NAME.....ADM NO.....

233/1
CHEMISTRY
PAPER 1
(THEORY)
JANUARY/FEBRUARY, 2019
TIME: 2HOURS

STREAM.....

MARANDA HIGH SCHOOL
FORM FOUR
MID TERM ONE EXAMINATION - 2019
Kenya Certificate of Secondary Education
CHEMISTRY
PAPER 1
(THEORY)
TIME: 2HOURS

INSTRUCTIONS TO CANDIDATES:

(i) Write your **name , admission number and stream** in the spaces provided **above.**
(iii) Answer **ALL** the questions in the spaces provided.
(iv) Mathematical tables and silent electronic calculators **may be** used.
(v) All working **must be** clearly shown where necessary.
(vi) Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing

For Examiner's Use Only

Questions	Maximum Score	Candidate's Score
1 – 29	80	

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

1. a). Define a complex ion (1mark)

.....

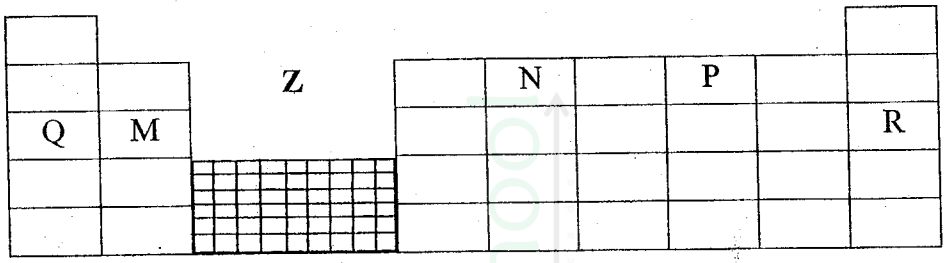
.....

b). Give the names of the following ions (2marks)

(i). $[Cu(NH_3)_4]^{2+}$ .....

(ii). $[Al(OH)_4]^-$ .....

2. Use the part of the periodic table given below to answer the questions that follow. (Letters are not the actual symbols of the elements)



a). Identify the element that forms giant covalent structures (1mark)

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b). Identify one element that does not form compounds (1mark)

.....

c). What name is given to elements labelled **Z** (1mark)

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3. Explain why a balloon filled with helium gas deflates faster than a balloon of the same size filled with argon gas (2marks)

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4. Calculate the solubility of potassium chlorate if 16g of it saturate $10cm^3$ of water (Density of water $=1gcm^{-3}$) (1mark)

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5. a). Complete the diagram below to show how a sample of aqueous solution of hydrogen chloride can be prepared in the laboratory (2marks)

$HCl_{(g)}$ ⟶ _____
_____

b). A few drops of lead (II) nitrate solution were added to the sample of the solution obtained above and the mixture warmed. State the observation made. (2marks)

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6. The empirical formular of a compound is CH_4 and it has a molecular mass of 42
a). What is the molecular formular of this compound. (2marks)

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.....

.....

b). Draw the structural formular of the third member of this series and state its IUPAC name. (2marks)

7. The table below gives the number of electrons, protons and neutrons in substances X, Y and Z. Study it and answer the questions that follow

Substance	Electrons	Protons	Neutrons
X	10	10	10
Y	10	8	10
Z	8	8	8

a). Which letters represent an ion (1mark)

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b). Which of the substances are isotopes? Explain (2marks)

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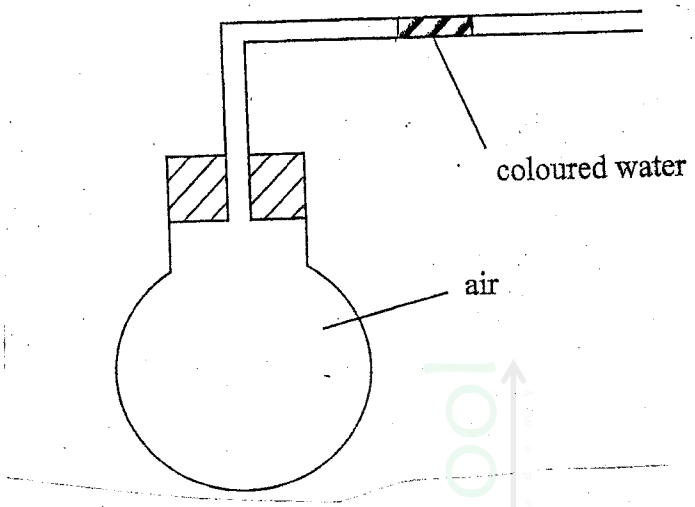
8. Use the setup in the figure below to answer the questions that follow. The flask was covered with a cloth that had been soaked in ice – cold water



i). State the observation made on the coloured water. Explain. (2marks)

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.....

ii). Name the gas law illustrated in the figure above (1mark)

.....

9. $30.0cm^3$ of aqueous sodium hydroxide containing 8.0g per litre of sodium hydroxide were completely neutralized by 0.294g of dibasic acid. Determine the relative formula mass of the dibasic acid (Na = 23.0 , O = 16.0, H = 1.0) (3marks)

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10. A solution of hydrogen chloride gas in water liberates hydrogen gas with zinc metal while a solution of the same gas in methylbenzene does not. Explain. (2marks)

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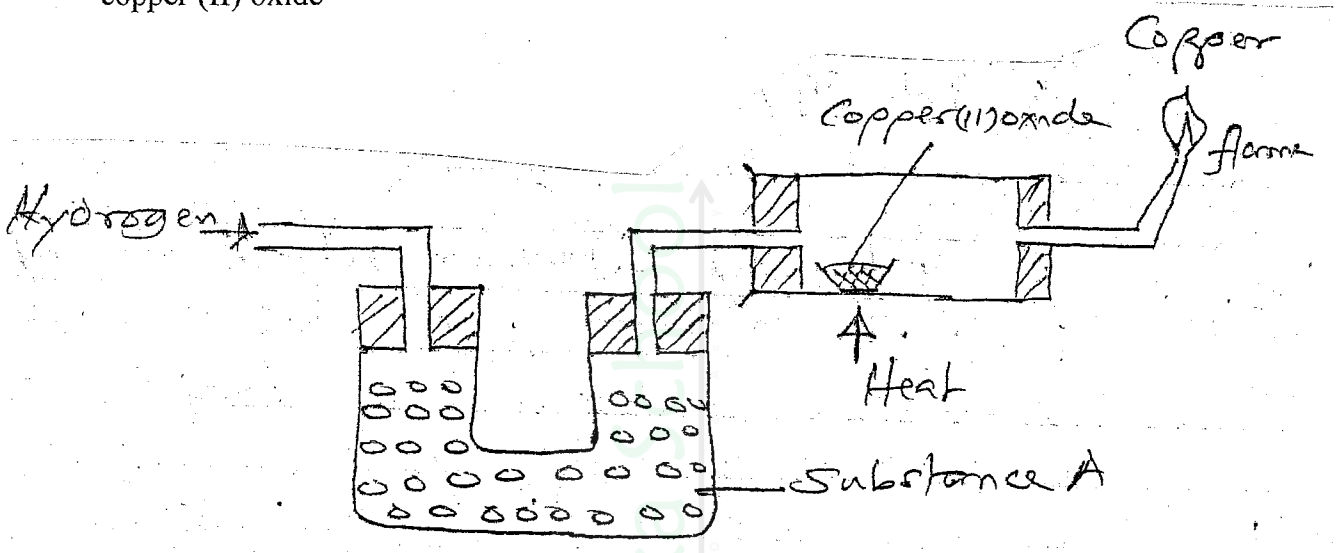
11. The setup below was used to investigate the reaction between dry hydrogen gas and copper (II) oxide



a). Name substance A (1mark)

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b). State the observation made in the combustion tube (1mark)

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c). Explain the observation stated in (b) above (1mark)

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12. What mass of magnesium carbonate would remain if 15g of magnesium carbonate reacts with 0.1 moles of hydrochloric acid. (C = 12, O= 16, Mg =24) (3marks)

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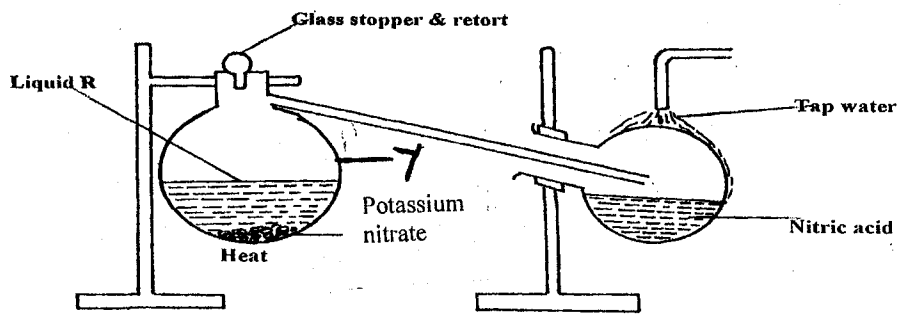
13. The setup below was used to prepare nitric (V) acid in the laboratory



i). Identify the apparatus Y (1mark)

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ii). State why potassium nitrate is preffered in the preparation of nitric (V) acid (1mark)

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(iii). Explain why nitric (V) acid obtained is yellow in colour (1mark)

.....

14. When a white powder **B** was heated it decreased in mass and produced solid **C** which was red when hot and yellow when cold. A gas **D** which formed a white precipitate with calcium hydroxide was evolved.

a). Identify:

i). White powder **B** (1mark)

.....

ii). Solid **C** (1mark)

.....

iii). Write equation for the reaction that leads to formation of white precipitate. (1mark)

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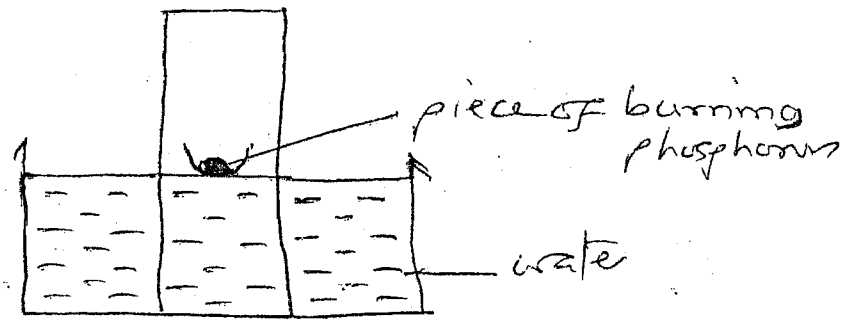
15. The diagram below represents a set up that was used to show that part of air is used during burning.



Given that phosphorus used was in excess, draw a diagram of the setup at the end of the experiment (When there was no further observable change). (1mark)

16. Describe how samples of lead (II) sulphate, ammonium chloride and sodium chloride can be obtained from the mixture of the three. (3marks)

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17. What will be the nature of magnesium chloride and aluminium chloride solutions in water. Explain your answer in each case.

I. Magnesium chloride (2marks)

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.....

II. Aluminium chloride (2marks)

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18. A gas occupies a volume of 40litres at s.t.p. At what pressure will its volume double if the temperature rises to 105°C. (2marks)

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19. Using dots (·) and crosses (×) to represent outermost electrons, draw diagrams to show the bonding in CO_2 and H_3O^+ (Atomic number of O= 8, H= 1) (3marks)

i). CO_2

ii). H_3O^+

20. The table below shows tests carried out on separate samples of water drawn from a well and the results obtained.

Test	Results
i). Addition of excess aqueous ammonia	White precipitate formed
ii). Addition of few drops of dilute sulphuric acid	No white precipitate formed
iii). Addition of dilute hydrochloric acid followed by a few drops of Barium chloride	White precipitate formed.

a). Identify the cation and anion present in water. (2marks)

I. Cation.....

II. Anion.....

b). Write ionic equation for the reaction which takes place in test (iii). (1mark)

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21. Aluminium metal is a good conductor and is used for overhead cables. State any other properties that make aluminium suitable for this purpose. (2marks)

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22. Explain why hydrogen has oxidation states of **+1** and **-1** in its compounds. (2marks)

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23. a). One of the allotropes of sulphur is monoclinic sulphur, name the other allotrope. (1mark)

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b). Concentrated sulphuric(VI) acid reacts with ethanol and copper. State the property of the acid shown in each case. (2marks)

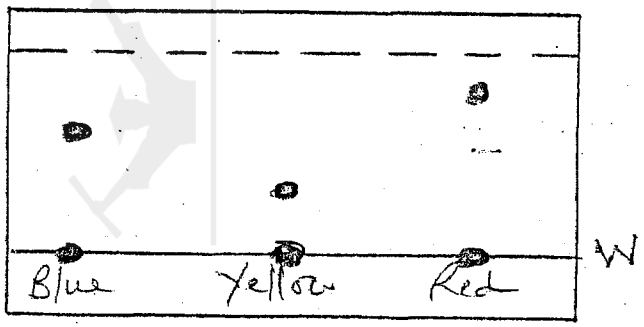
i). Ethanol

.....

ii). Copper

.....

24. The chromatogram below was obtained from a plant extract. Use it to answer the questions that follow.



a). Name the line **W** (1mark)

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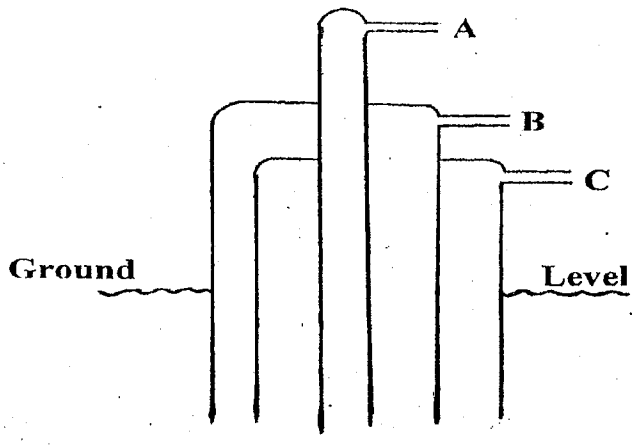
b). State with a reason the least soluble dye in the moving solvent. (1mark)

.....

25. The diagram below shows the extraction of sulphur by Frasch process.



a).Name the substances that pass through A,B and C. (3marks)

A .....

B.....

C.....

b). The sulphur obtained is mixed with water. Explain why sulphur is easily obtained from water. (1mark)

.....

26. A student mixed equal volumes of Ethanol and Butanoic acid. He then added a few drops of concentrated sulphuric (VI) acid and warmed the mixture.
i). Name and write the formula of the main products (2marks)

Name.....

Formula.....

27. The table below gives the first ionization energies of some metallic elements. The letters do not represent the actual symbols of the elements.

Metals	E	F	G	H
1st Ionization energy ($kJmol^{-1}$)	494	418	519	376

a). Arrange the metals in order of their reactivity starting with the most reactive one (1mark)

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b). Identify the metal with the highest melting point. (1mark)

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c).Give one factor that affects ionization energy. (1mark)

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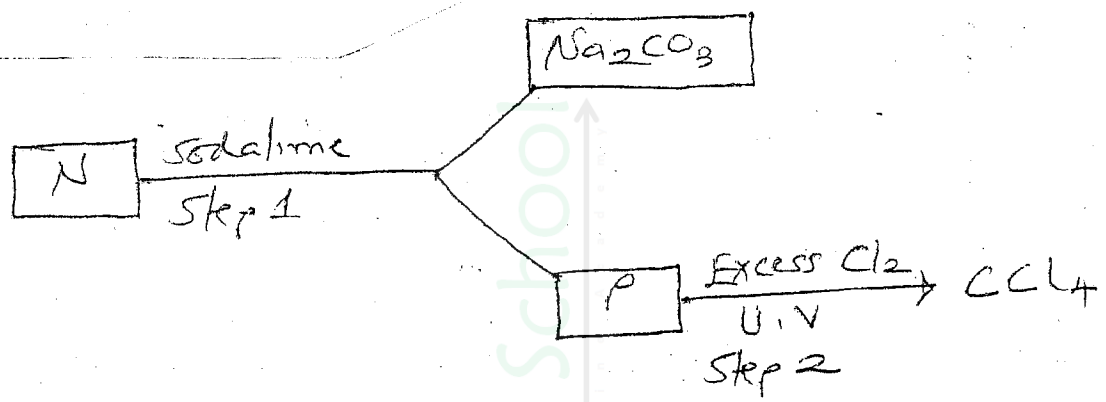
28. Study the chart below and answer the questions that follow



a). Identify N and P

N..... (1mark)

P..... (1mark)

b). Write a chemical equation for the production of gas P (1mark)

.....

29. Element R burns in air with a bright white flame to form two products W and Z. Z reacts with water to form an alkaline gas Y

Name:

i). Element R..... (1mark)

ii). Compound Z ..... (1mark)

iii). Alkaline gas Y..... (1mark)

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