NAME: ..... ADM NO: .....

SCHOOL: ..... DATE : .....

CANDIDATE'S SIGNATURE:.....

233/1
CHEMISTRY
PAPER 1
THEORY
JULY / AUGUST 2016
TIME: 2 HOURS

FORM 3

CHEMISTRY
PAPER 1
TIME: 2 HOURS

INSTRUCTIONS TO CANDIDATES

- Write your **Name, Index Number** and **School** in the spaces provided above.
- Sign and write the **date** of examination in the spaces provided.
- Answer **all** the questions in the spaces provided after each question.
- Mathematical tables and silent electronic calculators may be used.
- ALL working **MUST** be clearly shown where necessary.
- All questions should be answered in **English.**

FOR EXAMINER'S USE ONLY

QUESTIONS	MAX SCORE	CANDIDATE'S SCORE
1 – 24	80	

Study the table below and answer the questions that follows:-

Solution	PH
A	1.5
B	7.0
C	9.7

(i) Identify the solution which reacts with zinc oxide to give salt and water. (1mk)

.....

(ii) What is observed when sodium hydrogen carbonate is put in a beaker containing solution A. Explain. (2mks)

.....

.....

.....

Given Lead (II) Oxide solid, Sodium Sulphate solid, Dilute Nitric acid and Distilled water, describe how you can prepare Lead (II) Sulphate. (3mks)

.....

.....

.....

.....

.....

.....

(a) What is meant by Isotopes? (1mk)

.....

.....

(b) Two isotopes of an element X has mass number 69 and 71 with a relative abundance of 60.4% and 39.6%. Calculate the relative atomic mass of X. (3mks)

4. The ionization energies for three elements A, B and C are shown below.

Element	A	B	C
Ionization Energy (kJ)/moles	519	418	494

(a) What is Ionisation Energy (I.E)? (1mk)

.....

.....

(b) Which element is the strongest reducing agent? Explain. (2mks)

.....

.....

5. (i) Name a hydrogen carbonate that exists in solid state. (1mk)

.....

.....

(ii) Explain the differences in the observations which would be made when carbon (IV) oxide was bubbled through concentrated sodium hydroxide solution and lime water. (2mks)

.....

.....

.....

.....

6. Carbon (II) oxide would be prepared in the lab as shown by the equation below.

$$HCOOH \xrightarrow{\text{Conc. } H_2SO_4} CO_{(g)} + H_2O_{(l)}$$

(i) What is the purpose of the concentrated Sulphuric (IV) acid in the reaction? (1mk)

.....

.....

(ii) Why should the preparation of Carbon (II) oxide be carried out in the fume chamber? (1mk)

.....

.....

.....

(iii) Explain what would happen if carbon (II) oxide was passed over heated copper (II) oxide using a chemical equation. (2mks)

.....

.....

.....

.....

7. The table below shows the number of valence electrons of the elements J, L and M.

Element	J	L	M
Number of valence electrons	3	5	2

(a) Explain why J and M would not be expected to form a compound. (1mk)

.....

.....

(b) Write the formula for the most stable ion of L. (1mk)

.....

.....

8. (a) State Graham's Law of diffusion. (1mk)

.....

.....

(b) In an experiment, $60cm^3$ of oxygen diffuse through a porous pot in 10 seconds and $100cm^3$ of chlorine diffuse through the same porous pot in 30 seconds. If the density of oxygen is 1.25, calculate the density of chlorine. (3mks)

9. Under certain conditions, hexane can be converted to two products. The formula of one of the products is C_3H_8.

(i) Write the formula of the other products. (1mk)

(ii) Describe a simple chemical test to show difference between the two products. (2mks)

glass syringe contains 80cm^3 of air at 38^{0}C and 2 atmosphere pressure. Calculate the volume of r the syringe contains at a temperature of 38^{0}C and 4 atmospheres. (2mks)

sing dot (•) and crosses (x) draw structure to show the bonding in:

a) N_2H_4 (2mks)

b) H_3O^+

When a certain hydro-carbon burnt completely in excess oxygen 5.28g of carbon IV oxide and 2.16g of water were formed. If the molecular mass of the hydrocarbon is 84, determine the molecular formula of the hydrocarbon. (3mks)

$C_xH_y + O_{2(g)} \longrightarrow CO_{2(g)} + H_2O_{(l)}$

INSt

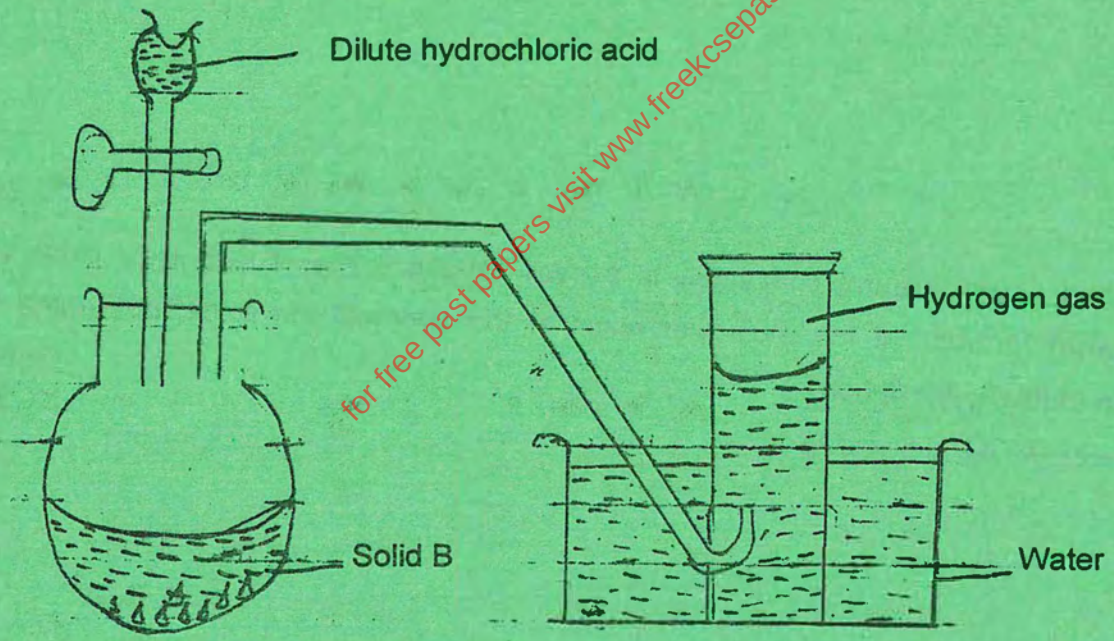
13. The table below gives information of four elements K, L, M and N. Study it and answer the questions that follow. The letters don't represent the actual chemical symbols.

Elements	Atomic No.	Atomic Radius (nm)	Ionic radius (nm)
K	12	0.136	0.045
L	17	0.099	0.181
M	19	0.203	0.133
N	20	0.174	0.099

(a) Write two elements that belong to the same group. Explain. (2mks)

(b) Which element is the strongest reducing agent? (1mk)

14. The set up below was used by a student to prepare hydrogen gas.



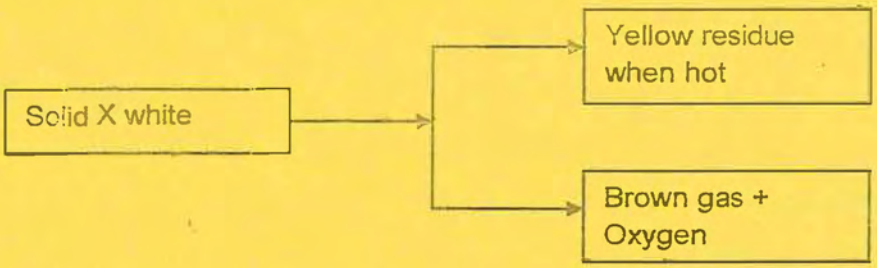
(i) Identify solid B. (1mk)

.....

(ii) Write a chemical equation for the reaction which produces hydrogen gas. (1mk)

(iii) Name **one** use of hydrogen gas. (1mk)

15. Study the scheme below and answer the questions that follow.



(a) Name:

(i) Solid X (1mk)

.....

(ii) The yellow residue. (1mk)

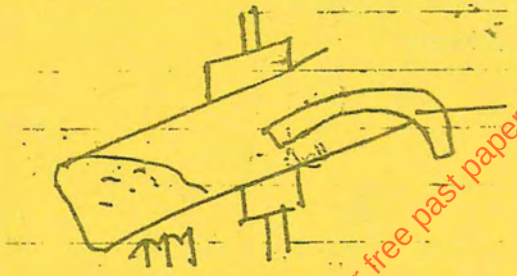
.....

(iii) The brown gas. (1mk)

.....

(b) Write an equation for the decomposition of solid x. (1mk)

16. The diagram below shows the heating of soli Ammonium chloride.



(a) The moist red litmus paper changed to blue then red. Explain. (2mks)

.....

.....

(b) State **one** observation in this experiment apart from litmus change. (2mks)

.....

.....

(c) Write an equation for the reaction. (1mk)

17. The gases methylamine (CH_5N) and Ammonia (NH_3) are closely related compounds and have similar properties. Each can be represented by formula $R - NH_2$.

(a) State what R will be in each case.

(i) Ammonia (1mk)

.....

(ii) Methylamine (1mk)

.....

(b) Predict the effect of methylamine on:

(i) Water coloured with litmus solution. (2mks)

.....

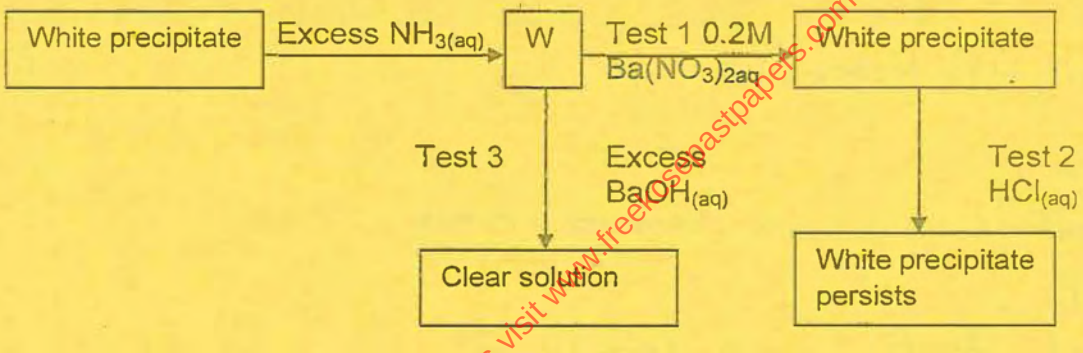
.....

(ii) Hydrogen chloride gas. (2mks)

.....

.....

18. Study the flow diagram below and answer the questions that follow.



(a) Identify the salt solution W. (1mk)

.....

(b) Name another reagent can be used in test 1 above. (1mk)

.....

(c) Write the formula of the ion responsible for the change in test 3. (1mk)

.....

19. Study the equations below:-

(i) $AlCl_{3(aq)} + 6H_2O_{(l)} \longrightarrow [Al(H_2O)_6]^{3+}_{(aq)} + 3Cl^-_{(aq)}$

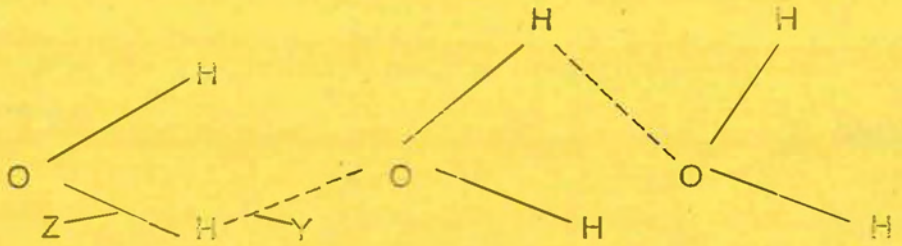
(ii) $[Al(H_2O)_6]^{3+}_{(aq)} + H_2O_{(l)} \longrightarrow [Al(H_2O)5OH]^{3+}_{(aq)} + H_3O^+_{(aq)}$

Name the processes in equations (i) and (ii)

(a) (i):.....

(b) (ii) .....

. The structure of water molecule can be represented as shown below.



(a) Name the type of bond represented by Y and Z. (2mks)

.....

.....

(b) Relative molecular mass of methane and water are almost similar. The boiling point of water is $100^{0}C$ while methane is $-161^{0}C$. Explain. (2mks)

.....

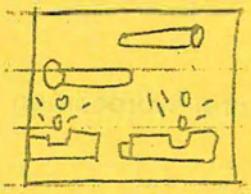
.....

.....

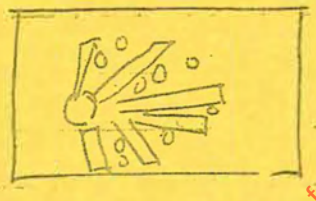
.....

. What does each of the following hazard signs mean?

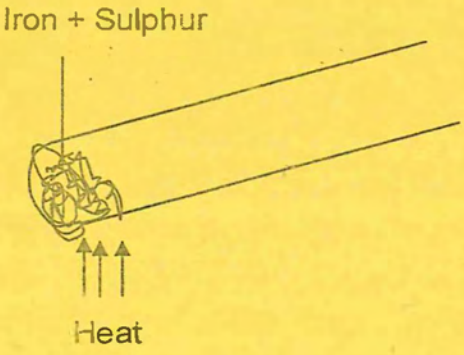
(a) (1mk)



(b) (1mk)



2. A mixture of Iron and sulphur powder was placed in a boiling tube and heated.



(a) State what was observed. (2mks)

.....

.....

(b) Write an equation for the reaction. (1mk)

(c) What would be observed if zinc is used instead of iron? (2mks)

.....

.....

.....

23. $20cm^3$ of NaOH solution containing $8.0g/dm^3$ required for complete neutralization 0.18g of dibasic acid. Calculate the relative molecular mass of the acid. (3mks)

24. A molecular of C_xH_6 has a mass of $5.0 \times 10^{-23}g$. Draw the structural formula of a hydrocarbon.