

ADM.....NAME.....CLASS.....

GATITU SECONDARY SCHOOL P.O BOX 327- 01030 GATUNDU

FORM FOUR CHEMISTRY END TERM 1 EXAM.

PAPER 2

TERM I 2015

TIME 2HRS

Instructions

- Write your name admission number and class in the spaces provided above
- Answer all the questions in the spaces provided in the question paper.
- Mathematical tables and electronic calculators may be used.
- All working must be shown clearly.

1. The letter P, Q, R, S and T represent some elements. These are not the usual symbols of the elements. The table below gives the formulae and electronic arrangement of the ions of the above elements. Study it and answer the questions that follow.

ION	ELECTRONIC ARRANGEMENT
P ⁻	2.8
Q ²⁻	2.8.8
R ²⁺	2.8.8
S ²⁻	2.8
T ³⁺	2.8

- (i) Select two elements that;
- a. Belong to the same group of the periodic table (1mark)
- b. Are members of the same period of the periodic table (1mark)
- (ii) Write the formula of the sulphate of element T (1mark)
- (iii) Compare the reactivities of elements Q and S (2marks)
- (iv) A sample of the chloride of element T was dissolved in distilled water. Both red and blue litmus papers were dropped into this solution. State and explain what was observed. (2marks)

(v) A mixture contains both potassium carbonate and the carbonate of R. Explain how this mixture can be separated. (2marks)

(vi) What is the name given to the elements which belong to the same group of the periodic table as element P? (1mark)

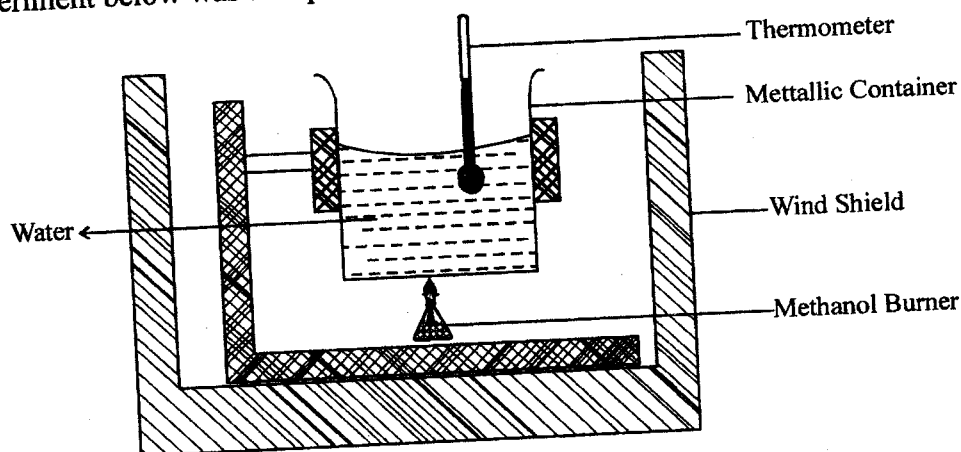
(vii) Write down the electronic arrangement of the ion formed by the element found just below element S in the periodic table (1mark)

(viii) Write down the equation for the reaction that takes place when element R reacts with cold water. (1mark)

2. (1mark)

a) What is the molar heat of combustion of a substance?

b) The experiment below was set up to determine the molar heat of combustion of methanol.



The following data was obtained from the above experiment.

Mass of burner + methanol before burning	=	62.74g
Mass of burner + methanol after burning	=	62.36g
Final temperature of water	=	38.5 ^o C
Initial temperature of water	=	23.5 ^o C
Volume of water used	=	100cm ³

i) From the above results calculate
I. heat change in this experiment.

(2mks)

(Density of water = 1g/cm^3 , C = 12, O = 16, H = 1.0)
Specific heat capacity of solution $4.2\text{Kj K}^{-1}\text{g}^{-1}\text{K}^{-1}$)

II. Molar heat combustion of methanol.

(2mks)

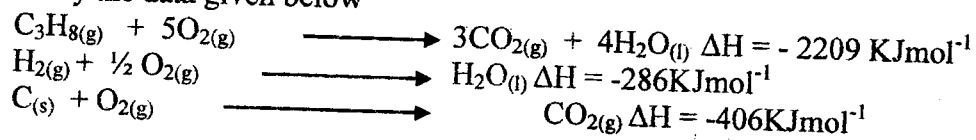
ii) Write a thermochemical equation for this reaction.

(1mark)

iii) Explain why the value obtained in (i) above may be lower than the theoretical value.

(1mark)

c) Study the data given below



Use this information to find the heat of formation of propane.

(3marks)

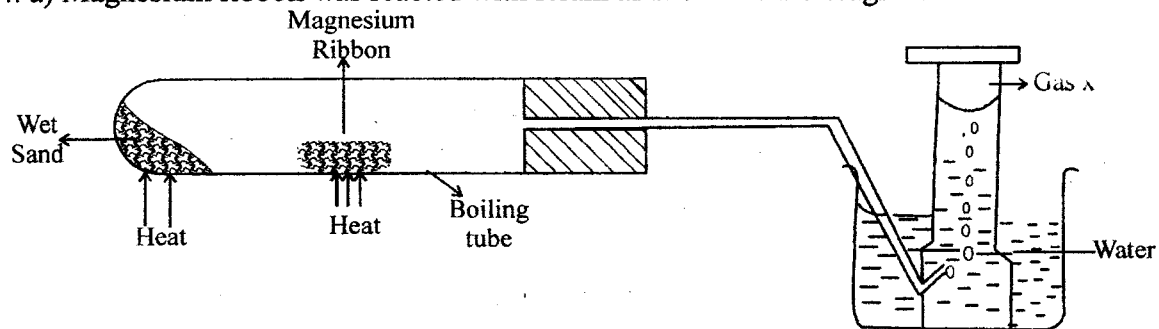
d) What do you understand by the term heating value of a given fuel?

(1mark)

e) State two factors you consider when choosing a fuel.

(2mark)

4. a) Magnesium ribbon was reacted with steam as shown in the diagram below.



(i) State two observations in the boiling tube.

(2marks)

(ii) Describe how you test for gas x

(2marks)

b) State one industrial use of the product formed in the boiling tube at the end of the experiment.

(1mark)

c) Explain what is meant by the term neutralisation.

(1mark)

d) Starting with 50cm^3 of 2M nitric (v) acid, describe how you would prepare crystals of sodium nitrate.

(3marks)

(i) Complete the table below.

(2marks)

Indicator	Colour in	
	Acidic solution	Alkaline solution
Phenolphthalein		Pink
Methyl orange	Pink	

b) When magnesium is burnt in air two reactions take place forming two different compounds. Write down the equations for the two reactions. (2marks)

4. The table below shows the solubility of X nitrate (XNO_3) in 100g of water at various temperatures in $^{\circ}C$

TEMP $^{\circ}C$	10	18	26	34	42	50
SOLUBILITY IN 100G OF WATER	20	29	40	53	68	88

a) In the grid provided, plot a graph of solubility of nitrate against temperature

(4marks)

b) From the graph determine;

i. The solubility of X nitrate at $15^{\circ}C$

(1mark)

ii. The mass of X nitrate that remained undissolved given that 80g of X nitrate were added to $100cm^3$ of water and warmed at $40^{\circ}C$ (1mark)

c) If a solution containing 110g of salt in 100g of solvent initially at $65^{\circ}C$ is cooled to $45^{\circ}C$

i. At what temperature will crystals start forming

(1mark)

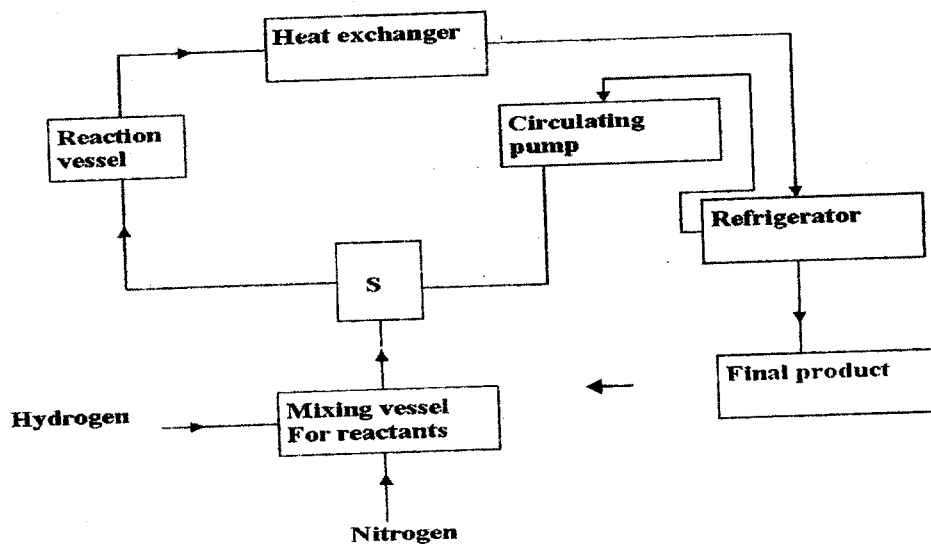
ii. How much X nitrate will crystallize out?

(1mark)

d) Determine the molar concentration of X nitrate at 15°C .
(X = 39, N=14, and O = 16)

(3marks)

5. Study the flow chart for the industrial manufacture of ammonia given below and answer the questions that follow.



a) State the purpose of the unit labeled S.

(1mk)

b) What is the function of the circulating pump?

(1mk)

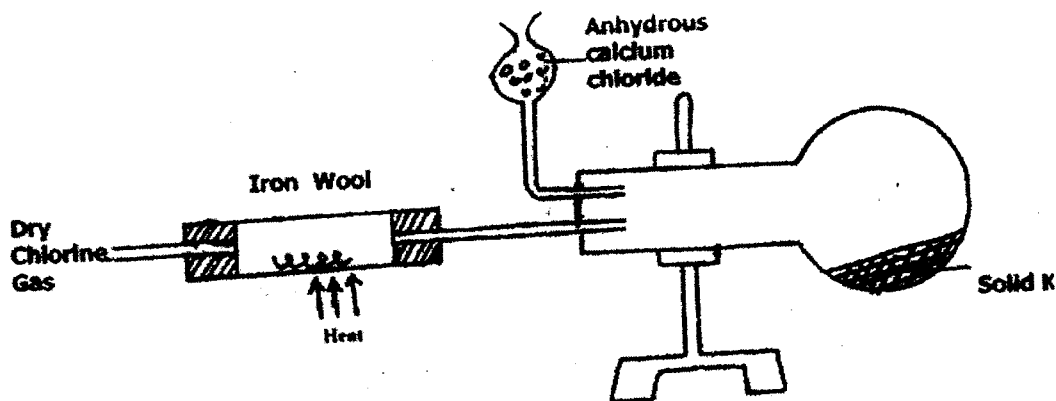
c) Suggest the source of the raw materials.

(2mks)

d) Name two impurities removed during the purification of hydrogen and nitrogen.

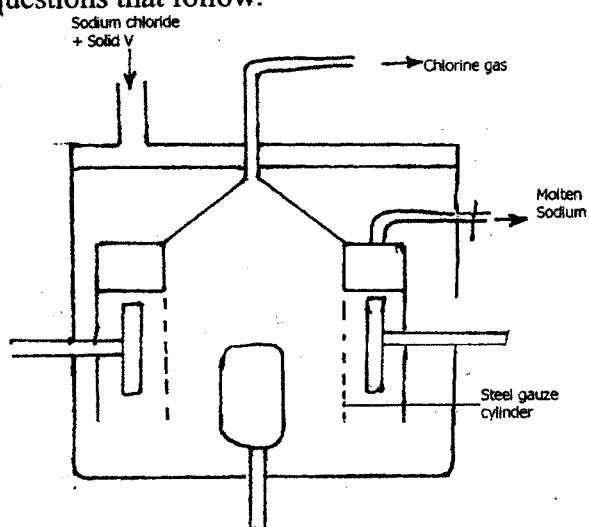
(1mk)

- e) In what state is the final product collected. Explain. (2mks)
 II. Below is a set – up in the preparation of a particular salt. Study it and answer the questions that follow.



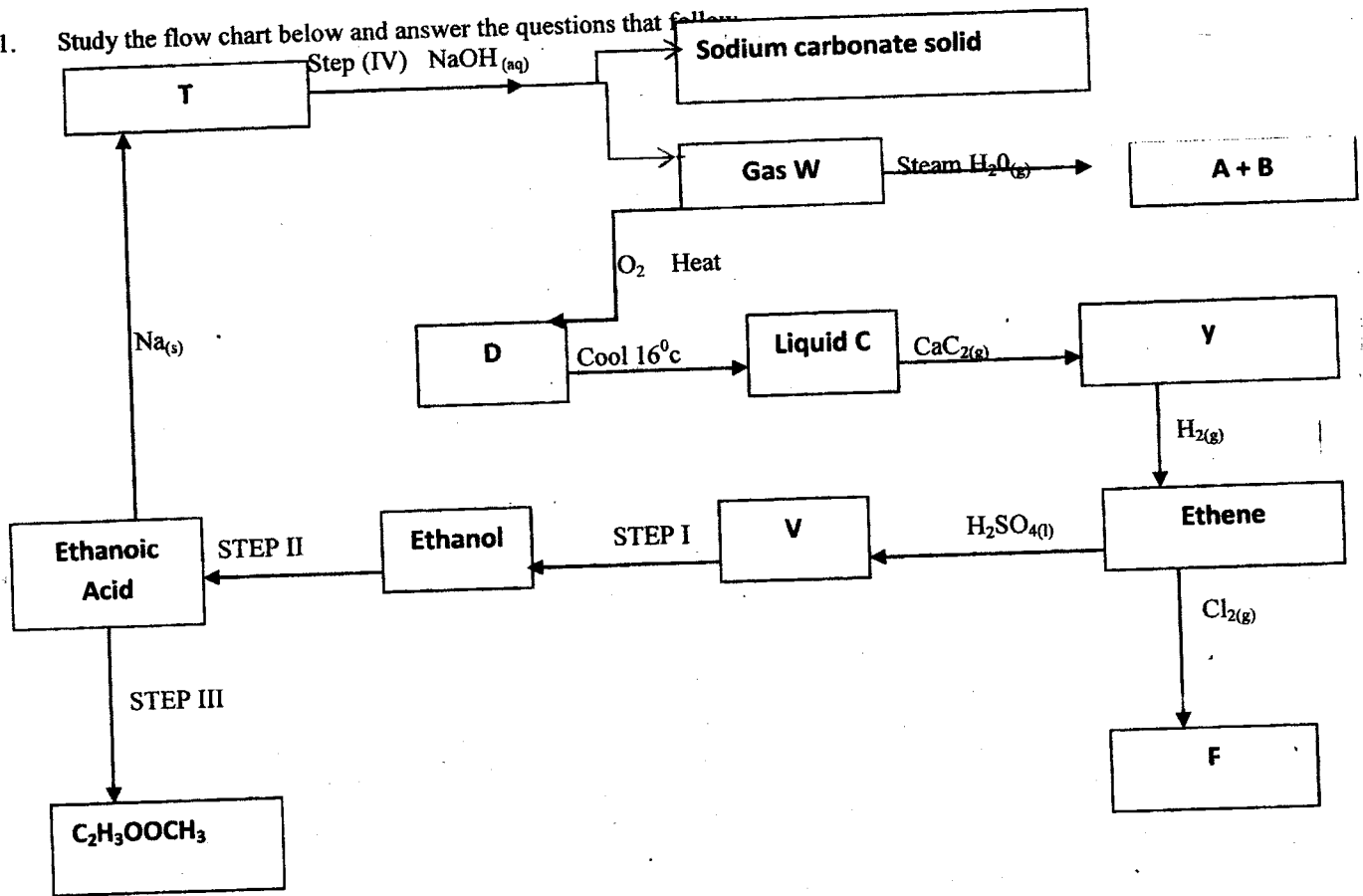
- a) Explain the observation made in the combustion tube when dry hydrogen Chloride gas is passed instead of dry chlorine. (2mks)
- b) Identify solid K (1mk)
- c) What property makes solid K to be collected in the flask as shown above. (1mk)
- d) State the purpose of anhydrous calcium Chloride as shown in the set – up above. (1mk)

6. The diagram below is the down all for the extraction of sodium metal. Use it to answer the questions that follow.



- a) In which state is sodium chloride and how is it maintained in the state. (1mk)
- b) Name solid V and state its use. (2mks)
- c) Give a reason why the anode is made of graphite and not steel. (1mk)
- d) Write equations for reactions that take place at:
- i) Anode (1mk)
 - ii) Cathode (1mk)
- e) State the function of the steel gauze cylinder. (2mks)
- f) State the main impurity in the sodium collected and state how it is removed. (1mk)
- g.) Why is it possible to collect the sodium as shown above? (1mk)

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



- (a) Name the substances
- T.....
 - W.....
 - A and B.....
 - C.....
 - D.....
 - Y.....
 - V.....

$\frac{1}{2}$ mk
 $\frac{1}{2}$ mk
 (1mk)
 $\frac{1}{2}$ mk
 $\frac{1}{2}$ mk
 $\frac{1}{2}$ mk
 $\frac{1}{2}$ mk
 (1mk)

(b). Write the equation in step IV

(d) Name the reagents used in:

i) Step II

(1mk)

ii) Step I

(1mk)

(e) Write the equation between gas W and steam H_2O

(1mk)

(f) Write the equation for the reaction between liquid C and calcium carbide.

(1mk)