Name…… **Index No……/…….**

School…… **Date ……..…**

Candidate's Signature…….

233/1
CHEMISTRY
Paper 1
(Theory)
KCSE MOCKS 2017

Time: 2 Hours

INSTRUCTIONS TO CANDIDATES

1. Write your name and index numbers in the space provided above.
2. Sign and write the date of examination in the space provided above.
3. Answers all the questions in the spaces provided in the question paper.
4. Mathematics tables and silent electronic calculators maybe used.
5. All working **MUST** be clearly shown where necessary.
6. This paper consists of 14 printed pages. Candidates should confirm the 14 printed pages are there.

FOR EXAMINER USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATES SCORE
1- 30	80	

This paper consists of 15 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing

1. Name the process that takes place when

(i) Fat or oils are hydrolyzed using an alkali. (1 mk)

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……

(ii) Sulphur is heated with natural rubber. (1 mk)

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……

2. When anhydrous Calcium Chloride is exposed to the atmosphere. It forms a solution.

(a) Name the process that takes place. (1 mk)

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(b) State one use of the process named in 2 (a) above. (1 mk)

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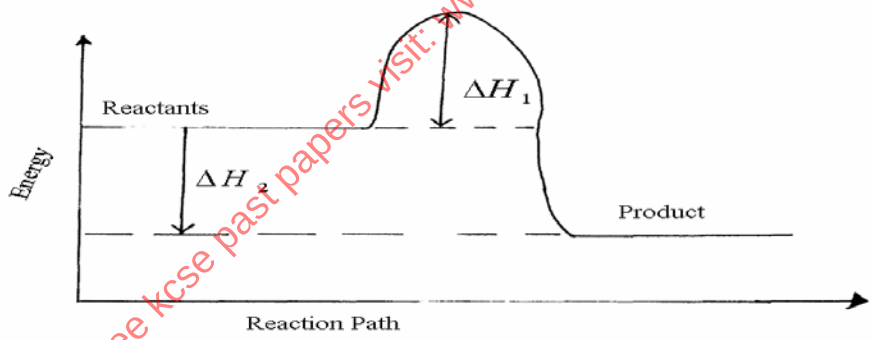
3. Study the energy level diagram for the reaction shown below and **use it to** answer the questions that follow.

$$2SO_2 + O_2 \longrightarrow 2SO_3$$

(g) (g) (g)



(i) State and explain two ways of increasing the yield of SO_3 per unit time from the diagram. (2 mks)

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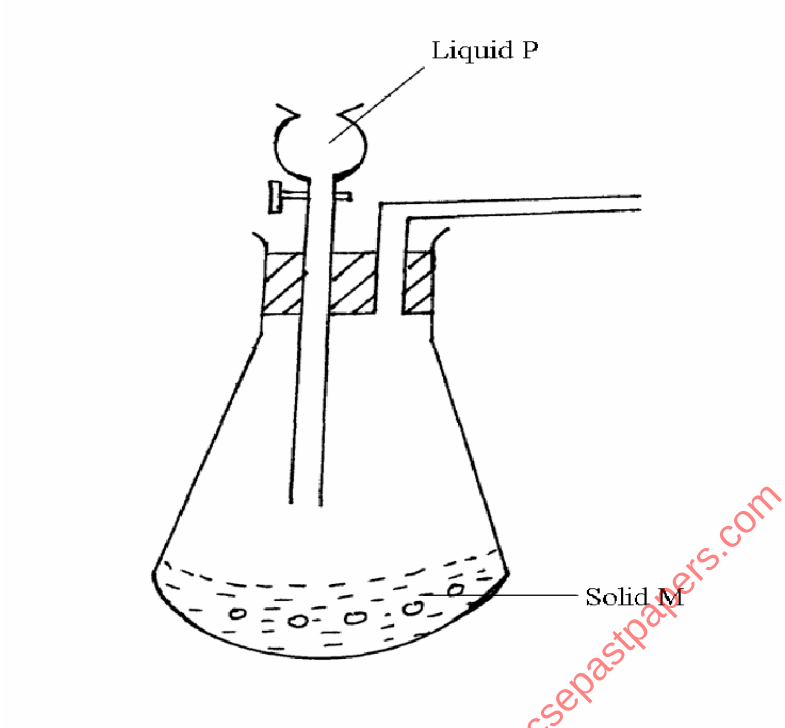
(ii) What do the following represent?

ΔH_1 …… (½ mk)

ΔH_2 …… (½ mk)

4. The diagram below shows an incomplete set-up of preparation and collect of dry hydrogen chloride gas. Use it to answer the questions that follow.



(a) Identify solid M and liquid P.

M ……

P ……..

(b) Complete the diagram above to show how the preparation and collection was achieved. (1 mk)

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5. Give the reaction type of the following:

(i) Reaction between Butan – 1-oic acid and Pentan – 1- ol in the presence of drops of conc. Sulphuric acid to form an organic compound. (1 mk)

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(ii) Reaction between Chlorine and Potassium Iodide to form a dark brown solution. (1 mk)

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(iii) Reaction between bromine and methane in the presence of U.V light (1 mk)

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6. A fossil was discovered in the year 2007. Its half-life was found to be 440 yrs. Calculate the time

it will take for the mass of the fossil to have reduced from 240g to 15g. (3 mks)

7. A form four student accidentally mixed Sodium Carbonate and Calcium Carbonate. Describe how he would obtain a dry sample of Sodium Carbonate from the mixture. (3 mks)

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8. State the conditions under which ammonia gives the following products when heated

(i) Nitrogen and hydrogen. (1 mk)

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(ii) Nitrogen and water. (1 mk)

……

……

(iii) Nitrogen (II) oxide and water. (1 mk)

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9. (a)The atomic number of Sulphur hydrogen and oxygen are 16, 1 and 8 respectively. Write the electron arrangement of Sulphur in the following substances.

(i) H_2S…… (1 mk)

(ii) SO_3^{2-}…….. (1 mk)

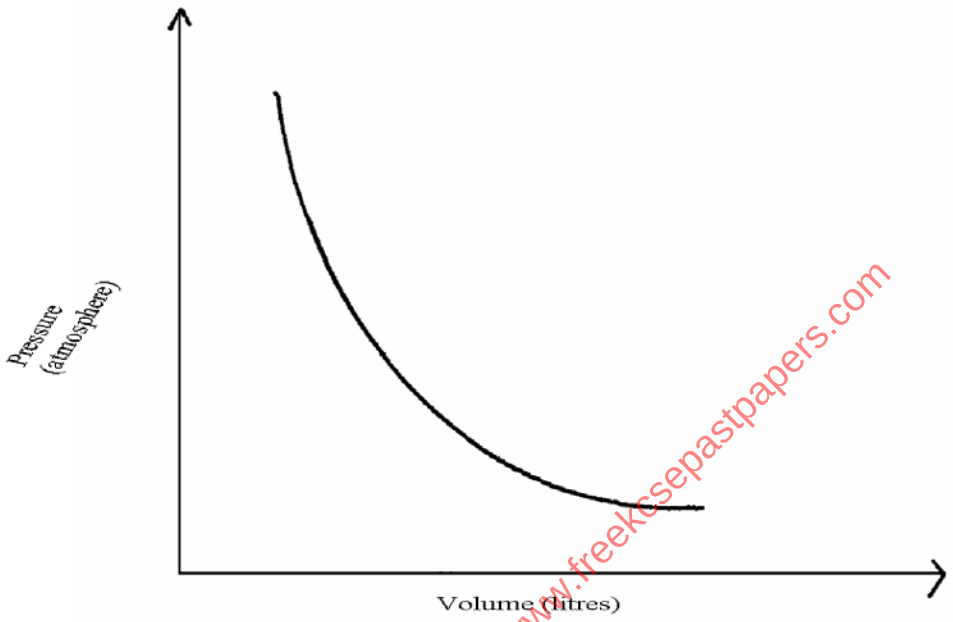
(b) State the number of neutrons and electrons in the species of Aluminum shown below:

$^{27}_{13}Al^{3+}$

Neutrons …….. (½ mk)

Electrons ……. (½ mk)

10. The graph below shows the behaviour of a fixed mass of a gas at constant temperature.



(i) What is the relationship between the volume and the pressure of the gas. (1 mk)

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(ii) 12 litres of oxygen gas at one atmosphere pressure were compressed to 2.5 atmospheres pressure at constant temperature. Calculate the volume occupied by the oxygen gas. (2 mks)

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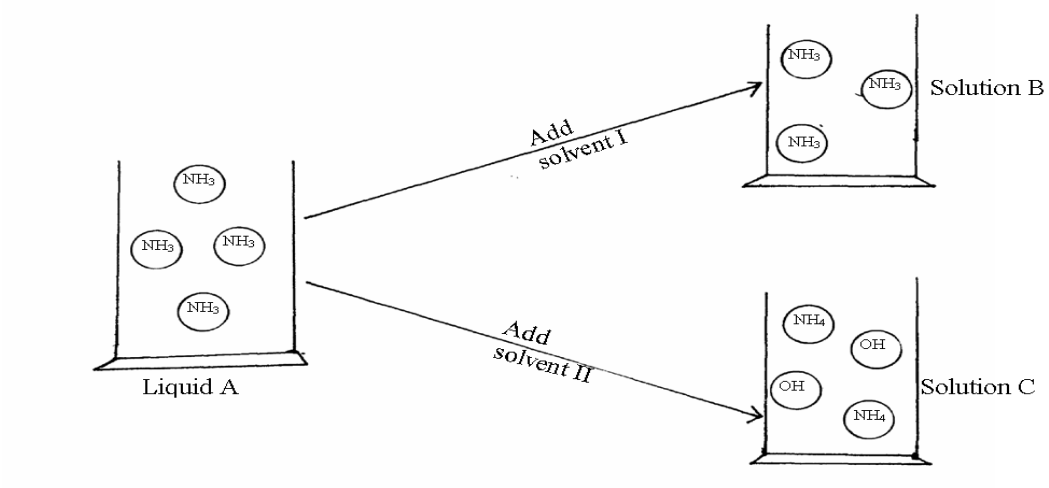
11. 20 cm^3 of 2 M Sulphuric (IV) acid reacted completely with 3.2 g of WOH (O=16, H=1) Calculate the R.A.M of W in the formula WOH. (3 mks)

12. Study the diagram below and answer the questions that follow.



(a) Identify the solvent used in step I and step II.

I…….. (½ mk)

II …….(½ mk)

(b) State and explain what is observed if a red litmus paper was dipped in solution B and C. (2 mks)

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13. The figure below shows part of non-luminous flame.

(a) (i) Describe an experiment that would confirm that region labeled A is not suitable for heating. (1 ½ mks)

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(ii) Explain why luminous flame produce light and soot. (1 ½ mks)

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14. An organic compound with the formula $C_4H_{10}O$ reacts with sodium metal to give hydrogen gas and a white solid.

(a) Give the formula of the white solid. (1 mk)

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(b) To which homologous series does the white solid belong? (1 mk)

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(c) Write the equation for the reaction between the organic compound $C_4H_{10}O$ and sodium metal. (1 mk)

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15. (a) Carbon (IV) oxide is bubbled through Calcium hydroxide until there is no further change. Explain using equations the changes observed. (2 mks)

(b) Explain why diamond is used in cutting of glass and drilling. (1 mk)

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16. The table below shows ammeter reading recorded when 2M Sulphuric (IV) acid and 2M ethanoic acid were tested separately.

Electrolyte	Current (A)
2M Sulphuric acid	8.1
2M Ethanoic acid	2.5

Explain the difference in the ammeter readings. (2 mks)

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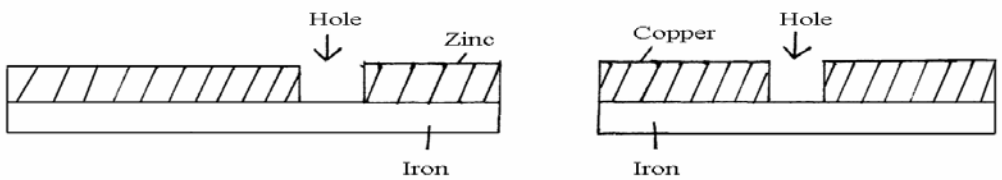
17. The figure below shows cross – sections of two pieces of iron coated with Zinc and Copper respectively.



Which piece of iron would rust when the holes were filled with water and left for sometime? Explain. (2 mks)

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18. (i) Define a dynamic equilibrium. (1 mk)

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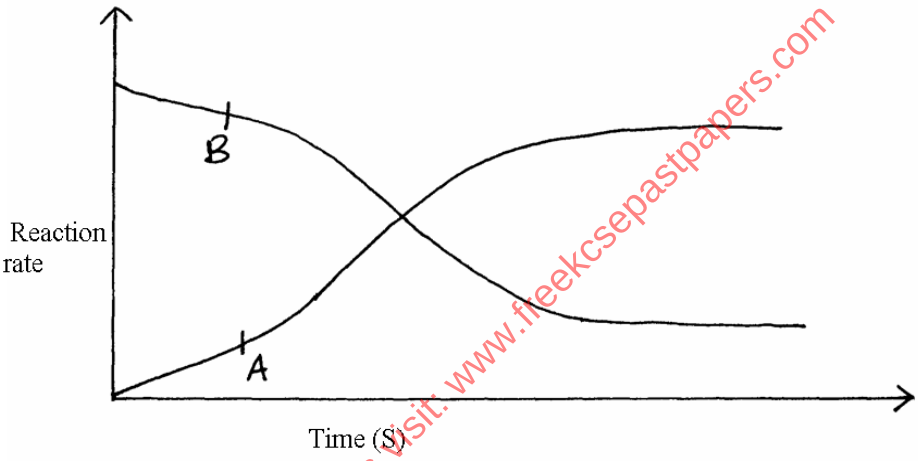
(ii) The equation below shows a reaction at equilibrium

$2CrO_4^{2-}{}_{(aq)} + 2H^+{}_{(aq)} \rightleftharpoons Cr_2O_7^{2-}{}_{(aq)} + H_2O_{(l)}$

If a graph of reaction rate against time plotted, the curve obtained is as below.



Giving a reason, identify species A and B.

A (1 mk)

……

……

B (1 mk)

……

……

19. (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= 16)

(i) PH_4^+ (1 mk)

……

……

(ii) B_2O_3 (1 mk)

……

……

(b) The formula of the compound formed when Aluminum and chlorine react is Al_2Cl_6. Name the types of bonds that exist in the compound. (1 mk)

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20. Sulphur (IV) oxide gas was bubbled through acidified potassium chromate (VI) solution and Iron (III) Sulphate solution chromate. Explain the observations made in each case.

(i) With Potassium Chromate (VI) solution. (1 ½ mk2)

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(ii) Iron (III) Sulphate solution (1 ½ mks)

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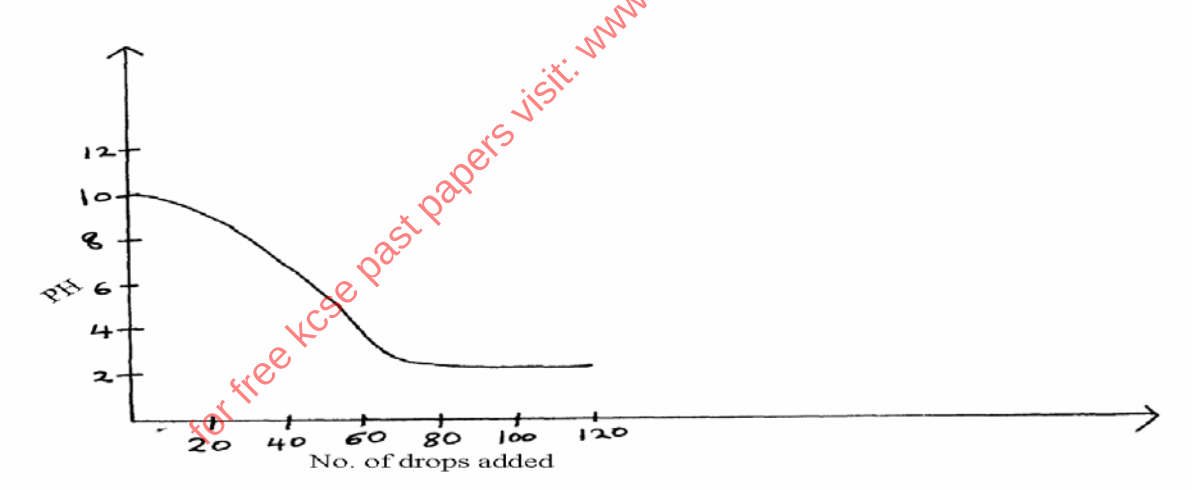
21. A liquid X is added dropwise to $20cm^3$ of Urea fertilizer $(NH_2)_2$ CO solution. The PH value is noted after the addition of every 10 drops and a graph of PH against number of drops is drawn as shown below.



(a) From the evidence on the graph, state the nature of liquid X added and explain your deduction (2 mks)

……

……

(b) The table below shows solution and their P^H value.

Solution	P^H value
P	2.0
R	7.0
R	14.0

Select two solutions that would react with zinc hydroxide. Explain. (1 mk)

……

……

22. State and explain what is observed when a burning piece of magnesium is lowered into a gas jar containing dry chlorine gas. (2 mks)

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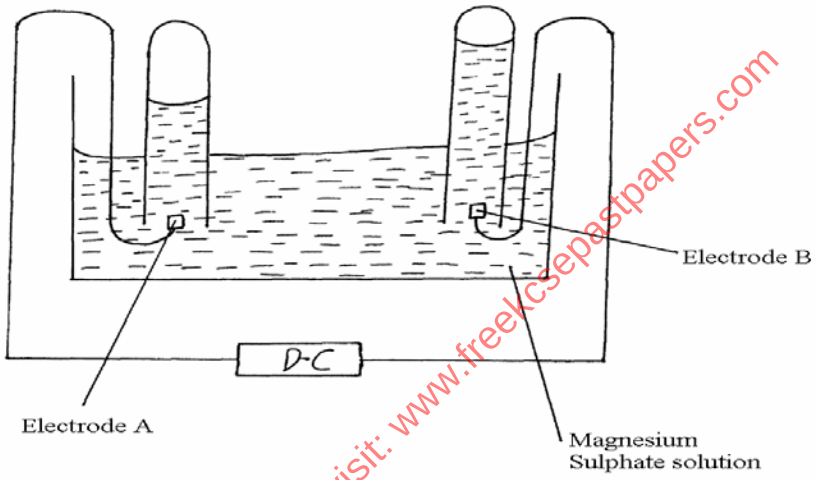
23. The set-up below was used during the electrolysis of Magnesium Sulphate solution using graphite electrons.



(i) Identify the anode and the cathode. (1 mk)

Anode: ……

Cathode: ……..

(ii) Write half ionic equation at the anode and cathode: (1 mk)

Anode: ……

(iii) Explain the P^H change of the electrolyte during the experiment. (1 mk)

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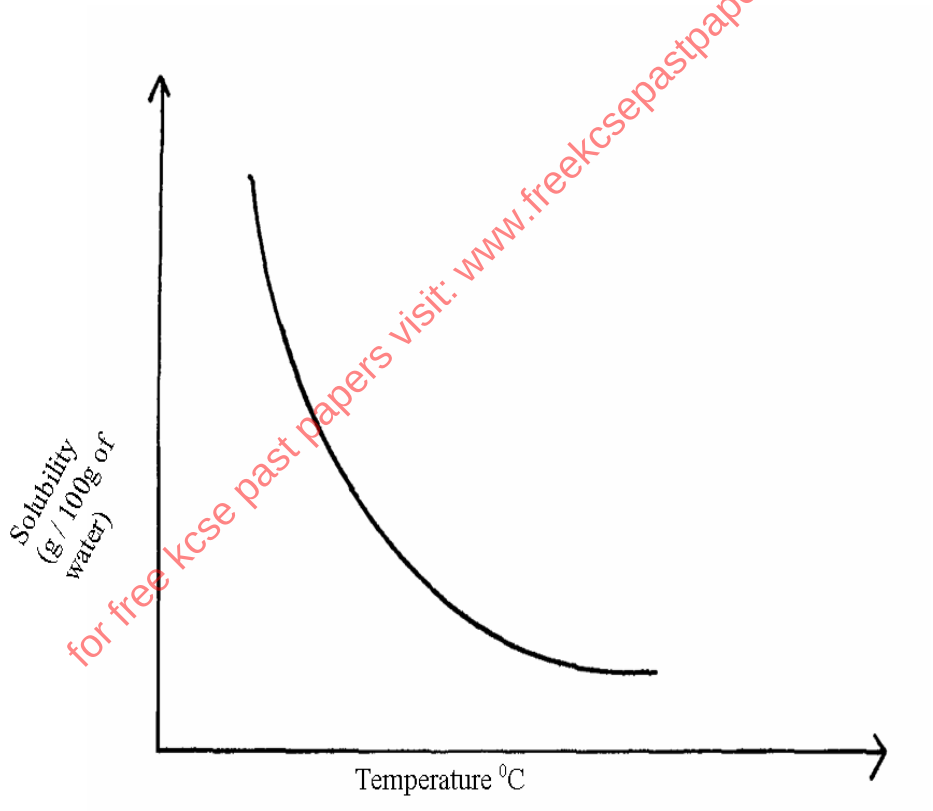
24. Calculate the standard enthalpy of formation of carbon disulphide given that:-

$S_{(s)} + O_{2\,(g)} \longrightarrow SO_2 \qquad \Delta H = -294 KJmol^{-}$

$CS_{2\,(l)} + 3O_{2\,(g)} \longrightarrow CO_2 + 2SO_2 \qquad \Delta H = -1072 KJmol^{-}$

$C_{(s)} + O_{2\,(g)} \longrightarrow CO_{2\,(g)} \qquad \Delta H = -393 KJmol^{-}$

25. The graph below represent the solubility curve of a gas in water.



State and explain the conclusion that can be drawn from this curve about the solubility of the gas.
(1 mk)

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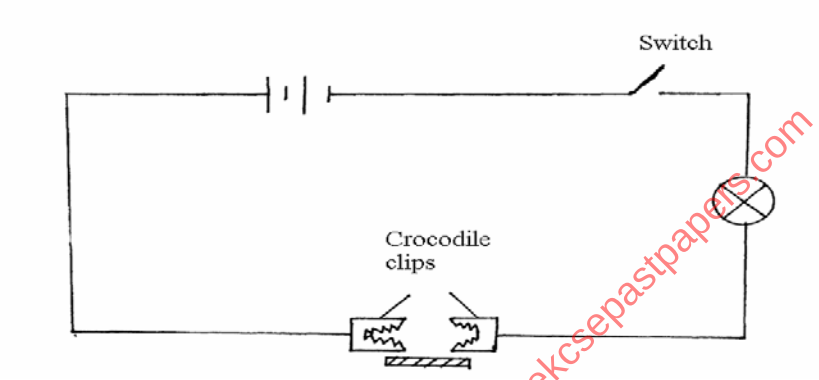
……

(b) The solubility of salt T at 80°C is 40g / 100g of water. What mass of T will saturate 65g of water at 80^0C? (2 mks)

26. The following circuit was set – up to investigate effect of electric current on substances.



State and explain the effect on the bulb when the following substances were connected between crocodile clips.

(i) Mercury (1 mk)

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(ii) Sugar crystals. (1 mk)

……

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27. A sample of pesticide is suspected to contain lead (II) ions. Describe how the presence of lead (II) ions can be established. (2 mks)

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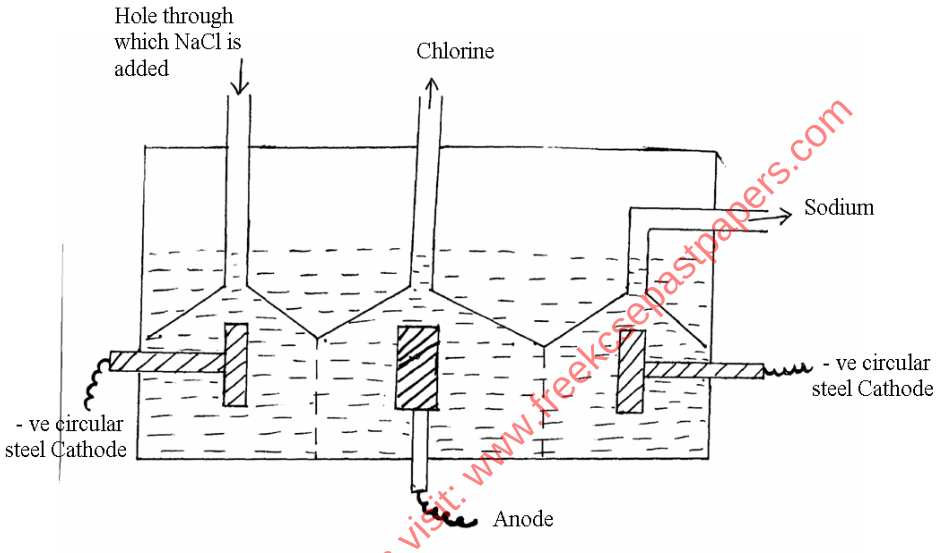
28. Below is a simplified diagram of the Down's cell used for the manufacture of Sodium. Study it and answer the questions that follow.



(i) Name two physical properties of Sodium utilized in the extraction and collection of sodium metal. (2 mks)

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(ii) What precaution is taken to prevent Chlorine and Sodium from recombining (½ mk)

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(iii) State one use of Sodium metal. (½ mk)

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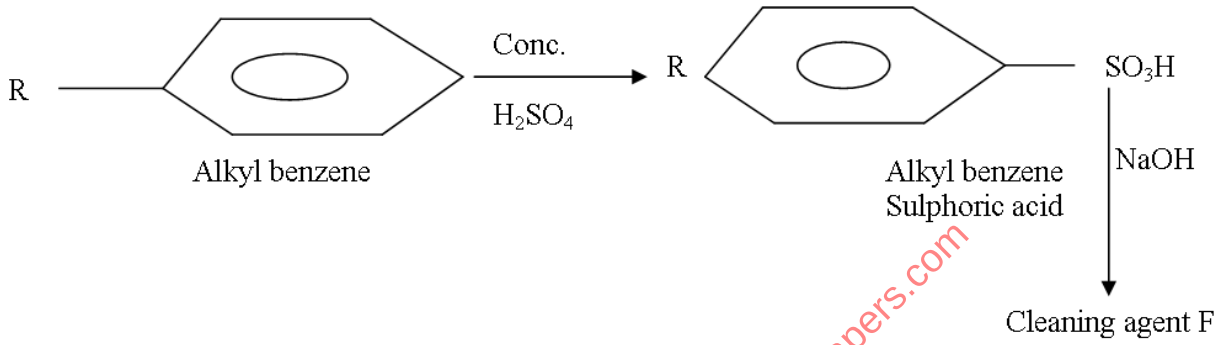
29. The scheme below represents the manufacture of a cleaning agent F.



(a) Give the formula of F and the type of cleaning agent in which F belongs. (2 mk)

Formula:

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……

Type:

……

……

(b) State one disadvantage of using F as a cleaning agent. (1 mk)

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30. 3.22g of hydrated Sodium Sulphate, Na_2SO_4ºX H_2O were heated to a constant mass of 1.42g, determine the value of X in the formula. (Na = 23, S = 32, O = 16, H=1). (2 mks)