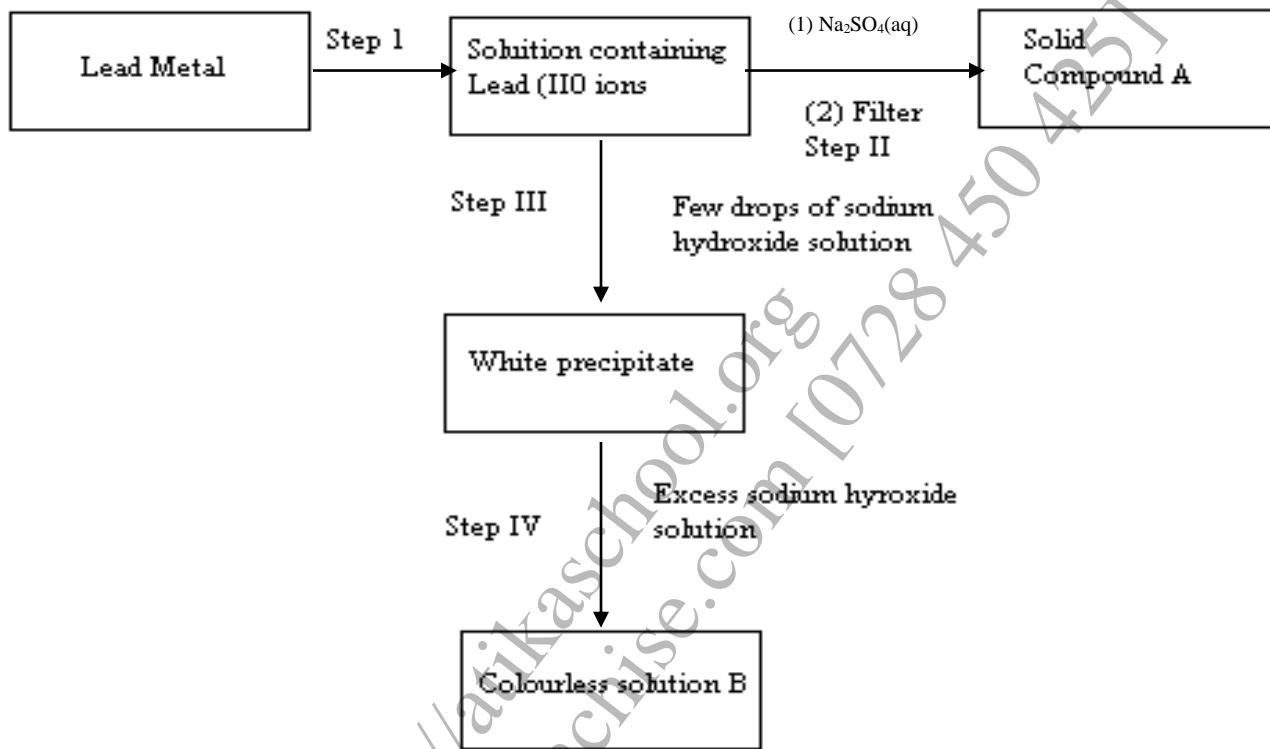


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QUESTIONS

- Aluminium metal is a good conductor and is used for overhead cables. State any other two properties that make aluminium suitable for this use
- Study the flow chart below and answer the questions that follow



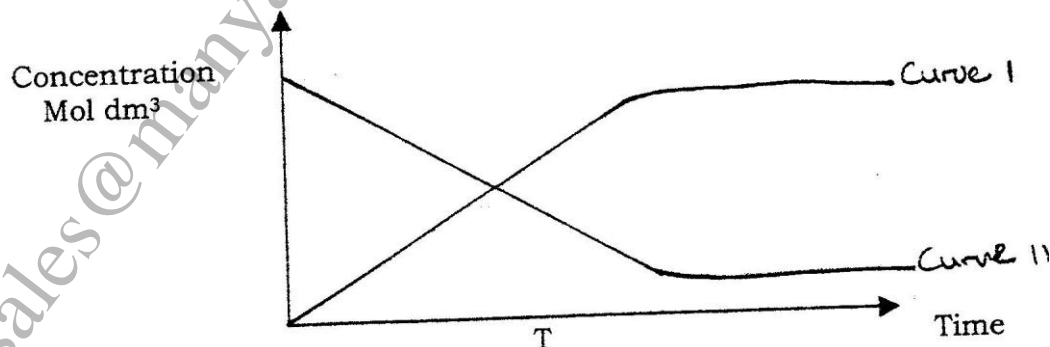
- Name:
 - The reagent used in step I
 - Compound A
 - Write an ionic equation for the reaction in step IV
- State and explain the observation that would be made when a few drops of concentrated sulphuric acid are added to a small sample of hydrated copper (II) sulphate
 - 4.76g of liquid ammonia and 4.76g of liquid nitrogen were each allowed to warm up and hang into gas at warm temperature and pressure. Relative atomic masses: H=1.0 and N=14.0. Using the data given above, explain which gas occupied the greater volume
 - Sulphur dioxide and nitrogen dioxide react as shown in the equation below
$$\text{SO}_2(\text{g}) + \text{NO}_2(\text{g}) \rightarrow \text{SO}_3(\text{g}) + \text{NO}(\text{g})$$
 - Using the oxidation numbers of either sulphur or nitrogen, show that this is a redox reaction

- (ii) Identify the reducing agent
6. What type of bond is formed when lithium and Fluorine react? Explain
(Atomic numbers: Li = 3 and F = 9)
7. Write the formula of sulphide of an element C, whose atomic number is 5. (C is not the actual symbol of the element)
8. The table below shows the solubility of a salt at various temperatures

Temperature ($^{\circ}\text{C}$)	Solubility g/ 100g W:
0	36
40	30
80	25
110	20

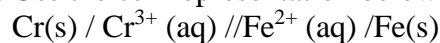
What would happen if a sample of a saturated solution of the salt at 40°C is heated to 80°C . Explain

9. State the observation that would be made when a piece of sodium metal is placed in samples of:
 Pentane: _____
 Pentanol: _____
10. D gm of potassium hydroxide were dissolved in distilled water to make 100cm^3 of solution. 50cm^3 of the solution- required 50cm^3 of 2 M nitric acid for complete neutralization. Calculate the mass D, of potassium hydroxide
 $(\text{KOH})(\text{aq}) + \text{HNO}_3(\text{aq}) \rightarrow \text{KNO}_3(\text{aq}) + \text{H}_2\text{O}(\text{l})$
 Relative formula mass of KOH = 56
11. In an attempt to prepare sulphur dioxide gas, dilute sulphuric acid was reacted with barium sulphuric. The yield of sulphur dioxide was found to be negligible explain
12. The curve below represents the changes in the concentration of substance E and F with time
 In the reaction; $\text{E}(\text{g}) \rightleftharpoons \text{F}(\text{g})$



- (i) Which curve represents the changes in concentration of substance F?
Give a reason
- (ii) Give a reason for shapes of curves after time 't' minutes

13. Use the cell representation below to answer the questions that follow



(a) Write the equation for the cell reaction

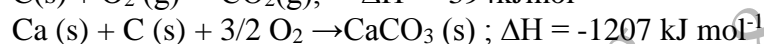
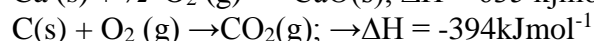
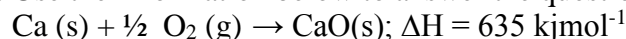
(b) If the E.M.F of the cell is 0.30 volts and the E^{θ} value for $\text{Cr}^{3+}(\text{aq}) / \text{Cr(s)}$

14. (a) A few drops of freshly prepared iron (II) sulphate solution were added to potassium nitrate solution in a test – tube. Concentrated sulphuric acid was then carefully added to the mixture. State the observation that were made

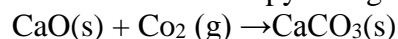
(b) Write an equation for the reaction that occurs when solid potassium nitrate is strongly heated



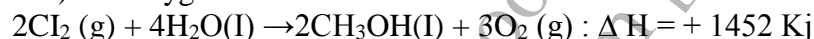
15. Use the information below to answer the question that follows.



Calculate the enthalpy change for the reaction

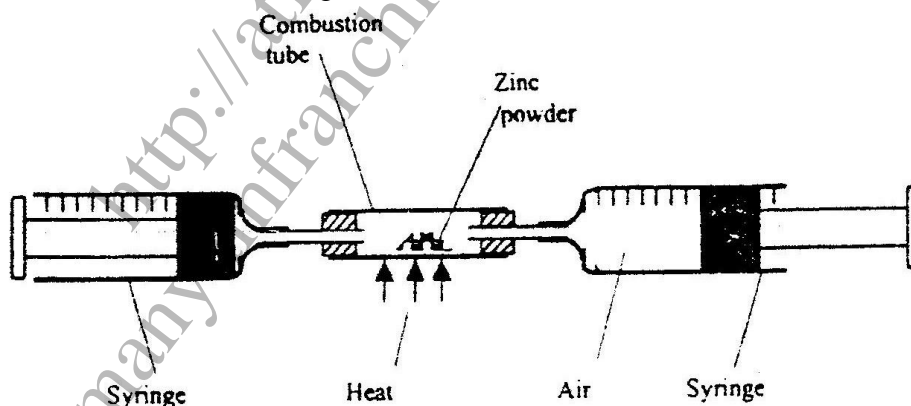


16. Under certain conditions, carbon dioxide reacts with water to form methanol (CH_3OH) and oxygen as shown below



What would be the effect on the yield of methanol if the temperature of the reaction mixture is increased? Explain

In an experiment a certain volume of air was passed from syringe to syringe over heated zinc powder as shown in the diagram below



The experiment was repeated using excess magnesium powder. In which of two experiments was the change in volume of the air greatest. (Give reasons)

17. Use the information in the table below to answer the questions that follows

Element	Fluorine	Chlorine	Bromine	Iodine
Heat of vaporization	3.16	10.2	15.0	22.0

Explain the trend in the molar heats of vaporization

18. The diagram below shows a set up for the laboratory preparation and collection of dry chlorine gas

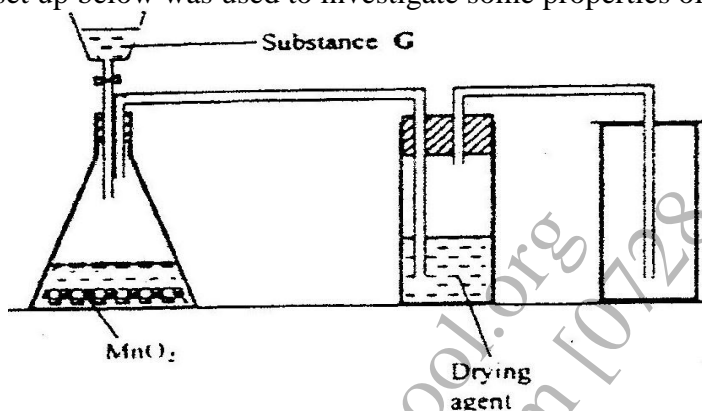
(a) Name

(i) Substance G

(ii) A suitable drying agent Conc.

(b) What property of chlorine makes it possible for it to be collected as shown in the diagram?

19. The set up below was used to investigate some properties of two gases M and N



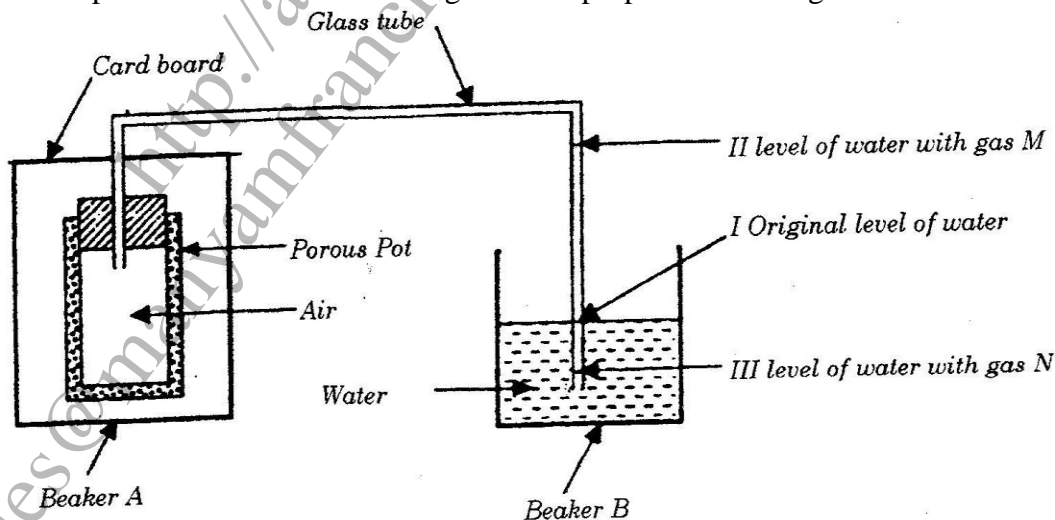
a) Name

(i) Substance G

(ii) A suitable drying agent conc.

b) What property of chlorine makes it possible for it to be collected as shown in the diagram?

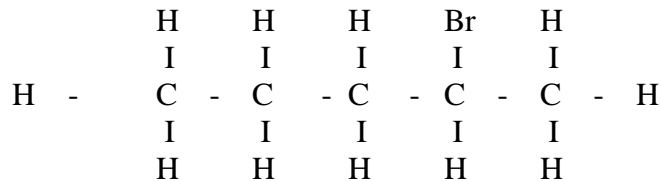
20. The set up below was used to investigate some properties of two gases M and N



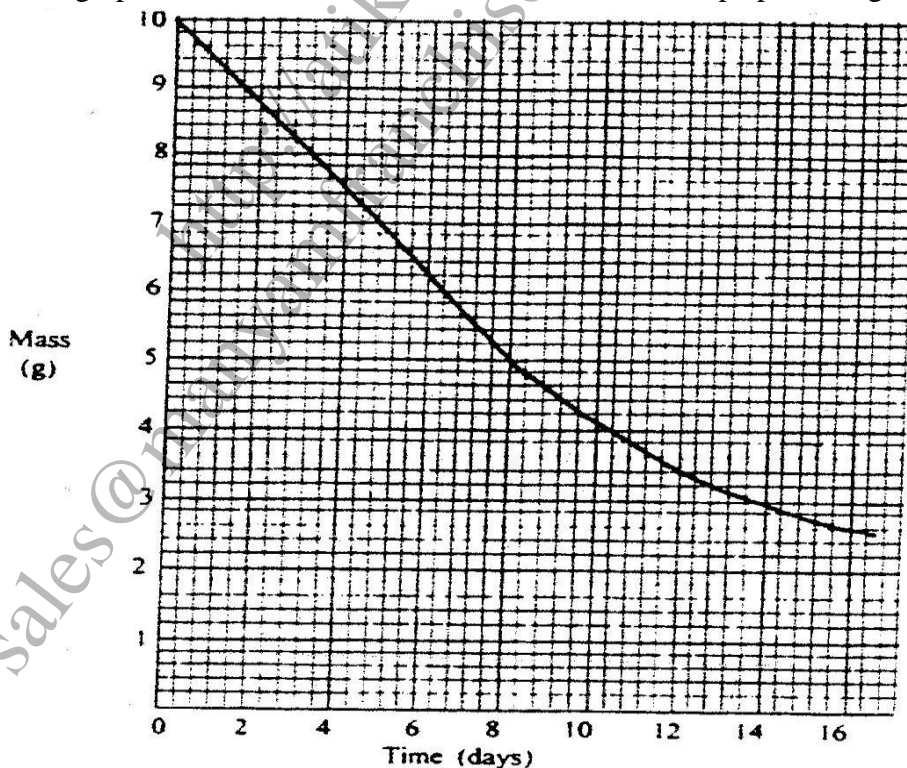
When beaker A was filled with gas M, the level of water in the glass tube rose to point II. When the experiment was repeated using gas N, the level of water dropped to point III. Explain these observations.

21. State and explain one disadvantages of using hard water in boilers

22. Compound L reacts with hydrogen bromide gas to give another compound whose structure is



- (a) Give the structural formula and name of compound L
 (b) Write an equation for the reaction, which takes place between ethane and excess chlorine gas
23. When excess carbon monoxide gas was passed over heated lead (II) oxide in combustion tube, lead (II) oxide was reduced
- (a) Write an equation for the reaction, which took place
 (b) What observation was made in the combustion tube when the reaction was complete?
 (c) Name another gas, which could be used to reduce lead (II) oxide
24. One of the fuels associated with crude oil is natural gas. Name the main constituent of natural gas and write an equation for its complete combustion
 Name:
 Equation:
25. When solid magnesium carbonate was added to a solution of hydrogen chloride in methylbenzene, there was no apparent reaction. On addition of water to the resulting mixture, there was vigorous effervescence. Explain these observations
26. The graph below shows the mass of a radioactive isotope plotted against time



- (a) Using the graph, determine the half-life of the isotope

- (b) Calculate the mass of the isotope present after 32 days
27. The table below shows the P^H values of solutions I, II, III and IV.

Solution	I	II	III	IV
P^H	2	7	11	14

- (a) which solution is likely to be that of calcium hydroxide?
- (b) Select the solution in which a sample of aluminium oxide is likely to dissolve. Give reason for your answer
28. Bromine reacts with ethane as shown below
- $$C_2H_6 + Br \rightarrow C_2H_5Br + HBr$$

- (a) What condition is necessary for this reaction to occur?
- (b) Identify the bonds which are broken and those that are formed
- Bonds broken
- Bonds formed

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QUESTIONS

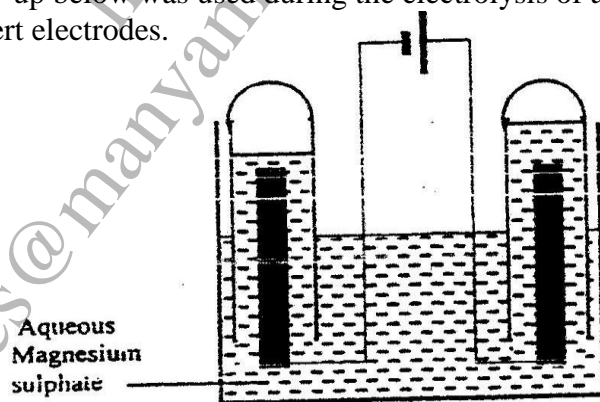
1. The table below gives the volume of the gas provided when different volumes of 2M hydrochloric were reacted with 0.6g of magnesium powder at room temperature

Volume of 2M hydrochloric (cm ³)	Volume of gas (cm ³)
0	0
10	240
20	480
30	600
40	600
50	600

- (a) Write an equation for the reaction between magnesium and hydrochloric acid
- (b) On the grid provided plot a graph of the volume of gas produced (vertical axis), against the volume of acid added (Note the reaction comes to completion, the volume of the gas produced directly proportional to completion, the acid added).
From the graph determine
- c) i) The volume for the gas produced if 12.5cm³ of 2M hydrochloric acid had been used.
ii) The volume of 2M hydrochloric acid which when reacted completely with 0.6 of magnesium powder.
- e) Given that one mole of the gas occupied 24000cm³ at room temperature.

Calculate the relative atomic mass of magnesium.

2. The set – up below was used during the electrolysis of aqueous magnesium sulphate using inert electrodes.



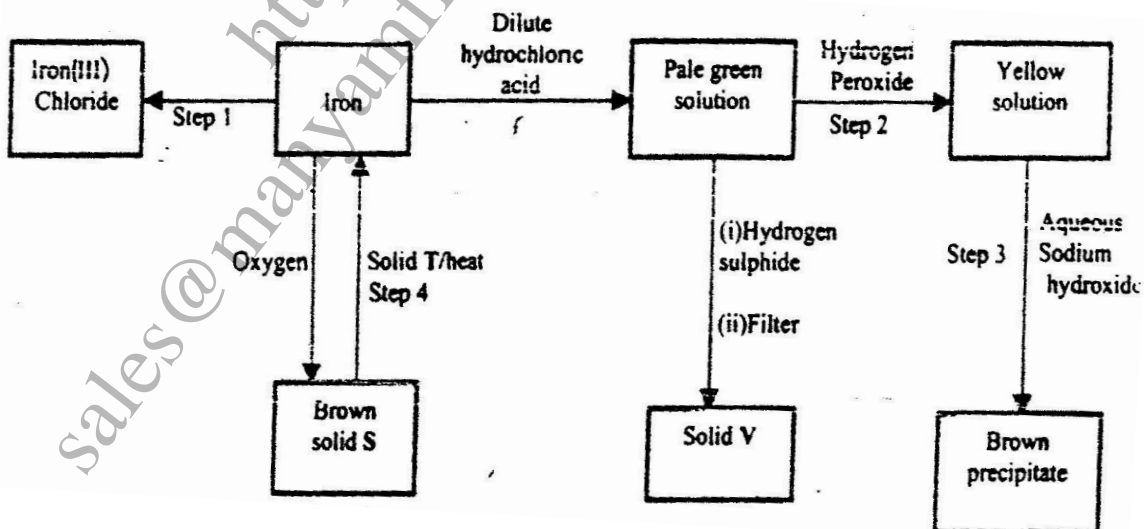
- i) name a suitable pair of electrodes for this experiment
- ii) Identify the ions and cations in the solution
- iii) On the diagram label the cathode
- iv) Write ionic equations for the reactions that took place at the anode.

- v) Explain the change that occurred to the concentration of magnesium sulphate solution during the experience.
- vi) During the electrolysis a current of 2 amperes was passed through the solution for 4 hours. Calculate the volume of the gas produced at the anode. (1 faraday 96500 coulombs and volume of a gas at room temperature is 24000cm³)
- vii) One of the uses of electrolysis is electroplating
What is meant by electroplating?
Give two reasons why electroplating is necessary.

3. Study the information in the table below and answer the questions that follow. The letters do not represent the symbols of the elements.

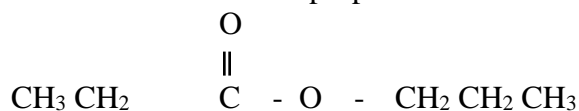
Element(C)	Atomic number	Melting point
L	11	97.8
M	13	660
N	14	1440
Q	17	401
R	19	63.7

- a) Write the electrons arrangement for the atom formed by elements and M and Q
- b) Select an element which is
- The most reactive non – metal
 - A poor conductor of electricity
- c) In which period of the periodic table does elements R below.
- d) Element R loses its outermost electron more readily than I. Explain
- e) Using dots(.) and crosses (x) to represent outermost electrons show bonding in the compound formed elements N and Q.
- f) Explain why the melting point elements M is higher than that of element .
- g) Describe how a solid mixture of sulphate of R and lead sulphate can be separated into solid samples.
4. a) The flow chart below shows a sequence of reactions starting with. Study and answer the questions that follow.

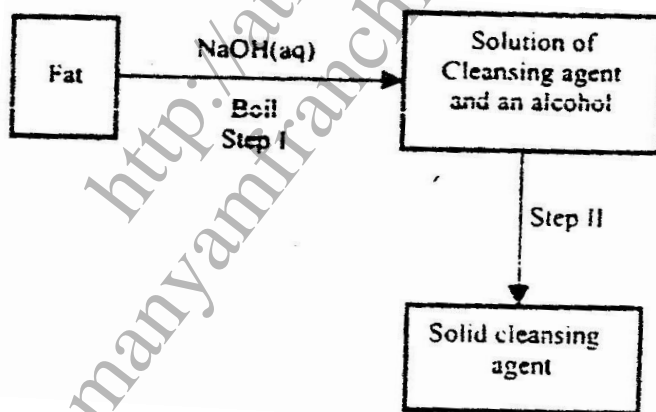


- i) Name the reagent and state the condition for the reaction in step.
- Reagent

- Condition
- ii) Give the names of the following
- Solid S
 - Solid V
 - Solid T
- iii) Give reasons for the colour change in step 2
- ii) Write an ionic equation for the reaction which takes place in step 3.
- v) Name one other substance that could be used instead of sodium hydroxide in step III.
- b) In an experiment 3.36g of iron fillings were added to excess aqueous copper(II) sulphate. Calculate the mass of copper that was deposited.
 Cu = 63.5, Fe = 56.0
- 5 a) When an organic compound Y is reacted with aqueous sodium carbonate, it produces carbon dioxide reacts with propanol to form a sweet smelling compound Z whose formula is.

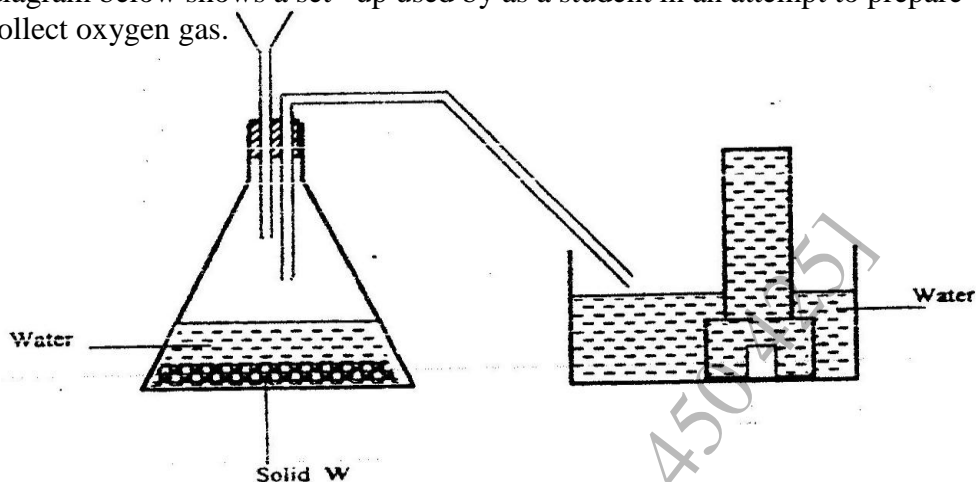


- Name and draw the structural formula of compound Y.
 - What is the name of the group of compounds to which Z belongs?
- b) In an experiment excess ethanol was warmed with potassium dichromate for about twenty minutes. State and explain the observation that was made at the end of the experiment.
- c) The scheme below was used to prepare a cleaning agent. Study and answer the questions that follow.

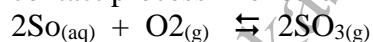


- What name is given to the type of cleaning agent prepared by the method shown in the scheme?
- Name one chemical substance added in step II
- What is the purpose of adding the elements substance names in C(ii) above.
- Explain how an aqueous solution of the cleansing removes oil from utensils during washing.

6. a) The diagram below shows a set-up used by a student in an attempt to prepare and collect oxygen gas.



- i) Complete the diagram correcting the mistakes on it
 - ii) Identify solid W.
- a) A piece of phosphorus was burnt in excess and the product obtained was shaken with a small amount of hot water to make a solution.
- i) Write an equation for the burning of phosphorus in excess air.
- b) Explain why cooking pots made of aluminium do not corrode when exposed to air.
- c) The reaction between sulphur dioxide and oxygen to form trioxide in the contact process is exothermic.



Factory manufacturing sulphuric acid by contact process produces 350kg of sulphur trioxide per day (conditions) for the reaction catalyst. 2 atmospheres pressure and temperatures between. (400 – 500 °C)

- i) What is meant by an exothermic reaction?
- ii) How would the yield per day of sulphur trioxide be affected if temperatures lower than 400°C are used? Explain.