

NAME: INDEX NO:

SCHOOL: DATE :

CANDIDATE'S SIGNATURE:.....

233/1
CHEMISTRY
PAPER 1
THEORY
JULY / AUGUST 2014
TIME: 2 HOURS

KURIA EAST SUB-COUNTY JOINT EXAMINATIONS COUNCIL 2014

Kenya Certificate of Secondary Education (K.C.S.E.)
CHEMISTRY
PAPER 1
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

- Write your **Name**, **Index Number** and **School** in the spaces provided above.
- **Sign** and write the **Date** of the examination in the spaces above.
- Answer **all** the questions in the spaces provided in the question paper.
- Mathematical tables and silent scientific calculators **may be** used.
- **ALL** workings **MUST** be clearly shown where necessary.

FOR EXAMINER'S USE ONLY

QUESTIONS	MAX SCORE	CANDIDATE'S SCORE
1 – 25	80	

This paper consists of 8 printed pages. Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

1. (a) Explain why permanent hardness in water cannot be removed by boiling. (1mk)

(b) Name two methods that can be used to remove permanent hardness of water. (2mks)

2. Study the information below and answer the questions that follow.

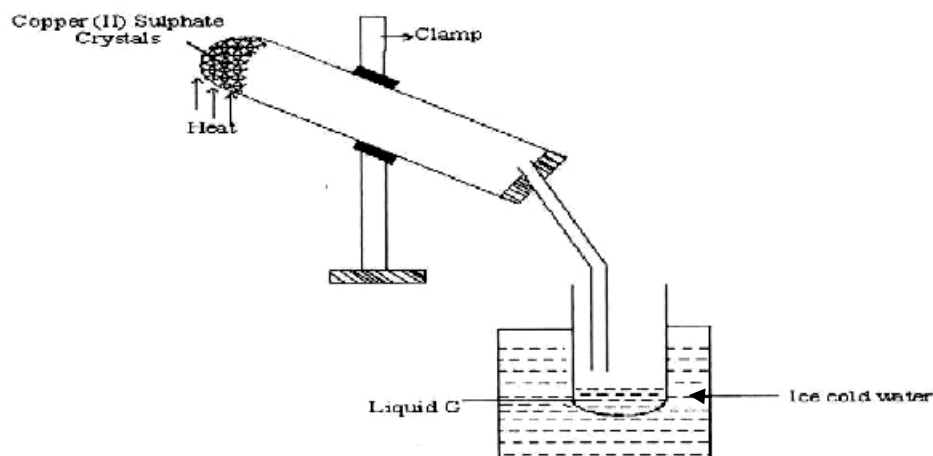
Ions	Electronic arrangement	Ionic radius
Na ⁺	2.8	0.095
K ⁺	2.8.8	0.133
Mg ²⁺	2.8	0.65

Explain why the ionic radius of:

(a) K⁺ is a greater than that of Na⁺. (1mk)

(b) Mg²⁺ is smaller than that of Na⁺. (1mk)

3. The diagram below is a set up to investigate the effect of heat on hydrated copper (II) sulphate. Study the diagram and answer the questions that follow.



(a) Why is the boiling tube slanted as shown? (1mk)

(b) What is observed in the boiling tube? (1mk)

(c) Identify liquid G.

(1mk)

4. 1.9g of Magnesium chloride was dissolved in water. Silver nitrate solution was added till excess. Calculate the mass of silver nitrate that was added for complete reaction.

(MgCl₂ = 95, N = 14, O = 16, Ag = 108)

(3mks)

5. Using reagents provided only, explain by means of balanced chemical equations how you would prepare a salt of zinc carbonate solid.

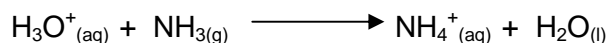
Zinc powder, Nitric (v) acid (dilute), Water and solid sodium carbonate.

(4mks)

6. (a) Distinguish between a strong acid and a concentrated acid.

(1mk)

(b) Giving a reason in each case, identify an acid and a base in the equation.



(3mks)

7. Calculate the oxidation number of nitrogen in the following species:

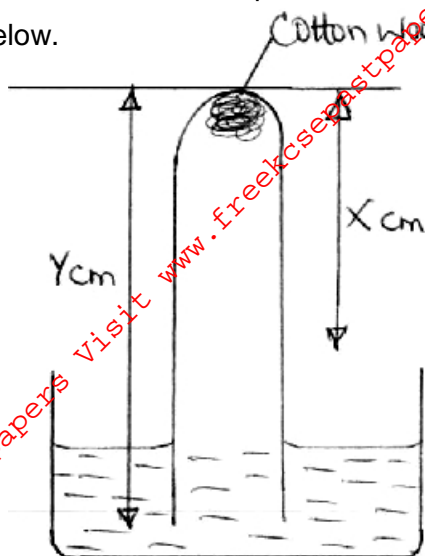
NO₂

(1mk)

NH₄⁺

(1mk)

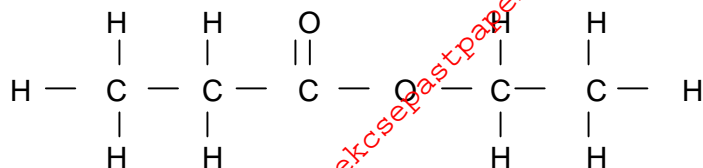
8. Some moist iron wool was placed in a test tube and the tube was inverted and set up as shown below.



The apparatus was left for one week. The water level rose and iron wool turned brown.

- (a) Write the chemical equation to show the rusting of iron. (1mk)
- (b) Write the expression for an approximate percentage of air used in the rusting of iron. (1mk)
- (c) State **two** similarities between rusting and combustion. (2mks)
9. Paper chromatography is a method of separating colours or dyes. What two properties should the components of a mixture have that would make the separation possible. (2mks)
10. In an experiment, a stream of dry hydrogen gas was passed over heated oxide of lead and the following results were obtained.
- Mass of porcelain boat = 10.2g
Mass of porcelain boat + lead oxide = 17.37g
Final mass of porcelain boat + Lead = 16.41g
Determine the formula of the oxide of lead (Pb = 207, O = 16) (4mks)

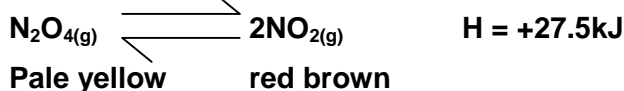
11. (a) Give the name of the compound below (1mk)



(b) What is the name of the reaction that led to the formation of the compound above?(1mk)

(c) State the reagents that were used in the preparation of the compound above. (2mks)

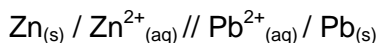
12. In a closed system, an equilibrium exists between nitrogen (IV) oxide and dinitrogen tetra oxide as shown in the equation below.



(a) State and explain the observation made when a glass of syringe containing the equilibrium mixture is immersed in a beaker with cold water. (2mks)

(b) If the piston of the syringe is pushed, state and explain the effect on the position of the equilibrium. (2mks)

13. The cell convention for an electrochemical cell is shown below:



(a) Name **two** substances that can be used as electrolytes in the above cell. (2mks)

(b) Which of the electrodes is the cathode in the cell above? Explain. (2mks)

14. (i) State Graham's law of diffusion. (1mk)

(ii) A sample of unknown compound Z is shown by analysis to contain sulphur and oxygen. The gas requires 28.3 seconds to diffuse through aperture into a vacuum. An identical number of oxygen molecules pass through the same aperture in 20 seconds. Determine the molecular mass of Z. (O = 16, S = 32). (3mks)

15. (a) Aluminium is obtained from its ore by electrolysis method yet its ore is a metal oxide.

(i) What is an ore? (2mks)

(ii) Why is the metal not obtained from its ore by the reduction of the metal oxide method? (1mk)

(b) Name two major ores of copper. (1mk)

(c) Name the method used to concentrate copper ore before extraction. (1mk)

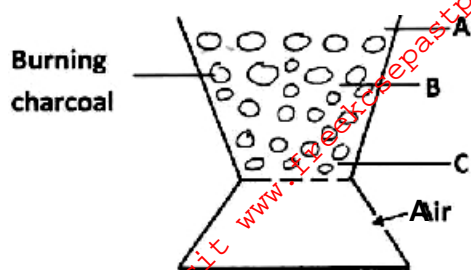
16. The heat of combustion of carbon, hydrogen and ethanol are -393kJ/mol, -286kJ/mol and -1386kJ/mol respectively. Calculate the heat of formation of ethanol. (3mks)

17. (a) Define allotropes. (1mk)

(b) (i) State the name of the allotrope of carbon that conducts electricity. (1mk)

(ii) Use the structure and bonding to explain your answer in (b) (i) above. (1mk)

18. The following diagram represents a charcoal burner. Study it and answer the questions that follow.



Write the equations for the reaction at:

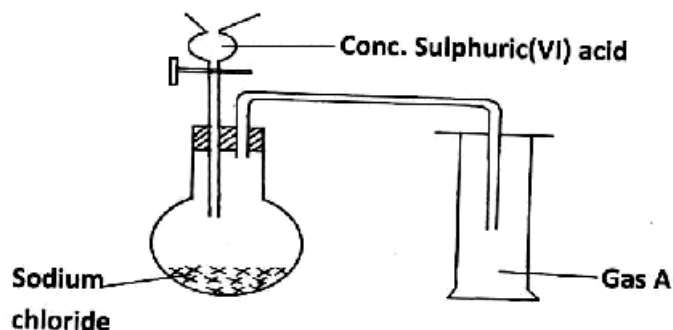
(3mks)

A

B

C

19. A student set up the apparatus below in the school laboratory to prepare and to study the properties of a gas A.



(a) Name gas A. (1mk)

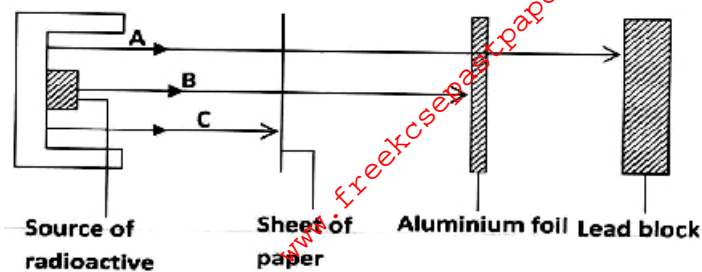
(b) Write down a chemical equation for the reaction taking place to produce gas A. (1mk)

(c) What major property of gas A enables the student to collect the gas above as shown in the diagram? (1mk)

20. Calculate the mass of copper that would be deposited on the cathode when a steady current of 5 amperes flows for 20 minutes through copper (II) sulphate solution. (3mks)

(Cu = 63.5; Faraday Constance = 96500C mol⁻¹)

21. Study the figure below and answer the questions that follow.



Identify the radiations A, B and C.

(3mks)

A

B

C

22. When aqueous sodium hydroxide solution was added to freshly prepared acidified iron (II) sulphate solution, a green precipitate was formed. When hydrogen peroxide was first added to Iron (II) sulphate solution followed by sodium hydroxide solution, a brown precipitate was formed. Explain these observations.

(3mks)

23. The atomic number of sulphur is 16, write the electron arrangement of sulphur on the following:-

(2mks)

(a) H_2S

(b) SO_3^{2-}

24. Using dots (•) and crosses (x) show bonding in:

(a) The compound formed between phosphorus and hydrogen (P = 15, H = 1). (2mks)

(b) Carbon (II) oxide (C = 6, O = 8) (1mk)

25. Substance X and Y consist of molecules X_2 and Y_2 respectively. When the two elements reacts, they form a molecule XY. The X-X bonds are as strong as the Y-Y bonds but X-Y bonds are stronger than either X-X or Y-Y. The equation for the reaction is



Is the reaction exothermic or endothermic? Give a reason for your answer. (3mks)