



MOI HIGH SCHOOL
KABARAK



Kenya Certificate of Secondary Education

233/ 2

CHEMISTRY - (Theory)
T2 -2024 – Time 2 hours

Paper 2

**POST MOCK,
2024**

Name Adm Number.....

Candidate's Signature Date

INSTRUCTIONS TO CANDIDATES

- Write your name and index number in the spaces provided
- Sign and write the date of examination in the spaces provided
- Answer ALL questions in the spaces provided
- Mathematical table and electronic calculators may be used.
- ALL working MUST be shown clearly where necessary
- Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing*

FOR EXAMINER'S USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORES
1 – 7	80	



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T4CHEM2024

TURN OVER

1. In an experiment of diluting concentrated sulphuric (vi) acid, 2 cm³ of acid were carefully poured into a plastic cup containing exactly 40cm³ of distilled water with a room temperature of 20⁰c. the mixture was stirred with a thermometer; the highest temperature noted was 35⁰c. (density of acid = 1.84g/cm³ while that of solution is assumed to be 1g/cm³. The acid is 98% pure, S.H.C. =4.2J/g/k
H = I S = 32 O = 16)

a). i). Determine the number of moles of the acid that dissolved (2 marks)

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ii). Determine the enthalpy change for the reaction. (2marks)

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iii). Determine the enthalpy change when one more of the acid is dissolved in water. (2 marks)

.....

b). use the information below to answer the questions that follow;

<u>Equation</u>	<u>Enthalpy of formation</u>
$C_{(s)} + O_{2(g)} \rightarrow CO_{2(g)}$	$DH_1 = -394KJmol^{-1}$
$C_{(s)} + O_{2(g)} \rightarrow CO_{(g)}$	$DH_2 = -170KJmol^{-1}$

a) Define the term enthalpy of formation of a compound (1mark)

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b) Calculate the molar enthalpy of combustion :DH₃ of carbon (ii) oxide (3marks)

.....

2. Name the following compounds

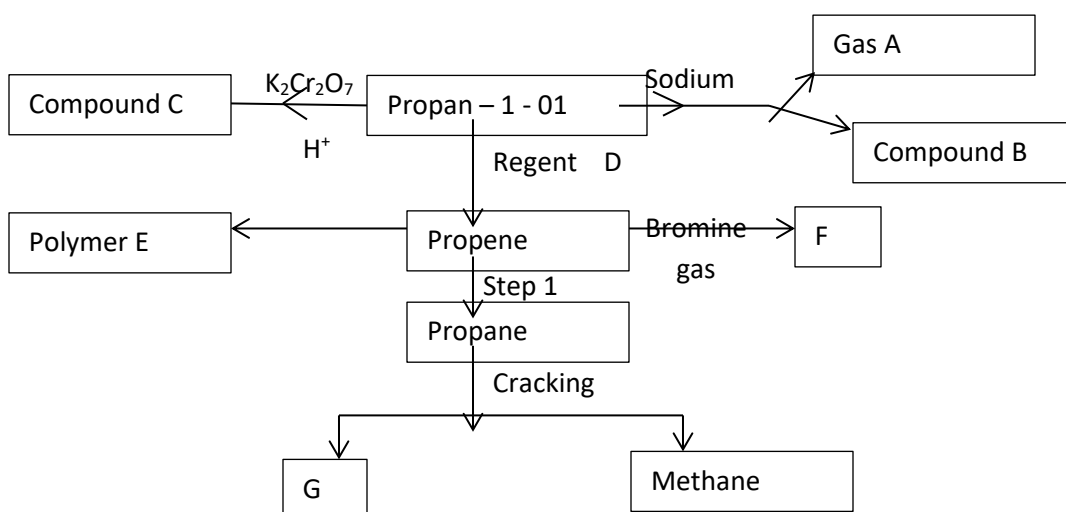
(3 marks)

a) i). $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$

.....
ii). $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOH}$

.....
iii). $\text{CH}_3\text{CH}_2\text{CH}_2\text{COOCH}_2\text{CH}_3$
.....

b). Study the scheme below and answer the questions that follow



i. Identify product

A. (1 mark)

F. (1 mark)

ii. Name the compound C

(1 mark)

.....
iii. State the conditions for step 1

(1 mark)

.....
iv. Name the process leading to formation of compound C

(1 mark)

.....
v. Write an equation for the reaction leading to the formation of methane.

(1 mark)

vi. Identify reagent D. (1 mark)

vii. Draw the structure of F. (1 mark)

3. The grid below is a section of the periodic table (letters used are not actual symbol) use it to answer questions that follow.

G		A					
			T			J	
S	F		R	Q		B	E
D	L					C	

i.

Select the most electro-negative element. (1 mark)

ii. The boiling point of the oxide of Q is much higher than that of the oxide of T. Explain the difference (2 marks)

iii. Identify with a reason the chemical family to which F and L belong. (2 marks)

iv. Use dot (.) and cross (x) diagram to show bonding in the compound formed when F reacts with B. (1 mark)

v. State and explain the nature of chloride of R when it is dissolved in water to form an aqueous solution. (2 marks)

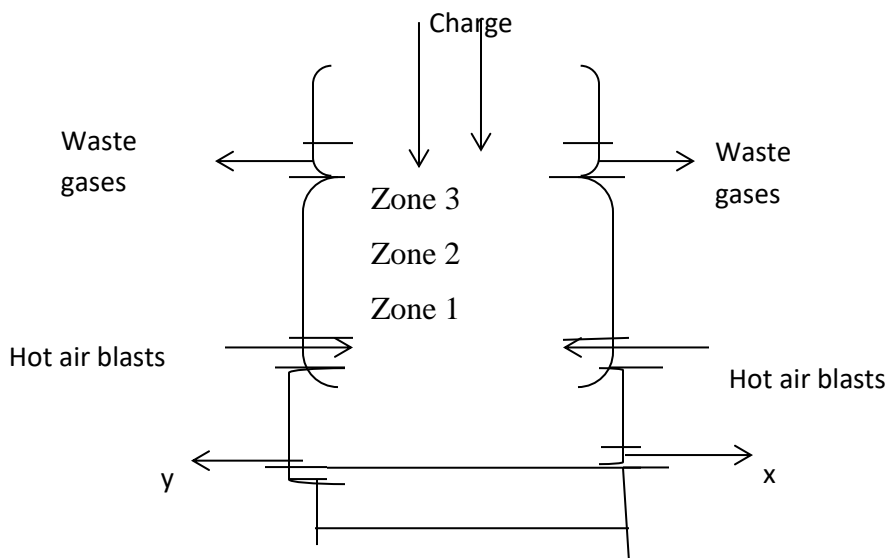
vi. Compare the atomic radius of elements D and L. (2 marks)

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vii. The elements S and D belong to group I, which element is more reactive, explain. (2 marks)

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4. The diagram below shows a blast furnace in the extraction of iron from haematite.



i. Name two other ores that can be used to extract iron. (2marks)

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ii. Name the components of the charge (raw materials). (1 marks)

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iii. Identify two components of the waste gases. (1 marks)

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iv. Give the identity of X and Y. (2 marks)

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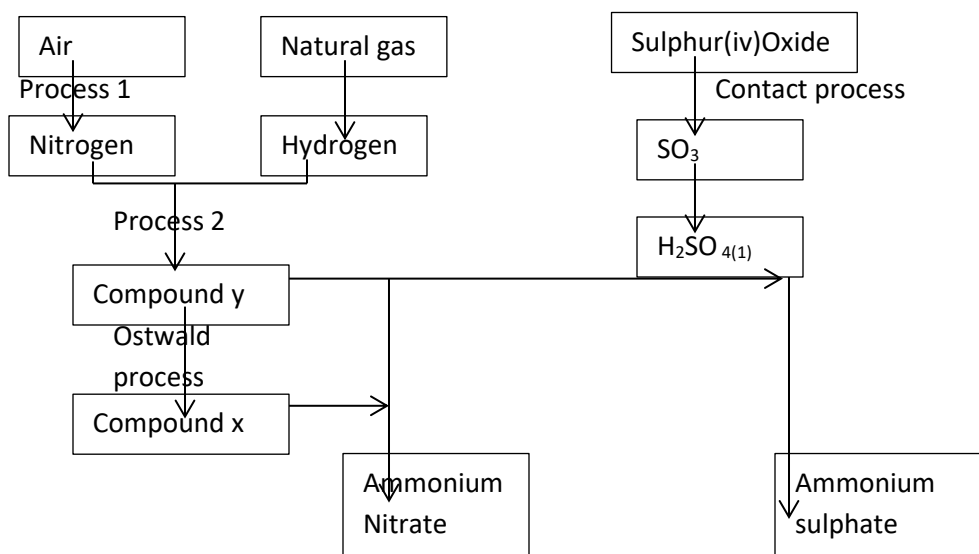
v. Identify two reducing agents in the blast furnace. (1 marks)

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.....

vi. Write the chemical equation for the reduction of haematite to iron metal using the main reducing agent. (1 mark)

vii. Which zone is the hottest? Explain. (1 marks)

5. The flow chart below represents some industrial processes leading to the formation of two nitrogenous fertilizers.



a) Name the catalyst used in i. a). Process 2 (2 marks)

ii. b). Ostwald's process

b) Name each of compounds X and Y (1 mark)

X.

Y.

c) Other than the catalyst named in (b) above, state two optimum conditions for process labeled 2. (1 mark)

.....

d) Briefly describe process 1 that leads to production of nitrogen from air. (3 marks)

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e) Other than ammonium nitrate being used as a fertilizer name one other use (1 marks)

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f) Ammonium nitrate and ammonium sulphate are used as fertilizers, one would you recommend to a farmer and why? show your working (N=14,O=16,S=32,H=1) (3Marks)

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g) Write an equation for the formation of Sulphur(iv) oxide in contact process. (1mark)

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h) Sulphur (iv) oxide is an acid anhydride of sulphuric vi acid, but in contact process Sulphur (iv) oxide is first dissolved in sulphuric (vi) acid. Explain why this is so. (2marks)

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6. a) The table below gives standard electrode potentials for the metals represented by the letters R, S, T and U. study and answer the questions that follow.

METALS	Standard Electrode Potential (Volts)
R	- 0.34
S	- 0.85
T	+ 0.34
U	- 0.76

i. Identify the metal which is the strongest reducing agent (1 mark)

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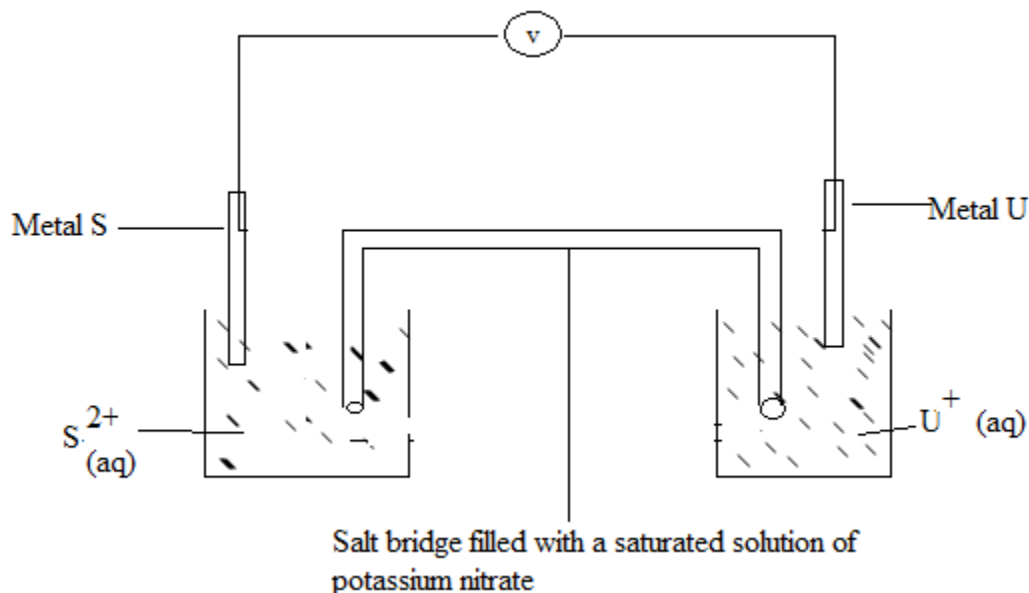
- ii. Which metal can be displaced from a solution of its salts by all the other metals in the table?
Give a reason (2 marks)

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b. Metal S and U were connected to form a cell as shown in the diagram below.



- i. Write the equation for the cell above (1 mark)
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-
- ii. Calculate the e.m.f, for the cell above (1 mark)
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- iii. On the diagram, indicate with an arrow the direction in which electrons would flow on the diagram above (1 mark)
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- iv. State one function of the salt bridge. (1 mark)
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c. In an experiment to electroplate a copper spoon with silver, a current of 0.5 A was passed for 18 minutes.

i. Draw a well labeled diagram showing how the copper spoon was electroplated. (2 marks)

ii. Other than electroplating state one use of electrolysis (1 mark)

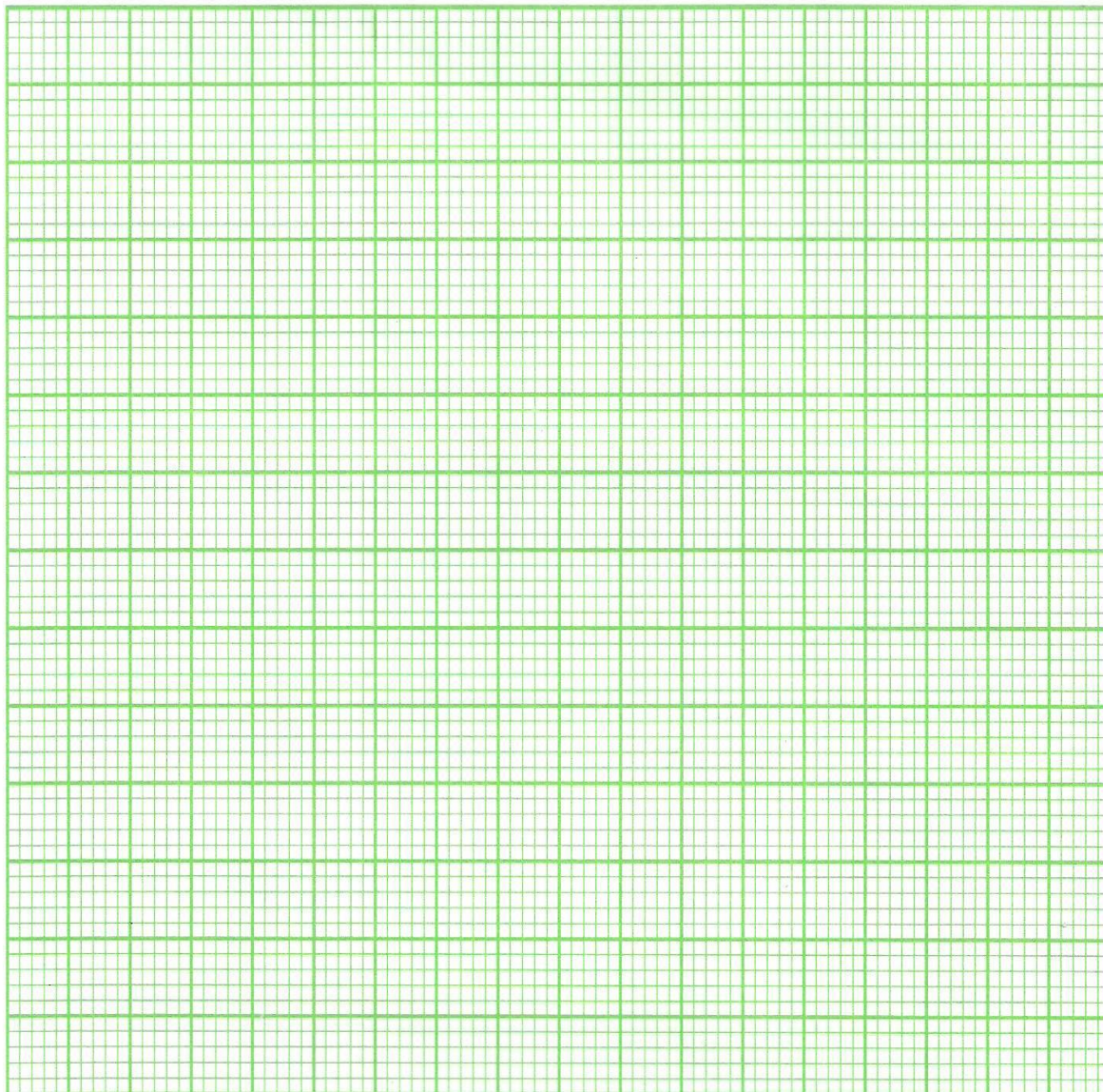
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7. A group of form four students of Cockerbet Secondary School carried out an experiment to determine the solubility of potassium chlorate. The table below shows the results obtained.

Total volume of water added(cm ³)	10.0	20.0	30.0	40.0	50.0
Mass of KClO ₃ (g)	5.0	5.0	5.0	5.0	5.0
Temperature at which crystals appear(0C)	80.0	65.0	55.0	45.0	30.0
Solubility of KClO ₃ (g/100gH ₂ O)					

(a) Complete the table to show the solubility of KClO₃ at different temperatures. (3marks)

(b) Plot a graph of mass of KClO_3 per 100g water against temperature at which crystals form. (3marks)



(c) From the graph, determine ;

(i) The solubility of KClO_3 at 40°C . (1mark)

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.....

(ii) The temperature at which the solubility of KClO_3 is 35g/100g water. (1mark)

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(d) Explain the shape of the graph. (1mark)

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(e) State one application of solubility and solubility curves. (1mark)

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f) In an experiment soap solution was added to three separate samples of water. The table below shows the volumes of soap solution required to form lather with 100cm³ of each sample of water before and after heating/boiling

SAMPLE	A	B	C
Volume of soap before water is boiled in (cm ³)	30	4	12
Volume of soap after water is boiled in (cm ³)	30	4	4

I) Which water sample is likely to be soft. Explain (2Marks)

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II) Explain the change in the volume of soap solution used in sample C (1Mark)

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