

NAME:INDEX:DATE.....
SCHOOL:SIGNATURE.....

233/2
CHEMISTRY PAPER 2
THEORY
2 HOURS
JULY/AUGUST 2010

BELGUT/AINAMOI JOINT EXAMINATION Kenya Certificate of Secondary Education 2010

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CHEMISTRY
PAPER 2
JULY/AUGUST 2010

INSTRUCTIONS TO CANDIDATES

- ❖ Write your name and index number in spaces provided above
- ❖ Sign and write the date of examination in the spaces provided above
- ❖ Answer **ALL** questions in the spaces provided.
- ❖ Mathematical tables and silent electronic calculators **may** be used.
- ❖ All workings **must** be clearly shown where necessary.

For Examiners' Use Only

Questions	Maximum Score	Candidates Score
1	10	
2	13	
3	11	
4	14	
5	11	
6	9	
7	12	
TOTAL	80	

1. The table below gives information on four elements represented by letters K,L,M and N. Study it and answer the questions that follow. Note that the letters are not the actual symbols for the elements.

Element	Electron arrangement	Atomic radius (nm)	Ionic Radius (nm)
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2.8.8.2	0.174	0.099

- a) Which two elements have similar chemical properties; explain. (2mks)

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- b) What is the most likely formula of the oxide of L. (1mk)

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- c) Which element is a non – metal? Explain (1mk)

.....

- d) Which one of the elements is the strongest reducing agent? Explain (2mks)

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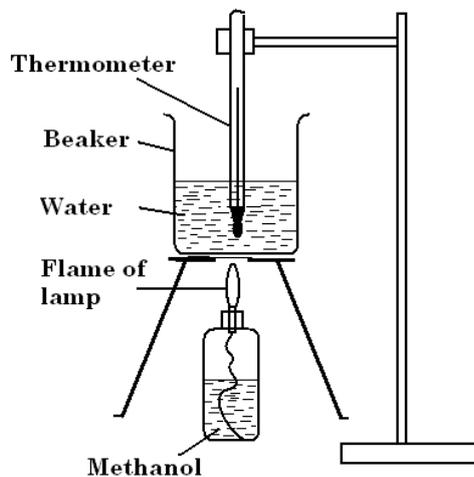
- e) Explain why the ionic radius of N is less than that of M (2mks)

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- f) Explain why the ionic radius of L is bigger than its atomic radius. (2mks)

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2. In an experiment to determine the heat of combustion of Methanol, CH₃OH, a student used a set – up like the one shown in the diagram below. Study the set – up and the data below it and answer the questions that follow.



Volume of water = 500cm³
 Final temperature of water = 27.0°C
 Initial temperature of water = 20.0°C
 Final mass of lamp + Methanol = 22.11g
 Initial mass of lamp + Methanol = 22.98g
 Density of water = 1.0gcm⁻³

(Specific heat capacity = 4.25 Jg⁻¹ °C⁻¹)

a) Calculate

i) The number of moles of Methanol used in the experiment.

(C = 12, O = 16, H = 1) (2mks)

ii) The heat change in this experiment. (1mk)

iii) The heat of combustion per mole of Methanol. (2mks)

b) Explain why the value of the molar heat of combustion of Methanol obtained in this experiment is different from the theoretical value. (2mks)

.....

c) On the axis below draw an energy level diagram for the combustion of the methanol. (2mks)



d) The table below gives factors which affect the rate of the reaction between Zinc and Hydrochloric acid.

i) Complete the table to show how the factors given affect the rate of reaction and give explanation for each effect. (2mks)

Factor	Effect on the rate of reaction	Explanation
Using Zinc powder instead of Zinc granules		
Heating the reactants		

(ii) Name the catalyst that will be added to increase the rate of reaction. (1mk)

.....

ii) Write an equation between the metal acid above. (1mk)

3. A hydrocarbon has a molecular mass 54 and has four Carbon atoms. (**C = 12, H=1**)

a) i) Name the homologous series to which Hydrogen belongs. (2mks)

.....

ii) Draw and name two isomers of the hydrocarbon.

(2mks)

b) The following table is showing physical properties of five alkanes

i) Draw and name the structures of all the isomers of Pentane.

(3mks)

Name	Formula	M.P (K)	B.P
Methane	CH ₄	90	112
Ethane	C ₂ H ₆	91	184
Propane	C ₃ H ₈	85	231
Butane	C ₄ H ₁₀	138	273
Pentane	C ₅ H ₁₂	143	309

ii) From the table state two reasons why the melting and boiling points increase down the series.

(2 mks)

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.....

c) Biogas is fuel that is improved by removing an impurity by passing it through an alkaline solution.

i) Name **two** main components of Biogas

(1mk)

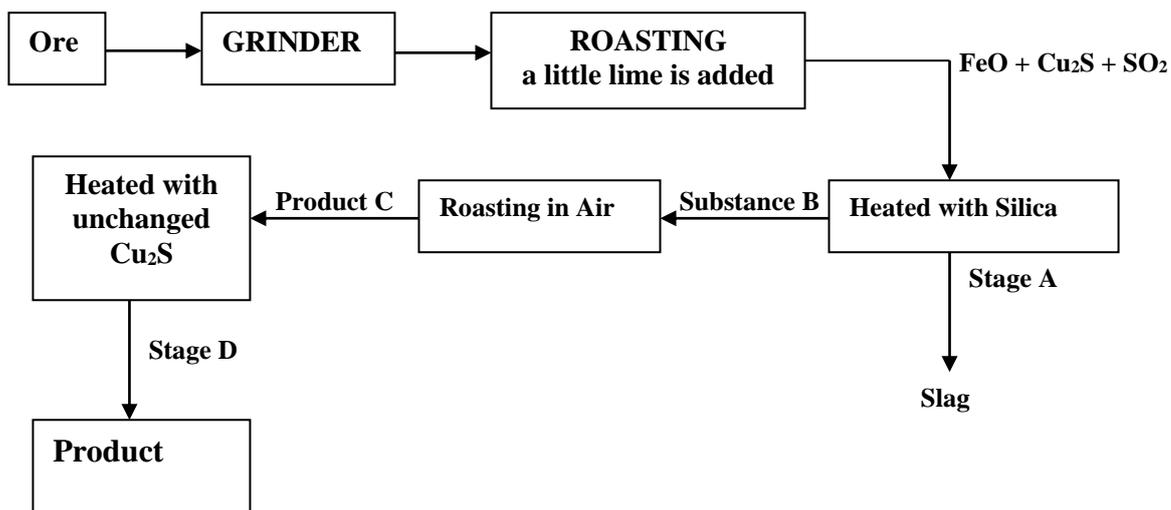
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ii) State a reason why Biogas is a fuel

(1mk)

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4. a) Study the flow chart below and answer the questions that follow



i) Name the main ore processed in the scheme above. (1mk)

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ii) Why is a little lime added at the roasting stage (1mk)

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iii) Give the equation for the formation of slag tapped in stage A. (2mks)

iv) Identify the following;

Substance B (1mk)

.....

Product C (1mk)

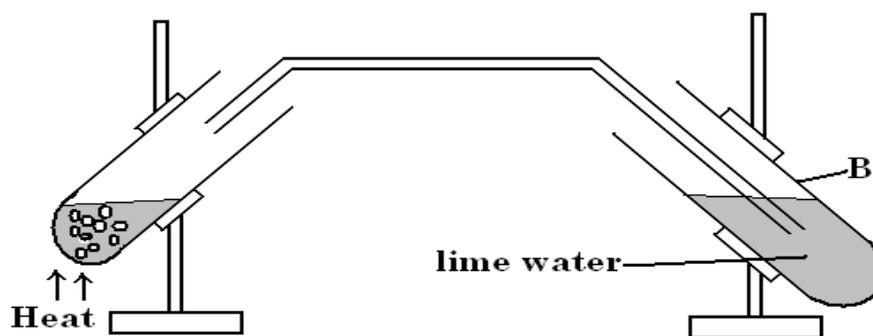
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v) What is the name given to the product obtained in stage D (1mk)

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vi) Draw a well labelled diagram to show how the Copper obtained can be purified (2mks)

b) A student set – up the apparatus shown below to investigate the effect of heat on a sample of Zinc carbonate.



i) State the observation made in the test tubes, when test tube A is heated strongly. (2mks)

A

.....

B.....

.....

ii) Write an equation for the reactions that occur in. (2mks)

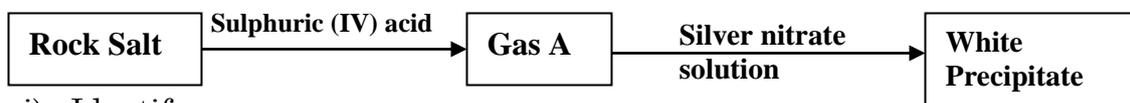
A

B

c) Name **one** use of Zinc other than galvanizing. (1mk)

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5. a) Study the flow chart below and answer the questions that follow.



i) Identify, gas A (1mk)

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White precipitate (1mk)

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.....

ii) Write an ionic equation of the white precipitate. Show your working. (2mks)

b) The atomic number of a trivalent metal M (*not its actual symbol*) is 13.

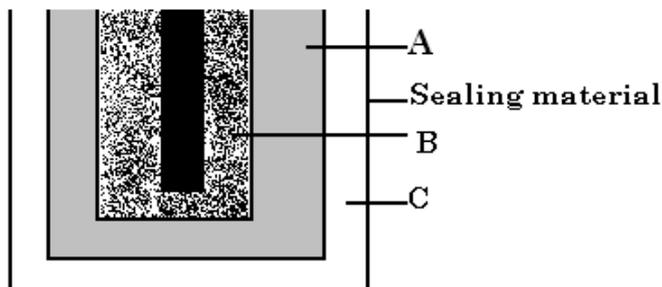
i) Write the chemical formula of its oxide (1mk)

ii) Fused metal M oxide conducts electricity. Write half equations for the reactions that occur during electrolysis at

Anode. (1mk)

Cathode (1mk)

c) Below is a diagram of an ordinary dry leclanche cell used in torches.



i) What is meant by primary cell. (1mk)

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ii) Identify parts. (2mks)

A

B.....

iii) On the diagram label the negative terminal of the cell. (1mk)

5. a) A sample of water from a village in Kericho Districts was divided into equal positions and each mixed with volume of soap solution. The observations made as tabulated below:

Sample	Treatment before adding soap	Observation made on shaking with soap
I	Boiled	Lather formed immediately
II	No treatment	Slight lather formed slowly
III	Treatment with washing soda	Lather formed immediately

i) What type of hardness is present in water from the village. Explain. (2mks)

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ii) Name three ions that would have formed the hardness above. (3mks)

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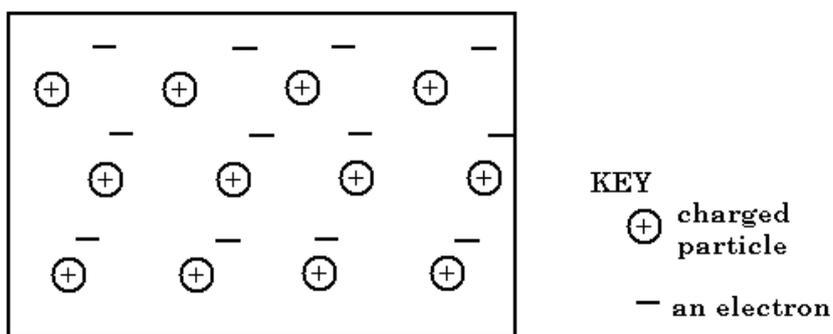
iii) State **one** advantage of hard water. (1mk)

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b) In a back titration experiment a 1.00g limestone was allowed to react with 100cm³ of 0.2M HCl acid. The excess acid required 24.8 cm³ of 0.1M NaOH solution.

Calculate the percentage of Carbonate in the limestone. (3mks)

6. a) The diagram below is a section of a model of the structure of element T



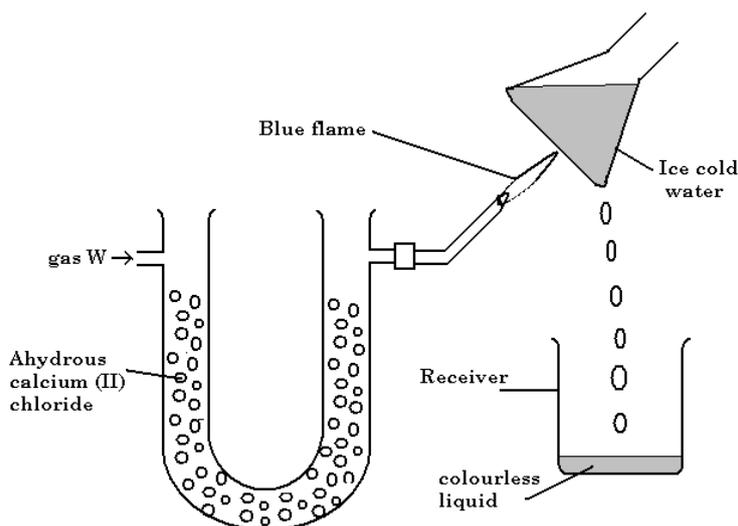
i) State the type of bonding that exists in T. (1mk)

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ii) In which group of periodic table does element T belong? Give a reason. (1mk)

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b) Study the diagram below and answer the questions that follow.



i) Name gas W. (1mk)

.....

ii) How is gas W tested in the laboratory. (1mk)

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iii) State the observation when Calcium carbonate powder was added to the colourless liquid in the dish and then carbon (IV) oxide gas was bubbled to the mixture for about 25 minutes. Write a stoichiometric equation for the chemical reaction that occurred in the dish (2mks)

c) State pollution effects of

i) Carbon compounds (2mks)

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ii) Sulphur compounds. (2mks)

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iii) Chlorine compounds. (2mks)

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