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

 TIME: 2 HOURS

FORM III CHEMISTRY

PAPER 2

July 2017

MWAKICAN JOINT EXAM

CHEMISTRY PAPER 2

**Instructions to students.**

**(a) Write your name and admission number.**

**(b) Answer ALL the questions in this question paper.**

**(c) All your answers must be written in the spaces provided in this question paper.**

**(d) Students must answer all questions in English**

 **For Examiner’s Use Only.**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| **1** | **13** |  |
| **2** | **10** |  |
| **3** | **13** |  |
| **4** | **10** |  |
| **5** | **11** |  |
| **6** | **11** |  |
| **7** | **12** |  |
| **Total Score** |  |
|  |

Section 1

Q1(a) The grid below is part of the periodic table. The elements are not represented by their actual symbols. Use it to answer the questions that follow.

|  |  |  |
| --- | --- | --- |
|  |  |  |
|  |  |  |  |  |  |  | J |  |
| L | K |  | P |  | , | M |  |  |
| R |  |  |  |  |  |  | N |  |
|  |  |  |  |  |  |  |  | S |

I) Which is the most reactive metal?

 Explain (2mks)

ii) Name the families to which K and S belong (2mks)

 K

 S

iii) Write the formula of the compound formed between P and M (1mk)

iv) What type of bond is contained in the oxide of K. Write the formula of the oxide. (1mks)

v) Compare the atomic radii of L and K. Explain (2mk)

vi) Write an equation for the reaction between L and water. (1mk)

vii) Identify the element which forms an ion with a charge of -2. Explain (1½mks)

viii) Write the electron configuration of the ion of R (½mks)

b) Give an example of a substance that exists as

 (i) Giant atomic structure (1mk)

 (ii) Dimers (1mk)

Q2. 80 cm3 of a sample of air was passed through two wash bottles, the first containing aqueous sodium hydroxide and the other containing concentrated sulphuric(VI) acid,after which it was collected in a gas syringe.

(a) what components of air were absorbed by each of the two solutions

(i) sodium hydroxide (1mk)

(ii) concentrated sulphuric(VI) acid (1mk)

b) The remaining sample was then passed several times over heated copper powder until no further

 contraction of volume took place. After cooling to the original temperature, the volume was found to

 have reduced to 63.2cm3.

(i) What change is observed on the copper. (1mk)

(ii) Which gas was removed by the copper (1mk)

(iii) Write an equation for the reaction between copper and the gas in (ii) above.(1mk)

(iv) Calculate the volume of this gas present in the air sample. (1mk)

(v) Calculate the percentage of this gas in the syringe. (1mk)

c)(i) Name the main gas remaining in the syringe (1mk)

ii) Is the main gas named in (i) above pure or not. Explain (2mks)

Q3 The scheme below outlines a method of preparing fertilizers. Use it to answer the questions below it

Air S02 Steam or natural gases

 Gas Gas B

 A

 Haber process

 Ammonia Fertilizer C

Dilute sulphuric (VI) acid

Fertilizer D

Oxygen

 900o C

catalyst E

 Nitric(V) acid Colourless gas F

 water Oxygen in air

 + Air Brown gas G

 a) Identify substances.

 B

 D

 E

 F

 (2mks)

b) Which is a better nitrogenous fertilizer between C and D? Explain

 S=32,O=16,H=1,N=14

 (3mks)

c) Write an equation for formation of fertilizer C (1mk)

d) Name the products formed when gas G is dissolved in water without excess oxygen. (1mk)

e) State one use of ammonia other than manufacture of fertilizer (1mk)

f) Name the method used to isolate Gas A from air on large scale. (1mk)

g) Wet litmus papers were inserted in a gas jar of ammonia

 (i) what changes were made on the litmus papers. (1mk)

 (ii) Which ion is responsible for the change (½mks)

h) Calculate the volume of hydrogen gas at st.p that would combine with 4.2g of nitrogen gas to form ammonia. $\left(\begin{array}{c}molar gas\\volume at s.t.p=22.4dm^{3}\end{array}\right)$ (2½mks)

Q4 In an experiment to prepare ethene,pieces of broken porcelain were put in a flask containing a mixture of ethanol and concentrated sulphuric(VI) acid. The mixture was heated over a sand bath and a thermometer fitted on the flask and the gas was collected over water.

(a) Draw the structure of ethene (1mk)

b) What property of concentrated sulphuric (VI) acid is used in the experiment. (1mk)

c) What is the purpose of

 (i) sand bath (1mk)

 (ii) broken porcelain (1mk)

d) The first portion of gas should be allowed to escape. Explain (1mk)

e) The remaining mixture in the flask after gas is collected is added to a large volume of water.

 Explain (1mk)

f) When alkanes combine with halogens they undergo substitution reactions. What type of reactions are involved in reactions of alkenes with halogens? (1mk)

h) Draw and name two isomers of pentene. (2mks)

i) Name the compound below

 CH3 C CH – CH2CH3 (1mk)

 CH3

Q5(a) Study the set-up below and answer the questions that follow



i) Write equations for the reaction in

 Tube A (1mk)

 Tube B (1mk)

ii) What is the aim of heating wet sand (1mk)

iii) Name another metal that can be used in place of zinc (1mk)

iv) What is the purpose of the Anhydrous calcium chloride in the u-tube (1mk)

v) How do you test for the gas produced in tube A (1mk)

b)(i) Name two sources of water pollution. (1mk)

ii) Write down and explain two observations made when a small grain of sodium metal is dropped on the surface of water in a beaker. (2mks)

c)(i) What property of hydrogen makes it useful in weather balloons. (1mk)

(ii) Name another use of hydrogen (1mk)

Q6(a)(i) Name two allotropes of carbon. (1mk)]

(ii) An allotrope of carbon is used in making jewellery. Name the allotrope and give the property that

 makes it suitable for making jewellery. (2mks)

b) Carbon (IV) oxide can be prepared in the lab by reacting a carbonate with a dilute acid.

 (i) Why is it not advisable to use lead (II) carbonate and dilute sulphuric (VI) acid. (1mk)

 (ii) Write an equation using suitable reagents for formation of carbon(IV) oxide. (1mk)

c) When a burning magnesium ribbon is lowered in a gas jar containing carbon(IV) oxide, it continues to burn

(i) Explain this observation. (1mk)

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

d)(i) Name two main raw materials in the industrial manufacture of soda ash by the Solvay process.

 (1mk)

ii) Name the other final product in the Solvay process. (1mk)

iii) Name one substance which is recycled. (1mk)

iv) Name one use of soda ash. (1mk)

Q7 12g of a mixture of sodium carbonate and sodium sulphate were mixed with distilled water in a flask and topped up to a litre. 25.0cm3 of this solution required 12.5cm3 of 0.2M sulphuric(VI) acid for complete reaction.

(a) Which substance in the mixture reacted with dilute sulphuric(VI) acid. (1mk)

b) Write an equation for the reaction that took place in (a) above. (1mk)

c) Calculate the number of moles of the acid which reacted with the substance above. (2mks)

d) Determine the number of moles of the substance which took part in the reaction. (1mk)

e) What is the concentration of the substance in moldm-3 (1mk)

f) Calculate the mass of the substance which reacted that was contained in the mixture. (2mks)

 (Na=23, C=12.0, O=16, H=1, S=32)

g) What was the percentage of sodium sulphate in the mixture. (2mks)

h) Calculate the volume of gas produced in the reaction at r.t.p(molar gas Volume at r.t.p = 24 litres) (2mks)

 (Na = 23, C=12,0=16,H=1,S=32)