**CHEMISTRY**

 **FORM 3**

**MID TERM**

**TERM 1 2021**

**TIME: 1HR 15MIN**

**NAME ……………………………………………….. ADM …………….. CLASS………….**

***Instructions*:**

***Answer all the questions in the spaces provided***

1. A substance contains 25.6% copper, 12.8% sulphur, 25.6% oxygen and 36.0% water of crystalisation. Calculate its simplest formula. (Cu=64, S=32, O=16 and H1) (4mks)
2. An organic compound has an empirical formula CH3O and relative molecular mass 62. What is its molecular formula? (2mks)
3. State Charles’s law. (1mk)

b. Draw a sketch graph to illustrate Charles’s law. (2mks)

c. At a temperature of 57OC, nitrogen gas occupies a volume of 750cm3. At what temperature will the gas occupy 100cm3? Express the answer in degrees Celsius. (3mks)

1. A given mass of a gas occupies 20cm3 at 25OC and 670mmHg pressure. Find out the volume it will occupy at;

a. 10OC and 335mmHg. (3mks)

b. OOC and 760mmHg. (3mks)

1. Write ionic equation for the reactions between:
2. Barium chloride solution and copper (II) Sulphate solution. (2mks)
3. Zinc and copper (II) sulphate. (2mks)
4. Zinc metal and hydrochloric acid reacts according to the following equation.

Zn(s) + 2HCl(aq) ZnCl2(aq) + H2(g)

1.96g of Zinc metal were reacted with 100cm3 of 0.2m hydrochloric acid.

1. Determine the reagent that was in excess. (Zn=65.4) (2mks)
2. Calculate the total volume of hydrogen gas that was liberated at S.T.P (S.T.P = 22.4l) (2mks)
3. Complete the table below which show properties of indicators used in titrations. (3mks)

|  |  |  |  |
| --- | --- | --- | --- |
| **Indicator**  | **Colour in Acid** | **Colour un Alkali** | **Colour in neutral** |
| Phenolphthalein |  | Pink  | Colourless  |
| Methyl orange  | Pink  |  | Orange  |
| Screened methyl orange | Red  | Green  |  |

1. Solution A was made up by dissolving 2.65g, of a metal carbonate, X2CO3 in water and diluting the solution to 250cm3. B is a 0.25m solution of hydrochloric acid. 20cm3 portions of A were titrated with solution B using methyl orange indicator with the following results.
2. Complete the following table. (1 ½ mks)

|  |  |  |  |
| --- | --- | --- | --- |
| ***Burette readings***  | ***1st***  | ***2nd***  | ***3rd***  |
| Final reading (cm3) |  |  | 48.1 |
| Initial reading (cm3) | 0.0 | 16.1 | 32.1 |
| Volume of solution B used (cm3) | 16.1 | 16.0 |  |

1. The volume of the pipette used. (1mk)
2. Calculate the average volume of solution B used. (1mk)

b. The equation of the reaction is;

2HCl(aq) + X2CO3(aq) 2XCl(aq) + H2O(l) +CO2(g)

Calculate the concentration of the solution A in;

1. Moles/litre (3mks)
2. g/litres (2mks)

c. Calculate the Relative Atomic Mass of X. (C=12, O=16, X=?) (3mks)

1. State the Gay Lussac’s law. (1mk)
2. If it takes 30 seconds for 100cm3 of Carbon (IV) Oxide to diffuse across a porous plate. How long will it take 150cm3 of nitrogen (IV) oxide to diffuse across the same plate under similar condition? (C=12, N=14, O=16) (3mks)
3. A form three student set up an experiment to explain the rate of diffusion of ammonia and hydrogen chloride in air. Study it and answer the question that follows.



1. What observation is made in the glass tube? Explain? (2mks)
2. Determine the molecular masses of ammonia (NH3) and hydrogen chloride (HCl) (N=14, H=1, Cl=35.5) (1mk)
3. Which gas covered a longer distance? ( ½ mk)
4. Name two laboratory apparatus that are used to measure fairly accurate volumes of liquids. (2mks)