

# **F2 TOPICAL REVISION**

# **CHEMISTRY**

***A SERIES OF KCSE TOPICAL REVISION  
QUESTIONS IN CHEMISTRY.***

***A Comprehensive Detailed Analysis of  
Past KCSE Questions. Candidates are  
Hereby Advised to Pay Key Attention to this  
Crucial Quick Revision Kit.***

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together with answers kindly  
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# LECTURER RAKDAFHA

## 1. STRUCTURE OF THE ATOM AND THE PERIODIC TABLE

- In an experiment an unknown mass of anhydrous sodium carbonate was dissolved in water and the solution made up to  $250\text{cm}^3$ .  $25\text{cm}^3$  of this solution neutralized  $20\text{cm}^3$  of  $0.25\text{M}$  nitric acid.  
(Na = 23.0 C = 12.0 O = 16.0)  
Calculate:  
(a) Moles of Nitric acid used  
(b) Moles of sodium carbonate in  $25\text{cm}^3$  of the solution  
(c) Mass of unknown sodium carbonate used
- Element **A** has atomic mass 23 and element **B** has atomic mass 7 and also have 12 neutrons and 4 neutrons respectively.  
(a) Write the electronic arrangement of **A** and **B**  
(b) Which element has higher ionization energy? Explain
- The table below shows the relative atomic masses and the percentage abundance of isotopes  $M_1$  and  $M_2$  of element **M**.

	Relative atomic mass	% abundance
$M_1$	62.93	69.09
$M_2$	64.93	30.91

Calculate the relative atomic mass of element **M**

- Element **V** has two isotopes. Two thirds of **V** and one third of **V**. What is the relative atomic mass of element **V**?
  - The following refers to element **Y**

Isotope	A	B	C
Isotope mass	54	56	57

Given that isotope **C** contains 31 neutrons in its nucleus find the number of protons in isotope **B**

- The table below shows the relative atomic masses and the percentage abundance of the isotopes  $L_1$  and  $L_2$  of element **L**.

	Relative atomic mass	% abundance
--	----------------------	-------------

Calculate the relative atomic mass of element K.

8. The table below gives information about the ions  $\text{T}^+$  and  $\text{Z}^{2-}$ .

(c) State **two** conditions under which the compound would conduct electricity

13. Study the table below and answer the questions that follows:- (Letters are not the actual symbols of element)

L3 has the highest electrical conductivity. Explain

15. Use the information in the table below to answer the questions that follow. (The letters do not represent the actual symbols of the elements).

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<b>Mass number</b>	40	10	7	11	40
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- (a) Which **two** letters represent the same element? Give a reason  
(b) Give the number of neutrons in an atom of element **R**

16. The table below gives some elements in the periodic table. Use it to answer the questions that follow. The letters do not represent the actual symbols of the elements.

Element	A	B	C	D	E
Atomic number	12	13	14	15	16

Which of the above letters represent:

17. The grid below is part of the periodic table. Use it to answer the questions that follow:  
(The letters are not the actual symbols).

- a) Write down the formula of the compound formed between C and A.
- b) Which element has the same electron arrangement as the stable ion of:  
(i) **F** ..... (ii) **A** .....
  - c) Element **Q** has atomic number 15. Indicate its position on the grid.
  - d) Explain how the atomic radii of the following compare:
    - (i) C and F
    - (ii) C and D
  - e) Write the type of bond present in a compound formed between D and A.
- f) Compound C and G were completely burned in oxygen.
  - (i) Write down equations to show the combustion of each of the elements.
  - (ii) State whether each of the oxides (i) above is basic or acidic.

18. The number of protons, neutrons and electrons in atoms **A** to **F** are given in the table

Atoms	Protons	Neutrons	Electrons
A	3	4	2
B	9	10	10
C	12	12	12
D	17	18	17
E F	17	20	17
	18	22	18

19. (a) Study the table below and answer the questions that follow.

Particle	Atomic number	Ionic configuration	Formula of oxide	Atomic radii	Ionic radii
<b>P</b>	4	.....	.....	0.110	0.031
<b>Q</b>	.....	2.8.8	QO	0.200	0.099
<b>R</b>	.....	2.8.8	R <sub>2</sub> O	0.230	0.133
<b>S</b>	17	2.8.8	S <sub>2</sub> O <sub>7</sub>	0.099	0.181
<b>T</b>	16	.....	.....	0.104	0.231

20. a) Work out the oxidation number of phosphorous in the following compound  $\text{H}_3\text{PO}_3$  b)  
Study the equation below:



Which species has undergone oxidation .Explain

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L							L	
M	P			T		J	U	X
N	Q			S			V	Y
							W	

- Explain why element **L** appears in two different groups in the grid above
- State the name of the chemical family to which **P** and **Q** belong
- Write the formula of the compound formed between **P** and **V**
- Compare the melting points of **Q** and **S**. Explain
- Identify an element whose oxide dissolves in both acids and alkalis
- Write the equation for the burning of **T** in excess air
- Using dots (•) and cross (x) to represent electrons, draw a diagram to illustrate bonding in the sulphide of **Q**

### (h) State

**one** use of element **X**

22. The grid below is part of the periodic table. The elements are not represented by their actual symbols. Use the information to answer the questions that follow.

The diagram shows two separate 3x2 grids. The left grid contains the letter 'T' in the top-left cell and 'Q' in the bottom-left cell. The right grid contains the letters 'K' (top-right), 'S' (top-middle), 'W' (middle-left), 'R' (middle-middle), and 'N' (middle-right).

- a) (i) Which is the most reactive  
(I) Non — metal?

### Explain

(II) Metal?

Explain

Name the family to which elements **T** and **Q** belongs.

- (iii) Write the formula of the compound formed when **W** reacts with **S**.

✻

(ii)

23. Study the data given in the following table and answer the questions that follow. The letters are not the actual symbols of elements.

Element	Number of protons	Melting point	Bpt °C
<b>A</b>	11	98	890
<b>B</b>	12	650	1110
<b>C</b>	13	60	2470
<b>D</b>	14	1410	2360
<b>E</b>	15	442 590	280
<b>F</b>	16	113 119	445
<b>G</b>	17	-101	-35
<b>H</b>	18	-189	-186

- (i) State and explain the trend in melting point in **A B C**
  - (ii) Explain why the melting point and boiling points of element **D** is the highest
  - (iii) Explain why the element represented by letter **E** has two melting point values
  - (iv) Write down the chemical formula between element **C** and sulphate ions
  - (v) Name the chemical family in which **H** belong and state one use of the element
  - (vi) What is the nature of the oxide of the elements represented by letters **C** and **F**?
24. An element **W** has an atomic number 13.
  - a) Write the electronic configuration of the most stable ion of **W**
  - b) Write the formula of the oxide of the element **W**
25. Identify the particles that facilitate the electric conductivity of the following substances
  - (i) Sodium metal
  - (ii) Sodium Chloride solution
  - (iii) Molten Lead Bromide
26. Compare with a reason the atomic radius of Sodium to that of Aluminum.
27. Study the information in the table below and answer the questions that follow:

Ion	No. of protons	No. of electrons
P <sub>3-</sub>	7	10
Q <sub>+</sub>	19	18
R <sub>2+</sub>	12	10

- a) Write the electron arrangement of element P.  
b) Give the group and period to which elements Q and R respectively.

Q .....  
R .....

28. Ethanol is a liquid at room temperature but does not conduct electricity. Explain.
29. Electronic configuration for elements represented by **P, Q, R** and **S** are:- P= 2.8.6, Q= 2.8.2, R= 2.8.1 D= 2.8.8.  
(a) Select the element which forms  
(i) A double charged ion  
(ii) A soluble carbonate
30. The table below gives information on four elements by letters **K, L, M** and **N**. Study it and answer the questions that follow. The letters do not represent the actual symbol of the elements.

Element	Electron arrangement	Atomic radius (nm)	Ionic radius (nm)
K	2.8.2	0.136	0.065
L	2.8.7	0.099	0.181
M	2.8.8.1	0.203	0.133
N	2.8.8.2	0.174	0.099

- (a) Which **two** elements have similar properties? Explain  
What is the most likely formula of the oxide of **L**?  
(b) (c) Which element is non-metal? Explain
31. Study the information given below and answer the questions that follow:

Element	Atomic radius (nm)	Ionic radius (nm)	Formula of oxide	Melting point of oxide (°C)
<b>A</b>	0.364	0.421	A <sub>2</sub> O	-119
<b>D</b>	0.830	0.711	DO <sub>2</sub>	837
<b>E</b>	0.592	0.485	E <sub>2</sub> O <sub>3</sub>	1466
<b>G</b>	0.381	0.446	G <sub>2</sub> O <sub>5</sub>	242
<b>J</b>	0.762	0.676	JO	1054

- (i) Write the formula of the compound formed when **J** combined with **G**  
(b) Explain why the melting point of the oxide of **E** is higher than that of the oxide of **G**

## CHEMICAL FAMILIES

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

Element	Atomic radius (nm)	Ionic radius (nm)
<b>W</b>	0.114	0.195
<b>X</b>	0.072	0.136
<b>Y</b>	0.133	0.216
<b>Z</b>	0.099	0.181

- (a) Would these form part of a metallic or a non-metallic group? Explain  
(b) Suggest an element in the table above likely to be the most reactive. Explain



2 State the reason for using Argon in electric light bulbs

3.

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

Element	Electronic configuration	Boiling point
X	2.7	-188°C
Y	2.8.7	-35°C
Z	2.8.8.7	59°C

- (a) What is the general name given to the group in which the elements **X**, **Y** and **Z** belong?
- (b) Select **two** elements which are coloured gases
- (c) Explain why **Z** has the highest boiling point
- (d) Write an equation for the reaction of element **Z** with iron metal
- (e) Element **Y** was dissolved in water and a piece of blue litmus paper was put into the resulting solution. State and explain the observation that was made on the litmus paper
4. The table below shows elements **A**, **B**, **C**, **E**, **F**, and **G**. Elements in group **X** have a valency of 2 while elements in group **Y** have a valency of 1. Use the table to answer the questions that follow:-

	GROUP X				GROUP Y	
Element	A	B	C	E	F	G
Atomic radius (nm)	14.0	19.5	19.7	5.2	7.9	11.3
Ionic radius (nm)	7.6	10.5	12.4	12.6	16.1	19.6

- (i) Atomic radius increases from **A** to **C** and from **E** to **G**. Explain
- (ii) Explain the difference in the atomic and ionic radii of group **X** elements
- (iii) Elements **C** and **G** belong to the same period. Explain why the atomic radius of **C** is greater than that of **G**
- (iv) Give the formula of the compound formed when **B** and **F** react
- (v) What type of bonding is formed in the compound above? Explain
- (vi) Starting with the least reactive, arrange the elements in group **Y** in the order of reactivity. Explain:
5. The information in the table below relates to elements in the same group of the periodic table. Study it and answer the question that follows.

Element	Atomic size (nm)
P	0.19
Q	0.23
R	0.15

Which element has the highest ionization energy? Explain

6. Starting with Lead (II) carbonate explain how you would prepare a pure sample of Lead (II) sulphate
7. a) What is an isotope?
- b) An element **Q** consists of 3 isotopes of mass 28, 29, 30 and percentage abundance of 92.2, 4.7, 3.1 respectively. Determine the relative atomic mass of the element?

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

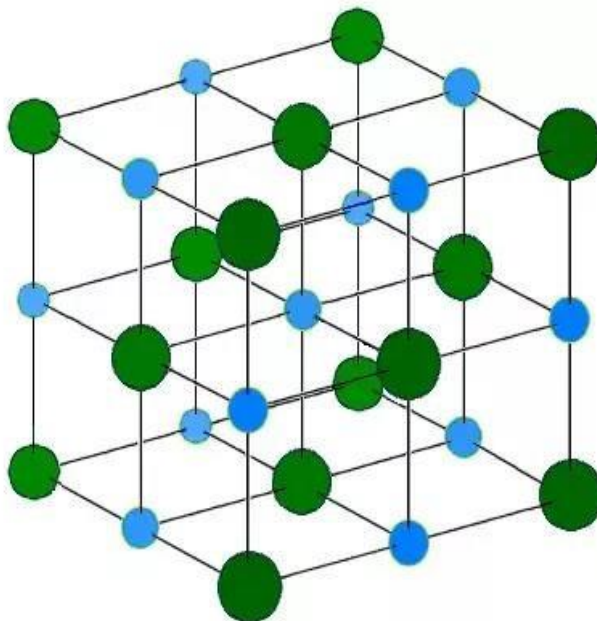
Element	Electronic configuration	Ionization energy KJ/mol
<b>P</b>	2.2	1800
<b>Q</b>	2.8.2	1450
<b>R</b>	2.8.8.2	1150

- What is the general name given to the group in which elements **P**, **Q** and **R** belong?
- Explain why **P** has the highest ionization energy
- Write a balanced chemical equation for the reaction between element **Q** and water

## STRUCTURE AND BONDING

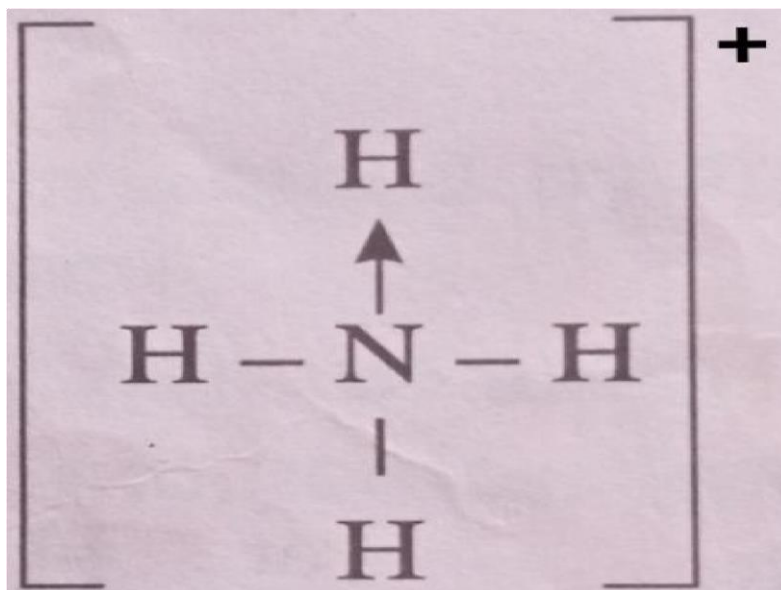
- Ethanol is a liquid at room temperature but does not conduct electricity. Explain.
- Distinguish between a covalent bond and a co-ordinate bond.
  - Draw a diagram to show bonding in an ammonium ion. (N = 7, H = 1)
- Explain why the metals magnesium and aluminium are good conductors of electricity.
  - Other than cost, give **two** reasons why aluminium is used for making electric cables while magnesium is not.
- Explain why the boiling point of ethanol is higher than that of hexane. (Relative molecular mass of ethanol is 46 while that of hexane is 86).
  - What is meant by **dative covalent bond**?

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The melting and boiling points of sodium chloride are 801C and 1413C respectively. Explain why sodium chloride does not conduct electricity at 25C, but does not at temperature between 801C and 1413C

- b) Give a reason why ammonia gas is highly soluble in water
- c) The structure of ammonium ion is shown below;



Name the type of bond represented in the diagram

- d) Carbon exists in different crystalline forms. Some of these forms were recently discovered in soot and are called fullerenes
- (i) What name is given to different crystalline forms of the same element



- What is meant by ionization energy?
- Element **R** has the lowest ionization energy. Explain
- When a piece of element **Q** is placed on water it melts and a hissing sound is produced as it moves on the water surface. Explain these observations
- Write the equation for the reaction between element **Q** and water

21. The table below shows the elements in the third period, the oxides of the third period and their properties. The letters are not the actual symbols of the elements. Study the information and answer the questions that follow:

Element	Atomic number	Atomic radius(nm)	Oxide	State at RT	oxide melting point °C
<b>M</b>	11	0.191	M <sub>2</sub> O	Solid	1132
<b>N</b>	.....	0.160	NO	Solid	2852
<b>P</b>	13	0.130	.....	Solid	2072
<b>Q</b>	14	0.118	QO <sub>2</sub>	.....	1610
<b>R</b>	.....	0.110	.....	Solid	580
<b>S</b>	16	0.102	SO <sub>2</sub>	.....	-75
<b>T</b>	17	0.099	TO <sub>2</sub>	Gas	-60
<b>V</b>	18	0.095	<b>X</b>	<b>X</b>	<b>X</b>

- Complete the table above
  - Explain the trend in the atomic radius across the period
  - Explain why the oxide of element **V** does not exist
- Name the type of structure and bond in the following oxide

Oxide	Structure	Bond type
NO		
TO <sub>2</sub>		

- Using dots and crosses to represent electrons. Show the bonding in the oxide, **QO<sub>2</sub>**
- Explain why elements **P** conducts electricity but **T** does not
- The oxide of **P** reacts both acids and alkalis. Give the name of this kind of oxide

22. The table below gives information about elements A<sub>1</sub>, A<sub>2</sub>, A<sub>3</sub> and A<sub>4</sub>

Element	Atomic number	Atomic radius (nm)	Ionic radius (nm)
A <sub>1</sub>	3	0.134	0.74
A <sub>2</sub>	5	0.090	0.012
A <sub>3</sub>	13	0.143	0.050
A <sub>4</sub>	17	0.099	0.181

- In which period of the periodic table is element A<sub>2</sub>? Give a reason

-

Oxides	Na <sub>2</sub> O	P <sub>4</sub> O <sub>6</sub>	SO <sub>2</sub>	Cl <sub>2</sub> O
State at room temp	Solid	Solid	Gas	Gas

- (a) Give the systematic name of Cl<sub>2</sub>O  
 (b) Explain why Na<sub>2</sub>O exists as a solid whereas SO<sub>2</sub> is a gas at room temperature

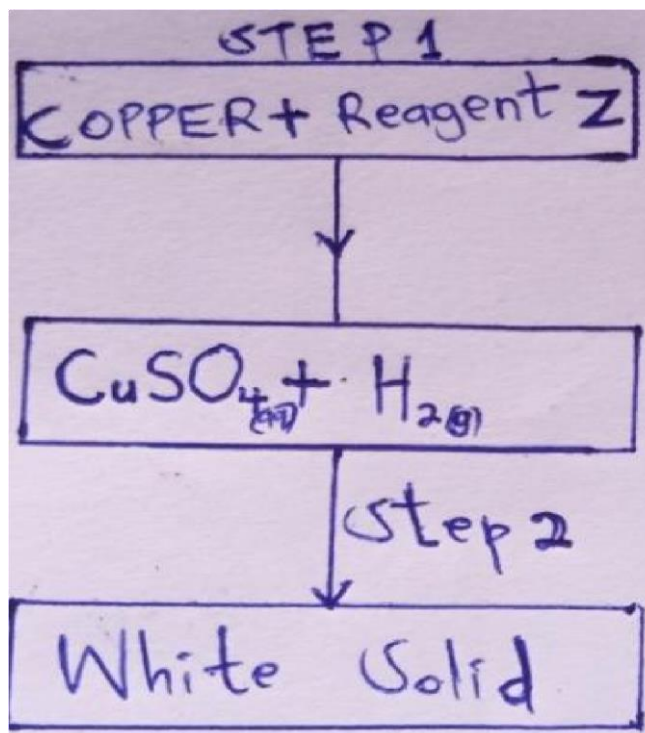
32. The table below shows properties of period three chlorides

<b>Formular of compound</b>	NaCl	MgCl <sub>2</sub>	AlCl <sub>3</sub>	SiCl <sub>4</sub>
<b>Bp °C</b>	1470°C	1420°C	180°C	60°C

Explain why AlCl<sub>3</sub> solid has a much lower boiling point than MgCl<sub>2</sub> solid

# SALTS

1. Study the flow chart below and answer the questions that follow:

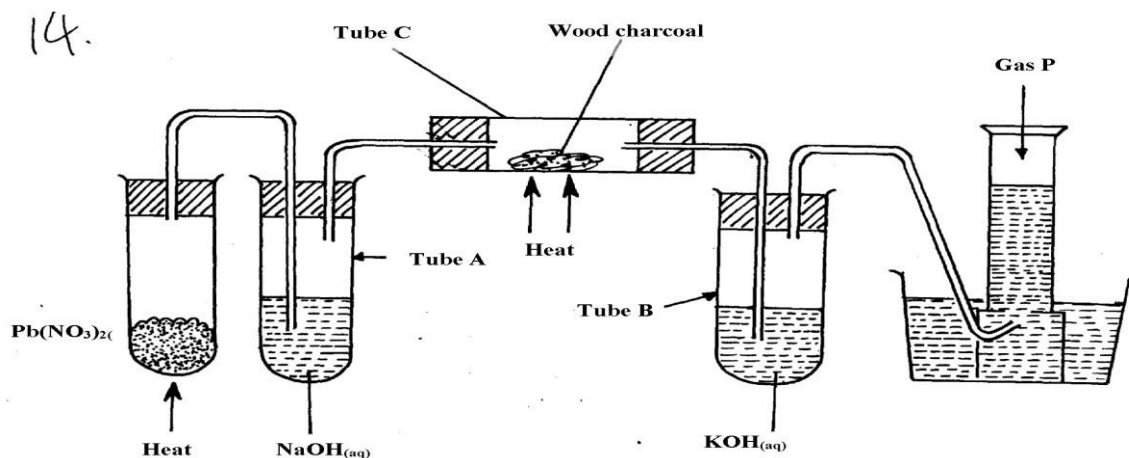


- Name reagent Z.
  - Describe the process which takes place in step 2.
  - Identify the white solid.
- Starting from solid magnesium oxide, describe how a solid sample of magnesium hydroxide can be prepared.
  - Give **one** use of magnesium hydroxide.
  - Starting with lead (II) oxide, describe how you would prepare a solid sample of



lead (II) Carbonate

4. Study the diagram below and answer the questions that follow:



- Name the **two** salts formed in tube A
- State the observations made in tube C
- Name gas P

5. Study the information in the table below and answer the questions that follow:-

PARTICLE	MASS NUMBER	NUMBER OF PROTONS	NUMBER OF NEUTRONS	NUMBER OF ELECTRONS
E	37	17	(i)	18
F	32	(ii)	16	16
G	(iii)	19	20	18
H	40	20	(iv)	18

- Complete the table by filling in the blank spaces (i) , (ii) (iii), and (iv)
  - Identify the particles which are electrically charged
6. Sodium Carbonate Decahydrate crystals were left exposed on a watch glass for two days.
- State the observations made on the crystals after two days.
  - Name the property of salts investigated in the above experiment

7. Starting with sodium oxide, describe how a sample of crystals of sodium hydrogen carbonate may be prepared

8. In an experiment, ammonium chloride was heated in test-tube. A moist red litmus paper placed at the mouth of test first changed blue then red. Explain these observations:-

9. Using dots (•) and cross (x), show the structure of ammonium ion of the processes described below which takes place when salts
- Anhydrous copper sulphate becomes wet

Magnesium chloride forms an aqueous solution

iii) Fresh crystals of sodium carbonate,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  become covered with white

- Give the name of each are exposed to air for sometime
-

powder of formula  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$

b) Write the formula of the complex ion formed in each of the following reactions described below;

- i) Zinc metal dissolves in hot alkaline solution
- ii) Copper hydroxide dissolves excess ammonia solution

11 (a) Write an equation to show the effect of heat on the nitrate of:-

- (i) Potassium (ii)

Silver

12. Describe how a solid sample of anhydrous magnesium carbonate is obtained

13. In the preparation of magnesium carbonate, magnesium was burnt in air and the product collected. Dilute sulphuric acid was then added and the mixture filtered and cooled. Sodium carbonate was added to the filtrate and the contents filtered. The residue was then washed and dried to give a white powder.

(a) Give the name of the product

(b) Write the chemical equation for the formation of the product (c)

(i) Name the filtrate collected after sodium carbonate was added.

(ii) Write down the chemical formula of the white powder

(d) Write a chemical equation for the reaction between product in (a) and the acid (e)

Write an ionic equation to show the formation of the white powder. (f)

Write an equation to show what happens when the white powder is strongly heated. (g)

Identify the ions present in the filtrate after addition of sodium carbonate.

(h) What is the name given to the reaction that takes place when sodium carbonate was added to the filtrate?

(i) Explain the observations made when crystals of sodium carbonate decahydrate are left exposed to the atmosphere for two days

14. a) Give the name of each of the processes described below which takes place when salts are exposed to air for sometime

- i) Anhydrous copper sulphate becomes wet ii)
- Magnesium chloride forms an aqueous solution

iii) Fresh crystals of sodium carbonate,  $\text{Na}_2\text{CO}_3 \cdot 10\text{H}_2\text{O}$  become covered with white powder of formula  $\text{Na}_2\text{CO}_3 \cdot \text{H}_2\text{O}$

15. You are provided with the following:- solid lead (II) nitrate, magnesium oxide

Powder, dilute sulphuric (VI) acid and distilled water. Describe how you can prepare a dry sample of lead (II) sulphate

16. When potassium nitrate is heated, it produces potassium nitrite and gas C

[a] Identify gas C

[b] Name the type of reaction undergone by the potassium nitrate

17. When exposed to air, crystals of hydrated sodium carbonate lose water of crystallization:-

- i) Name this process
- ii) Write the formula of hydrated sodium carbonate

18. A student poured sodium iodide solution into a small portion of solution Q, a yellow precipitate was formed.

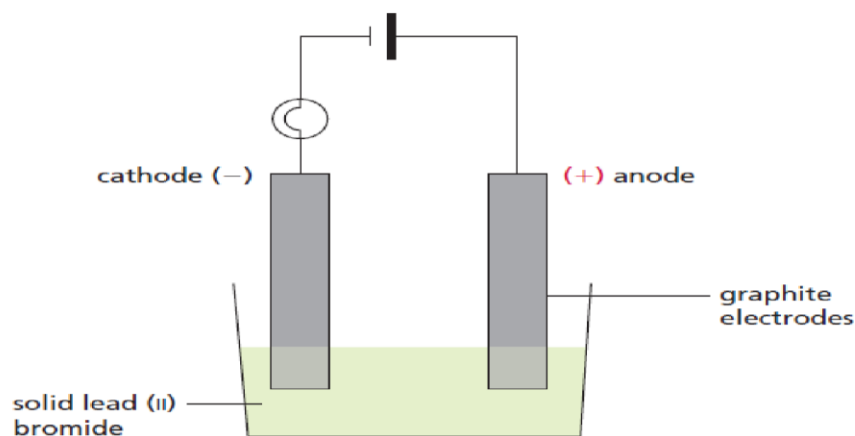
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- The diagram illustrates the experimental setup. A large trough containing water is shown. Inside the trough, a gas jar is inverted. A candle is placed inside the gas jar, resting on a small block. The candle is lit, with a flame. Labels with leader lines identify the 'Gas Jar', 'Candle', and 'Trough'. The chemical formula  $\text{NaOH(aq)}$  is written in the water of the trough, indicating the solution used in the experiment.

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- (b) (i) Explain the process which takes place when  $\text{FeCl}_3$  is dissolved in water  
(ii) A student placed a moist litmus paper on the product in (i) above. State and explain the observation made

## EFFECT OF AN ELECTRIC CURRENT ON SUBSTANCES

1. The set-up was used to electrolyse Lead (II) bromide. Study it and answer the questions that follow;



HEAT

- (a) Write an ionic equation for the reaction that occurred at the cathode  
(b) State and explain what happened at the anode

2. When an electric current was passed through two molten substances **E** and **F** in separate voltammeters. The observations recorded below were made:-

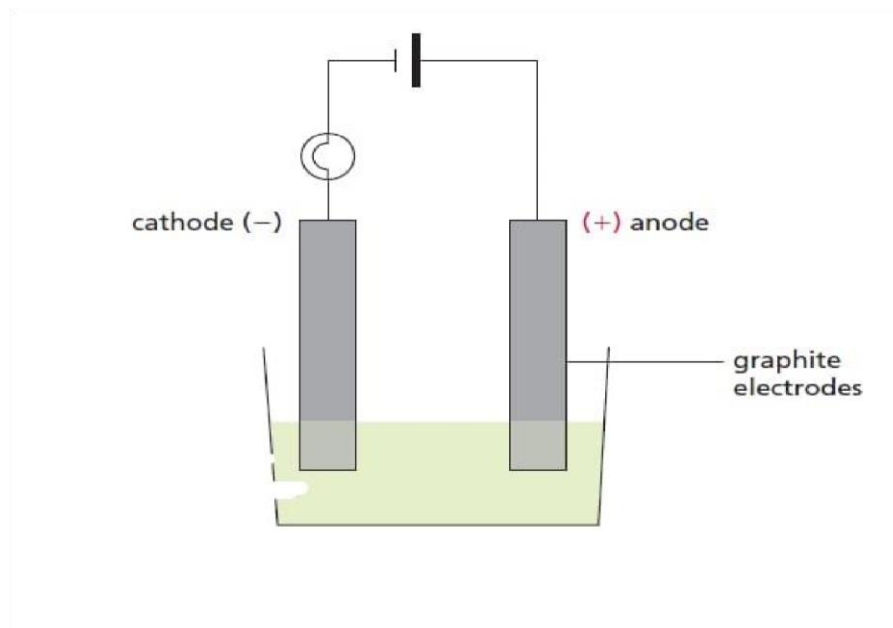
Substance	Observation	Type of structure
<b>E</b>	Conducts electric current and a gas is formed at one of the electrodes	
<b>F</b>	Conducts an electric current and is not decomposed	

Complete the table above

3. (a) Differentiate the following terms :-

Electrolyte and non-electrolyte

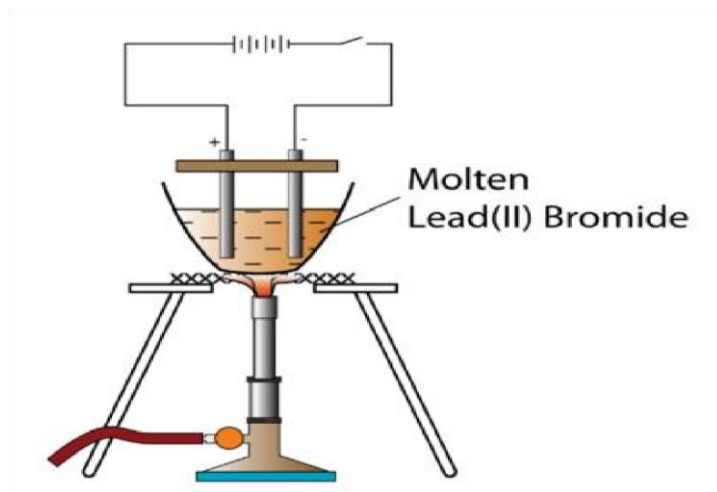
(b) The diagram below is a set-up used to investigate the conductivity of electric current by some aqueous solution. Study it and answer the questions that follow;



- (i) State the observation made on the bulb when each of the following solution were put onto the beaker
- Sugar solution
  - Salt solution
- (ii) Classify the substance in (i) above as either electrolyte or non-electrolyte
- (b) If in the above set-up of apparatus, the substance to be tested is Lead II Bromide, what modification should be included in the set-up?
- (c) Write an Ionic equation at the electrodes and state the observation:-
- Anode

- 

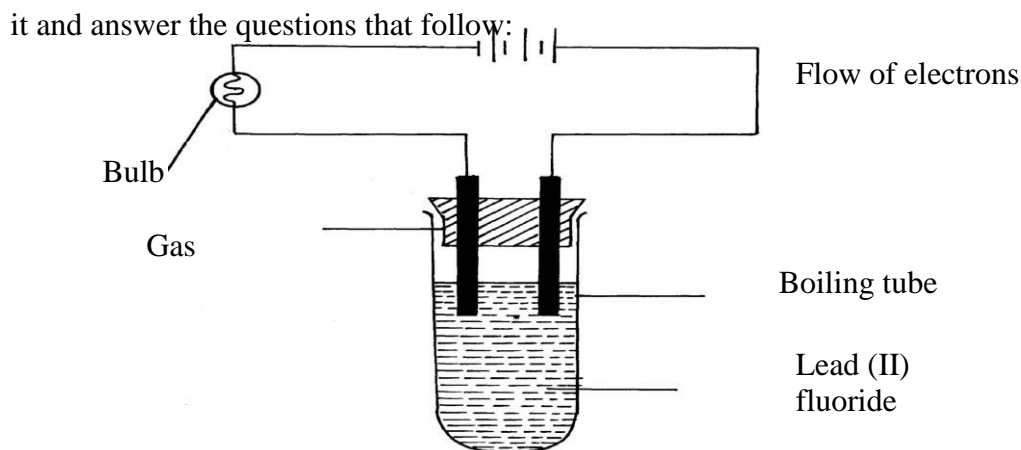
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State the observations that would be made at the anode and cathode as the electrolysis progressed

7.
  - (a) (i) Describe how you would prepare pure crystals of lead II nitrate in the laboratory from lead II oxide
  - (ii) Write an equation for the reaction that takes place in **(a)(i)** above
  - (b) (i) State what happens when lead II nitrate is strongly heated
  - (ii) Write an equation for the reaction in **b(i)** above
  - (c) (i) State what is observed when ammonia solution is gradually added to a solution of lead II nitrate until the alkali is in excess
  - (ii) Write an ionic equation for the reaction that takes place in (i) above

8. The diagram show an experiment for investigating electrical conduction in lead (II) fluoride. Study



(a) On the diagram

- Label the anode and the cathode
- Show the direction of movement of electrons
- Complete the diagram by indicating the condition that is missing but must be present for electrical conduction to take place.
- Why is it necessary to leave a gap between the cork and the boiling tube?
- State the observations that are expected at the electrodes during electrical conduction and at the experiment

(d) Write equations for the reactions that take place at the electrodes

(e) Why should this experiment be carried out in a fume chamber?

table below shows the electrical conductivity of substance **A**, **B** and **C**

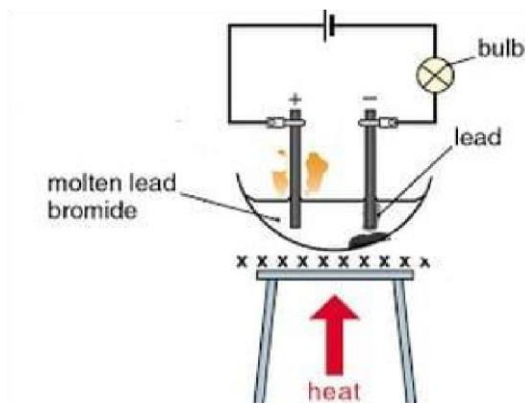
II. The

Substance	Solid state	Molten state	Aqueous solution
<b>A</b>	Conducts	Conducts	Not soluble
<b>B</b>	Doesn't conduct	Conducts	Conducts
<b>C</b>	Doesn't conduct	Doesn't conduct	Not soluble

- Which one of the substance is likely to be plastic?
- Explain why the substance you have given in (a) above behaves in the way it does
- Which of the substances is likely to be sodium chloride? Explain
- Give the type of structure and bonding that is present in substance **A**

9. Study the diagram below and use it to answer the questions that follow:-

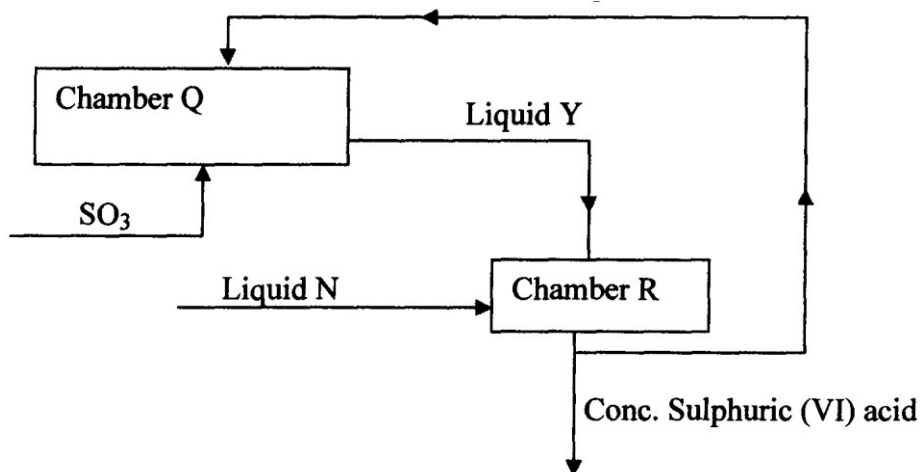




- Identify electrodes **A** and **B**
  - Name the product formed at the anode
  - Write the electrode half equation of reaction at electrode **A**
- differences in electrical conductivity between molten sodium chloride and

10. Explain the liquid mercury

11. Below is part of a flow diagram for the contact process:



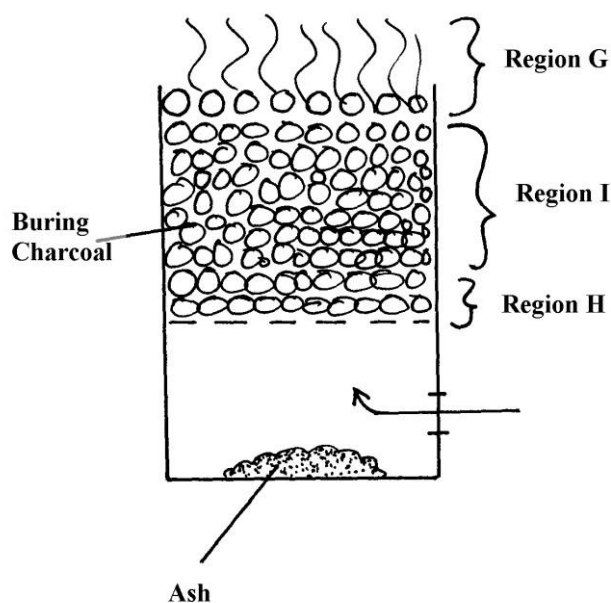
- Name :
  - Liquid **Y** .....
  - Liquid **N** .....
- Write the equation for the reaction taking place in;
  - Chamber **Q**
  - Chamber **R**

12. In an experiment to investigate the conductivity of substances, a student used the set-up Shown below.  
The student noted that the bulb did not light.

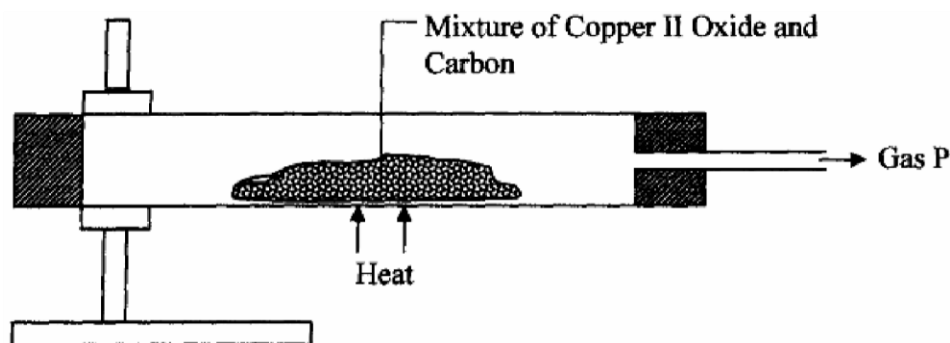
- # CARBON AND ITS COMPOUNDS

- 
- ```
graph TD; A[Coke and Limestone] --> B[Furnace]; B -- GAS --> C[Filter]; C --> D[Roaster]; D --> B; B --> E[CaO]; E --> F[Slaking with water]
```

- Whatsapp Dr. Rakdatha 0742783642 for more information about **KCSE LEAKAGES** AND HOW TO GET

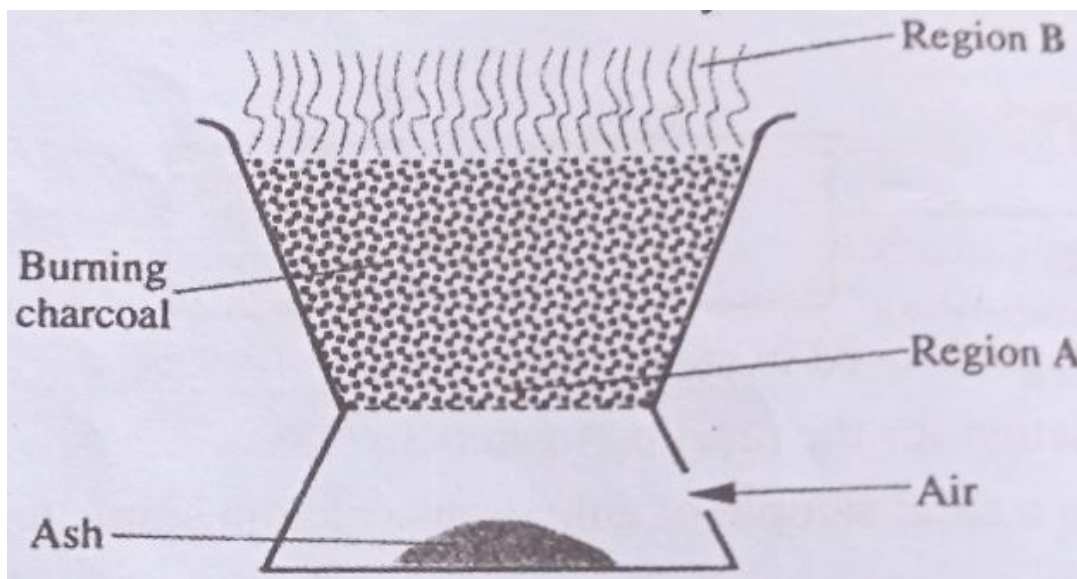


- (a) Identify the gas formed at region **H**
- (b) State and explain the observation made at region **G**
5. Study the diagram below and use it to answer the questions that follow.

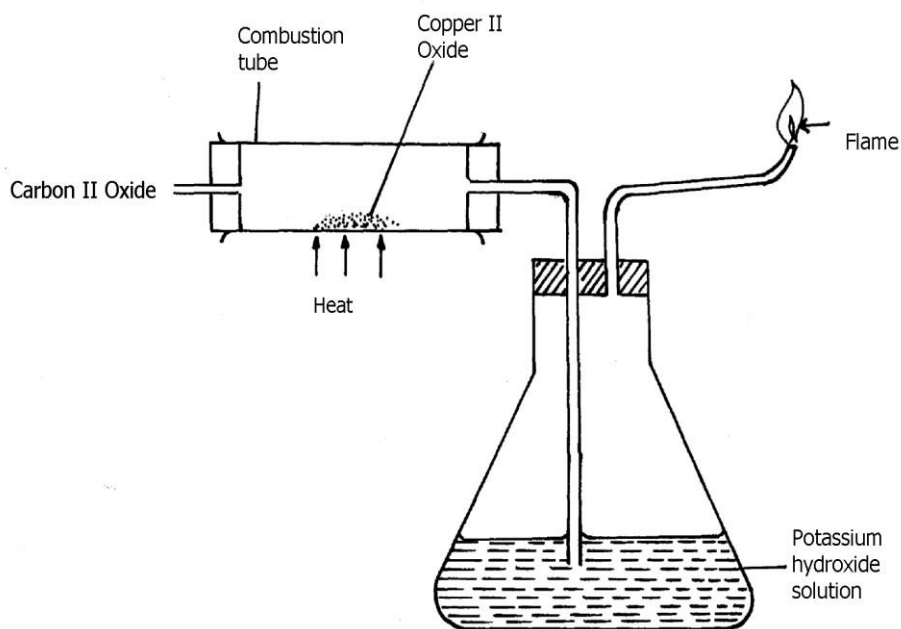


- (a) State the observation made in the combustion tube.
- (b) Write an equation for the reaction that took place in the combustion tube
- (c) Give **one** use of **P**
6. (a) Identify **two** substance that are reacted to regenerate ammonia gas in the solvay process
- (b) Write down a balanced chemical equation for the reaction above
7. When the oxide of element **H** was heated with powdered Carbon, the mixture glowed and (IV) oxide was formed. When the experiment was repeated using the oxide of element **J**, there was no apparent reaction
- (a) Suggest **one** method that can be used to extract element **J** from its oxide
- (b) Arrange the elements **H**, **J** and Carbon in order of their decreasing reactivity
8. (i) Diamond and silicon (IV) Oxide have a certain similarity in terms of structure and bonding. State it

- (ii) State **one** use of diamond
- (a) What is allotropy?
- (b) Diamond and graphite are allotropes of Carbon. In terms of structure and bonding explain why graphite conducts electricity but not diamond
10. The diagram below shows a charcoal stove with different regions

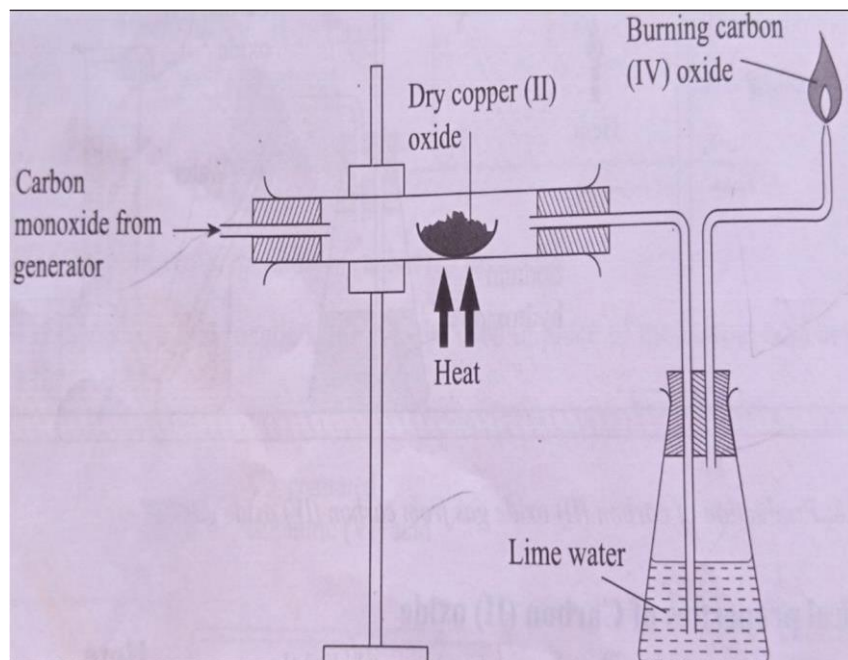


- (a) Write an equation for the formation of the product in region **B**
- (b) How would one avoid the production of the product at **B**? Give a reason for your answer
11. Study the diagram below and answer the questions that follow:

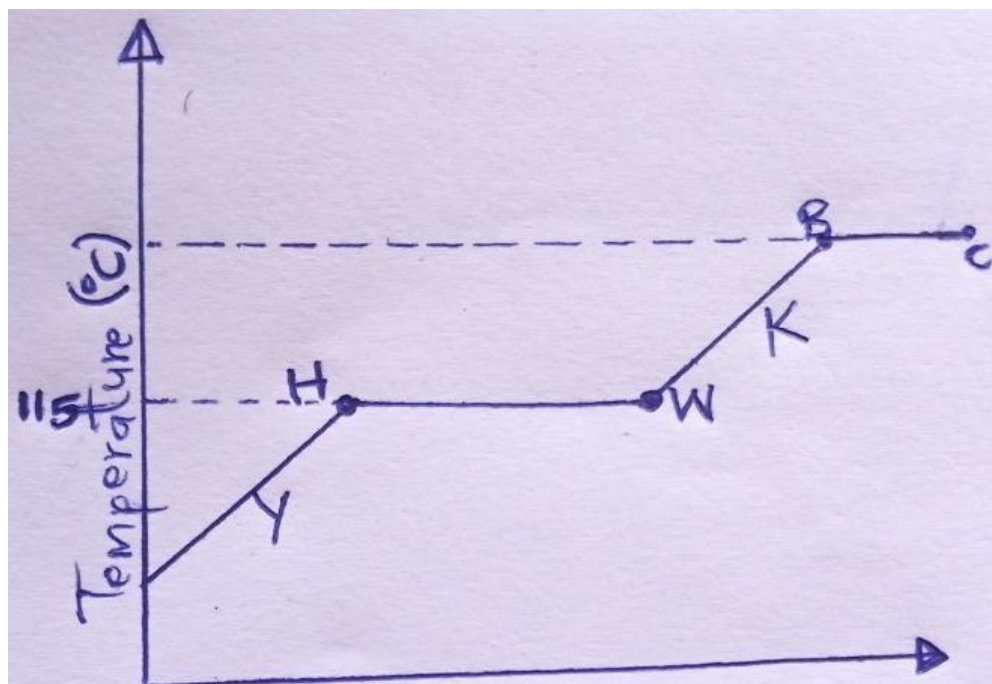


12. Diamond and graphite are allotropes of carbon:-

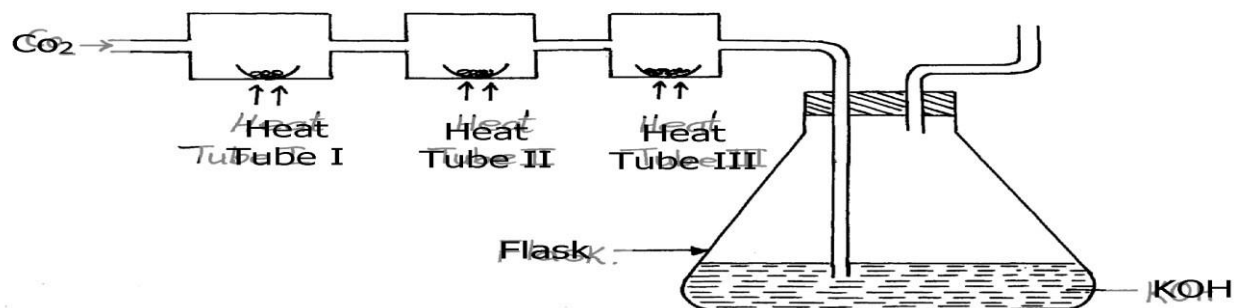
13. Study the experimental set-up below:



14. 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 **H** and **W**?
  - (b) What are the physical states of the substance at **Y** and **K**?
    - (c) Using the simple kinetic theory of matter, explain what happens to the substance between points **A** and **C**
    - (d) The substance under test is definitely not water; Give a reason for this
    - (e) What would happen to the melting point of this substance if it were contaminated with sodium chloride?
  - (f) What happens to the temperature between points **B** and **C**?
15. Study the set-up below and answer the questions that follow:



- (a) (i) Name Gas **X** .....  
 (ii) State the effect of releasing gas **X** to the environment  
 (b) Write down equations for the reactions taking place in;  
 (i) Tube **I**  
 (ii) Tube **II**  
 (iii) Flask  
 (c) State the observation made in tube **III**  
 (d) Write down an equation for the reaction which could be used to generate Carbon  
 (IV) Oxide for the above set up  
 (e) Name the reagents used to generate gas **x** in the laboratory



(f) Complete the diagram above to show how excess gas **x** can be collected

16.a) (i) Name **three** starting materials in the manufacturer of sodium carbonate.

(ii) Which substances are recycled in this process?

b) State **one** commercial use for

(i) Sodium carbonate.

17. [a] (i) State **one** use of carbon (IV) Oxide gas apart from fire extinguisher

(ii) Give **two** properties that make carbon (IV) Oxide to be used as fire extinguisher

(b)  $\text{PbO}_{(s)} + \text{CO}_{(g)} \rightarrow \text{Pb}_{(s)} + \text{CO}_{2(g)}$

Which property of carbon (II) Oxide is demonstrated by the above equation?

(c) Aluminium carbonate does not exist. Give a reason

(d) Ammonium carbonate decomposes when heated. Write a chemical equation to represent this decomposition

18. State and explain the observation made when a piece of charcoal is dropped in a jar containing concentrated nitric (V) acid

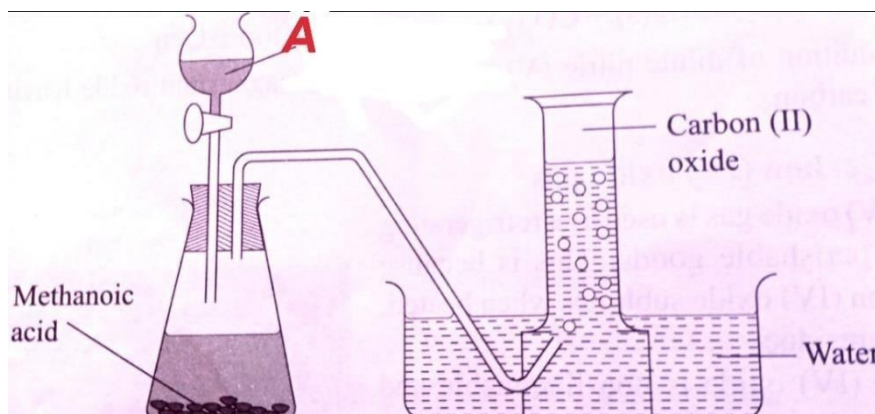
19. When Carbon (IV) oxide is passed through lime water, a white precipitate is formed but when excess Carbon (IV) Oxide is passed, the white precipitate disappears;

(a) Explain why the white precipitate disappears

(b) Give an equation for the reaction that takes place in (a) above

20. The set-

up below was used to prepare a carbon (II) oxide gas.



(a) Give the name of substance **A** .....

(b) Complete the diagram to show how the gas can be collected

(c) Write the equation for the reaction

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