

NAME.....

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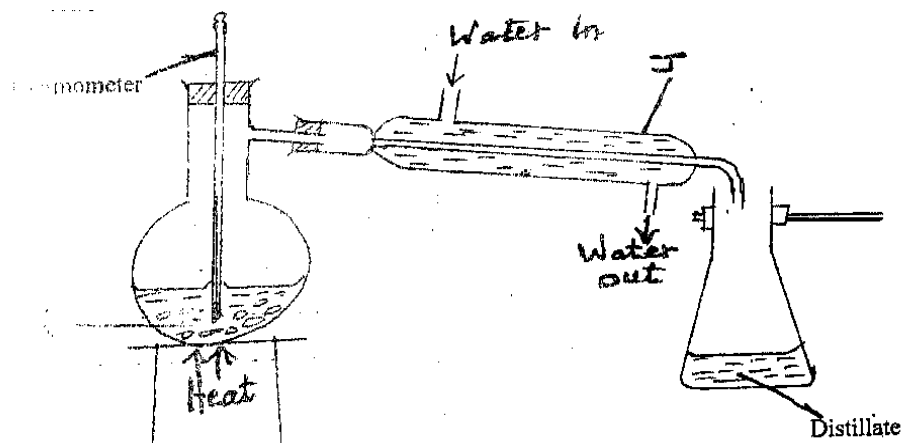
233/2  
CHEMISTRY  
PAPER 2  
THEORY  
JULY/AUGUST – 2009  
2 HOURS

**BARINGO – KOIBATEX DISTRICTS EDUCATIONAL  
IMPROVEMENT EXAM – 2009**

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

233/2  
Chemistry  
Theory  
Paper 2  
July/August 2009  
2 Hours

1. (a) Nitrogen is obtained by fractional distillation of liquid air
- (i) Name two other gases obtained during the distillation ( 1 mark)
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- (ii) State one property that makes it possible for the components of liquid air to be separated fractional distillation ( 1 mark)
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- (b) In an experiment to separate a mixture of two miscible liquids P ( b.o = 83<sup>0</sup>C and Q (b.p = 114<sup>0</sup>C) a student set up the apparatus shown below. Study it and answer the questions that follow.



(i) Identify two mistakes in the set – up ( 2 marks)

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(ii) Name the apparatus labeled J (1 mark)

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(iii) Solids labeled K were included in the mixture. State the role of these solids ( 1 mark)

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(iv) A round – bottomed flask is usually preferred when carrying out fractional distillation of miscible liquids mixture. Explain ( 1 mark)

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(v) Identify the distillate ( 1 mark)

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(vi) The distillate collected is not pure. Explain (2 marks)

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2. (a) Define allotropy (1 mark)

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(b) Graphite is an allotrope of carbon, which conducts electricity although carbon is non-metal. Explain (1 mark)

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(c) In terms of structure and bonding explain why diamond is used to make rock drills (2 marks)

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(d) Carbon reacts with hot concentrated sulphuric (VI) acid

(i) Give an equation for the reaction that occurs (1 mark)

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(ii) what property of carbon is shown by this reaction (1 mark)

(e) Sodium carbonate can be produced from trona, double salt, whose formula is  $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}_{(s)}$

(i) Why is trona a double salt? (1 mark)

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(ii) How is trona a double salt? (1 mark)

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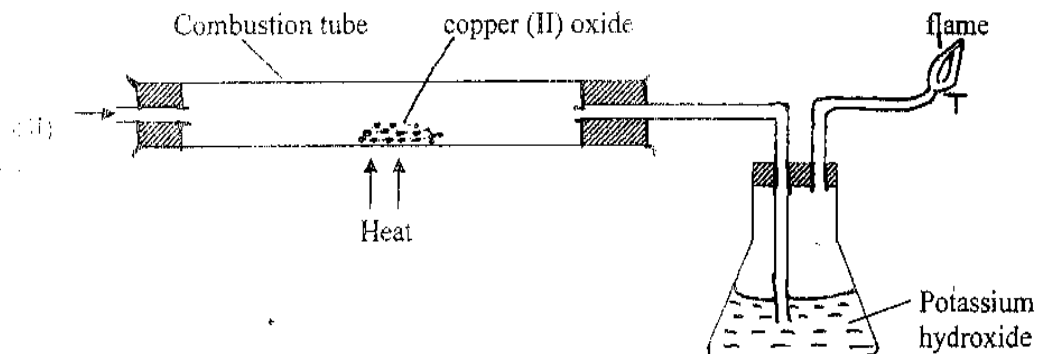
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(iii) State one use of sodium carbonate (1 mark)

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(f) Study the diagram below and answer the questions that follow



(i) Explain the observation made in the combustion tube during the experiment ( 2 marks)

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(ii) Write an equation for the reaction that takes place in the combustion tube ( 1 mark)

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(iii) What is responsible for the flame at the end of the tube marked T ( 1 mark)

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3. The table gives electrode potential obtained when half-cells of each of the metals represented by letters (not actual symbol) was connected to copper half-cell

Metal	Electrode potential (volts)
N	-2.70
P	-1.10
Copper	-
Q	-0.78
R	+0.45

(i) what is the electrode potential value for copper? Explain (1 mark)

(ii) Which is the strongest reducing agent? Explain (1 mark)

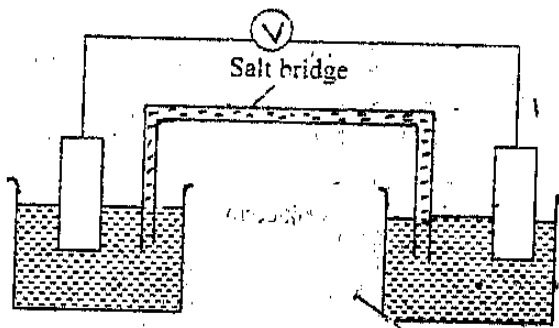
(iii) Work out the e.m.f of a cell represented by the equation below



State whether the reaction is feasible or not. Give a reason for your answer

(1 ½ marks)

(iv) Given that metal P is divalent while metal R is monovalent. Label the diagram below which shows an electrochemical cell between P and R (2 marks)



(v) write an equation for the half-cell reaction that occurs at each electrode. (2 marks)

Electrode P:

Electrode R:

(vi) Explain how a salt bridge filled with potassium chloride solution provides a balance of ions in the above cell. (1 ½)

- (b) A current of 5.0 amperes was passed through molten calcium bromide for 4 minutes. Calculate the mass of calcium deposited. (Ca = 40, 1 faraday = 96,500 coulombs ( 2 marks)

4. Study the information in the table below and answer the question that follow.

The letters do not represent the actual symbols of the elements

Elements	Atomic	Boiling point (K)
E	19	1047
Y	18	87
H	16	718
H	13	2743
J	3	1603

(a) Calculate the elements which belong to the same

(i) Group

( 1 mark)

(ii) Period

(b) Which element

(i) Is the gaseous state at room temperature? Explain

( 1 mark)

(ii) Does not form an oxide?

( 1 mark)

(c) Write the

(i) Formula of the nitrate of element H

( 1 mark)

- (ii) Equation for the reaction between elements J and G ( 1 mark)
- (d) The aqueous sulphate of element E was electrolyzed using inert electrodes. Write an ionic equation for the reaction at the anode ( 1 mark)
- (e) state the nature of oxide of element  
J \_\_\_\_\_ ( ½ mark)  
G \_\_\_\_\_ ( ½ mark)
- (f) What type of bond exists in the compound formed when elements H and H react? Give a reason for your answer ( 1 mark)
- (g) Compare the chemical reactivity of J and E with water. Explain your answer ( 1 mark)
5. Aluminium is extracted by electrolysis of molten alumina
- (a) Name the chief ore of aluminium ( 1 mark)
- ( b) Describe how the presence of aluminium in a sample of alumina can be confirmed using the following reagents in the given order, dilute nitric (V) acid, sodium hydroxide solution, ammonia solution and dilute sulphuric (VI) acid ( 3 marks)
- (c) Give two equations to show the role of sodium hydroxide solution in the purification of the chief ore of aluminium ( 2 marks)
- (d) What is the function of cryolite in the extraction of aluminium ( 1 mark)

(e) State one use of duralumin, an alloy of aluminium ( 1 mark)

(f) During the extraction of aluminium, carbon (IV) oxide is produced. Explain ( 2 marks)

(g) Write an equation for the reaction that forms aluminium ( 1 mark)

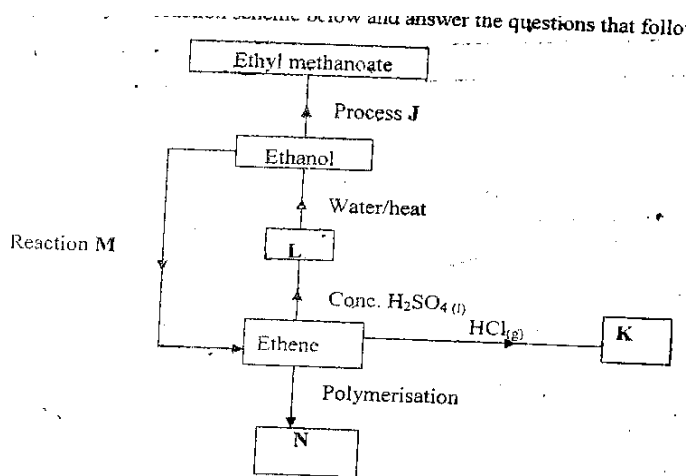
(h) Why is it not possible to extract aluminium by electrolysis of aqueous aluminium sulphate? ( 1 mark)

6. (a) Explain how bromine water can be used to distinguish propane from propane ( 3 marks)

(b) Draw the structural formula of the third member of the homologous series to which ethane belong ( 1 mark)



(d) Study the reaction scheme below and answer the questions that follow



- (i) Name  
 Process J ( 1 mark)  
 Reaction M ( 1 mark)

Substance N ( 1 mark)

- (ii) What is the reactant needed for process J to occur? ( 1 mark)  
 (iii) Give the conditions for process J to occur ( 1 mark)  
 (iv) Identify substance (2 mark)

K

L

- (v) Draw the structural formula of ethyl methanoate (1 mark)

- (vi) What type of reaction is producing substance K? ( 1 mark)

7. The table below shows the solubility of salt X at various temperatures. Study it and answer question that follow.

Temperature ( $^{\circ}\text{C}$ )	0	40	80	110	140
Solubility of X (g/100g water)	36	30	25	22	20

(a) use the grid provided to plot a graph of solubility of X against temperature  
( x – axis) ( 4 marks)

(b) From your graph:

(i) State the trend in solubility of X with temperature ( 1 mark)

(ii) Determine the temperature at which the solubility of X is 28g per 100g of water ( 2 marks)

(iii) Determine the mass of crystals that would separate out when the temperature of solution X is raised from  $20^{\circ}\text{C}$  to  $60^{\circ}\text{C}$  ( 2 marks)

(iv) State two uses of solubility curves ( 2 marks)

8.

9.