

NAME:.....INDEX NO:.....

SCHOOL:.....SIGNATURE.....

DATE:.....

233/2

CHEMISTRY

PAPER 2

(THEORY)

JULY/ AUGUST - 2013

TIME: 2 HOURS

**NYABIMA JOINT EXAMINATION - 2018**  
**KENYA CERTIFICATE OF SECONDARY EDUCATION (K.C.S.E)**

**INSTRUCTIONS TO CANDIDATES**

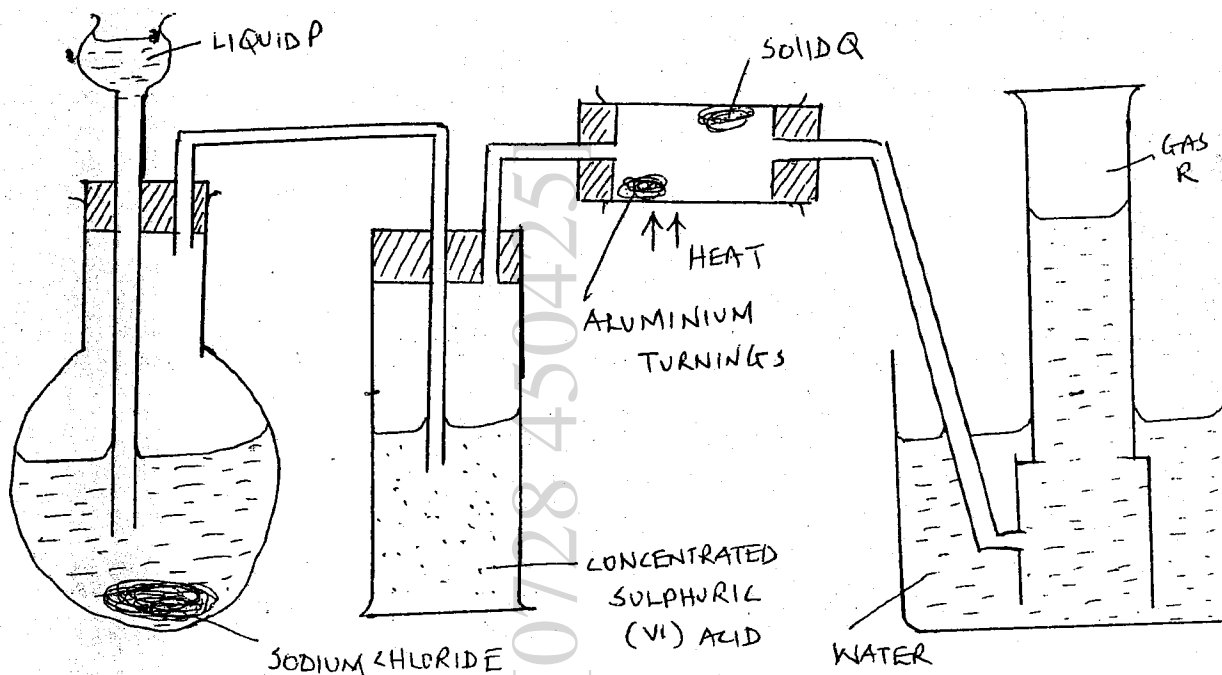
- ❖ Write your name and index no in the spaces provided.
- ❖ Sign and write the date of the examinations in the spaces provided above.
- ❖ Answer all the questions in the spaces provided in the question paper.
- ❖ All working must be clearly shown where necessary.
- ❖ Mathematical tables and silent electronic calculators may be used.

**For Examiner's Use Only**

Question	Maximum Score	Candidates Score
1	09	
2	14	
3	13	
4	12	
5	10	
6	12	
7	10	
<b>Total Score</b>	<b>80</b>	

This paper consists of 11 printed pages  
 candidates should check the question paper to ascertain  
 that all the pages are printed as indicated and no questions are missing.

1. In an experiment, hydrogen chloride gas was prepared and reacted with aluminium turnings to form a solid Q and gas R as shown in the diagram below.



- i) Name
- a) Liquid P (1 mk)
- b) Solid Q (1 mk)
- c) Gas R (1 mk)
- d) Write an equation in the tube. (1 mk)
- ii) Name another substance that could serve the same purpose as the concentrated sulphuric acid. (1 mk)
- iii) Explain the following observations when blue litmus paper was dipped into the water in the beaker at the end of the experiment, it turned red. (2 mks)

iv) Explain why solid Q collects further away from the heated aluminium. (1 mk)

v) Write an equation for the reaction between ammonia and HCl gas. (1 mk)

2. The grid 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.

				<b>T</b>		
<b>B</b>			<b>X</b>		<b>Z</b>	
<b>C</b>	<b>D</b>			<b>J</b>		

a) Select the elements that can form a mono-valent anion. Explain. (2 mks)

b) What type of structure could the chloride of X have? (1 mk)

c) How does the reactivity of T compare with that of J? Explain. (2 mks)

d) Explain how you could expect the following to compare;

i) Ionic radii, of C and D. (2 mks)

ii) Atomic radii of B and C. (2 mks)

e) State the family to which the following element belong;

i) B and C (1 mk)

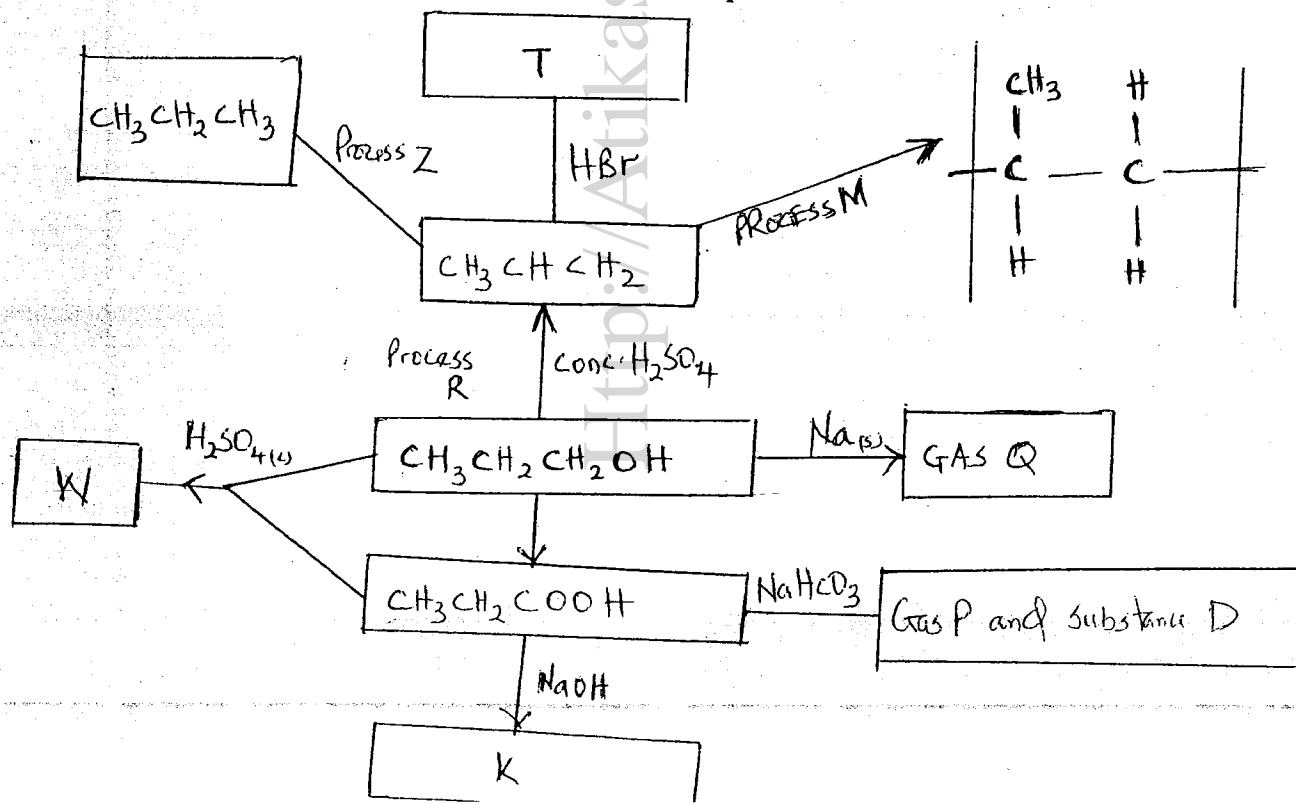
ii) D (1 mk)

f) 1.80g of solid X react completely with 1.12 litres of oxygen gas at stp (MGV = 22 litres at stp)

i) Write a balanced equation for the reaction between X and oxygen. (1 mk)

ii) Determine the relative atomic mass of X. (2 mks)

3. Study the reaction scheme below and answer the questions that follow.



- a) Name:
- i) Gas P ( ½ mk)
  - ii) Substance K ( ½ mk)
- b) Give the most probable structural formula of compound T. (1 mk)
- c) i) Write the chemical formula of compound W. (1 mk)
- ii) What is the main characteristic of compound W? (1 mk)
- d) Give two conditions necessary for process Z. (2 mks)
- e) What is process M and what is the condition necessary for the process to occur?(2 mks)
- f) Name gas P and substance D (1 mk)
- Write the equation for the reaction that forms gas P and substance D. (1 mk)
- g) How can you distinguish ethanol from ethanoic acid if you are given aqueous solution sodium carbonate and calcium hydroxide. (3 mks)

4. A dilute solution of zinc sulphate was electrolysed using platinum electrode. Write equations for the reactions that take place at the electrode

i) Cathode (1 mk)

ii) Anode (1 mk)

b) Comment on the concentration of the electrolyte after sometime. (2 mks)

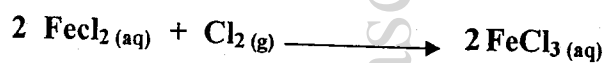
c) If 1.007g of element R was deposited by an electric current of 0.2A passed for 75 minutes.  
( $R = 108\text{g}$   $1F = 96500\text{C}$ )

Calculate

i) Quantity of electricity used. (1 mk)

ii) The amount of electricity used to produce 1 mole of R. (2 mks)

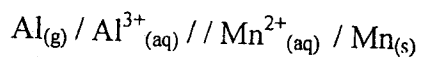
d) Identify the reducing agent and oxidizing agents in the given reactions. Give reasons in each case.



i) oxidizing agent (1 mk)

ii) Reducing agent. (1 mk)

h) Use the cell representation below to answer the questions that follow.





b) In step III the solution B is transferred into an evaporation dish and heated in a water bath until it is saturated.

i) What is a saturated solution? (1 mk)

ii) Why is heating done over a water bath? (1 mk)

iii) How would one determine whether a solution is saturated? (1 mk)

c) Explain why metal powder K is used in excess. (1 mk)

d) Name step (II) and state its importance. (1 mk)

e) Identify: (1½ mks)

i) White precipitate  $W_1$

ii) White precipitate  $W_2$

iii) Colourless solution  $S_1$

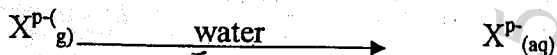
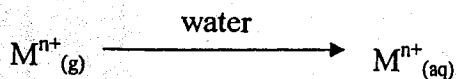
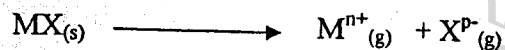
f) Write equations for step I and for the formation of  $S_1$

Equation step I

(1 mk)



d) Use the equations below to answer the questions that follow.



(i) Name the types of enthalpy changes represented by

$\Delta H_1$  ..... (1 mark)

$\Delta H_2$  ..... (1 mark)

(ii) Given that enthalpy change of  $\Delta H_1$  is +690Kj/Mol, and  $\Delta H_2$  and  $\Delta H_3$  are -322Kj and -364Kj respectively, Calculate the enthalpy change of solution of  $\text{MX}_{(s)}$ . (2 marks)

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7. During the extraction of copper pyrites ( $\text{CuFeS}_2$ ) some of the processes include

- Crushing the ore
- Mixing the crushed ore with water and oil and then bubbling air through it.
- Roasting the ore

a) i) Name two other ores that can be used.

(2 mks)

ii) Name the process marked (b) above and give its use.

(2 mks)

Name

Use

Formation of  $S_1$

(1 mk)

6. a) Define the term standard heat of formation of a substance.

(1 mk)

b) Butane cannot be prepared directly from its elements and so its standard heat of formation ( $\Delta H_f^\theta$ ) must be obtained indirectly.

Write down an equation

i) For the formation of butane from its elements in their normal physical states standard condition of temperature and pressure.

(1 mk)

ii) For the combustion of 1 mole of butane.

(1 mk)

c) i) State the Hess's law.

(1 mk)

If the following heats of combustion are given.

$$\Delta H_c^\theta \text{ carbon(s)} = -393 \text{ Kj/Mol}$$

$$\Delta H_c^\theta \text{ H}_{2(g)} = 286 \text{ Kj/Mol}$$

$$\Delta H_c \text{ C}_4\text{H}_{10} = -2877 \text{ Kj / Mol}$$

ii) Draw an energy cycle diagram linking the heat of formation of butane with its heat of combustion and the heat of combustion of constituent elements. (2 mks)

iii) Calculate the heat of formation of butane  $\Delta H_f^\theta$  ( $\text{C}_4\text{H}_{10}$ )

(2 mks)

iii) Write an equation for the roasting of copper pyrites. (1 mk)

b) i) Pure copper is obtained from impure copper by electrolysis. Name the; (3 mks)

Anode.....

Cathode.....

Electrolyte.....

ii) Write equations for the reactions at. (2 mks)

I Anode

II Cathode