Name …… Class: ……..Adm no.....

FORM 2
CHEMISTRY
END-YEAR EXAMINATION 2017
TIME: 2 HOURS

Instructions

- **The paper contains two sections A and B**
- **Answer ALL the questions in the spaces provided.**
- **Mathematical tables and electronic calculators MAY be used.**
- **All working MUST be clearly shown where necessary.**

FOR EXAMINERS' USE ONLY

Questions	Max. Score	Candidates' Score
17	100 marks	

NB: This paper consists of 11 printed pages. Students should check the question paper to ensure that all pages are printed as indicated and that no questions are missing.

Turn over!

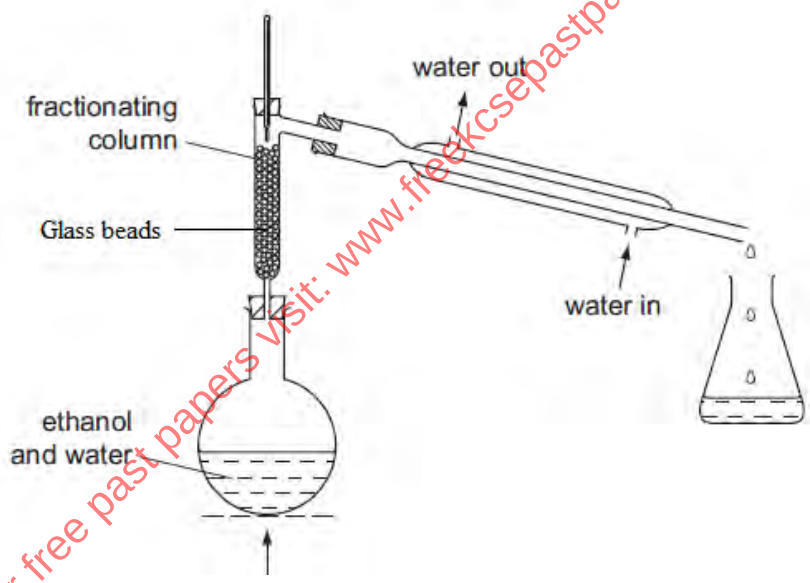
SECTION A[50MARKS]

1) State and explain the change in mass that occurs when the following substances are heated in a crucible.

A] zinc nitrate [2mks]

b] zinc metal [2mks]

2) Fractional distillation can be used to separate a mixture of water and ethanol using the set up shown below.



a]State the role of each of the following parts of the set up for the process

i] Fractionating column

[1mk]

ii]Glass beads in the fractionating column [1mk]

b] State two properties that make it possible to separate the mixture. [1 mk]

c] State two other industrial applications of fractional distillation. [2mks]

3) Impurities have an effect on both the melting and boiling point of a substance.

a]State the effect of an impurity on the melting point of a substance. [1mk]

b] State the **two** real life applications of the effect you have stated above. [2mks]

4. Magnesium hydroxide is used as a medication to relieve stomach acid.

a] Write a chemical equation for the reaction that occurs in the stomach once the medicine is taken. [1mk]

b] Explain why it is not advisable to use potassium hydroxide for the same purpose. [1mk]

c]i)State and explain the observation made when a spatula full of lead (II) carbonate is added to a beaker containing $10cm^3$ of dilute sulphuric acid. [2mks]

ii) Write a chemical equation to support your explanation in (c)(i) above. [1mk]

5. a]Name four types of oxides [2mks]

b] Name any two major gaseous air pollutants [1mk]

6. [a]In the preparation of hydrogen gas in the laboratory, explain why copper metal and dilute hydrochloric acid are not suitable reagents. [1mk]

[b] State two uses of hydrogen gas. [1mk]

7. Explain the following observations;

[a]Potassium has a higher affinity for oxygen than lithium although they belong to the same group. [2mks]

[b] The boiling point of chlorine is lower than that of iodine yet they are all halogens [2mks]

[c] Magnesium is less reactive than sodium [2mks]

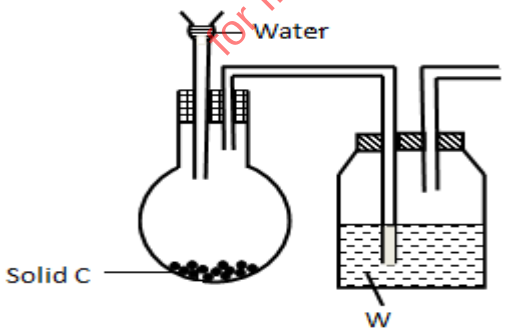
8. The second ionisation energies of the alkaline earth metals are much higher than their corresponding first ionisation energies.Explain [2mks]

9. Using dot (.) and cross (x) diagrams ,show the bonding in the following substances;

[a] Calcium fluoride (Atomic no. Ca = 20, F = 9) [2mks]

[b]Ammonium ion (Atomic no. N = 7, H = 1) [2mks]

10. The diagram below illustrates an experiment for preparing dry oxygen gas.



[i] Complete the diagram above by showing how the gas can be collected. [1mk]

[ii] Name substances

Solid C

Substance W [2mks]

[iii] State the role of liquid W
[1mk]

[iv] Which other chemical compound could play the same role as W? [1 mk]

[b] Write an equation to show the reaction taking place in the flask between C and water. [1mk]

11. State two differences in the electrical conductivity of magnesium metal and zinc chloride.
[2mks]

12. [a] Starting with lead(ii) oxide, briefly describe how pure sample of lead (II) carbonate can be prepared in the laboratory. [3mks]

[b] i)Write a balanced equation when copper (II) nitrate is strongly heated. [1mk]

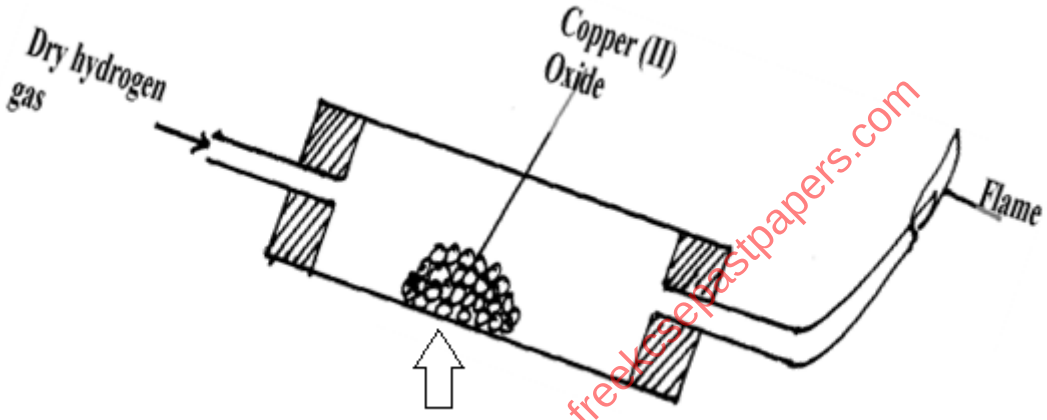
ii) State two observations madewhen copper (II) nitrate is strongly heated. [2 mks]

[c] i) What is the meaning of the term efflorescence ? [1mk]

ii)Give an example of an efflorescent salt. [1mk]

SECTION B (50 MKS)

13. Study the diagram below and use it to answer the questions that follow.



[a] What property of hydrogen gas is being illustrated in the above experiment?

[1mk]

[b] Before lighting hydrogen gas at the jet,it is important to drive off all the air in the combustion tube. Explain [1mk]

[c]i) State two observations made in the combustion tube during the experiment. [2mks]

ii)Give an equation for the reaction that causes the change you have mentioned . [1mk]

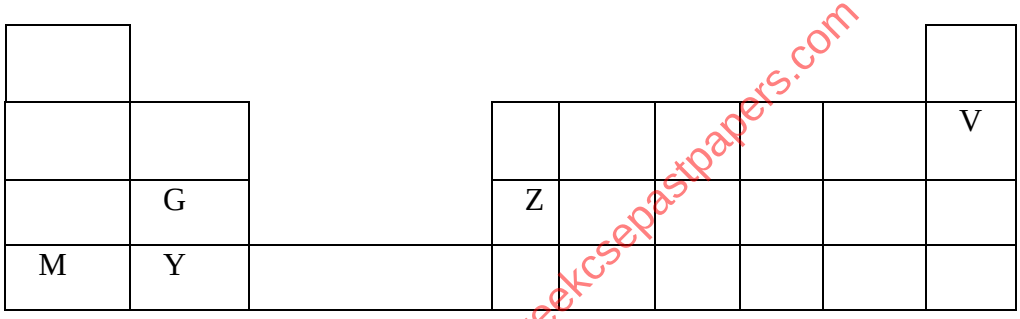
[d]Why is it important to clamp the combustion tube in a slanting position?

[1mk]

[e] Why should the supply of hydrogen continue until the apparatus are cool? [1mk]

[f] Name the product formed at the flame, giving an equation for the reaction. [2mks]

14. The grid below represents the periodic table. Study it and answer the questions that follow. (The letters do not represent the actual symbols of the elements.)



[a] Indicate the position of an element X on the grid where X has a mass number of 18 and 10 neutrons in its nucleus. [1mk]

[b] To which period does element Y belong? [1mk]

[c] Give the electronic arrangement and formula of the most stable ion formed by the element Z. [2mks]

[d] Compare the reactivity of G and Z, giving an explanation. [2mks]

[e] What name do we give to the group to which element G and Y belong to? [1mk]

[f] An element B is in period 3 and forms an ion with a charge of -2. Show its position on the grid.

[1mk]

[g] Which two elements have similar chemical reactions? Explain. [2mks]

[h] Give the formula for the sulphite of M. [1mk]

15. The diagram below shows a common charcoal burner .Assume the burning take place in a room with sufficient supply of air.

(a)Explain what happens around and write the correct chemical equation

(i)Layer A [2mk]

(ii)Layer B[2mk]

(ii)Layer C[2mk]

(b)State and explain what would happen if the burner is put in an enclosed room.[2mk]

16[a]An ion R^{3+} has an electron arrangement of 2.8. Give the formula of the oxide of the element and state the type of bond in the compound. [2mks]

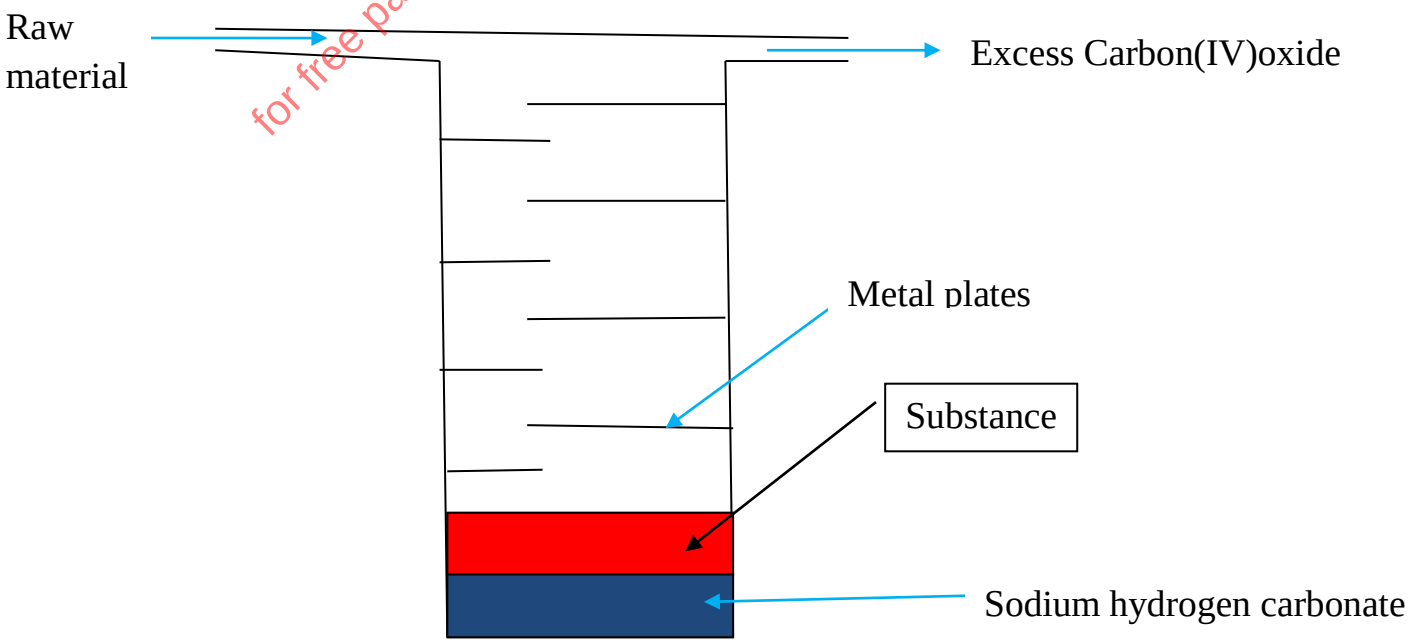
[b] Sodium has a melting point of 98°C while aluminium has a melting point of 660°C. Explain the large difference in the melting points of the two metals. [2mks]

[d] Work out the ionic equations for the following reactions ;

i) Lead (ii) nitrate solution and sodium chloride solution. [2mks]

ii) Ammonium carbonate solution and barium nitrate solution. [2mks]

17 a] The diagram below shows a simple ammonia soda tower used in manufacturing sodium carbonate .Use it to answer the questions that follow:



(i)Name the raw materials needed in the above process[3marks]

(ii)Identify substance A[1mk]

(iii) Write the equation for the reaction taking place in:
I.Tower.
Chemical equation [1mk]

II. Production of excess carbon (IV)oxide.
Chemical equation [1mk]

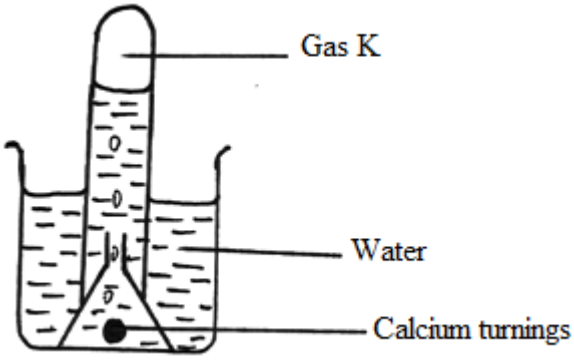
III. The regeneration of ammonia
Chemical equation [1mk]

(iv)Give a reason for having the circular metal plates in the tower.[2mks]

(v)Name the gases recycled in the process illustrated above.[1mk]

[Vii] Describe how you would differentiate between carbon (IV)oxide and carbon(II)oxide using chemical method.[2marks]

[b]The set-up below was used to prepare and collect gas K produced by the reaction between water and calcium metal



[a] Name gas K [1mk]

[b] At the end of the experiments, the solution in the beaker was found to have a pH of about 11. Explain (2mks)

[c] State and explain one more observation made as the reaction progressed. [2 mks]