). which of the compounds in (a) would conduct electricity in molten state. (01 mark)

....

ii).Explain your answer in b (i) above.   (01 mark)

....

....

c).State the most;   (01mark)

(i).Electropositive element.

....

(ii).Inert element.

....

8.   a).Burning Magnesium was plunged into a gas jar of Carbon dioxide gas.

i).State what was observed?   (01 mark)

....

ii).Explain the observation in (i).   (01½ marks)

....

....

b).Chlorine gas was bubbled into potassium iodine solution.

i).State what was observed?   (01 mark)

....

....

ii).Write an equation for the reaction that took place.   (01½ marks)

....

9.   A mixture of Sulphur and iron filings were heated until a reaction began. When the
burner was then removed, the reaction mixture continued to glow. A black solid
remained.

a).i).How would you show that Sulphur and iron filings is a mixture? (01 mark)

....

....

ii).Write an equation for the reaction that took place. (01 mark)

....

iii).What does the observation made after removing the burner indicate? (0½ marks)

....

b).Describe briefly the action of dilute hydrochloric acid on the black solid. (01$\frac{1}{2}$ marks)

....

....

....

10. Sulphur (IV) oxide reacts with oxygen in the contact process according to the following equation.

$$2SO_{2(g)} + O_{2(g)} \rightleftharpoons 2SO_{3(g)} \quad H = ^-192KJmol^{-1}.$$
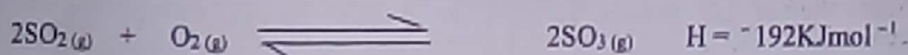
a).State the conditions that increase the yield of sulphur (VI) oxide. (01½ marks)

....

....

....

b).Write equations of reactions leading to the production of sulphuric acid from sulphur (VI) oxide. (03 marks)

....

....

c).State one use of sulphuric acid. (01 mark)

....

SECTION B

Answer any 2 questions

11. a). (i).State two properties which show that air is a mixture. (02 marks)

(ii).Name two other gases other than oxygen that are constituents of air and give their approximate percentages in air. (02 marks)

b).Describe an experiment to determine the percentage of oxygen in air. Show how the percentage can be calculated from the results. (08½ marks)

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c).(i). State observation, if burning sodium is lowered into a jar of oxygen . (01½ marks)

(ii). Write the name and formula of the product of the reaction between iron and oxygen in the above reaction. (01 mark)

12 (a). What is meant by the following terms; (02 marks)

(i). Soap.   (ii). Saponification.

(b). Outline the steps taken to prepare a dry sample of soap in the laboratory (No equations is required) (06½ marks).

(c). Briefly explain how soap can remove dirt from your shirt. (03 marks)

(d). When soap is used for washing in hard water, lathering does not occur immediately but when a detergent is used for washing in the same water, there is immediate lathering. Explain this observation. (03½ marks)

13 (a). Define the term rate of a chemical reaction. (02 marks)

(b). Explain how the following factors affect the rate of a chemical reaction

     i). Temperature (02 marks)

     ii). Concentration (02 marks)

(c). The table below shows variations in the concentration of hydrogen peroxide with time when hydrogen peroxide reacted to produce oxygen.

Concentration of H_2O_2 (Modm^{-3})	1.10	0.60	0.32	0.20	0.10
Time (Min)	0	10	20	30	40

     (i). Plot a graph of concentration of hydrogen peroxide against time. (04 marks)

     (ii). Explain briefly the shape of your graph. (02 marks)

d). Determine from the graph the rate of reaction at

     i). 15 minutes (01½ marks)

     ii). 05 minutes (01½ marks)

14 (a). What is meant by the term enthalpy of neutralization? (02 marks)

(b). Describe an experiment that can be carried out to determine the enthalpy of neutralization of hydrochloric acid by sodium hydroxide (show the working). (06 marks)

(c). When 50cm^3 of 1M H_2SO_4 acid was added to 50cm^3 of 2M NaOH, the temperature of the resultant solution rose by 24.6°C to 38.2°C.

i). Write an ionic equation for the reaction that took place. (01½ mark)

ii). Calculate the enthalpy of neutralization of NaOH. (04½ marks)

     (S.H.C of solution = 4.2Jg^{-1}k^{-1}, density of solution =1gkm^3)

(d) Explain why plastic wares are used in neutralization experiments instead of glass wares. (01mark)

END