

Name: Class: Adm.No.

School: Date:

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233/1
CHEMISTRY
Paper 1
MARCH/APRIL 2016
Time: 2 hours

MOKASA JOINT EXAMINATION

Kenya Certificate to Secondary Education

CHEMISTRY PAPER 1

TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

- *Write your name, admission number, date and school in the spaces provided.*
- *Answer all the questions in the spaces provided.*
- *All working must be clearly shown where necessary.*
- *Scientific calculators may be used.*

FOR EXAMINERS' USE ONLY

Questions	Maximum Score	Candidate's Score
1 - 31	80	

This paper consists of **14** printed pages. Candidates are advised to check and to make sure all pages are as indicated and no question is missing.

1. Explain the following:

(i) It is always advisable to scoop chemical substances using a clean spatula. **(½ mark)**

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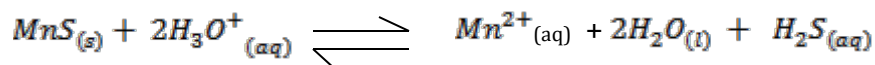
(ii) Flammable substances should always be kept away from flames in the laboratory. **(½ mark)**

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2. Name one reagent that can be used to distinguish between Al^{3+} and Zn^{2+} ions in solution and state what would be observed if each of the ions is treated with the reagent you have named. **(3 marks)**

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3. Manganese sulphide reacts with acids according to the following equation.



State, giving a reason what would happen to the equilibrium if;

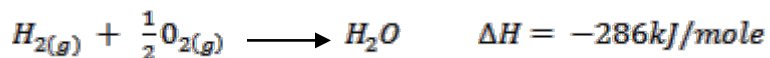
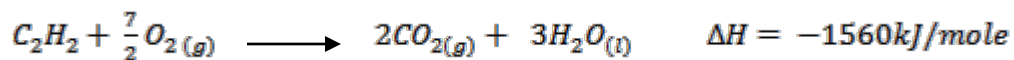
(i) Water is added to the equilibrium mixture. **(1 ½ marks)**

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(ii) Hydrogen chloride is bubbled into the equilibrium mixture. **(1 ½ marks)**

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4. Use the thermochemical equations below to answer the questions that follow.



(i) Draw an energy cycle diagram to show the enthalpy of formation of ethane.

(1 ½ marks)

(ii) Calculate the enthalpy of formation of ethane.

(1 ½ marks)

5. State the conditions under which copper reacts with sulphuric acid and give an equation for the reaction. **(2 marks)**

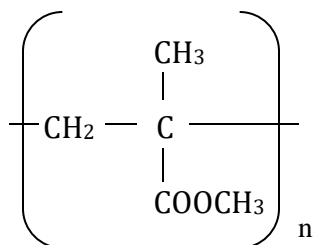
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6. When 8.8g of hydrocarbon Z was burnt in excess air, 14.4g of water and 11.95 dm³ of carbon (IV) oxide were obtained at s.t.p. Determine the empirical formula of Z. **(3 marks)**

7. Perspex is a synthetic polymer of formula



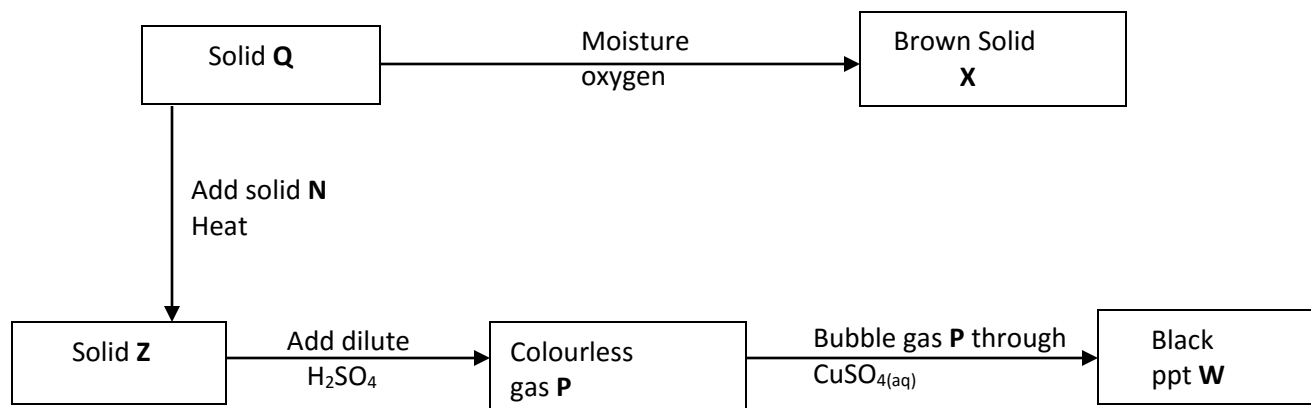
- (a) Write the structural formula of the monomer of Perspex. **(1 mark)**

- (b) State the type of polymerization involved in the formation of perspex. **(1 mark)**
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8. When zinc granules are dropped into two separate solutions of dilute sulphuric (VI) and concentrated sulphuric (VI) acid, effervescence of a colourless gas occurs in each case. Give equations to represent the reactions that take place. **(2 marks)**

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9. Study the chart below and answer the questions that follow.



- (a) Identity solid X. **(1 mark)**

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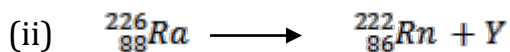
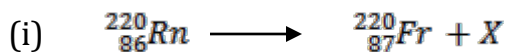
- (b) Write an ionic equation for the reaction between P and copper (II) sulphide solution. **(1 mark)**

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- (c) State the observation made when gas P is bubbled through iron (III) chloride solution. **(1 mark)**

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10. Use the nuclear equations below to answer the questions that follow.



(a) Give the actual names of particles X and Y. (1 mark)

X

Y

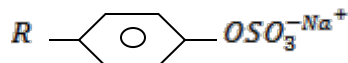
(b) Give the name of a radiation whose emission does not change the mass number or the atomic number of a radioisotope. (1 mark)

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11. The structures below represent two cleaning agents M and P.



M

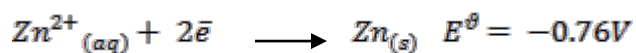
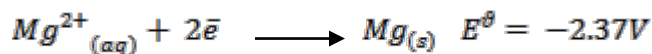


P

Which cleaning agent would be most suitable for use with water containing calcium sulphate. Give a reason. (2 marks)

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12. You are given the following half equations:



(i) Obtain an equation of the cell reaction. (1 mark)

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(ii) Calculate the E^\ominus value for the cell. (1 mark)

(iii) Give the oxidizing species. (1 mark)

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13. Using dots (•) and crosses (×) to represent outermost electrons; draw diagrams to show bonding in:

(a) Aluminium chloride. **(1 ½ marks)**

(b) Sulphuric (IV) oxide. **(1 ½ marks)**

14. Use the information in the table below to answer the questions that follow.

Melting point	Element	Atomic number
97.8	R	11
660	S	13
1440	T	14
-40.1	U	17
63.1	V	19

(a) Write the electron arrangement of: **(1 mark)**

(i) ion of S

(ii) atom of T

(b) Explain why the melting point of T is higher than that of U. (2 marks)

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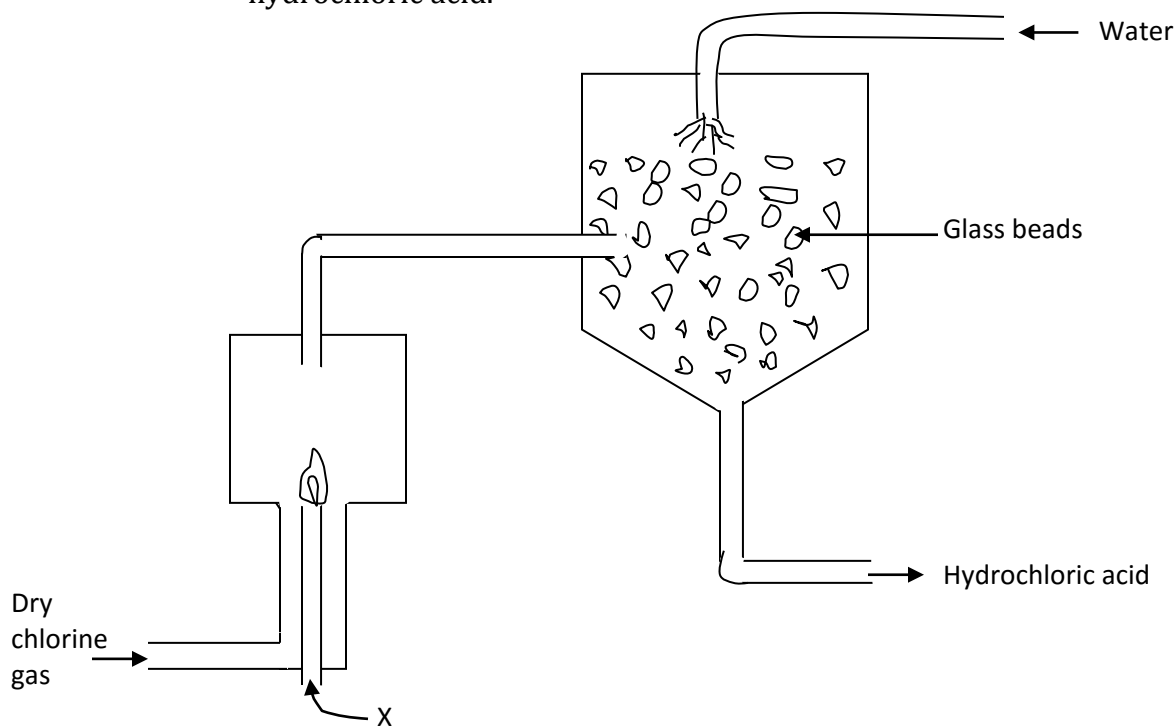
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15. Complete the table below. (3 marks)

Metal	Aluminium	Lead	Sodium
Chief ore	Bauxite		Rock salt
Chemical name			
Method of extraction		reduction	

16. The diagram below represents a set up used for the large scale manufacture of hydrochloric acid.



(a) Name substance X. **(1 mark)**

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(b) What is the purpose of the glass beads? **(1 mark)**

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(c) Give one use of hydrochloric acid. **(1 mark)**

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17. Calculate the volume of nitrogen (I) oxide produced when 38.2g of ammonium nitrate is completely decomposed by heating (at s.t.p). (N = 14, H = 1, O = 16) **(3 marks)**

18. Give equations to show the reactions that take place when;

(a) iron reacts with steam. **(1 mark)**

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(b) Give one industrial use of the gas produced in the reactions in (i) and (ii) above. **(1 mark)**

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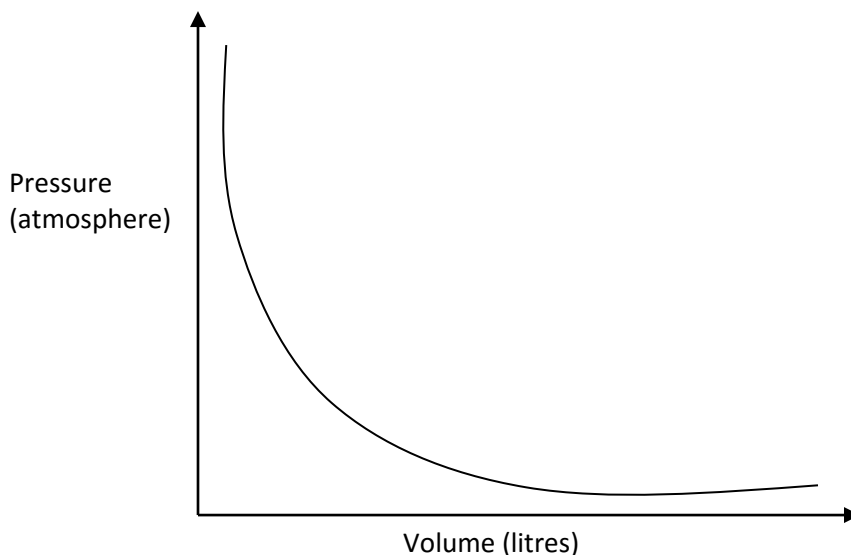
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19. (a) When magnesium metal is burnt in air, it reacts with both oxygen and nitrogen gases giving a white ash. Write two equations for the reactions that take place. **(2 marks)**

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- (b) Give the total number of atoms present in the gas produced when water is added to magnesium nitrate. **(1 mark)**
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20. The graph below shows the behavior of a fixed mass of a gas at constant temperature.



- (a) What is the relationship between the volume and the pressure of the gas? **(1 mark)**

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- (b) 60 cm³ of oxygen gas diffused through a porous partition in 50 seconds. How long would it take 60cm³ of sulphur (IV) oxide gas to diffuse through the same partition under the same conditions? (S = 32., O = 16.0) **(3 marks)**

21. State and explain the observation made when a moist red litmus paper is put in a gas jar of dry chlorine gas. **(2 marks)**

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22. (a) When extinguishing a fire caused by burning kerosene, carbon (IV) oxide is preferred to water. Explain. **(2 marks)**

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(b) Write the formula of the oxide of carbon which is 'silent killer'. **(1 mark)**

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23. Explain why chlorine is a gas while iodine is a solid at room temperature. **(2 marks)**

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24. Apart from their location, state any two differences between a proton and an electron. **(2 marks)**

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25. What term is given to: The amount of energy given out when a neutral atom in gaseous state gains an electron? **(1 mark)**

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26. A certain fertilizer is suspected to be containing nitrate ions. Describe how the presence of nitrate ions can be determined in such fertilizer. **(3 marks)**

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27. Write balanced chemical equations to show the action of heat on the following nitrates.

(a) Lead (II) nitrate **(1 mark)**

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(b) Silver nitrate **(1 mark)**

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28. What is an amphoteric oxide? **(1 mark)**

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29. Starting with zinc carbonate solid describe how zinc hydroxide can be prepared in the laboratory. **(3 marks)**

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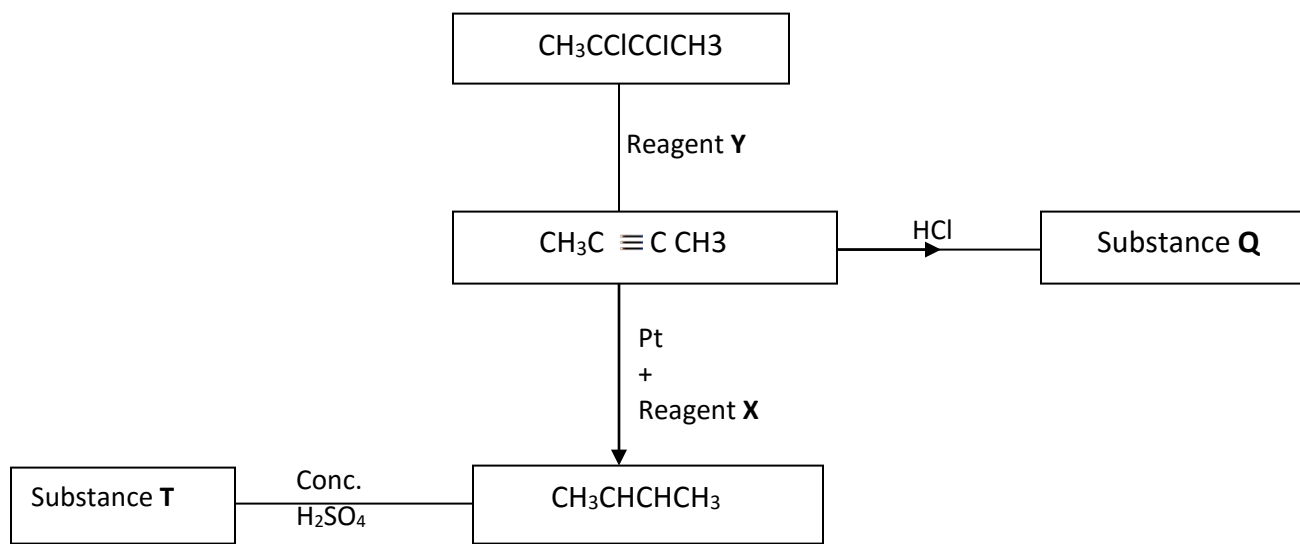
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30. Below is a scheme of some reactions starting with but-2-yne. Study it and answer the questions that follow.



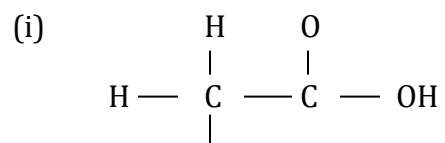
- (a) Name Y, X and T (1 ½ marks)

Y

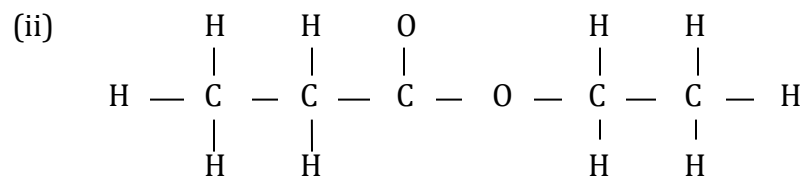
X

T

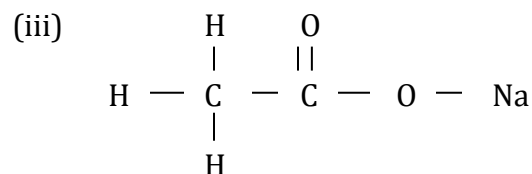
- (b) Give the name of the following organic compounds. (½ mark)



H



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31. The following results were obtained during an experiment to determine the solubility of potassium nitrate in water at 30°C. Mass of dish = 15.86g, mass of dish + saturated solution at 30°C = 26.86g, mass of dish + solid KNO₃ after evaporation to dryness = 16.7g. Calculate the mass of saturated solution containing 60.0g of water at 30°C.

(3 marks)