Name…… ……..…**Adm No**:……Index no……
School……**Candidate's Signature** ……..……

233/2
CHEMISTRY **Date:** ……
PAPER2
THEORY
FEB 2020
TIME: 2 HOURS

STARTER JOINT EXAM 2020

Kenya Certificate of Secondary Education (K.C.S.E.)
233/2
Chemistry
Paper 2
2 Hours

INSTRUCTIONS TO CANDIDATES

- Write your name and Index number in spaces provided above.
- Sign and write the date of examination in the spaces provided above
- Answer all the questions in the spaces provided above.
- KNEC Mathematical tables and silent electronic calculators may be used.
- All working must be clearly shown where necessary.
- Candidates should answer the questions in English.

For Examiners Use Only

Question	**Maximum score**	**Candidate's score**
1	12	
2	9	
3	10	
4	14	
5	11	
6	12	
7	12	
Total score	**80**	

This paper consists of 11printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.

QUESTION ONE

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

E	T				V		A	
	M		G		J		B	
W							C	

a) State and explain the difference in the melting points of **M** and **G**. **(2mks)**

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b) Name the chemical family of elements **T** and **M**. **(1mk)**

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c) Explain the difference in the nature of aqueous solution of the oxides of **M** and that of **B**. **(2mks)**

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d) Write an equation for the reaction of **W** with excess oxygen**.** **(1mk)**

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e) How does the electronegativity of **A**, **B** and **C** vary? Explain. **(2mks)**

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f) Using dots (.) and crosses(x) to represent electrons draw the structure of the compound formed between M and A **(1mk)**

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g) State the type of bond formed in (f) above. Explain. **(1mk)**

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h) Identify the best oxidizing agent from the periodic table. Explain. **(2mks)**

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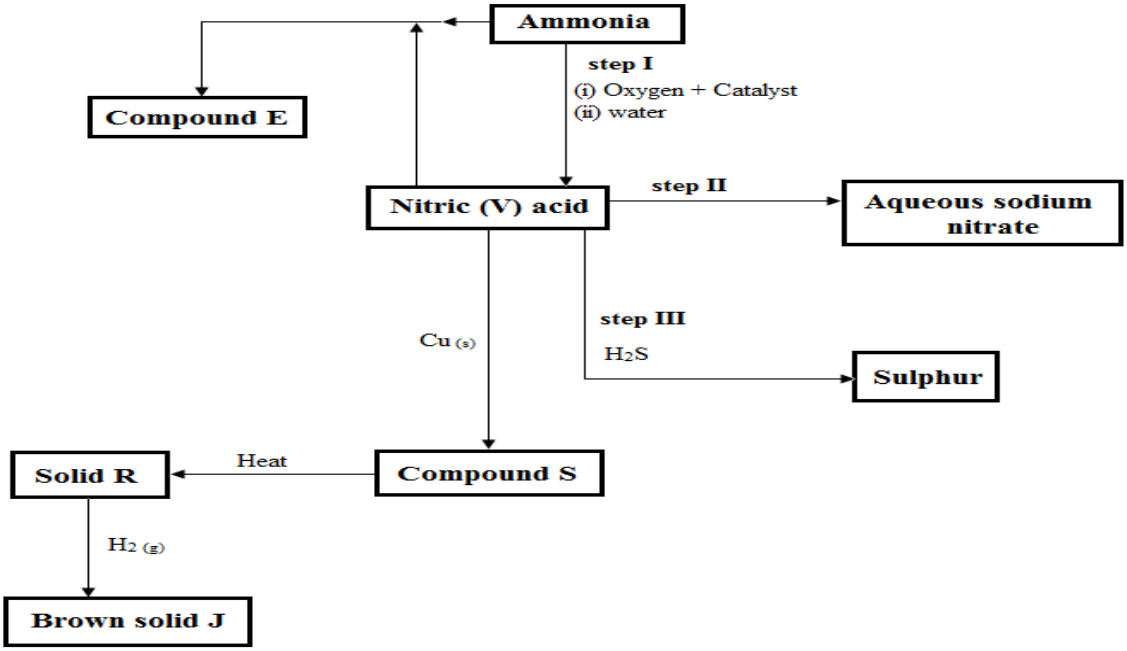
QUESTION 2

The scheme below shows various reactions starting with ammonia. Study it and answer the questions that follow.



a) Name the catalyst used in **step I** (1 Mark)

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b) Write any **two** equations for the reactions that take place in **step I** (2 Marks)

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c) Name the process taking place in **step II** (1 Mark)

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d.) Explain what happens in **step III** (2 Marks)

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d) Identify **solid R** (1 Mark)

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e) Give **one advantage** that ammonium phosphate has over ammonium sulphate as a fertilizer (N = 14, P = 31, H = 1, O = 16, S = 32) (1 Mark)

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f) Give **one disadvantage** of using artificial fertilizer (1 Mark)

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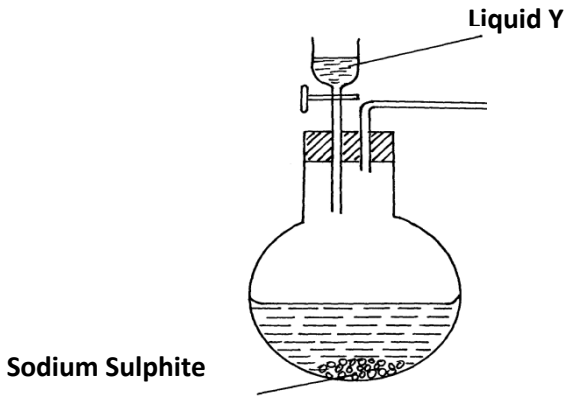
Question 3

.The following diagram represents an incomplete setup of apparatus that can be used to prepare and collect dry sulphur (IV) oxide gas.



i) Complete the diagram to show how dry sulphur (IV) oxide gas may be collected (3mks)

ii) Identify Liquid Y (1mk)

iii) Write an equation for the reaction which takes place in the round-bottomed flask (2mk)

iv) State the precaution that should be taken during this experiment (1mk)

b) i) State and explain the observations made when a piece of burning magnesium is lowered into a gas jar full of sulphur (IV) oxide gas (2mks)

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ii) The sulphur (VI) oxide is normally absorbed in concentrated sulphuric (VI) acid and not in water. Explain (1mk)

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Question 4

. a) A hydrocarbon has the general formula CnH_{2n-2}. Name the homologous series to which it belongs.

(1 mk)

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b) Describe a chemical test that can be used to differentiate C_2H_4 and C_2H_6 (3 MKS)

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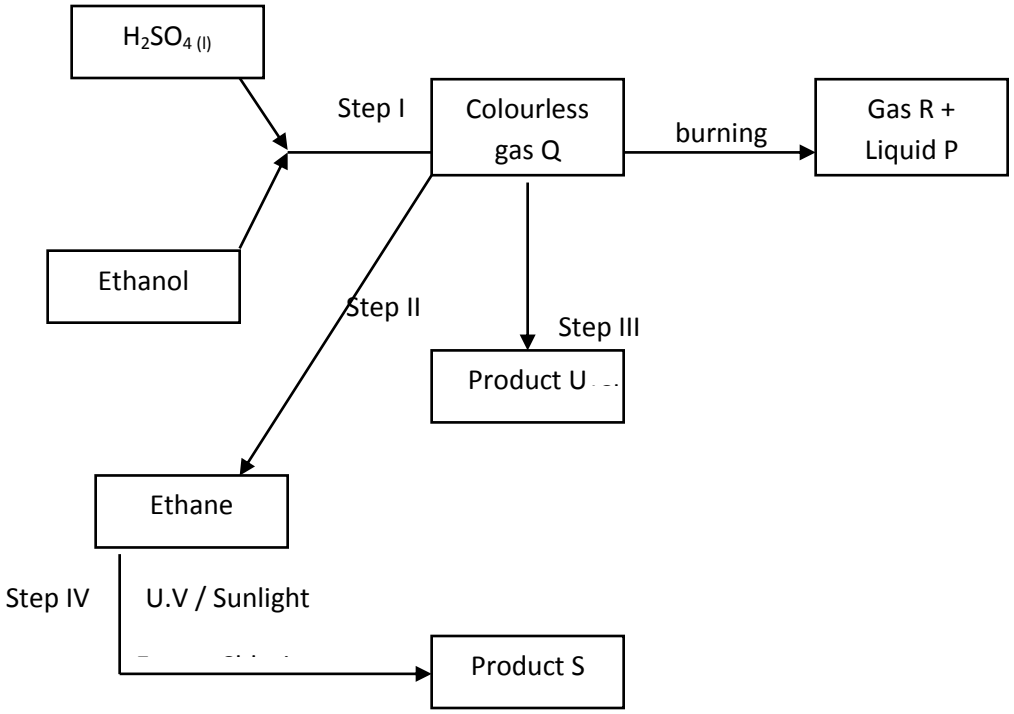
b) Study the reaction scheme below and answer the questions that follow.



(i) Draw the structural formula of gas Q. (1 mk)

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(ii) Name the types of reaction in steps; (3 mks)

I……

II……

IV……

(iii) Write a chemical equation for the reaction in step III (1 mk)

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(iv) Give the IUPAC name of compound S. (1 mk)

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(v) The empirical formula of a hydrocarbon as C_2H_3. The hydrocarbon has a relative atomic mass of 54. Determine its molecular formula.(C = 12, H = 1.0) (2 mks)

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(vi) Draw two different structural formula of the hydrocarbon in (v) above. (2 mks)

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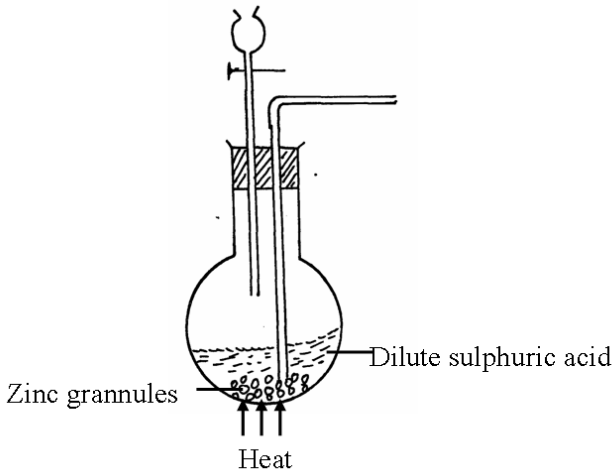
Question 5

.A student set-up the arrangement below to prepare and collect dry hydrogen gas



(a) Identify two errors from the section of the arrangement shown above (2mks)

I……

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II:……

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(b) Complete the diagram to show how dry hydrogen gas can be collected. (2mks)

(c) (i) Explain the effect of hydrogen gas on a wet red litmus paper (1mk)

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(ii) Write a balanced chemical equation for the reaction that takes place when hydrogen gas is burnt in air. (1mk)

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(b) Determine the relative atomic mass of zinc, given that when 6.54g of zinc was used, 2.4litres of hydrogen gas was produced. (molar gas volume = 24 litres) (3mks)

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(c) State any **two non**-industrial uses of hydrogen gas (2mks)

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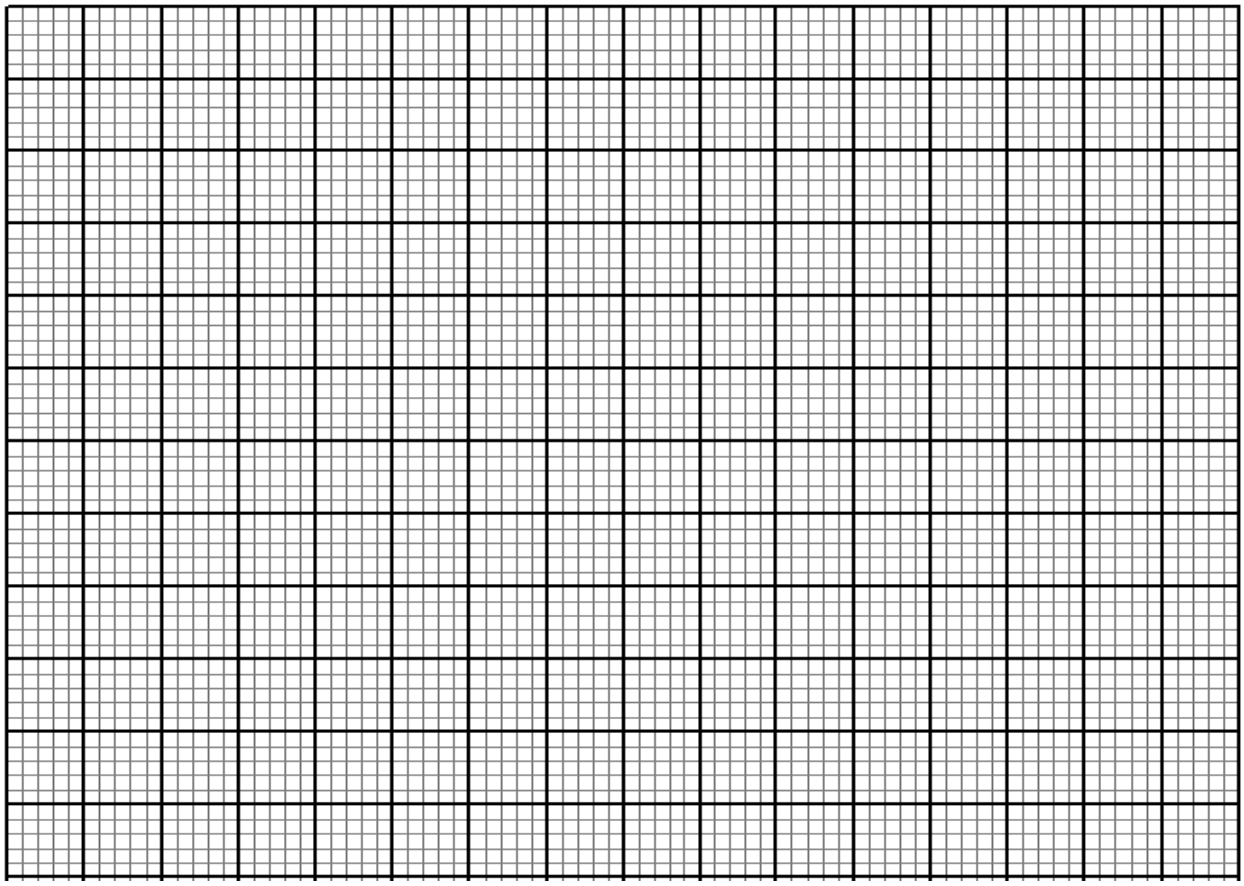
Question 6

The table below gives formulae and volumes occupied by 1 g of some gases at s.t.p. Study it carefully to answer the questions that follow.

Formula of gas	Ne	C_2H_2	O_2	Ar	NO_2	SO_2	SO_3
Relative Molecular Mass	20	26	32	40	46	64	80
Volume (cm^3)	1120	862	700	560	487	350	280

(a) Plot a graph of volume of gas (y-axis) against the relative molecular mass. (3 marks)



(b) Use the graph to predict the volume occupied at s.t.p by

(i) 1g of hydrogen chloride gas (Cl=35.5, H=1) (1 mark)

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(ii) 1g of carbon (II) oxide. (C=12, O=16) (1 mark)

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(iii) Relative molecular mass of a gas which occupies 508 cm^3 per gram at s.t.p. (1 mark)

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(c) (i) State the Graham's law of diffusion. (1 mark)

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(ii) A gas X diffuses through a porous plug in 60 seconds. Gas Y which is a quarter the volume of gas X diffuses through the same plug in 22.5 seconds. Calculate the relative molecular mass of gas Y. (Relative Molecular Mass of X = 34) (3 marks)

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(d) A gas occupies 100 cm^3 at 0 ^0C and 1 atmosphere pressure. Calculate the temperature at which the volume is double and the pressure is halved. (2 marks)

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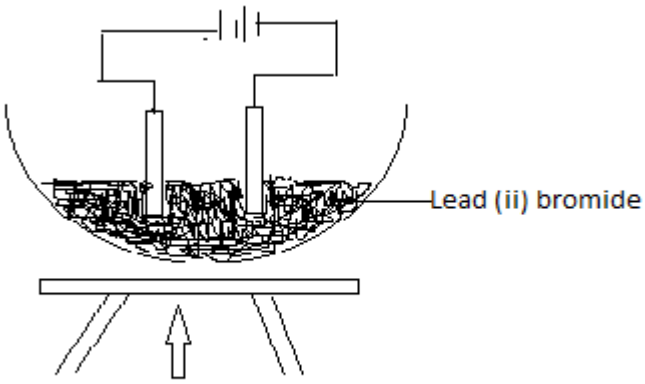
7. Study the diagram below and use it to answer the questions that follow



a.)Identify electrodes A and B (2mk)

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b)Name the product formed at the anode (1mk)

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c)Write the electrode half equation for the reaction at electrode A (1mk)

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d)State and explain the observations made at electrode A and B (2mks)

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(II)State the particles responsible for electrical conductity in ; (3mks)

a) Molten lead (ii)bromide

b) Magnesium metal

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g) Aqueous sodium chloride

(III) a) Define a binary electrolyte (1mk)

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b)State two applications of electrolysis (2mks)