Name ………………………………………………...…………	**Index No.**……………………………….…………………

School …………………………………………………………...	**Candidate's Signature** ………………………

Date ……………….......................……….

233/2
CHEMISTRY
PAPER 2
(THEORY)
JULY / AUGUST
TIME: 2 HOURS

LOWER YATTA DISTRICT JOINT EVALUATION EXAM - 2011

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

233/2
CHEMISTRY
PAPER 2
(THEORY)
JULY / AUGUST
TIME: 2 HOURS

INSTRUCTIONS:

- Write your name and index number in spaces provided above
- Answer **ALL** the questions in the spaces provided
- Mathematical tables and electronic calculators may be used
- All working must be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

Question	Maximum Score	Candidates score
1	14	
2	12 ½	
3	12	
4	13	
5	7	
6	11	
7	10 ½	
TOTAL SCORE	80	

This paper consists of 10 printed pages.
Candidates should check to ensure that all pages are printed as indicated and no questions are missing

	Turn Over

1. a) The grid given below represents part of the periodic table. Study it and answer the questions that follow. (The letters do not represent the actual symbols of the elements).

D								D
							J	
E	F		H					
	G						K	

i) What name is given to the group in which J and K belong? (1 Mark)

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ii) Why is D placed in two positions in the periodic table? (1 Mark)

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iii) The ionic radius of K is larger than that of G. Explain. (2 Marks)

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iv) The electrone affinity of J is smaller than that of K. Explain. (2 Marks)

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v) The electrone configuration of ion X^{2-} is 2.8.8. On the grid, indicate the position of X. (1 Mark)

b) Study the information in the table below and answer the question that follow. (The letters do not represent the actual symbols of the substances).

Substance	Melting point (^{o}c)	Boiling point ^{o}c	Solubility in water	Density at room temperature g/cm^3
A	-117	78.5	Very soluble	0.8
B	-78	-33	Very soluble	0.77×10^{-3}
C	-23	77	Insoluble	1.6
D	-219	-183	Slightly soluble	1.33×10^{-3}

i) Which substance would dissolve in water and could be separated from the solution by fractional distillation? Explain. (2 Marks)

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ii) Which substance is a liquid at room temperature and when mixed with water two layers could be formed. (1 Mark)

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iii) Which letters represents a substance that is a gas at room temperature and which can be collected:-

I. Over water. Explain. (2 Marks)

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II. By downward displacement of air? (Density of air 1.29 x 10^{-3}g/cm^3 at room temperature) (2 Marks)

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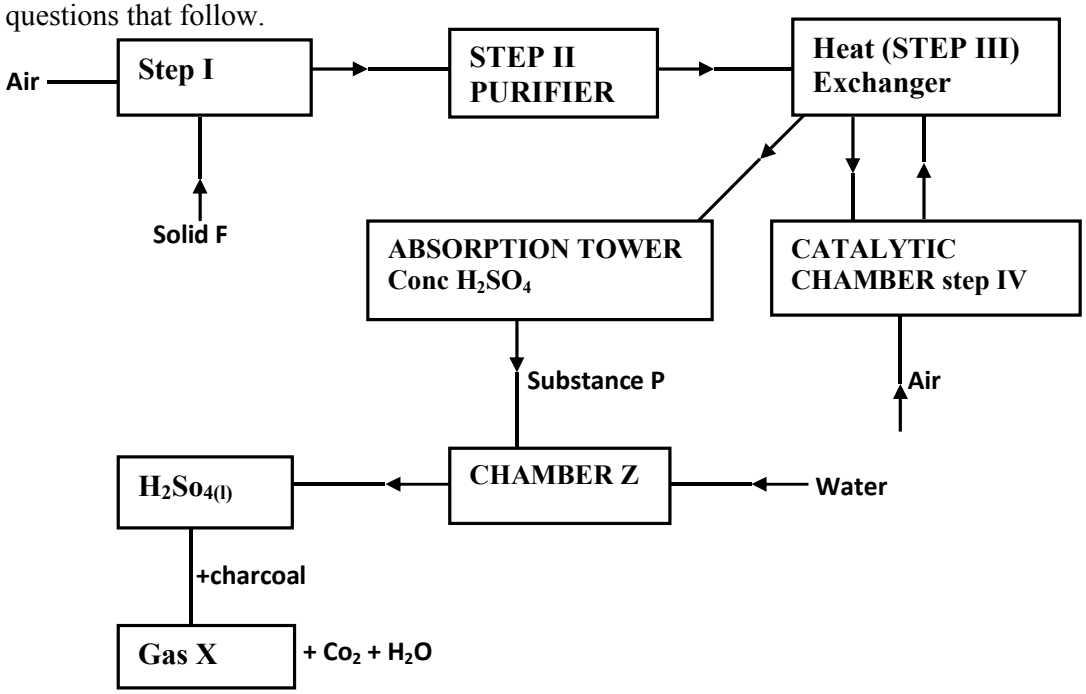
2. Sulphuric acid is manufactured by contact process. Study the flow chart below and answer the questions that follow.



a) Identify.

i) Solid F. (½ Mark)

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ii) Chamber Z. (½ Mark)

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iii) Substance P. (½ Mark)

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iv) Gas X. (½ Mark)

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b) i) Name the appropriate catalyst that can be used in step IV. (1 Mark)

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ii) Which impurities are found in step II? (1 Mark)

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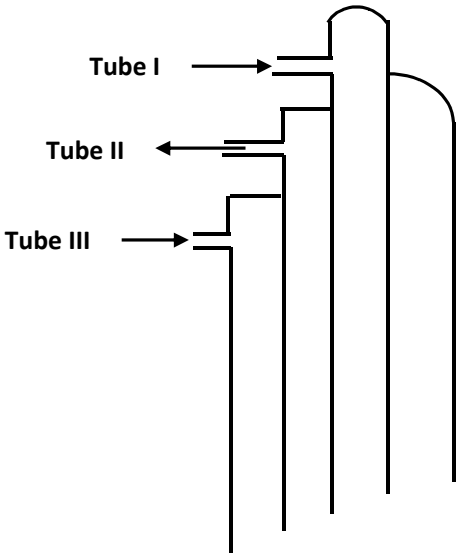
c)



Label the tube in which:- (2 Marks)

I) Superheated water was passed.

II) Compressed air.

III) What is the function of superheated water in the frasch process? (½ Mark)

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d) I) What is the main pollutant in contact process? (1 Mark)

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II) Give **two** uses of sulphuric acid. (2 Marks)

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e) 100cm^3 of Sulphuric (VI) acid was diluted with water to make 1000cm^3 of solution. The diluted Sulphuric acid was then titrated with aqueous sodium hydroxide, NaOH.

$H_2SO_{4\,(aq)} + 2NaOH_{\,(aq)} \longrightarrow Na_2SO_{4\,(aq)} + 2H_2O_{\,(l)}$

In the titration, 25.0cm^3 of 0.1mol dm^{-3} aqueous sodium hydroxide required 20cm^3 of the diluted Sulphuric (VI) acid for neutralization.

i) Calculate the moles of NaOH used. (1 Mark)

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ii) Calculate the concentration in moldm^{-3} of diluted sulphuric (VI) acid. (2 Marks)

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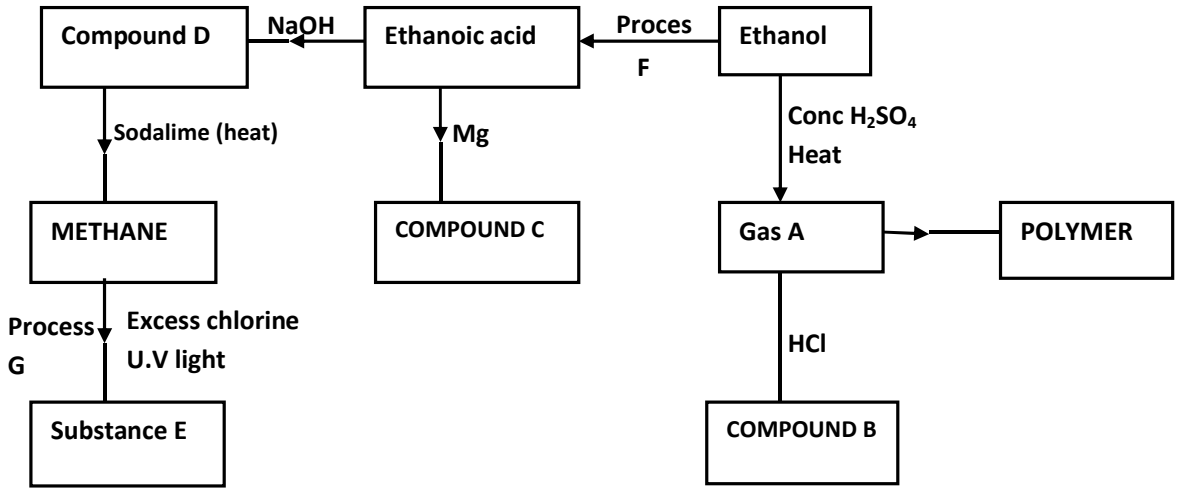
3. The flow chart below shows the series of reactions starting with Ethanoic acid.



Name (2 Marks)

A. I. Process F.

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II. Process G.

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B. Substances. (3 Marks)

B ……

D ……

E……

C. Write chemical equation to show how compound C is formed. (1 Mark)

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D. I. Draw and name the polymer formed when compound A undergoes self-addition. (2 Marks)

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II. Given that the relative molecular mass of the polymer is 812 calculate the number of monomers in the polymer. (C=12 H=1). (2 Marks)

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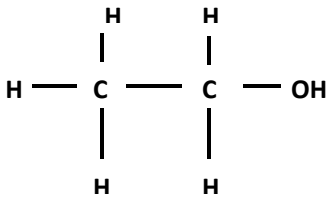
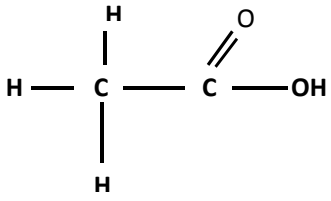
E. Describe a chemical test that can be carried out in order to distinguish between.



and



(2 Marks)

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4. The following results were obtained in an experiment to determine heat of neutralization of $50cm^3$ of 2M HCl and 2M NaOH.

Mass of plastic Cup	= 50.0
Initial temperature of Acid	= 29^oc
Initial temperature of Alkali	= 25^oc
Mass of plastic cup +HCl +NaOH	= 150.0
Final temperature of resulting solution	= 38.5^oc

a) Define molar heat of neutralization. (1 Mark)

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b) Write an ionic equation for the neutralization of hydrochloric acid and sodium hydroxide. (1 Mark)

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c) Given specific heat capacity of the solution is 4.2KJ $Kg^{-}K^{-}$, density 1g/cm^3, calculate :-

i) The amount of heat produced during the experiment. (3 Marks)

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ii) Molar heat of neutralization. (3 Marks)

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d) Write the thermochemical equation for the reaction above. (1 Mark)

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e) Draw an energy level diagram for the above reaction. (2 Marks)

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f) When the HCl in the above experiment was replaced with ethanoic acid the value for molar heat of neutralization was found to be lower. Explain. (2 Marks)

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5. A weather indicator can be made with a hydrated cobalt II chloride, which changes colour as a result of the following:-

$Co(OH_2)_6\ Cl_{2(s)} \rightleftharpoons Co(OH_2)_4Cl_{2(s)} + 2H_2O_{(l)}$

Pink Blue

a) Does the blue colour indicator "moist" or "dry" air? Explain. (3 Marks)

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b) Explain the effect of each of the following;

i) Addition of fused calcium chloride. (2 Marks)

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ii) Addition of water. (2 Marks)

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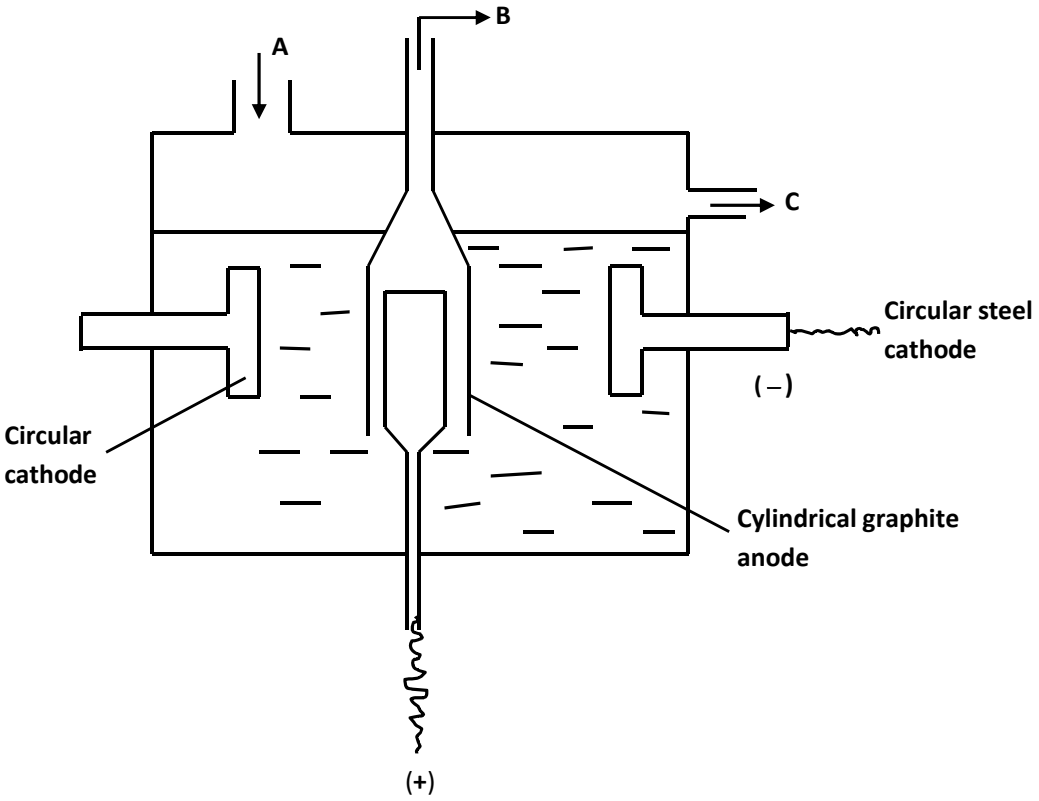
6. Below is a diagram of Down's cell that is to extract sodium by electrolysis.



a) What is added through A? (1 Mark)

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b) The Down's cell must be operated at high temperature of about 600°c. Why is this necessary? (1 Mark)

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c) In Down's cell, the cathode is made of steel, but Anode is made of graphite. Why is the anode made of graphite inspite of the fact that steel would be a better conductor? (2 Marks)

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d) Why is it necessary to use steel diaphragm. (1 Mark)

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e) State one property which makes it possible for sodium to be collected as shown in the diagram. (1 Mark)

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f) Can Mercury be used as cathode? Explain your answer. (2 Marks)

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g) During the electrolysis of molten sodium Chloride, a current of 30,000A and 6.7V is passed through electrolyte for 2 hours.

i) From this statement state one factor that must be considered when locating the site of the Down's cell. (1 Mark)

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ii) State two uses of Sodium. (2 Marks)

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7. Study the electrode potential in the table below and answer the question that follow.

Half cell			(volts)
½ $A_{2(g)}$ + $2e^-$	⟶	$W^-_{(aq)}$	+1.88
$B^{2+}_{(aq)}$ +$2e^-$	⟶	B	+0.34
$C^+_{(aq)}$ +e^-	⟶	½ $C_{2(g)}$	0.00
$D^{2+}_{(aq)}$ +2e	⟶	$D_{(s)}$	-0.80
$E^+_{(aq)}$ + e	⟶	$E_{(s)}$	-2.48
$F^{2+}_{(aq)}$ + e	⟶	$F_{(s)}$	-2.87

a) i) State the strongest reducing agent. (1 Mark)

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ii) Which element is likely to be hydrogen? Give a reason for your answer. (1½ Mark)

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iii) Draw a labelled diagram of electrochemical cell that would be obtained when half-cells of element B and E are combined. (3 Marks)

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iv) Can a solution of D be stored in a container made of element A? Explain. (2 Marks)

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b) During electrolysis of aqueous copper (II) sulphate using copper electrodes a current of 0.4A was passed through the cell for 45 minutes given (IF 96500C, Cu = 64.0). Determine the mass deposited at the cathode. (3 Marks)

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