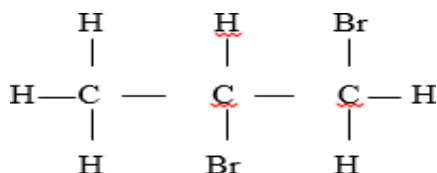


FORM FOUR CLUSTER KCSE MODEL13

CHEMISTRY PAPER 1 QUESTIONS

1. Bromine reacted with compound Q to form a compound with structural formula.



- i) Write the structural formula of Q.

.....

- ii) When Q is reacted with concentrated sulphuric (VI) acid compound P is formed which further reacted with water to form K.

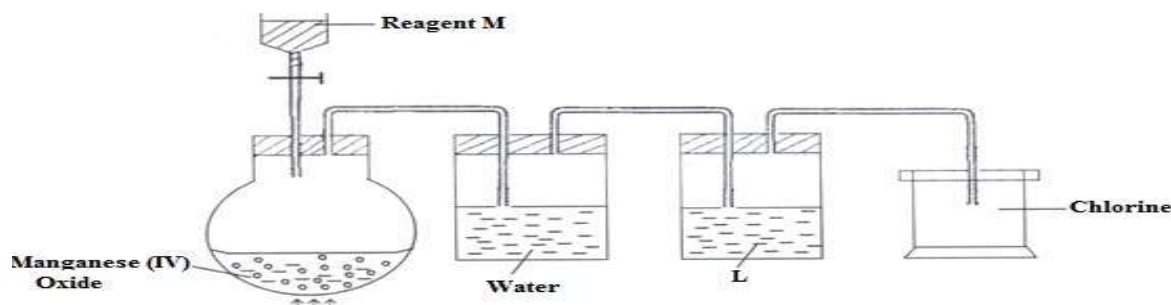
I. Identify substance K.

.....

II. Write an equation to show how compound K reacts with sodium metal.

.....

2. The set-up below was used to prepare dry chlorine gas. Study and answer the questions that follow.



- a) Name reagents M and substance L.

M:.....

L:.....

- b) A warm red phosphorus was lowered into the gas jar of chlorine using a deflagrating spoon:

- i) State any one observation made in this experiment.

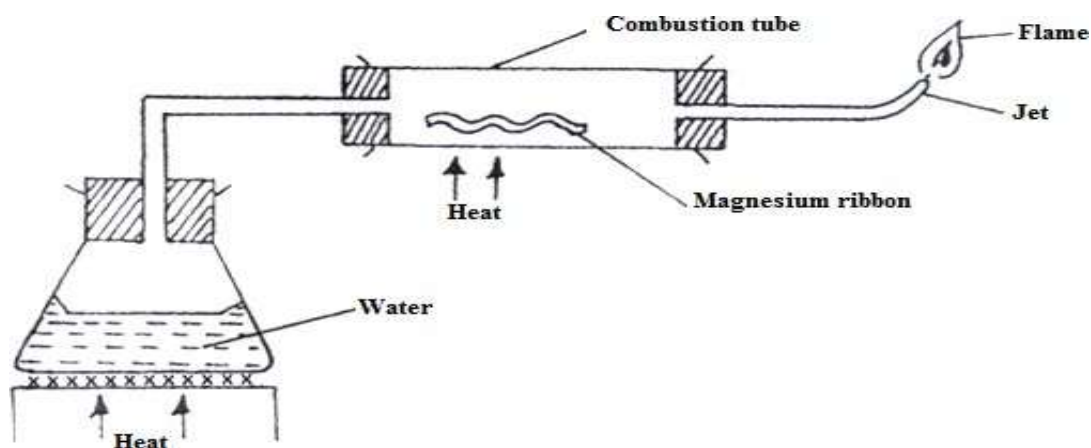
.....

ii) Identify the substance formed in the above reaction.

.....

c) Both substances in (ii) above undergo hydrolysis when exposed to air. Write an equation to show how any one of them undergoes hydrolysis.

3. Steam was passed over magnesium ribbon as shown in the diagram below. Study it and answer the questions that follow.



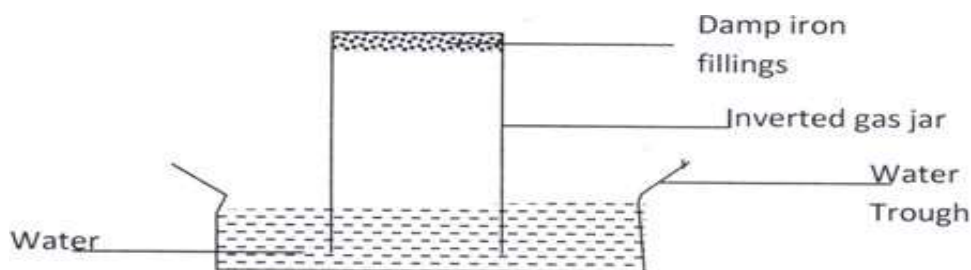
a) State one precaution which should be taken before lighting the gas at the jet.

b) Write a chemical equation for the reaction taking place in the tube.

i) Combustion tube.

ii) Jet (burning flame).

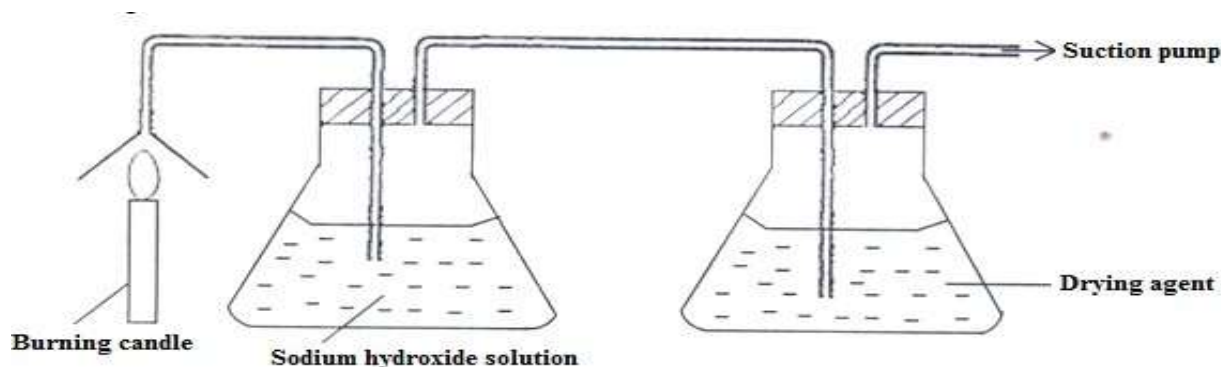
4. In an experiment a gas jar containing some damp iron fillings was inverted in a water trough containing some water as shown in the diagram below. The set-up was left undisturbed for three days. Study it and answer the questions that follow:



a) Why were the iron fillings moistened?

b) State and explain the observation made after three days.

5. The set-up of diagram shown below is used to prepare dry nitrogen gas from air. Study it and answer the questions that follow.



- a) What is the purpose of using. i) A burning candle.

.....

.....

- ii) Sodium hydroxide solution.

.....

.....

- b) Name: i) One impurity present in nitrogen gas prepared.

.....

.....

- ii) A suitable drying agent used.

.....

.....

- c) Give two uses of nitrogen gas.

.....

.....

6. i) Using a dot (•) and cross (x) show how NH_4^+ ion is formed from NH_3 molecule and H^+ ion.

- ii) State the type of bond that exists between NH_3 and H^+ ion.

.....

.....

iii) Molecular substances have low melting points. Give one reason why they have low melting points.

.....

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

| Ions | Electron arrangement | Ionic radius |
|------------------|----------------------|--------------|
| Na^+ | 2,8 | 0.95 |
| K^+ | 2,8,8 | 0.133 |
| Mg^{2+} | 2,8 | 0.065 |

Explain why the ionic radius of:

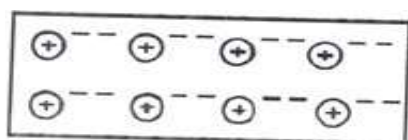
a) K^+ is greater than that of Na^+ .

.....

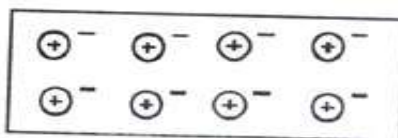
b) Mg^{2+} is smaller than that of Na^+ .

.....

8. The diagrams below are sections of models of the structures of elements V and W.



V



W

Key

⊕ Charged nucleus
 - An electron

i) Are these elements metals or non – metals? Explain your answer.

.....

ii) Which element is likely to have a higher melting point? Explain your answer.

.....

.....

.....

.....

9. The grid below shows part of the periodic table. Study it and answer the questions that follow. The letters do not represent the true symbols of the elements.

| | | | | | | | |
|---|---|--|---|---|---|---|---|
| | | | | | | | |
| T | | | Q | V | R | S | U |
| | W | | | | | | |
| | | | | | | | |

- a) Which element forms ion with the charge of 3-.

.....

- b) What is the nature of oxide formed by Q.

.....

- c) Using crosses (x) and dots (•), show how the ion of S is formed.

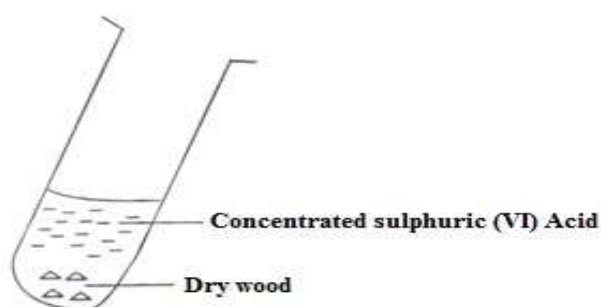
10. a) Define Grahams law of diffusion.

.....

.....

- b) Given that the density of gas X is $1.4290 \times 10^{-3} \text{g/cm}^3$ and the density of gas Y is $1.2506 \times 10 \text{g/cm}^3$. How many times will gas X diffuse faster than Y?

11. Excess concentrated sulphuric (VI) acid was mixed with pieces of dry wood as shown below.



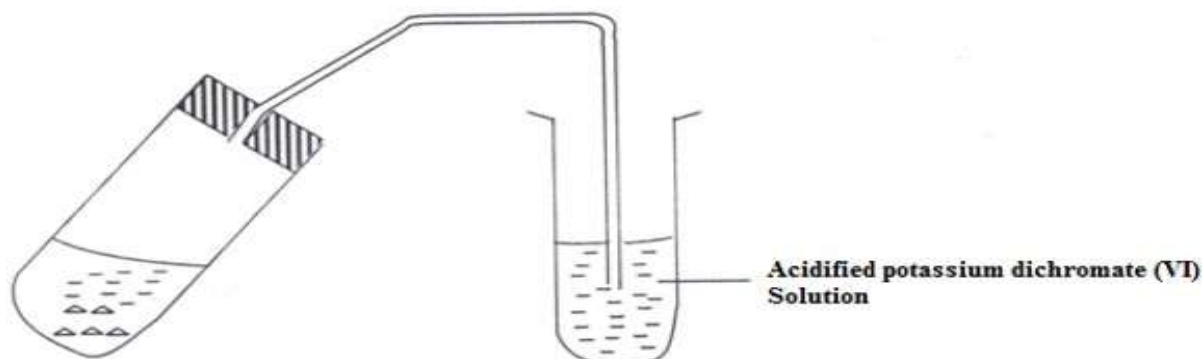
- a) State the observation made. Explain.

.....

.....

.....

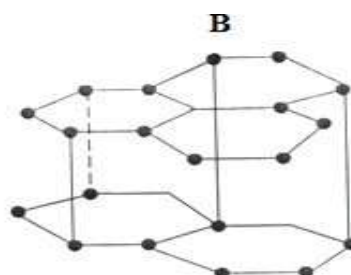
b) When the reaction was complete, the mixture was heated gently, then strongly and set – up adjusted as shown below.



Explain the observation made on acidified potassium dichromate (VI) solution.

.....

12. The following diagrams show the structure of two allotropes of carbon. Study them and answer the questions that follow.



a) Name the allotropes.

A.....
 B.....

b) Give one use of A.

.....

c) Which allotrope conducts electricity? Explain.

.....

13. Write half equations for the electrode reactions when molten sodium chloride is electrolysed using graphite electrodes. Anode

.....

Cathode

.....
.....

14. Give two reasons why helium is used in weather balloons.

.....
.....
.....

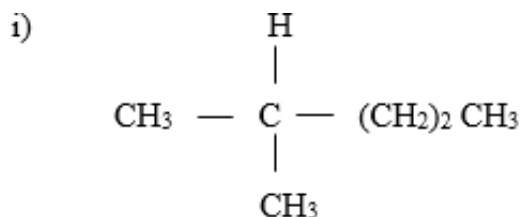
15. A certain carbonate, reacts with dilute hydrochloric acid according to the equation given below.



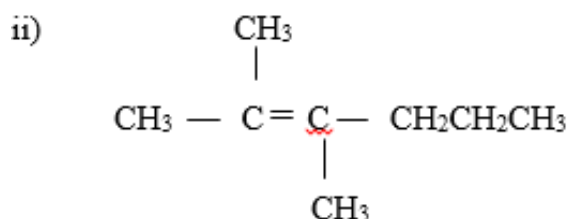
If 1g of the carbonate reacts completely with 20cm³ of 1M hydrochloric acid, calculate the relative atomic mass of G. (C =12, O=16)

.....
.....
.....

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



Name.....

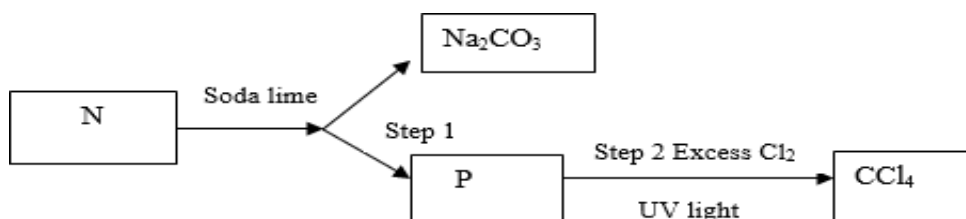


Name

- b) What observation would be made if a few drops of bromine liquid are added to a sample of the compound in (a) (ii) above?

.....
.....
.....

17. Study the flow chart below to answer the questions that follow.



a) Identify N and P

N.....

P.....

b) What name is given to the type of halogen / chlorination reaction in step 2?

.....

18. The PH – values of various solutions are given in the table below. Study it and answer the questions that follow.

| Solution | PH - value |
|----------|------------|
| W | 14.0 |
| X | 6.0 |
| Y | 7.0 |
| Z | 2.0 |

a) Select a pair of solutions that if reacted would have the highest heat change of the reaction (ΔH_{r}). Give a reason for your answer.

.....

b) Select the solutions in which a sample of aluminium oxide is likely to dissolve.

.....

19. Describe how a sample of lead (II) chloride can be prepared using the following reagents:

- Dilute nitric acid.
- Dilute hydrochloric acid and lead (II) carbonate.

.....

20. An element R has three isotopes A, B and C as shown in the table.

| Isotope | A | B | C |
|---------------|----|----|----|
| Isotopic mass | 40 | 38 | 42 |
| % abundance | 60 | - | 10 |

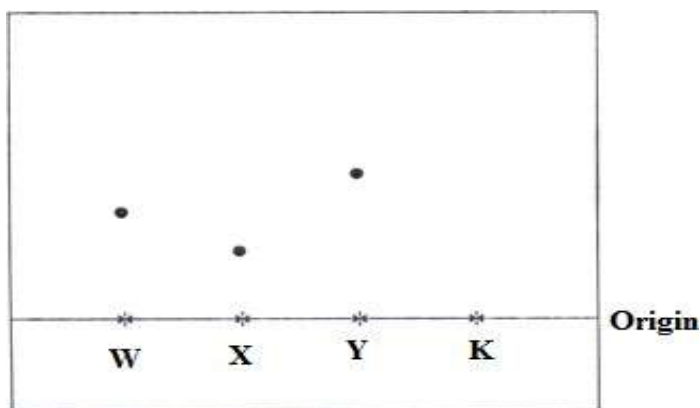
i) Determine the relative abundance of isotope B.

.....

ii) Calculate the relative atomic mass of element R.

.....

21. The diagram below represents a paper chromatogram of pure W, X and Y. A mixture K contains W and Y only. Indicate on the diagram the chromatogram of K.



Show the solvent front.

.....

22. A compound has an empirical formula C_3H_6O and relative formula mass of 116.

a) Determine its molecular formula. (H=1, C=12, O=16)

.....

b) Calculate the percentage composition of carbon by mass in the compound.

.....

23. In the laboratory hydrogen sulphide gas is prepared by the action of dilute hydrochloric acid on metal sulphides. a) Name the metal sulphide that can be used in preparing the gas.

.....

.....
b) Write down the equation for the reaction in (a) above.
.....
.....

c) Give one chemical test for hydrogen sulphide gas.
.....
.....

24. The table below gives atomic numbers of elements represented by the letters A, B, C and D.

| Elements | A | B | C | D |
|----------------|----|----|----|----|
| Atomic numbers | 15 | 16 | 17 | 20 |

Use the information to answer the questions that follow. a) Name the type of bonding that exists in the compound formed when A and D react.
.....
.....

b) Select the letters which represents the best oxidizing agent. Give a reason for your answer.
.....
.....

25. Element **T** is in period 2 of the periodic table and forms a stable ion, T^{2+} .

a) State the atomic number of element **Q** which is directly below **T** in the periodic table.
.....
.....

b) Compare the reactivity of T and Q with chlorine.
.....
.....

26. 20.0cm^3 of a solution containing 4.5gdm^{-3} of sodium hydroxide reacted exactly with 24.0cm^3 of dilute sulphuric acid solution, using methyl orange as indicator. Calculate the molarity of the sulphuric acid.
.....
.....
.....

27. Ammonia is produced in large scale by Haber process.

i) Write an equation for the formation of ammonia gas.
.....
.....

ii) State two optimum condition for obtaining a high yield of ammonia in the process.
.....
.....

28. The table below gives elements represented by letters which are not the actual symbols.

| Element | U | V | W | X | Y | Z |
|------------|---|----|----|----|----|----|
| Atomic No. | 8 | 12 | 13 | 15 | 17 | 20 |

i) Select an element that can form divalent anion.

.....
.....

ii) What is the structure of the oxide of W?

.....
.....

iii) Compare the atomic radius of W and X.

.....
.....