NAME…………………………………...……..ADM NO……..…CLASS………..…

END YEAR EXAMINATIONS 2019
FORM THREE
CHEMISTRY PAPER 1 CODE: **233/1**

| MAXIMUM SCORE	STUDENTS SCORE
80	

TIME 2 HOURS
INSTRUCTIONS TO CANDIDATES
- *Write your name, class and Admission Number in the spaces provided above.*
- *Answer **ALL** questions in the spaces provided.*
- *Mathematical tables and electronic calculators may be used.*
- *All workings **MUST** be clearly shown where necessary.*

1. Explain why burning magnesium continues to burn in a gas jar full of sulphur (IV) oxide while a burning splint would be extinguished. (3 marks)

2. Draw structural formulae and name two positional isomers with molecular formula C_4H_8. (2 marks)

3. Dry Hydrogen chloride gas was made to dissolve in water using the set of apparatus shown below

Dry hydrogen Chloride

Funnel
Blue litmus paper
Water
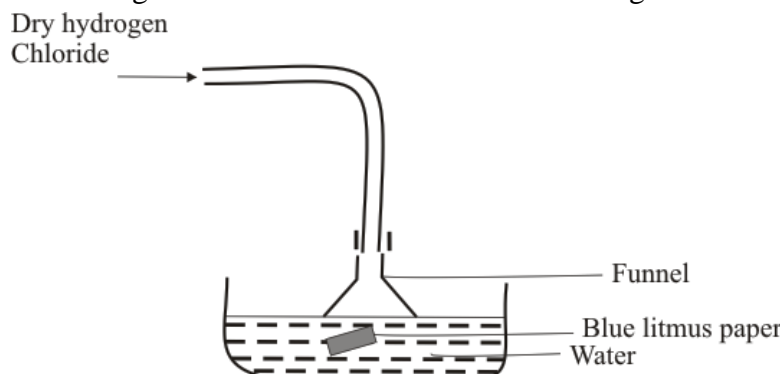
(a) What is the use of the inverted funnel? (1 mark)

(b) State and explain the observations made on the litmus paper
(2 mark)

(c) State and explain the observation made on the litmus paper if methylbenzene is used instead of water in the above set up.
        (2 mark)

4. Using sodium hydroxide solution, describe a chemical test that can be used to distinguish between copper (II) ions and iron (II) ions
      (2 marks)

5. The flow chart below shows laboratory preparation of chlorine gas. Study it and answer the questions that follow:

| Mn O$_2$ + W Heat | $\xrightarrow{Cl_{2(g)}}$ | Water | $\longrightarrow$ | Y |

Dry chlorine gas
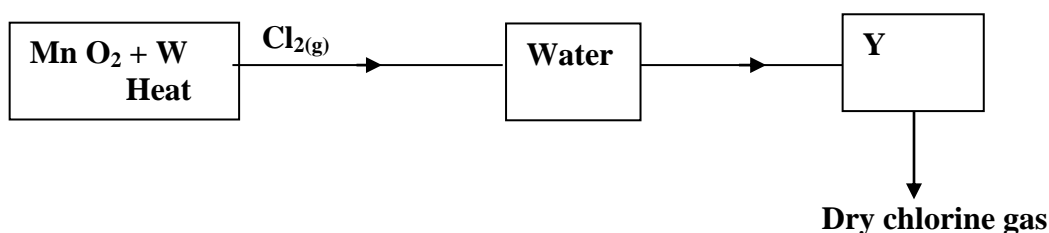
(a) Name substances   (2 marks)
    W-…………………………………………   Y-…………………………………………

(b) What is the function of water in the above set up?

I									
	J						Q	M	
								N	

        (1 mark)

6. An unknown mass of anhydrous potassium carbonate was dissolved in water and the solution made up to 200cm^3. 25cm^3 of this solution neutralized 18.0cm^3 of 0.22M nitric (v) acid. Calculate the unknown mass of potassium carbonate (**K**=39, **C**=12, **O**=1)
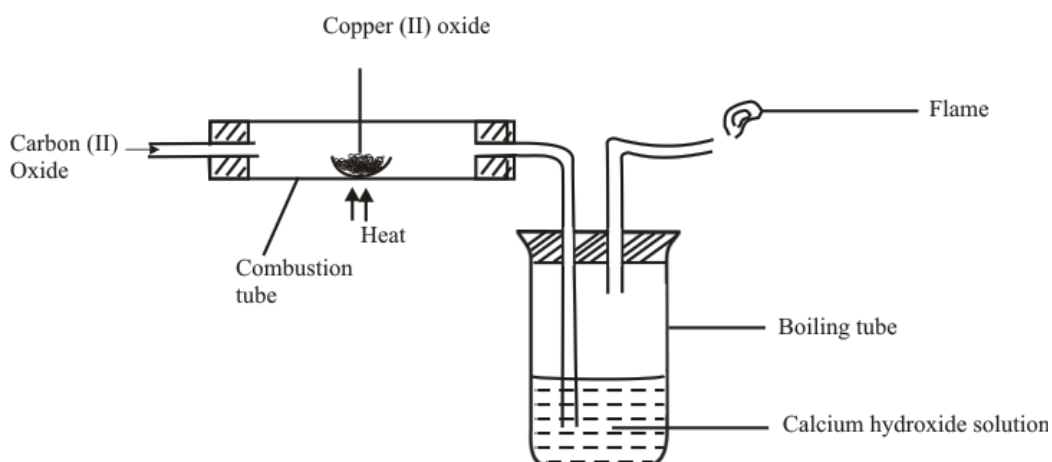   (3 marks)

K	L			P					

7. Below is a sample of the periodic table

a) Give the family name to which elements **M** and **N** belong
(1 mark)

(b) Compare the reactivity of elements **I** and **K**. Give a reason
(2 mark)

(c)   Write the formula of the compound formed when **P r**eacts with **Q**
(1 mark)

8. Study the experimental set up of apparatus shown below.

Copper (II) oxide
Flame
Carbon (II) Oxide
Heat
Combustion tube
Boiling tube
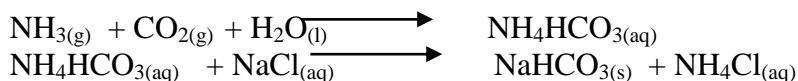Calcium hydroxide solution

(i) State two observations made in the set up as the experiment progressed   (2 marks)

(ii) Using an equation, explain the change that occurred in the boiling tube
(1 mark)

(iii) Why was the gas burned in the flame?   (1 mark)

9. Painting, oiling, galvanizing and tin plating are methods of rust prevention.

(a) Explain the similarity of these methods in the way they prevent rusting   (1 mark)

(b) Explain why galvanized iron objects are better protected even when scratched (1mark)

10. The chemical equations below are the main reactions in large scale manufacture of sodium carbonate.

$NH_{3(g)} + CO_{2(g)} + H_2O_{(l)} \longrightarrow NH_4HCO_{3(aq)}$
$NH_4HCO_{3(aq)} + NaCl_{(aq)} \longrightarrow NaHCO_{3(s)} + NH_4Cl_{(aq)}$

(a) Explain how the two products $NaHCO_3$ and NH_4Cl are separated
        (1 mark)

(b)How sodium carbonate is finally obtained from $NaHCO_3$?
        (1 mark)

(c) Explain how ammonia is recovered in this process.
        (1 mark)

11. 80 cm^3 of oxygen gas diffused through a porous hole in 50 seconds. How long will it take 120cm^3 of Nitrogen (IV) oxide to diffuse through the same hole under the same conditions? (N =14, O=16)   (3 marks)

12. Filtration is carried out in the apparatus shown
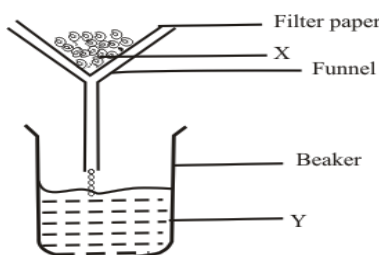
    Name :   (2 marks)
    X   ……………………………..   Y ………………………………..
13. Two carbonates **P** and **Q** are weighed before and after heating. The results are given in the table below.

Carbonate	Mass in grams	
	Before heating	After heating
P	15.0	15.0
Q	15.0	10.0

Which one is likely to be sodium carbonate? Explain.
(2 marks)

14. Describe how you would separate a solid mixture of lead(II) chloride and copper(II) oxide (3 marks)

15. The general formula for a homologous series of organic compounds in C_nH_{2n+2}

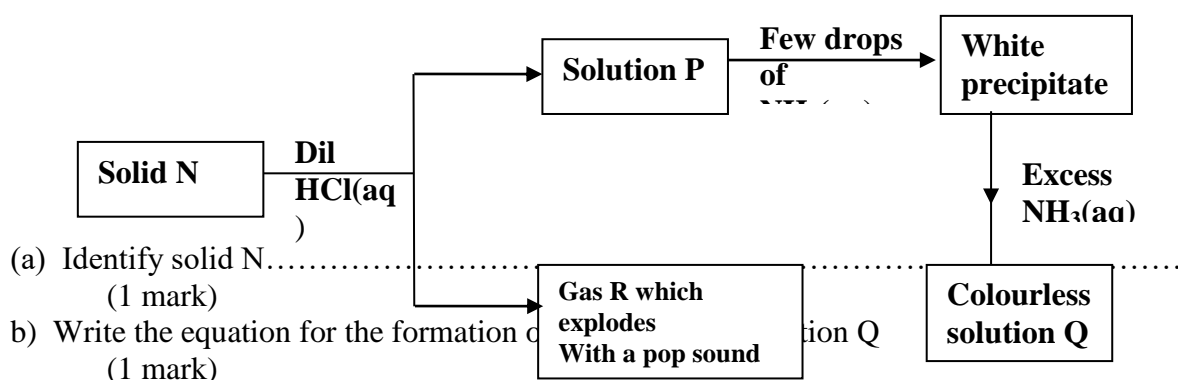   (a) Give the name and structural formula of the fourth member of the series
    (2 marks)
    (i) Name ………………………
    (ii) Structural formula
    (b) Write an equation for the combustion reaction of the above molecule   (1mark)

16. The scheme below shows some reactions sequence starting with solid **N**.   Study it and answer the questions that follow:

(a) Identify solid N…………………………………………………………………………………
       (1 mark)
b) Write the equation for the formation of …………tion Q
       (1 mark)

c) Give the identity of gas R   (1 mark)
   17. In an experiment, a gas jar containing moist sulphur (IV) oxide was inverted over another gas jar containing hydrogen sulphide gas.
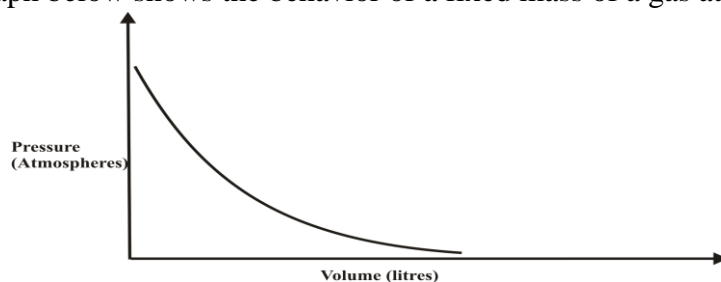
    (a) State and explain the observation that was made
    (2 marks)

     (b) State the precautions that should be taken when carrying out this experiment
            (1 mark)

18. The graph below shows the behavior of a fixed mass of a gas at constant temperature

    (a)   What   is   the   relationship

between the volume and pressure of the gas? (1 mark)

(b) 3 litres of oxygen gas at one atmosphere pressure were compressed to two atmospheres at constant temperature. Calculate the new volume occupied by the oxygen gas.
(2 marks)

19. The table below shows the relative atomic masses and percentages abundance of the isotopes M_1 and M_2 of element M

	Relative abundance	% abundance
M_1	60.57	59.71
M_2	62.83	40.29

Calculate the relative atomic mass of element M
(2 marks)

20. The table below shows the pH values of solutions A,B,C and D

solution	A	B	C	D
pH	2	7	11	14

(a) Which solution is likely to be that of calcium hydroxide (1 mark)

(b) Select the solution in which a sample of aluminum oxide is likely to dissolve. Give a reason for your answer
(1 mark)

21. Name one property of neon that makes it possible to be used in electric lamps.
(1mark)

22. Distinguish between ionic bond and covalent bond (2 marks)

23. Explain why the boiling point of hexane is higher than that of ethane. (relative molecular mass of ethane is **30** while that of hexane is **86**)
(2 marks)

24. When a student was stung by a nettle plant, a teacher applied an aqueous solution of ammonia to the affected area of the skin and the student was relieved of pain. Explain
    (2 marks)

25. Using dots(.) and crosses (x) show the bonding
    (3mks)
    (i) NH_4^+

    (ii)   Carbon (IV) oxide.

    (iii)   Potassium chloride

26. On complete combustion of a hydrocarbon gas X, 1.32g of carbon (IV) oxide and 0.54g of water. Calculate the empirical formula of X (C = 12.0, H = 1, O = 16.0)
    (3 marks)

27. Study the diagram below and answer the questions that follow.   (3 marks)

Dilute Hydrochloric acid

Gas jar

Clamp

Zinc granules
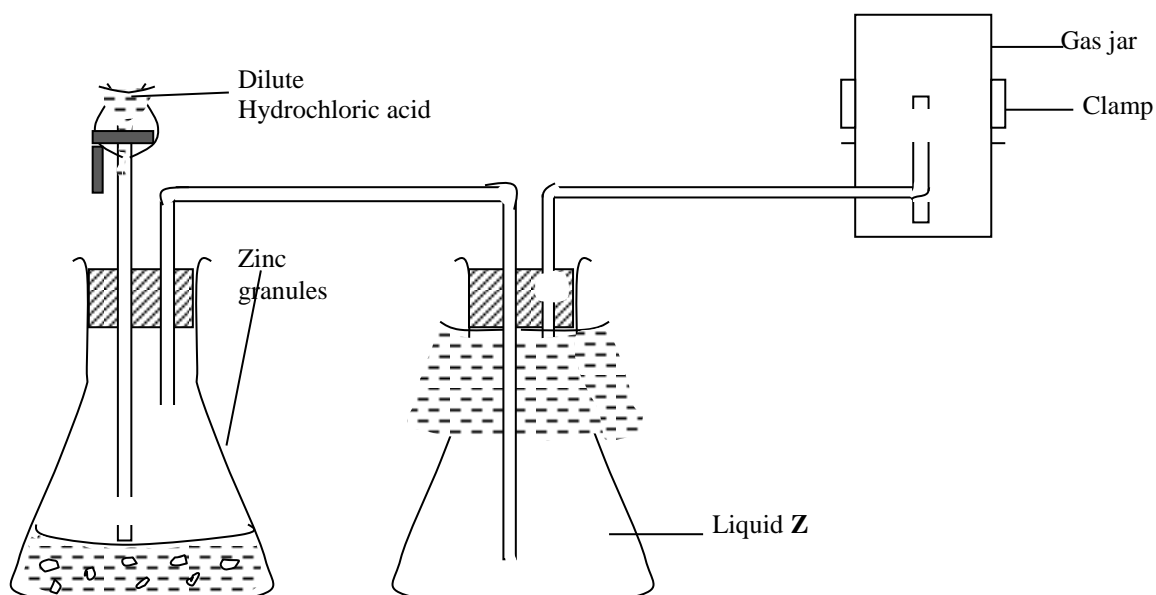
Liquid **Z**

(a)   Write an equation for the reaction between zinc granules and dilute hydrochloric acid. (1 mark)

(b)   What property of hydrogen is demonstrated by the method of collection shown on the diagram?
                (1 mark)

(c)   Hydrogen gas passed through liquid **Z**. What is the name of liquid **Z** and what is the purpose of liquid **Z**?
                (2 mark)

(ci)   Name one industrial use of hydrogen.
                (1 mark)

28. Three liquids were mixed together accidentally and this included lubricating oil, kerosene and water. The table below gives information about the properties of the liquids.

Constituent	Boiling point in ^{0}C	Solubility in water	Solubility kerosene
Lubricating oil	350 – 400	Insoluble	Soluble
Kerosene oil	175 – 250	Insoluble	
Water	100		Insoluble

Suggest a method you would use to separate the three liquids.   (2 marks)

29. a) Define the term allotropy
     (1mk)

b) Name the two allotropes of sulphur   (2 mks)

30. A concentrated solution of Sulphuric (VI) acid contains 70% H_2SO_4 and has a density of 1.8g cm^3. Determine the molarity of Sulphuric (VI) acid solution. (H= I, S=32, 0=16)
     (3 mrks)