MANGU HIGH SCHOOL

**233/2**

**CHEMISTRY**

**PAPER 2**

**JULY 2014**

**TIME: 2 HOURS**

NAME: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

ADM NO: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ CLASS: \_\_\_\_\_\_\_\_\_\_

**Kenya Certificate of Secondary Education**

**MOCK EXAMINATIONS**

**Chemistry**

**Paper 2**

**2 Hours.**

* Answer ALL the questions in the spaces provided.

This paper consists of **printed pages.**

Make sure that all the pages are printed and that no page is missing.

*Turn Over*

1. (a) Acidified potassium manganate VII solution oxidizes iron (II) to iron

(III) as shown in the ionic equation below. If 0.2m KHMO4 solution is needed to react with 25cm3 of 0.1m iron (II) ammonium sulphate. Calculate the volume of KMnO4 solution required. (3mks)

MnO-4(aq) + 5Fe2+(aq) + 8H+1(aq) Mn2+(aq) + 4H2O+(l) + 5Fe3+(aq)

(b) 12g of a mixture of sodium sulphate and sodium carbonate were mixed with distilled water in a flask and topped up to 100cm3. 25cm3 of this solution required 12.5cm3 of 0.2M sulphuric (VI) acid for complete reaction.

(i) Write the chemical equation for the reaction that occurred between the mixture and sulphuric (VI) acid. (1mk)

(ii) Calculate the number of moles of H2SO4 which reacted with the mixture. (2mks)

1. Determine the number of moles of the substance in the mixture that reacted with H2SO4. (2mks)
2. Determine the molarity of the substance in (c) above. (2mks)
3. What was the mass of sodium carbonate in the mixture. (2mks)
4. What was the percentage of sodium sulphate in the mixture.

(2mks)

1. (a) Explain what would happen to the position of equilibrium of the following reactions if the temperature is increased. (2mks)
2. 2SO2(g) + O2(g) 2SO3(g) DH=-189kJ/mol
3. N2(g) + O2(g) 2NO(g) DH=+180kJ/mol

(b) Given the equation

N2(g) + 3H2(g) 2NH3 (g) DH=-92kJ/mol

Explain what happens to the position of equilibrium when; (3mks)

1. more hydrogen is introduced into the system
2. the pressure of the system is reduced
3. temperature is raised

(c) Give the conditions which are likely to improve the yield of ammonia in (b) above. (2mks)

1. The extraction and purification of zinc has been summarized in the diagram below.

Calamine

Zinc Blende

A

D

C

Zinc Sulphate

Zinc oxide

E

B

Pure zinc

Impure Zinc

1. Name the processes represented by A and E (2mks)

A

E

1. Name reagents required for processes. (2mks)

C

D

1. Describe how would you prepare reasonably pure crystals of zinc sulphate starting from zinc metal. (3mks)
2. Calculate the maximum mass of zinc obtained from 1000g of pure zinc blende obtained in process A above (Zn=65, S=32, O=16) (3mks)
3. The diagram below shows the preparation of dry chlorine gas.
4. Name substance X (1mk)
5. Identify three mistakes in the apparatus (3mks)
6. Write reactions for the action of chlorine on (2mks)
7. hydrogen sulphide
8. iron (II) chloride
9. When red-hot iron wire is plunged into a gas jar of chlorine, dense brown fumes are formed and iron continues to glow. Give
10. the name of the product (1mk)
11. the equation of the reaction taking place. (1mk)
12. Sodium thiosulphate reacts with dilute hydrochloric acid according to the

following equation.

S2O32-(aq) + 2H+(aq) H2O(l) + SO2(g) + S(s)

In an experiment to study how the rate of reaction varies with concentration, 10cm3g of 0.4M sodium thiosulphate was mixed with 10cm3 of 2M hydrochloric acid in a flask. The flask was placed on a white paper marked with a cross (**x**). The time taken for the cross (**x**) to become invisible when viewed from above was noted and recorded in the table below. The experiment was repeated three times and the temperature using the volumes in the table. Results were as shown

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Experiment | Volume of 0.4M thiosulphate (cm3) | Volume of water in (cm3) | Volume of 2M HCl(cm3) | Time in Second |
| 1 | 10.0 | 0.0 | 10.0 | 16 |
| 2 | 7.5 | 2.5 | 10.0 | 23 |
| 3 | 5.0 | 5.0 | 10.0 | 32 |
| 4 | 2.5 | 7.5 | 10.0 | 72 |

1. On the grid provided, plot a graph of volume of thiosulphate against time taken for the cross(x) to become invisible. (4mks)
2. From the graph, determine how long it would take for the cross to become invisible if the experiment was done using;
3. 6.0cm3 of the 0.4M thiosulphate solution (1mk)
4. 6.0cm3 of 0.2M thiosulphate solution (1mk)
5. Using values for experiment 1. Calculate;
6. moles of thiosulphate used (1mk)
7. moles of hydrochloric acid used (1mk)
8. which of the two reactants in experiment 1 controlled the rate of reaction? Explain (2mks)
9. State two precautions which should be taken in the experiment. (2mks)
10. In an experiment to determine the solubility of sodium chloride, 5.0cm3 of a saturated solution of sodium chloride weighing 5.35g was placed in a volumetric flask and diluted to a total volume of 250cm3.

25.3cm3 of the dilute sodium chloride completely reacted with 24.0cm3 of 0.1M silver nitrate.

*Calculate*

1. moles of silver nitrate in 24.0cm3 of solution (1mk)
2. moles of sodium chloride in 25.0cm3 of solution (1mk)
3. moles of sodium chloride in 250cm3 of solution (1mk)
4. mass of sodium chloride in 5.0cm3 of saturated sodium chloride solution (Na=23.0, Cl=35.5) (2mks)
5. Mass of water in 5.0cm3 of saturated solution of sodium chloride. (2mks)
6. A compound J contains 84.7% carbon and the rest hydrogen. Its relative molecular mass is 42. Under appropriate conditions J reacts with water to produce liquid K. Liquid K reacts with sodium metal to produce a gas that burns with a pop sound K reacts with acidified potassium manganate(VII) to produce a solution whose PH is below 7. (C=12, H=1)
7. Determine the empirical formula of J. (2mks)
8. Determine the molecular formula of J. (1mk)
9. Write the structural formula of J. (1mk)
10. Name K and explain how it is formed. (2mks)
11. Write an equation of the reaction of K.
12. Sodium metal (1mk)
13. Potassium manganate (VII) (1mk)
14. When the product in e(II) above reacts with K, what name is given to the process? (1mk)

Step III

X

CH3CH=CH2

Step I H2

CH3

CH CH2

n

Step II

Liquid N

Potassium Step IV

Propanoic acid

CH3CH2CH2OH

Step V

Step VI Conc.H2SO4 + Ethanol + Heat

Step IV

Sugars

P

1. Name the type of reaction in the following steps. (2mks)
2. Step IV
3. Step V

(b) Name the important reagents and conditions in step II (2mks)

1. Reagent

1. Condition
2. The table below gives information of some elements. The letters are not actual symbols of the elements. Study it and answer the questions that follow.

|  |  |  |  |
| --- | --- | --- | --- |
| Element | Ionization Atomic  Energy kJmol-1 | Ionic radii (nm) | Atomic radii (nm) |
| L | 410 | 0.154 | 0.091 |
| G | 380 | 0.192 | 0.97 |
| Q | 490 | 0.108 | 0.06 |

1. Which is the most reactive element? Explain (2mks)
2. Compare the boiling point of Q and G. Explain (1mk)
3. Use the sketch of the periodic table below to answer the questions that follow. The letters do not represent the actual symbols of the elements.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |  |  |  |
| G |  |  |  |  |  |  | H |  |
|  |  |  | J | K |  |  | L |  |
|  | P |  |  |  |  |  |  | M |
| N |  |  |  |  |  |  |  |  |

1. What name is given to elements where P belongs? ( ½ mk)
2. From the table select;
3. Strongest oxidizing agent ( ½ mk)
4. Weakest reducing agent ( ½ mk)
5. J is reacted with excess chlorine to form compound Q. Draw a ‘dot’ and ‘cross’ diagram showing the structure of Q. (2mks)
6. Write the chemical formula of a compound K and H. (½ mk)
7. The table below gives information on three substances A, B and C. Study it and answer the questions that follow.

|  |  |  |  |
| --- | --- | --- | --- |
| Substance | Melting  Point | Boiling  Point | Electrical  Conductivity |
| A | 98 | 824 | Conducts in solid and molten state |
| B | -117 | 80 | Does not conduct |
| C | 658 | 1320 | Conducts in molten and aqueous states |

1. State the type of structure in C (1mk)
2. Name the charge carriers in A (1mk)