

# **FORM ONE CHEMISTRY** **TOPICAL QUESTIONS**



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## **F1 CHEMISTRY** **TOPICAL QUESTIONS**

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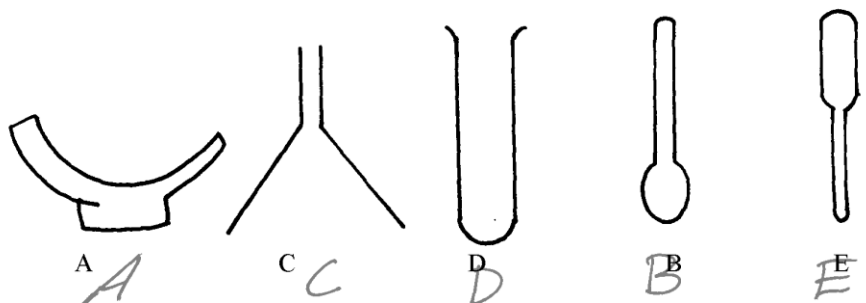
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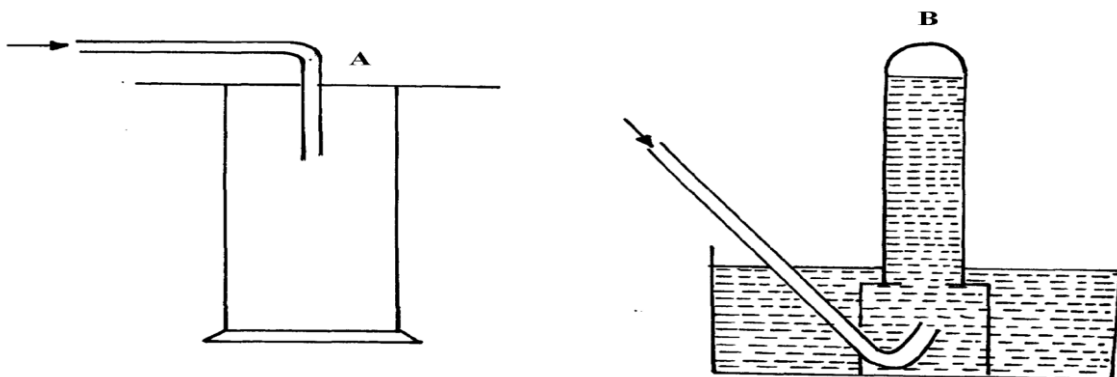
# INTRODUCTION TO CHEMISTRY

1. The diagrams below represent a list of apparatus which are commonly used in a chemistry laboratory:-



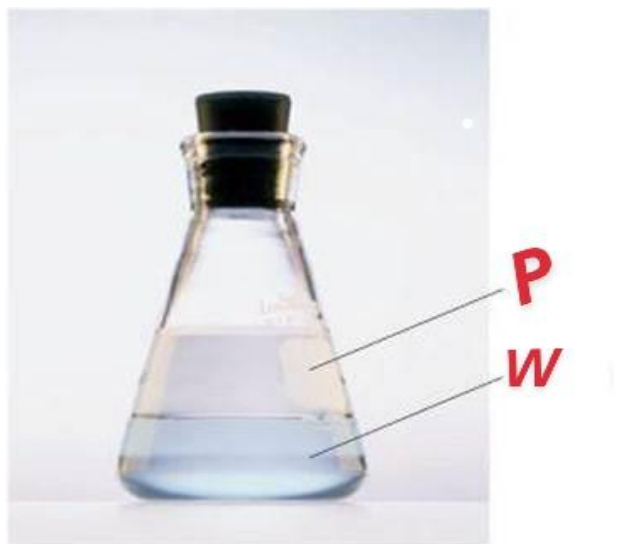
- (a) Give the correct order of the apparatus, using the **letters only**, to show the correct Arrangement that can be used to prepare and investigate the nature of PH of a sample of onion solution
- (b) Name **one** chemical substance and apparatus that is needed in this experiment
2. (a) When the air-hole is fully opened, the bunsen burner produces a non-luminous flame. Explain
- (b) Draw a labelled diagram of anon-luminous flame
3. (a) What is a drug?
- (b) Give **two** drugs that are commonly abused by the youth.
4. The diagram below shows three methods for collecting gases in the laboratory





- (a) Name the methods **A** and **B**
- (b) From the methods above, identify **one** that is suitable for collecting sulphur (IV) oxide. Explain

5. A mixture of hexane and water was shaken and left to separate as shown in the diagram below:



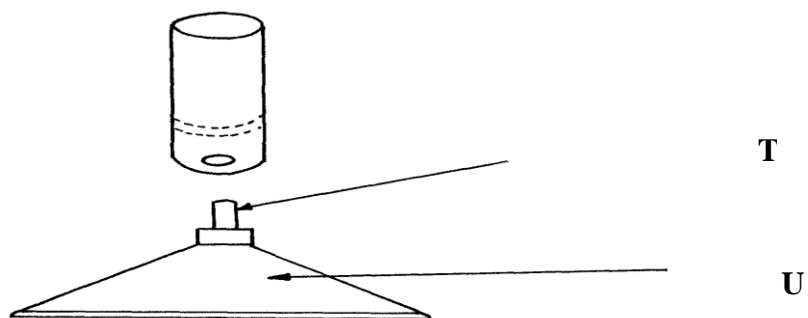
State the identity of;

- (i) **P**
- (ii) (ii) **W**

6. The diagrams below are some common laboratory apparatus. Name each apparatus and state its use

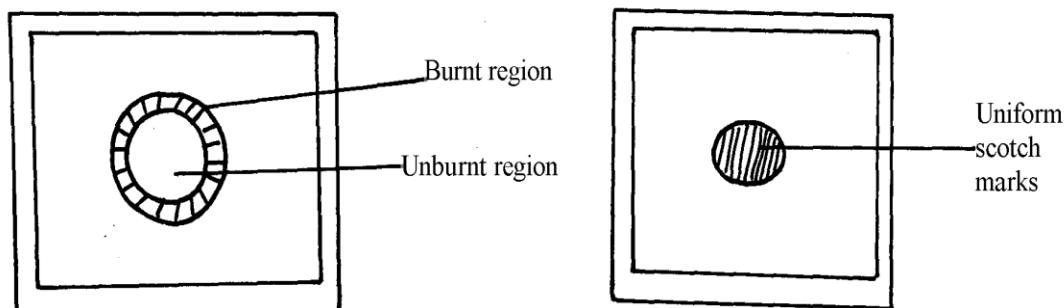
Diagram	Name	Use
	(1/2mk )	(1/2mk)
	(1/2mk)	(1/2mk)

7. The diagram below shows some parts of a Bunsen burner



Explain how the parts labelled **T** and **U** are suited to their functions

8. The diagram below shows the appearance of two pieces of paper placed in different parts of a non-luminous flame of a Bunsen burner and removed quickly before they caught fire.



(a) What do the experiments show about the outer region of the flame?

(b) From the above experiment, which part of the flame is better to use for heating? Give a reason

9. A crystal of copper (II) sulphate was placed in a beaker of water. The beaker was left standing for two days without shaking. State and explain the observations that were made.

10. Study the information in the table below and answer questions that follow.  
(Letters given are not real symbols)

<b>Ions</b>	<b>Electron arrangement</b>	<b>Ionic radius (nm)</b>
A <sup>+</sup>	2.8	0.95
B <sup>+</sup>	2.8.8	0.133
C <sup>2+</sup>	2.8	0.065

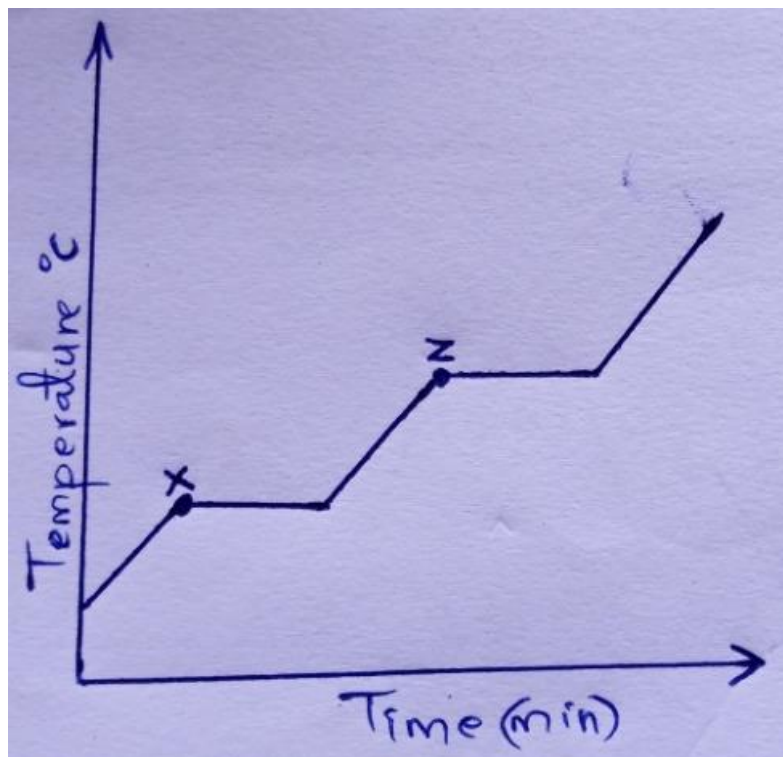
Explain why the ionic radius of :-

(a) B<sup>+</sup> is greater than that of A<sup>+</sup>

(b) C<sup>2+</sup> is smaller than the of A<sup>+</sup>

## SIMPLE CLASSIFICATION OF SUBSTANCES

1. The diagram below shows the heating curve of a pure substance. Study it and answer the questions that follow:



- (a) What physical changes are taking place at points **X** and **Z**?
- (b) Explain what happens to the melting point of sodium chloride added to this substance
2. (a) State **two** differences between luminous flame and non-luminous flame
- (b) It is advisable to set a Bunsen burner to luminous flame prior to an experiment. Explain
3. The paper chromatography of a plant extract gave the following results:



<b>Solvent</b>	<b>Number of spots</b>
X	6
Y	2
Z	3

- (a) Which is the most suitable solvent for purifying the extract? Explain
- (b) Ball pen cannot be used to mark solvent front in the above chromatography. Explain
4. Name the process which takes place when:
- (a) Solid Carbon (Iv) Oxide (dry ice) changes directly into gas
- (b) A red litmus paper turns white when dropped into chlorine water
- (c) Propene gas molecules are converted into a giant molecule
5. A sample of copper turnings was found to be contaminated with copper (II) oxide.  
Describe how a sample of copper metal can be separated from the mixture
6. Copper (II) oxide and charcoal are black solids. How would you distinguish between the two solids?

7. a) What is chromatography?

b) Give **two** applications of chromatography

8. The two elements **P** and **R** were separately burned in air, the products gave the results recorded in the table below:

<b>ELEMENTS PHYSICAL STATE AT ROOM TEMPERATURE</b>	<b>P SOLID</b>	<b>R SOLID</b>
Physical states of products	White solid powder only	Colourless gases <b>L</b> and <b>M</b>
Nature of solutions in water	Basic	<b>L</b> strongly acidic <b>M</b> slightly acidic

(a) Suggest the identity of element **R**.

(b) Describe how the nature of the solutions of the oxides were determined

9 The diagram below represents a paper chromatography for the three brands of soft drinks containing banned artificial food additives.

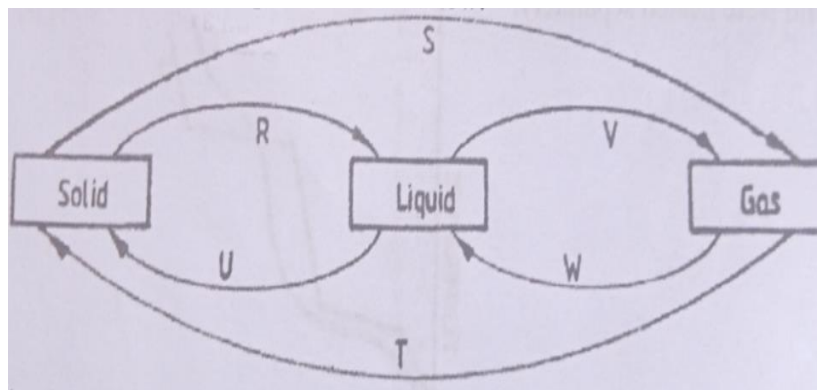
4	6	7	
1	2	5	
		3	
	<b>A</b>	<b>B</b>	<b>C</b>
<b>BRANDS OF SOFT DRINKS</b>			

**A** and **C** found to contain the banned artificial food additives. Which numbers indicate the banned artificial food additives?

10. Without using any laboratory chemical, describe a simple laboratory experiment to distinguish between calcium hydrogen carbonate and sodium hydrogen carbonate

11. The diagram below shows the relationships between the physical state of matter. Study it and

answer the questions that follow



[a] Identify the processes R, V, W and U

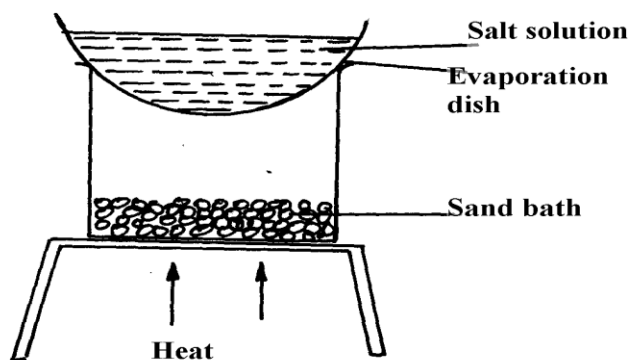
[b] Name one substance that can undergo the process represented by S & T

12. Cooking oils comprise of a mixture of compounds which have a boiling point range of 23°C to 27°C.

(i) What evidence is there to support the statement that cooking oil is a mixture?

(ii) Name another experimental technique that could be used to confirm your answer in part (i) above

13. A form 1 student carried out the separation as shown in the set-up below:-

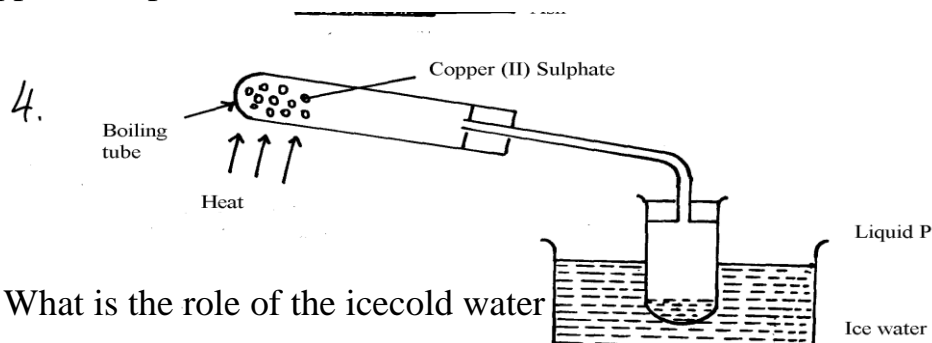


- (i) Identify the method above
- (ii) Give **one** of its disadvantages
- (iii) Name a mixture which can be separated by the set-up above

14. What is meant by melting point and boiling point of a substance?

15. The apparatus below were used by a student to study the effect of heat on hydrated

copper II sulphate



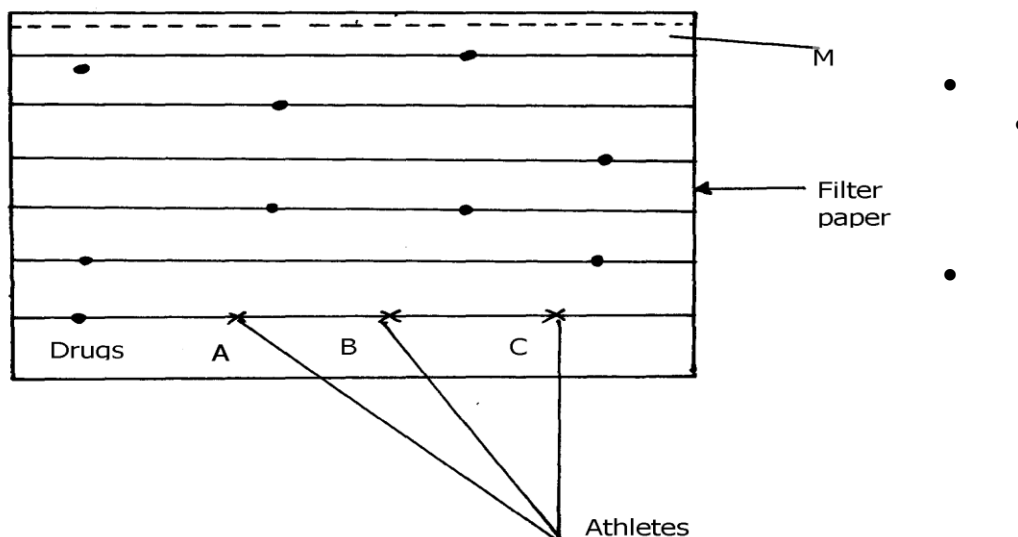
(a) What is the role of the icecold water

(b) Name liquid **P**

(c) What observation is made in the boiling tube

17. The diagram below shows chromatograms of blood samples obtained from three athletes.

One athlete used illegal drug to improve performance in competition.



(a) Name the line marked **M**

(b) Identify the athlete who used illegal drug

18. Classify the following processes as chemical changes or physical changes

<u>Process</u>	<u>physical or chemical</u>
Neutralization	.....
Sublimation	.....
Fractional distillation	.....
Displacement reaction	.....



19. Give **two** reasons why a luminous flame is not used for heating purposes

20. Classify the following processes as chemical changes or physical changes

<u>Process</u>	<u>physical or chemical</u>
Neutralization	.....
Sublimation	.....
Fractional distillation	.....
Displacement reaction	.....

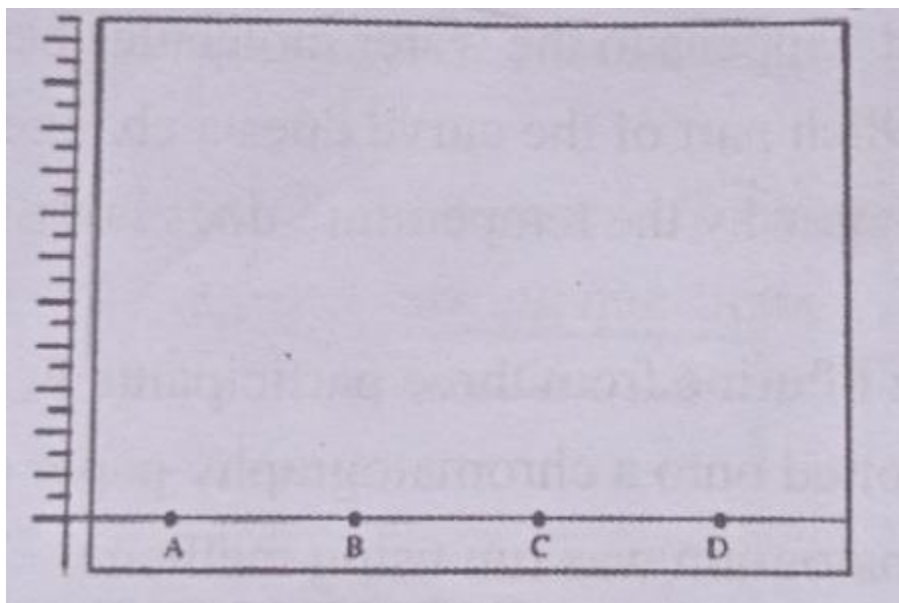
21. Give **two** reasons why a luminous flame is not used for heating purposes

22. State **two** criteria for determining the purity of a substance

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

i) A mixture contains ethene, Hydrogen and ammonia gases. Explain how a sample of hydrogen gas can be obtained from this mixture.

24. a)i) The diagram below shows spots of a pure substance **A**, **B**, and **C** on chromatography paper. Spot **D** is that of a mixture



After development **A**, **B**, and **C** were found to have moved 8cm, 3cm and 6cm respectively. **D** had separated into two spots which had moved 6cm and 8cm

On the diagram above;

I. Label the baseline (origin)

II. Show the positions of all the spots after development

ii) Identify the substances present in mixture **D**

b) Describe how solid ammonium chloride can be separated from a solid mixture of ammonium chloride and anhydrous calcium chloride

c) The table below shows liquids that are miscible and those that are immiscible

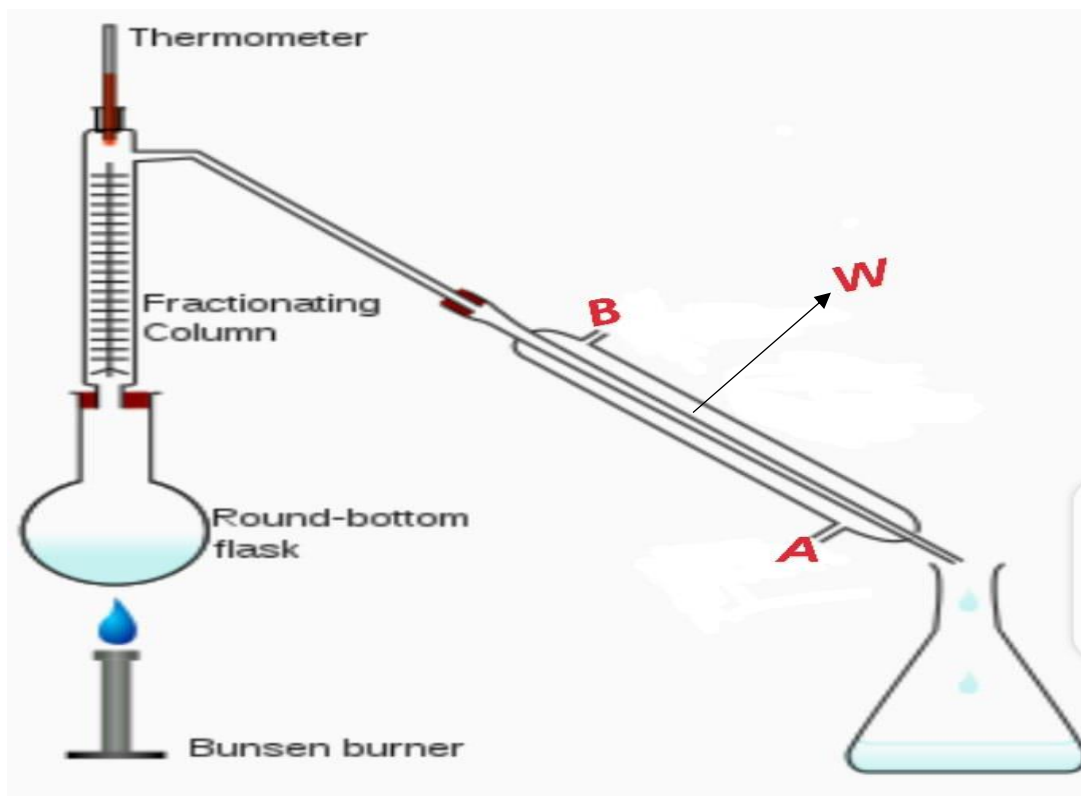
Liquid	L <sub>3</sub>	L <sub>4</sub>
L <sub>1</sub>	Miscible	Miscible
L <sub>2</sub>	Miscible	Immiscible

Use the information given in the table to answer that questions that follow;

i) Name the method that can be used to separate  $L_1$  and  $L_2$  from a mixture of the two

ii) Describe how a mixture of  $L_2$  and  $L_4$  can be separated

25. A student left some crushed fruit mixture with water for some days. He found the mixture had fermented. He concluded that the mixture was contaminated with water and ethanol with boiling point of  $100^\circ\text{C}$  and  $78^\circ\text{C}$  respectively. The set-up of apparatus below are used to separate the mixture.

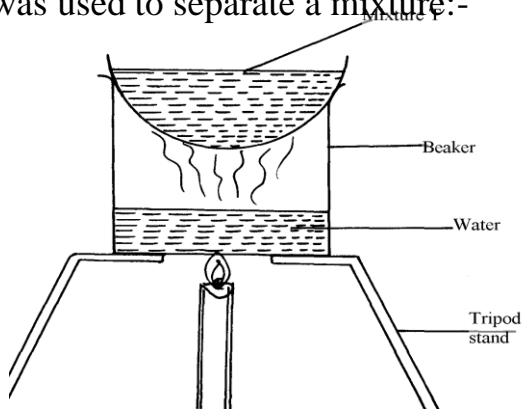


(i) Name the piece of apparatus labelled **W**

- (ii) What is the purpose of the thermometer in the set-up?
- iii) At which end of the apparatus **W** should tap water be connected?
- (iv) Which liquid was collected as the first distillate? Explain
- (v) What is the name given to the above method of separating mixture?
- (vi) State **two** applications of the above method of separating mixtures

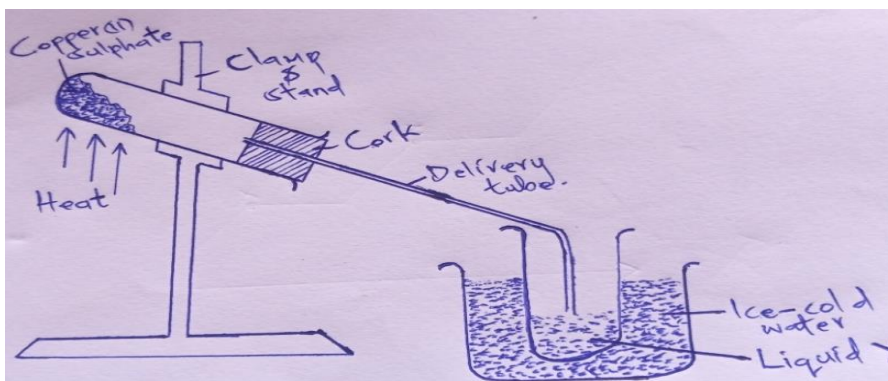
(vi) What properties of the mixture makes it possible for the component to be separated by the above methods?

26. The set-up below was used to separate a mixture:-



- (a) Name the apparatus missing in the set-up
- (b) Give **one** example of mixture **T**
- (c) What is the name of this method of separation

27. a) The diagram below shows a set – up used by a student to find out what happens when Copper (II) sulphate crystals are heated.

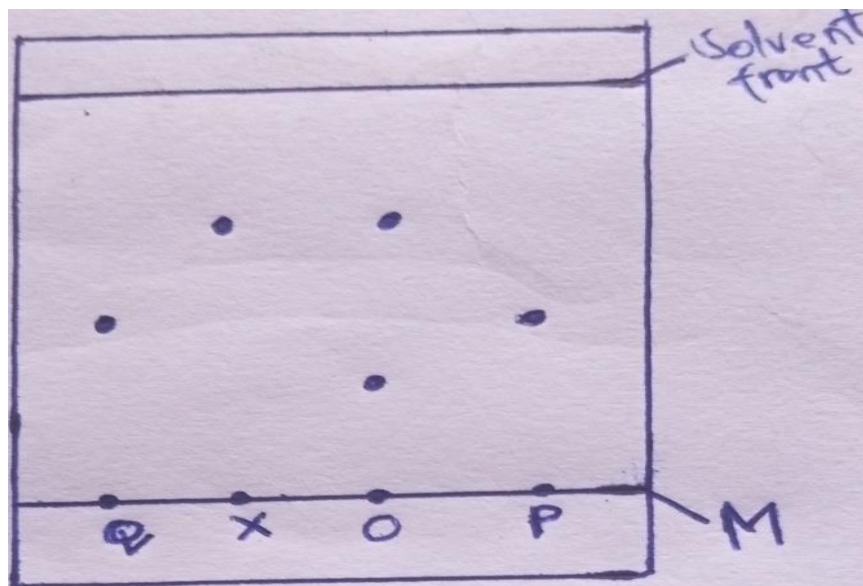


(i) State the observations made when the blue copper (II) sulphate crystals are heated.

(ii) Identify liquid Y and write an equation for its formation.

b) Pellets of sodium hydrogen and anhydrous Copper (II) sulphate were put in separate Petri-dishes and left in the open for two hours. Explain the observation in each Petri-dish.

28. The chromatography below shows the constituents of a flower extract using an organic solvent:-



(a) (i) Name a possible organic solvent you can use for this experiment

(ii) State **one** property that makes the red pigment to move the furthest distance from **M**

(iii) Describe how one could get a sample of yellow pigment

(iv) On the diagram indicate solvent front

(b) Describe how Aluminium chloride can be separated from a mixture of aluminium chloride and sodium chloride

29. Study the information below and answer the questions that follow:

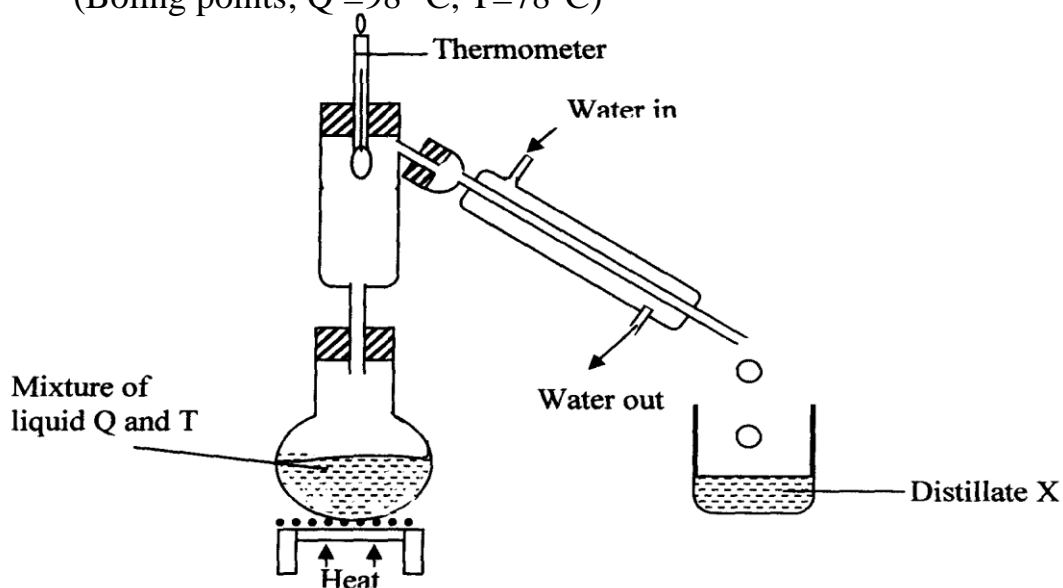
Solid	Cold water	Hot water
<b>R</b>	Soluble	Soluble
<b>V</b>	Insoluble	Insoluble
<b>S</b>	Insoluble	Insoluble

Describe how the mixture of solid **R**, **S**, and **V** can be separated



30. Given a mixture of lead (II) oxide, ammonium chloride and sodium chloride, describe how this mixture can be separated to obtain a sample of each.

31. The setup below was used to separate two miscible liquids **Q** and **T**  
(Boiling points;  $Q = 98^\circ \text{C}$ ,  $T = 78^\circ \text{C}$ )



(a) Identify the mistakes in the setup above

(b) Identify Distillate **X**

32. Name the process which takes place when:

a) Solid Carbon (IV) oxide (dry ice) changes directly into gas.

b) A red litmus paper turns white when dropped into chlorine water.

c) Propene gas molecules are converted into a giant molecule.

33. State and explain the change in mass that occurs when the following substances are

separately heated in open crucibles

[a]Copper metal

[b]copper [II] nitrate

34. Study the information below and answer the following questions. A mixture contains three solids **A**, **B**, and **C**. The solubility of these solids in different liquids is as show below:-

<b>Solid</b>	<b>Water</b>	<b>Alcohol</b>	<b>Ether</b>
<b>A</b>	Soluble	Insoluble	Insoluble
<b>B</b>	Insoluble	Soluble	Very soluble
<b>C</b>	Soluble	Soluble	Insoluble

Explain how you will obtain sample **C** from the mixture

35. State and explain the observations made when iodine crystals is heated in a boiling tube?

## ACIDS, BASES AND INDICATORS

1. The table below shows solutions **A**, **B** and **C** are tested and observations records as shown:

<b>Solution</b>	<b>Observations on indicator</b>
<b>A</b>	Methyl orange turns yellow
<b>B</b>	Phenolphthalein turns colourless
<b>C</b>	Litmus turns purple

- (a) Using the table above, name an acid
- (b) How does the pH value of 1M potassium hydroxide solution compare with that of 1M aqueous ammonia? Explain

2. The information below gives PH values of solutions **V**, **W**, **X**, **Y** **Z**

<b>Solution</b>	<b>PH values</b>
V	2
W	6.5
X	11
Y	14
Z	4.5

- (a) Which solution is likely to be:
- (i) Calcium hydroxide?
- (ii) Rain water?

(b) Which solution would react most vigorously with Zinc carbonate

3. a) Complete the table below to show the colour of the given indicator in acidic and basic solutions.

Indicator	Colour in	
	Acidic Solution	Basic Solution
Methyl Orange		Yellow
Phenolphthalein	Colourless	

b) How does the PH value of 0.1M potassium hydroxide solution compare with that of 0.1M aqueous ammonia.Explain.

4. Use the information given below to answer the questions that follow:

Solution	G	H	I	J	K
pH	1.5	6.5	13.0	7.0	8.0

(a) Which of the solutions would be used to relieve a stomach upset caused indigestion?

(b) Which solution is likely to be:

(i) Dilute sulphuric acid?

(ii) Sodium hydroxide solution?

5. Solid copper (II) oxide is a base although it does not turn litmus paper to blue. Explain

6. Below are the pH values of 4 types of medicine represented by letters **P**, **Q**, **R** and **S**

MEDICINE	pH VALUES
<b>P</b>	7.0
<b>Q</b>	5.0
<b>R</b>	8.0
<b>S</b>	6.0

a) It is not advisable to use **S** when a patient has indigestion .Explain

b) What is the role of chemistry in drug manufacture

7. Explain why very little Carbon (IV) oxide gas is evolved when dilute sulphuric (VI) acid is added to lead (II) carbonate

8 . State **one** commercial use of Calcium Oxide

9. The following data gives the **pH** values of some solutions

Solution	pH
<b>P</b>	14.0
<b>Q</b>	6.8
<b>R</b>	2.5

(a) What colour change would occur in solution **P** on addition of two drops of phenolphthalein indicator?

(b) State the pH value of a resulting solution when equal moles of solution **P** and **R** react

10. In an experiment, ammonia gas was prepared by heating ammonium salt with an alkali.

After drying, ammonia gas was collected at room temperature and pressure.

(a) What is meant by the term alkali?

(b) Explain using physical properties of the gas why ammonia is not collected downward delivery

11. The table shows the colours obtained when some indicators are added to solutions:-

<b>Solution</b>	<b>Blue litmus paper</b>	<b>Indicator W</b>
Distilled water	.....	Colourless
Calcium hydroxide	Blue	Pink
Nitric acid	.....	Colourless

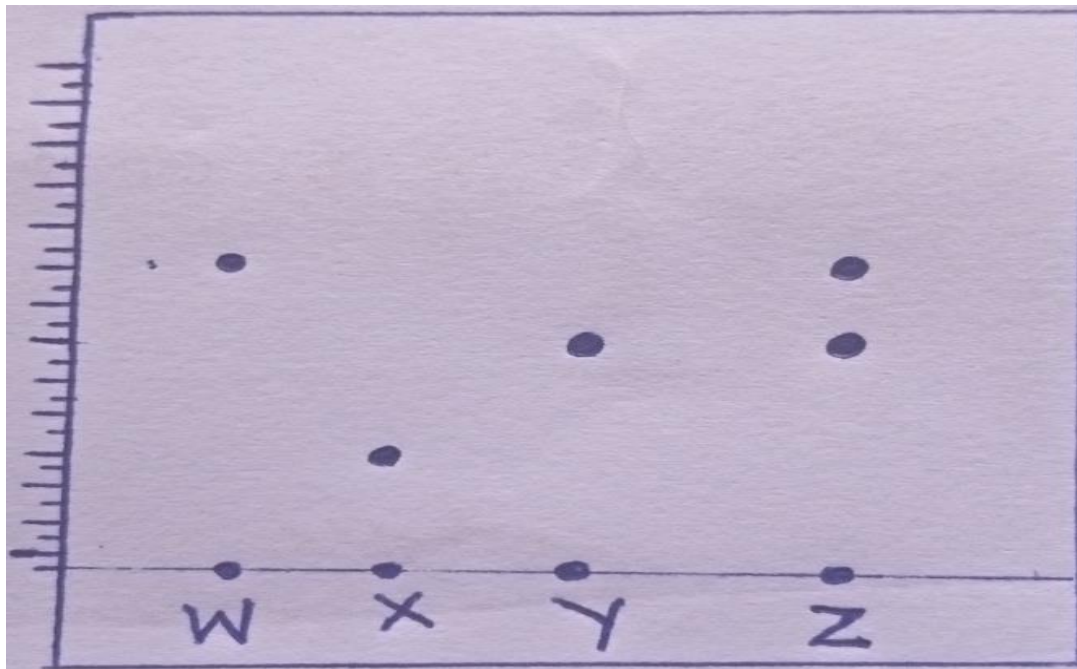
(a) Complete the table by filling in the missing colours

(b) Identify indicator **W**

12. (a) Flower extracts can be used as Acid-base indicators. Give **two** limitations of such indicators



(b) The diagram below shows spots of pure substances **W**, **X**, and **Y** on chromatograph paper. Spot **Z** is that of a mixture



After development **W**, **X**, and **Y** were found to have moved  $9\text{cm}^3$ ,  $4\text{cm}^3$  and  $7\text{cm}^3$  respectively. **Z** has separated into two spots which have moved  $7\text{cm}^3$  and  $9\text{cm}^3$ :-

On the diagram:-

- I. Label the baseline and solvent front
- II. Show the position of all the spots after development
- III. Identify the substances present in mixture **Z**

13. A beekeeper found that when stung by a bee, application of a little solution of sodium hydrogen carbonate helped to relieve the irritation of the affected area. Explain

14. 10g of sodium hydrogen carbonate were dissolved in 20cm<sup>3</sup> of water in a boiling tube. Lemon juice was then added dropwise with shaking until there was no further change.

(a) Explain the observation which was made in the boiling tube when the reaction was in progress

(b) What observations would be made if the lemon juice had been added to copper turnings in a boiling tube?

15. (a) Complete the table below to show the colour of the given indicator in acidic and basic

solutions:

Indicator	Colour in acidic solution	Basic solution
Methyl orange	Pink	
Phenolphthalein		Pink

16. Solutions can be classified as acids, bases or neutral. The table below shows solutions and their PH values:-

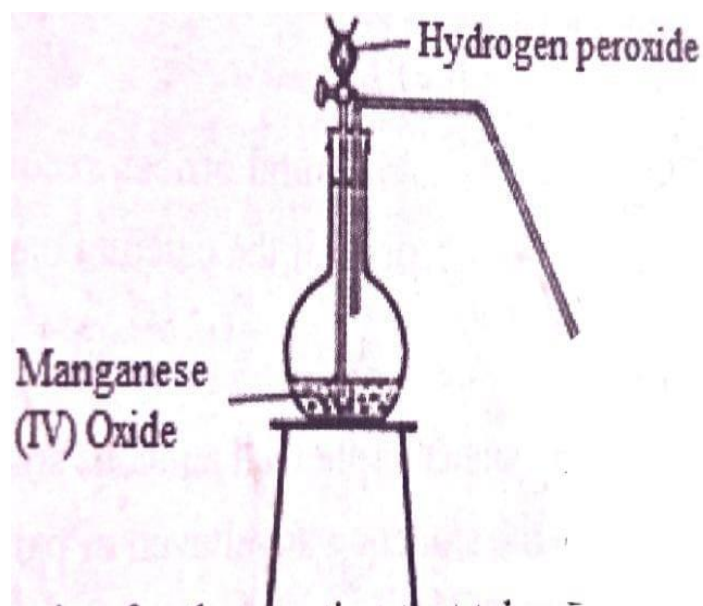
Solutions	PH VALUES
K	1.5
L	7.0
M	14.0

(i) Select any pair that would react to form a solution of PH 7

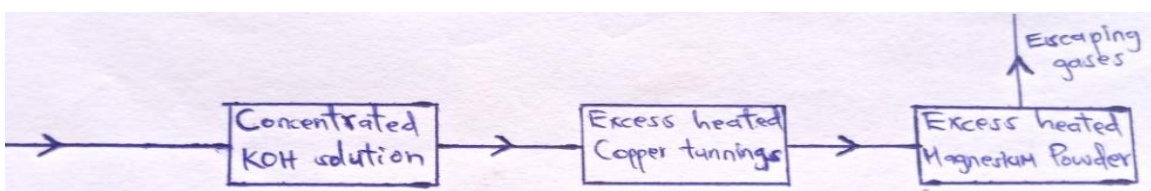
(ii) Identify **two** solutions that would react with aluminium hydroxide. Explain

# AIR AND COMBUSTION

1. The set-up below was used to prepare a sample of oxygen gas. Study it and answer the questions that follow.



- (i) Complete the diagram to show how Oxygen can be collected
- (ii) Write a chemical equation of the reaction to produce oxygen
2. Air was passed through several reagents as shown below:



(a) Write an equation for the reaction which takes place in the chamber containing Magnesium powder

(b) Name **one** gas which escapes from the chamber containing magnesium powder. Give a reason for your answer

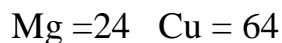
3. (a) What is rust?

(b) Give **two** methods that can be used to prevent rusting

(c) Name **one** substance which speeds up the rusting process

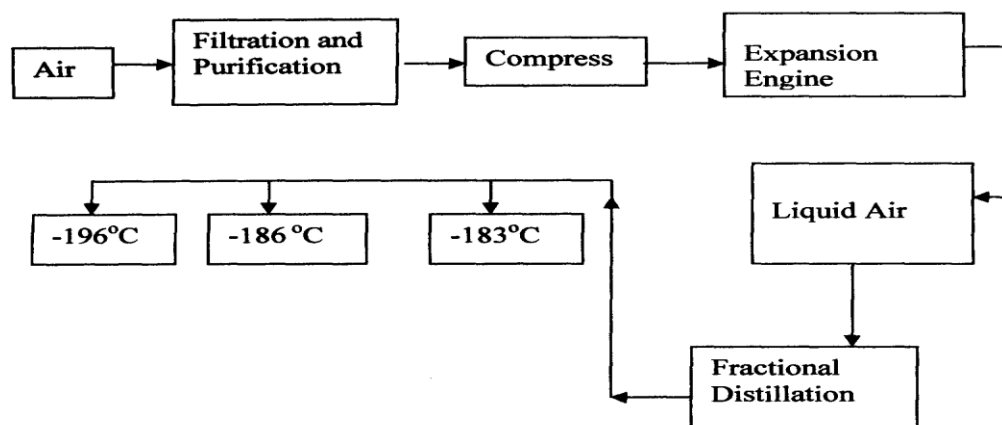
4. 3.0g of clean magnesium ribbon 8.0g of clean copper metal were burnt separately in equal volume of air and both metals reacted completely with air;

a) State and explain where there was greater change in volume of air

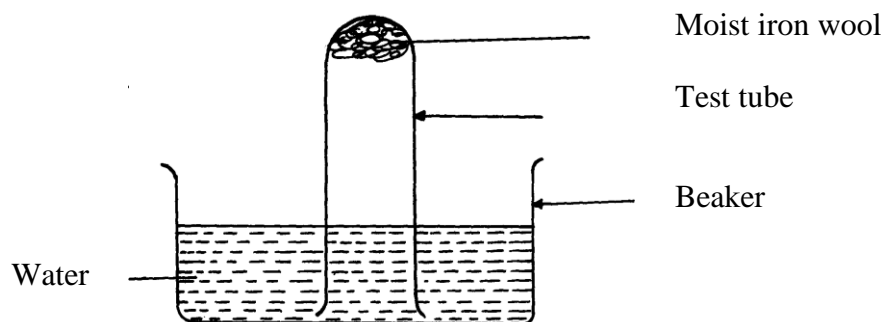


b) Write an equation for the reaction between dilute sulphuric acid and product of burnt copper

5. Oxygen is obtained on large scale by the fractional distillation of air as shown on the flow chart below.

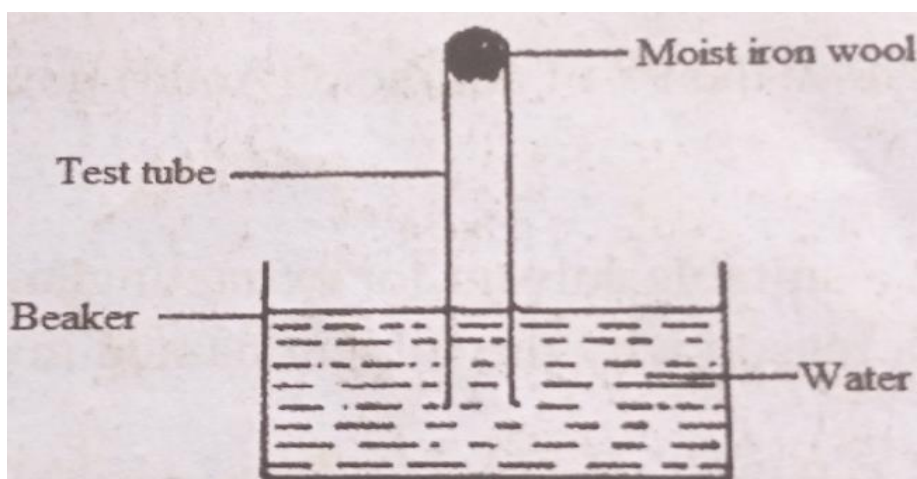


- a) Identify the substance that is removed at the filtration stage
  - b) Explain why Carbon (IV) oxide and water are removed before liquefaction of air
  - c) Identify the component that is collected at  $-186^{\circ}\text{C}$
6. The set-up below was used to study some properties of air.



State and explain **two** observations that would be made at the end of the experiment

7. The set-up below was used to study some properties of air



State and explain two observations that would be made at the end of the experiment

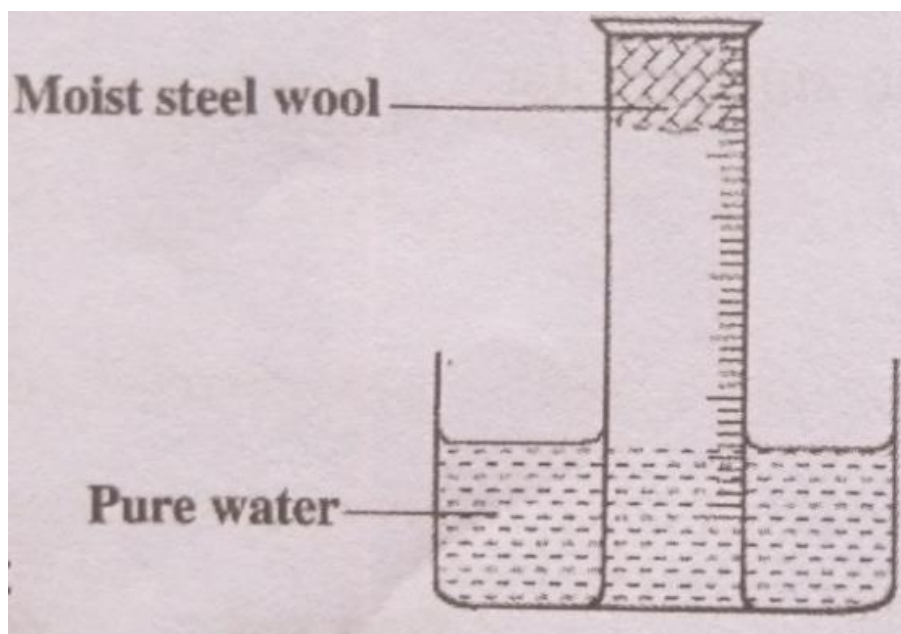
8. In an experiment, a piece of magnesium ribbon was cleaned with steel wool. 2.4g of the clean magnesium ribbon was placed in a crucible and completely burnt in oxygen.

After cooling the product weighed 4.0g

- a) Explain why it is necessary to clean magnesium ribbon
  
- b) What observation was made in the crucible after burning magnesium ribbon?
  
- c) Why was there an increase in mass?
  
- d) Write an equation for the major chemical reaction which took place in the crucible
  
- e) The product in the crucible was shaken with water and filtered. State and explain the observation which was made when red and blue litmus paper were dropped into the filtrate

9. In an experiment a gas jar containing some damp iron fillings was inverted in a water trough containing some water as shown in the diagram below. The set-up was left undisturbed for three days. Study it and answer the questions that follow:

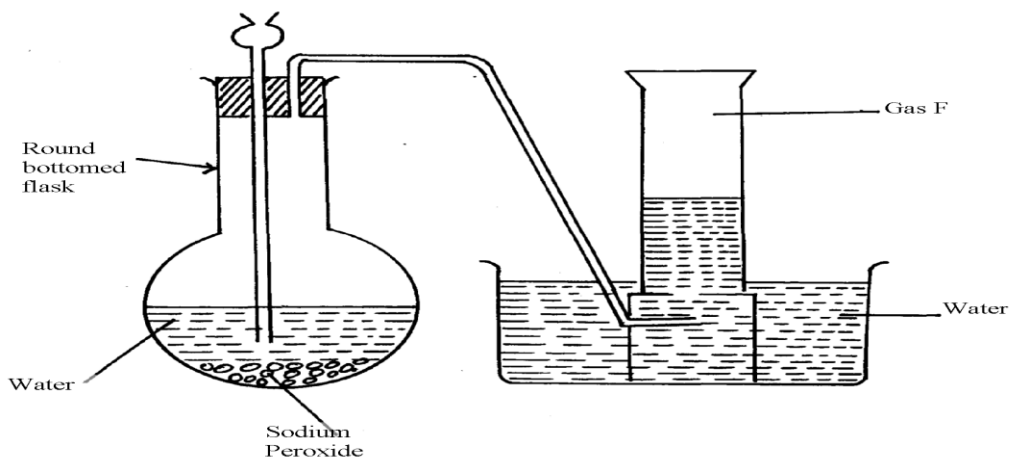




- (a) Why were the iron filings moistened?
- b) State and explain the observation made after three days.
- (c) State **two** conclusions made from the experiment.
- d) Draw a labelled set-up of apparatus for the laboratory preparation of oxygen using Sodium Peroxide
- (e) State **two** uses of oxygen
10. In an experiment, a piece of magnesium ribbon was cleaned with steel wool. 2.4g of the clean magnesium ribbon was placed in a crucible and completely burnt in oxygen. After cooling the product weighed 4.0g
- a) Explain why it is necessary to clean magnesium ribbon

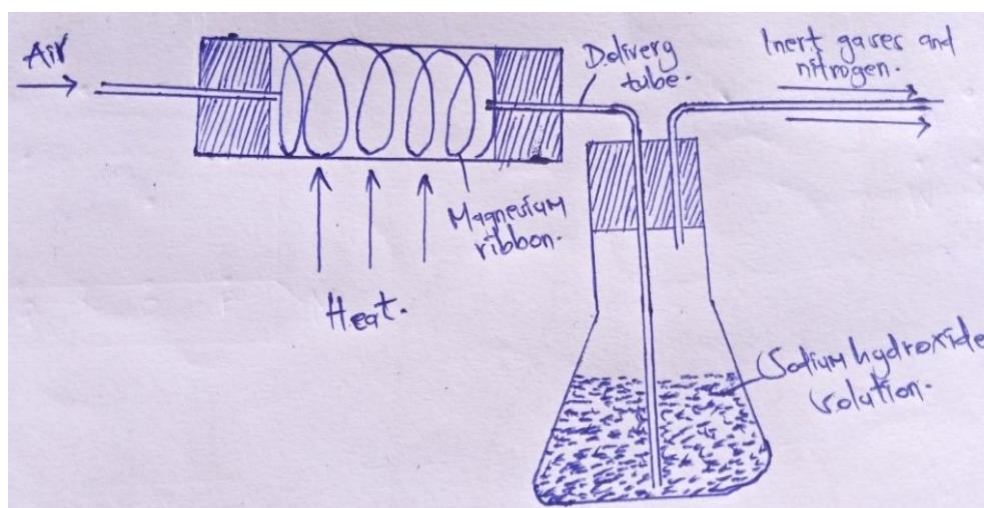
- b) What observation was made in the crucible after burning magnesium ribbon?
- c) Why was there an increase in mass?
- d) Write an equation for the major chemical reaction which took place in the crucible
- e) The product in the crucible was shaken with water and filtered. State and explain the observation which was made when red and blue litmus paper were dropped into the filtrate

11. The set-up below was used to collect gas **F** produced by the reaction between sodium peroxide and water



- (i) Name gas **F**
- (ii) At the end of the experiment, the solution in the round bottomed flask was found to be a strong base. Explain why this was so
- (iii) Which property of gas **F** makes it be collected by the method used in the set-up?
- (iv) Give **one** industrial use of gas **F**

12. The set-up below was used to investigate properties of the components of air:



(i) State **two** observations made during the experiment

(ii) Write **two** chemical equations for the reactions which occurred

(iii) The experiment was repeated using burning magnesium in place of phosphorous.

There was greater rise of water than in the first case. Explain this observation

(iv) After the two experiments, the water in each trough was tested using blue and red litmus papers. State and explain the observations of each case.

(a) Phosphorous experiment

b) magnesium experiment

(v) Briefly explain how a sample of nitrogen gas can be isolated from air in the laboratory

13. (a) A group of students burnt a piece of Mg ribbon in air and its ash collected in a Petri dish. The ash was found to comprise of magnesium Oxide and Magnesium nitride

(i) Write an equation for the reaction leading to formation of the magnesium nitride

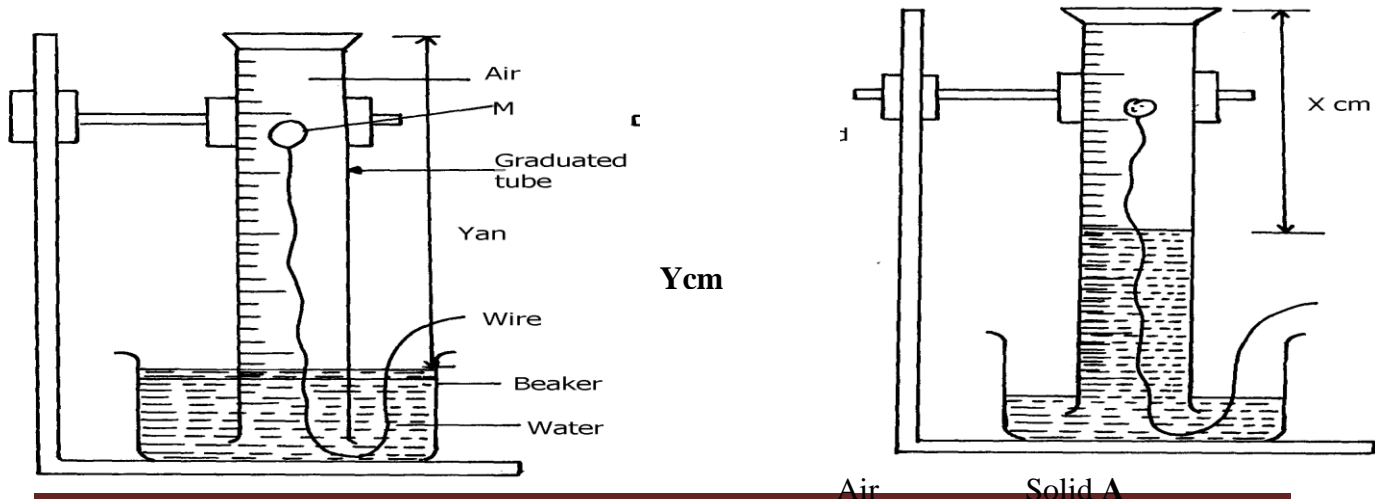
(ii) A little water was added to the products in the Petri dish. State and explain the observation made.

(iii) A piece of blue litmus paper was dipped into the solution formed in (b) above. State the observation made.

14. A form one class carried out an experiment to determine the active part of air. The diagram below shows the set-up of the experiment and also the observation made.

(i) At the beginning

(ii) observation at the end of the experiment



(a) (i) Identify substance **M** .....

(ii) State **two** reasons for the suitability of substance **M** for this experiment

(b) Write the equation for the reaction of substance **M** and the active part of air

(c) (i) Using the letters **Y** and **X** write an expression for the percentage of the active part of air

(ii) The expression in (c)(i) above gives lower value than the expected.

Explain

(c) (i) Explain the observation made when litmus paper is dipped into the beaker at the end of the experiment

(ii) Name the active part of air

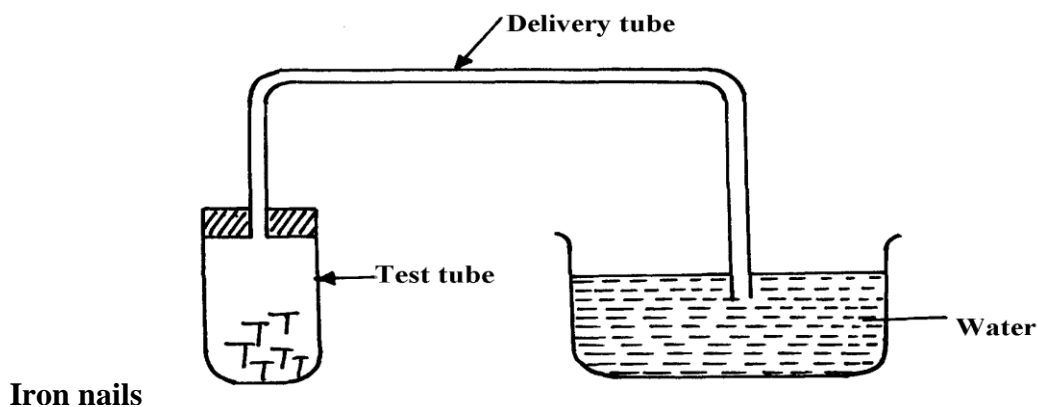
(iii) Suggest another method that can be used to determine the active part of air

15. A piece of phosphorous was burnt in excess air. 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

ii) The solution obtained in (b) above as found to have pH of 2. Give reasons for this observation

16. Study the set-up below and answer the questions that follow:-



(a) State **two** observations that would be made after one week. Explain

(b) Write the equation of the reaction taking place in the test-tube

17.  $\text{Fe}_3\text{O}_4$  and  $\text{FeO}$  are oxides of iron which can be produced in the laboratory

(a) Write chemical equation for the reaction which can be used to produce each of the oxides

(b) Write an ionic equation for the reaction between the oxide,  $\text{Fe}_3\text{O}_4$  and a dilute acid.

18. Below is a list of oxides.

$\text{MgO}$ ,  $\text{N}_2\text{O}$ ,  $\text{K}_2\text{O}$ ,  $\text{CaO}$  and  $\text{Al}_2\text{O}_3$

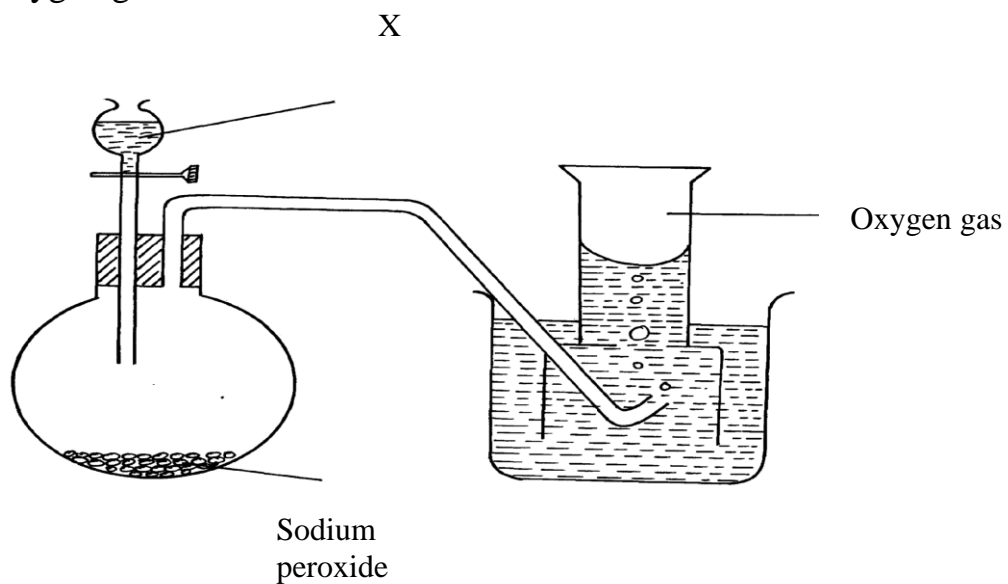
Select:-

a) A neutral oxide.

b) A highly water soluble basic oxide.

c) An oxide which can react with both sodium hydroxide solution and dilute hydrochloric acid.

19. The diagram below shows students set-up for the preparation and collection of oxygen gas



(a) Name substance **X** used

(b) Write an equation to show the reaction of sodium peroxide with the substance named in **1(a)**

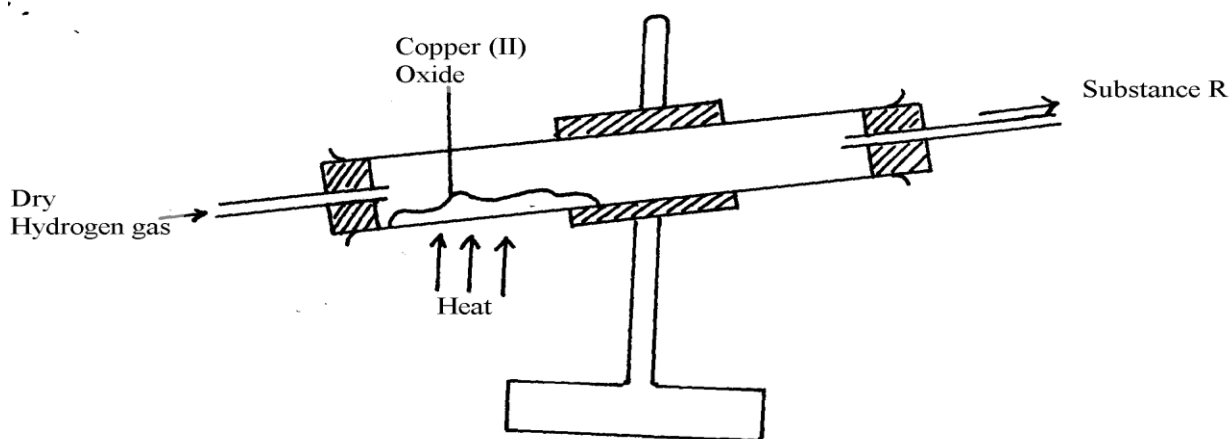
## 5. WATER AND HYDROGEN

1. (a) Hydrogen can reduce copper's Oxide but not aluminum oxide. Explain
- (b) When water reacts with potassium metal the hydrogen produced ignites explosively on the surface of water.

(i) What causes this ignition?

(ii) Write an equation to show how this ignition occurs

2. In an experiment, dry hydrogen gas was passed over hot copper (II) oxide in a combustion tube as shown in the diagram below:-

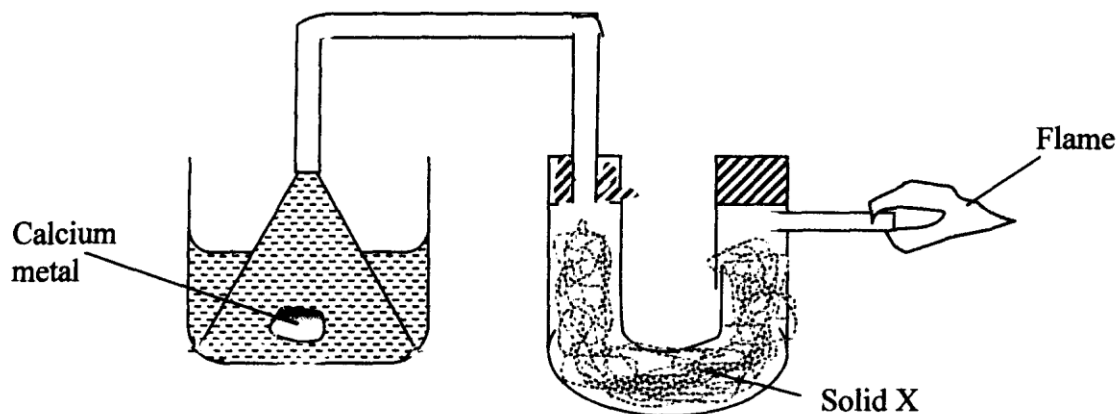


(a) Complete the diagram to show how the other product, substance **R** could be collected in the laboratory.

(b) Describe how copper could be obtained from the mixture containing copper (II) oxide



3. The setup below was used to investigate the reaction between metals and water.



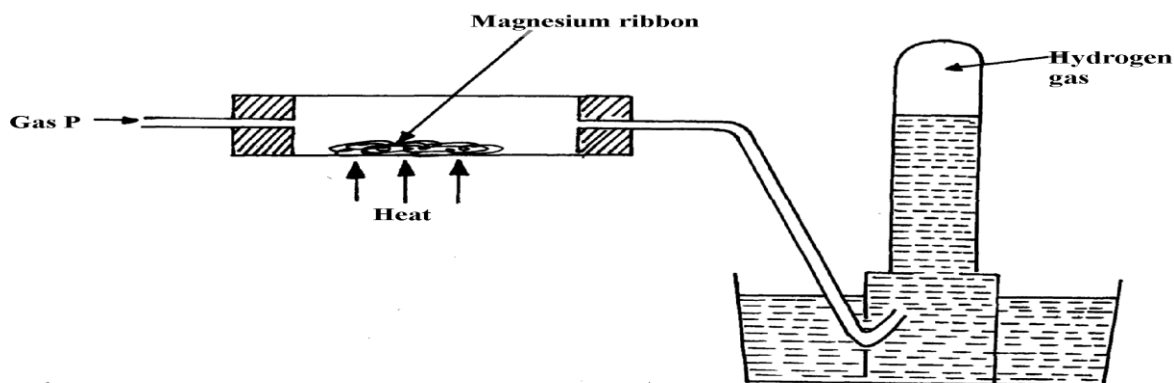
(a) Identify solid **X** and state its purpose

Solid X

Purpose

(b) Write a chemical equation for the reaction that produces the flame.

4. Gas **P** was passed over heated magnesium ribbon and hydrogen gas was collected as shown in the diagram below:

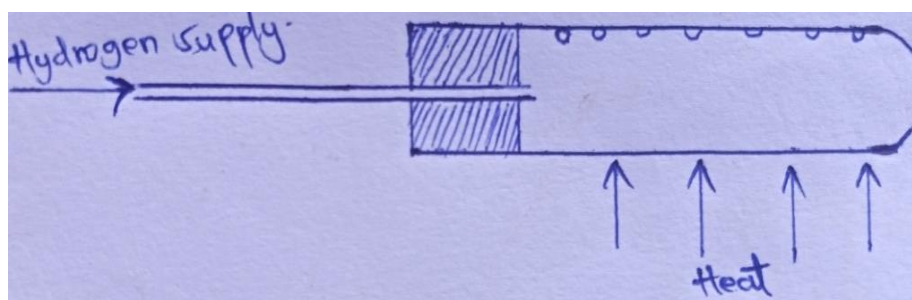


(i) Name gas **P**

(ii) Write an equation of the reaction that takes place in the combustion tube

(iii) State **one** precaution necessary at the end of this experiment

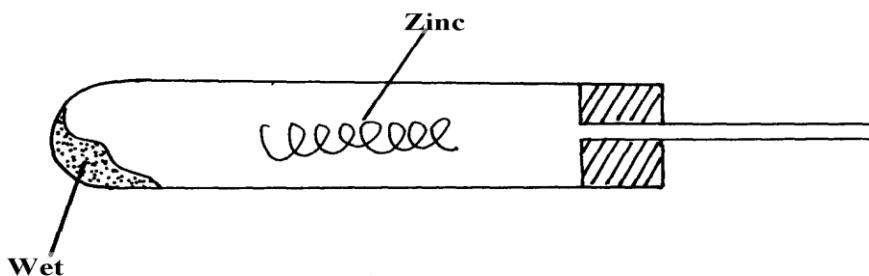
5. When hydrogen is burnt and the product cooled, the following results are obtained as shown in the diagram below:



(a) Write the equation for the formation of liquid **Y**

(b) Give a chemical test for liquid **Y**

6. Jane set-up the experiment as shown below to collect a gas. The wet sand was heated before heating Zinc granules

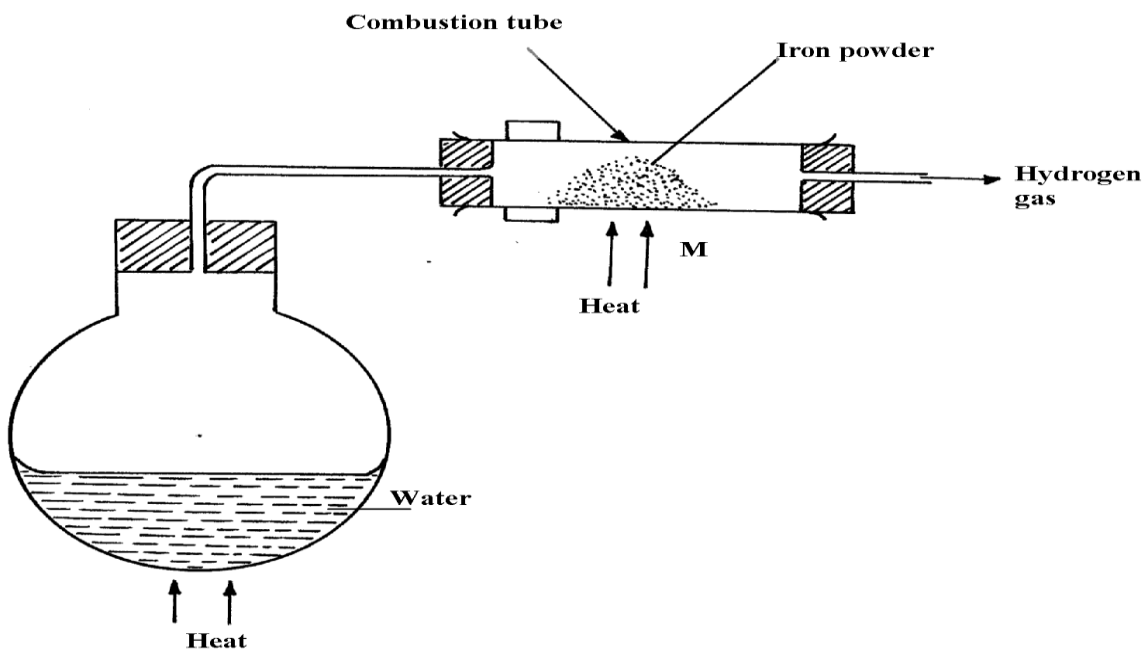


**Wet sand**

(a) Complete the diagram for the laboratory preparation of the gas

(b) Why was it necessary to heat wet sand before heating Zinc granules?

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

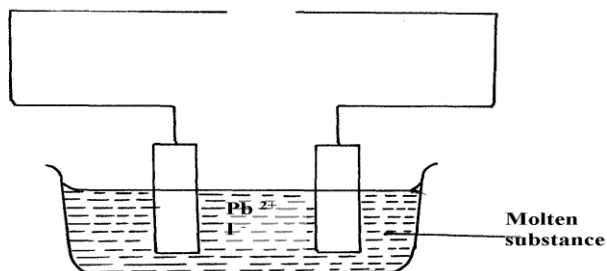


N

(a) Between N and M which part should be heated first? Explain

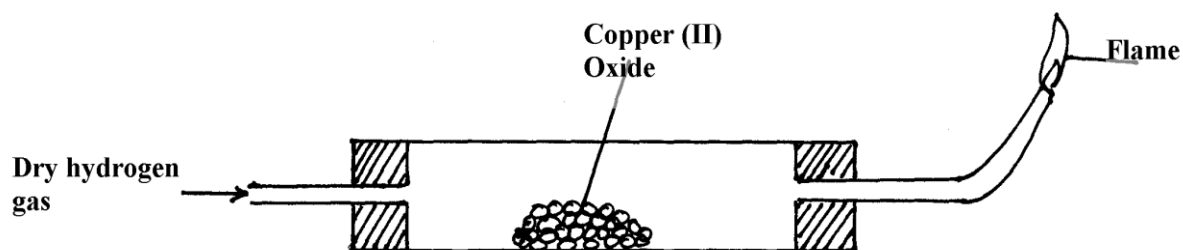
(b) Write a chemical equation for the reaction occurring in the combustion tube.

8. The set-up below was used to investigate electrolysis of a certain molten compound;-



- (a) Complete the circuit by drawing the cell in the gap left in the diagram
- (b) Write half-cell equation to show what happens at the cathode
- (c) Using an arrow show the direction of electron flow in the diagram above
9. Hydrogen can be prepared by reacting zinc with dilute hydrochloric acid.
- a) Write an equation for the reaction.
- b) Name an appropriate drying agent for hydrogen gas.
- c) Explain why copper metal cannot be used to prepare hydrogen gas.
- d) Hydrogen burns in oxygen to form an oxide.
- (i) Write an equation for the reaction.
- (ii) State **two** precautions that must be taken before the combustion begins and at the end of the combustion.
- e) Give **two** uses of hydrogen gas.
- f) When zinc is heated to redness in a current of steam, hydrogen gas is obtained. Write an equation for the reaction.
- g) Element **Q** reacts with dilute acids but not with cold water. Element **R** does not react with dilute acids. Element **S** displaces element **P** from its oxide. **P** reacts with cold water. Arrange the four elements in order of their reactivity, starting with the most reactive.
- h) Explain how hydrogen is used in the manufacture of margarine.

10. a) The set-up below is used to investigate the properties of hydrogen.

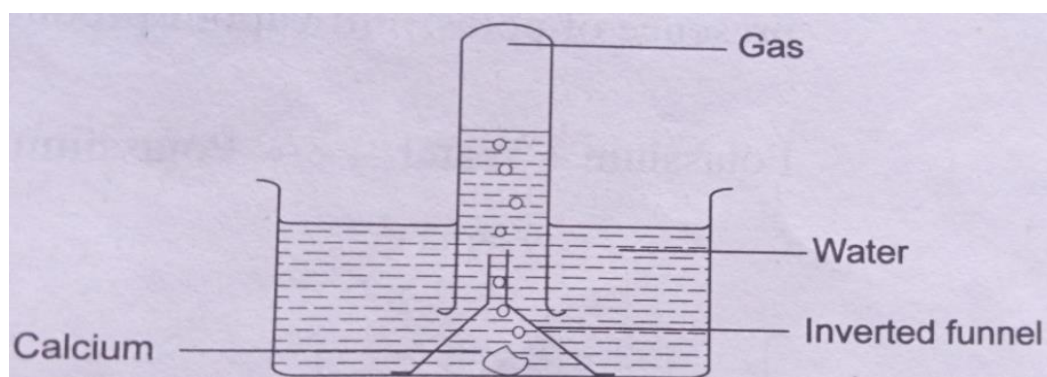


- i) On the diagram, indicate what should be done for the reaction to occur
- ii) Hydrogen gas is allowed to pass through the tube for some time before it is lit.

Explain

- iii) Write an equation for the reaction that occurs in the combustion tube
- iv) When the reaction is complete, hydrogen gas is passed through the apparatus until they cool down . Explain
- v) What property of hydrogen is being investigated?
- vi) What observation confirms the property stated in (v) above?
- vii) Why is zinc oxide not used to investigate this property of hydrogen gas?

11. The set up below was used to collect gas **K**, produced by the reaction between water and calcium metal.



- (a) Name gas **K**
- (b) At the end of the experiment, the solution in the beaker was found to be a weak base. Explain why the solution is a weak base

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