**DR AGGREY HIGH SCHOOL**

**FORM 3 TERM 2, EXAM 2, 2018**

**CHEMISTRY TIME: 2HRS**

Name: ………………………………………… Adm No:….… Class…..

INSTRUCTIONS

-Answer all the questions in the spaces provided below each question.

1. 60cm3 of oxygen gas diffused through a porous portion in 50 seconds. How long would it take 60cm3 of sulphur (IV) oxide gas to diffuse through the same portion under same conditions. (S=32.0, O=16.0) (3mks)
2. i) State how burning can be used to distinguish between ethane and ethyne.

Explain. (2mks)

 ii) Draw and name the structural formula of the third member of the homologous series

of ethyne. (1mk)

1. a) Give the systematic names of the following hydrocarbons.

 i) CH3 (CH2)4 CH3 (1mk)

 CH3

 ii) CH3 – C = CH2 (1mk)

b) Draw the structural formula for each of the following compounds

i) 2,2,4-trimethylpentane (1mk)

ii) 3-chloro-2-iodo-4,4-dimethlyhex-2-ene (1mk)

iii) 1-bromo-3-ethylpentene (1mk)

1. Explain the observation made when, burning magnesium is lowered into a glass jar of carbon (IV) oxide. (1mk)

(b) Write an equation for the reaction that takes place in (a) (1mk)

1. Study the set-up below and answer the questions that follow.



1. Name gas K. (1mk)
2. To which homologous series does K belong? (1mk)
3. Write the chemical equation of the reaction in the round bottom flask.(1mk)
4. Define the following terms (3mks)
	1. Monatomic gas
	2. Diatomic gas
	3. Atomicity of an element
5. 12.5 cm3 of solution containing 13.8g/cm3 of carbonate M2 CO3 required 12.3 cm3 of

H2 SO4 containing 9.8g/ dm3 for complete neutralization.

(a) Write the equation for the above reaction ( 1 mk)

(b) Calculate the molarity of the acid ( 2 mks)

(c) Calculate the molarity of the carbonate ( 2 mks)

(d) Calculate the molar mass of the carbonate ( 2 mks)

(e) Find the relative atomic mass of M ( 2 mks)

1. Calculate the volume of water that must be added to 15cm3 of 3M nitric acid solution to produce a solution of 0.1M. (3mks)
2. 500 cm3 of carbon (ii) oxide was reacted with 170 cm3 of oxygen gas

a) Give an equation for the reaction between carbon (ii) oxide and oxygen (1mk)

b) Assuming that the reaction goes to completion and that all volumes were measured at r.t.p. Calculate

 i) the volume of carbon (iv) oxide formed (3mks)

 ii) The volume of carbon (ii) oxide left if any. (1mk)

 iii) The total volume of the gaseous mixture at the end of the reaction (1mk)

 iv) The number of oxygen molecules that reacted. (L= 6.0 x 1023) (2mks)

1. In the preparation of magnesium carbonate magnesium was burnt in air and the product collected. Dilute sulphuric acid was added and the mixture filtered and cooled. Sodium carbonate was added to the filtrate and the content filtered. The residue was washed and dried to give a white powder.

 a) Give the chemical name of the product formed when magnesium burns in air (1mk)

 b) Write a chemical equation for the formation of product. (1mk)

 c) (i) Name filtrate collected after sodium carbonate was added (1mk)

 (ii) Name the white powder. (1mk)

 d) Write chemical equation for the reaction between product in (a) and acid. (1mk)

 e) Name the ions present in the filtrate after addition of sodium carbonate. (1mk)

 f) Write an ionic equation to show the formation of the white powder (1mk)

 g) Write an equation to show what happened when white powder is strongly heated. (1mk)

1. The following table gives information on four elements by letters **W**, **X**, **Y** and **Z.**
2. Study it and answer the questions that follow. The letters are not the actual symbols of the elements.

|  |  |  |  |
| --- | --- | --- | --- |
| **Element** | **Electron** **Arrangement** | **Atomic radius (mm)** | **Ionic radius (mm)** |
| **W** | 2.8.2 | 0.136 | 0.065 |
| **X** | 2.8.7 | 0.099 | 0.181 |
| **Y** | 2.8.8.1 | 0.203 | 0.133 |
| **Z** | 2.8.8.2 | 0.174 | 0.099 |

1. Which **two** elements have similar properties? Explain. (2mks)

1. What is the most likely formula of the oxide of **X**. (1mk)

1. Which element is a non-metal? Explain. (2mks)
2. Explain the difference in the atomic radii of **Y** and **Z**. (1mk)

(b) Sodium hydroxide pellets were accidentally mixed with sodium chloride. 17.6g of the mixture were dissolved in water to make one litre of solution. 100cm3 of the solution was neutralized by 40cm3 of 0.5M sulphuric (VI) acid.

(i) Write an equation for the reaction that took place. (1mk)

(ii) Calculate:

1. Number of moles of the substance that reacted with sulphuric (VI) acid. (1mk)
2. Number of moles of the substance that would react with sulphuric (VI) acid in one litre of solution. (1mk)
3. Mass of the unreacted substance in one litre of solution.

(H=1, Na=23, Cl=35.5, O=16). (2mks)

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

**L + H2O**

**Ca(OH)2**

**Gas J**

**K**

 **H H**

 **C C**

 **H Cl**

**CH3 CH2 OH**

**C2H4**

**CH3 CH3**

 Step 3

 1mole

 HCl

 Step 1 Step 2

 1mole step 4

 H2(g)

 H2O catalyst Ni, H2, 150oc

 Step 5 Step 6

1. (i) Identify reagent **L**. (1mk)

(ii) Name the catalyst used in step 5. (1mks)

 (iii) Draw the structural formula of gas **J**. (1mk)

1. Name the process in: (3mks)

 Step 3

 Step 5

 Step 6

1. State **one** commercial application of the process which takes place in step 6 (1mk)
2. Write equations for the reaction in

 Step 2 (1mk)

 Step 4 (1mk)

(b) The lists below are for organic compounds. Use it to answer the questions that follow:

K1 CH3CH2CH2OH

K2 CH3 CH2 CH3

 O

K3 CH3 CH2 CH2 C –OH

K4 CH3 CH2 CH2 CH=CH2

K5 CH3 CH2 CH2 CH3

 (i)Select **two** compounds which

I. Are not hydrocarbons. (1mk)

II. Belong to the same homologous series. (1mk)

 (ii) Identify the compound that is likely to undergo polymerization. (1mk)