



**ALLIANCE HIGH SCHOOL**  
**CHEMISTRY PAPER 2 233/2**  
PRE-TRIAL EXAMINATION  
**May/June 2020 2 HOURS**  
**Set 2**

NAME.....

Class .....Adm ..... signature .....

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

**Instructions to Candidates**

- (a) Write your name and index number in the spaces provided above.
- (b) Sign and write the date of examination in the spaces provided above
- (c) Answer **ALL** the questions in the spaces provided in the question paper
- (d) KNEC Mathematical tables and electronic calculators may be used for calculations
- (e) All working **MUST** be clearly shown where necessary
- (f) ***This paper consists of 12 printed pages***
- (g) ***Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing***
- (h) ***Candidates should answer the questions in English***

FOR EXAMINERS USE ONLY

Question	Maximum score	Candidates score
1	13	
2	12	
3	11	
4	10	
5	12	
6	12	
7	11	
Total	80	

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a) The following tests were carried out on solid M

- \* Solid M is a green solid
- \* When solid M was heated strongly, colourless liquid formed on the cooler parts and a colourless odourless gas N that forms a white precipitate with lime water is given off, black residue remained in the boiling tube.
- \* When dilute hydrochloric acid was added to the black residue, the black residue dissolved to form a green solution
- \* When aqueous ammonia was added to a portion of green solution obtained in step III above a blue precipitate
- \* which dissolves in excess ammonia to form a deep blue solution was formed
- \* When zinc metal powder was added to a portion of green solution, and the resulting mixture filtered a brown residue was obtained and colourless filtrate

a) Identify the colourless gas N and white precipitate formed in step I (1mk)

b) Write the formula of cation and anion in solid M (1mk)

c) What conclusion can be made in step III about nature of the residue (1mk)

d) Write the formula of the complex ion in the deep blue solution (1mk)

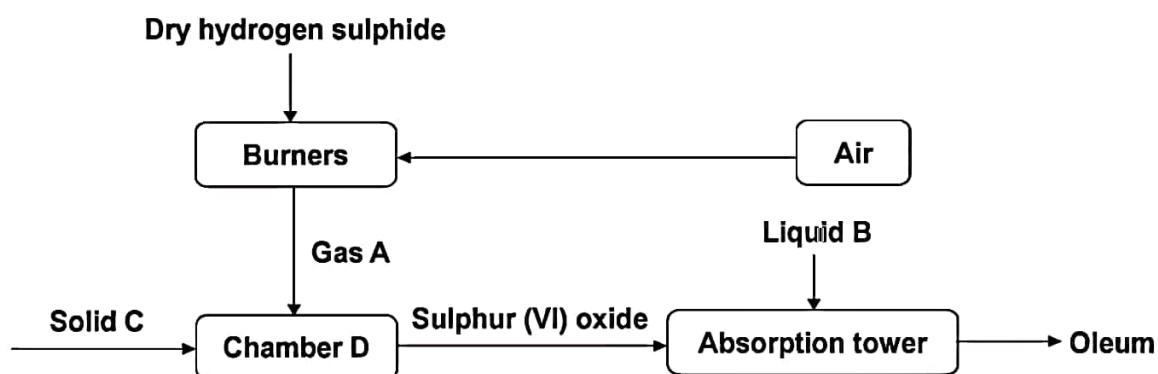
e) Write ionic equation for the formation of blue precipitate and deep blue solution (2mks)

f) Name the residue and filtrate in step V (2mks)

g) Name the type of reaction that takes place in step V (1mk)

h) Write an ionic equation for the reaction that took place in step (V) 1mk)

2 Sulphuric (IV) acid can be prepared using hydrogen supplied as shown in flow chart below. Study it and answer the questions that follow.



(a) Identify:

- (i) Gas A: 1 mk)
- (ii) Liquid B: (1 mk)

(b) (i) What function does solid C play in the chamber D? (1mk)

(ii) Write an equation for the reaction in chamber D. (1 mk)

(c) Explain the observations made if hydrogen sulphide gas is bubbled through copper (II) nitrate solution. (2marks)

(d) Write an ionic equation for the confirmatory test for hydrogen sulphide gas. (1 mk)

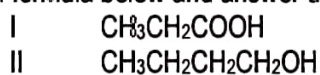
(e) Write a chemical equation to show the formation of concentrated Sulphuric (VI) acid from the oleum. (1 mk)

(f) Explain why in contact process  $\text{SO}_3$  gas is not directly dissolved in water to make concentrated Sulphuric (VI) acid. (2 mks)

g. A certain matchstick head contains potassium chlorate and sulphur. On striking the two substances react to produce sulphur (IV) oxide and potassium chloride. Explain the environmental effect of using such matches in large numbers. (2marks)

3.

(a) Study the structural formula below and answer the questions that follow.



(i) Give the systematic name of each compound. (1 mark)

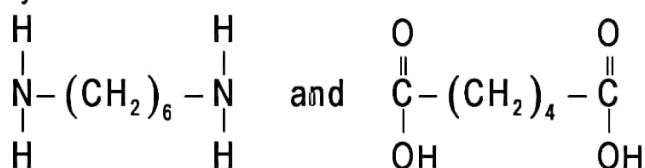
(ii) Write the molecular formula of each compound. (1 mark)

(iii) How does the boiling point of I compare to that of II? (1 mark)

(iv) A gas J is bubbled into concentrated sulphuric (VI) acid. Water is added to the mixture then boiled to yield compound II. Name gas J. (1 mark)

(v) Draw the structural formula of the compound immediately after compound I in the homologous series.

(b) Study the structural formula of the two monomers below and answer the questions that follow.



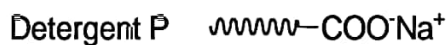
(i) Name the type of polymerization these monomers would undergo to form a polymer. (1 mark)

(ii) Draw the structural formula to represent the polymer formed. (1 mark)

(iii) What is the name of the polymer? (1 mark)

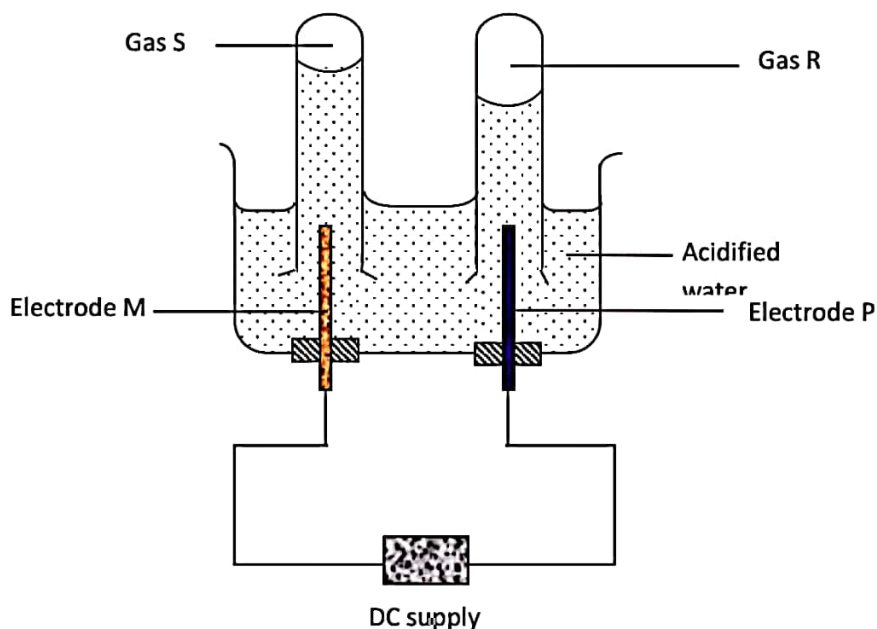
(iv) State the use of this polymer. (1 mark)

(c) Two cleansing agents are represented below.



Select one that would be suitable for use in hard water. Explain. (2 marks)

4. An electric current was passed through water to which a few drops of dilute sulphuric (VI) acid had been added. The results obtained were as shown below.



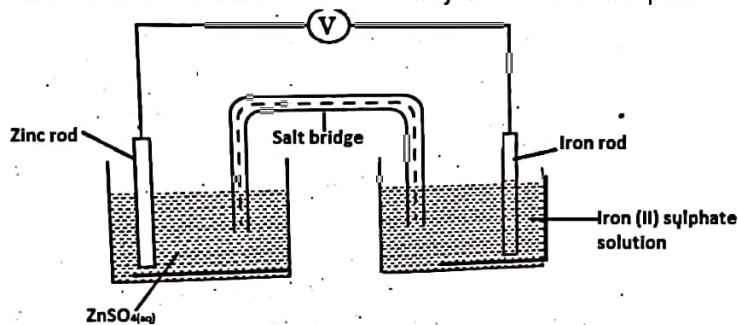
(a) What is an electrolyte? (1 mark)

(b) Give one test you could perform to confirm the identity of gas R. (1 mark)

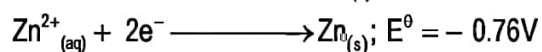
(c) Which electrode above is cathode? Give reason for your answer. (1 mark)

- (d) Write chemical equations to show the products of electrolysis at electrode P and electrode M.  
(2 marks)

- e. The diagram below shows an electrochemical cell. Study it and answer the questions that follow.



Given the following:



- i) Show on the diagram using an arrow, the direction of flow of electrons. (1 mark)

- ii) Name two substances that are used to fill the part labeled L. (2 marks)

- f. In an experiment to electroplate iron with silver, a current of 0.5 amperes was passed through a solution of silver nitrate for an hour.

(i) Give **two** reasons why it is necessary to electroplate iron with silver. (2 marks)

(ii) Calculate the mass of silver that was deposited on iron ( $\text{Ag} \approx 108$ , 1 Faraday  $\approx 96,500$  coulombs). (3 marks)

5. Study the information in the table below and answer the questions that follow. The letters do not represent the symbols of the elements.

Element C	Atomic number	Melting point °C
L	11	97.8
K	12	650
M	13	660
N	14	1410
Q	17	-101
R	19	63.7

(a) Write the electronic arrangement for the ions formed by elements **M** and **Q**. (1 mark)

(b) Select an element which is:

(i) The most electronegative element. (1 mark)

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

(c) In which period of the periodic table does element **Q** belong? Explain. (1 mark)

(d) Compare the reactivity of element **R** and **L**. Explain your answer. (2 marks)

(e) Using dots (•) and crosses (X) to represent outmost electrons, show bonding in the compound formed

by elements M and Q. (1 mark)

(f) Explain why the melting point of element M is higher than that of element L. (2 marks)

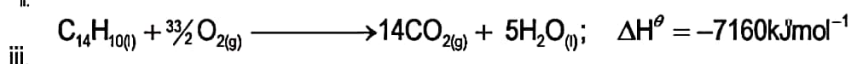
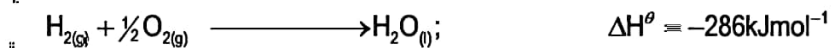
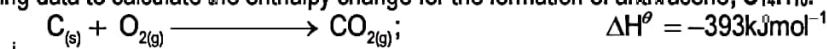
(g) Write an equation for the reaction that would occur between K and water. (1 mark)

(h) In terms of structure and bonding, explain why there is a large difference in the melting points of N and Q. (2 marks)

6.

a. . An atom of hydrogen can form two ions. Write two equations to show how a neutral atom of hydrogen can form two ions. In each case show the sign of the energy change involved. (2 marks)

b. Use the following data to calculate the enthalpy change for the formation of anthracene, C<sub>14</sub>H<sub>10</sub>.

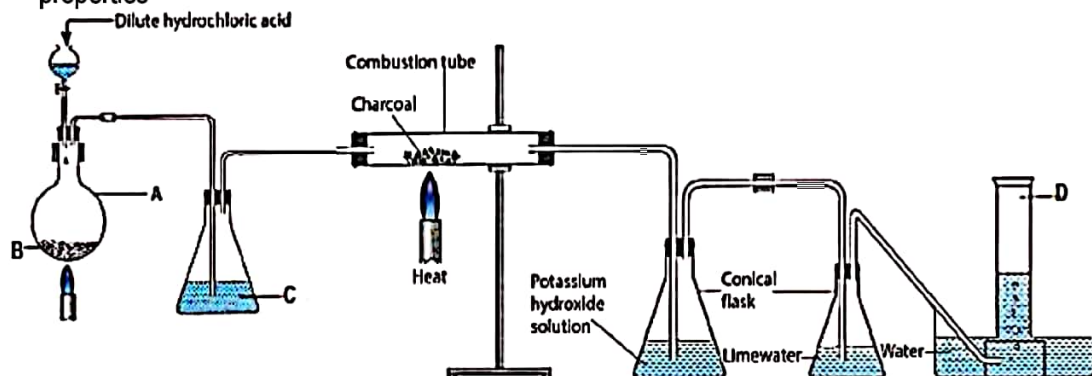


i. Write an equation for the formation of anthracene, (C<sub>14</sub>H<sub>10</sub>) from its constituent elements.

(1 mark)

- II. Draw an energy cycle diagram linking heat of formation of anthracene to its heat of combustion and heat of combustion of carbon and hydrogen. (3 mks)
- III. Use the energy cycle above to calculate heat of formation of anthracene. (2mks)
- c. State two factors considered when choosing a fuel (2mks)
- d. The molar enthalpy of vapourization of water is  $+44\text{kJ/mole}$  ,while the enthalpy of fusion of water is  $+6\text{kJ/mol}$ . Explain the difference (2marks)

7. The diagram below was used to prepare dry carbon (IV) oxide and investigate some of its properties



(a) Write chemical equations for the reactions that occur in flask A and in the combustion tube. (2 marks)

(b) Identify reagent B, substance C and gas D. (2 marks)

(c) With the help of an equation, explain the use of potassium hydroxide in the set up. (1 mark)

(d) Why is it not possible to collect pure and dry carbon (II) oxide using both downward delivery or upward delivery. (1 mark)

(e) Give a the most suitable method that can be used to collect dry carbon (II) oxide. (1 mark)

(f) Both sulphur (IV) oxide and carbon (IV) oxide are denser than air, but only carbon (IV) oxide is used in fire extinguishers. Explain. (2 marks)

(g) Carbon dioxide is referred to as a silent killer. Give two physical properties of carbon (IV) oxide that make it a silent killer. (2 marks)