

Bishop mugendi nyakegogi sec school

NAME.....

INDEX NO:.....

CANDIDATE'S SIGNATURE

DATE:

233/1
CHEMISTRY
PAPER 1
THEORY

TIME: 2 HOURS

Kenya Certificate of Secondary Education (K.C.S.E.) Champions jet 2 examinations.

INSTRUCTIONS TO CANDIDATES

- Write your **name** and **index number** in the spaces provided above
- **Sign** and write the **date of examination** in the spaces provided.
- Answer ***all*** the questions in the spaces provided.
- Mathematical table and silent electronic calculators may be used.
- **All** working must be clearly shown where necessary.

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1-29	80	

This paper consists of 12 printed pages. Candidates should check the question paper to ascertain all the pages are printed as indicated And no questions are missing.

1. The table below gives the atomic numbers of elements W,X,Y and Z. The letters do not represent the actual symbol of the elements.

Element	A	B	C	D
Atomic number	9	10	11	12

- a) Which **one** of the elements is least reactive? Explain

(1mk)

.....

- b)i) Which **two** elements would react most vigorously with each other?

(1mk)

.....

- ii) write the equation for the reaction that occurs when the elements named in b(i) above react.

(1mk)

.....

2. a) illustrate the hydrogen bond using water molecules

(1mks)

.....

- b) Explain why the boiling point of ethanol is higher than that of hexane
 (Relative molecular mass of ethanol is 46 while that hexane is 86)

(2mk)

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3. The solubility of Iron (II) Sulphate crystals at 22°C is 15.65g per 100g of water. Calculate the mass of iron (II) sulphate crystals in 45g of saturated solution at the same temperature.

(2mks)

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.....

4. A compound has an empirical formula. C_3H_6O and relative formula mass 116.

a) Determine its molecular formula ($H=1.0$, $C=12.0$, $O=16.0$)
(2mks)

b) Calculate the percentage composition of carbon by mass in the compound. (1mk)

5. Both kerosene and water are liquids at room temperature. Describe a procedure that can be used to separate a mixture of the two liquids. (3mks)

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6. Calculate the amount of zinc carbonate that would remain if 15.0 g of zinc carbonate were reacted with 0.2 moles of nitric (V) acid. The equation for the reaction is:



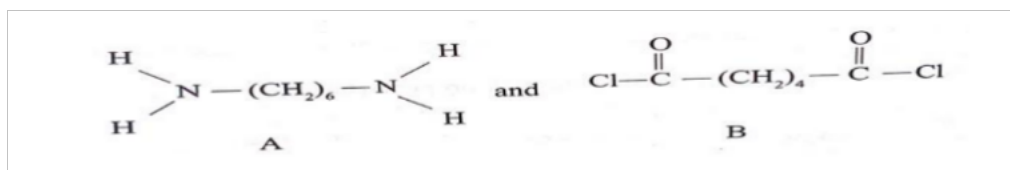
(C=12.0, O= 16.0, Zn = 65.4).

(3mks)

7. When acidified potassium manganate vii was added to a sample of an organic compound X, the colour of acidified potassium manganate vii changed from purple to colourless, when acidified potassium dichromate vi was added to another sample of compound X, the colour of acidified potassium dichromate vi remained orange.

- i) Give the functional group present in the organic compound (1 mark)
- ii) What observation would be made if bromine water was added to another sample of compound C in a test tube? (1mark)

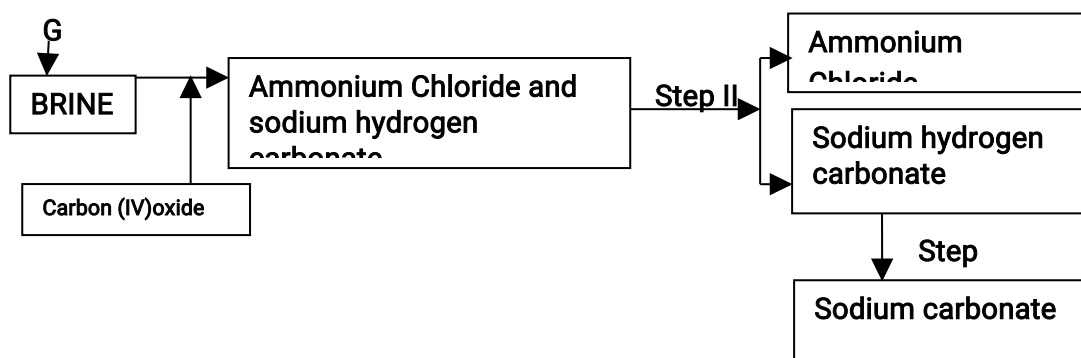
b) Structures A and B shown below represents monomers which undergo condensation polymerization to produce a polymer T with formation of hydrogen chloride molecules.



Draw the structure of polymer T

(1 mark)

8. The simplified flow chart shows some of the steps in the manufacture of sodium carbonate by the Solvay process



- a) Identify substance G. (1mk)

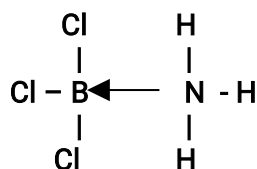
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- b) Give a reason why the Solvay process is considered to be cheap (1mk)

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- c) Write an equation for the reaction, which takes place in step III. (1mk)

9. The diagram below shows the bonding between boron chloride and ammonia



- a) Name the types of bonds that exist in the molecule. (1mk)

.....

- b) How many electrons are used for bonding in the molecule? (1mk)

.....

-
- c) What makes it possible for the boron chloride molecule to bond with the ammonia molecule?
(1mk)
-
-

10. The table shows the colours obtained when some indicators are added to solutions:-

Solution	Phenolphthalein Indicator	Indicator N
Distilled water	colourless	Green
Ammonium hydroxide		Blue
Hydrochloric acid		Red

(a) Complete the table by filling in the missing colour.
(2mks)

(b) Identify indicator **N** (1mk)

11. A certain mass of gas occupies 0.30dm^3 at 30°C and **100,648.5 Pa** Calculate its volume at **101,325 Pa** at 10°C
(2mks)

12. The grid below shows part of the periodic table. The letters do not represent the actual symbols of the elements.

				J				
				K			L	
M								

Select the

i)

Element which has the largest atomic radius

(1mk)

.....

ii)

Most reactive metal

(1mk)

.....

iii)

Give the nature of the oxide of element K.

(1mk)

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13. You are provided with a boiling tube ,delivery tubes, source of heat ,test tube and other relevant chemicals/reagents .Draw a set up of apparatus that can be used to investigate action of heat on calcium carbonate and test gaseous products formed.

(3mk)

14. Hardness of water may be removed by either boiling or addition of chemicals:

a) Write an equation to show how boiling removes hardness of water.

(1mk)

b) Name **two** chemicals that are used to remove hardness of water

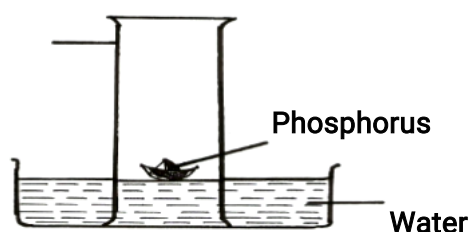
(1mk)

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15. The set-up below was used to investigate properties of the components of air:

Gas Jar



used to investigate properties of the

(i) State **one** observation made during the experiment

(1mk)

(ii) Write a chemical equation for the reaction which occurred.

(1mk)

(iii) The experiment was repeated using burning magnesium in place of phosphorus, the volume reduction of air was greater. Explain

(1mk)

16. A radio isotope X decays by emitting two alpha (α) particles and one beta (β) particle to form $^{214}_{83}\text{Bi}$.

a) What is the atomic number of X.

(1mk)

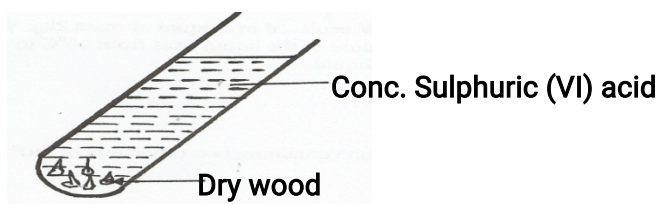
b) After 112 days $\frac{1}{16}$ of the mass of X remained. Determine the half-life of X.

(2mks)

17. What volume of 0.5 M hydrochloric acid solution will neutralize 20cm³ solution of sodium carbonate containing 5.3 of anhydrous sodium carbonate per litre of solution? (Na = 23.0 C= 12.0 O = 16.0 H=1.0 Cl = 35.5)

(3 mks)

18. Excess concentrated sulphuric (VI) acid was mixed with pieces of dry wood as shown below

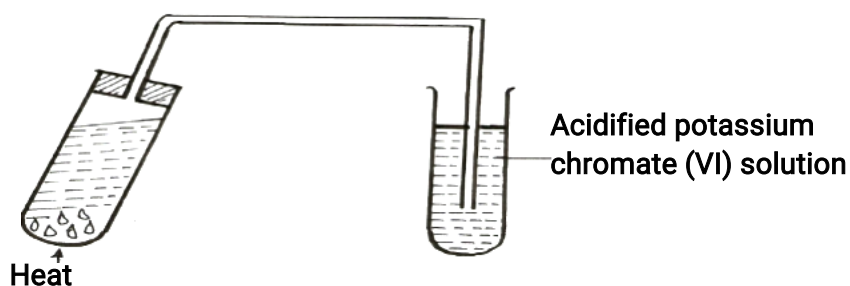


a) State the observation made in the tube. Explain

(1 k)

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.....

b) When the reaction was complete, the mixture was heated gently, then strongly and set – up adjusted as shown below



State and explain the observation made on acidified potassium chromate (VI) solution.
(2mks)

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19. a) Diesel and petrol are some of the some of the products of fractional distillation of crude oil and commonly used as fuels.

State two environmental effects of the use of these substances as fuels

(1mks)

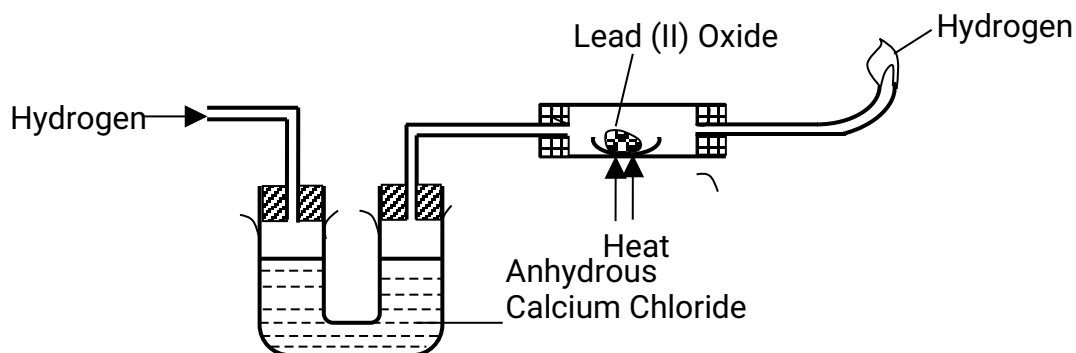
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b) The table below gives bond energies of some covalent compound

Bond	Bond energy KJ mol ⁻¹
C – H	413
O= O	497
C= O	804
H- O	464

Calculate the enthalpy change for the combustion of methane in excess oxygen gas. (2mks)

20. Study the diagram below and use it to answer the questions that follows.



(i) Write an equation for the reaction that takes place in the tube (1 mk)

(ii) What property of hydrogen makes this reaction possible? (1 mk)

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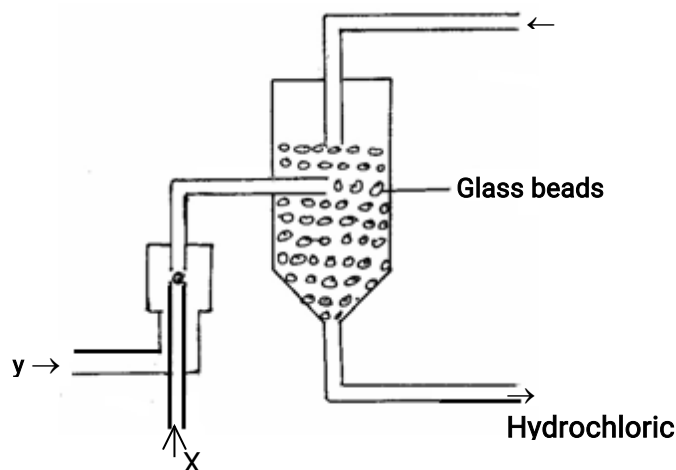
(iii) What would you expect to happen, if sodium oxide (Na₂O) was used instead of Lead (II) oxide? (1 mk)

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21. Starting with **zinc oxide**, describe how a sample of solid **zinc carbonate** can be obtained (3 mks)

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22. The diagram **below** represents a set-up for large scale manufacture of hydrochloric acid. Study it and answer the questions that follow:



(i) Name substance **X** and **Y**.

(1mk)

X.....

Y.....

(ii) What is the purpose of glass beads?

(1mk)

.....

(iii) Write the chemical equation for the reaction between gas A and B.

(1mk)

23. a) Name the substance used to vulcanize rubber
(1mk)

.....

b) Why is it necessary to vulcanize rubber
(1mk)

.....
.....

24. Study the information in the table below and answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	Electronic configuration	Boiling point
X	2.7	-188°C
Y	2.8.7	-35°C
Z	2.8.8.7	59°C

a) What is the general name given to the group in which the elements X, Y and Z belong?
(1mk)

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b) Select two elements which are colored gases
(1mk)

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.....

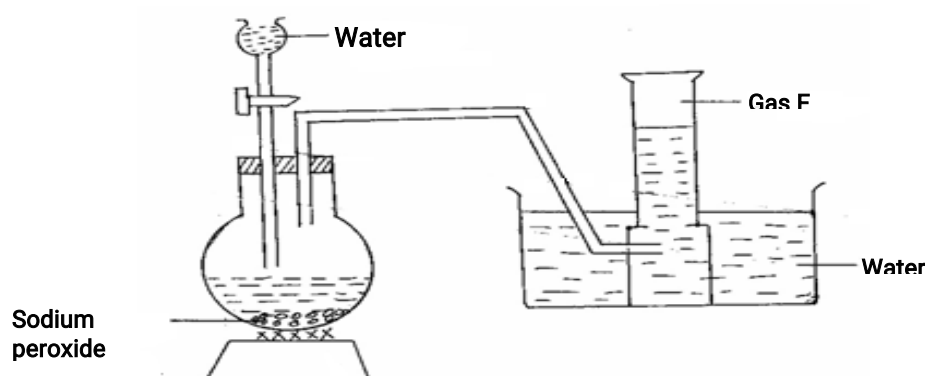
c) Write an equation for the reaction of element Z with iron metal (1 mk)

25. Explain how conduction of electricity takes place in the following.

(a) Iron metal
(1 mk)

(b) Molten lead (II) iodide
(1 mk)

26. The set-up below was used to collect gas F produced by the reaction between sodium Peroxide and water



i) Name gas F

(1mk)

.....

(ii) Give **one** industrial use of gas F

(1mk)

.....

(iii) Write an equation to show the reaction that produces gas

(1mk)

28..In an experiment to investigate electrolysis of copper ii sulphate solution, it was noticed that the anode reduced in size while the cathode increased in size

a)identify the electrodes that were used

(1mark)

b)write the equation for the reaction that took place at the anode

(1 mark)

c)state the change that occurs on the color of the electrolyte in the above process(1 mark)

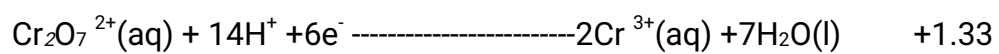
29.One of the theories used in the study of reactions in chemistry is the collisions theory.

a) explain the collision theory as used to explain rate of reaction in chemistry (2 marks)

b)state the effect of increase in size of reactant particles on rate of reaction (1 mark)

30) study the redox reactions shown below and use them to answer questions that follow

Half cell E^0 (volts)



Calculate the volume 0.020M $\text{Cr}_2\text{O}_7^{2-}$ required to completely oxidise 30cm³ of 0.1M Fe^{2+} (3 marks)

END