Name: ……………………………………………………… Index No. ……………………………

School: ……………………………………………………. Candidate's Sign. …………..............

Date: …………………………........................................

**233/2**
**CHEMISTRY**
**PAPER 2**
**JULY/AUGUST 2011**
**TIME: 2 HOURS**

# BUSIA  JOINT EVALUATION TEST

*Kenya Certificate of Secondary Education (K.C.S.E.)*

**Chemistry**
**Paper 2**

**INSTRUCTIONS TO CANDIDATES:**

- Answer *all* the questions in the spaces provided.
- All working **must** be clearly shown where necessary.
- Mathematical tables and electronic calculators can be used.

| Question | Maximum score | Candidate's score |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| **Total** | **80** | |

*This paper consists of  8 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

*© Busia – 2011*                    *Form Four*    1                              *Chemistry 233/2*

1.  Use the information below on standard electrode potentials to answer the questions that follow:

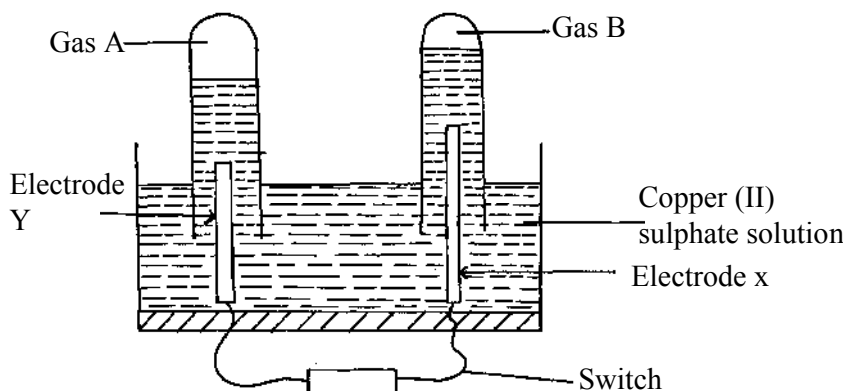| Electrode reaction | | | $E^\theta$ volts |
|---|---|---|---|
| $C^{2+}_{(aq)} + 2e^-$ | $\rightleftharpoons$ | $C_{(s)}$ | + 0.34 |
| $D^{2+}_{(aq)} + 2e^-$ | $\rightleftharpoons$ | $D_{(s)}$ | + 0.44 |
| $E^+_{(aq)} + e^-$ | $\rightleftharpoons$ | $E_{(s)}$ | - 2.92 |
| $Fe^{2+} + 2e^-$ | $\rightleftharpoons$ | $F_{(s)}$ | - 2.71 |
| $G^{2+} + 2e^-$ | $\rightleftharpoons$ | $G_{(s)}$ | – 0.14 |
| $\frac{1}{2} H_{2(g)} + e^-$ | $\rightleftharpoons$ | $H^-_{(aq)}$ | + 2.87 |
| $\frac{1}{2} K_{2(g)} + e^-$ | $\rightleftharpoons$ | $K^-_{(aq)}$ | + 1.09 |
| $L^+_{(aq)} + e^-$ | $\rightleftharpoons$ | $\frac{1}{2} L_2$ | 0.00 |

a) (i) Identify the strongest reducing agent and the strongest oxidizing agent. Give reasons.        (2mks)

………………………………………………………………………………………………………….

………………………………………………………………………………………………………….

   (ii) Calculate the e.m.f of the cell formed by connecting half cells **C** and **D**.        (1mk)

b) Draw and label a diagram of a cell formed by –connecting half cells of E and D. On the diagram indicate the flow of electrons.        (3mk)

c)  An aqueous solution of Copper (II) Sulphate was electrolysed using platinum electrodes. When a current was passed a gas that relights a glowing splint was  produced.



(i) Name the electrode which acts as cathode. Give a reason.        (1mk)

………………………………………………………………………………………………………….

(ii) Write an equation for the reaction at the anode.        (1mk)

d) 0.11g  of metal R deposited by electrolysis when a current  of 0.03 amperes flow for 99 minutes.
( R =92.) ,(1 Faraday = 96500 C)

(i) Find the number of moles of metal deposited.                                    (2mks)

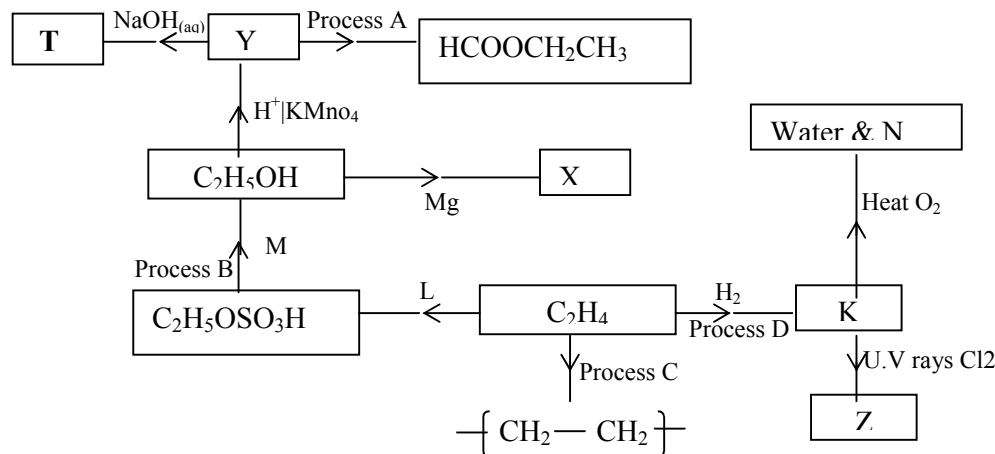(ii) Find the number of moles of electrons passed.                                  (2mks)

(iii) Determine the value of **n** in the metallic ion $R^{nt}$.                     (2mks)

2.   (a) Define Isomerism.                                                          (1mk)
……………………………………………………………………………………………………………….

(b) Draw and name one  of the position isomers of Butene.                           (2mks)

(c) Filter paper dipped in acidified Potassium Manganate (VII) were placed  in two separate gas jars A
and B containing pentane and Pent-l-ene respectively. Explain what was observed in each case.
                                                                                    (2mks)
……………………………………………………………………………………………………………….
……………………………………………………………………………………………………………….
………………………………………………………………………………………………………………

(d) The scheme below shows some products that can  be obtained starting from  ethene.

(i) Name the compounds                                                                                    (4mks)

**K**……………………..……………          **T**…………………………………

**L**……………………..……………          **X**…………………………………

**M**……………………..…….              **Y**………………………………..

**N**………………………………..           **Z**…………………………………

(ii) Name the process                                                                                       (2mks)

**A**……………………………..            **C**…………………………………

**B**……………………………..            **D**…………………………………

(iii) State **one** condition necessary for the processes in (ii) above to take place.        (3mks)
Process                                    condition

**A**                          ………………………………..

**C**                          ………………………………..

**D**                          …………………………………

3.  In the preparation of magnesium carbonate magnesium was burnt in air and the product collected.
    Dilute sulphuric  acid was added and the mixture filtered and cooled. Sodium carbonate was added
    to the   filtrate and the  content filtered. The residue was washed and dried to give a white powder.

   a) Give the chemical name of the product formed when magnesium burns in air        (1mk)
   …………………………………………………………………………………………………….

   b) Write a chemical equation for the formation of product.                          (1mk)

   c) (i) Name filtrate collected after sodium carbonate was added                     (1mk)
   …………………………………………………………………………………………………….

   (ii) Name the white powder.                                                          (1mk)
   …………………………………………………………………………………………………….

   d) Write chemical equation for the reaction between product in (a) and acid.         (1mk)

   e) Name the ions present in the filtrate after addition of sodium carbonate.         (1mk)
   …………………………………………………………………………………………………….

   f) Write an ionic equation to show the formation of the white powder                 (1mk)

   g) Write an equation to show what happened when white powder  is strongly heated.    (1mk)

4. Elements **V,W** and **X** have atomic number 17,19 and 20 respectively.
   (a) What is the valencies of **V** and **W** respectively                           (1mk)
   …………………………………………………………………………………………………….

   (b) To which groups of the periodic table do **V**, and **X** belong.                (1mk)
   …………………………………………………………………………………………………….

   (c) In which periods do elements **V** and **W** lie.?                               (1mk)
   …………………………………………………………………………………………………….

   (d) Which of the three elements is a non-metal?                                      (1mk)
   …………………………………………………………………………………………………….

(e) Write down the formula of the compounds formed when:
   (i) **V** reacts with **W**                                                                              (1mk)

   (ii) **X** reacts with Oxygen                                                                         (1mk)

  f) How many
     (i) Neutrons does V have?  if its mass number  is 35                                (1mk)

     (ii) Protons does W have ?                                                                       (1mk)

5.   The diagram below shows the preparation  of nitric acid.
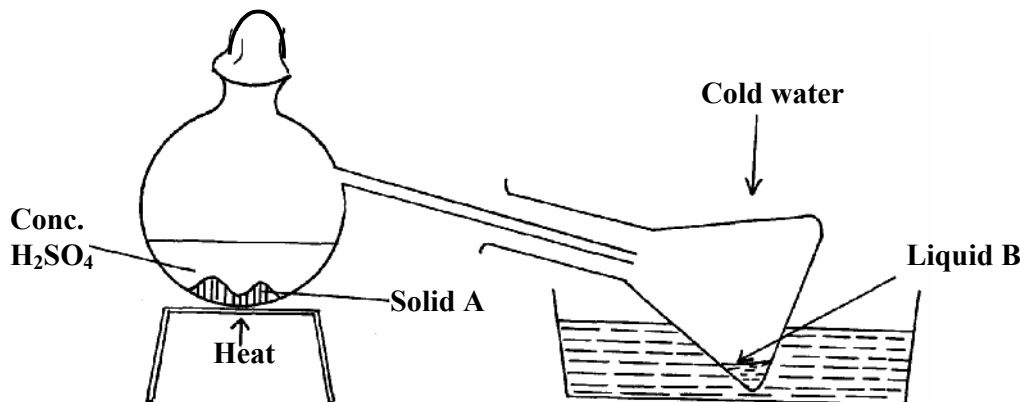


a) Name solid A                                                                                              (1mk)
   …………………………………………………………………………………………….
b) Under what conditions does sulphuric acid react with solid A                     (1mk)
   …………………………………………………………………………………………….
c) What is the colour  of liquid B                                                                      (1mk)
   …………………………………………………………………………………………….
d) What is the  purpose of cold water                                                              (1mk)
   …………………………………………………………………………………………….

e) 1 cm$^3$  of liquid B was diluted with distilled water and afew drops of copper turnings dropped into it
   A colourless gas and later brown gas  were produced.
    (i) Name the colourless gas                                                                       (1mk)
   …………………………………………………………………………………………….
    (ii) Name the brown gas formed?                                                               (1mk)
   …………………………………………………………………………………………….
   (iii) Give an equation for the formation of the brown gas                           (1mk)

   (iv) Give **two** uses of the nitric acid.                                    (1mk)
   ………………………………………………………………………………………….
   ………………………………………………………………………………………………
   …………………………………………………………………………………………….

b) The diagram below shows the process of extracting sulphur from its ore. Study it and answer the questions that  follow.
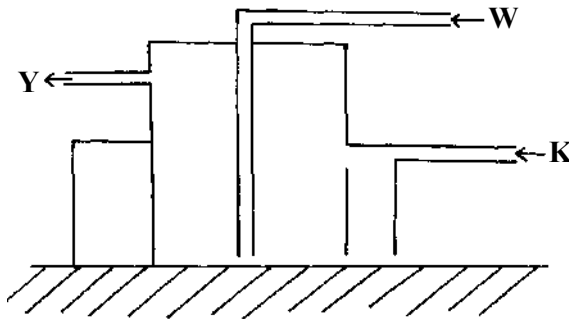


a) Name the substances that  pass through

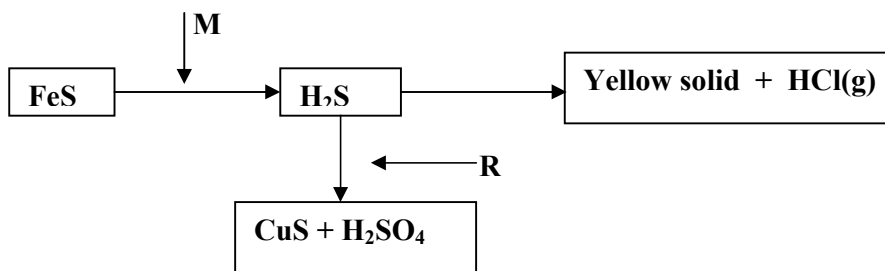(i) **W**………………………………………. (½mk)

(ii) **K**………………………………………… (½mk)

b) Explain the purpose of what  passes through (1mk)

(i) **W**……………………………………….

(ii) **K**………………………………………

c) Study the diagram below and answer the questions that follow



(i) Identify the reagents (1mk)

   **M**…………………………………

   **R**………………………………….

(ii) Name the yellow solid. (1mk)

……………………………………………………………………………………………………….

(iii) By using a chemical test, how  can you distinguish $H_2S(g)$ and $SO_2(g)$ (2mks)

……………………………………………………………………………………………………….

……………………………………………………………………………………………………….

……………………………………………………………………………………………………….

d) What would be the effect  of the yield of sulphur (VI) oxide when

(i) Increasing the concentration of oxygen. (1mk)

……………………………………………………………………………………………………….

(ii) Increasing the temperature . (1mk)

……………………………………………………………………………………………………….

e) (i) Describe how sulphuric acid is manufactured from sulphur (VI) oxide. (2mks)

……………………………………………………………………………………………………….

……………………………………………………………………………………………………….

(ii) Name **two** uses of sulphur (VI) acid. (2mks)

…………………………………………………………………………………………………………………

……………………………………………………………………………………………………………..

6. The flow chart below shows industrial extraction Aluminium metal. Study it and answer the questions that follow.
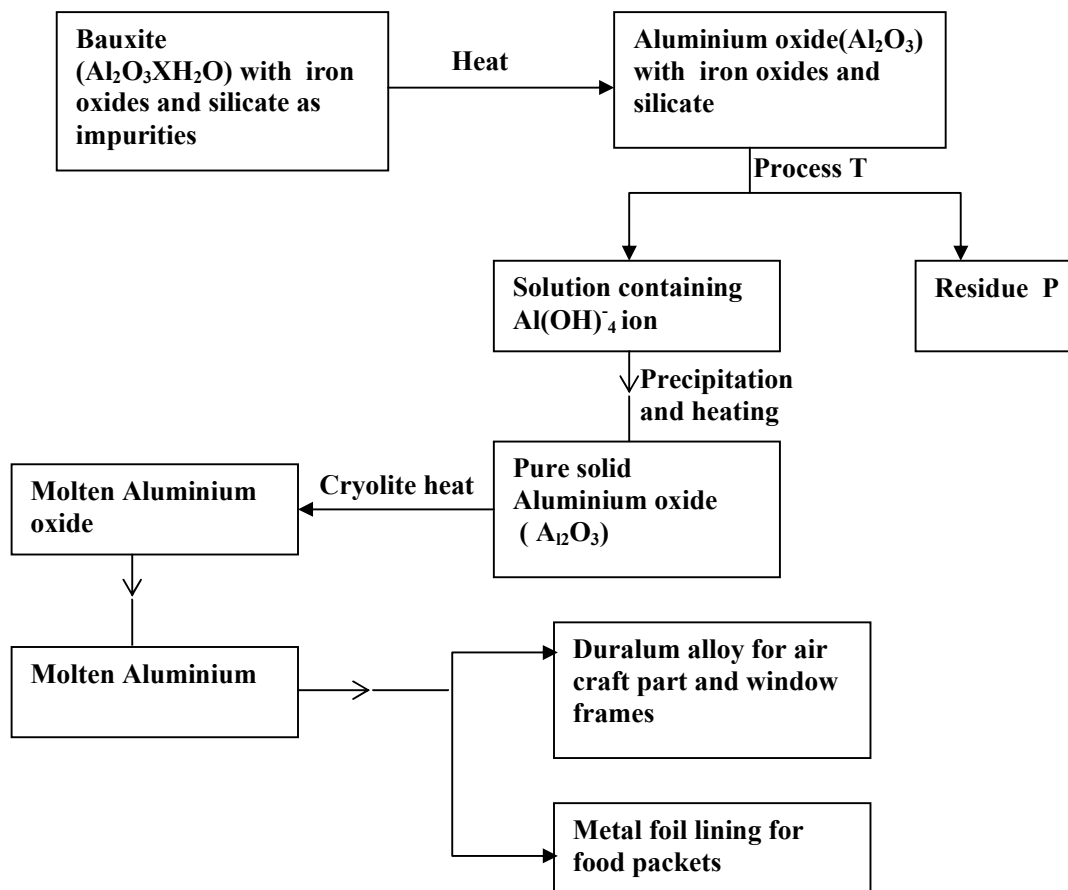


a) (i) Explain how process **T** is carried out. (2mks)

………………………………………………………………………………………………………….

………………………………………………………………………………………………………….

(ii) Name residue **P**, give a reason. (2mks)

………………………………………………………………………………………………………….

………………………………………………………………………………………………………….

(iii) Explain why it is necessary to heat Aluminium oxide in presence  of cryolite before electrolysis is carried  out. (1mk)

…………………………………………………………………………………………………………

…………………………………………………………………………………………………………..

b) Suggest a reason why:

(i) Aluminium is not used for marine purpose (1mk)

…………………………………………………………………………………………………………

(ii) Carbon  is not used for the reduction of Aluminium oxides. (1mk)

…………………………………………………………………………………………………………

c) What properties of Aluminium and its alloys make them suitable for the uses indicated?        (1mk)

…………………………………………………………………………………………………………….

d) When 31.2g of hydrated. Aluminium oxide ( $Al_2O_3XH_2O$) was heated to a constant mass of 20.6g of Aluminium oxide ( $Al_2O_3$) was obtained. Determine the value of x in hydrated oxide.        (3mks)
(Al= 27.0, O=16.0, H=1.0)

7.  (a) Name the solution and the catalyst used  in preparation  of oxygen in the laboratory.        (2mks)
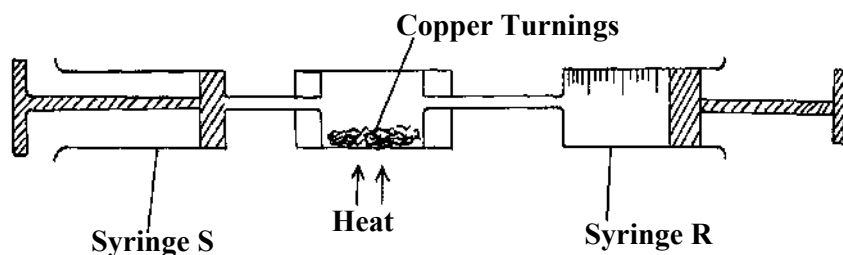
…………………………………………………………………………………………………………….

…………………………………………………………………………………………………………….

(b) Give a chemical equation for the reaction above.        (1mk)

…………………………………………………………………………………………………………….

…………………………………………………………………………………………………………….

(c) In an experiment to determine the proportion of oxygen in air, Copper turning were   packed in excess in a long combustion tube connected to two syringes of $120cm^3$ each in a volume . Syringe R contained $120cm^3$ of air while syringe S was closed and empty as shown.

**Copper Turnings**



**Syringe S**        **Heat**        **Syringe R**

Air  was passed over heated turnings slowly and repeatedly until there was no further change in volume. $95.5cm^3$ of air remained in syringe **R**.

(i) Why was copper packed in excess?        (1mk)

…………………………………………………………………………………………………………….

(ii) Why was air passed over heated copper slowly?        (1mk)

……………………………………………………………………………………………………………

(iii) State **one** observation made in the combustion tube during experiment.        (1mk)

……………………………………………………………………………………………………………

(iv) Give an equation for the reaction that  took place in combustion tube        (1mk)

(v) Determine the percentage of oxygen used  up during the experiment .        (2mks)

(vi) Give a hospital use of oxygen.        (1mk)

…………………………………………………………………………………………………………….