

Name _____ Index No. _____

Candidate's signature _____

Date _____

233/2

CHEMISTRY

PAPER 2

THEORY

JULY / AUGUST 2010

2 HOURS

FORM IV MID YEAR CONTINUOUS ASSESSMENT TEST

Kenya Certificate of Secondary Education

CHEMISTRY

PAPER 2

2 HOURS

INSTRUCTIONS TO CANDIDATES

- (a) Write your name and index number in the spaces provided.
- (b) Sign and write the date of examination in the spaces provided
- (c) Answer ALL the questions in the spaces provided.
- (d) Mathematical tables and electronic calculators may be used.
- (e) All working MUST be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

QUESTIONS	MAXIMUM SCORE	CANDIDATES SCORE
1	13	
2	11	
3	13	
4	10	
5	10	
6	11	
7	12	
TOTAL	80	

This paper consists of 14 printed pages

Turn Over

1. The grid below represents part of the periodic table (The letters do not represent the actual symbols of the elements).

				D		
A				E	F	
B	C				G	

- (a) (i) Select an element that can form an ion with a charge of -2. (1 mark)

- (ii) What type of structure will the chloride of D have. (1 mark)

- (iii) Explain how the reactivities of F and G. Compare (1 mark)

- (iv) Compare the atomic radius of C with that of B. (1 mark)

- (b) 2.5g of D react completely with 1.2dm³ of gas F at S.T.P.

- (i) Write a balanced equation for the reaction of D and gas F. (1 mark)

- (ii) Determine the relative atomic mass of D (Molar gas volume at s.t.p = 22.4dm³) (3 marks)

- (c) B and E burn in oxygen to form oxides.

- (i) State which of the two oxides is basic and which is acidic. (2 marks)

(ii) Write down the formulae of the oxides of B and E

(2 marks)

B

E

2. (a) The diagram below represents a set-up that was used to obtain dry nitrogen from air. Study it and answer the questions that follow.

Copper powder Air Tube P Heat Syringe Solid Q N_{2(g)} Aqueous NaOH

(i) Name solid Q _____ (1 mark)

(ii) What is the purpose of NaOH(aq) ? (1 mark)

(iii) Write an equation for the reaction which took place in tube P. (1 mark)

(iv) Give the name of one impurity in the nitrogen gas obtained. (1 mark)

(v) Why is liquid nitrogen used for storage of semen for artificial insemination. (1 mark)

(a) The set-up below was used to prepare nitric acid.

(i) Give the name of liquid R _____ (1 mark)

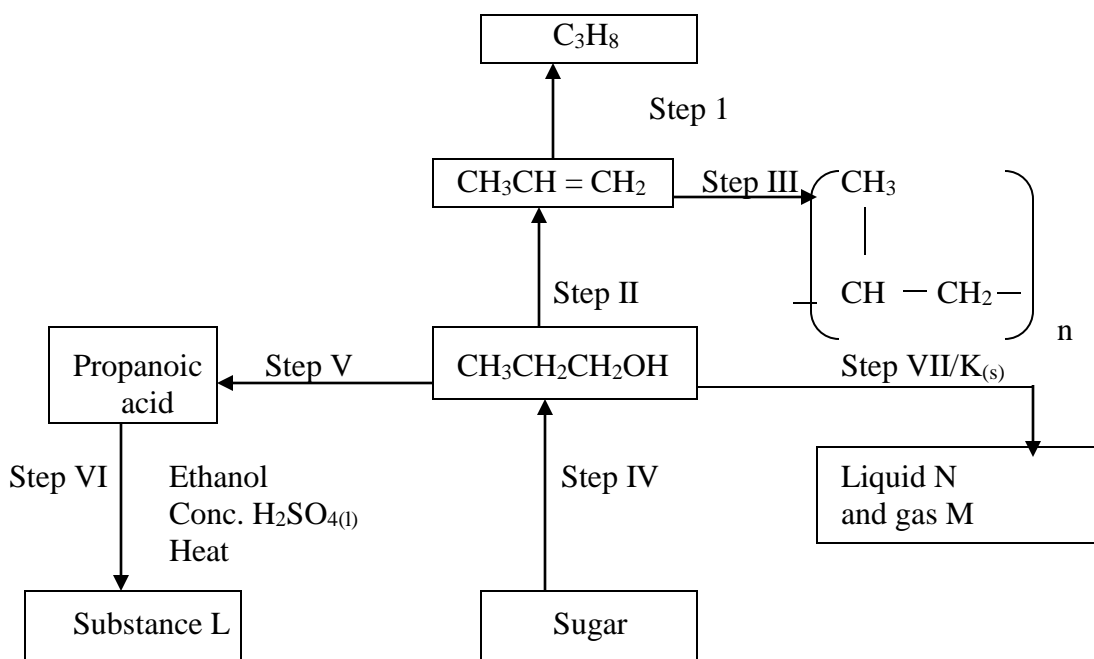
(ii) Write an equation for the reaction which took place in the glass retort. (1 mark)

(iii) Explain the following

(a) Nitric acid is not stored in clear / transparent glass. (2 marks)

(b) The reaction between copper metal with 50% nitric acid (one volume of acid added to an equal volume of water) in an open test tube gives brown fumes. (2 marks)

3. Study the flow chart below and answer the questions that follow.



(a) (i) Name the type of reaction in the steps marked III and IV. (2 marks)

(ii) Name the important reagents and conditions in steps marked I, II and V. (3 marks)

(b) (i) Write balanced equations for the reactions taking place in steps VI and VII. (2 marks)

Step VI

Step VII

(ii) Give the systematic names of
Liquid N

(2 marks)

Substance L

(c) State two chemical tests used to distinguish between C_3H_8 and C_3H_6 .

(2 marks)

3. (i) If the relative molecular mass of the compound formed in step III is 42000,
determine the value of n in the compound. (C = 12.0, H = 1.0).

(2 marks)

(ii) State one disadvantage of the continued use of items made from the
compound formed in (d) (i) above.

(1 mark)

4. (a) Hexane and ethanol are miscible liquids. Ethanol is soluble in water while hexane is
insoluble. Explain how water can be used in the separation of hexane and ethanol.
(Density of water = 1.00g/cm^3 , ethanol = 0.79g/cm^3 , hexane = 0.66g/cm^3).

(b) Study the set up below and answer the questions that follow.

Zinc granules Dilute hydrochloric acid Anhydrous calcium chloride Gas T

(a) Identify gas T _____ (1 mark)

(b) Write equation for the reaction liberating gas T. (1 mark)

(c) Why is it not advisable to use sodium in place of zinc granules? (½ mark)

(d) What is the purpose of anhydrous calcium chloride in the U-tube? (½ mark)

(e) Name another compound that could serve the same purpose as anhydrous calcium chloride. (½ mark)

(f) Give another metal that could be used in place of zinc. (½ mark)

(g) Name the method used to collect the gas and give the property of the gas that enables it to be collected using the method. (½ mark)

(h) Why is it not advisable to collect the first portions of the gas. (1 mark)

5. The table below shows some standard electrode potential for some electrodes.

Half reaction	Reduction potential (V)
$\text{Mg}^{2+}_{(\text{aq})} + 2\text{e}^{-} \longrightarrow \text{Mg}_{(\text{s})}$	-2.36
$\text{Ag}^{+} + \text{e}^{-} \longrightarrow \text{Ag}_{(\text{s})}$	-0.80
$\text{Zn}^{2+}_{(\text{aq})} + 2\text{e}^{-} \longrightarrow \text{Cu}_{(\text{s})}$	-0.76
$\text{Cu}^{2+}_{(\text{aq})} + 2\text{e}^{-} \longrightarrow \text{Cu}_{(\text{s})}$	+0.34
$\text{Cl}_{2(\text{g})} + 2\text{e}^{-} \longrightarrow 2\text{Cl}^{-}_{(\text{aq})}$	+1.36
$\text{F}_{2(\text{g})} + 2\text{e}^{-} \longrightarrow 2\text{F}^{-}_{(\text{aq})}$	+2.87

(a) Which pair of electrodes when use in a cell would produce the greatest e.m.f ? (1 mark)

(b) Identify the strongest agent and the strongest reducing agent. (2 marks)

(c) Given the $\text{Zn}_{(\text{s})} / \text{Zn}^{2+}_{(\text{aq})} // \text{Ag}^{2+}_{(\text{aq})} / \text{Ag}_{(\text{s})}$:

(i) Draw the cell diagram for the above cell. (3 marks)

(ii) What is the e.m.f. of the cell?

(2 marks)

(iii) What is the meaning of the two parallel lines in the cell representation.

(2 marks)

6. The diagram below shows a set up for the extraction aluminium. Study it and answer the questions that follow.

Carbon anodes Anode Cathode Powdered coke Molten aluminium
Fused cryolite + alumina
($\text{Na}_3\text{AlF}_6 + \text{Al}_2\text{O}_3$)

(a) Name the main ore from where aluminium is extracted.

(1 mark)

(b) Explain why the ore is first dissolved in hot aqueous sodium hydroxide. (2 marks)

(c) Write equation for the reactions that take place at:

(i) The anode. (1 mark)

(ii) The cathode (1 mark)

(d) State why the graphite lining is used as the cathode. (1 mark)

(e) Explain why the anode has to be replaced from time to time. (1 mark)

(f) Give two reasons of mixing aluminium oxide with cryolite in the electrolyte cell. (2 marks)

(g) Give two industrial uses of aluminium. (2 marks)

7. The following experiment was used to study the reaction between lead (II) nitrate and potassium iodide solutions. Both are ionic compounds. 10cm^3 of 0.4M solutions of potassium iodide were put in 10 different test tubes. Different volumes of a 0.25M solution of lead (II) nitrate were added to the different test tubes and they were shaken and left to stand. A yellow precipitate and a colourless solution were formed in each case. The height of the precipitate in each case was measured. The following table gives the height of precipitate in millimeters (mm) and the volume of lead (II) nitrate.

Height of precipitate (mm)	5	10	15	20	25	30	35	39	39	39
Volume of lead (II) nitrate (cm ³)	1	2	3	4	5	6	7	8	9	10

- (a) Using a suitable scale draw a graph of height of precipitate against volume of lead (II) nitrate added.

(3 marks)

(b) Name the yellow precipitate formed during the experiment. (1 mark)

(c) From the graph, what is the height of the precipitate on adding 5.4cm³ of lead (II) nitrate solution. (1 mark)

(d) Why does the height of the precipitate remain constant after some time. (1 mark)

(e) What volume of lead (II) nitrate is required for complete precipitation. (1 mark)

(f) How many moles of potassium iodide are present in 1dm³ of 0.4M solution of potassium iodide ? (1 mark)

(g) What volume in cm³ of 0.25m lead (II) nitrate are required to react completely with 1dm³ of 0.4M potassium iodide ? (2 marks)

(h) How many moles of lead (II) nitrate are present in (g) above ?

(1 mark)

(i) Write the ionic equation for the reaction between lead (II) nitrate and potassium iodide. (1 mark)
