Name …… Index No……

School …… Candidate's Signature ……

Date ……

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

MASINGA DISTRICT JOINT EVALUATION TEST - 2011

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

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

INSTRUCTIONS

a) Write your name and the Index Number in the spaces provided above.
b) Answer **ALL** the questions in the spaces provided after each question.
c) Use of Mathematical sets and silent calculators may be used.
d) **All** working should be clearly shown.

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QUESTIONS	EXPECTED SCORE	CANDIDATES SCORE
1	10	
2	12	
3	10	
4	10	
5	14	
6	10	
7	13	
TOTAL	**80**	

This paper consists of 12 printed pages.
Candidates should check to ensure that all pages are printed as indicated and no questions are missing.

 Turn Over

1. a) State **two** environmental effects of fuel.

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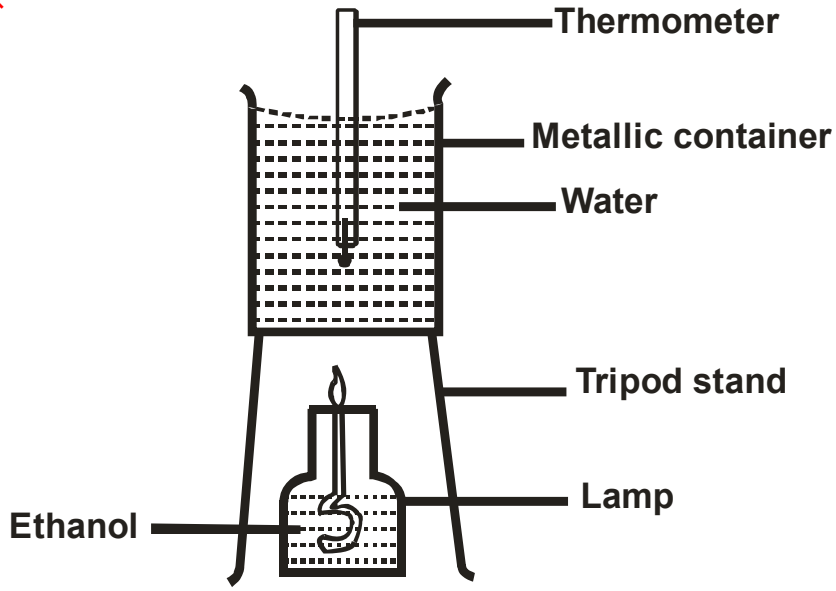
b) The diagram below represents a set up that was used to determine the molar heat of combustion of ethanol



During the experiment the data given below was recorded.

Volume of water	$450cm^3$
Initial temperature of water	25^0c
Final temperature of water	46.5^0c
Mass of ethanol + lamp before burning	125.5g
Mass of ethanol + lamp after burning	124.0g

Calculate

i. Heat evolved during the experiment.
Density of water $=1g/cm^3$, specific heat capacity of water $=4.2jg^{-1}k^{-1}$) (3 Marks)

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ii. Molar heat of combustion of ethanol
(C=12.0 O=16.0 H=1.0) (2 Marks)

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c) Write the equation for the complete combustion of ethanol. (1 Mark)

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d) The value of the molar heat of combustion of ethanol is -1368Kj/mole.

i. State the meaning of the negative sign in the value above. (1 Mark)

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ii. Why does the value calculated from experimental results differ from this. (1 Mark)

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2. a)Draw the structures of the following compounds

i. 2,2, – dimethyl propane. (1 Mark)

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ii. Hexanoic acid . (1 Mark)

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b) State the observations made when hexanoic acid reacts with.

i. Acidified potassium dichromate (VI) solution (1 Mark)

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ii. Sodium metal (1 Mark)

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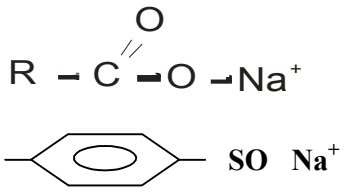
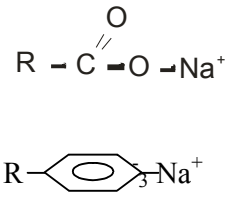
c) The structures below represents two cleansing agents.



In the table below give one advantage and one disadvantage of using each one of them.

	Advantage	Disadvantage
		

(2 Marks)

d) Under certain conditions, ethanoic acid ($C_2H_4O_2$) and ethanol (C_2H_5OH) reacts to form a sweet smelling compound.

i. What is the general name of the compounds to which the sweet smelling compound belongs.

(1 Mark)

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ii. Write the formula of the sweet smelling compounds. (1 Mark)

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iii. Give one use of ethanoic acid other than the formation of the sweet selling compounds.

(1 Mark)

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iv. Write the equation for the reaction between dilute ethanoic acid and olid potassium carbonate. (1 Mark)

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e) Fibres are either synthetic or natural. give one

i. Example of a natural fibre. (1 Mark)

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ii. One disadvantage of synthetic fibres (1 Mark)

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3. a) The table below shows the standard reduction potentials for four half–cells. Study it and answer the questions that follow (letter are not the actual symbols for the elements)

				(Volts)
$F_{2(aq)}$	+ 2 e	⟶	$2F^-_{(aq)}$	+0.54
$G^{2+}_{(aq)}$	+ 2e	⟶	$G_{(s)}$	-0.44
$H^{2+}_{(aq)}$	+ 2e	⟶	$H_{2(g)}$	+0.34
$2J^+_{(aq)}$	+ 2e	⟶	$J_{2(g)}$	0.00

i. Identify the strongest reducing agents. (1 Mark)

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ii. Write the question for the reaction which takes place when solid G is added to a solution containing H^{2+} ions. (1 Mark)

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iii. Calculate the E^0 value for the reaction in (ii) above. (1 Mark)

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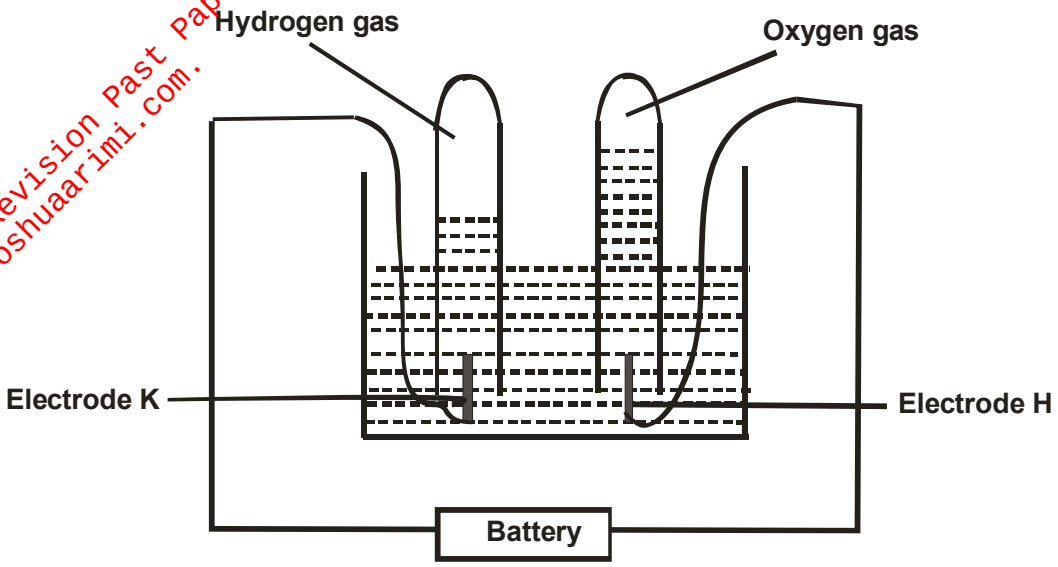
b) The diagram below shows the apparatus that can be used to electrolyse acidified water to obtain hydrogen and oxygen gases. Study it and answer the questions that follow.



i. Identify the electrode at which oxidation takes place. (1 Mark)

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ii. Give a reason why it is necessary to acidify the water. (1 Mark)

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iii. Explain why hydrochloric acid is not used to acidify the water. (2 Mark)

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c) During electrolysis of aqueous copper (ii) sulphate 144750 coulombs of electricity were used. Calculate the mass of copper metal that was obtained (Cu=64; 1 Faraday =96500 coulombs)

(3 Marks)

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4. a) An atom of K can be represented as . What does the number 19 represent? (1 Mark)

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b) Study the information in the table below and answer the questions that follow (letters are not the actual symbols of the elements)

Element	Element arrangement of stable ion	Atomic radius (nm)	Ionic radius (nm)
N	2.8.8	0.197	0.099
P	2.8.8	0.099	0.181
R	2.8	0.160	0.065
S	2.8	0.186	0.095
T	2	0.152	0.068
U	2.8	0.072	0.136

i. Write the formula of the compound formed when N reacts with P.
(Atomic numbers are N=20 P=17) (1 Mark)

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ii. Identify the elements which belong to the third period of the periodic table. Explain (2 Marks)

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iii. Which of the elements identified in b(ii) above comes first in the third period? Explain (2 Marks)

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iv. Select two elements which are non- metals. (1 Mark)

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c) The table below gives some properties of substances I, II, III and IV. Study it and answer the questions that follow.

Substance	**Electrical conductivity**		M.P^{0}C	B.P^{0}C
	Solid	liquid		
I	Does not Conduct	Conducts	801	1420
II	Conducts	Conducts	650	1107
III	Does not Conduct	Does not Conduct	1700	2200
IV	Does not Conduct	Does not Conduct	113	440

i. What type of bonding exists in substance I and II (2 Marks)

I……

II……

ii. Which substance is likely to be sulphur? Explain (2 Marks)

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5. a) A salt believed to contain chloride ions was dissolved in water to form a solution.

i. Describe how a sample of the solution could be tested to find out if it contained chloride ions. (2 Marks)

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ii. Calculate the percentage by mass of chloride in potassium chloride. (K=39.0 Cl=35.5) (1 Mark)

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b) 20g of potassium chloride were placed in a glass beaker and 40.0cm^3 of water were added. The beaker was heated until all the potassium chloride had dissolved and then allowed to cool. When crystals first appears the temperature was noted. An extra 5.0cm^3 of water were added and the experiment was repeated. The results of experiment were as shown below.

Experiment	Volume of water (cm$^{3)}$	Temperature at which crystals formed	Solubility in g/100g of water
1	40	77	-
2	45	56	44.5
3	50	40	-
4	55	26	36.3
5	60	15	-
6	65	8	30.8

i. Calculate the values of solubility in g/100g of water which are missing from the table. (3 Marks)

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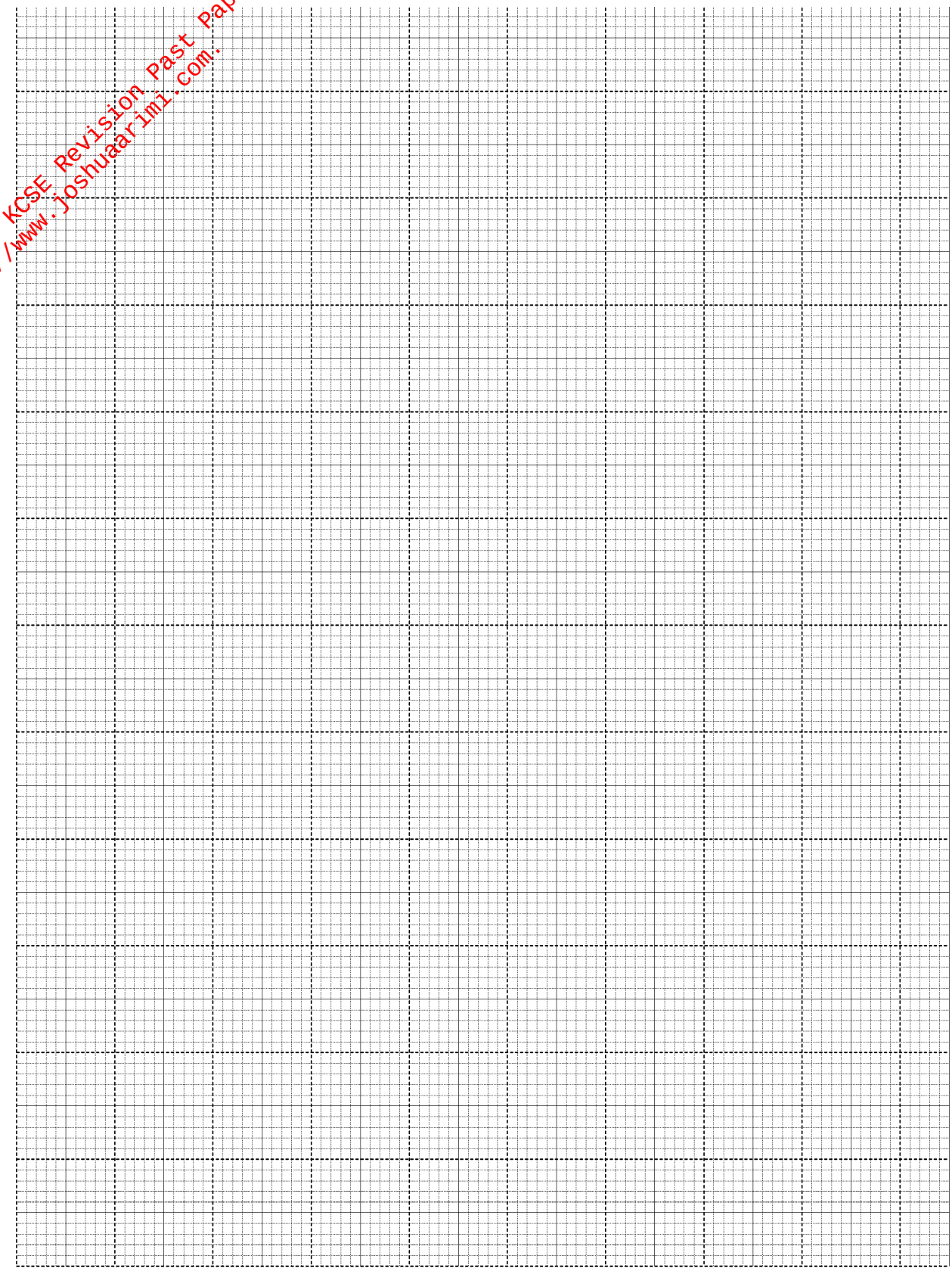
ii. On the grid provided plot the graph of values of solubility (vertical axis) against temperature (horizontal axis) (3 Marks)



iii. What is the effect of temperature on solubility of potassium chloride in water? (1 Mark)

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iv. From the graph

I. What is the solubility of potassium chloride at 60^0c? (1 Mark)

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II. At what temperature will solubility be 35g/100g of water? (1 Mark)

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III. What is the mass of crystals deposited when the solution is cooled from 70^0c to 40^0c? (2 Marks)

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6. In an experiment a piece of aluminium ribbon was cleared with steel wool. 2.4g of the clean aluminium ribbon was placed in a crucible and completely burnt in oxygen. After cooling the product weight 4.0g.

a) Explain why it was necessary to clean the aluminium ribbon? (1 Mark)

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b) What observation was made in the crucible after burning? (1 Mark)

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c) Why was there an increase in mass? (1 Mark)

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d) Write equation for the reaction which took place in the crucible. (1 Mark)

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e) The product in the crucible was shaken with water and filtered. Explain the observation which was made when blue and red litmus papers were dropped into the filtrate. (3 Marks)

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f) Calculate the volume of oxygen gas used during the burning (O=16; molar volume of gas is 24000cm^3 at room temperature) (3 Marks)

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g) State one use of oxygen. (1 Mark)

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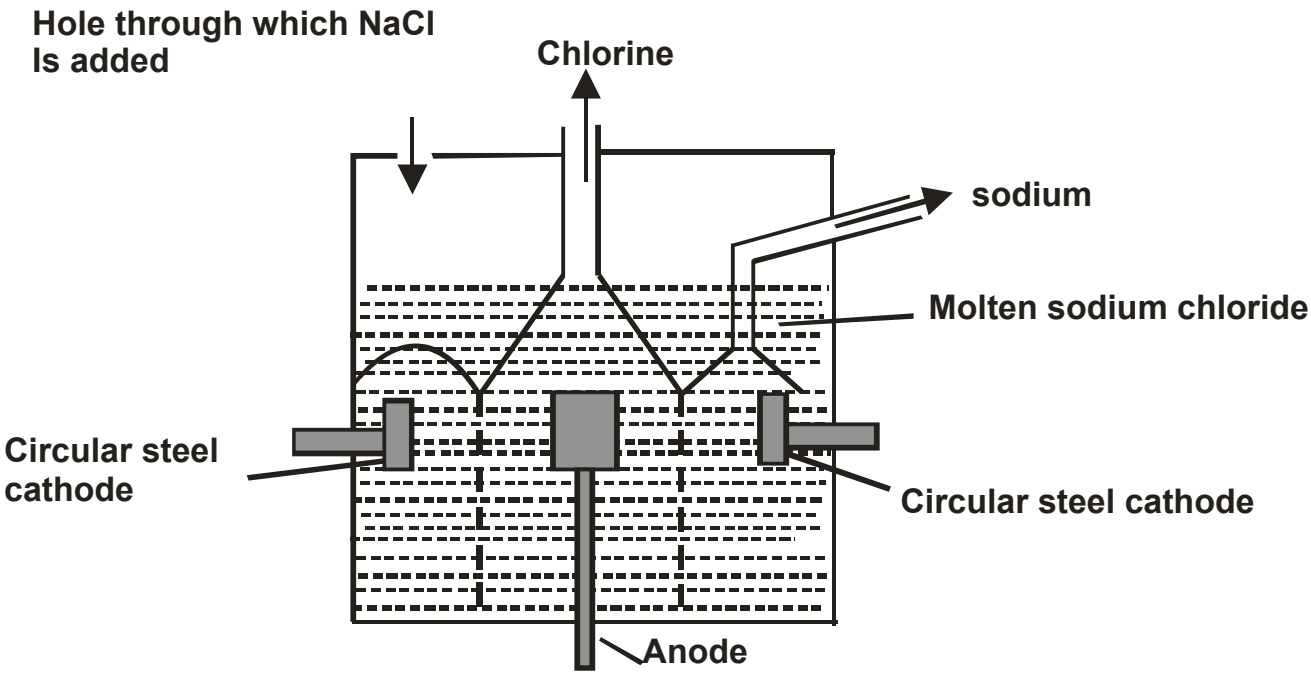
7. a) Below is a simplified diagram of the Down's cell used for the manufacture of sodium. Study it and answer the questions that follow.



i. What material is the anode made of? Give a reason (2 Marks)

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ii. What precautions is taken to prevent chlorine and sodium from re-combining. (1 Mark)

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iii. Write an ionic equation for the reaction in which chlorine gas is formed. (1 Mark)

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b) In the Downs process (used for manufacture of sodium) a certain salt is added to lower the melting point of sodium chloride from about 800^0c to about 600^0c.

i). Name the salt that is added. (1 Mark)

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ii).State why it is necessary to lower the temperature. (1 Mark)

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c).Explain why aqueous sodium chloride is not suitable as an electrolyte for the manufacture of sodium in the Downs process. (2 Marks)

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d).Sodium metal reacts with air to form two oxides. Give the formulae of the two oxides. (2 Marks)

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e).State three uses of sodium metal. (3 Marks)

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