

# **K.C.S.E 2024 BLUEPRINT PREDICTION**

## **CHEMISTRY PP1 10 QUESTION PAPERS**



# **KCSE BLUEPRINT PREDICTION CHEMISTRY PP1 10 QUESTION PAPERS**

Prefer Calling Amobi Group of Examiners @  
0743 333 000 OR 0706 851 439  
for Marking Schemes

*N/B In Response to the Huge Costs Associated in Coming Up with Such/Similar Resources Regularly, We inform us All, MARKING SCHEMES ARE NOT FREE OF CHARGE. However Similar QUESTIONS, Inform of soft Copies, are Absolutely FREE to Anybody/Everybody. Hence NOT FOR SALE by Amobi Group of Examiners.*

**CALL AMOBI GROUP OF EXAMINERS @  
0743 333 000 OR 0706 851 439 TO  
ACQUIRE :**



NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION QUESTION PAPER NO: 1

233/1

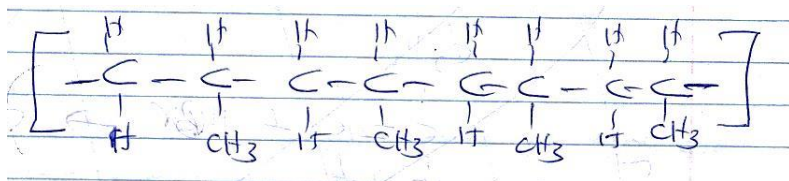
CHEMISTRY

PAPER 1

TIME: 1 HOUR

- 1[a] State Boyle's law [1mk]
- [b] At  $400^{\circ}\text{C}$ ,  $850\text{cm}^3$  of a gas exert a pressure of  $560\text{mmHg}$ . What volume of the same gas would exert a pressure of  $640\text{mmHg}$  at the same temperature? [3mks]
2. When burning magnesium is lowered into a gas jar containing nitrogen (I) oxide, it continues to burn forming a white solid
- [a] Name the white solid [1mk]
- [b] Write a chemical equation of the reaction that occurred [1mk]
3. Carbon {IV} oxide is one of the gases used in fire extinguishers
- [a] State any other possible use of carbon {IV} oxide [1mk]
- [b] Name any two reagents that can be reacted together to generate carbon {IV} oxide [2mks]
4. Rusting is a process that causes massive destruction of iron structures
- [a] State one condition that accelerates rusting [1mk]
- [b] State one advantage of rusting [1mk]
5. At  $60^{\circ}\text{C}$ , 38 grams of lead{II} nitrate saturate  $56\text{cm}^3$  of water. Determine the solubility of lead {II} nitrate at this temperature [2mks]
6. Explain why molten sodium chloride conducts electricity, but solid sodium chloride does not [2mks]

7. A polymer can be represented as



[a] Name and draw the structure of the monomer [2mks]

[b] What type of polymerization occurs in the above case? [1mk]

[c] Given that the molecular mass of the polymer is 25620, how many units of the monomer make the polymer [2mks]

8. A reaction can be represented as;



Given the bond energies of C-H, C=C, C-C, C-Br, and H-Br as 20kJ/mol, 580Kj/mole, 446Kj/mole, 438KJ/mole and 396kJ/mole respectively. Determine the heat of formation of C<sub>2</sub>H<sub>5</sub>Br [3mks]

9[a] Define the term, dynamic equilibrium [1mks]

[b] A reaction at equilibrium can be represented as



State and explain the observation made when;

[i] NaOH is added to the equilibrium mixture [2mks]

[ii] HCl is added to the equilibrium mixture [2mks]

10. During the electrolysis of dilute copper {II} chloride using carbon electrodes, a current of 1.5

A was passed through the solution for 2 hours and 30 minutes

[a] Write the ionic equation of the reaction that occurred at the cathode [1mk]

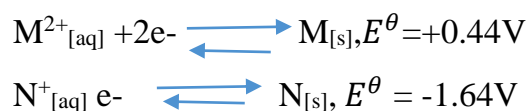
[b] Given R.A.M of copper = 64 and 1F = 96500C, calculate the change in mass of the cathode [3mks]

11. [a] Define the term half-life [1mk]

[b] Name two particles likely to be emitted when a radioactive nuclide undergoes radioactivity [2mks]

[c] The half-life of a radioactive nuclide is 3 hours. Given that its initial mass is 288g, determine the remaining mass after 12 hours. [2mks]

12. The reduction potentials of elements M and N are;



Using the above reduction potentials, predict whether a reaction would occur between  $N^+_{[aq]}$  and  $M_{[s]}$  [3mks]

13. An hydrocarbon can be represented as:  $C_2H_2$

- [a] Name the hydrocarbon [1mk]  
[b] State two reagents that can be reacted together to generate the hydrocarbon [2mks]  
[c] Identify the group of hydrocarbons into which  $C_2H_2$  belongs to [1mk]

14. [a] Name two allotropes of sulphur [2mks]

[b] In an experiment to investigate a certain property of sulphur, Maina added few drops of conc  $HNO_3$  to sulphur in a test tube and warmed the mixture

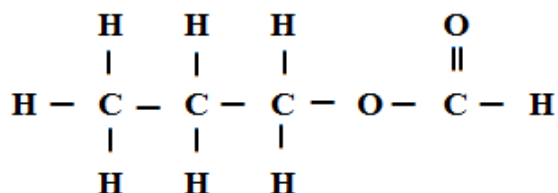
[i] State one observation made [1mk]

[ii] Write a chemical equation of the reaction that occurred [1mk]

15. Chlorine is commonly used in the manufacture of  $Ca(OCl)_2$

- [i] State one use of the above compound of chlorine [1mk]  
[ii] Write a chemical equation leading to the production of  $Ca(OCl)_2$  [1mk]

16. A compound can be represented as



- [a] What name is given to the above class of compounds [1mk]  
[b] Name two reagents that can be reacted together to generate the above compound [2mks]  
[c] State two conditions necessary for the reaction leading to formation of the above compound to occur [2mks]

17. Using dots and crosses, show bonding in carbon{II} oxide [2mks]

18. When 20g of a compound containing carbon, hydrogen and oxygen was burnt in the air, 29.3g of carbon{IV} oxide and 11.7g of water were produced. Determine its empirical formulae.

{C=12, H=1, O=16} [3mks]

19. Few drops of hydrochloric acid were added into a test tube containing lead {II} Nitrate solution

{a} State one observation made [1mk]

{b} Write an ionic equation of the reaction that occurred in the test tube [1mk]

20. In the industrial manufacture of Ammonia one of the raw materials is nitrogen gas

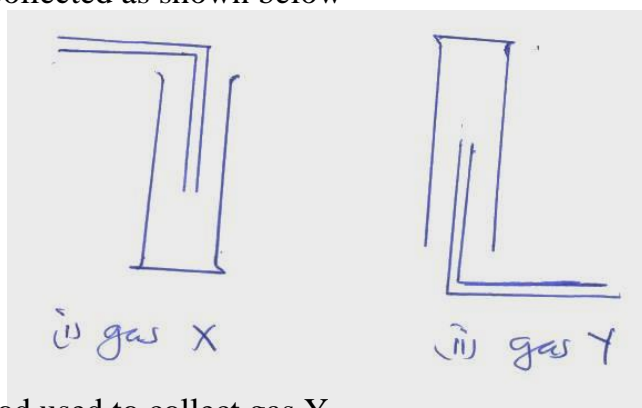
{a} Name one other raw material [1mk]

{b} Name two possible sources of the raw material you have named in {a} above [2mks]

{c} Name two substances that can be used as catalyst in this process [2mks]

{d} State one use of ammonia [1mk]

21. Gas X and Y can be collected as shown below



{a} Name the method used to collect gas Y [1mk]

{b} How do densities of gas X and gas Y compare? [1mk]

{c} Give an example of a gas that can be collected using the same method as gas Y [1mk]

22. Element W has two isotopes W – 36 and W-40 which occur in the ratio x:4. Given that R.A.M of W is 37.25, find the value of x [2mks]

23. Describe an experiment that can be used to determine whether a given sample of a liquid is pure [2mks]

24. A given mass of gas T diffuses through a porous plug in 48 seconds while a similar mass of gas R diffuse in 70 seconds. Given that the density of gas T is 0.6g/cm<sup>3</sup>, find the density of gas R [2mks]

25. The electron configuration of elements A, B, C, D and E are as given below

{a} Which element has the highest electrical conductivity [1mk]

{b} Which letter represents the most reactive metal [1mk]

{c} Which letter represents the most reactive non-metal [1mk]

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 2

233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1.a) What name is given to the process by which alcohol is formed from carbohydrates (1mk)

b) Using electrons in the outermost energy level, draw the dot (.) and cross(x) diagrams for the molecule of  $H_2O$  and  $NH_4^+$ . (H =1, O =8, N=7 atomic number)

I)  $H_2O$  (1mk)

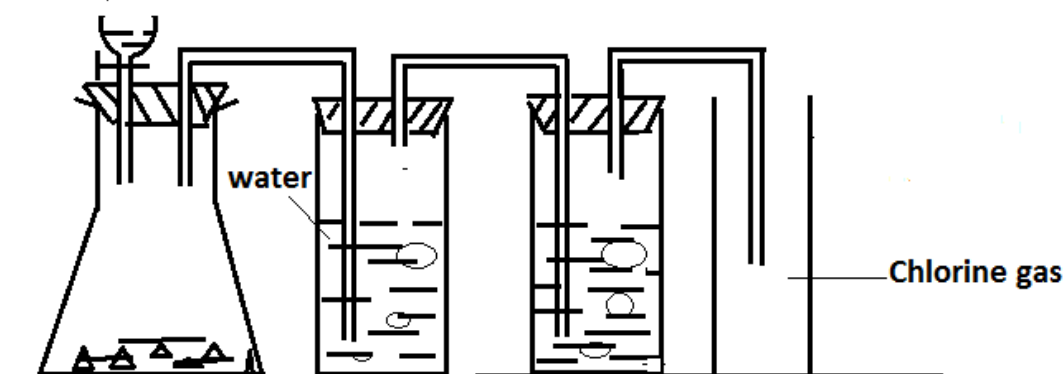
II)  $NH_4^+$  (2mks)

2. Carbon (ii) oxide is described as “silent killer”

(a) State *one* physical property of carbon (II) Oxide that makes it “silent killer”. (1mk)

b) State and explain *one* chemical property that makes carbon (II) oxide poisonous to human beings. (1mk)

3. Chlorine gas can be prepared using the apparatus shown below



- (a) Name the reagent in the dropping funnel (1mk)
- (b) What is the function of the water in the wash bottle (1mk)
- (c) (i) Name the method of gas collection used (1/2mk)
- ii) What physical property of the gas is suggested by the method of gas collection used (1/2mk)

4. Distinguish between the terms deliquescent and efflorescent as used in chemistry (2mks)

5. Analysis of a compound showed that it had the following composition. 69.42% Carbon, 4.13 % Hydrogen and the rest Oxygen

a) Determine the empirical formula of the compounds (3mks)

(C =12.0, H =1.0, O =16.0)

6. A water trough, aqueous sodiumhydroxide, burning candle, watch glass and a graduated gas jar were used in an experimental set up to determine the percentage of active part of air.

Draw a labeled diagram of the set up or the end of the experiment. (3mks)

7. In terms of structure and bonding, explain why the melting point of oxygen is much lower than that of sodium (3mks)

8. Bottles of sodium carbonate, sodium chloride and sugar have lost their labels. A student prepares and tests an aqueous solution of a sample from each bottle. The results obtained are as follows in the table below Complete the table by filling the correct label for each bottle (3mks)

BOTTLE	PH	Electrical Conductivity	Correct Labels
1	7	Conducts	
2	7	Does not Conduct	
3	10	Conducts	

9. The label below gives atomic numbers of elements respectively by letters A,B,C and D

Element	A	B	C	D
Atomic Number	15	16	17	20

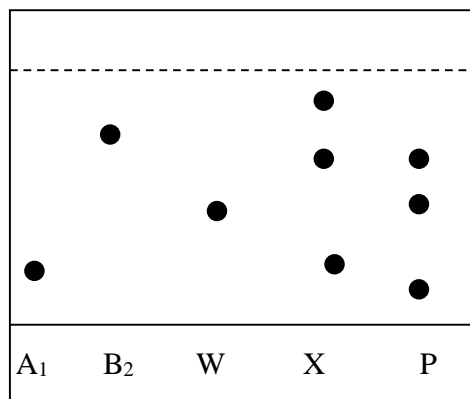
a) Name the type of bonding that exists in the compound formed when A and D reacts (1mk)

b) Select letters which represent the most reactive non-metal. Give a reason for your answer (2mks)



10. Sample of urine from three participants **W**, **X** and **P** at an international sports meeting were spotted onto a chromatography paper alongside two from illegal drugs, **A<sub>1</sub>** and **B<sub>2</sub>**.

A Chromatogram was run using methanol. The figure below shows the chromatogram.



a) Identify the athlete who had used an illegal drug (1mk)

b) Which drug is more soluble in methanol (1mk)

11.a) State Grahams law of Diffusion (1mk)

(b) The molecular masses of gases P and Q are 32 and 88 respectively. If the diffusion of P through a porous material is  $12\text{cm}^3\text{s}^{-1}$ , calculate the rate of diffusion of gas Q through the same material. (2mks)

12. When a student was stung by a nettle plant, a teacher applied an aqueous solution of ammonia to the affected area of the skin and the student was relieved of the pain. Explain (2mks)

13. How does a rise in temperature affect the following:

(i) Rate of a reaction (1mk)

(ii) Position of a chemical equilibrium (1mk)

14. Draw and name the possible isomers in the compound with the formula  $\text{C}_5\text{H}_{12}$  (3mks)

15. A compound has an empirical formula of  $\text{CH}_2\text{O}$  and a relative molecular mass of 180. Work out its molecular formula (3mks)

(C =12, H =1, O =16)

16. Complete the table below by filling the missing information. (3mks)

Symbol of Particle	Number of protons	Electronic Configuration	Number of Neutrons
Al	13		14
F <sup>-</sup>		2.8	10
Be <sup>2+</sup>	4		9

17. State and explain the change in mass that occur when the following substances are separately heated in open crucibles

a) Copper Metal (1½mks)

b) Copper(ii)nitrate (1½mks)

18. An element represented as X has 16 neutrons. Draw the electronic structure for the ion of element X

19.a) State Charles Law as applied to ideal gases (1mk)

b) Gas occupies a volume of  $400\text{cm}^3$  at a temperature of  $500\text{k}$  and pressure of 5 atmosphere. What will be the temperature of the gas when the volume is  $100\text{cm}^3$  and pressure is 0.25 atmosphere? (2mks)

20. Calculate the concentration in moles/litre of potassium hydroxide which contains 11.2 of solute in  $50\text{cm}^3$  of solution(K =39, O = 16, H = 1) (3mks)

21. Starting with aluminum sulphate describe how a solid sample of aluminum hydroxide could be prepared. (3mks)

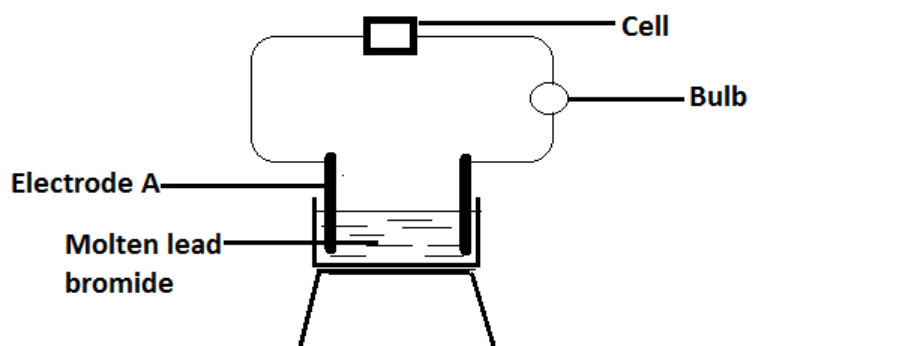
22. Iron (II) sulphate is prepared by adding excess iron filings into a dilute acid. The unreacted filings are then filtered off. The filtrate is evaporated to dryness

(a) Write the systematic name of the acid used (1mk)

(b) What indicates that the reaction is over? (1mk)

(c) What is the colour of the filtrate? (1mk)

23. The set-up below was used to investigate the effect of an electric current on a molten lead (II) bromide



(a)The bulb lit for a while then went off. Explain this observation. (1mk)

(b) A red gas was formed at electrode A while the bulb was still lit.

Using this observation label the terminals of the cell. (1mk)

(c)Write an equation to show the formation of the product at the other electrode. (1mk)

24. i) Name *two* crystalline allotropes of carbon (2mk)

ii) What is allotropy? (2mks)

25. 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 solution would be used to relieve a stomach upset caused by indigestion? (1mk)

b) Which solution is likely to be :

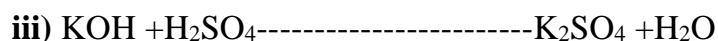
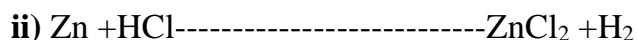
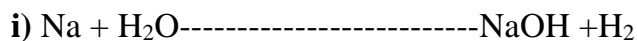
i) Dilute Sulphuric Acid

ii) Sodium hydroxide solution

26. Classify the following processes as either physical or chemical change (3mks)

Process	Change
Sublimation	-----
Neutralization	-----
Fractional Distillation	-----

27. Balance the following equations (3mks)



28. With the help of a well labeled diagram, draw a set-up of an arrangement of assembled apparatus that can be used to prepare dry hydrogen gas, including the appropriate reagents. (3mks)

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION QUESTION PAPER NO: 3

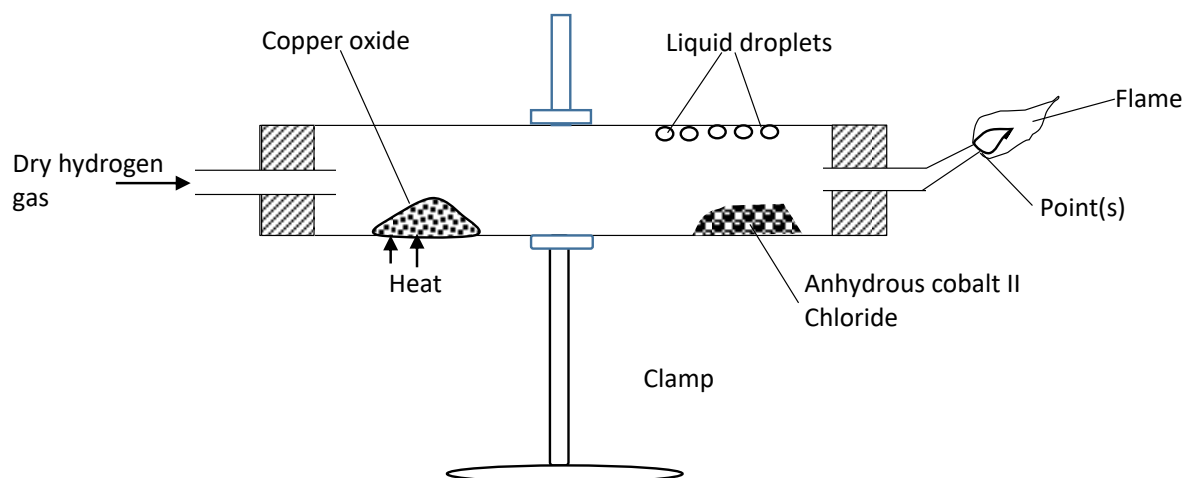
233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1. Study the set-up shown below and use it to answer the questions that follow.



(a) State the observations made at the end of the experiment on:

(i) The cobalt II chloride papers.

(1Mk)

(ii) Copper II oxide powder.

(1Mk)

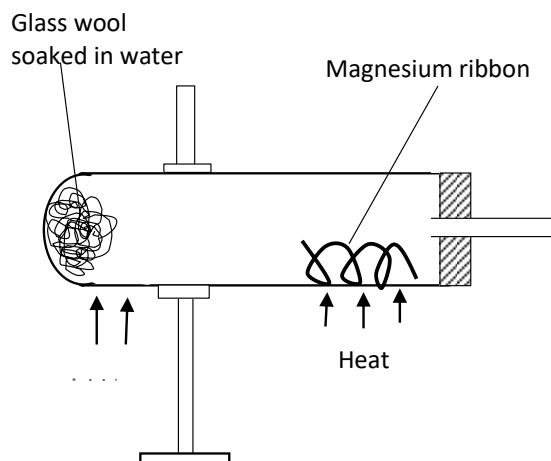
(b) (i) Why was excess hydrogen ignited?

(1Mk)

(ii) Write a fully balanced equation for the reaction occurring at the flame at point(s).

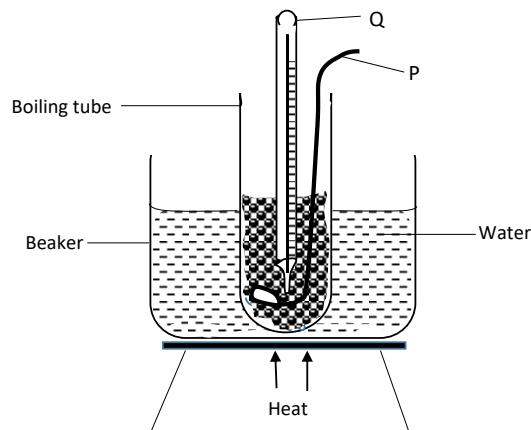
(1Mk)

2. A student used the reaction between steam and heated magnesium metal to collect a dry sample of hydrogen gas. Complete the diagram to collect the gas. (3Mks)



Write the equation for the reaction producing the hydrogen gas in the above reaction. (1Mk)

3. The following diagram represents a set-up showing how changes of state from solid to liquid could be investigated.



(a) Identify the apparatus P and Q and state their uses. (2Mks)

- 4.(a) Define the term “Gay Lussac’s law”. (1Mk)

(b) When  $100\text{cm}^3$  of gaseous hydrocarbon ( $\text{C}_x\text{H}_y$ ) burn in  $400\text{cm}^3$  of oxygen,  $100\text{cm}^3$  of oxygen is unused,  $200\text{cm}^3$  of steam are formed. Deduce the equation for the reaction and the formula of the hydrocarbon. (2Mks)

5. If it takes 30 seconds for  $100\text{cm}^3$  of carbon (IV) oxide to diffuse across a porous plate. How long will it take  $150\text{cm}^3$  of nitrogen (IV) oxide to diffuse across the same plate under similar conditions?

(C = 12.0, N = 14.0, O = 16.0) (2Mks)

6. Define Charles’ law. (1Mk)

7. The table below shows the solubility of a salt at various temperatures.

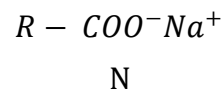
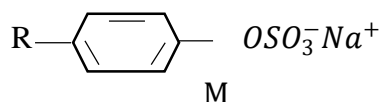
Temperature °C	Solubility (g/100g water)
0	36
40	30
80	25
100	22
120	20

(a) Define the term fractional crystallization. (1Mk)

(b) A saturated solution of the salt at 40°C was heated to 100°C. State and explain the observation made. (2Mks)

(c) Calculate the mass of salt formed when a saturated solution of the salt at 0°C is placed in a water bath maintained at 100°C. (1Mk)

8. The structures below are a representation of cleansing agents M and N.



(i) Identify the agents. M & N (1Mk)

(ii) Write an equation for the compound formed when agent N is used with water containing calcium nitrate salt. (1Mk)

(iii) A water engineer analyzed water from a borehole and found out that it contained magnesium chloride impurities. State any two methods used to make the water suitable for washing using agent N. (1Mk)

9. Calculate the percentage abundance of two other isotopes of element A with three isotopes, (30, 32, 35).

Given that the R.A.M is 30.5 and percentage abundance of 35 is 5%. (2Mks)

10. An element Z has ionic configuration of  $Z^+ - 2.8$ . The element is burned in excess oxygen and the product is then added to water. Write two possible equation for the reactions which took place. (2Mks)

11. Phosphorus (III) oxide has a lower melting point than calcium chloride. Explain. (2Mks)

12. Describe how you would prepare silver carbonate starting with silver. (3Mks)

13. Use the table below to determine the enthalpy change for the reaction between hydrogen and chlorine. (3Mks)

Bond	Bond Energy kJ/mole
H – H	435
H – Cl	431
Cl – Cl	244

14. Explain why hydrogen sulphide cannot be used as a fuel, though it can burn to give out useful heat energy. (1Mk)
15. (a) Explain why cryolite is added to aluminium oxide before electrolysis. (1Mk)
- (b) During electrolysis 40,000 amperes was passed through a Hall cell for 10 hrs. Calculate the mass of aluminium deposited at the cathode in kg. (IF = 96500C, Al = 27) (3Mks)
16. (a) Define the term half-life. (1Mk)
- (b) A certain nuclide has a half-life of 2.5 hours. What percentage of a given mass of the nuclide will be left after 7.5 hrs? (2Mks)
17. Explain how increase in temperature affects the rate of a given reaction. (2Mks)
18. Write down the preliminary steps undertaken to concentrate an ore during extraction of metals. (2Mks)
19. Write down the formula of the chief ore of Aluminium. (1Mk)
20. Dilute sulphuric (VI) acid was added to a compound P of magnesium. The solid reacted with the acid to form a colourless solution Q and a colourless gas R which formed a white precipitate when bubbled through lime water. Identify: (1½Mks)
- (a) Compound P -
- (b) Solution Q -
- (c) Colourless gas R -
21. During an experiment on the reduction of an oxide of copper, the following data was obtained.
- |  |   |       |
|--|---|-------|
| Mass of empty boat                     | = | 25.0g |
| Mass of empty boat + oxide of copper   | = | 29.0g |
| Mass of boat + copper (after reaction) | = | 28.2g |
- Determine the empirical formula. (3Mks)
- (Cu = 64, O = 16)
22. Calculate the number of atoms in 26.4g of calcium carbonate. (2Mks)
- (Ca = 40, C = 12, O = 16, L =  $6.02 \times 10^{23}$ )
23. Lead (II) nitrate was heated completely. (1Mk)
- (a) Write an equation for heating lead (II) nitrate. (1Mk)
- (b) Calculate the mass of the oxide formed given that 0.2 moles of the nitrate was heated. (2Mks)
- (Pb = 207, O = 16)
24. Draw and name two branched isomers of the compound whose chemical formula is  $C_5H_{12}$ . (2Mks)

25.(a) Complete the following table based on organic compounds. (1Mk)

	Compound	Reagents needed for preparation
(i)	Ethyne	
(ii)	Ethane	

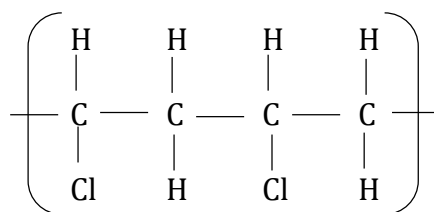
(b) Write chemical equations to represent the reaction in (a) above. (2Mks)

(c) An organic substance (Q) reacted with ethanoic acid to form pleasant smelling compound  $CH_3CHOOCH_2CH_2CH_3$ .

(i) What conditions will be required to form the product? (1Mk)

(ii) If another compound with a chemical formula  $C_3H_6$  has to be formed from compound Q, what would be the conditions required in this process. (1Mk)

26.(a) Give the formula of the Monomer used during the formation of the following polymer. (1Mk)



(b) State any use of the polymer in (a) above. (1Mk)

(c) Other than using universal indicator explain how one can differentiate between the following chemicals. Propanol and propanoic acid. (1Mk)

27. The melting points of oxygen and sulphur are  $-216^{\circ}C$  and  $113^{\circ}C$  respectively yet the two elements belong to group VI in the periodic table. Explain. (2Mks)

28. Which type of Sulphur is formed under the following conditions?

	Conditions	Type of Sulphur
(i)	Above $96^{\circ}$	( ½ mark)
(ii)	Pouring boiling Sulphur into cold water	( ½ mark)
(iii)	Rapidly cooling Sulphur vapour	( ½ mark)
(iv)	Mixing sodium thiosulphate with dilute hydrochloric acid	( ½ mark)



29. When dry chlorine is passed over heated iron in a combustion tube, a brown solid forms on the cooler parts of the combustion tube.

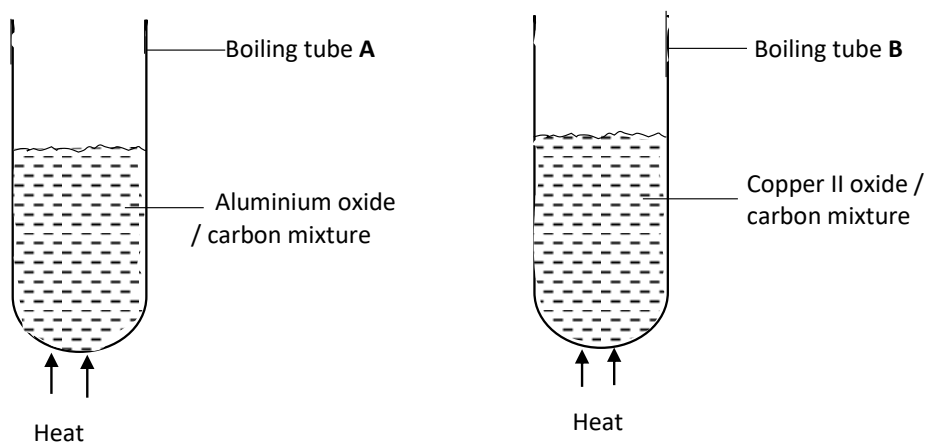
(i) Name the brown solid. (1Mk)

(ii) Why does the brown solid form on the cooler parts of the combustion? (1Mk)

(iii) What will be the pH of the solution formed when the brown solid is dissolved in water? (1Mk)

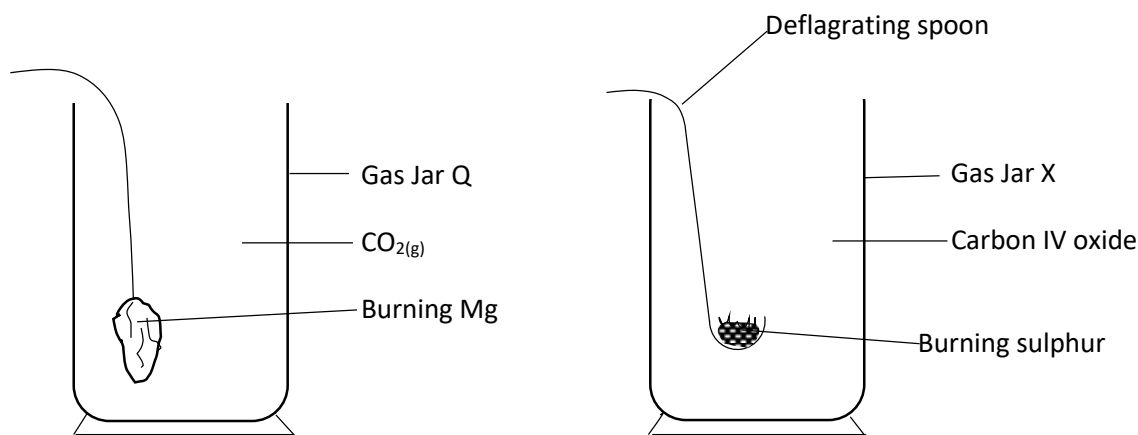
(iv) Chlorine gas is poisonous yet it is used to treat water. Explain. (1Mk)

30. The diagrams below show the apparatus used to investigate one of the properties of carbon.



State and explain the observations made in each boiling tube. (2Mks)

31. The diagrams below show the apparatus used to investigate the properties of carbon (IV) oxide gas.



(i) State and explain the observations made in each gas jar. (2Mks)

(ii) State **one** industrial use of carbon (IV) oxide. (1Mk)

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 4

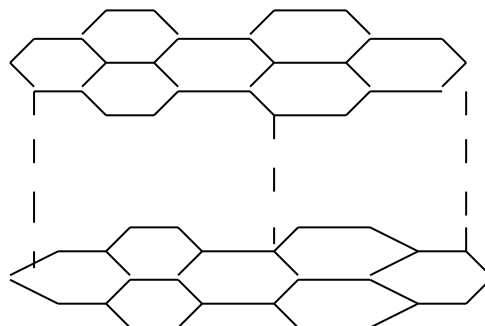
233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1. Explain briefly how you would obtain crystals of sodium chloride from a mixture of sodium chloride, lead (II) chloride and iron fillings. **(3Mks)**
2. a) What is meant by allotropy? **(1Mk)**  
b) The diagram below shows the structure of one of the allotropes of carbon



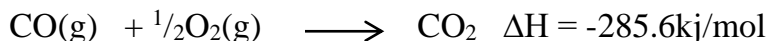
- i) Identify the allotrope **(1Mk)**  
ii) State one property of the above allotrope and explain how it is related to its structure. **(1Mk)**
3. a) Using dots and cross diagram, show how a hydro-oxonium ion,  $\text{H}_3\text{O}^+$  is formed  
Hint:  $\text{H}_2\text{O} + \text{H}^+ \longrightarrow \text{H}_3\text{O}^+(\text{H} = 1, \text{O} = 8)$  **(2Mks)**  
b) What name is given to the bonding in (a) above. **(1Mk)**

4.  $60\text{cm}^3$  of oxygen gas diffused through a porous hole in 50 seconds. How long will it take  $80\text{cm}^3$  of sulphur(IV) oxide to diffuse through the same hole under the same conditions. (2Mks)

(S= 32.0. O=16.0)

5. (a) Define the term standard enthalpy of formation of a substance (1Mk).

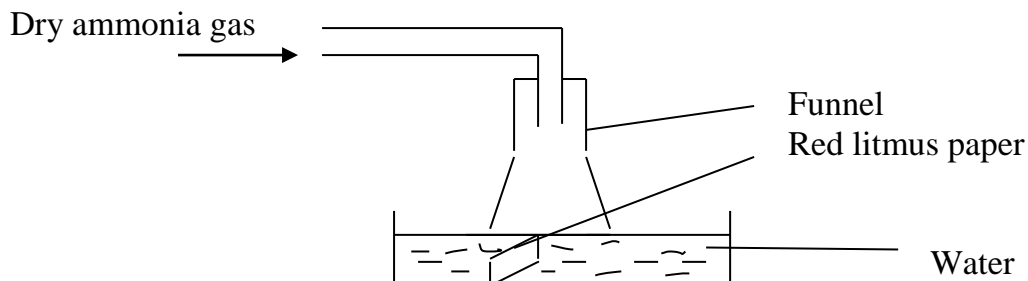
- (b) Calculate the heat of formation of carbon (II) oxide from the following data. (2Mks)



6. a) Draw and name the structure of the compound formed when one mole of ethyne reacts with one mole of hydrogen bromide. (1Mk)

- b) Draw and name two positional isomers of  $\text{C}_4\text{H}_8$  (2Mks)

7. Dry ammonia gas was made to dissolve in water using the set of apparatus shown below



- a) What is the use of the inverted funnel (1Mk)

- b) Give and explain the observation made on the litmus paper. (1Mk)

8. The table below gives the solubility of potassium bromide and potassium sulphate at  $0^\circ\text{C}$  and  $40^\circ\text{C}$

<u>Substance</u>	<u>Solubility g/100g H<sub>2</sub>O at</u>	
	<u><math>0^\circ\text{C}</math></u>	<u><math>40^\circ\text{C}</math></u>
Potassium bromide	55	75
Potassium sulphate	10	12

When an aqueous mixture containing 60g of potassium bromide and 7g potassium sulphate in 100g of water at  $80^\circ\text{C}$  was cooled to  $0^\circ\text{C}$ , some crystals were formed

- (a) Identify the crystals (1mk)

- (b) Determine the mass of the crystals (1mk)

- (c) Name the method used to obtain the crystals (1mk)

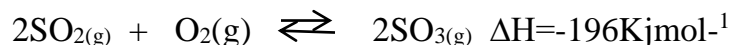
9. Describe how you would prepare a dry sample of zinc carbonate in the laboratory starting With zinc chloride solid. (3Mks)

10. Calcium oxide can be used to dry hydrogen chloride gas.

(a) Explain why calcium oxide is not used to dry chlorine gas (1Mk)

(b) Name one drying agent for hydrogen chloride gas other than the one named above (1Mk)

11. The equation below shows the oxidation of sulphur(IV) oxide to sulphur (VI) oxide in contact process.



(i) Name one catalyst for this reaction (1mk)

(ii) State and explain the effect on the yield of sulphur (VI) oxide when

I The temperature is increased (1mk)

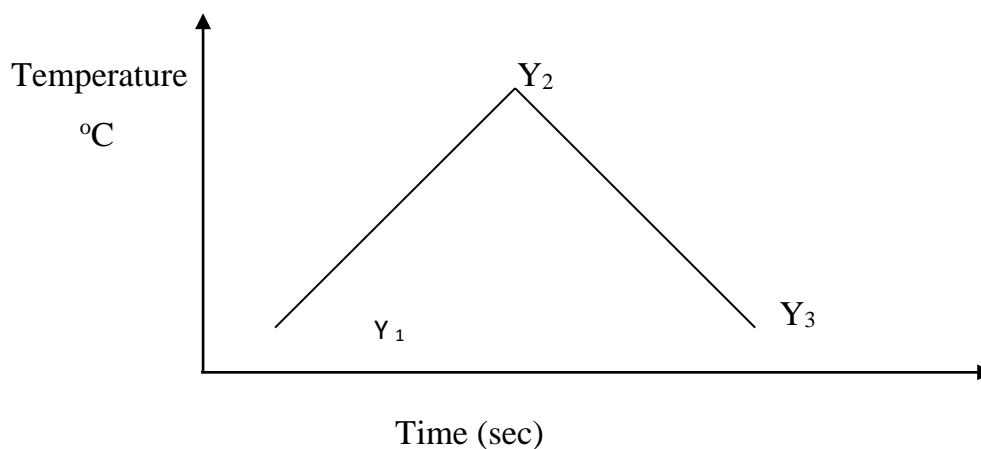
II The amount of oxygen is increased (1mk)

12. In order to determine the molar heat of neutralization of sodium hydroxide 100cm<sup>3</sup> of 1M sodium hydroxide and 100cm<sup>3</sup> of 1M hydrochloric acid, both at the same initial temperature were mixed and stirred continuously with a thermometer. The temperature of the resulting solution was recorded after every 30 seconds until the highest temperature of the solution was attained. Thereafter the temperature of the solution was recorded for further two minutes

(a) Write an ionic equation for the reaction which took place (1mk)

(b) The sketch below was obtained when the temperatures of the mixture were plotted against time.

Study it and answer the questions that follow



I What is the significance of point Y<sub>2</sub> (1mk)

II Explain the temperature change

(a) Between Y<sub>1</sub> and Y<sub>2</sub> (1mk)

(b) Between Y<sub>2</sub> and Y<sub>3</sub> (1mk)

13. For each of the following experiments, give the observations, and the type of change that occurs (Physical or chemical) (3Mks)

Experiment	Observation	Type of change
A few drops of concentrated sulphuric acid added to small amounts of sugar		
A few crystals of Iodine are heated gently in a test tube		
A few crystals of copper (II) Nitrate are heated strongly in a test tube.		

14. In the laboratory ammonia gas is prepared by heating an ammonium salt with an alkali.

(a) What is meant by the term alkali (1Mk)

(b)(i) Explain using the physical properties of the gas, why ammonia is not collected

(i) Over water (1Mk)

(ii) By downward delivery (1Mk)

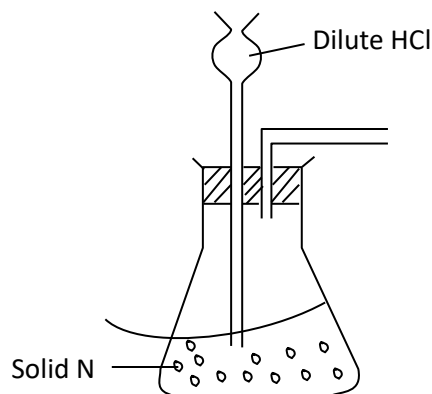
15. 0.702g of a gaseous alkene occupies 560cm<sup>3</sup> at s.t.p.

(a) Calculate the relative molecular mass of the gaseous alkene

(C = 12.0, H = 1.0, MGV at s.t.p = 22.4dm<sup>3</sup>) (2Mks)

(b) Draw the structure of the alkene. (1Mk)

16. The set-up **below** was used to prepare and collect a dry sample of hydrogen sulphide. Study it and answer the questions that follow.



(i) Name solid N (1mk)

(ii) Complete the diagram above to show how dry sample of the gas is collected. (2mks)

17. Explain the observations made when a small amount of sodium carbonate is put in a solution made from dissolving.

(i) Hydrogen chloride gas in water. (1½mks)

(ii) Hydrogen chloride gas in methylbenzene. (1½mks)

18. A form one student was interested in determining the components in a spinach leaf that makes it have the green colouration. He set to do some experiment. State the **two** methods of separation that the student will apply in the right sequence to get the results. (2mks)

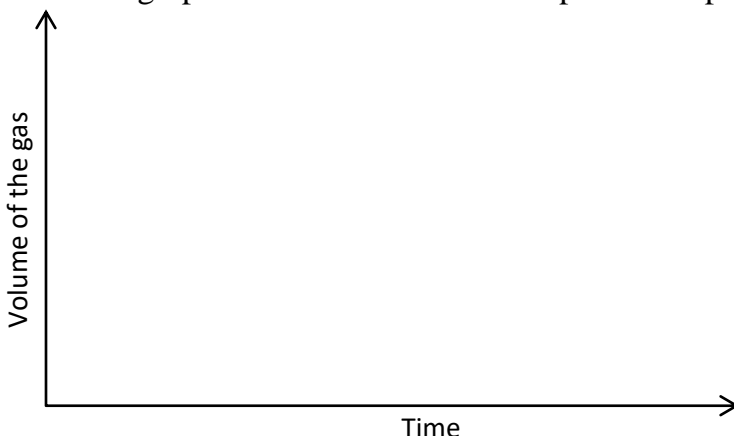
19. A student performed three experiments on the reaction of magnesium with dilute hydrochloric acid and collected the hydrogen gas evolved for each experiment.

(i) **Experiment I:** Reacted 2g of magnesium ribbon with 1M hydrochloric acid.

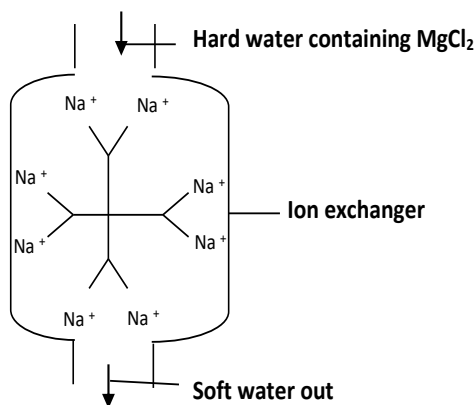
(ii) **Experiment II:** Reacted 2g of magnesium powder with 1M hydrochloric acid

(iii) **Experiment III:** Reacted 2g of magnesium ribbon with 0.5M hydrochloric acid

On the grid **below** sketch the graphs for each of the three experiments performed. (3mks)



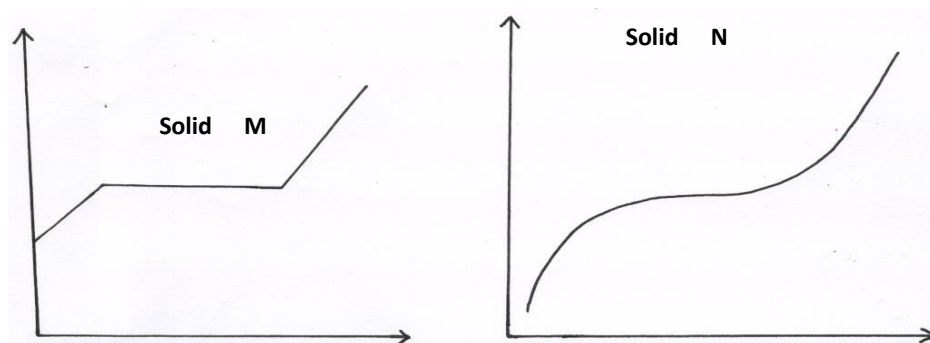
20. The diagram below shows the process of softening hard water using an ion exchanger.



(i) Draw the ion exchanger and show how it will appear at the end of softening process. (2mks)

(ii) How is the ion exchanger recharged after exhaustion. (1mk)

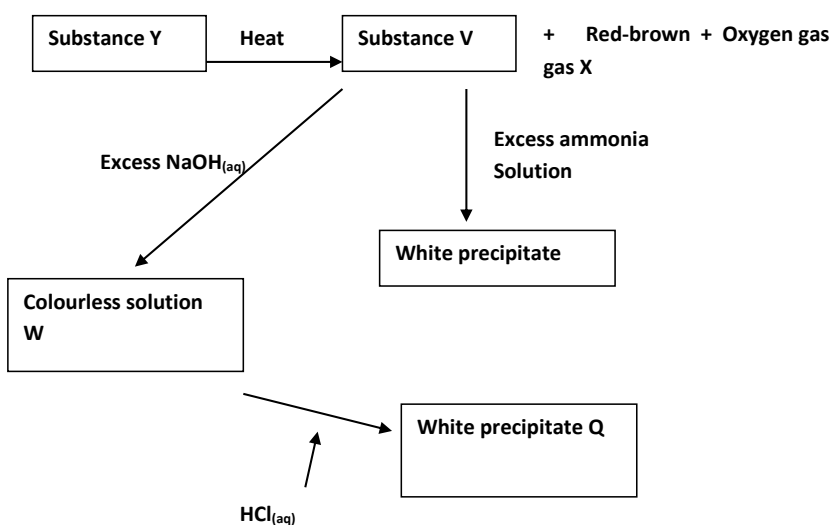
21. The graphs below represents the temperature-time curves for solids M and N



(a) What is the name given to the curves above? (1Mk)

(b) Which of the **two** solids is an impure substance? Explain. (2Mks)

22. Study the reaction scheme below and answer the questions that follow.



(a) Suggest the possible anions in **Y** and **V** (2mks)

(b) Name gas X. (1mk)

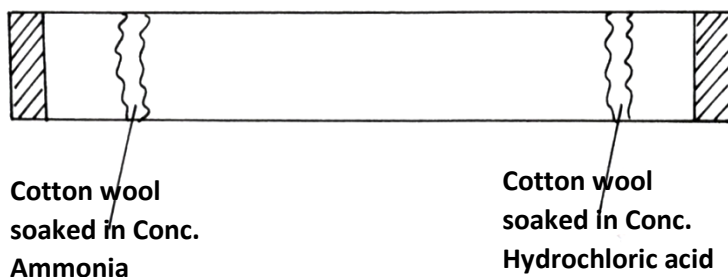
23. The table below gives the products of decomposition of metal nitrate of E, F and G. Study the information and answer the questions that follow. (The letters are not the actual symbols of the elements)

Nitrate of metal	Products of decomposition when heated
E	Metal nitrite and oxygen gas
F	Metal, Nitrogen (IV) oxide and oxygen
G	Metal oxide, Nitrogen (IV) oxide and oxygen

a) Arrange the metals in order of increasing reactivity starting with the least reactive. (1Mk)

b) Give two possible identities of metal F. (1Mks)

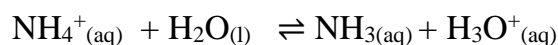
24. In an Experiment to study diffusion of gases, the following set up was used.



i) State and explain observations made in the experiment. (2mks)

ii) Write an equation for the reaction that occurs in the experiment. (1mk)

25. Identify the acid and base for the forward reaction in the equation below. (2mks)



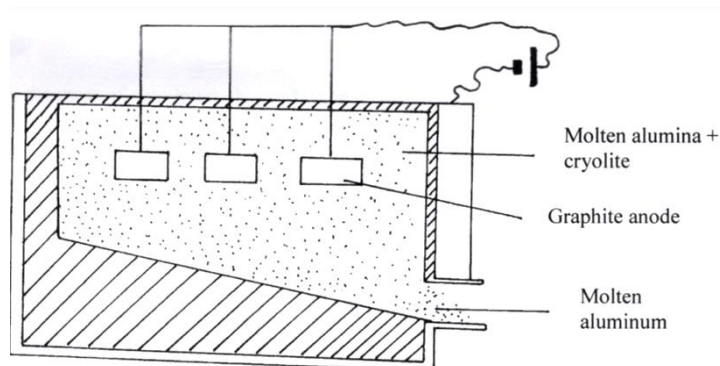
26. In an experiment, soap solution was added to three separate samples of water. The table below shows the volume of soap solution required to form lather with 2 liters of each sample of water before and after boiling.

Sample	Sample A	Sample B	Sample C
Volume of soap before is boiled( $\text{cm}^3$ )	30	3	13
Volume of soap after is boiled( $\text{cm}^3$ )	30	3	3

a) Which sample is likely to be soft? Explain (1Mk)

b) Explain the change in the volume of soap used in sample C. (1Mk)

27. The diagram below shows industrial extraction of aluminum





(a) Name and write the formulae of the major ore for this process. (1mk)

b) Write the equation of the reaction taking place at the: Anode & Cathode (2mks)

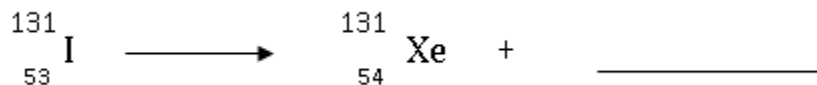
28. Study the table below and answer the questions that follow.

ELEMENT	A	B	C	D
ATOMIC NUMBER	12	13	10	8

a. Select the least reactive element. Explain. (1mk)

b. State and explain how the atomic radius of element A compares with that of element B. (2mks)

29. (a) Complete the nuclear equation below (1mk)



(b) The half- life of iodine–131 is 8 days. Determine the remaining mass when 50g of iodine - 131 decayed for 40 days. (1mk)

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 5

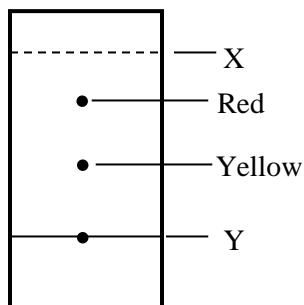
233/1

CHEMISTRY

PAPER 1

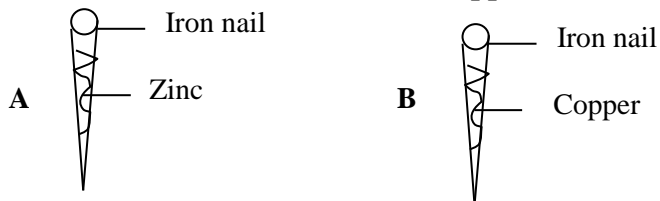
TIME: 1 HOUR

1. (i) What is a fume chamber. (1mk)  
(ii) State 2 uses of fume chamber in a school laboratory (2mks)
2. The chromatogram below shows the constituents of a flower extract. Study it and answer the questions.



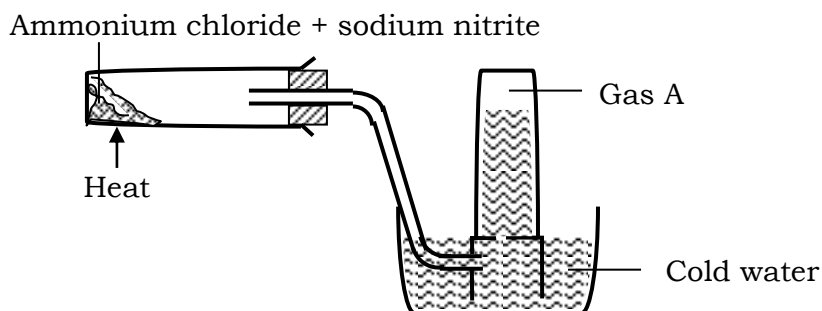
- (a) Give a reason to explain the different positions of red and yellow pigments. (2mks)  
(b) What does the line labeled X represent? (1mk)
- 3.(a) State the chemical name of rust (1mk)

- (b) Two iron nails were coated with zinc and copper as shown below



State and explain what was observed on each nail. (2mks)

4. After a meal, bacteria in the mouth break down some food to produce organic acids, such as acetic acid and lactic acids. Therefore one is advised to brush his/her teeth using tooth paste containing fluoride compounds. Give a reason why. **(2mks)**
5. A mixture of ammonium chloride and sodium nitrite was heated as shown in the set up below



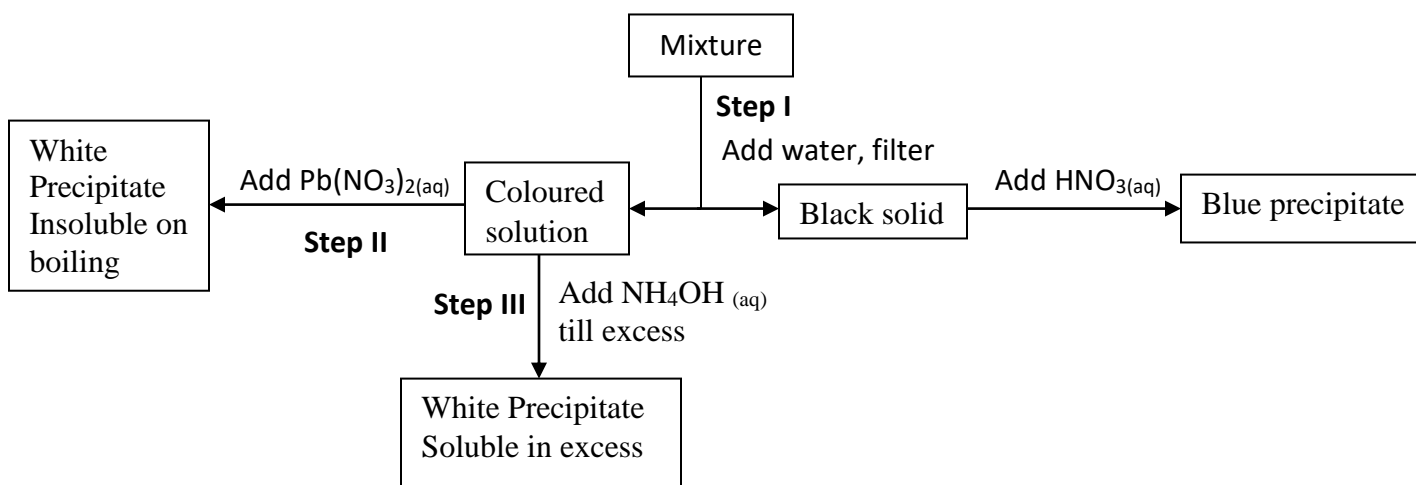
- (i) Identify gas A **(1mk)**
- (ii) State and explain the precaution that should be taken before heating is stopped. **(2mks)**
6. Study the table below and answer the questions that follow.

(The letters are not the actual symbols of the elements)

Element	B	C	D	E	F
Atomic number	18	5	3	5	20
Mass number	40	10	7	11	40

- (i) Which two letters represent the same elements? Give reason **(2mks)**
- (ii) Give the number of neutrons in an atom of element D. (Show your working) **(1mk)**
7. Explain why red hot iron reacts with chlorine to form iron (III) chloride, but red hot iron reacts with iodine to form iron (II) iodine. **(1mk)**
8. Explain the following trends in the periodic table
- (i) Reactivity of alkali metals increases down the group. **(1mk)**
- (ii) The atomic radius of elements decreases across a period **(1mk)**
9. Using dot(.) and cross(x) draw a diagram to represent carbon (II) oxide **(2mks)**
10. When aluminium chloride is dissolved in water, an acidic solution is formed. Write the chemical equations to represent the observation made. **(2mks)**

11. Study the flow chart below and answer the questions



- (i) Name cations present in the mixture (1mk)
- (ii) Anions present in the mixture (1mk)
- (iii) Write an equation to show reaction taking place at step 3 . (1mk)

12. State two gases found in water gas formed when carbon at about 1200°C reduces steam (1mk)

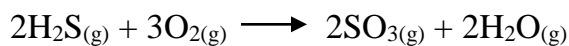
13. (a) Explain why potassium carbonate cannot be manufactured by Solvay process. (1mk)

(b) Write an equation for the reaction that takes place in the carbonator or Solvay tower. (1mk)

(c) State one commercial use of soda ash. (1mk)

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

(b) In an experiment 436cm<sup>3</sup> of hydrogen sulphide was exploded in 363cm<sup>3</sup> of oxygen and reacted as per the following equations



Determine the volume of the residue gas (2mks)

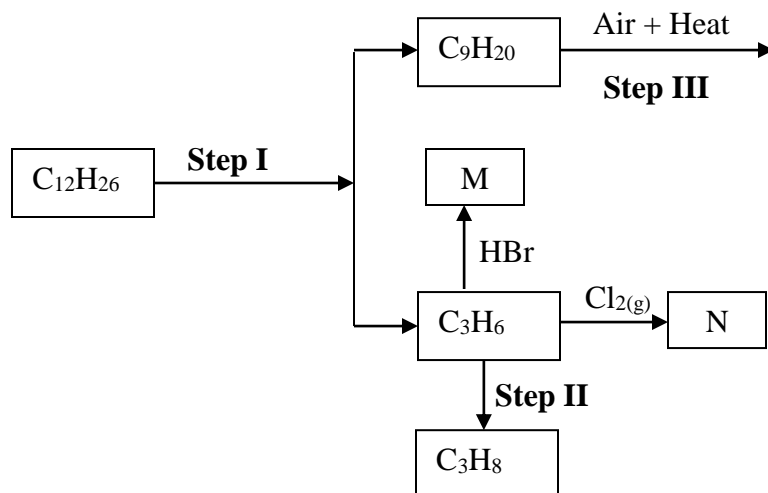
15. 5.34g of a salt of formula M<sub>2</sub>SO<sub>4</sub> was dissolved in water. The sulphate was precipitated by adding excess barium chloride solution. The mass of the precipitate formed was 4.6g.

(Ba=56, S=32, O=16)

(i) Determine the moles of sulphate ions present. (1mk)

(ii) Calculate the relative atomic mass of M in M<sub>2</sub>SO<sub>4</sub> . (2mks)

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



(a) Name the process labeled in steps above

Step I

(½mk)

Step II

(½mk)

(b) State the physical condition required for step I to occur.

(1mk)

(c) Name the reagent and state the conditions required for step 2 to occur.

(1mk)

17. State one use of sulphur which is associated with.

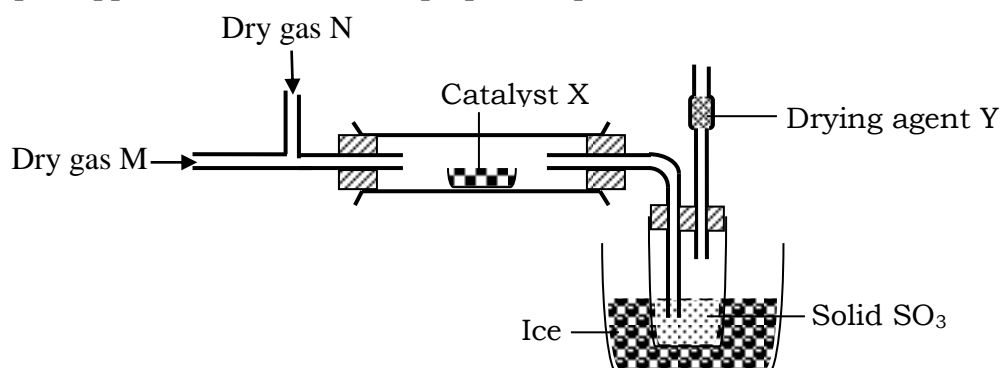
(a) Medicine

(1mk)

(b) Agriculture

(1mk)

18. The set up of apparatus below used to prepare sulphur (VI) oxide :



(i) Name

Gas N

(½mk)

Gas M

(½mk)

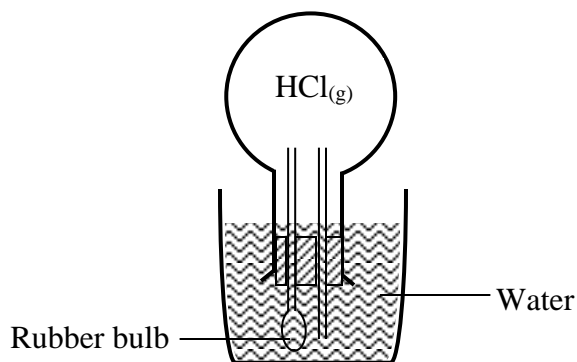
Catalyst X

(1mk)

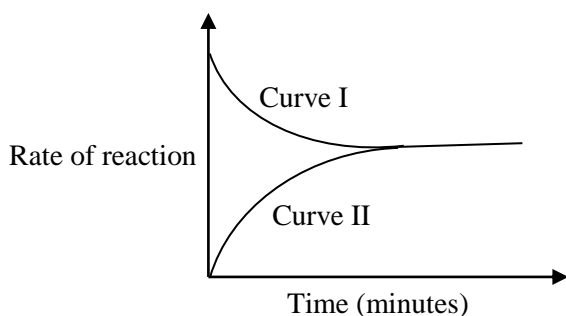
(ii) Why is it necessary to use drying agent Y?

(1mk)

19. Consider the apparatus shown below when a small amount of water is introduced into the flask by squeezing the bulb of the medicinal dropper, water is squirted upward out of the long glass tubing. Explain this observation. (2mks)



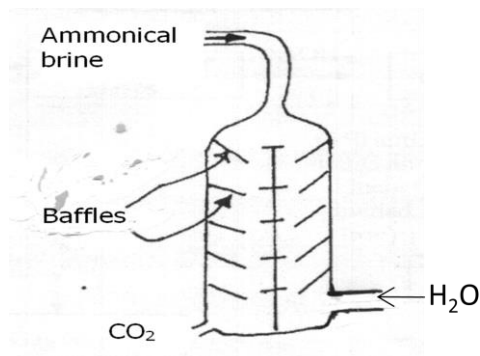
20. A certain detergent was found to contain a molecule represented by the formula  $C_{17}H_{35}COONa$ . When this detergent was added to a sample of water a white precipitate was formed.
- State a possible reason for formation of the white precipitate. (1mk)
  - Write down one possible formula of the white precipitate formed. (1mk)
21. The solubility of salt X in water at  $75^{\circ}C$  is  $82g/100g$  of water, while that of salt Y is  $37g/100g$  of water. Describe how a sample of salt Y can be obtained from their solid mixture. (2mks)
22. The figure below shows the variation in rates of the following reaction,



- Other than concentration of either reactants or products, identify two other factors that can affect the rate of reaction above. Explain your answer. (2mks)
23. In the industrial production of aluminium a current of  $300,000A$  is passed through molten aluminium oxide for 24 hours. Calculate the mass of aluminium produced at the cathode. ( $Al = 27, 1F = 96500C$ ) (3mks)
- 24.(a) Radioactive materials pollutes the environment with great effects. State two ways of controlling the effects of radioactive material to the environment (2mks)

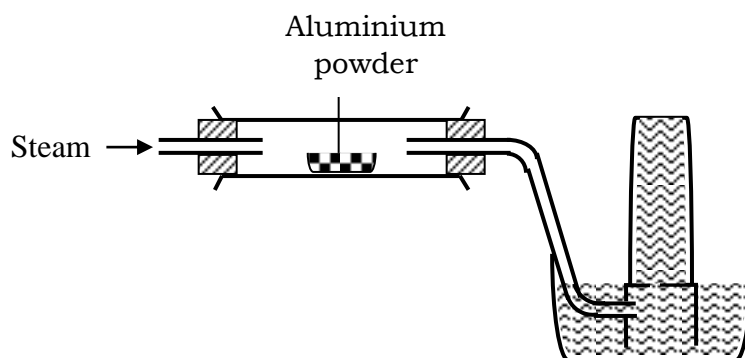
- (b) In a sample, there are  $5.12 \times 10^{20}$  atoms of Krypton 92 initially. If half-life of Krypton is 3.0 seconds, determine the number of atoms that will have decayed after 6 seconds. (2mks)

25. Study the Solvay tower diagram shown below and answer the questions that follow:



- (a) Give reasons why the baffles are used in the Solvay . (2mks)
- (b) A factory produces 63.6 tonnes of anhydrous sodium carbonate on a certain day by this process. Calculate the number of tonnes of sodium chloride used upon on this particular day. Assume the plant is working 100% efficient (C=12 , H=1, Cl=35.5, Na =23) (2mks)
26. When reacting sulphur (IV) oxide and hydrogen sulphide gases, some traces of water vapour is required for the reaction to occur.
- (i) State the role of water vapour (1mk)
- (ii) Write the equation for the reaction that occurs . (1mk)
- (iii) Identify the reducing agent in the reaction in (b) above. (1mk)
- 27.(a) Give the IUPAC names of the compounds listed below (2mks)
- (i)  $\text{CH}_2\text{Br CHBrCH}_2\text{CH}_3$
- (ii)  $\text{CH}_2=\text{CH}=\text{CH CH}_3$
- (b) Draw the structural formula of 2, 3- dimethylbutane (1mk)
28. (a) The terms malleability and ductility are commonly used in chemistry. What is meant by the terms:
- (i) Malleability (1mk)
- (ii) Ductility (1mk)
- (b) Name and write chemical formula for the slag formed during extraction of the following metals.
- (i) Copper (1mk)
- (ii) Iron (1mk)

29. Study the diagram below used to investigate the property of steam on aluminium



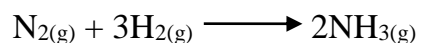
(a) Explain why no gas was collected in the set up above. (1mk)

(b) Explain why the reaction between aluminium and steam stops after a short time (2mk)

30.(a) State Hess law. (1mk)

(b) Study the bond energies below and answer the questions that follow

Calculate heat of formation of one mole of ammonia gas from the equation below



(3mks)



NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 6

233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1. Elements X and Y reacted forming a compound Z. the compound has the following properties

i) It does not conduct electricity in solid state

ii) It has low melting and boiling points

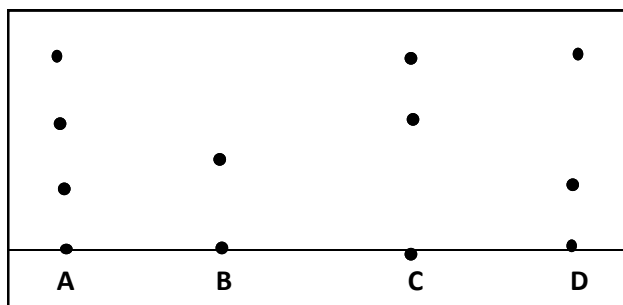
a) What is the nature of elements X and Y

1mk

b) What type of structure does compound Z have

1mk

2. The following chromatogram was obtained from an experiment to investigate the component of a certain dye



a) Which two dyes when mixed would produce A

1mk

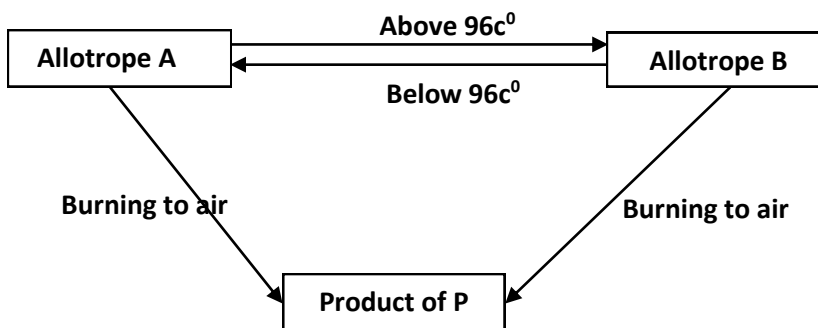
b) Which dye is pure

1mk

c) Indicate on the diagram the probable position of the solvent front

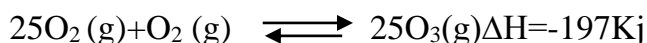
1mk

3. The flow chart below shows some properties of two allotropes of element P



- a) Name allotrope A (1mk)
- b) Write an equation to show the formation of the product of P (1mk)
- c) What does  $96^{\circ}\text{C}$  (1mk)

4. Study the equation and answer the questions that follows



- a) Suggest two changes to which the yield of sulphur (vi) oxide could be improved 2mks
- b) Determine the molar heat of formation of  $\text{SO}_3$  from  $\text{SO}_2$  and  $\text{O}_2$  1mk

5. In an experiment soap solution was added to three separate water samples. The table below shows the volumes of soap solution required to form lather with  $100\text{cm}^3$  of each water sample before and after boiling

	Sample		
	A	B	C
Volume of soap before boiling ( $\text{cm}^3$ )	27	3	10.6
Volume of soap after boiling ( $\text{cm}^3$ )	27	3	3

Which water sample is likely to be;

- a) Soft water 1mk
- b) Water with temporary hardness 1mk
- c) Water with permanent hardness 1mk

6. 5.0g of calcium carbonate were allowed to react with  $25\text{cm}^3$  of 0.1M hydrochloric acid until there was no further reaction. Calculate the mass of calcium carbonate that remained unreacted.

(Ca=40.0, C=12.0, O=16)

**3mks**

7. Silicon has three isotopes such as silicon-X, silicon-29 and silicon-30. Their percentages abundance are 92%, 5% and 3% respectively

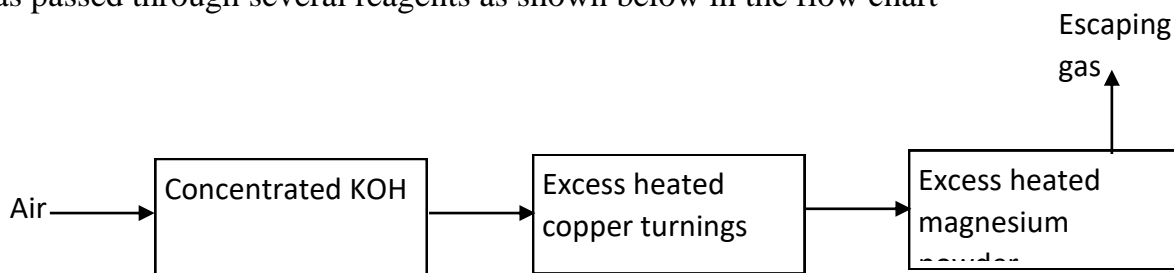
a) Given that the relative atomic mass of silicon is 28.11, determine the value of X **2mks**

b) Identify the most stable isotope. Give a reason for your answer **1mk**

8. i) Starting with calcium oxide, describe how a solid sample of calcium carbonate can be prepared in the laboratory **3mks**

ii) State one use of calcium oxide **1mk**

9. Air was passed through several reagents as shown below in the flow chart



a) Write an equation for the reaction which takes place in the chamber with magnesium powder **1mk**

b) Name one gas which escapes from the chamber. Give a reason for your answer **2mks**

10. Draw a setup that can be used to separate a mixture of sand and ammonium chloride **3mks**

11. Study the table below and use it to answer the questions that follow

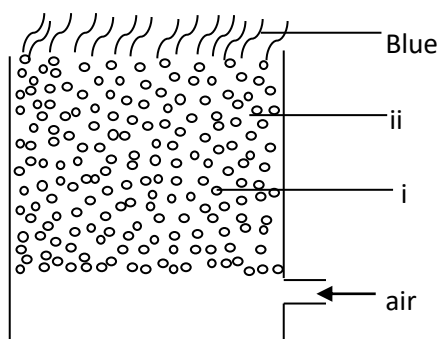
	Add sodium carbonate solution	Add few drops of phenolphthalein
<b>Substance X</b>	No effervescence	pink
<b>Substance Y</b>	Effervescence occurs	colorless
<b>Substance Z</b>	No effervescence	colorless

i) Which substance contains hydrogen ions **1mk**

ii) Which substance could be sodium chloride solution **1mk**

iii) Which substance could react with an acid to form salt and water only **1mk**

12. The diagram below represents a charcoal burner. Study it and answer the questions that follow



(i) Write an equation for the reaction taking place at I and ii 2mks

(ii) What safety precautions should be taken when using the charcoal burner 1mk

13. a) A gaseous hydrocarbon contain 80% carbon by mass. Determine it empirical formula

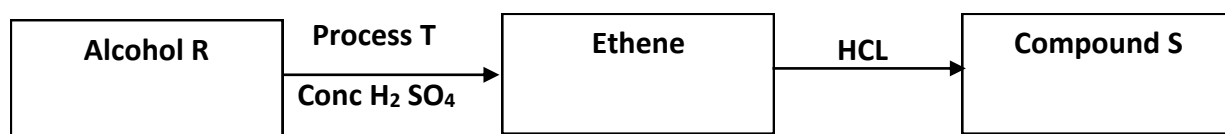
(C=12, H=1) 1½mk

b) Given that 0.3g of the hydrocarbon occupy a volume of 224 cm<sup>3</sup> at s.t.p, determine its molecular formula (C=12, H=1) , molar gas volume at s.t.p =22.4 dm<sup>3</sup> 1½mk

14. a) State Charles law 1mk

b) The volume of a sample of nitrogen gas at a temperature of 291k and 1.0x10<sup>5</sup> pascal was 3.5x10<sup>-2</sup>m<sup>3</sup>. Calculate the temperature at which the volume of the gas would be 2.8x 10<sup>-2</sup>m<sup>3</sup> at 1.0x10<sup>5</sup> pascal 2mks

15. Study the following flow chart and answer the questions that follow

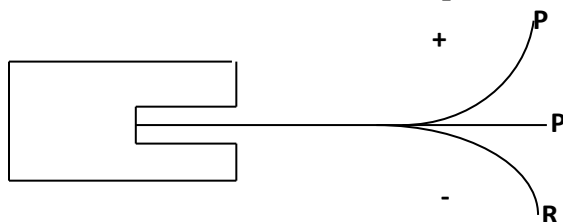


i) Write the formula of Alcohol R 1mk

Compound S 1mk

ii) Name process T 1mk

16. Study the diagram below and use it to answer the questions that follow



a) Name;

i) Radiation represented by Q

1/2mk

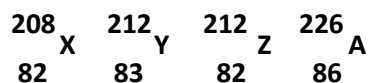
ii) Radiation represented by R

1/2mk

iii) Explain why radiation P is deflected more than R

1mk

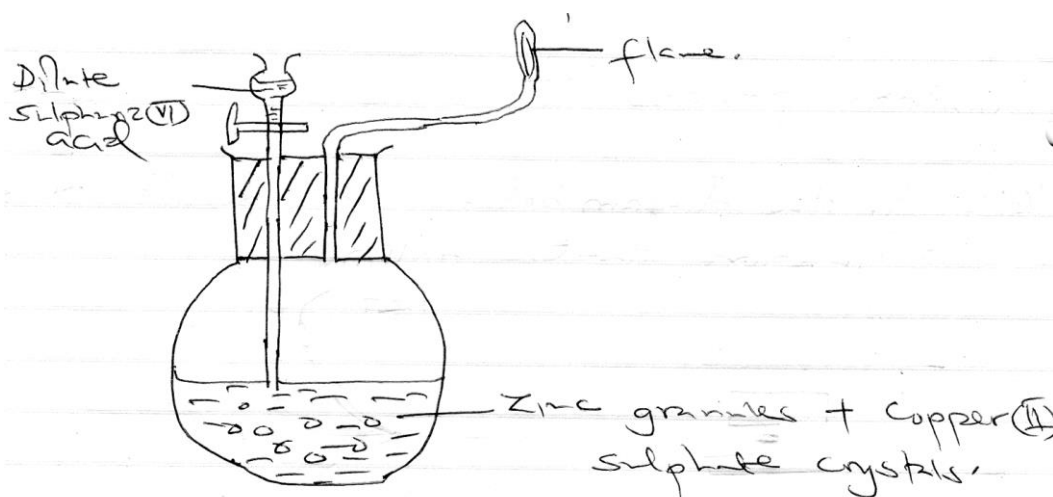
b) Study the symbols below and answer the questions that follow.



Note that the letters are not the actual symbols of the elements. Name any two letters that are isobars. Explain

2mks

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



a) Write three equations for the reaction that takes place in the set up above

3mks

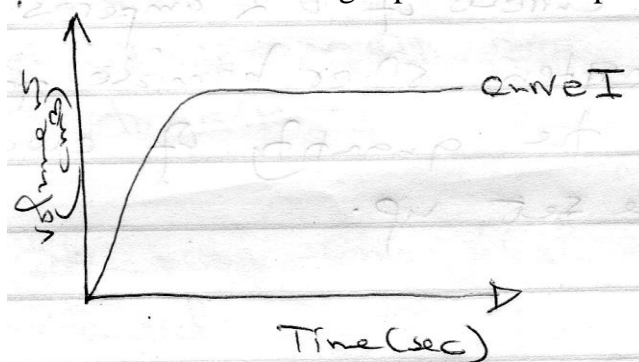
b) State the role of copper (ii) sulphate crystal in the set up

1mk

18. the table below describe three experiment on reaction of excess sulphate (vi) acid with 0.5g of zinc done under different conditions. In each case the volume of gas produced was recorded at different time intervals

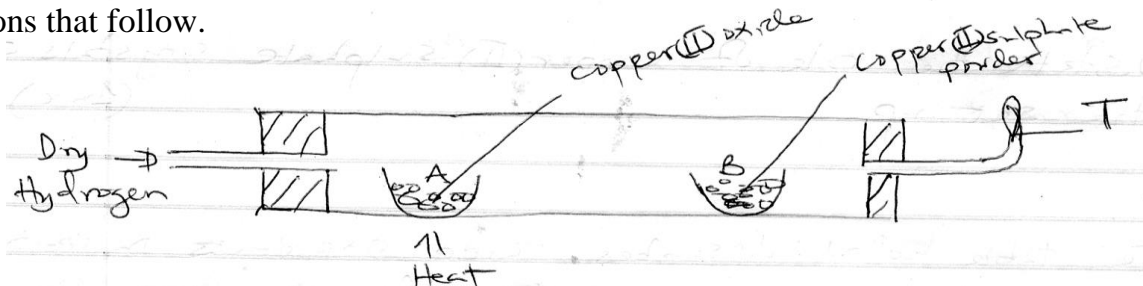
Experiment	Form of zinc	Concentration $\text{H}_2\text{SO}_4$
I	Powder	0.8M
Ii	Powder	1.0M
iii	Granules	0.8M

The graph below was obtained when volume of gas produced was plotted against time to experiment. i)



- a) On the same axes above, sketch and label curves experiments ii & iii 2mks
- b) A part from concentration, name the other factor which affect the rate of reaction that was being investigated 1mk

19. The diagram below was used to investigate some property of hydrogen. Study it and answer the questions that follow.

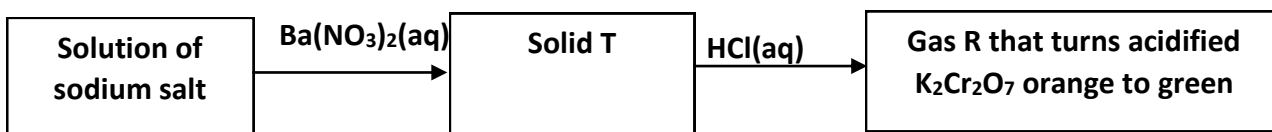


- i) State two observations that would be made at the of the experiment 2mks
- ii) Why is it necessary to burn gas at point T 1mk
- iii) Write an equation for the reaction that occurs at A 1mk

20. A steady current of 0.2 amperes was passed through molten silver bromide for 80 minutes.

- a) Calculate the quantity of electricity passed through the set up. 1mk
- b) Calculate the mass of products deposited at the cathode ( $1F=96500C, Ag=108, Br=80$ ) 3mks

21. Study the flow chart below and answer the questions that follow



- a) Name the gas R 1mk
- b) Write ionic equation for formation of solid T 1mk
- c) Use the information in (b) to write chemical equation for the reaction between solid and dilute hydrochloric acid 1mk

22. Name the process which takes place when;

- a) A red litmus paper turns white when dropped into chlorine water **1mk**
- b) Propane gas molecules are converted into a giant molecule **1mk**
- c) White phosphorus melts into a ball when exposed to air **1mk**

23.a) Name two ores from which zinc metal mostly extracted **1mk**

b) One of the steps to the extraction of zinc metal from its ore is roasting of the ore in excess oxygen.

Write an equation for the reaction that takes place when the ore in (a) above is roasted **1mk**

24. The nitrates of the metal A,B &C were heated over a Bunsen burner flame . The table below shows the products of the reaction. (A,B & C are not the actual symbols of the metals)

Nitrate of metals	Products
A	Metal nitrate and oxygen
B	Metal, nitrogen (iv) oxide and oxygen
C	Metal oxide, nitrogen (iv) and oxygen

- a) State the chemical family that metal A belongs to **1mk**
- b) Name one metal that is likely to be B **1mk**
- c) Arrange the metals above in order of reactivity starting with the least reactive **1mk**

25.a) Define the term molar heat of centralization **1mk**

b) The rise to temperature when 50cm<sup>3</sup> of sodium hydroxide is reacted with two acids is given in the table below

Acid	50cm <sup>3</sup> of Hcl	50cm <sup>3</sup> oxalic acid
Temperature rise (0c)	7	4

Explain the difference to temperature **2mks**

26. Carbon (iv) oxide, methane, nitrogen (i) oxide and trichloromethane are green hones gases

- i) State one effect of an increased level of these gases to the environment **1mk**
- ii) Give one source from which each of the following gases is released to the environment;
- a) Nitrogen (i) oxide **1/2mk**
- b) Trichloromethane **1/2mk**

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 7

233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

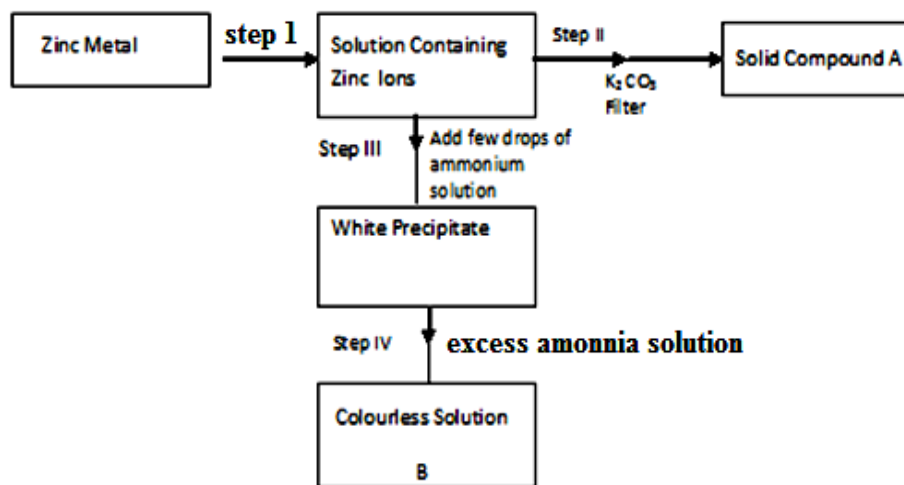
1. Identify the laboratory apparatus used for each of the following purposes in a chemistry laboratory?

- i) Holding and supporting pieces of apparatus such as burettes during experiments. (1mk)
- ii) Scooping solid chemical substances during experiments (1mk)
- iii) Storage of liquid chemicals in a laboratory.

2. Pure air contains about 1% argon.

- i) State the name of the group of elements to which argon belongs. (½mk)
- ii) Write the electronic configuration to argon? (½mk)
- iii) Why is argon used in lamps? (1mk)
- iv) An Isotope of argon has a mass number of 40. Calculate the number of neutrons in this Isotope of argon. (1mk)

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





a) i) Name the reagent in step I (½mk)

ii) Compound A (½mk)

b) Write an ionic equation for the reaction in step ( IV) (1mk)

4. 30 cm<sup>3</sup> of the solution containing 2.88gdm<sup>-3</sup> of an alkali MOH completely reacts with 40 cm<sup>3</sup> of 0.045M sulphuric (Vi) acid .

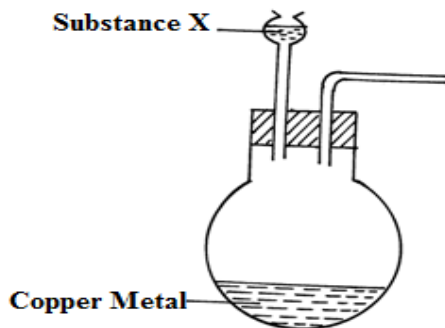
a) Calculate the molarity of the alkali. (2mks)

b) Calculate the relative atomic mass of x in the alkali ( O = 16, S= 32,H = 1. (2mks)

5. The table below gives some information about the melting and the likely structures in substances V,W, and X. Complete the table by filling the missing Information in the spaces numbered. I,II and III (3mks)

Element	Structure	Example	Melting point
V	Grant Metallic	(i)	High
W	II	F <sub>2</sub>	Low
X	III	Si	Very high

6. The arrangement below is used to prepare nitrogen (iv) oxide.



(i) Complete the diagram to show the collection of the gas. (1mk)

(ii) Identify substance X. (1mk)

(iii) Write a balanced equation for the reaction that occurs in the conical flask. (1mk)

7. Given the standard electrodes potentials.

Half reactions	Elvolts
Zn <sup>2+</sup> <sub>(aq)</sub> / Zn <sub>(s)</sub>	-0.76
Cu <sup>2+</sup> <sub>(aq)</sub> / Cu <sub>(s)</sub>	+ 0.34
Cr <sup>3+</sup> <sub>(aq)</sub> / Cr <sub>(s)</sub>	- 0.74
Co <sup>2+</sup> <sub>(aq)</sub> / Co <sub>(s)</sub>	+ 0.28

From the following cell combinations copper- Zinc half cells.

Chromium cobalt half cells.

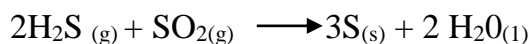
i) Which reaction is faster? Explain by use of electrode potentials? (2mks)

ii) Write the cell representation for the chromium – cobalt half cells. (1mk)

8. A freshly picked red flower petal was placed in a gas jar containing moist sulphur (IV) oxide gas.

i) State the observation made after sometime. (1mk)

ii) Consider the reaction shown below.



From the above reaction. Identify the reducing agent. Explain. (2mks)

iii) Using the equation, show how calcium hydroxide is used to control pollution caused by sulphate (iv) oxide in a sulphuric (vi) acid plant. (1mk)

9. The relative rate of diffusion of two gases X and Y are in the ratio 3:2 respectively. Given that the relative formula mass of X is 48, calculate the relative formula mass of Y. (2mks)

10.a) In the fractional distillation of liquid air explain how each of the following components are removed prior to liquifaction of air.

i) Dust particles (1mk)

ii) Carbon (iv) Oxide (1mk)

iii) Water Vapour (1mk)

b) Explain why removal of carbon (iv) oxide should occur before compression and condensation of air into liquid state. (1mk)

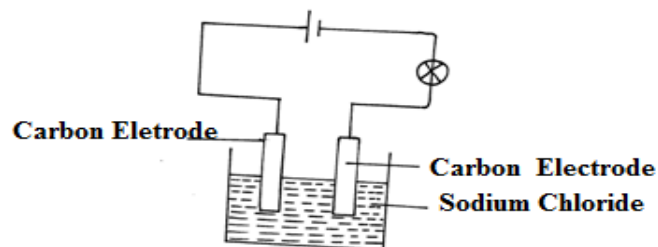
11. An element R has an atomic number 12.

a) Write the electro configuration of the ion of R. (1mk)

b) Write the formula of the nitride of R. (1mk)

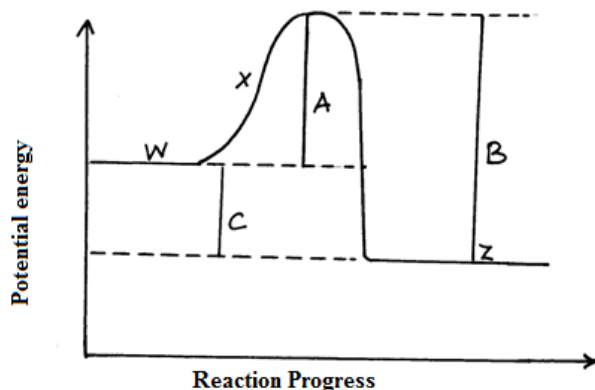
c) The nitride of R dissolves in water. Write a balanced equation to show what happens. (1mk)

12. The set up below was set up to electrolysis molten sodium chloride.

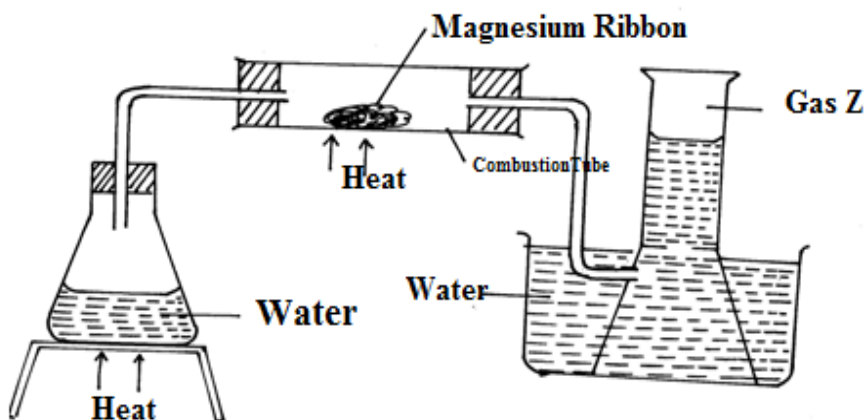


- a) State the observation that was made at the anode during the electrolysis. (½mk)
- b) Name the electrode of which reduction occurs (½mk)
- c) Write an equation for the reaction that occurs at anode electrode. (1mk)

13. Use for diagram below to answer the questions that follows:-



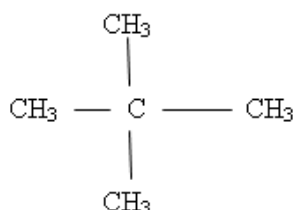
- a) Name the letter that corresponds to: \_
- i) Activation energy of the reaction (1mk)
- ii) Change in energy for the overall reaction. (1mk)
- b) The reaction exothermic or endothermic. Explain. (2mk)
14. The solubility of potassium nitrate is 155g/100g of solvent at 75°C and 38g/100g potassium nitrate will crystallizes out if 50g of a saturated solution at 75c<sup>0</sup> was cooled to 25<sup>0</sup>c. (3mks)
15. Study the set up below and answer the question that follows.



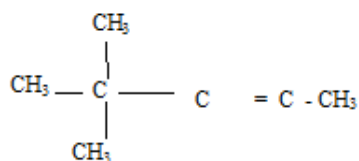
- a) Write an equation for the reaction which takes place in the combustion tube. (1mk)
- b) What property of gas Z to allows it to be collected as shown in the diagram. (½mk)
- c) Identify gas Z (½mk)

16. a) Give the IUPAC names of the following compounds.

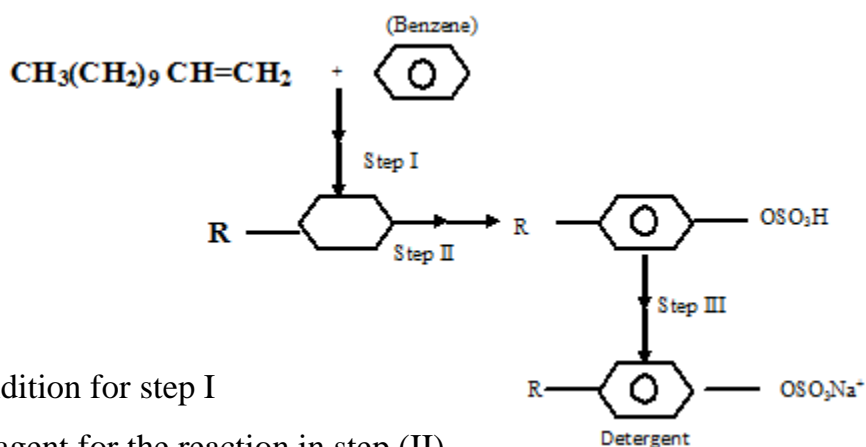
i)



ii)



b) The flow chart below shows the three main steps in the preparation of a detergent.



i) State the condition for step I

ii) Name the reagent for the reaction in step (II)

iii) For step III Name :

a) The reaction

b) The reagent used

(½mk)

(½mk)

(½mk)

(½mk)

17. You are provided with dilute sulphuric (vi) oxide nitric acid and lead (ii) Oxide. Explain how you can prepare a sample of lead (ii) sulphate.

(2mks)

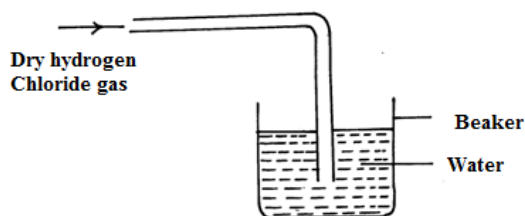
18. a) Distinguish between allotropes and Isomers.

(2mks)

b) Other than sulphur , Name two elements that are allotropic.

(2mks)

19. The diagram below shows preparation hydrochloric acid.



i) State one mistake in the diagram (1mk)

ii) Hydrogen chloride gas does not have any effect on litmus paper unlike hydrochloric acid.

Explain. (1mk)

iii) State one use of hydrogen chloride gas. (1mk)

20. A radioactive element R decays emitting two alpha( $\alpha$ ) and Beta( $\beta$ ) Particle to form  ${}_{81}^{214}\text{Si}$

a) What is the atomic number of R? (1mk)

b) After 224 days 1/16 of mass of R remained. determine the half life of R? (2mks)

21. The table below shows atomic numbers of elements represented by the letter R to Y. The letters are not the actual chemical symbols of the elements.

Elements	R	S	T	U	V	W	Z	Y
Atomic Number	3	7	8	9	10	11	12	13

i) Two elements that belong to the same period of the periodic table. (1/2mk)

ii) Two elements in the same group (1/2mk)

iii) Write down the formula of the compounds when Z combines with U. (1mk)

22. Using dots(.) and crosses (x), draw electronic structures to show the bonding in the following compounds.

i) Water (1mk)

ii) Calcium oxide (1mk)

23.a) State the Le chatelier's principle. (1mk)

b) One of the steps in the commercial manufacture of nitric (v) acid is the oxidation of ammonia according to the equation.



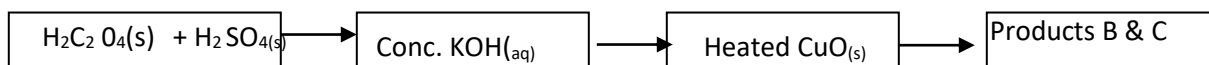
How would true position of the equilibrium change in the following circumstances? Explain.

i) An increase in pressure (1/2mk)

ii) A decrease in temperature (1/2mk)

iii) The addition of a catalyst (1mk)

24. The flow chart below shows the preparation of carbon (ii) Oxide and its reaction.



- a) Name the type of reaction taking place between  $\text{H}_2\text{C}_2\text{O}_4$  and concentrated  $\text{H}_2\text{SO}_4$  (1mk)
- b) Write an equation for the production of B and C. (1mk)
- c) State two uses of carbon (II) Oxide . (1mk)

25. Paper chromatography of a plant extracts gave the following results.

Solvent	Number of sports
Quinine	1
Cocaine	6
Papain	4
Titanium	2

Which of the extracts.

- i) Is more pure. Explain. (1mk)
- ii) Is most dense. Explain? (1mk)

26.  $50\text{ cm}^3$  of methane gas ( $\text{CH}_4$ ) was exploded until  $170\text{ cm}^3$  of oxygen and under complete Combustion.

- a) Write an equation for the complete combustion of methane. (1mk)
- b) Determine the amount of oxygen that remained unreacted. (2mks)

27. The main reaction of the contact process is  $2\text{SO}_2(\text{g}) + \text{O}_2(\text{g}) \rightleftharpoons 2\text{SO}_3(\text{g}) \quad \Delta H = -98\text{KJ}$

- a) Name two factors that would favour maximum yield in this reaction. (1mk)
- b) Which substance can be recycled in this process. (1mk)
- c) Why is  $\text{SO}_3$  formed dissolves in sulphuric acid and not in water.

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 8

233/1

CHEMISTRY

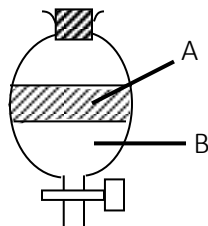
PAPER 1

TIME: 1 HOUR

1.(a) Give *two* differences between luminous and non-luminous flames. (2Mks)

(b) How is the non-luminous flame produced? (1Mk)

2.The apparatus below were used to separate a mixture of liquid A and B.



(a) State *two* properties of liquids that make it possible to separate using such apparatus. (2Mks)

(b) Give the name of the above apparatus. (1Mk)

3.(a) Explain why solid Carbon (IV) oxide is preferred over ordinary ice for use by ice cream venders. (1Mk)

(b) Name one piece apparatus used to measure volume of gases. (1Mk)

(c) Draw a diagram of a deflagrating spoon. (1Mk)

4. The table below shows the pH values of solutions P, R, Q and S.

Solution	P	R	Q	S
pH	2	7	6.5	13.5

(a) Which solution represent:

(i) Strong base - (1Mk)

(ii) Weak acid- (1Mk)

(b) Give an example of solution S. (1Mk)

5. 6.95g of hydrated iron (II) sulphate  $\text{FeSO}_4 \cdot n\text{H}_2\text{O}$  was dissolved in  $250 \text{ cm}^3$  solution resulting into a 0.1M solution. Determine the value of n. (3Mks)

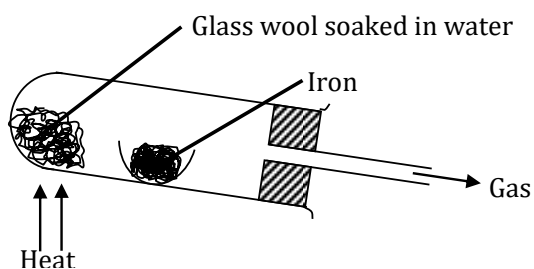
(Fe = 56, O = 16, S = 32, H = 1).

6. Rusting leads to fast wearing out of farm tools and equipment as well as buildings.

(a) Give the chemical name of rust. (1Mk)

(b) What *two* conditions accelerate rusting process? (2Mks)

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



(a) Write an equation for the reaction that take place in the combustion tube. (1Mk)

(b) Why would it not be advisable to use potassium in place of iron in the set-up? (1Mk)

(c) Glass wool should be heated before heating iron. Explain. (1Mk)

8. I. Name the following organic compounds.

(a)  $\text{CH}_3 \begin{array}{c} \text{CH} \\ | \\ \text{CH}_3 \end{array} \text{CH}_2 \begin{array}{c} \text{CH} \\ | \\ \text{Br} \end{array} \text{CH}_3$  (1Mk)

(b)  $\text{HOCH}_2 - \text{CHOH} - \text{CH}_2\text{OH}$  (1Mk)

II. Given

A  $\text{CH}_3(\text{CH}_2)_{16} \text{COO}^- \text{Na}^+$

B  $\text{CH}_3(\text{CH}_2)_6 \text{CH}(\text{CH}_3)\text{CH}_2 \text{SO}_3^- \text{Na}^+$

Identify detergent A & B (2Mk)

9. In terms of structure and bonding, explain the following.

(a) Graphite is used as a lubricant. (1Mk)

(b) Alluminium is better conductor of electricity than magnesium. (1Mk)

(c) Water is a liquid at room temperature while hydrogen sulphide is a gas. (1Mk)



10.(a) Define the term molar latent heat of fusion. (1Mk)

(b) The molar heat of fusion of ice at 0°C is 6kJ mol<sup>-1</sup>. Calculate the heat change when 36g of ice is converted to 36g of water at 10°C. (3Mks)

(SHC = 4.2<sup>-1</sup>g K<sup>-1</sup>, density = 1.0g/cm<sup>3</sup>, H = 1.0, O = 16.0)

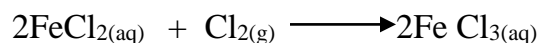
11. Draw a well labeled diagram showing how blister copper is purified. (3Mks)

12. Gas Q with a relative molecular mass of 48 took 50 seconds to diffuse through a porous diaphragm.

How long will it take for the same amount of hydrogen Chloride (HCl) to diffuse through the same diaphragm under similar conditions? (H = 1.0, Cl = 35.5). (3Mks)

13.(a) Calculate the oxidation state of chromium in the ion Cr<sub>2</sub> O<sup>2-</sup>. (1Mk)

(b) Using oxidation numbers, determine from the equation below the species which undergoes oxidation and reduction.



Oxidation - (1Mk)

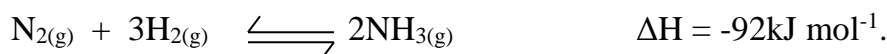
Reduction - (1Mk)

14. Given elements A, B and C with atomic numbers 11, 19 and 13 respectively.

(a) Compare the atomic radius of A and C. Explain. (2Mks)

(b) Compare reactivity of A and B. (1Mk)

15. Haber process (the manufacture of ammonia gas) is given by the following equation.



State and explain the effect of:

(a) Introducing some drops of water to the equilibrium. (1Mk)

(b) Pumping nitrogen gas to the equilibrium mixture. (1Mk)

(c) Lowering the temperature of the reaction. (1Mk)

16. Elements P and Q have the following atomic numbers 19 and 8 respectively.

(i) Using dot (•) and cross draw a diagram to show how the elements form bonds. (1Mk)

17. Describe how sodium sulphate crystals can be prepared starting with 50cm<sup>3</sup> of 2M sodium hydroxide and 1M sulphuric (VI) acid. (3Mks)

18. Write ionic equations to show how;

(a) (i) Excess ammonia solution reacts with a solution containing Copper II ions. (1Mk)

(ii) Excess sodium hydroxide added to a solution containing Al<sup>3+</sup> ions. (1Mk)

(b) Give the name of the following ion [Zn(NH<sub>3</sub>)<sub>4</sub>]<sup>2+</sup> (1Mk)

19. (a) Define electrolysis. (1Mk)

(b) During the electrolysis of molten aluminium oxide, write the equations at the;

Anode - (1Mk)

Cathode - (1Mk)

20. (a) Give any *two* differences between alpha and beta particles. (2Mks)

(b) A radioactive isotope T decays by emitting three alpha particles to form  ${}_{83}^{214}\text{Bi}$  what is the atomic number and mass number T?

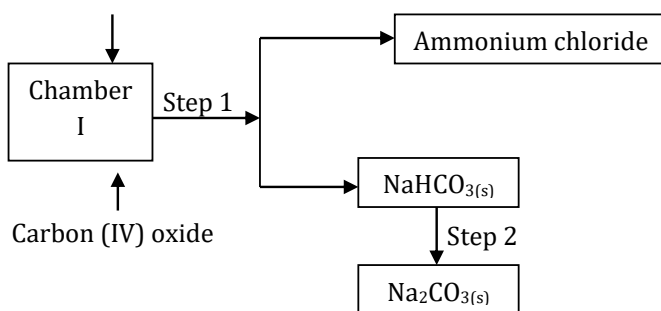
Atomic number - (1Mk)

Mass number - (1Mk)

21. (a) Using acidified potassium dichromate (VI) solution, describe how you would differentiate between sulphur (IV) oxide and hydrogen sulphide. (2Mks)

(b) Identify the catalyst preferred in contact process. Explain. (2Mks)

22. Study the following part of the solvay process for the manufacture of sodium carbonate and answer the questions that follows:



(i) State the main source of Carbon (IV) oxide in the process. (1Mk)

(ii) Write down the overall equation for the reaction in chamber I. (1Mk)

(iii) Name process in step 1. (1Mk)

23. (a) The following equation involve hydrochloric acid.



State the type of reaction taking place in the reaction. (1mk)

(b) State *two* contrasting chemical properties of hydrogen and chlorine. (2Mks)

24. (a) An element O has two isotopes  ${}^16_8\text{O}$  containing 90% and Isotope  ${}^{18}_8\text{O}$ .

(i) What are isotopes? (1Mk)

(ii) Find the R.A.M of O. (2Mks)

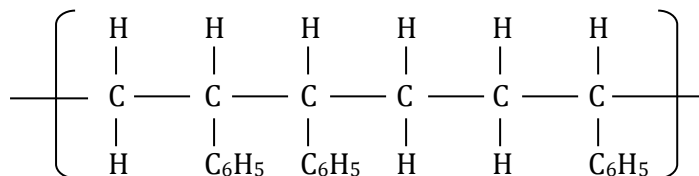
25. When a hydrocarbon is completely burnt in oxygen 4.2g of Carbon (IV) oxide and 1.71g of water were formed.

(a) Determine the empirical formular of the hydrocarbon. (3Mks)

(b) Given that formula mass of compound above is 28. Find the molecular formular. (1Mk)

26.(a) Name the *two* types of polymerization. (1Mk)

(b) Study the section of the polymer below and answer the questions that follow.



(i) Give the name of the polymer above. (1mk)

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 9

233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1. Name the most suitable method you can use to separate;

(a) Xanthophyll and chlorophyll in green leaves. (1Mk)

(b) Oil from simsim seeds. (1Mk)

2. The table below shows atomic numbers of four elements W, X, Y and Z.

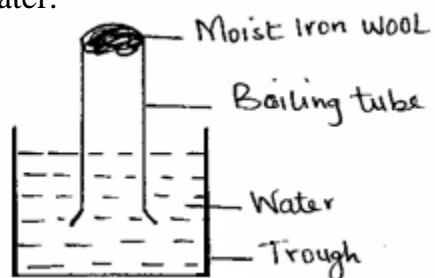
Element	W	X	Y	Z
Atomic number	20	17	19	9

(a) Write electron arrangement of the ion of Z. (1Mk)

(b)(i) Write the formula of the compound formed between W and X. (1Mk)

(ii) Name the bond(s) and structure of the compound in (i) above. (1Mk)

3. A student set-up an experiment as shown below. Moist iron wool was placed in a boiling tube and inverted over water.



(a) What was observed after two days? (1Mk)

(b) Explain the observations. (1Mk)

(c) What would be observed if a large piece of iron wool was used? (1Mk)

4. Element X is found in period 3 group (IV) it consists of two isotopes  $^{28}\text{X}$  and  $^{\text{Q}}\text{X}$ . A sample of X was found to consist of 90% of  $^{28}\text{X}$  if the relative atomic mass of X is 28.3, work out the number of neutrons in  $^{\text{Q}}\text{X}$ . (3Mks)
5. Study the table below and answer the questions that follow:

Element	Atomic radius (nm)	Ionic radius (nm)
P	0.168	0.095
Q	0.094	0.133
R	0.124	0.156
S	0.146	0.086

- (i) State the elements which are metals. (1Mk)
- (ii) Identify the strongest reducing agent. Give a reason. (2Mks)
6. The diagram below represents an apparatus found in a chemistry laboratory. Give its name. (1Mk)



7. Given the following bond energies.

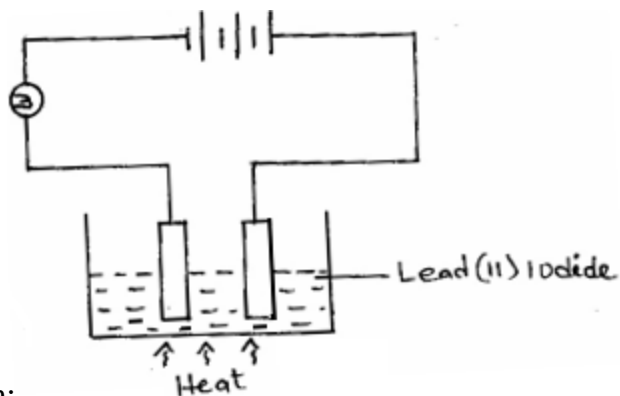
C – C	(347kJ mol <sup>-1</sup> )
C – H	(413kJ mol <sup>-1</sup> )
C = C	(612kJ mol <sup>-1</sup> )
H – H	(435.9kJ mol <sup>-1</sup> )

Calculate the enthalpy change of hydrogenation of ethene. (3Mks)

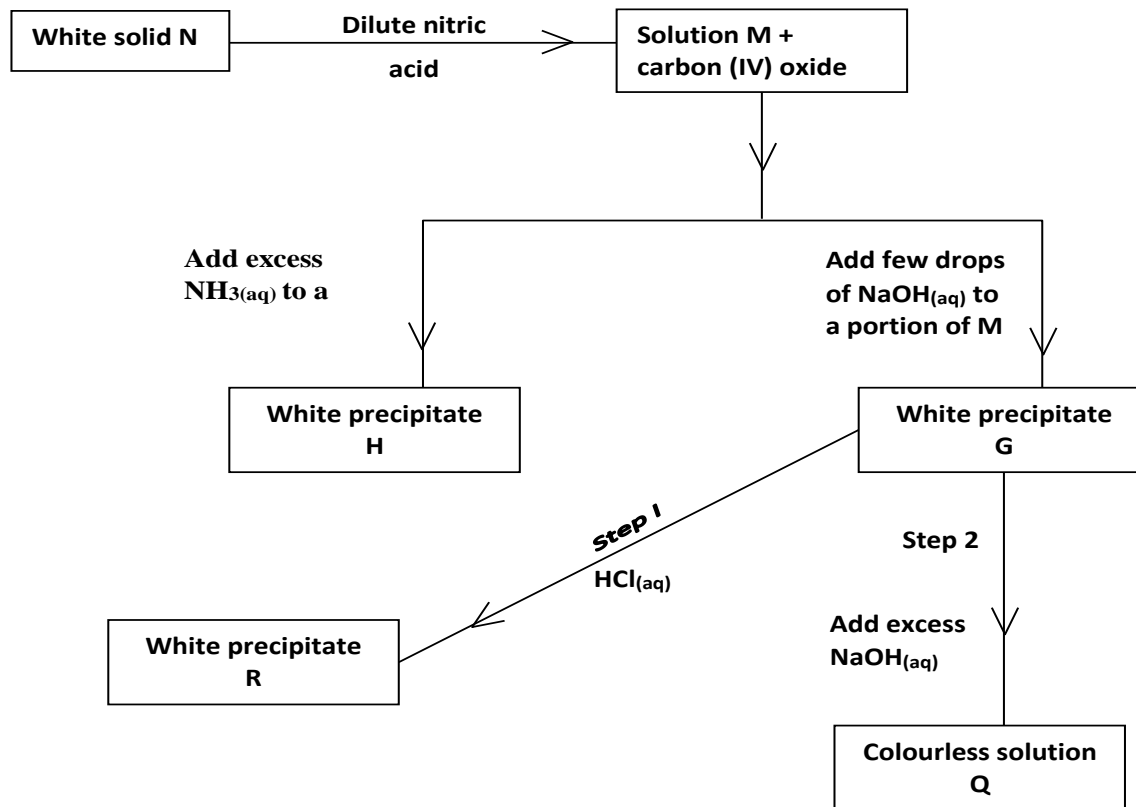
8. When hydrogen gas was passed over heated lead (II) oxide in a combustion tube and the gaseous products cooled, a colourless liquid was obtained.

- (i) Which chemical test would you use to confirm the colourless liquid above? (1mk)
- (ii) What observations were made in the combustion tube? (1Mk)
- (iii) Write an equation for the reaction between hydrogen and lead (II) oxide. (1Mk)

9. The diagram below shows an experiment for investigating electrical conductivity in lead (II) iodide. Study it and answer the questions that follow.



- (a) On the diagram;
- Label the cathode. (1Mk)
  - Show the direction of movement of electrons. (1Mk)
- (b) Write an equation for the reaction that takes place at the anode. (1Mk)
- 10.(a) State the Graham's law of diffusion. (1Mk)
- (b) Two gases A and B diffuse in the ratio 2: 1 if the molecular mass of gas A is 16g, find the molecular mass of B. (2Mks)
11. Study the flow chart below and answer the questions that follow.



(a) Identify solid **N**. (1Mk)

(b) Write down the equation for the reaction that leads to the formation of solution **Q** from the white precipitate **G**. (1Mk)

(c) State the property of precipitate **G** that is demonstrated by Step 1 and 2. (1Mk)

12. The basic raw material for extraction of aluminium is bauxite.

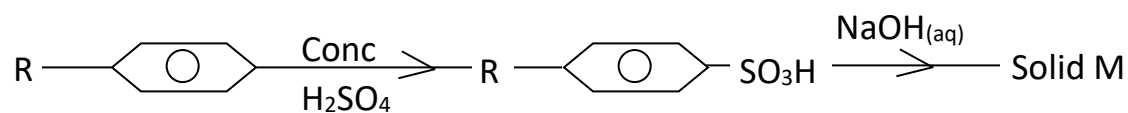
(a) Name the method that is used to extract aluminium from bauxite. (1Mk)

(b) Cryolite is used in the extraction of aluminium from bauxite. State its role. (1Mk)

(c) Aluminium is a reactive metal yet utensils made of aluminium do not corrode easily.

Explain this observation. (1Mk)

13. The scheme below represents the manufacture of a cleansing agent **M**.



(a)(i) Draw the structure of **M**. (1Mk)

(ii) To which type of cleansing agent does **M** belong? (1Mk)

14. If chlorine gas is passed over heated iron fillings and the product dissolved in water, a yellow solution is formed.

(i) Identify the yellow solution. (1Mk)

(ii) What would be observed if aqueous sodium hydroxide solution was added to the yellow solution? (1Mk)

(iii) Write an ionic equation for the reaction between the yellow solution and sodium hydroxide. (1Mk)

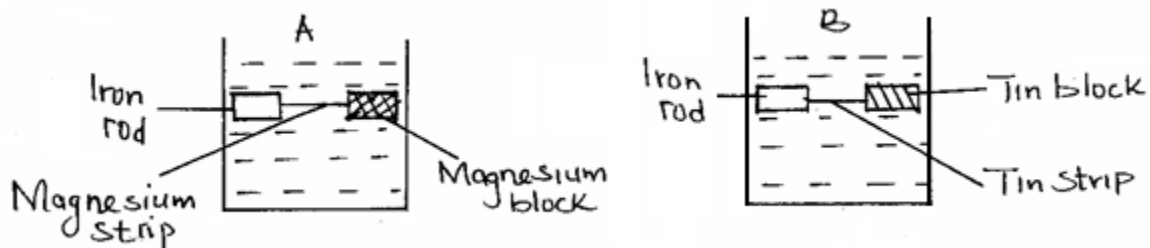
15. Using excess zinc powder and dilute sulphuric (VI) acid describe how a sample of dry zinc sulphate crystals can be prepared. (3Mks)

16. An organic compound **Y** was analysed and found to contain carbon, hydrogen and oxygen only.

1.29g of **Y** on complete combustion gave 2.64g of carbon (IV) oxide and 0.81g of water. Find the empirical formula of **Y**. (C = 12, H = 1, O = 16).

(3Mks)

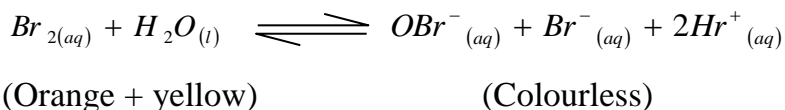
17. The diagrams below were set up by form 4 students to investigate methods of preventing rusting.



(i) It was observed that rusting occurred in set up B and not in set up A. Explain. (2Mks)

(ii) State **one** other method of preventing rusting in iron. (1Mk)

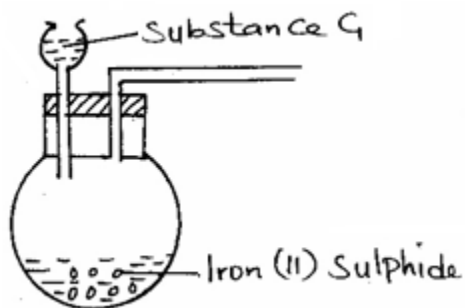
18. An equilibrium exists between the reactants and products as shown in the equation below.



(i) Select the species that acts as an acid. Explain. (1Mk)

(ii) State and explain the observations made when aqueous sodium hydroxide solution is added to the above equilibrium. (1Mk)

19. The apparatus shown below were set-up to prepare and collect hydrogen sulphide gas.



(a) Name substance G. (1Mk)

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

20. The boiling points of some compounds of hydrogen and some elements in group (IV) and (VI) of the periodic table are given below.

Compound	Boiling point (°C)	Compound	Boiling point (°C)
CH <sub>4</sub>	-174.0	H <sub>2</sub> O	100
SiH <sub>4</sub>	-112.0	H <sub>2</sub> S	-61

(a) Which of the compounds CH<sub>4</sub> and SiH<sub>4</sub> has stronger intermolecular forces.

Give a reason. (1Mk)

(b) Explain why the boiling points of H<sub>2</sub>O and H<sub>2</sub>S show different trends from that of CH<sub>4</sub> and SiH<sub>4</sub>.

(4Mks)



21. Radon  ${}_{84}^{222}\text{Ra}$  undergoes alpha decay to form lead, taking 15 days for the original mass to reduce to 6.25%.

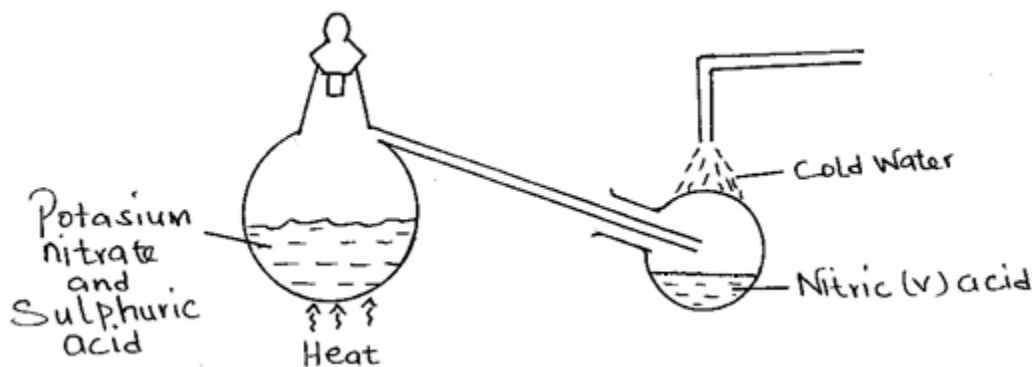
(a) Write the nuclear equation for the reaction. (1Mk)

(b) Calculate the half-life of radon. (2Mks)

22. Ethanol and pentane are miscible liquids. Explain how water can be used to separate a mixture of ethanol and pentane. (2Mks)

23. Illustrate bonding in carbon (II) oxide using dot (•) and cross (x) (C – 6, O – 8). (2Mks)

24. The diagram below shows a set-up that was used to prepare and collect a sample of nitric (V) acid.



(a) Give a reason why it is possible to separate nitric (V) acid from sulphuric (VI) acid in the set up. (1mk)

(b) Name another substance that can be used instead of potassium nitrate. (1Mk)

(c) Give **one** use of nitric (V) acid. (1Mk)

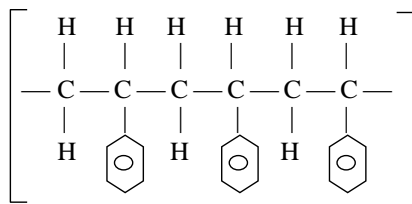
25. A mixture of kerosene and water was shaken and left to stand, ammonia gas was then bubbled into the mixture followed by a few drops of phenolphthalein indicator. State and explain the observations made. (2Mks)

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

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

(ii) State **two** uses of sodium carbonate. (2Mks)

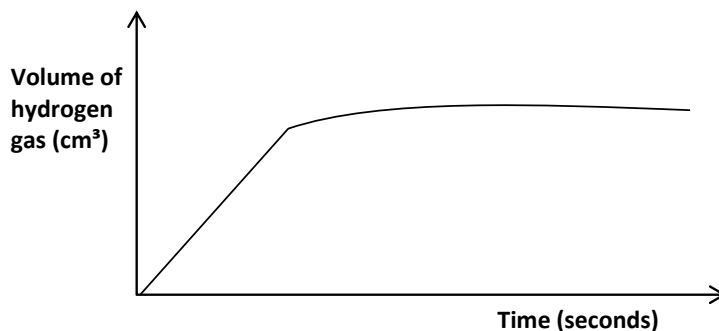
27. Below is part of a synthetic polymer. Study it and answer the questions that follow.



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

(ii) Determine the number of monomers making the above compound if its relative molecular mass is 104,000. The benzene ring has six carbon atoms and five hydrogen atoms ( $C = 12$ ,  $H = 1$ ). (2Mks)

28. In an experiment to prepare hydrogen gas using magnesium ribbon and dilute hydrochloric acid, a student plotted volume of hydrogen gas against time as shown in the sketch below.



(a)(i) On the same axes, sketch the curve that would be obtained if a few crystals of copper (II) sulphate are added and label it curve C. (1Mk)

(ii) What would be the function of copper (II) sulphate in the reaction? (1Mk)

29. 1g of element T was completely converted to its chloride,  $TCl_2$ . The mass of the chloride formed was 3.96g. Calculate the relative atomic mass of element T. ( $Cl = 35.5$ ). (3Mks)

NAME: .....

SCHOOL: .....

INDEX NO: ..... CANDIDATE'S SIGNATURE: .....

DATE: .....

## K.C.S.E BLUEPRINT PREDICTION

### QUESTION PAPER NO: 10

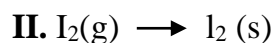
233/1

CHEMISTRY

PAPER 1

TIME: 1 HOUR

1. Study the reactions shown below



- What name is used to refer equation I & II ?

(1mk)

2. You're given the following list of gases;

Nitrogen (IV) oxide

Ammonia

Hydrogen

Sulphur (IV) oxide

a) Draw a diagram to show how dry sample of nitrogen (IV) oxide is collected.

(1mk)

b) Name a suitable drying agent for ammonia gas.

(½ mk)

c) Write a balanced chemical equation for oxidation of sulphur (IV) oxide in air.

(1mk)

d) Choose the lightest gas

(½mk)

3. State the method that can be used to separate

i) Sulphur and Iron powder

(1mk)

ii) Iron (II) sulphide and Iron (II) sulphate.

(1mk)

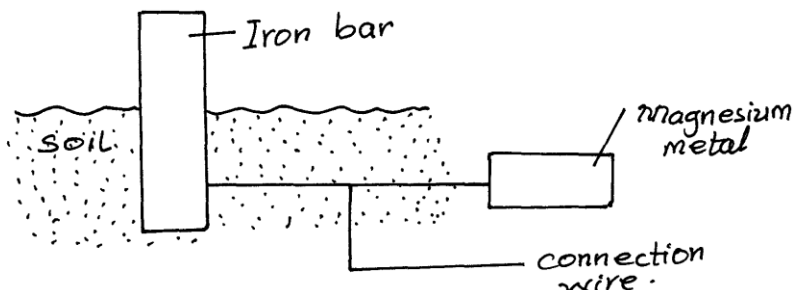
4. Generally molecular substances have low melting point and boiling point. Explain why this is so. (2mks)

5. The atomic number of an element X is 14.

a) In which period of the periodic table is element X? Explain. (2mks)

b) Write the electron arrangement of element X. (1mk)

6. The diagram below shows an iron bar which supports a bridge. The iron bar is connected to a piece of magnesium metal.



Explain why it's necessary to connect the piece of magnesium to the iron bar. (2mks)

7. When gas x was passed over heated copper metal the metal changed its colour to black. Identify

i) Gas x (1mk)

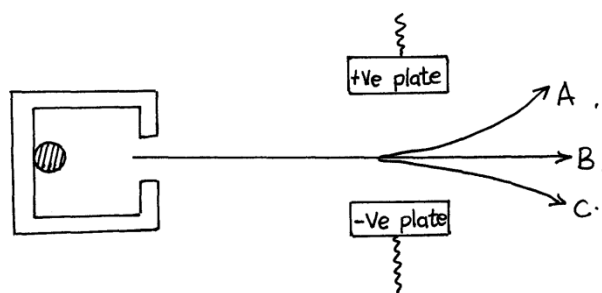
ii) Name the black substance formed (1mk)

8. Explain why;

i) Aluminium has a high melting point compared to magnesium (2mks)

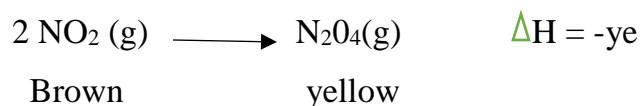
ii) Aluminium has a higher electrical conductivity compared to magnesium. (1mk)

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



a) Name particles A and B (2mks)

10. Study the equation below and answer the questions that follow



a) State and explain the observation made when a mixture at equilibrium is heated. (2mks)

b) If pressure is exerted at the mixture at equilibrium, what observation will be made? (1mk)

11. A student dipped an iron nail into a solution of 0.5M copper (II) sulphate solution and allowed to remain in the solution for 5 minutes

i) What observation was made on the iron nail? Explain (2mks)

ii) Write an ionic equation for the reaction that occurred. (1mk)

12. Below are standard enthalpies. Use them to answer the question below



Calculate enthalpy formation of ethyne from its constituent elements. (2mks)

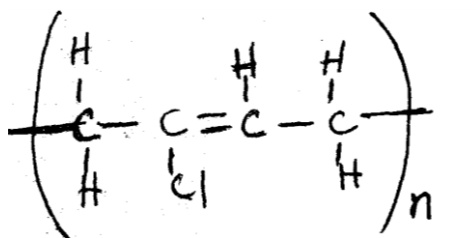
13. Iron (II) chloride can be prepared in the laboratory by passing dry chlorine gas over hot steel wool.

a) Name the above method of preparing salts. (1mk)

b) Why should we prepare the salt in a dry environment? (1mk)

c) A solution of Iron (III) chloride in water changes a blue litmus paper to red. Explain. (1mk)

14. The structure of a synthetic rubber is shown below

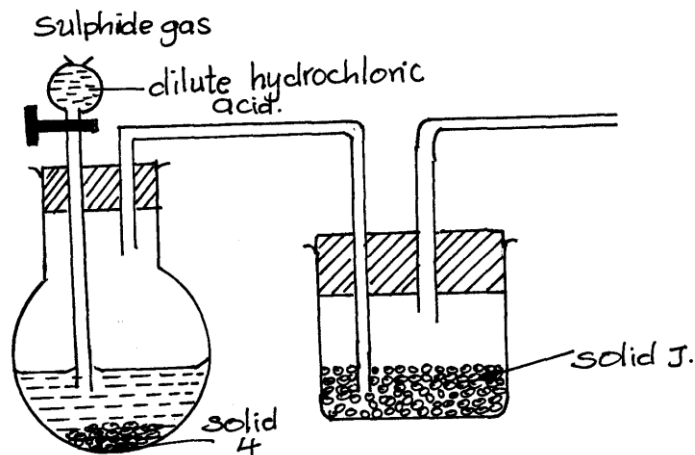


a) i) Determine the relative molecular mass of the monomer. (1mk)

ii.) Determine mass of a polymer that is made when 250 monomers polymerise. (1mk)

b) Give one advantage of natural polymers over synthetic ones. (1mk)

15. The setup below was used to prepare dry sample or hydrogen sulphide gas.



a) Complete the diagram to show how the gas was collected. (1mk)

b) Identify the following solids; H & J (5mks)

16. The table below shows the observations made when an aqueous salt P was reacted with ammonia

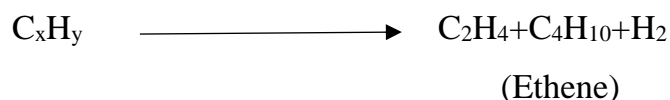
Test	Observation
P <sup>+</sup> A few drops of aqueous Ammonia	Blue precipitate forms
P <sup>+</sup> Excess aqueous ammonia	Blue precipitate dissolves to form a deep blue solution

a) Identify the cation present in aqueous salt P. (1mk)

b) Write the formula of the ion formed when the blue precipitate dissolves in excess aqueous ammonia. (1mk)

c) Explain why aqueous ammonia is said to be a weak base. (1mk)

17. Ethene gas can be manufactured industrially starting with a certain hydrocarbon CH as shown below

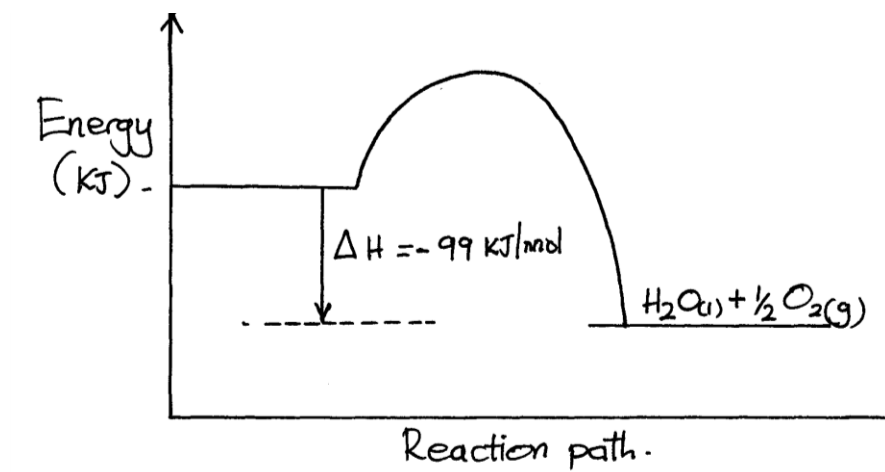


a) Name the type of reaction shown above. (1mk)

b) Name the hydrocarbon which is used to manufacture ethane in the reaction shown above (1/2mk)

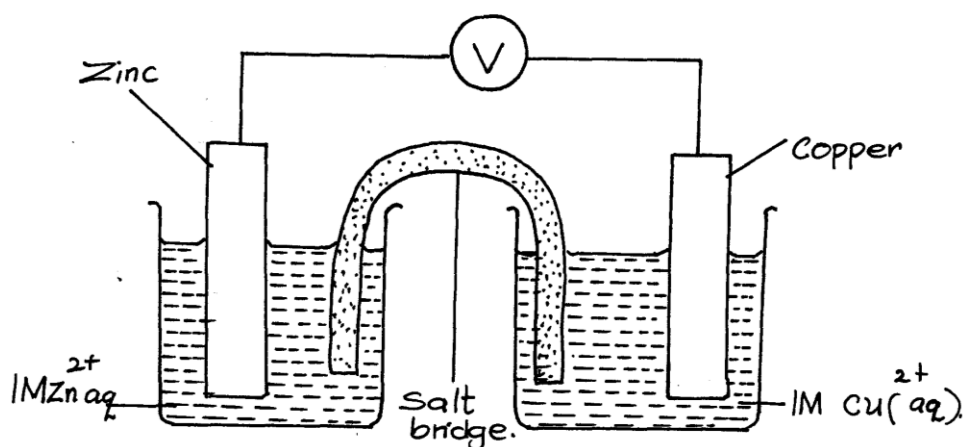
c) Give one industrial use of ethene (1/2mk)

18. The axis below shows an energy level diagram for the reaction producing oxygen gas from hydrogen peroxide.



- a) Using a dotted line, sketch the curve of the reaction if manganese (IV) oxide was added. Explain the shape of your sketch. (2mks)
- b) The reaction between Zinc powder and hydrochloric acid evolves hydrogen gas faster than when zinc granules are used. Explain. (2mks)
19. a) What is the maximum mass of a gas that would be produced when 0.36g of magnesium reacted with excess hydrochloric acid. (Mg=24; H=1) (2mks)
- b) What volume would the gas in (a) above occupy at room temperature and pressure. (r.t.p) (1 mole of a gas at r.t.p occupies 24 litres) (1mk)

20. Study the following electrochemical cell, then answer the questions that follow.



- a) Write down the half-cell equation for reactions occurring at each electrode. (2mks)
- b) Show on the diagram the direction of flow of electrons. (1mk)
21. Using equations explain the effect of heat on the following;
- a) Sodium nitrate (1mk)
- b) Lead (ii) hydroxide (1mk)
- c) Ammonium carbonate (1mk)
22. A certain mass of sulphur (IV) oxide occupied 400cm<sup>3</sup> at 30°C and 750mmHg pressure. Calculate the volume occupied by the same gas if pressure is lowered to 300mmHg and temperature raised to 60°C. (2mks)

23. The table below shows atomic and ionic radii of some elements by letters U, V, W and X not the actual symbols) Study it and answer the questions that follow.

Element	Atomic Radius (nm)	Ionic radius (nm)
U	0.174	0.099
V	0.203	0.133
W	0.099	0.181
X	0.136	0.065

a) Classify X as a metal or non-metal. Explain (1mk)

b) Identify the element which is the strongest reducing agent. (1mk)

c) Which element forms an anion? (1mk)

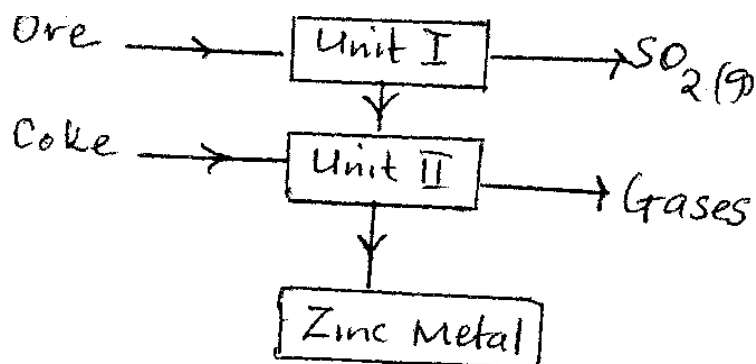
24. Ethanol has important uses in our daily lives. For each use, state the property that makes ethanol suitable as;

a) Fuel (1mk)

b) Solvent (1mk)

c) Draw the structural formula of ethanol (1mk)

25. The flow chart below shows some processes involved in the industrial extraction of zinc metal.



a) Name one ore from which zinc is extracted. (1mk)

b) Write equation for the reaction taking place in unit II. (1mk)

c) State two uses of Zinc. (1mk)

26. In a water purification plant, aluminium sulphate is added to coagulate small suspended particles

a) State the reason for chlorinating and adding lime in water purification plant (2mks)

Chlorinating

Adding lime

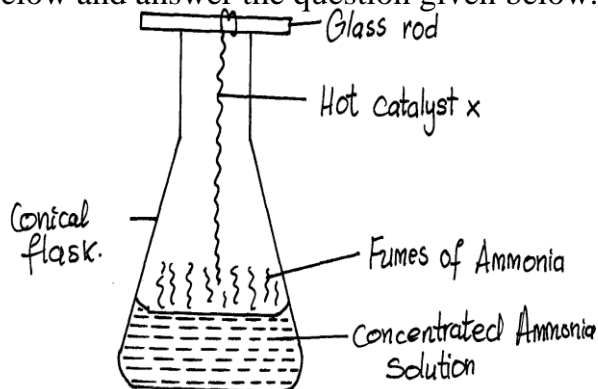
b) Name the compounds responsible for temporary hardness in water (1mk)



27. Commercial sulphuric (VI) acid has a density of  $1.8\text{gcm}^3$

- a) Calculate the molarity of the acid. (2mks)
- b) Determine the volume of the commercial acid in (a) above that can be used to prepare  $500\text{cm}^3$  of 0.2M sulphuric (VI) acid solution. (2mks)

28. Study the diagram below and answer the question given below.



- a) The reaction between ammonia and oxygen in the presence of a catalyst continue without further heating. Explain (2mks)
- b) Name catalyst X (1mk)

29. Coloured flowers placed in a gas jar containing moist gas P immediately turned colourless, A solution of gas P formed a white precipitate with lead (ii) nitrate solution. On warming gently, the white precipitate dissolved.

- a) What is the identity of gas P? (1mk)
- b) Name and write the chemical formula of the compound responsible for the decolourisation of the flowers

**CALL AMOBI GROUP OF EXAMINERS @  
0743 333 000 OR 0706 851 439 TO  
ACQUIRE :**

