

FORM 4 TERM 1 OPENER

CHEMISTRY

NAME..... ADM NO.....

CLASS..... SIGN.....

INDEX NO..... DATE.....

PAPER 1

TIME: 2 HOURS

Attempt all the questions in the spaces provided.

1. Starting with lead metal describe how to prepare a solid sample of lead (II) sulphate salt.(3 mks)

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2. Draw the structure of:

(a) (i) Hydroxonium ion H_3O^+ (2 mks)

(ii) Aluminium oxide (2 mks)

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(b) Aluminium chloride has a melting point of 120°C while aluminium oxide has a melting point of 2977°C . In terms of structure and bonding, explain how the differences come about. (2 mks)

3. 3.1g of an organic compound containing carbon, hydrogen and oxygen only produced 4.4g of Carbon (Iv) oxide and 2.0g of water on complete combustion.
(a) Calculate its empirical formulae. (3 mks)

(b) Calculate its molecular formulae if its molecular mass is 62. (2 mks)

4. Two cleansing agents are represented below.

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(a) Name the detergents (2 mks)

(b) Select one of the detergents that would be suitable for washing in water containing magnesium chloride. Explain. (2 mks)

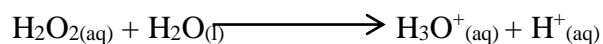
5. The table below shows pH values of substances A, B, C and D. Study it and answer the questions that follow.

Substance	A	B	C	D
pH Value	3	10	1	7

(a) Which substance is likely to be pure water? (1 mk)

(b) Which solution contains the lowest concentration of hydrogen ions. (1 mk)

(c) In the equation below, identify the reagent that acts as a base. Give a reason for your answer. (2 mks)



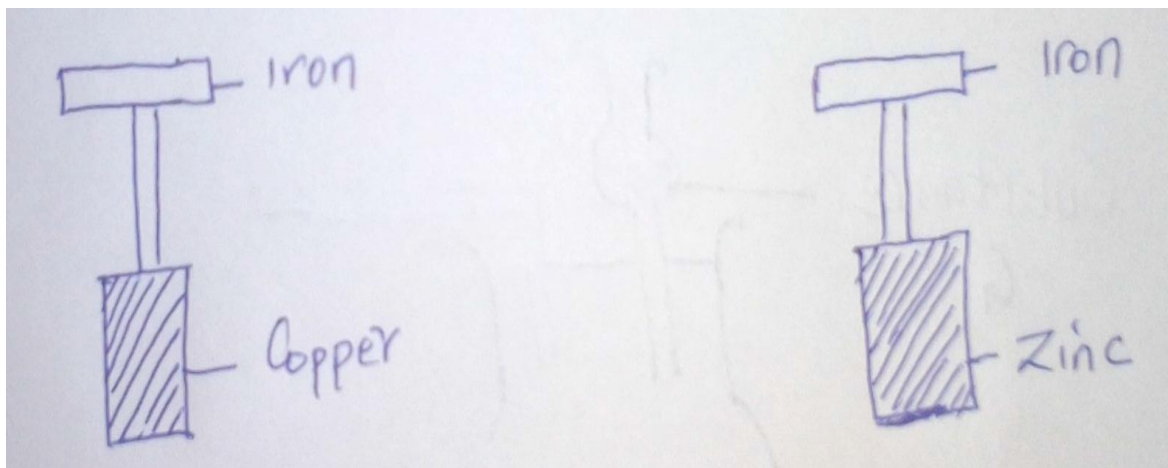
6. Identify the particles which enable the following substances to conduct electricity. (2 mks)

(i) Aluminium metal

(ii) Molten lead (II) bromide

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

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(i) State what would happen in set up X and Y after one week. (2 mks)

(ii) Explain your answer in diagram Y. (1 mk)

8. 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. (2 mks)

(b) Write the formula of the compound that would be formed between X and Y. (1 mk)

9. Study the structure below.



(a) Name the compound. (1 mk)

(b) Name the compounds used to prepare the above compound. (2 mks)

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(c) What is the identifying physical property of the above compound? (1 mk)

10. Determine the oxidation number of; (2 mks)
(i) Manganese in KMnO_4

(ii) Chromium in $\text{Cr}_2\text{O}_7^{2-}$

11. (a) Name two cations responsible for hard water. (2 mks)

(b) Name two chemicals that are used to remove hardness of water. (2 mks)

12. Classify the following as either compounds or mixtures. (1 mk)

Substance	Type of substance
a. Air	
b. Salt solution	
c. Sugar	

13. Study the information in the table below and answer the questions that follow.

Salt	Solubility (g/100g H_2O)	
	at 50°C	At 80°C
G	43	58
Y	82	138

A mixture containing 40g salt G and 120g salt Y in 100g of water at 80°C was cooled to 50°C .

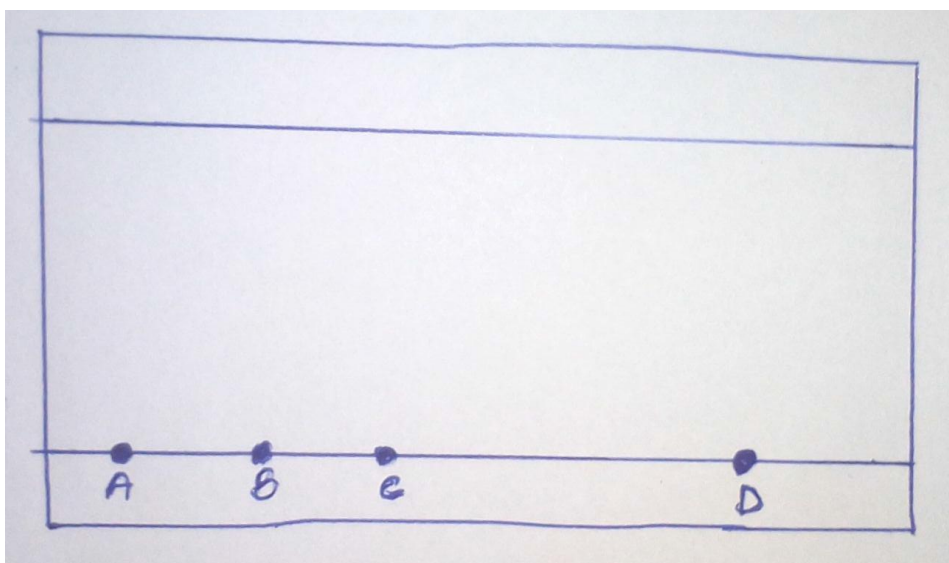
(a) Which salt crystallised out? Give a reason. (2 mks)

(b) Calculate the mass of the salt that crystallised out. (1 mk)

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14. When the oxide of metal Z is heated in the presence of metal X is reduced. The oxide of metal X is reduced by metal Y. Arrange the three metals in order of increasing reactivity. (2 mks)

15. The diagram below shows spots of pure substances A, B and C on a chromatography paper. Spot D is that of a mixture.



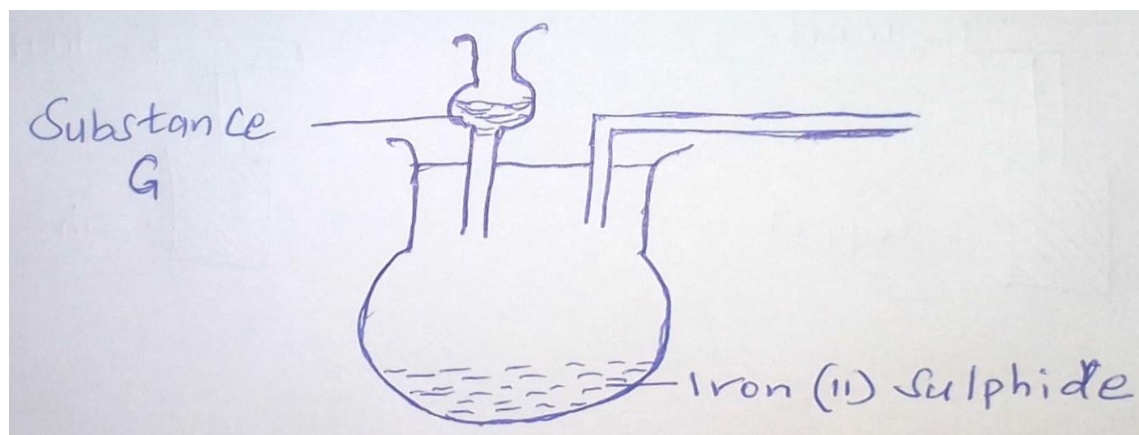
After development A, B and C were found to have moved 4cm, 1.5cm and 3cm respectively. D has separated into two spots which had moved 3cm and 4cm.

(i) On the diagram show the positions of all the spots after development. (3 mks)

(ii) Identify the substances present in mixture D. (1 mk)

16. The apparatus shown below were set up used to prepare and collect hydrogen Sulphide gas

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(a) Name substance G. (1 mk)

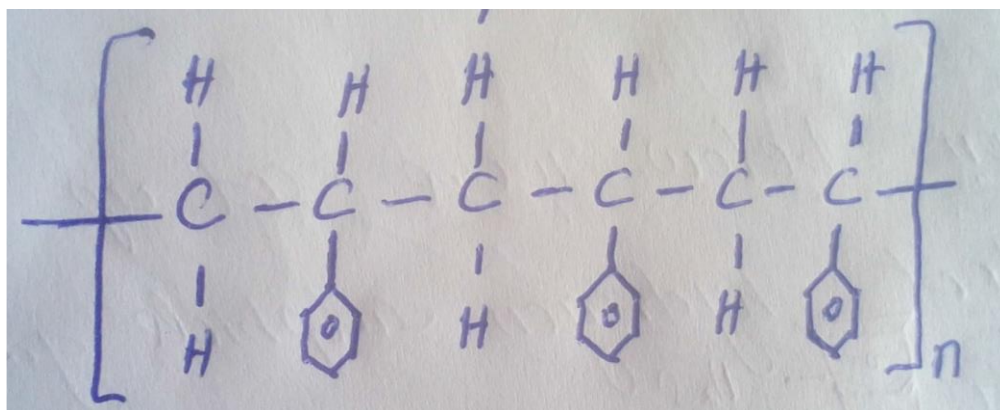
(b) Complete the set up to show how a dry sample of hydrogen Sulphide gas is collected. (2 mks)

17. Trona is a double salt of sodium with formula $\text{Na}_2\text{CO}_3 \cdot \text{NaHCO}_3 \cdot 2\text{H}_2\text{O}$. Trona is collected, dried and heated to convert it to sodium carbonate.

(i) Write an equation for the decomposition of trona by heat (1 mk)

(ii) State two uses of Sodium Carbonate. (2 mks)

18. Below is a part of a synthetic polymer. Study it and answer the questions that follow.



(i) Draw the structure of its monomer. (1 mk)

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(ii) Determine the number of monomers making the above compound if its relative molecular mass is 104,000. The benzene ring has six carbon atoms and five hydrogen atoms.

19. Nitric (v) acid may be prepared in the laboratory by the action of concentrated Sulphuric (vi) acid on a suitable nitrate and distilling off the nitric acid.

(a) Why is the apparatus consisting of glass desirable? (1 mk)

(b) Pure nitric (v) acid is colourless but the products in the laboratory preparation is usually yellow. Explain. (2 mks)

20. The results of an experiment to determine the solubility of Potassium chlorate in water at 30°C was as follows:

Mass of dish = 15.86g

Mass of dish + saturated solution at 30°C = 26.86g

Mass of dish + solid potassium chlorate after evaporation to dryness = 16.86g

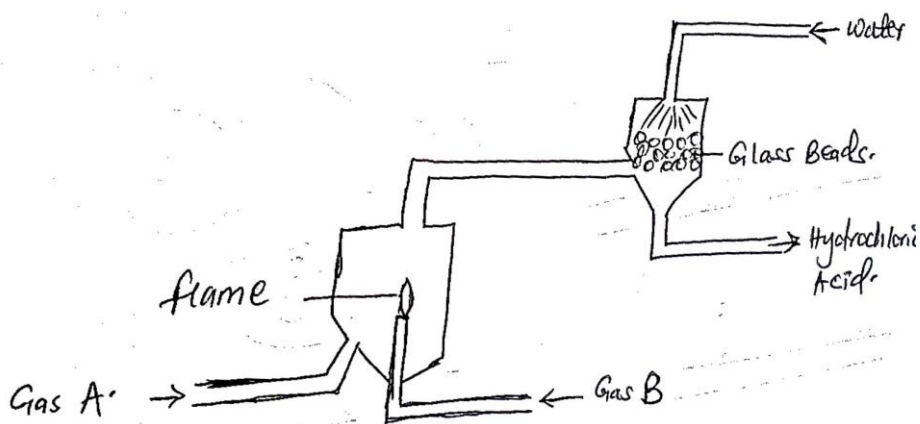
Calculate the mass of saturated solution containing 60g of water at 30°C. (3 mks)

21. (a) State the Gay Lussac's law. (1 mk)

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- (b) 15cm^3 of a gaseous hydrocarbon reacted completely with 45cm^3 of oxygen. 30cm^3 of Carbon (IV) oxide and 30cm^3 water were formed. Determine the formula of the hydrocarbon given that all volumes of gases were measured under the same conditions of temperature and pressure. (2 mks)

22. The diagram below represents large scale manufacture of hydrochloric acid. Study it and answer the questions that follow.



- (a) Identify; (2 mks)
- (i) Gas A -
- (ii) Gas B -
- (b) Write the chemical equation for the reaction between gas A and B. (1 mk)
- (c) State the role of glass beads in the process. (1 mk)
23. 60cm^3 of oxygen gas diffused through a porous partition in 50 seconds. How long will it take 120cm^3 of Sulphur(IV) oxide gas to diffuse through the same partition under similar conditions. (3 mks)

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24. The table below shows the observations made on tests carried out on a colour liquid sample.

Exp	Test	Observation
(i)	Addition of excess $\text{NaOH}_{(\text{aq})}$	White ppt soluble in excess
(ii)	Addition of dilute $\text{H}_2\text{SO}_{4(\text{aq})}$	White ppt
(iii)	Addition of $\text{AgNO}_{3(\text{aq})}$	White ppt

(a) Identify; (2 mks)

- (i) Cation in the sample
- (ii) Anion in the sample

(b) Write the ionic equation for the reaction taking place in experiment (III) (1 mk)

25. (a) Explain why its not advisable to use wood ash for cleaning aluminium utensils. (1 mk)

(b) Aluminium metal is a good conductor and its used for over-head cables. State any other properties that makes aluminium suitable for this use. (1 mks)

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