FORM FOUR CLUSTER KCSE MODEL5

CHEMISTRY PAPER 1 QUESTIONS

1. The atomic number of element W is 15.

   i) Write the electron arrangement of W. (1mark)

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   ii) Give the formula of chloride of W. (1mark)

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2. a) Define the term solubility as used in chemistry. (1mark)

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   b) Calculate the solubility of potassium chlorate if 5g of it saturate 10cm3 of water

   (density of water = 1g/cm3 (2marks)

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3. Classify the following processes as chemical changes or physical changes:

Process	Physical or chemical
Sublimation	
Displacement	
Neutralization	
Fractional distillation	

4. Study the information in the table below and use it to answer the questions that follow.

Bond	Bond energy ($uJmol^{-}$)
CI –CI	243
H – CI	431
C - H	413
C – CI	326
C-C	443

Calculate the enthalpy change for the reaction:

$$CH_3CH_{3(g)} + Cl_{2(g)} \rightarrow CH_3CH_2Cl_{(g)} + HCl_{(g)}$$

5. Give the IUPAC names of the following compounds.

$a)\ CH_3 - (CH_2)_4 - CH_3$ (1*mark*)

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b) $CH_3 - \underset{\displaystyle CH_3}{\overset{\displaystyle |}{C}} = CH_2$ (1 mark)

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c) $CH_3CHBrCH_2$ (1*mark*)

$\underset{\displaystyle CH_3}{\overset{\displaystyle |}{}}$

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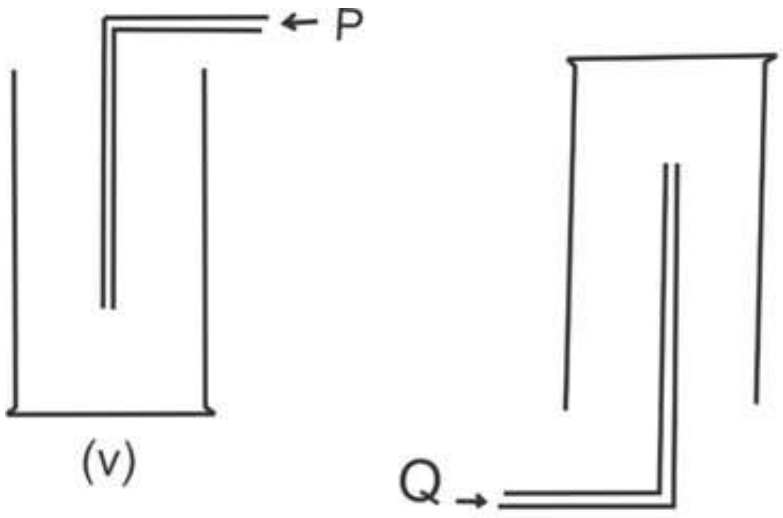
6. The diagram below shows how two gases P and Q were collected.



a) Name the two methods used:

i) ½ mark)

ii) ½ mark)

b) How do the densities of P and Q compare? (1mark)

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7. a) Using dots (•) and crosses (x) to represent electrons, show bonding in:

i) NH3 (1mark)

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ii) NH4+ (1mark)

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b) State why ammonia molecule (NH3) can combine with H+ to form NH4+ (1mark)
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8. A given volume of ozone (O3) diffused from a certain apparatus in 96 seconds.

   Calculate the time taken by an equal volume of carbon (IV) oxide to diffuse under the

   same conditions (C= 12, O =16)

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9. Identify the species that acts as a base in the reverse reaction given below. Give a reason

$$HSO^-_{4(aq)} + OH^-_{(aq)} \rightleftharpoons SO^{2-}_{4(aq)} + H_2O_{(l)}$$

10. Starting with lead (II) oxide, describe how you would prepare a solid sample of lead (II) carbonate
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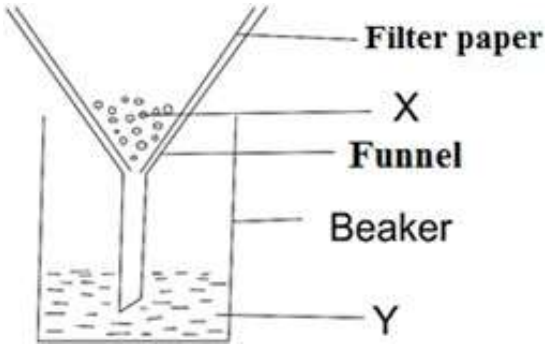
11. Filtration is carried out in the apparatus shown.



i) Name X and Y. (2marks)

X.....

Y.....

12. 1.8cm3 of dilute sulphuric (VI) acid required 25cm3 0.2M sodium hydroxide solution for complete neutralization.

   Calculate the concentration of sulphuric (VI) acid in moles per litre.

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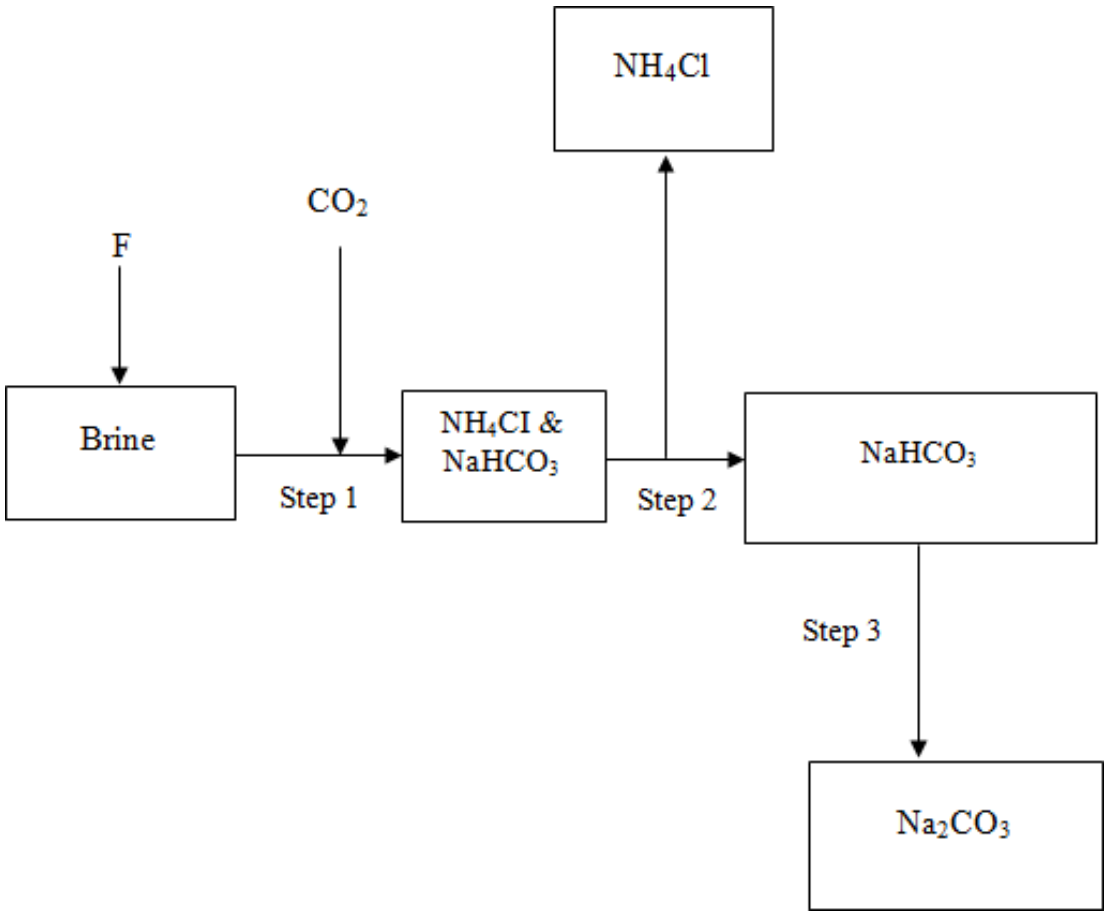
13. The simplified flow chart below shows some steps in the manufacture of sodium carbonate by solvay process.



a) Identify substance F (1mark)

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b) Name the process taking place in step 2. (1mark)

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c) Write an equation for the reaction which takes place in step 3. (1mark)
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14. The table below shows tests carried out in separate samples of water drawn from a well and results obtained.

Test		Results
(i)	Addition of excess aqueous ammonia	White precipitate
(ii)	Addition of few drops of dilute sulphuric (VI) acid	No white precipitate formed
(iii)	Addition of dilute hydrochloric acid followed by few drops of $BaCl_2$	White precipitate

Identify the cation and anion present in the water. Cation (1mark)

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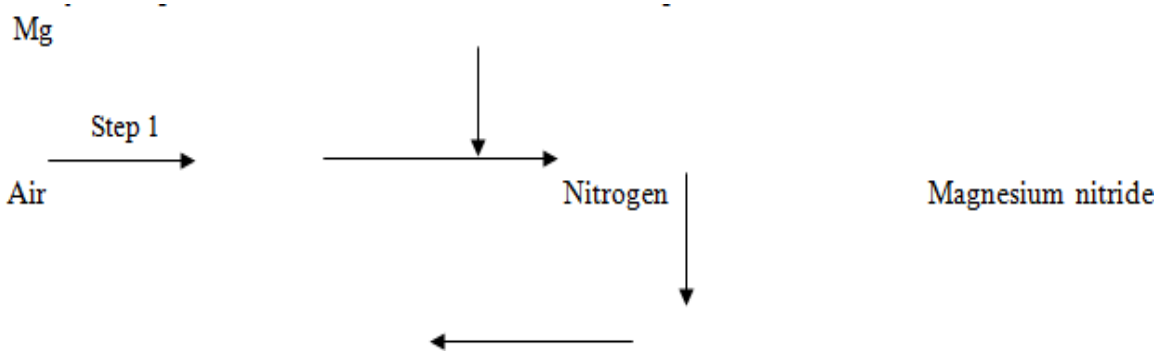
Anion (1mark)

15. Study the sequence of reactions below and answer the questions that follow



a) Name the process in step I. (1mark)

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b) i) What reactant is used to achieve step 4. (1mark)

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ii) Write a balanced chemical equation for step 3. (1mark)

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16. Use the information in the table below to answer the question that follows:

Element	Fluorine	Chlorine	Bromine
B.P ^{0}C	-180	-35	59

Explain the trend in the boiling points.

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17. What observation will be made when a few drops of concentrated sulphuric (VI) acid is added to crystals of sugar?

    Explain your answer (2marks)

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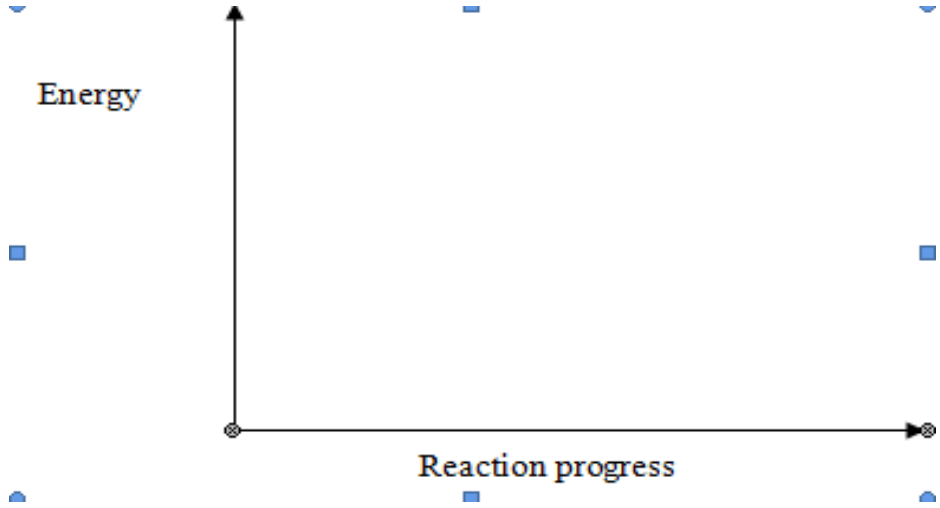
18. Hydrogen and Flourine react according to the equation.

    $H_{2(g)} + F_{2(g)} \rightarrow 2HF(g); \quad \Delta H = -538kJ$

    a) On the grid provided below sketch the energy level diagram for the reaction. (1mark)



    b) Calculate the molar enthalpy of formation of HF. (1mark)

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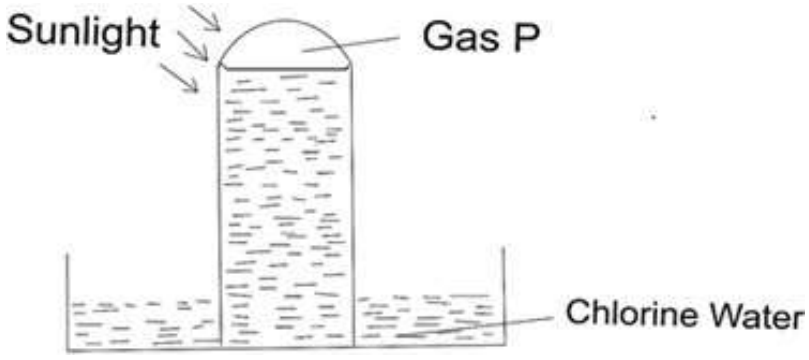
19. Form three students at Kongoni high school set up the apparatus shown the apparatus shown below

    to investigate the action of sunlight on chlorine water.



a. Identify gas P. ` (1mark)

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b. Write an equation to show how gas P is formed. (1mark)

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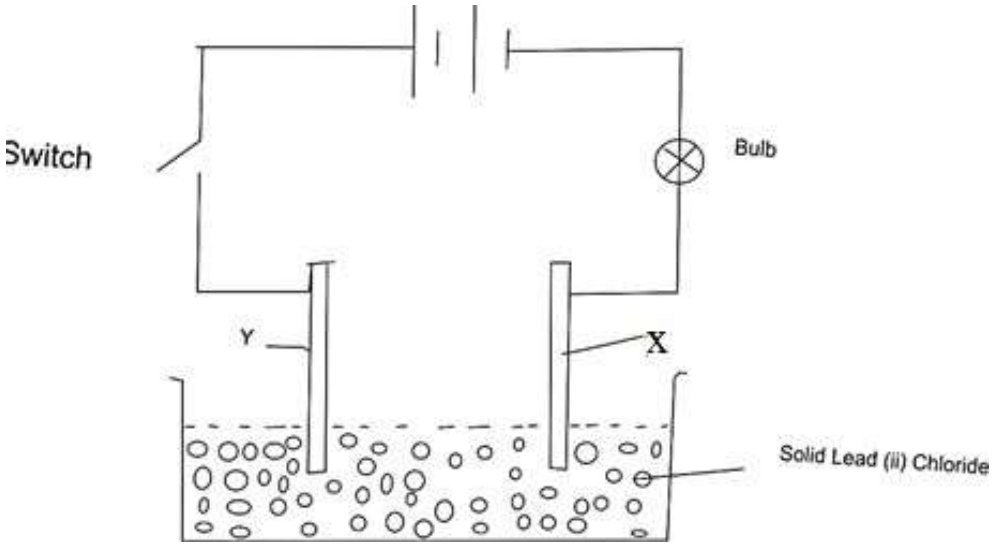
c. State one commercial use of gas P. (1mark)

20.he following set- up was used to investigate the effect of an electric current on lead (II) chloride.



a) Identify the electrodes labelled X and Y. (1mark)

X.....

Y.....

. b) When the switch was closed, the bulb did not light. Explain (2marks)

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20. State and explain what happens to the masses of the following substances when they are separately heated in open crucibles.

i) Copper metal (1 ½ marks)

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ii) Sulphur powder. (1 ½ marks)

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21. An organic compound has the following composition by mass: 60% carbon, 13.33% hydrogen and the rest oxygen.

Determine the empirical formula of the compound (C= 12, H = 1, O=16)

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22. The table below shows the first ionization energies of elements A and B.

Element	Ionization energy (kJ/mole)
A	500
B	740

a) Define the ionization energy. (1mark)

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b) What do these values suggest about the reactivity of B compared to A? Explain (2marks)
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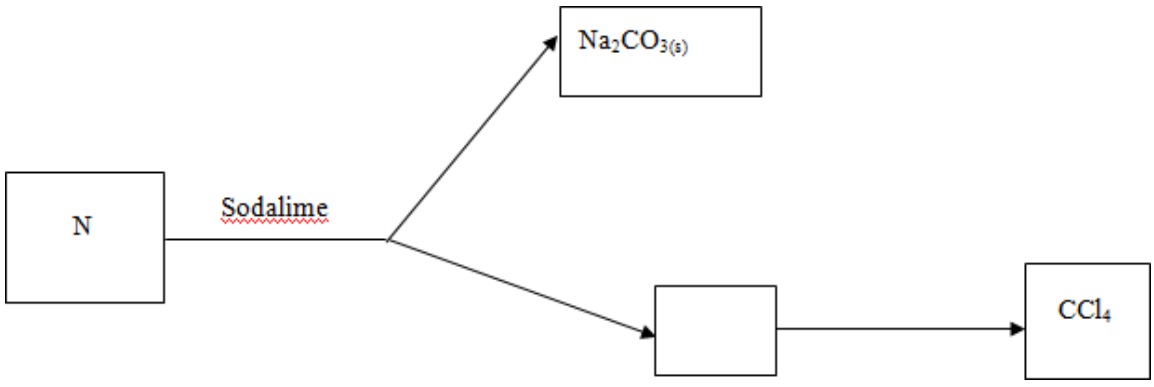
23. Study the flow chart below and answer the questions that follow.



i) Identify N and P. (2marks)

N.....

P.....

ii) What name is given to the type of halogenation in step 2? (1mark)

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24. A student added 1g of zinc powder to 50cm3 of 0.2M copper (II) sulphate solution and stirred the mixture gently using a thermometer.

The temperature at the beginning of the experiment was 210c and rose to a maximum of 280c.

Calculate the molar heat of displacement of copper

(density of solution = 1gcm-3, specific heat capacity of water = 4.2kJkg-1k-1)

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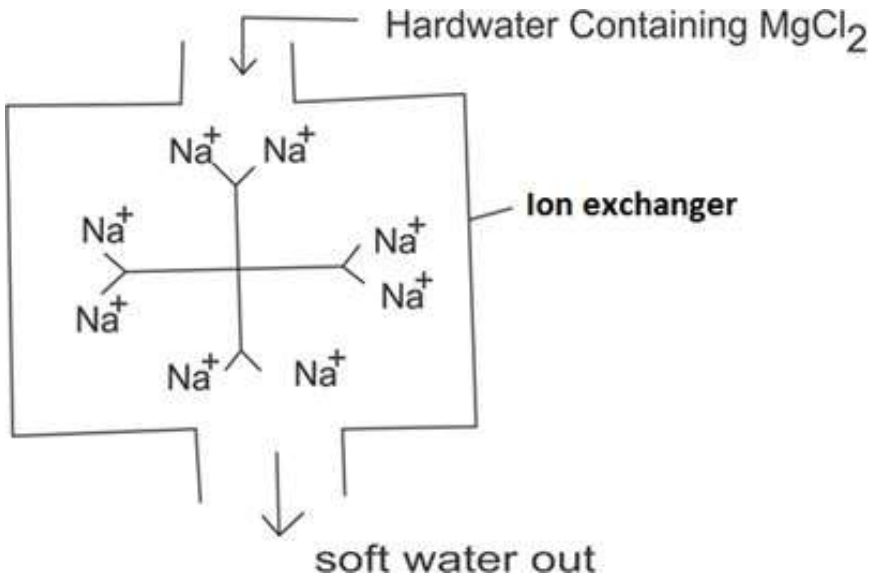
25. a) The diagram below shows an ion exchange column.



i) Draw the ion exchanger and show how it will appear at the end of softening process. (1mark)

ii) How is the ion exchanger recharged after exhaustion? (1mark)

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iii) State one advantage of hard water. (1mark)

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26. . a) State Gay Lussac's law (1mark)

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b) 10cm3 of a gaseous hydrocarbon, C2Hx required 30cm3 of oxygen for complete combustion.

If steam and 20cm3 of carbon (IV) oxide gas were produced, what is the value of x? (2marks)

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27. a) Explain why copper metal reacts with concentrated nitric (V) acid does not react with concentrated hydrochloric acid. (1mark)
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b) Write an equation for the reaction between copper and concentrated nitric (V) Acid. (1mark)
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28. The table below gives the melting points of oxides of elements in period 3. Study it and answer the questions that follow.

Formula of oxide	Na_2O	MgO	Al_2O_3	SiO_2	P_4O_{10}	SO_3
M.p	1190	3080	2050	1730	560	-73

a) Identify the compound in the table above that will dissolve in dilute hydrochloric acid and dilute sodium hydroxide. (1mark)
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b) Explain the difference in melting points of MgO and P4O10 (2marks)

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