NAME..... INDEX NO.....

CANDIDATE'S SIGNATURE.....

ALLIANCE HIGH SCHOOL

233/2

CHEMISTRY

PAPER 2

PIRE- TRIAL EXAM 2016

THEORY

TIME: 2 HRS

INSTRUCTIONS TO CANDIDATES

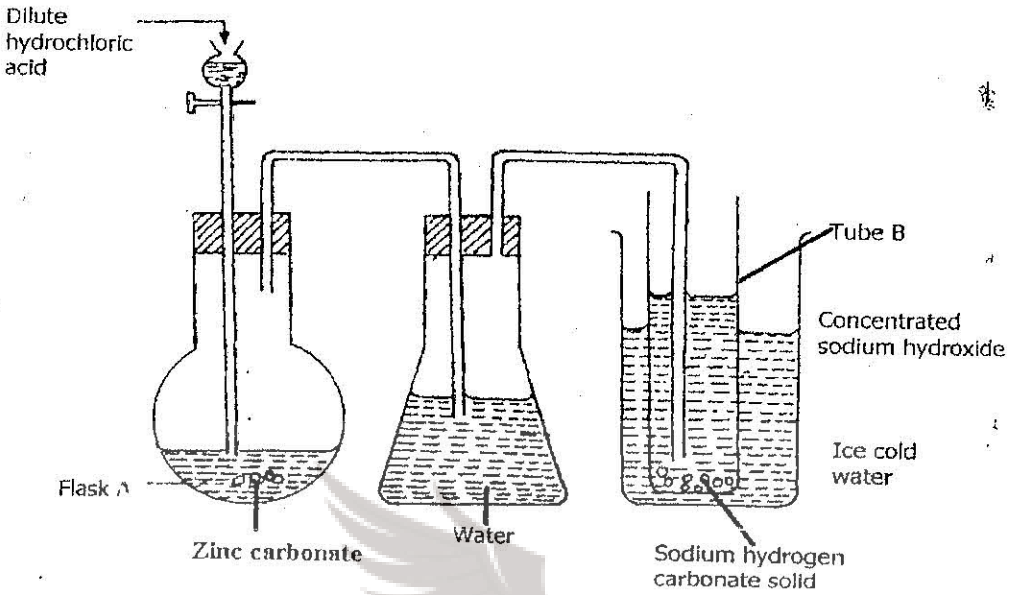
1. Answer ALL questions in this paper in the spaces provided
2. Mathematical tables and electronic calculators may be used for calculation
3. All working must be clearly shown where necessary

FOR EXAMINERS USE ONLY

QUESTION	MAXIMUM SCORE	CANDIDATE'S SCORE
1	10	
2	3	
3	6	
4	14	
5	12	
6	7	
7	15	
TOTAL	80	

This paper consists of 12 printed pages.
Candidates should check the question paper to ensure that all pages are printed as indicated and no questions are missing.

1. A student wanted to prepare sodium carbonate in the laboratory. She set up the apparatus as shown



a) i) Write an equation for the reaction taking place in flask A. (1mk)

ii) Give one reason why the product(s) (are) passed through water. (1mk)

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.....

iii) Give one disadvantage of passing products through water. (1mk)

.....

iv) Write the two possible equations that led to the formation of sodium hydrogen carbonate (2mks)

v) Suggest why the student should do to finally obtain sodium carbonate from sodium hydrogen carbonate. (1 mrk)

b) A certain carbonate reach with dilute hydrochloric acid according to the following equation.

$$XCO_{3(s)} + 2HCl_{(aq)} \longrightarrow XCl_{2(g)} + H_2O_{(l)} + CO_{2(g)}$$

1g of this carbonate was dissolved in 50g of 1M hydrochloric acid. After the reaction the solution needed $30cm^3$ of 1M sodium hydroxide for neutralization.

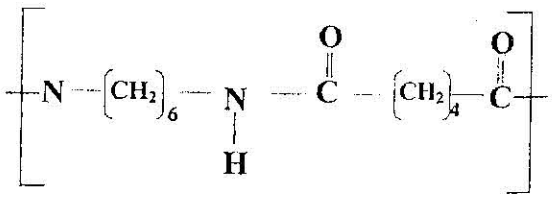
i) Calculate the number of moles of sodium hydroxide that reacted? (1mk)

ii) Determine the number of moles of hydrochloric acid used in the reaction with XCO_3?

iii) Calculate the molecular mass of XCO_3? (2mks)

iv) Hence give the relative atomic mass of X. (1mk)

2. Study the compound shown below carefully and answer the questions that follow.



i) Give the general term that describes compounds of this nature. (1mk)

.....

ii) Draw the structure of two repeating units that can from the compound in (i) above (1mk)

iii) Give one use of this compound in (b) above . (1mk)

.....

3. The table below shows some properties of organic compounds A,B and C. Use the information to answer the questions that follow.

Compounds	A	B	C
Reactions with liquid bromine	Decolourise bromine very fast	No reaction	Decolourise bromine liquid very slowly
Combustion	Burns with yellow smoky flame	Burns with blue flame leaving no residue	Burns with yellow flame
Reaction concentrated at 180°C	No reaction	Compound A is formed	No reaction

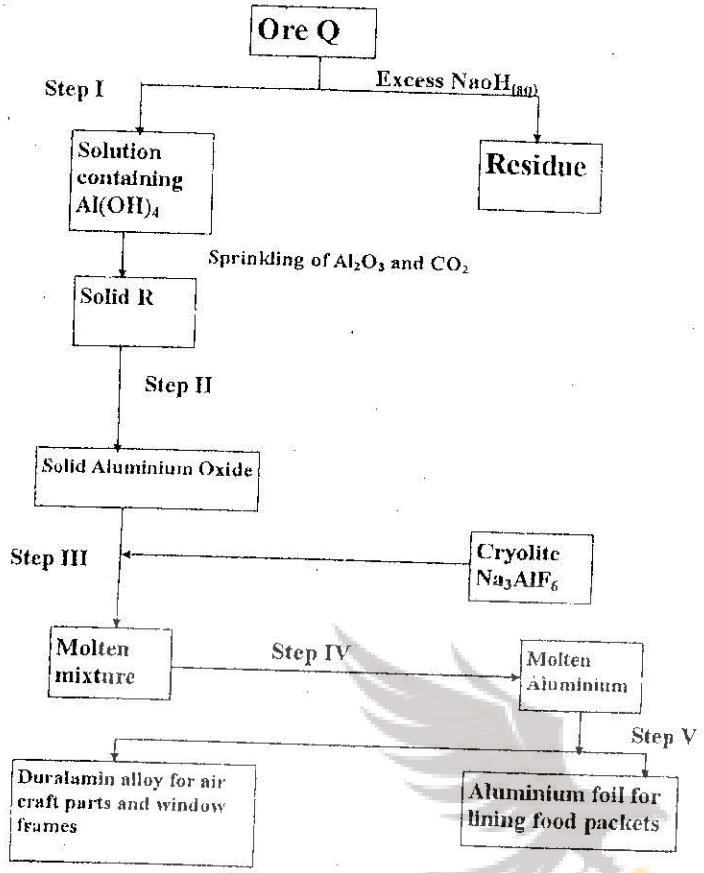
i) To which homologous series does each compound belong? (3mks)

A ..... (1mk)

B ..... (1mk)

C ..... (1mk)

4. Study the scheme shown below and answer the questions that follow.



a) i) Name ore Q and solid R. (2mrks)

.....

ii) Explain why step I is necessary (1mk)

.....

.....

iii) Explain happens in step II (1mk)

.....

.....

iv) Why is cryolite added in step III. (1mk)

.....

.....

b) i) Why is the anode replaced from time to time during the electrolysis?
(1mk)

.....

ii) During the reaction in step IV Na+ and F- ions are note discharged. Explain
(2mrks)

.....

.....

iii) Write ionic equations for the reaction that takes places at the anode and cathode in step IV.
At anode

..... (1mk)

At cathode.

..... (1mk)

c) State two reasons why aluminium is preferred to copper in the manufacture of overhead electric cables

.....

.....

.....

(2mrks)

d) Aluminium is high in the reactivity series yet it does not react with water and air.

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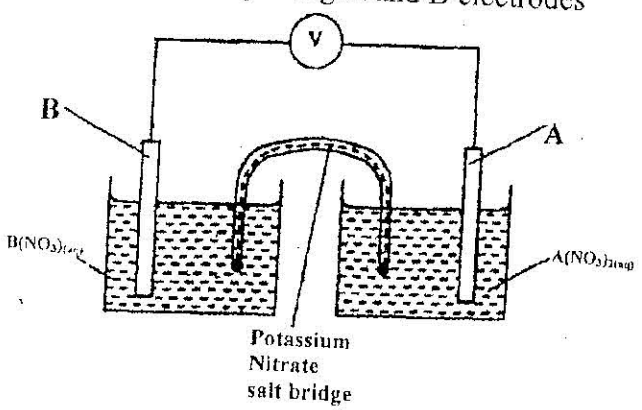
.....

(1mrk)

5. Standard electrode potentials for half cell reactions are shown below.

$A^{2+}_{(aq)} + 2e^-$	⟶	$A_{(s)}$	- 0.76V
$B^{2+}_{(aq)} + 2e^-$	⟶	$B_{(s)}$	- 0.13V
$C^{+}_{(aq)} + e^-$	⟶	$C_{(s)}$	+ 0.80V
$D^{2+}_{(aq)} + 2e^-$	⟶	$D_{(s)}$	+ 0.34v

The cell below was set up using A and B electrodes



a) i) Give the half -- cell equations of each half cell? (1mk)

ii) Write the overall cell equation. (1mk)

iii) Calculate the e.m.f of the cell above. (1mk)

iv) Describe how the salt bridge helps in maintaining the charge balance is each half cell when the cell is in operation.

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v) It is not advisable to use potassium chloride salt bridge when lead nitrate solution is used as an electrolyte in the above set up.Explain . (2mrks)

..... (2mks)

.....

.....

b) Sodium hydroxide is a chemical that can be prepared industrially in a mercury cell.

i) Give the name of the main raw material used? (1 mrk)

ii) In the cell, graphite is used as anode electrode. Name another substance that be used in the place of graphite (carbon) (1mrk)

iii) Name two uses of sodium hydroxide. (1mk)

.....

.....

iv) Give two reasons why mercury is recycled. (1mk)

.....

.....

v) Write an equation for the reaction in which sodium hydroxide is produced. (1mk)

b) If the volume of hydrogen gas produced in the mercury cell is 100 litres. Calculate the mass of sodium hydroxide formed room temp and Pressure (H = 1.0 Na = 23.0 O = 16.0, MGV = 24 litres) (2mrks)

6. Use the grid below to answer the questions that follow. The letters do not represent the actual symbols of elements.

F	J
G	
H	

		M		O	
K	L		N	P	Q

a) Give the family name of the group in which elements G and H are members? (1mrk)

b) State and explain the difference in reactivity between;
I G and J

.....

.....

.....

(1mk)

II N and P (1mrk)

.....

.....

c) How does atomic radius of k compare to that of L? Explain. (1mrk)

.....

.....

d) Element R forms an oxide of the formula RO_2 and belongs to period two. Indicate in the grid the position of R. (1mrk)

.....

.....

e) Explain the trend in the melting points in the group of elements to which F and J belong?

(2mks)

.....

.....

f) Give the formula of the compound formed between K and P. (1mrk)

g) Name the type of bond formed when F reacts with O. Explain. (2mks)

.....

.....

h) Give one use of element Q ? (1mk)

.....

g) Give the electron arrangement of an ion of ;

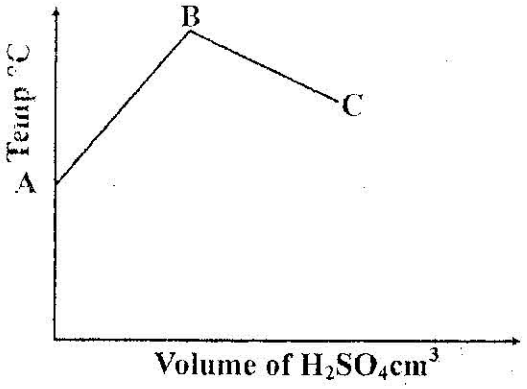
H (½ mk)

.....

M (½ mk)

.....

7. In an experiment $50cm^3$ of 1M solution hydroxide was placed in a plastic beaker wrapped in a newspaper sheet. $10cm^3$ portions of 1M sulphuric acid were added at a time and the mixture was stirred with a thermometer and the highest temperature rioted. The results were plotted in a graph as shown below.



i) Why was it necessary to wrap the plastic beaker with newspaper sheet? (½ mrk)

.....

ii) State the significance of point ;

A ..... (½ mrk)

B ..... (½ mrk)

iii) Suggest the volume of sulphuric (VI) acid that corresponds to point B. (2 mks)

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.....

iv) Stirring was necessary. Explain ? (½ mrk)

.....

.....

v) Explain the temperature change between points B and C. (1mrk)

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

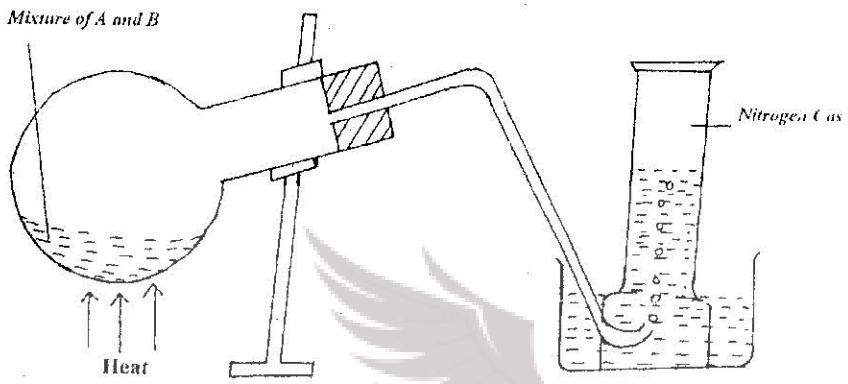
$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(aq)}$ $\Delta H = -92Jk\ mol^{-1}$

What is the effect on the position of the equilibrium by:

i) Increasing pressure

ii) Increasing temperature (2mrks)

8. The set – up below was used to prepare nitrogen gas in the laboratory. Study it And answer the questions below.



i) Identify the substances A and B (1mk)

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ii) Write equation that lead to the production of nitrogen gas. (1mk)

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iii) Why is the mixture of A and B used? (1mk)

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.....

b) Calculate the oxidation numbers of nitrogen in:

i) Sodium nitrate $NaNO_3$ (1mk)

.....

ii) Ammonium ion NH_4^+ (1mk)

.....

b) Between ammonium Sulphate and ammonium nitrate which one is a better Fertilizer. Show your working?(N=14, H=1, S=32, O=16) (3mks)

.....

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d) Name the raw materials and the catalyst used in the industrial manufacture of nitric acid (3mrks)

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e) Explain why hydrogen gas is not produced when nitric acid is reacted with Zinc metal (1mk)

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f) Describe the pollution effects of nitrogen compounds in the atmosphere. (3mks)

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