

INDEX NO. SIGNATURE

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

MBOONI EAST SUB – COUNTY FORM FOUR JOINT EVALUATION TEST, 2014

Kenya Certificate of Secondary Education.

233/1
CHEMISTRY
(THEORY)
PAPER 1
TIME: 2 HOURS.

INSTRUCTIONS TO CANDIDATES.

- Write your **NAME** and **INDEX NUMBER** in the space provided above
- Sign and write the date of examination in the spaces provided above
- Answer **ALL** the questions in the spaces provided
- ALL** working must be clearly shown where necessary.
- Mathematical tables and silent electronic calculators may be used.
- This paper consists of 11 printed pages. Candidates should check to ensure that all pages are printed as indicated and no questions are missing

FOR EXAMINER'S USE ONLY.

Question	Maximum score	Candidate's score
1 > 27	80	
Total score	80	

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 233/1
 Chemistry
 (Theory) Paper 1

Turn over

1. The electron arrangement of ions X^{3+} and Y^{2-} are 2,8 and 2,8,8 respectively.
 (a) In which groups do X and Y belong to. (1 mark)

X.....

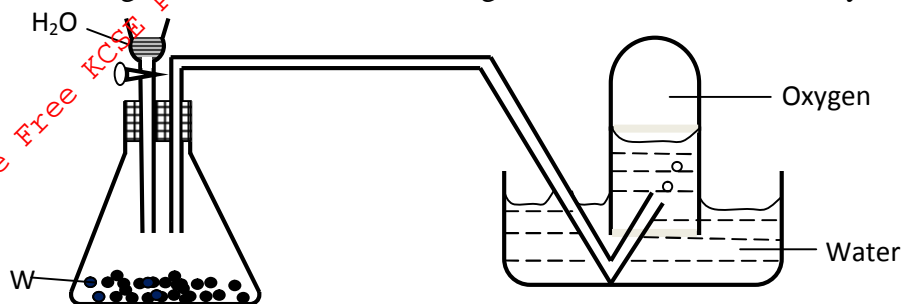
Y.....

- (b) State the atomic numbers of X and Y. (1 mark)

X.....

Y.....

2. The diagram below shows the arrangement used in the laboratory during preparation of oxygen gas.



- (i) Name the substance labeled W. (1 mark)

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- (ii) Write an equation showing the preparation of oxygen in the above arrangement. (1 mark)

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- (iii) Name two solids which may be heated to obtain oxygen gas. (1 mark)

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3. 50cm^3 of Carbon (IV) Oxide diffuses through a porous plate in 15 seconds. Calculate the time taken by 75cm^3 of Nitrogen (IV) Oxide to diffuse through the same plate under similar conditions.

(C = 12, O = 16, N = 14) (3 marks)

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4. A student fetched water from a river in a limestone area. He used it for washing and realized that it did not lather easily.

- (i) Name the two ions that prevent lathering. (1 mark)

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(ii) Given that the structure of soap is $C_{17}H_{35}COONa$.

Explain by means of ionic equations how the above ions prevent lathering.

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5. The table below shows solutions and their PH values.

Solution	PH value
P	2.0
R	7.0
S	14.0

Select two solutions that would react with zinc hydroxide. Explain your answer (2 marks)

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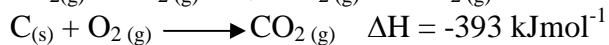
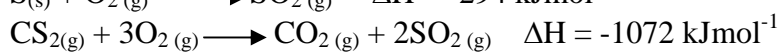
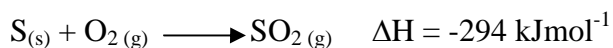
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6. Using an energy cycle diagram, calculate the enthalpy change of formation of carbon disulphide.

(3 marks)



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7. An element E has relative atomic mass of 69.39. Given that the element has two isotopes of atomic masses 60.15 and 70.15. Calculate the relative abundance of each of the isotopes. (3 marks)

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8. A student burnt Magnesium ribbon in a gas jar full of Sulphur (IV) Oxide gas.

(i) State two observations made in the gas jar. (2 marks)

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(ii) Write an equation for the reaction that took place. (1 mark)

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9. The table below shows the tests carried out in sample of water and the results obtained.

Sample	Results	Observations
A	Addition of Sodium Hydroxide dropwise until in excess	White precipitate which dissolves in excess
B	Addition of excess Ammonia solution	White precipitate
C	Addition of dilute Nitric (V) acid followed by Barium Chloride	White precipitate

(i) Identify the anion present in the water. (1 mark)

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(ii) Write the ionic equation for the reaction in C (1 mark)

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(iii) Write the formula of the complex ion in A. (1 mark)

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10. Study the table below and answer the questions that follow.

Element	Atomic radii (nm)	Ionic radii (nm)
Flourine	0.071	0.136
Chlorine	0.099	0.181
Bromine	0.114	0.195

(a) Explain why

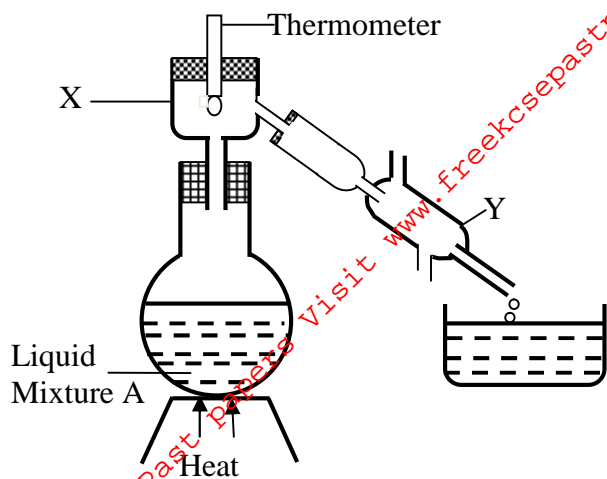
(i) Atomic radius increases from fluorine to bromine (2 marks)

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(ii) The ionic radius is larger than the atomic radius. (2 marks)

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11.



(i) Name X and Y

(1 Mark)

(ii) What is the purpose of apparatus X?

(1 Mark)

(iii) Show the direction of flow of cold water used for cooling the vapour formed.

(½ Mark)

(iv) What name is given to the above method of separating mixtures?

(½ Mark)

12. 25cm^3 of 0.12M Potassium Hydroxide solution required 30cm^3 of a solution of a dibasic acid (H_2X) for complete neutralization. The acid contained 3.15g per 500cm^3 solution. Calculate

(i) The molarity of the acid solution.

(2 marks)

(ii) The relative molecular mass of the acid.

(2 marks)

13. Solid P when heated gives a black powder Q and a colourless gas that forms a white precipitate in lime water. When dilute Sulphuric (VI) acid is added to the powder Q, a pale blue solution is formed.

(a) Give the chemical formula of

(i) Solid P

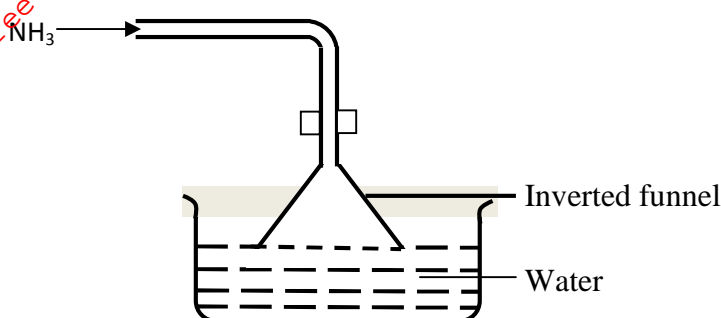
(1 Mark)

(ii) Solid Q

(1 Mark)

(b) Write an equation for the reaction leading to the formation of the pale blue solution. (1 Mark)

14. The figure below is for dissolving Ammonia gas in water. Study it and answer the questions that follow.



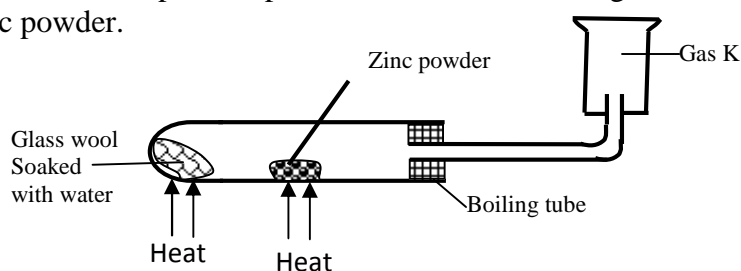
(a) What property of Ammonia gas makes this method of choice?

(1 Mark)

(b) Give two importance of the funnel

(2 Marks)

15. A student set-up the experiment below to collect gas K. The glass wool was heated before heating the zinc powder.



(a) Why was it necessary to heat the moist glass wool before heating the zinc powder?

(1 Mark)

(b) What observation was made in the boiling tube.

(1 Mark)

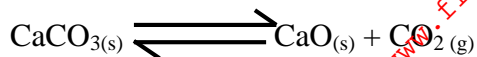
(c) Identify gas K.

(1 Mark)

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16. Calcium Carbonate is heated in a closed vessel and the following equilibrium is established.



State and explain the effect on the yield of CO_2 by removing Calcium Oxide as soon as it forms.

(2 Marks)

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17. A compound B with a molecular mass of 28 contains 85.7% carbon and 14.3% hydrogen (C = 12, H = 1)

(i) Determine the molecular formula of B.

(2 Marks)

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(ii) Write the structural formula of B.

(1 Mark)

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18. The table below gives some properties of compounds P, Q, R and S.

Compound	B.P ($^{\circ}\text{C}$)	M.P ($^{\circ}\text{C}$)	Conductivity in water
P	77	-22	Does not conduct
Q	74	-19	Does not conduct
R	-161	-85	Conducts
S	2407	714	Conducts

(a) Which of the compounds in the table is ionic? Explain your answer.

(2 Marks)

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(b) Select the compound that is a liquid at room temperature. Explain your answer.

(2 Marks)

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19. M grammes of a radioactive isotope decayed to 5 grammes in 100 days. The half life of the isotope is 25 days.

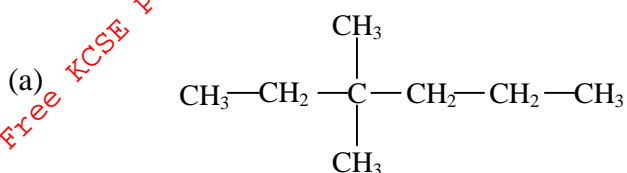
(a) What is meant by half life? (1 Mark)

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(b) Calculate the initial mass M of the radioactive isotope. (2 Marks)

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20. Name the following organic compound. (1 Mark)



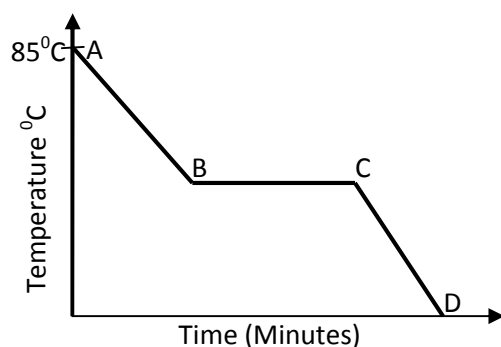
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(b) Draw the structure of the following

(i) 2 - Bromo - 4 - Chloro - 3, 3 - dimethylhex - 1 - ene (1 Mark)

(ii) 2 - Bromo - 1 - chloro - 4 methylpentane. (1 Mark)

21. A student in form four placed a thermometer in molten naphthalene at 85°C and recorded the temperature and time until the naphthalene solidified. From the values obtained, the figure below was drawn.



(a) What name is given to such a figure? (1 Mark)

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(b) Which part of the figure represents the change in state of naphthalene. (1 Mark)

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(c) In terms of kinetic theory, explain what happens to molecules along B. (2 Marks)

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22. Element G has an electronic configuration of 2, 8, 18, 7 and element H has an atomic number of 17.

(a) To which period in the periodic table does element G belong? Explain your answer. (1 Mark)

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(b) How would the reaction of sodium metal with G compare to its reaction with H? Explain your answer (2 Marks)

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23. The following were the results obtained in an experiment to determine solubility of Potassium Nitrate at room temperature.

Mass of evaporating dish = 14.32g

Mass of evaporating dish + solution = 35.70g

Mass of evaporating dish + salt (residue) = 18.60g

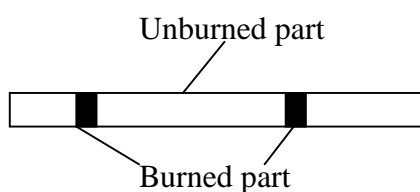
(i) Define solubility. (1MARK)

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(ii) Calculate the solubility of Potassium Nitrate from the specimen results. (2 Marks)

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24. A wooden splint was slipped through a region of a particular flame in the laboratory and was burnt as shown in the diagram below.



(a) Name the type of flame the splint was slipped through (1 mark)

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(b) Explain why the splint was burnt the way is shown in the diagram. (2 Marks)

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25. (a) Using electrons in the outermost energy level; draw a dot (•) and cross (x) diagram for the ion of PH_4^+ and compound B_2O_3 (P = 15, H = 1, B = 5, O = 8) (2 Marks)

(b) The formula of the compound formed when Aluminium and Chlorine react is Al_2Cl_6 . Name the types of bonds that exist in the compound. (1 Mark)

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26. (a) State Gay Lusaacs Law (1 Mark)

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(b) 10cm^3 of a gaseous Hydrocarbon, C_2H_x required 30cm^3 of oxygen for complete combustion. If steam and 20cm^3 of Carbon (IV) Oxide gas were produced, what is the value of x? (2marks)

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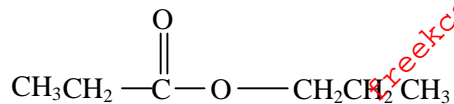
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27. When an organic compound Y is reacted with aqueous sodium carbonate, it produces Carbon (IV) oxide. Y reacts with propanol to form a sweet smelling compound Z, whose formula is



- (i) Name and draw the structural formula of compound Y. (1 Mark)

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- (ii) What is the name of the group of compounds to which Z belongs? (1 Mark)

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- (iii) In an experiment excess ethanol was warmed with acidified potassium dichromate for about twenty minutes. State and explain the observation that was made at the end of the experiment. (1 Mark)

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