

Name

Index Number /

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Candidate's Signature

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Date

233/2

CHEMISTRY

PAPER 2 (THEORY)

JULY/AUGUST 2013

TIME: 2 HOURS

LENOCET EVALUATION TEST
KENYA CERTIFICATE OF SECONDARY EDUCATION

233/2

CHEMISTRY

PAPER 2 (THEORY)

TIME: 2 HOURS

Instructions to candidates

1. Write your name and Index Number in the space provided above.
2. Answer **ALL** questions in the spaces provided.
3. **ALL** workings must be clearly shown where necessary.
4. Mathematical tables and silent electronic calculators may be used.

For Examiner's use only

Questions	Maximum Score	Candidate's Score
1	13	
2	10	
3	11	
4	10	
5	14	
6	12	
7	10	
Total Score	80	

1. Study the information in the table below and answer the questions that follow.

The letters do not represent the symbols of the elements.

Element	Atomic Number	Melting point
L	11	97.8
M	13	660
N	14	1440
Q	17	401
R	19	63.7

(a) Write the electronic arrangement for the atoms of elements M and Q. (2 marks)

(b) Select an element which is
(i) The most reactive non - metal . (1 mark)

(ii) a poor conductor of electricity. (1 mark)

(c) In which period of the periodic table does element R belong. (1 mark)

(d) Element R loses its outermost electrons more readily than L. Explain. (2 marks)

(e) Using dot (•) and cross (x) to represent outermost electrons show bonding in compounds formed elements N and Q. (2 marks)

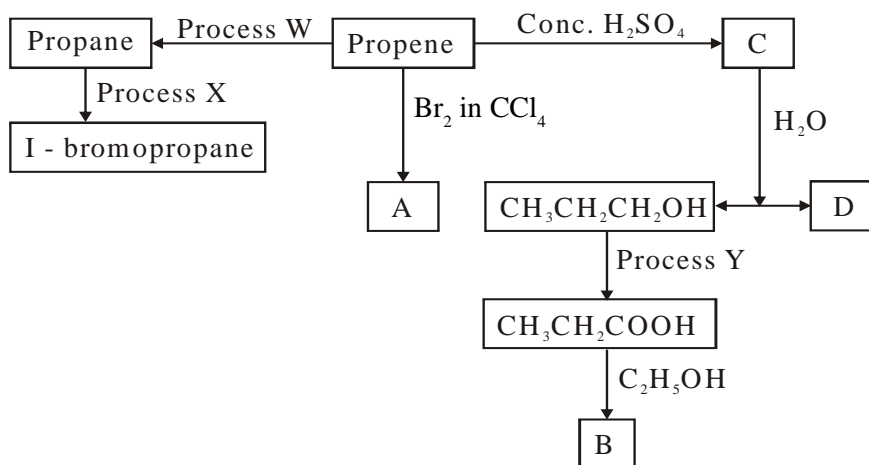
(f) Explain why the melting points of elements M is higher than that of element L.

(1 mark)

(g) Describe how a solid mixture of sulphates of elements R and lead sulphate can be separated into solid sample.

(3 marks)

2. The flow chart below shows some reactions of organic compounds. Study it and answer the questions that follow.



(a) Name processes.

(3 marks)

- (i) W _____
- (ii) X _____
- (iii) Y _____

(b) Name compounds C and D.

(2 marks)

- C _____
- D _____

(c) (i) Give one reagent that can be used in process Y.

(1 mark)

(ii) Write an equation for the reaction between compound D and Sodium hydroxide.

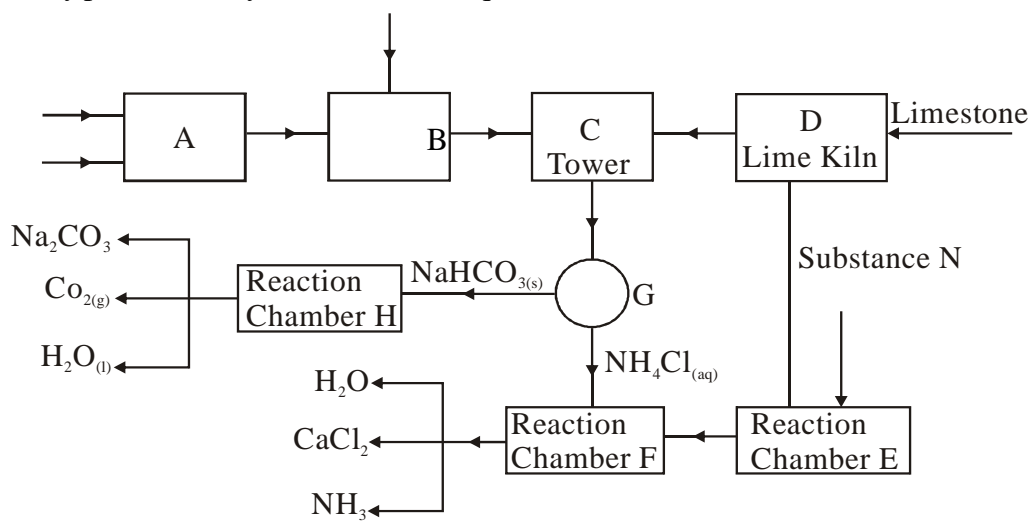
(1 mark)

(d) Identify compound A. (1 mark)

(e) (i) Give the name and formula of compound B. (1 mark)

(ii) State one physical property of compound B which is detected during its preparation. (1 mark)

3. Below is a flow chart diagram for the manufacture of Sodium Carbonate by the solvay process. Study it and answer the questions that follows.



(i) Name substance N. (1 mark)

(ii) Explain the use of water in Chamber C. (1 mark)

(iii) Name the two materials required in the manufacture of sodium carbonate A. (1 mark)

(iv) Write an equation for the reaction taking place in chamber C. (1 mark)

- (v) A factory produced 63 tonnes of sodium hydrogen carbonate which is further used to produce sodium carbonate. Calculate the number of tonnes of Sodium carbonate produced assuming the plant is operating at 100% efficiency.

C = 12, O = 16, H = 1 Na = 23.

(3 marks)

- (b) In the last stage of solvay process a mixture of sodium hydrogen carbonate and ammonium chloride is formed.

(i) State the method of separation used.

(1 mark)

(ii) Write an equation to show how lime is slaked.

(1 mark)

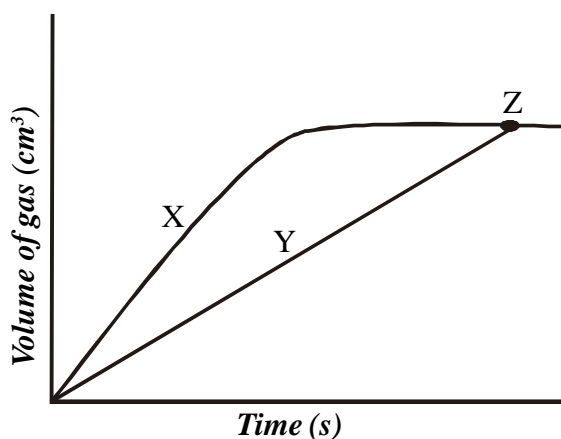
- (c) (i) Name the by products recycled in the above process.

(1 mark)

(ii) Why is recycling important?

(1 mark)

4. Equal masses of magnesium ribbons were reacted separately with equal volumes of 1M hydrochloric acid and 1M ethanoic acid. The results were plotted on a graph as shown below. Two curves X and Y were obtained.



(a) Explain which curve represents.

(i) 1M hydrochloric acid.

(1 mark)

(ii) 1M ethanoic acid.

(3 marks)

(b) State the significance of point Z.

(1 mark)

(c) On the same axis, sketch the curve you would obtain if the same mass of powdered magnesium was reacted with the same quantity of 1M hydrochloric acid. Mark the curve W.

(1 mark)

(d) Write an equation for the reaction between magnesium and dilute hydrochloric acid.

(1 mark)

(e) Calculate the maximum mass of the gas that would be produced if 1.2g of magnesium reacted with excess hydrochloric acid. (Mg = 24, H = 1)

(2 marks)

(f) Calculate the volume of the gas produced in (e) above at R.T.P (molar volume of a gas at RTP is 24.0cm³)

(2 marks)

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5. (a) At 25°C 50g of potassium nitrate were added to 100g of water to make a saturated solution. What is meant by a saturated solution. (1 mark)

- (b) The table below gives the solubilities of potassium nitrate at different temperatures.

Temperature °C	12	20	28	36	44	52
Solubility of 100g of water	22	31	42	55	70	90

- (i) Plot a graph of the solubility of potassium nitrate (vertical axis) against temperature. (3 marks)

(ii) Using the graph:

- (i) Determine the solubility of potassium nitrate at 15°C. (1 mark)

- (ii) Determine the mass of potassium nitrate that remain undissolved given that 80g of potassium nitrate were added of 100cm³ of water and warmed to 40°C. (2 marks)

- (c) Determine the molar concentration of potassium nitrate at 15°C.
(Assume there is no change in density of water at this temperature)

K = 39.0, N = 14.0, O = 16.0 (3 marks)

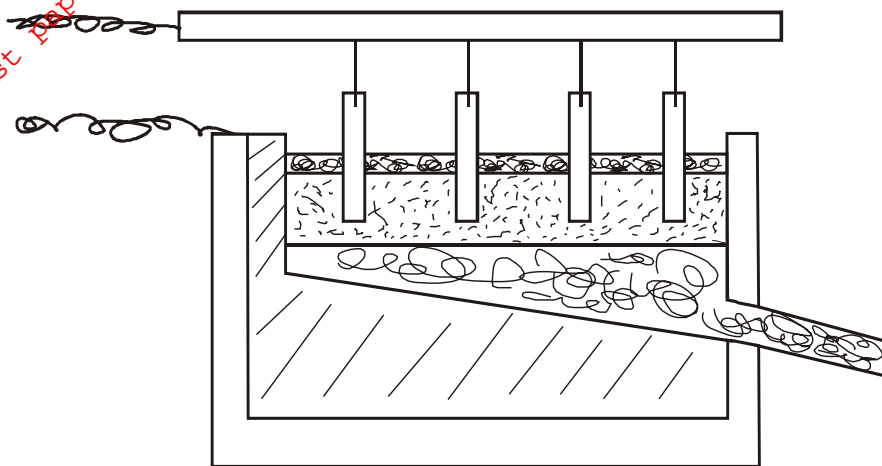
- (d) The elements nitrogen, phosphorus and potassium are essential for plant growth.

- (i) Potassium in fertilizers may be in form of potassium nitrate. Describe how a sample of a fertilizer may be tested to find out if it contained nitrates ions. (2 marks)

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- (ii) Calculate the mass of nitrogen present if 25kg bag contained pure ammonium hydrogen phosphate. $(\text{NH}_4)_2\text{HPO}_4$.
 N = 14.0, H = 1.0, P = 31.0, O = 16.0 (2 marks)

6.



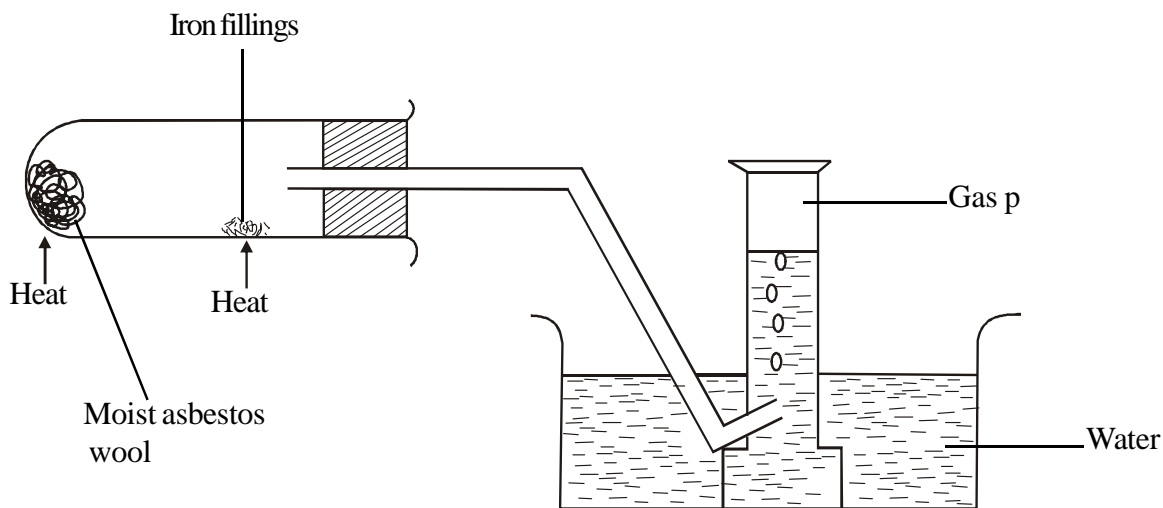
- (a) (i) Name one ore from which aluminium is extracted. (1 mark)
-
-
- (ii) Name one impurity which is removed at the purification stage. (1 mark)
-
-
- (b) (i) Label on the diagram each of the following.
- (I) Anode (1 mark)
- (II) Cathode (1 mark)
- (III) Region containing the electrolyte. (1 mark)
- (ii) The melting point of Aluminium oxide is 2654°C , but the electrolysis is carried out between $800 - 900^{\circ}\text{C}$.
- (I) Why is the electrolyte not carried out at 2654°C . (1 mark)
-
-
- (II) What is done to lower the temperature? (1 mark)
-
-

- (iii) The aluminium which is produced is tapped off as a liquid. What does this suggest about its melting point. (1 mark)

- (e) A typical electrolysis cell uses a current of 40 000 Amperes. Calculate the mass (in kilograms) of aluminium produced in one hour. $Al - 27$, 1 Faraday = 96500 coulombs. (3 marks)

- (d) Name one commercial use of Aluminium. (1 mark)

7. The diagram below shows the production of gas P. Study it and answer questions that follow.



- (a) Identify gas P. (1 mark)

- (b) Write a balanced equation for the reaction that produces gas P. (1 mark)

(c) Describe a confirmatory test for gas P. (2 marks)

(d) State one property of the gas P which makes it possible for the gas to be collected as shown in the diagram. (1 mark)

(e) State one use of gas P. (1 mark)

(f) The table below shows the reaction of some dilute mineral acids with metals K, L, M and N. Use the information to answer the questions that follow.

Acid	Metal			
	K	L	M	N
A	✓	X	✓	X
B	✓	X	✓	X
C	X	✓	✓	X

(i) Which metal is most likely to be magnesium? Explain. (2 marks)

(ii) Which metal is most likely to be copper? Explain. (2 marks)
