NAME…………………………………………………………….………….ADM.NO:……………

CHEMISTRY PAPER 1
FORM III
TIME: 2 HOURS

INSTRUCTIONS TO STUDENTS
1.   Answer all questions in this question paper.

2.   All your answers must be written in the spaces provided in this question paper.

Question	Maximum score	Candidates score
1 -	80	

1)   (a) State and explain simple method you can use to separate a mixture of sulphur powder and iron fillings
        (2mark

(b) A mixture of iron and sulphur was heated strongly until it glowed red throughout and then left to cool. Explain why you cannot obtain sulphur and iron from the product using the method you stated in (a) above   (2marks)

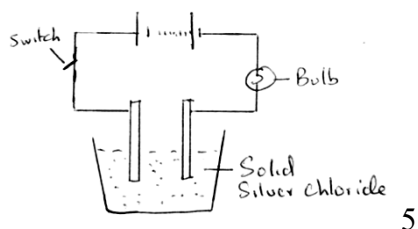2) Explain why the following substances are good conductors of electricity:

 (a) Molten lead II bromide   (1mark)

 (b)   Aluminium   (1mark)

3) Define the term electrolyte   (1mark)

4) The following set up was used to investigate the effect of an electric current on silver chloride

(a) Label the cathode and anode on the diagram   (1mk)

(b) When the switch was closed the bulb did not light. Explain.   (1mk)

(c) If the bulb lights, write the equation of the reaction occurring at the cathode.

                                                                                (1mk)

(d) State and explain the observation made at the anode. (2mks)

5) State three application of electrolysis.   (3marks).

6) Calculate the pressure required to compress 4.24 dm^3 of a gas at 5.4299 X 10^4 Pascal's to 1.56 dm^3 at constant temperature. (2marks)

7) Draw the structure of;

i) Hydroxonium ion H$_3$O$^+$ (2mk)

ii) Ammonium ion   (Al = 13, 0 = 8) (2mk)

8) The table below shows some properties of substances A-E. Study it and answer the questions that follow.

substance	Solubility in water	Solubility in chloroform	m.p.(^{o}C)	b.p .(^{o}C)
A	soluble	soluble	-22	141
B	insoluble	soluble	115	444
C	soluble	insoluble	801	1465
D	insoluble	soluble	-188	-42
E	insoluble	insoluble	1083	2600

3

(a) Which of the substances is a gas at room temperature of 25 °C? .   (1mark)

(b) What is the physical state of substance A at room temperature of 25 ° C? .   (1mark)

(c) How can you separate the mixture of substances B , C and E ?   (3marks)

9) What volume of acidified potassium manganate VII of concentration 0.02 moles per dm^3 is decolorized by 200 dm^3 of hydrogen peroxide of concentration 0.02 moles per dm^3 ? (3marks)

 Use the following ionic equation

$2MnO^{4-}_{(aq)}$ + $6H^+_{(aq)}$ + $5H_2 O_{2(aq)}$ $\longrightarrow$ $2Mn^{2+}_{(aq)}$ + $8H_2 O_{(l)}$ + $5O_{2(g)}$
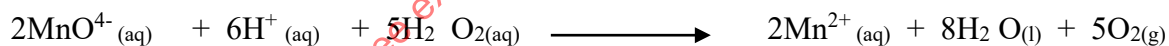
10) A mass of 3.6 g magnesium reacts in excess chlorine to form a chloride. If the mass of the chloride formed is 14.25 g, find the formula of the chloride formed. (Mg = 24, Cl =35.5).
     .   (2marks)

11) Starting with copper metal describe how a dry sample of copper II carbonate can be prepared in the laboratory. (3 marks).

12) The table below shows the first ionization energies of metals A to D (not their actual chemical symbols) in the same group of the periodic table.

Metal	A	B	C	D
First ionization energy (kJmol^{-1})	402	496	520	419

(a) Arrange the metals in order of that they occur in the periodic table starting from the topmost to the lowest. Give a reason to support your answer. (3marks)

(b) Which of the metals has the largest atomic radius? (1mark)

13) When a piece of calcium is dropped into a beaker of water, it sinks to the bottom and bubbles of a gas are observed on the surface of the metal.

(a) Why does calcium sink to bottom of the beaker? (1mark)

(b) Name the gas that is formed in the reaction. (1mark)

(c) Besides effervescence, what else is observed in the beaker as the reaction progresses? Explain this observation. (2marks)

5

(b) Write an equation for the reaction between calcium and water.   1mk

14) Explain the following statements:

 (a) Following a bee's sting, application of sodium hydrogen carbonates to the affected area of the skin reliefs the irritation.   (2marks)

 (b) It is not advisable to clean aluminium utensils using wood ash   .   (2marks)

15) The set-up below was used to investigate some properties of hydrogen gas. Study it and answer the questions that follow:

Tube

Y   Lead II oxide

Moist hydrogen gas in

6

Anhydrous copper II sulphate
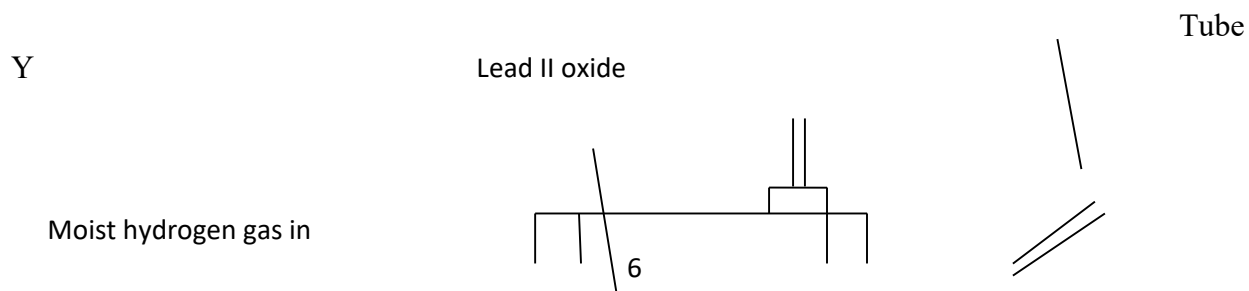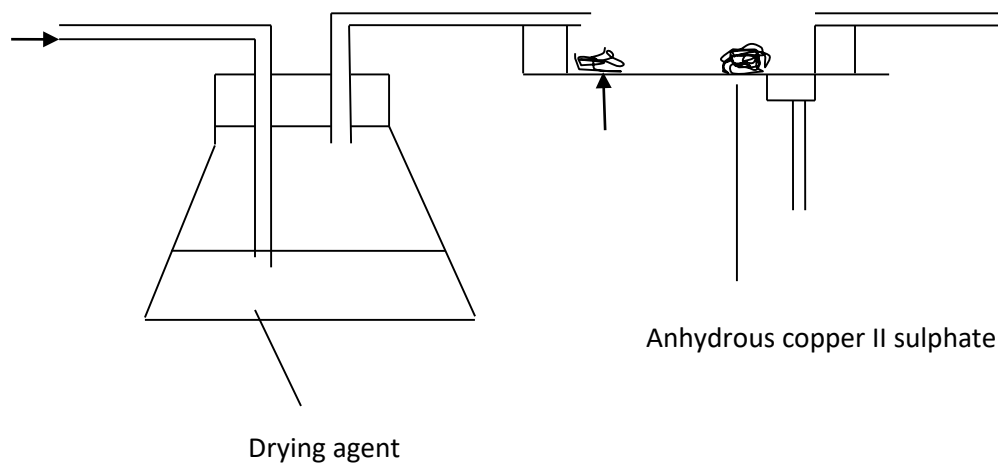
Drying agent

(a) Name a suitable liquid that can serve as a drying agent.   (1mark)

(b)   State the observations you would expect in the combustion tube as the experiment progresses. (2mks)

16) Explain the following terms:

   a) Water of crystallization   (1mark)

   b) Hygroscopy   (1mark)

   c) Acidic salts   (1mark)

   d) Normal salts   (1mark)

17) Explain the role of helium in the welding of metals.   (2marks)

18) Whereas hydrogen was commonly used in airships and weather balloons earlier on it is no longer used nowadays. Give a reason for this. (1mark)

19) Chebet, Mutua and Waweru are international athletes. Paper chromatography was used to test for the presence of illegal drugs in their blood which enhance the performance. The diagram below shows the chromatogram with the illegal drug labeled N.
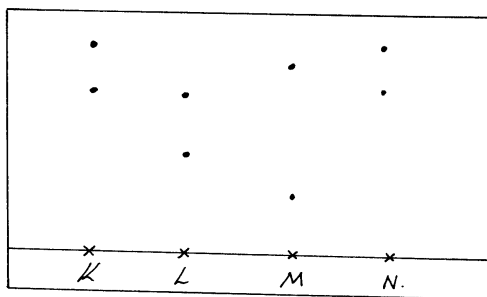
  a) Who among them tested positive for the illegal drug? Explain. **(2marks)**

(b) Explain what is meant by 'solvent front'. **(1mark)**

20) An aqueous solution of ammonia was added drop wise to a solution of copper (II) Sulphate until in excess. State the observation made when

    i) A few drops of aqueous ammonia were added. (1 mark)

    ii) Excess aqueous ammonia was added. (1 mark)

21) The table below gives information about the ions W^+ and $y2-$

Ion	W+	Y2-
Electrons arrangements	2.8	2.8.8
Number of neutrons	12	16

a) How many protons are there in the nucleus of
   i) Elements W?   (1 mark)

   ii) Elements Y?   (1 mark)

b) Write the formula of the compound formed when W and Y reacts.
                                                 (1 mark)

c) State two conditions under which the compound would conduct electricity.
                                                 (2marks)

22) The following data gives the PH vales of some solution A, B and C..

Solution	PH
A	13.0
B	6.9
C	2.0

a) Which solution would produce carbon (IV) oxide gas when reacted with copper (II)
   carbonate? Explain.   (2 mark)

b) What colour change would occur in solution A on addition of three drops of
   phenolphthalein indicator.   (1 mark)

c) What volume of 0.2 M hydrochloric acid would react completely with 0.005 moles of pure calcium carbonate? (3 marks)

23) What is an allotrope?   (1mark)

(a) Give two allotropes of sulphur. (2marks)

(b) State three uses of sulphur.   (3marks)