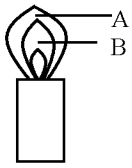
MAKUENI COUNTY CLUSTER PREPARATORY EXAMINATION 2016

233/1
CHEMISTRY
PAPER 1
(THEORY)
JULY/AUGUST 2016
TIME: 2 HOURS.

1. The following represents a Bunsen Burner flame.



(a) Name the parts of the flame labeled A and B. (2 marks)
(b) Identify the hottest part of the flame. Give a reason. (1 mark)

2. Give the I.U.P.A.C name of the oxide of nitrogen that:-
(i) Relights a glowing splint (1 mark)
(ii) Forms brown complex compound with acidified Iron (II) sulphate solution (1 mark)
(iii) Reacts with water to form nitric (V) acid (1 mark)

3. The table below shows P^H values of substances A, B, C and D. Study it and answer the questions that follow.

Substance	A	B	C	D
P^H	3	10	1	7

(a) Which substance is likely to be pure water (½ mark)
(b) Which solution contains the lowest concentration of hydrogen ions? (½ mark)
(c) In the equation below, identify the reagent that acts as a base. Give a reason for your answer. (2 marks)

$$H_2O_{2(aq)} + H_2O_{(l)} \rightleftharpoons H_3O^+_{(aq)} + H^-_{(aq)}$$

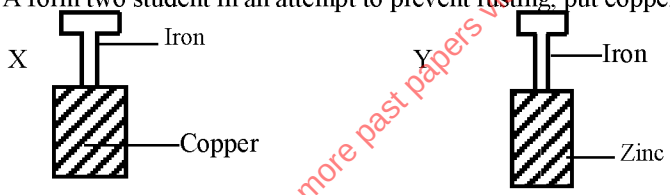
4. Identify the particles which enable the following substances to conduct electricity.
(i) Aluminium metal (1 mark)
(ii) Molten lead (II) bromide

5. Element R – 238 decays in series forming different nuclides as shown below.

$$R \xrightarrow{X} P \xrightarrow{Y} T$$

(a) Identify the type of decay X and Y (2 marks)
(b) Give one use of radioactive isotopes in medicine (1 mark)

6. A form two student in an attempt to prevent rusting, put copper and zinc in contact with iron as shown below.



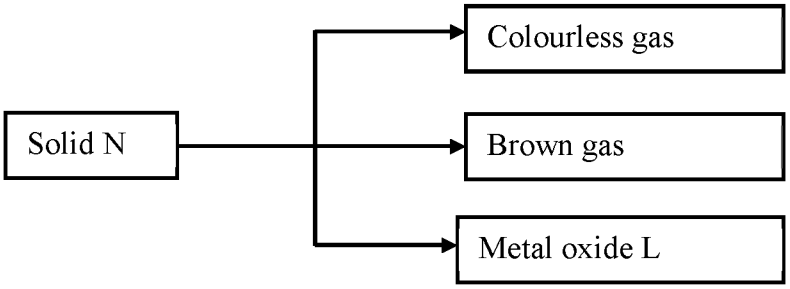
(i) State what would happen in set up **X** and **Y** after one week. (2 marks)
(ii) Explain your answer in diagram **Y**. (1mark)

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

Ion	X^{3+}	Y^{2-}
Electron arrangement	2,8	2,8,8

(a) Write the electronic arrangement of elements. X and Y
(b) Write the formula of the compound that would be formed between X and Y.

8. Study the flowchart below and answer the questions that follow.



(a) Write the formula of the anion present in solid N. (1 mark)

(b) Solid N in the flow chart above burns in air with a red flame. Identify the

(i) Cation present in solid N (1mark)

(ii) Metal oxide L

9. Study the information in the table below and answer the question the table below the table.

Bond	Bond energy ($kJmol^{-1}$)
C-H	414
Cl-Cl	244
C-Cl	326
H-Cl	431

Calculate the enthalpy change for the reactor. (3marks)

$CH_{4\,(g)} + Cl_{2\,(g)} \rightarrow CH_3Cl_{(g)} + HCl_{(g)}$

10. The table below shows the tests carried out on separate samples of water drawn from a well and the results obtained.

Test	**Results**
(i) Addition of excess aqueous ammonia	White precipitate
(ii) Addition of a few drops of dilute sulphuric (VI) acid	No observable change
(iii) Addition of dilute hydrochloric acid followed by a few drops of Barium Chloride	White precipitate

(a) Identify the cation and the anion present in the water. (1 mark)

(b) Write an ionic equation for the reaction which takes place in test (iii) (1 mark)

11. Study the structure below.

$C_3H_7COOC_2H_5$

(a) Name the compound (1 mark)

(b) Name the compounds used to prepare the above compound. (1mark)

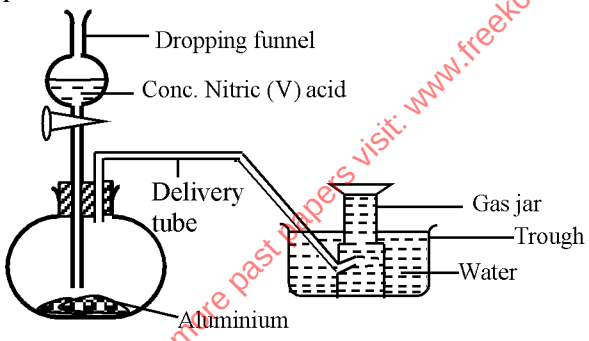
(c) What is the identifying physical property of the above compound?

12. Study the information in the table and answer the questions below.

Substance	Solubility g/100g water
V	126
W	2

Describe how a solid sample of substance V could be obtained from solid mixture of V and W. (3 marks)

13. In order to prepare hydrogen gas in the laboratory a student set-up the apparatus shown in the diagram below. Study it and answer the questions that follow.



(a) Suggest why the student did not collect hydrogen gas.

(b) In a separate experiment the student reacted iron and hydrochloric acid to prepare hydrogen gas.

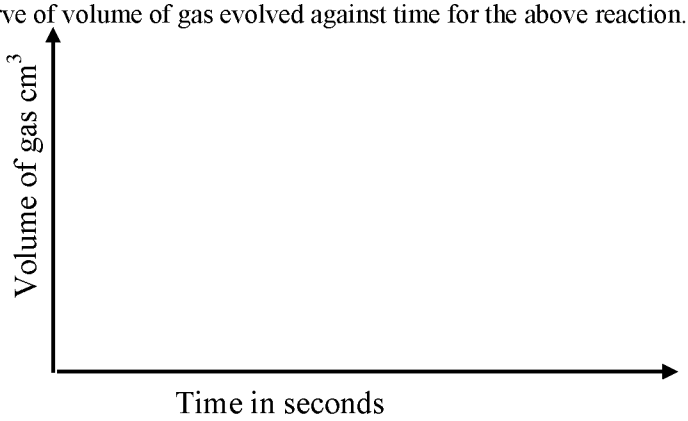
(i) Write an ionic equation for the reaction. (1mark)

(ii) The hydrogen gas produced was found to have a foul smell. Suggest an explanation for this. (1mark)

14. In an experiment, excess magnesium ribbons were immersed in ethanoic acid and the gas evolved was measured at 10 seconds intervals.

(a) Write an equation for the reaction between Ethanoic acid and magnesium ribbon. (1mark)

(b) Sketch a curve of volume of gas evolved against time for the above reaction.

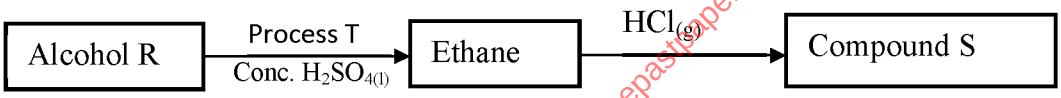


(c) On the same axis above sketch the curve that would be obtained of hydrochloric acid was used. Label the curve 1. (1 mark)

15. When excess chlorine is bubbled through cold dilute sodium hydroxide solution, the resulting solution is a bleaching agent.
    (a) Write a chemical equation for the reaction that produces the bleaching agent. (1 mark)
    (b) Name the bleaching compound and show how it bleaches using an equation. (2 marks)
16. An element X has a relative atomic mass of 88. When a current of 0.5 amphere was passed through a fused chloride of X for 32 minutes 10 seconds, 0.44g of X was deposited.
    (i) Determine the charge of element X (1 Faraday = 96500C) (2 marks)
    (ii) Write the formula of hydroxide of X. (1 mark)
17. (a) Name two ores from which zinc is extracted. (1 mark)
    (b) During extraction of zinc metal, the ore is subjected to froth floatation. Give a reason why this process is necessary. (1 mark)
    (c) Name one alloy of zinc and state its use.
18. (a) State Graham's law of diffusion.
    (b) Two gases A and B have relative densities of 1.98 and 2.90 respectively. They diffuse under the same conditions.
    (i) Compare their rates of diffusion (1 mark)
    (ii) Determine the relative molecular mass of A, given that the relative molecular mass of B is 64. (2 marks)
19. The table below shows elements in the halogen group of the periodic table. Study the table and answer the questions that follow.

Element	Atomic number	Melting point ^0C
Fluorine	9	-218
Chlorine	17	-101
Bromine	35	-7
Iodine	53	114

    (i) Name the element likely to be a solid at room temperature. Explain (1 mark)
    (ii) Explain why the melting point increases from fluorine to iodine. (2 marks)
20. Starting with aluminium sulphate, describe how a solid sample of aluminium hydroxide could be prepared. (2 Marks)
21. Study the following flow chart and answer the questions that follow.

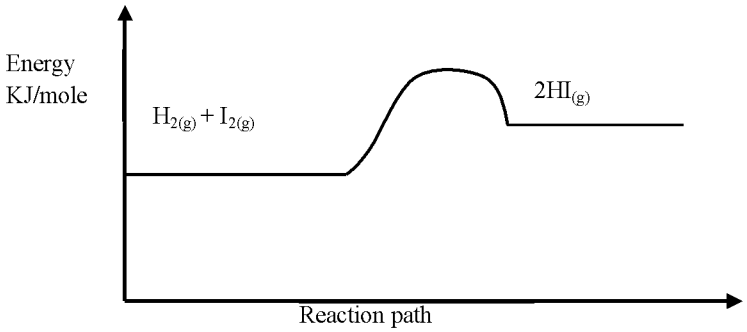


    (i) Write the formula of
    I. Alcohol R (1 mark)
    II. Compound S (1 mark)
    (ii) Name process T (1 mark)
22. The table below gives atomic numbers of elements represented by the letters A, B, C and D.

Element	A	B	C	D
Atomic number	15	16	17	20

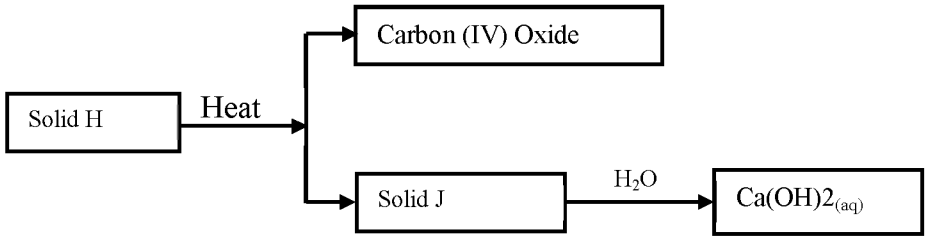
    Use the information to answer the questions that follow.
(a) Name the type of bonding that exists in the compound formed when A and D react. (1 mark)
(b) Select the letter which represents the best oxidizing agent. Give a reason for your answer. (1 mark)
(c) Give a reason why phosphorous is stored under water. (1 mark)
23. Production of hydrogen iodide can be demonstrated by the equation.

$$H_{2(g)} + I_{2(g)} \rightleftharpoons 2HI_{(g)}$$



    Explain how the following would affect the yield of hydrogen iodide.
    (i) Increase in temperature (2 marks)
    (ii) Decrease in pressure (1 mark)

24. Use the scheme below to answer the questions that follow.



(a) Identify the solids; S and J (2 marks)
(b) State one commercial use of solid J. (1 mark)
Given the equations, determine the heat of formation of ethanol. (3 marks)

$C_{(s)} + O_{2(g)} \longrightarrow CO_{2(g)}$ $\Delta H = -393Kj/mol$

$H2(g) + -O_2(g) \longrightarrow H_2O_{(l)}$ $\Delta H = -286Kj/mol$

$C_2H_5OH\ (l) + 3O_{2(g)} \longrightarrow 2CO_{2(g)} + 3H_2O_{(l)}$ $\Delta H = -1368kJ/mol$

Explain how you would separate a mixture of ammonium chloride and sodium chloride into its pure components. (2 marks)

25. Natural Gallium consists of two isotopes ^{68}Ga and ^{71}Ga in the ratio 3:2 respectively. Given that the atomic number of gallium is 31.
(a) Calculate the number of neutrons in the isotope ^{68}Ga. (½ mark)
Calculate the relative atomic mass of gallium (1½ mark)
A piece of burning magnesium was lowered into a gas jar of Carbon (IV) oxide.
(b) State the observations made. (2 marks)
Write an equation for the reaction in (a) above. (1 mark)