**Name…………………………………………………….Index No…………………./…………**

**School…………………………………………Adm No…………………Stream………………**

**Date……………………………………………**

233/1

**CHEMISTRY**

Paper 1

(THEORY)

NOV 2021

**TIME: 2 HOURS**

**SAMIA SUB-COUNTY JOINT EXAMINATION-2021**

***Kenya Certificate of Secondary Education (K.C.S.E) Trial Examination***

**INSTRUCTIONS TO CANDIDATES**

* *Write your* ***name*** *and* ***Index Number*** *in the spaces provided above.*
* ***Sign*** *and* ***write date*** *of examination in the spaces provided above.*
* *Answer* ***ALL*** *questions in the spaces provided.*
* *Mathematical tables and electronic calculators may be used.*
* *All working* ***MUST*** *be clearly shown where necessary.*

**For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Questions** | **Maximum score** | **Candidate’s Score** |
| **1-27** | **80** |  |

1. Define the term **half-life** as used in radioactivity. (1mk)
2. 100g of radioactive substance was reduced to 12.5g in 15.6years. **Calculate** the half-life of the substance. (2mks)
3. You are provided with water and usual laboratory apparatus. Describe how you would fully separate solid lead (II) carbonate from a mixture of iron fillings, lead (II) carbonate and sodium carbonate. (3mks)
4. In order to determine the molar heat of neutralization of sodium hydroxide, 100cm3 of 1M NaOH and 100cm3 of 1M HCI both at the same initial temperature were mixed and stirred continuously with a thermometer. The temperature of the resulting solution was recorded after every 30 seconds until the highest temperature was attained. Thereafter the temperature of the solution was recorded for further two minutes.
5. Write the ionic equation for the reaction which took place. (1mk)
6. The sketch below was obtained when the temperature of the mixture were plotted against time. Study it and answer the questions that follow.

Y2

Temp (oC) Y3

Y1

Time in seconds

1. What is the significance of point Y2 (1mk)
2. **Explain** the temperature change;

Between Y1 and Y2 (1mk)

Between Y2 and Y3 (1mk)

1. Dry chlorine gas was passed through two pipes of coloured cotton cloth as shown below.

Dry chlorine Dry chlorine

**Exp 1.** **Exp. 2**

Wet red cloth

Dry red cloth

1. **State** what is observed in each of the experiment;

Experiment 1 (1mk)

Experiment 2 (1mk)

1. Explain your observation using an equation. (1mk)
2. Two elements **A** and **B** have electronic configuration 2.8.3 and 2.6 respectively.
3. To which group and period does element B belong? (1mk)
4. If the two react, what is the formula of the compound they form? (1mk)
5. Iron fillings react with steam according to the equation given below.

3Fe(s) + 4H2O(g) Fe3O4(s) + 4H2 (g)

**State** and **explain** the effects of each of the following on the equilibrium.

1. Increase in pressure (2mks)
2. Addition of magnesium ribbon to the equilibrium mixture. (2mks)
3. Unknown substances had PH values as shown in the table below.

|  |  |
| --- | --- |
| Substance | PH values |
| A | 6.0 |
| B | 2.0 |
| C | 8.0 |

State which substance is likely to be;

1. Lemon juice (1mk)
2. Phosphoric (v) acid (1mk)
3. **Identify** a substance that would be a better electrolyte? (1mk)
4. In an experiment to study diffusion of gases, the following set up was used.

Cotton wool Cotton wool

Soaked in Conc soaked in Conc

Ammonia hydrolic acid

1. **State** and **explain** the observations made in the experiment. (2mks)
2. Write an equation for the reaction that occurs in the experiment. (1mk)
3. An electric current was passed through molten potassium fluoride using inert electrodes.
4. Name the products at;

Anode (1mk)

Cathode (1mk)

1. Write an equation for the reaction at the anode. (1mk)
2. During the extraction of copper and zinc from their ores, some of the processes include;
3. Crushing
4. Mixing of the crushed ore with oil and water and bubbling air through it.
5. Name the process (ii) above. (1mk)
6. What is the purpose of process (ii) above? (1mk)
7. Bronze is an alloy of copper and another metal. **Identify** the other metal. (1mk)
8. Name **another** gas which is used together with oxygen in welding. (1mk)
9. The structure of ammonium ion is shown below.

H

Y X

N

H H

H

1. Name the type of bond represented by X and Y

X………………………… (1mk)

Y………………………….. (1mk)

1. How many electrons are used in bonding in the ammonium ion? (1mk)
2. A dibasic acid H2C2O4nH2O of concentration 6.3g/dm3 was titrated against NaOH solution. 25cm3 of the acid solution required 15.6cm3 of 0.16MNaOH for complete neutralization. **Calculate** the value of n in the formula. (H=1, O=16, C=12) (3mks)
3. The table below shows the solubility of potassium nitrate and potassium chlorite at various temperatures.

|  |  |  |
| --- | --- | --- |
| Salt | Solubility at various temperatures | |
|  | 50oc | 20oC |
| KNO3 | 86g | 31g |
| KCIO3 | 18g | 8g |

A mixture of salts contains 20g of KNO3 and 18g of KCIO3 in 100g of water at 50oC.

1. **State** the method which may be used to separate the mixture. (1mk)
2. If the mixture was cooled from 50oC to 20oC, **state** and **explain** what would be observe. (2mk)
3. Name the following organic compounds.

O

CH3CH2CH2C OH (1mk)

CH3CH2CH2CH3 (1mk)

1. Below is a simple representation of a soap molecule.

Polar head Non polar head

Using the structure above show how soap removes an oil smear from the fabric below.(2mks)

1. Explain how a sample of lead(ii) chloride can be prepared using the following reagents.
2. Dilute nitric (v) acid

ii.Dilute hydrochloric acid

1. Lead (ii) carbonate (3mks)
2. The diagram below represents a set up used to react magnesium with steam. Study it and answer the questions that follow below.

Mg(s)

Cotton wool Gas

Soaked in water

Heat Heat

1. **State** the observation made in the combustion tube. (1mk)
2. Why would it not be advisable to use potassium in place of magnesium In the above set

up. (1mk)

1. Explain **why** cotton wool is heated prior to heating magnesium (1mk)

1. The scheme below shows some reaction sequence starting with solid M.

H2SO4

+ Gas which burns with a ‘pop’ sound

Solution N

Solid M

Few drops NH3

Excess NH3(aq)

White ppt

Colourless Soln Q

* + 1. Name solid **M** (1mk)
    2. Write the formula of a complex ion present in solution **Q** (1mk)
    3. Write an ionic equation of the reaction between Barium nitrate and solution **N**.(1mk)

1. Below are standard reduction potentials of **3** electrodes.

Fe2+(aq) + 2e Fe(s) -0.44v

Zn2+(aq) +2e Zn(s) -0.76v

Sn2+(aq) + 2e Sn(s) -0.14v

**Calculate** the electromotive force of a cell formed between Fe/Fe2+ half-cell and Zn/Zn2+ half-cell. (2mks)

1. Draw a clearly labeled diagram of a set up you would use to electroplate an iron spoon with silver metal. (2mks)
2. Name the **process** of extracting Sulphur. (1mk)
3. What is the **role** of super-heated water? (1mk)
4. State **two** uses of sulphur (1mk)

1. The diagram below shows how carbon (ii) oxide can be prepared starting with carbon (iv) oxide and solid W. study it and answer the questions that follow.

Solid **W**

Carbon (iv) Oxide

Potassium

Hydroxide

Heat Solution

1. With reasons, **state** a suitable location where such an experiment should be rightly conducted. (1mk)
2. What is the purpose of concentrated potassium hydroxide? (1mk)
3. Identify solid **W** (1mk)
4. Explain how you would separate a mixture of nitrogen and oxygen. (2mks)
5. **Draw** a well labeled diagram to show the percentage composition of oxygen in air can be determined. (2mks)
6. Use the information below to answer the questions that follow.

H2(g) +¹₂O2 H2O(l) ∆H1= -286KJ/Mol

C(s) + O2 (g) CO2(g) ∆H2 = -384KJ/Mol

C(s) +4H2 (g) +¹₂O2 (g) C3H7OH ∆H3 = -2686.6KJ/Mol

1. Define ‘**enthalpy** of formation’ (1mk)
2. Determine the molar enthalpy of formation of propanol. (2mks)
3. Most natural water occurs as permanent hard water or temporary hard water.
4. Name **two** compounds that cause;
5. Temporary hardness (1mk)
6. Permanent hardness (1mk)
7. How is temporary hardness removed from water? (1mk)
8. State **one** disadvantage of using hard water in boilers. (1mk)
9. Both Sodium and Aluminum are metals in period 3 yet sodium has much lower melting point than aluminum. **Explain**. (2mks)
10. Determine the values of X and Y in the equation below.

23692U + xYBa 9236Kr + 10Z + Energy

x………………………………………. Y……………………………….. (1mk)

1. State **two** effects of emitting SO2 in the environment. (1mk)