kenyaeducators@gmail.com

KCSE REVEALED 2021

CHEMISTRY

PAPER II

This PDF consists of two sample exams that contains questions that are expected in the national exams 2021

For marking schemes call Mr Machuki 0795491185.

kenyaeducators@gmail.com

SAMPLE I

NAME: _____ ADM NO:_____

CLASS: _____DATE:_____

SIGN:_____

233/1

CHEMISTRY THEORY

FORM FOUR PAPER 2

TIME: 2HOURS

CHEMISTRY THEORY

TIME: 2HRS

INSTRUCTIONS TO CANDIDATES

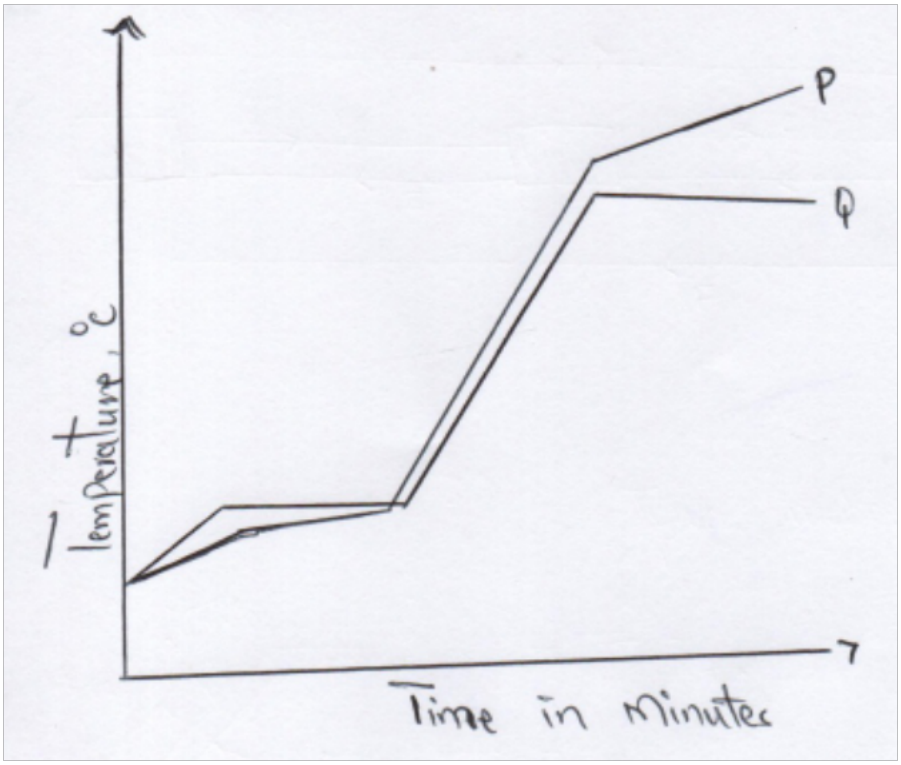
1. Write your name and admission number in the spaces provided above
2. Sign and write the date of examination in the spaces provided
3. Electronic calculators may be used.
4. All working must be clearly shown where necessary

FOR EXAMINERS USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1	8	
2	10	
3	10	
4	12	
5	10	
6	10	

7 8	09 11	
	80MARKS	

1. (a) The curves below represent the variation of temperature with time when pure and impure samples of a solid were heated separately.



(i) (a)Which curve shows the variation in temperature for the pure solid? Explain. (2mks)

……
……
……

(ii) State the effect of impurities on the melting and boiling points of a pure substance.

I. Melting points ($^1/_2$ mk)

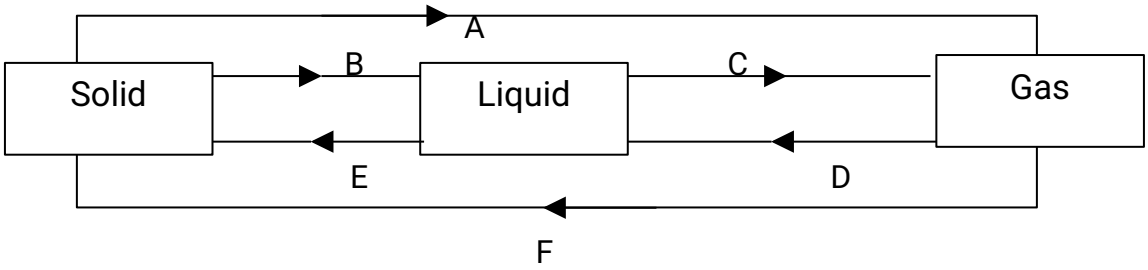
……
……

II. Boilling points ($^1/_2$ mk)

……

……..

(b)The diagram below shows the relationship between the physical states of matter.



i) Identify the processes B and D.
(2mks)

B……

D……..

ii) Name process A (1mk)

……

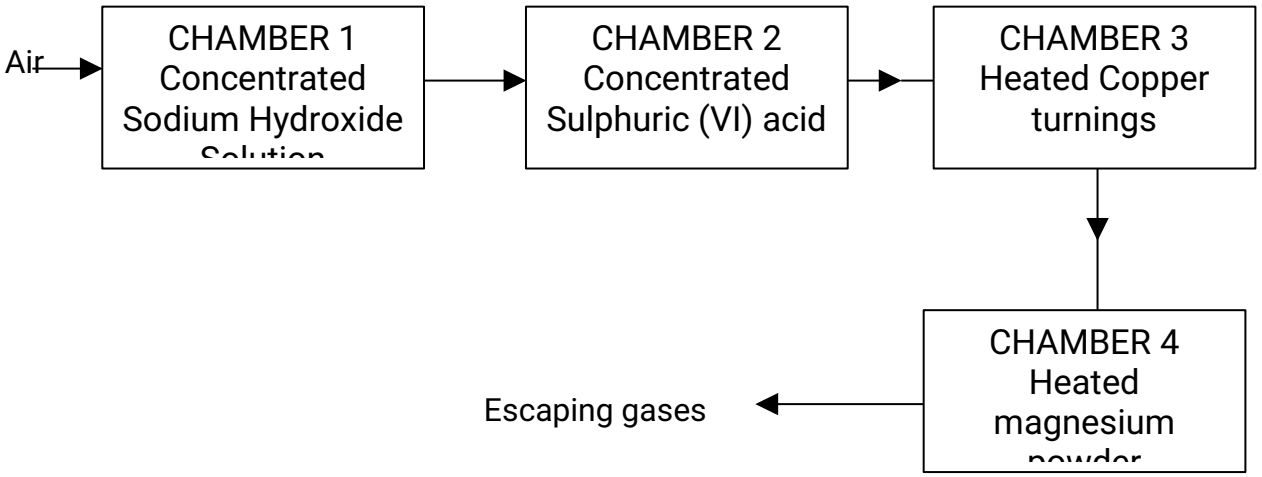
iii) State two substances in chemistry that undergo the process A (1mk)

……
……..

iv) Is the process E exothermic or endothermic? Explain (1mk)

……
……..

2.Air was passed through several reagents as shown below



(a) Name the main inactive component of air
(1mk)

……

(b) Name the components of air that are removed in the following chambers (3mks)

I. Chamber 1

……..

II. Chamber 3

……

III. Chamber 4

……..

C) What is the purpose of passing air through concentrated sulphuric (1v) acid. (1mk)

……
……

d) Write a chemical equation for thereaction which takes place in :-

I. chamber 1 (1mk)

……

II. Chamber4 (1mk)

……

e) State and explain the observation made in chamber 3 during reaction (2mks)

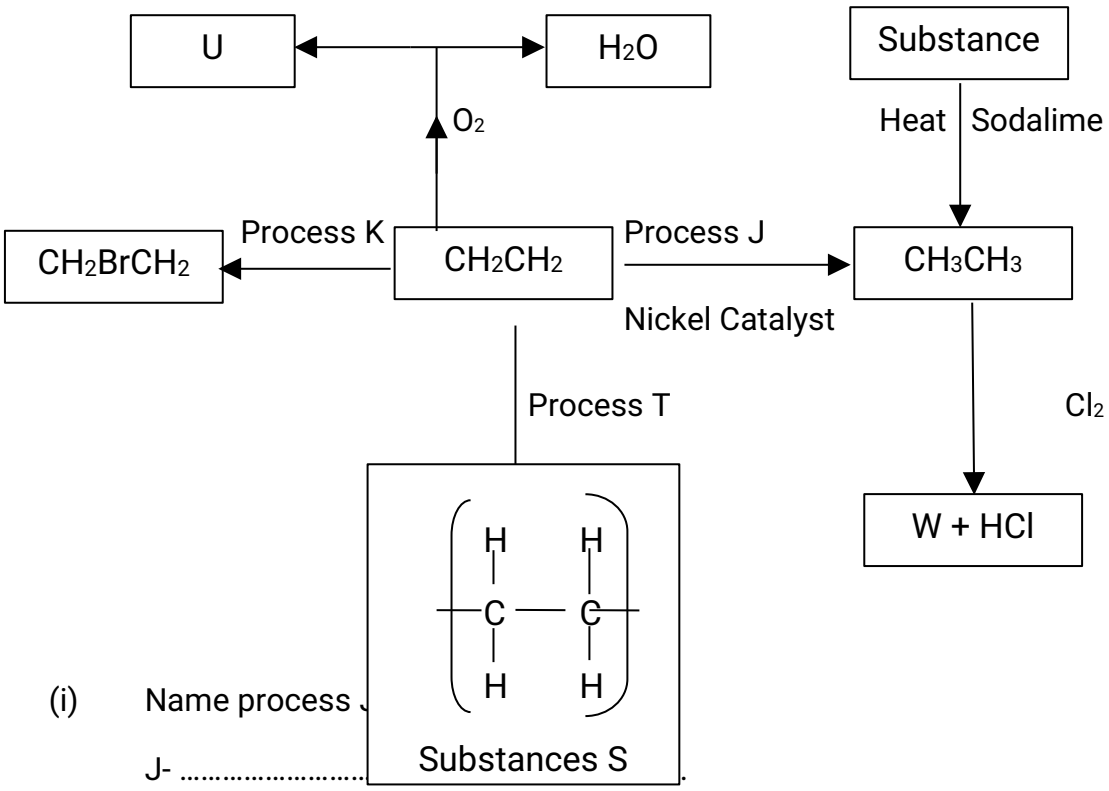
……
……

f) Name one gas which escapes from the scheme above
(1mk)

……

3. (a) Draw and name two isomers of Pentane (2mks)

(B) Study the flow diagram below and then answer the questions that follow.



(i) Name process J (3mks)

J- ……

K- ……

T- ……

(ii) State the reagents necessary for processed J and K (1mk)

……

(iii) Name substances U, W, S and Y (2mks)

U ……

W ……

S ……

Y ……

C) Describe how burning can distinguish CH_2CH_2 from CH_3CH_3 (2mks)

……
……
……

4. The grid below shows a part of the periodic table. The letters do not represent the actual symbols. Study it and answer the questions that follow.

C								T
						U		
X	K		M			Q	W	
	Y					P		Z
J								

a) Identify the elements in period 1 (1mk)

……

b) With a reason, identify the element with the largest atomic radius (2mks)

……
……

c) Draw the atomic structure of element Q (1mks)

d) Write down the electronic configurations of elements Y and W

Y- ……

W- ……

e) Element G forms an ion G^{3-} and its ionic configuration 2.8.8. indicate its position on the grid above (1mk)

f) Identify an element whose oxide reacts with both acids and alkalis (1mk)

……

g) i. Write down the chemical formular of the compound formed between elements K and W (1mk)

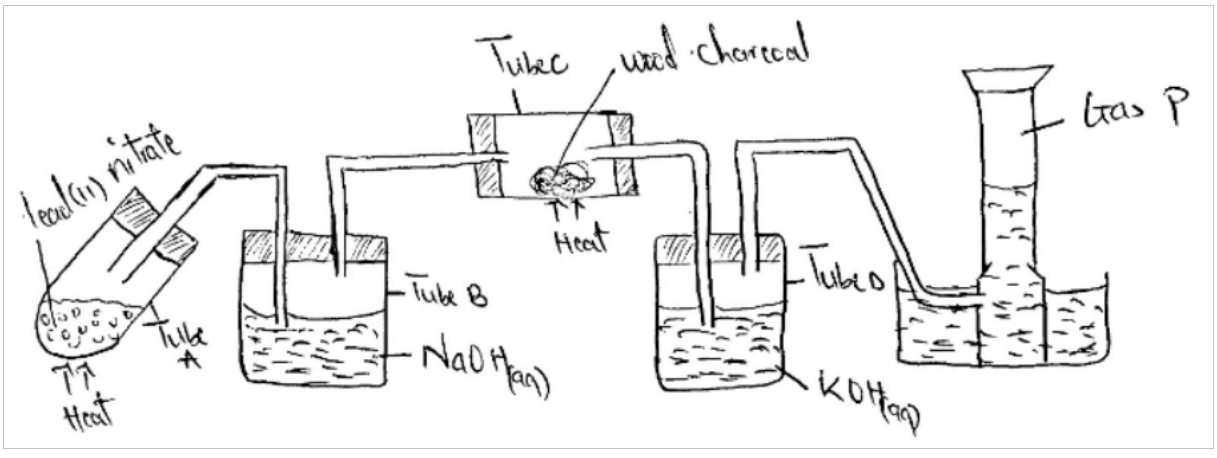
……

ii. Draw the bonding in the compound formed in (g) (i) above using dots (.) and crosses (x) to represent electrons (1mk)

h) Compare the atomic radius elements X and K. Explain (2mks)

……
……
……..

5 (a) Study the diagram below and answer the questions that follow



i) Write a chemical equation for the reaction in tube A (1mk)

……

ii) Name the two salts formed in tube B (1mk)

……

……

iii) State the observation made in tube C (1mk)

……

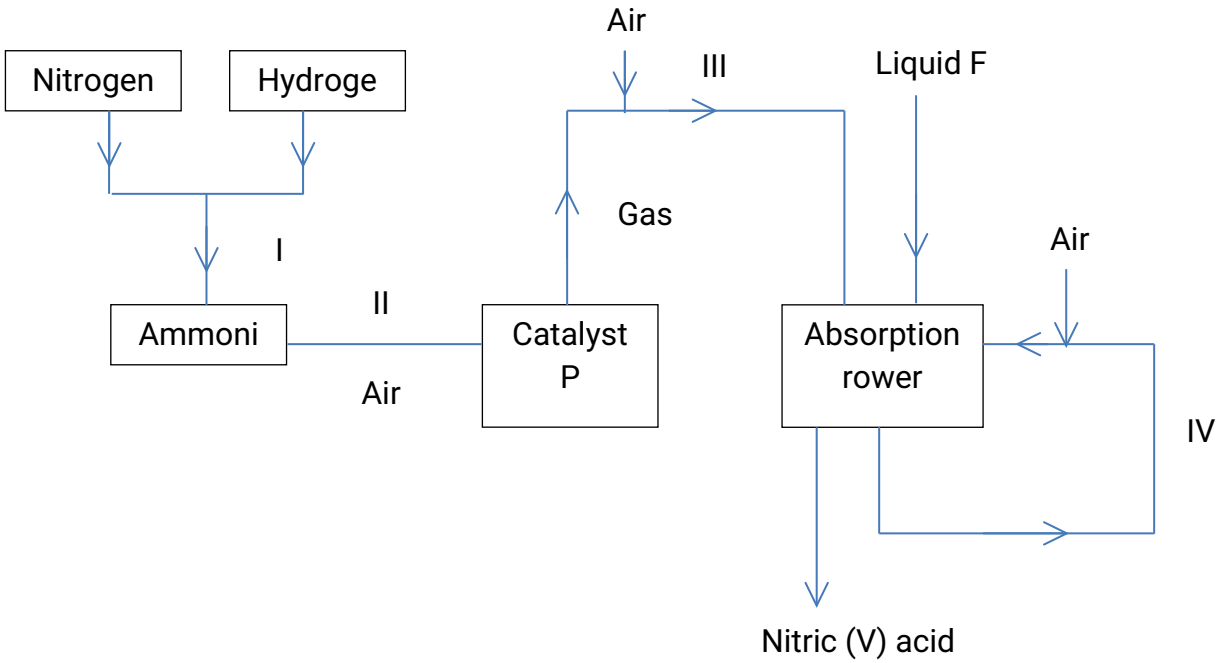
iv) What is the purpose of potassium hydroxide in tube D. (1mk)

……

v) Name gas P (1mk)

……

(b) The flow chart below shows some industrial processes. Use it to answer the questions that follow



(i) Give the source of the following raw materials

a) Nitrogen gas (½mk)

……

b) Hydrogen gas (½mk)

……

ii) Name the following substances;

a) Catalyst P (½ mk)

……

b) Gas M (½ mk)

……

c) Liquid F (½mk)

……

iii)Write the chemical equations for; formation of gas M. (1mk)

……

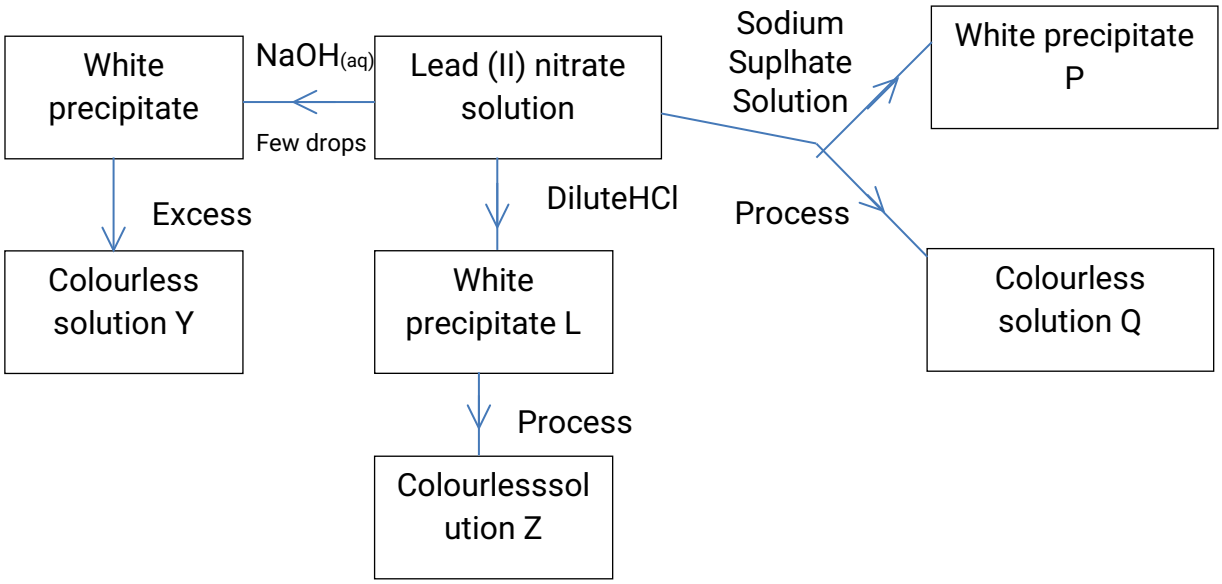
The reaction in the absorption tower (1mk)

……

iv) State one use of nitric (v) acid (½mk)

……

6. Study the reaction scheme below and answer the questions that follow



a) Write the chemical formular of compounds P and Q

i) P ……

ii) Q …… (2mks)

b) Write an ionic equation for the process that produces white precipitate P (1mk)

……

C) Name process 2 (1mk)

……

d) Name the process that separated P and Q (1mk)

P ……..

Q ……

e) Write a balanced chemical equation for the formation of white precipitate L. (1mk)

……

f) State the condition required for process 3 (1mk)

……

g) What physical process is exhibited in process 3 (1mk)

……

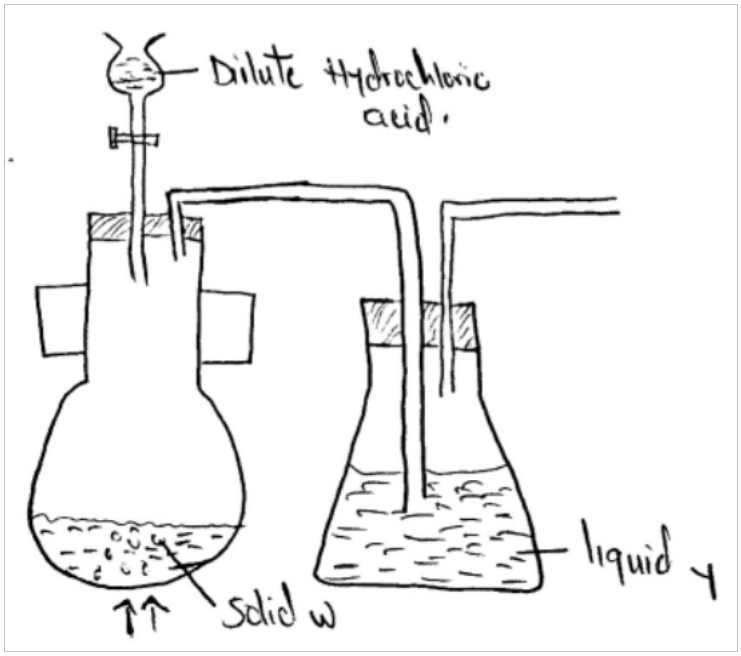
h) Name the anion present in colourless solution Z (1mk)

……

i) Write the formula of the complex ion present in colourless solution Y (1mk)

……

7. Below is a set of apparatus that was used to obtain a dry sample of sulphur(iv)oxide gas



a) Name;

i) Solid W (1mk)

……

(ii)The apparatus containing dilute hydrochloric acid (1mk)

……

b) State the role of Liquid Y (1mk)

……..

C) Complete the diagram to show how the gas could have been collected (1mk)

d) A sample of sulphur(iv)oxide gas was passed through freshly prepared iron(III)sulphate solution. State and explain the observation made (2mks)

……

……

……

e) 50cm^3 of 2M Hydrochloric acid was used during the above experiment. Determine the volume of sulphur(iv)oxide gas produced at r.t.p (molar gas volume = 24dm^3)

……

……

……

8. In an experiment, 40cm^3 of 0.1 M sodium hydroxide solution was placed in a suitable apparatus and 5.0cm^3 portions of hydrochloric acid were added. The resulting mixture was stirred with a thermometer and the temperature taken after each addition. Both solutions were initially at 20^{0}c

Volume of HCL (cm^3)	5	10	15	20	25	30	35	40	45
Temperature (^{o}c)	21.5	22.5	24.0	25.0	26.0	27.0	27.5	27.5	27.0

a) i. Plot a graph of temperature against volume of the acid added (4mks)

ii) Use the graph to determine the concentration in moles per litre of the

hydrochloric acid (2mks)

b) i) Calculate the heat change for the reaction (1½mk)

ii) Molar enthalpy of neutralization of hydrochloric acid by sodium hyndroxide solution (density of solution 1g/cm^3 specific heat capacity 4.2 kj/kg) (1½mks)

c) Write the thermochemical equation for the reaction (1mks)

……

……

d) Draw an energy level diagram for the reaction (1mk)

SAMPLE II

NAME……CLASS_____ADM NO_____

SIGNATURE_____DATE_____

233/2 :CHEMISTRY

PAPER 2

TIME: 2HRS

INSTRUCTIONS TO CANDIDATE

Write your name and admission number in the spaces provided.

Sign and write the date of examination in the spaces provided

Answer all the questions in the spaces provided

All working must be shown where necessary

Electronic calculators and mathematical tables may be use.

FOR EXAMINERS USE ONLY

Questions	1	2	3	4	5	6	7	Total score
Max score	12	11	11	14	12	11	10	80
Candidates score								

This paper consists of 12 Printed pages.

1. Study the information given below and answer the questions that follow.

Element	Atomic radius(nm)	Ionic radius nm	Formula of oxide	Melting point(^{0}c)
A	0.364	0.421	A_2 O	-119
D	0.830	0.711	D O_2	837
E	0.592	0.485	E_2 O_3	1466
G	0.381	0.446	G $_2O_3$	242
J	0.762	0.676	J O	1054

   a. Which elements are non-metals .Give a reason?(2mks)

   b. I)Write a formula of a compound formed when J combines with A(1mk)

      ii)What type of bond exist between J and D.(1mk)

   c. Explain why the melting point of the oxide of E is higher than that of the oxide of G.(2mks)

   d. i)Which two elements would react with each other most vigorously.Give a reason.(2mks)

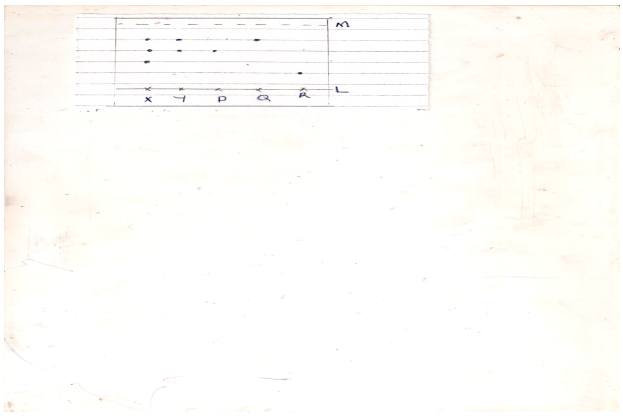
      ii)Which element would be suitable for making utensils for boiling water.State two properties that make the elements suitable for the use.(2mks)

e. Elements Qand R haveelectronic configuration 2.8.2 and 2.8.6. respectfully.

i)Explain why the ionic radius of R is expected to be greater than its atomic radius.(1mk)

ii)Write the equation for the reaction between Q and R.(1mk)

2. The chromatogram below is of and acid enzyme x and y and three simple sugar P,Q and R.



a. I)Name two simples sugars present in both x and y.(2mks)

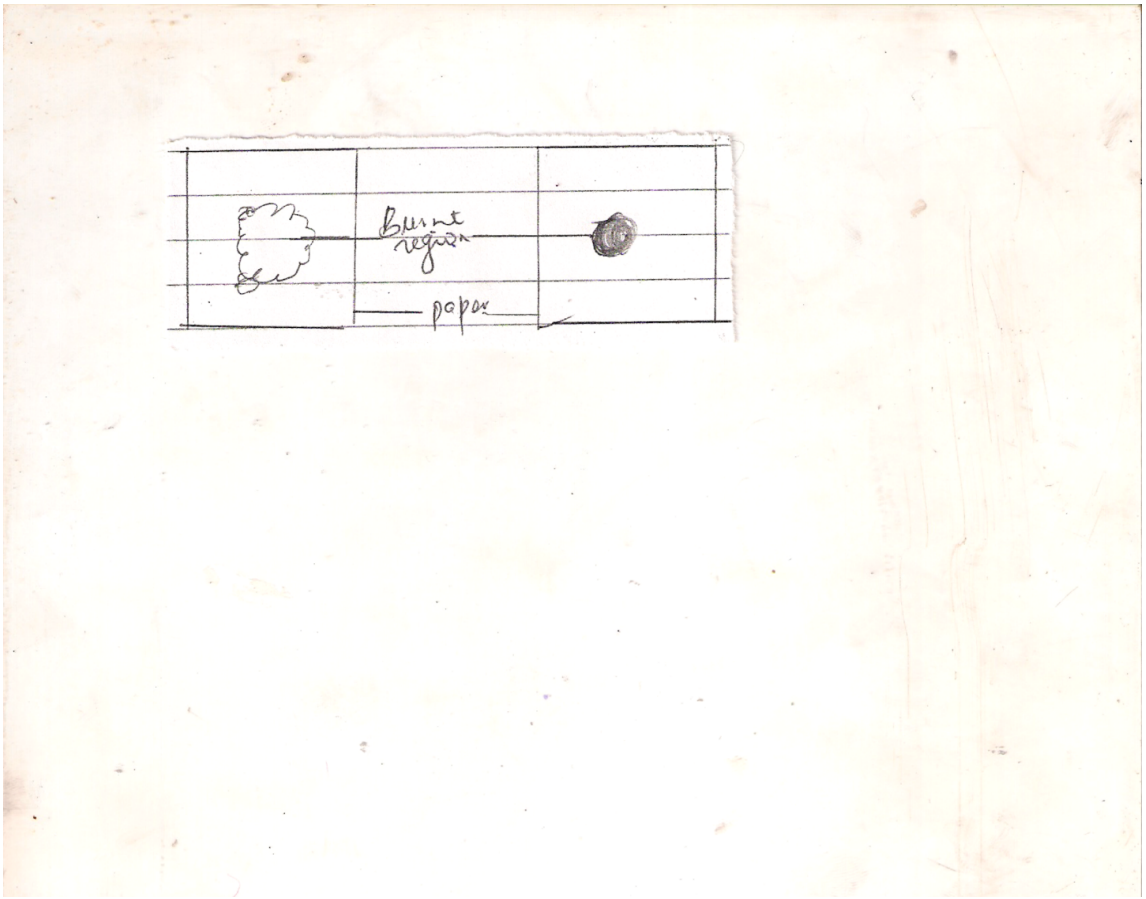
ii)Name lines L and M. (2mks)

L-

M-

iii)What property is exhibitaed by simple sugar x.(1mk)

b.Two pieces of paper were lowered into different Bunsen burner flames and removed quickly.The results were as shown below.



c.Oxygen can be obtained industrially by fractorise distribution of liquid air

i. Why is the gas mixture passed through sodium hydroxide solution.(1mk)

ii) In the final stage,which gas is distil out fuse.explain.(1mk)

iii)Name two commercial uses of oxygen gas.(1mk)

3. Study the flow diagram and answer the questions below.

Few drops ofNaoH

Filter and heat

Dilute hydrochloric acid

$Pb(NO_3)$

Excess

NaoH

a. Identify

i. White ppt I (1mk)

ii. Solution II (1mk)

iii. Residue II (1mk)

b. Write ionic equation for the reactions colourless solution (II) with $Pb(NO_3)$ 1mk

c. Write observations that would be made when ammonia solution is added drop wise till in excess to the colourless solution(II) 2mks

d. Below are P^H values of some solutions

Solution	Z	Y	X	W
P^H	6.5	3.5	2.2	7.2

i. Which solution is likely to be

a. Acidic rain (1mk)

b. Potassium hydroxide (1mk)

ii. A basic substance V reacted with both solutions Y and X.What is the nature of V.(2mks)

iii. Name two substances that shows this characteristics in question (ii) above.(2mks)

4. A sample of crude oil was heated and its vapour passed over red-hot pumicestore. A mixture of gases was evolved which decolourised bromine in tetra chloromethane and burnt in air with a yellow flame.

   a. What process id taking place when the vapour from the crude oil passes over heated pumice.(1mk)

   b. Name the most likely type of compound causing decolourisation of the bromine solution.(1mk)

   c. Name two compounds formed when the gas mixture above burns in air.(1mk)

   ii.Study the flow chart below and answer the questions that follow.

Conc $H_2 SO_4$

high

pressure

H_2

O_2(Excess)

Line water

Na

a. Identify substances (4mks)

   A-

   B-

   F-

   G-

b. Write down the equation for the formation of

   i. Substance C

   ii. E and F

   iii. Gas G

c. Substance D was formed to have molecular mass of 42,000 .Determine the number of molecules present in the substances(H+1 ,C=12) 2mks

d. State

   i. The condition necessary for the conversion of ethanol to substance A.(1mk)

   ii. The catalyst required in the conversion of A and B.(1mk)

5. The table below gives the solubility of hydrated copper(ii) sulphate in mol dm^{-3} at different temperatures.

Temperature(^{0})	Solubility mol dm^{-3}
20	8×10^{-2}
40	12×10^{-2}
60	16×10^{-2}
80	22×10^{-2}
100	30×10^{-2}

i. On the drid provided plot a graph of solubility of copper(II) sulphate (vertical axis) against temperature.(3mks

ii. From the graph ,determinee the mass of copper(II) sulphate deposited when the solution is cooled from 70^0c to 40^0.(Molar mass of hydrated copper(ii) sulphate = 250g)

b.In an experiment to determine the solubility of sodium chloride ,5.0 cm^3 of a saturated solution of sodium chloride weighing 5.35g were placed in a volumetric flask and diluted to a total volume of 250cm^3.

25.0 cm^3 of the dilute solution of sodium chloride completely reacted with 24.1 cm^3 of 0.1 M silver nitrate solution.

$Ag\ No_{3(aq)} + NaCl_{(aq)} \quad Ag\ Cl_{(s)} + NaNO_3(aq)$

Calculate;

i. Moles of silver nitrate in 24.1cm^3 of solution.(1mk)

ii. Moles of sodium chloride in 25.0cm^3 of solution.(1mk)

iii. Moles of sodium chloride in 250cm^3 of solution(1mk)

iv. Mass of sodium chloride in 5.0cm^3 of saturated chloride solution (Na=23.0 Cu=35.5) (1mk)

v. Mass of water in 5.o cm^3 of saturated solution of sodium chloride(1mk)

vi. The solubility of sodium chloride in g/100 g of water.(2mks)

6. The flow chart below shows some of the processes involved in large scale production of sulphur((vi) acid .

   Use it to answer the questions that follow.

Sulphur(iV)oxide

oxygen sulphur (vi) oxide Oleum

Water

a. Name the process

b. I)Name substance A.(1mk)

ii)Write an equation for the process that takes place in the absorption tower.(1mk)

c. Vanadium (v) oxide is commonly used catalyst in the process.

i. Name another catalyst which can be used for this process.(1mk)

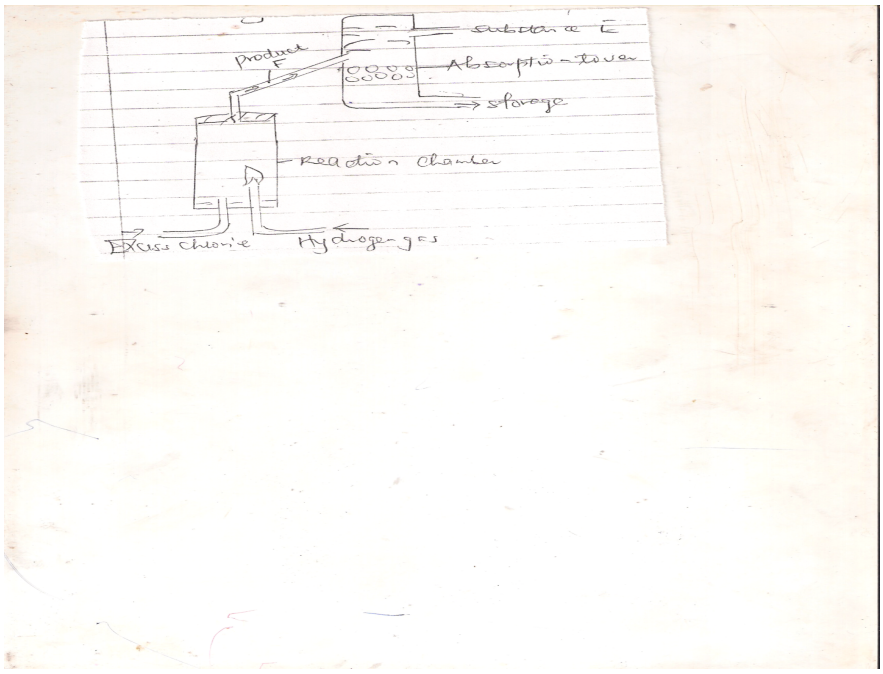
ii. Give two why reasons vanadium (v) oxide is commonly used catalyst.(2mks)

d. Sate and explain the observations made when concentrated sulphuric (vi) acid is added to crystals copper(ii) sulphate in a beaker(2mks)

e. The reaction of concentrated sulphuric (vi) acid with sodium chloride produces hydrogen chloride gas.State the property of concentrated sulphuric (vi) acid illustrated in the reaction.(1mk)

f. Name two uses of sulphuric (vii) acid.2mks

7. The above diagram shows a set up that can be used for industrial manufacture of hydrochloric acid.Study it and answer the questions that follow.



a. Name

   i. Produce F

   ii. Substance E

b. Explain are application of hydrochloric acid in textile industry.(1mk)

c. Hydrochloricb acid was added to iron powder in a test tube and shaken thoroughly to mix to 1cm^3 of the resulting solution ,six drops of acqueous solution of ammonia were added .

   i. State the observation made on adding ammonia solution.(

   ii. Explain the observation sated above and white an ionic equation for the reaction.(2mks)

   iii. Concentrated hydrochloric is 35% pure with density 1.18g/cm^3.Calculate it's concentration in moles per litre..(3mks)