**Name: …………………………………………………………** **Admn. No.:……… Class: …………….**

**Candidate’s Sign:………………… Date:…..……………..……………………………..**

**CHEMISTRY**

**PAPER 1**

**SEPTEMBER 2022**

**TIME: 2 HOURS**

**SUNRISE 2 END TERM 2 EXAM - 2022**

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

**233/1**

**CHEMISTRY**

**PAPER 1**

**2 HOURS**

**INSTRUCTIONS TO CANDIDATES:**

* *Write your* ***name and ADM NO*** *in the spaces provided above.*
* *Answer* ***All*** *the questions in the spaces provided below each question.*
* *All working* ***MUST*** *be clearly shown where necessary.*
* *Sign and write the date of examination in the spaces provided above.*
* *Electronic calculators may be used.*
* *This paper consists of 11 printed pages.*
* *Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**For Examiner’s Use Only**

|  |  |  |
| --- | --- | --- |
| **Question** | **Maximum score** | **Candidate’s score** |
| **1- 29** | **80** |  |

***This paper consists of 11 printed pages.***

***Candidates should check the questions paper to ascertain that all pages are printed as indicated and no questions are missing***

1. State two laboratory rules that should be followed to avoid contamination and wastage of chemicals. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. Describe one method used to distinguish between sodium sulphate and sodium sulphite. (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………

1. A gaseous compound consists of 86% carbon and 14% hydrogen by mass. At s.t.p 3.2 dm3 of the compound has a mass of 6 grams. Calculate:
2. its empirical formulae ( C=12,H=1, MGV=at stp 22.4dm3  (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. its molecular formulae (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………….....………………………………………………………………………………………………………………………………

1. The graph below shows amount of calcium carbonate and calcium chloride varying with time in the reaction.

CaCO3  + 2 HCl CaCl2  + H20 + CO2

Time(s)

Amount (g)

Curve I

Curve II

1. Which curve shows amount of calcium chloride varying with time (1 mark)

………………………………………………………………………………………………………

1. Explain why the two curves become horizontal after given period of time (1 mark)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………..

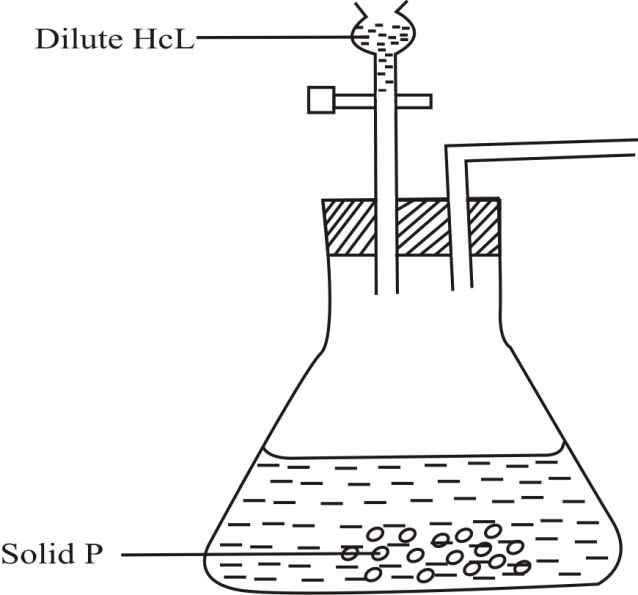
1. Sketch on graph curve II would appear if the experiment was repeated using more dilute hydrochloric acid solution (1 mark)
2. The thermal chemical equation for the reaction between X and Y are shown below.

2X2 (g) + Y2(g)  ―—→ 2X2Y(g) ∆H= -197KJ/mol

1. Other than change in temperature, suggest two ways in which yield of X2Y can be increased (1 mark)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………………

1. draw a well labeled energy level diagram for the forward reaction (2 marks)
2. The diagram below was used by a form two student at Kimuchul secondary school to prepare and collect dry carbon IV oxide.



1. Name suitable solid p (1 mark)

……………………………………………………………………………………………………….....

1. Complete the diagram above (3 marks)
2. The melting point of Nitrogen is -1960c while that of sodium is 980 c. In terms of structure and bonding explain the difference in the melting point of Nitrogen and sodium (2 marks)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………………………………………………………………………………..

1. The following tests were carried out on three separate portion of colourless solution P.

|  |  |
| --- | --- |
| **TEST** | **OBSERVATION** |
| i)Addition of dilute hydrochloric acid to the first portion of solution P | Formation of effervescence |
| ii)Addition of aqueous potassium sulphate solution to the second portion of solution P | No white precipitate |
| iii)Addition of acqueous sodium hydroxide to the third portion to portion of solution P till in excess | White precipitate formed which dissolved in excess to form colorless solution |

1. From information in test(i),name two anions that are likely to be present in solution P (1 mark)

……………………………………………………………………………………………………….....

1. Identify cations that are likely to be present in solution P (1 mark)

……………………………………………………………………………………………………….....………………………………………………………………………………………………………….

1. Write an ionic equation for the reaction which takes place in test (i) (1 mark)

………………………………………………………………………………………………………….

1. Describe how you would prepare crystals of potassium sulphate starting with 100cm3 of 0.5M Potassium hydroxide (3 marks)

……………………………………………………………………………………………………….....…………………………………………………………………………………………….……………………………………………………………………………………………………….....…………………………………………………………………………………………….……………………………………………………………………………………………………….....………………………………………………………………………………………………………………………………………………………

1. use dot(.) and cross(x) diagram to show bonding in magnesium fluoride (Mg=12 , F=9) (1 mark)

……………………………………………………………………………………………………………………………………………………………………………………………………………….....…………………………………………………………………………………………..……………………………………………………………………………………………………………………………………………

1. An element R has a relative atomic mass 88. When a current of 0.5A were passed through fused chloride of R for 32 minutes and 10 seconds, 0.44g of R were deposited at cathode. Determine charge of ion Q (I F– 96500C) (3 marks)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………………………………………………….....………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. a) Define the term isomerism (1 mark)

……………………………………………………………………………………………………….....……………………………………………………………………………………………………….

b. Draw and name two positional isomers of butanol (2 marks)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………………………………………………………………………………………………….....……………………………………………………………………………………………………………………………….

1. During the extraction copper and zinc from their ores, some processes include:
2. Crushing (1 mark) ……………………………………………………………………………………………………….....…………………………………………………………………………………………………..
3. Mixing of the crushed one with oil and water and bubbling air through it.
4. Name the process (b) above (1 mark)

…………………………………………………………………………………………

1. What is the purpose of(b) above (1 mark)

…………………………………………………………………………………………

1. Write an equation when the following compounds are heated
2. zinc nitrate (1 mark)

………………………………………………………………………………………………………

1. silver nitrate (1 mark)

………………………………………………………………………………………………………

1. The table below gives solubilities of potassium bromide and potassium sulphate at 00c and 400c.

|  |  |  |
| --- | --- | --- |
|  | Solubility g/100g H2O at | |
| 00c | 400c |
| Potassium bromide | 55 | 75 |
| Potassium sulphate | 10 | 12 |

When an aqueous mixture containing 60g of potassium bromide and 7g of potassium sulphate in 100g of water at 400c was cooled to 00c some crystals were formed.

1. identify the crystal (1 mark)

…………………………………………………………………………………………………………

1. Determine the mass of the crystal (1 mark)

……………………………………………………………………………………………………….....

1. The set up below was used to carry out electrolysis of a molten bromide of metal X,XBr2.

B

A

XBr2

1. write equations for reaction taking place at:
2. Anode : ……………………………………………………………………… (1 mark)
3. Cathode ……………………………………………………………………… (1 mark)
4. Give reason why experiment should be carried out in fume chamber (1 mark)

……………………………………………………………………………………………………….....…………………………………………………………………………………………………..

1. below are the standard electrode for electrodes X and Y

X2+ (aq )+ 2e \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ X(s) -2.92 V

Y2+ (aq ) + 2e \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Y(s) + 0.34 V

1. identify the electrode which is the least reducing agent (1 mark)

………………………………………………………………………………………………………

1. calculate the e.m.f of the cell formed when the two electrodes are connected (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. write cell representation for the cell above (1 mark)

………………………………………………………………………………………………………

1. a) Give two differences between a nuclear reaction and a chemical reaction (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b. complete the nuclear equation below (1 mark)

230 230

90Th ——→ 92 Pa + …………………………….

1. Explain why the boiling point of ethanol is higher than that of hexane (R.m.m of ethanol 46 while that of hexane is 86. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. The atomic number of element Q is 8 and that of P is 11.
2. Write down the formulae of compound formed between Q and P (1 mark)

…………………………………………………………………………………………………………

1. Name the type of bond formed by compound given in (a) above .Explain. (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………

1. a) State charles’ law (1 mark)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

1. sketch a graph to represent Charles law (1 mark)
2. A gas occupied a volume of 250cm3 at -230c and atmosphere. Determine volume at 107 0c when pressure kept constant. (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

22. The structures shown below represent two cleansing agent A and B.

**A B**

R-

SO-3Na+

1. Name the type of cleansing agent **A** (1 mark)

.………………………………………………………………………………………………………….

1. Which of the **two** cleansing agents is more suitable for washing in water containing calcium chloride? Give a reason. (2 marks)

.……………………………………………………………………………………………………………………………………………………………………………………………………………………

23. a) Define the term enthalpy of formation of a compound. (1 mark)

…………………………………………………………………………………………………………………………………………………………………………………………………………………….

b)Use the information below to answer the questions that follow:

Equation Enthalpy of formation

(i) H2(g) + ½ O2(g) H2O(l) ∆H1= -286kJmol-1

(ii) C(s) + O2(g) CO2(g) ∆H2= -394kJmol-1

(iii) 2C(s) + 3H2(g) + ½ O2(g)  C2H5OH(l) ∆H3= -277kJmol-

Calculate the molar enthalpy of combustion of ethanol. Given that:

C2H5OH (l) + 3O2 (g) 2CO2 (g) + 3H2O (l)  (3mks)

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

………………………………………………………………………………………………

24. The chromatogram below shows the constituents of a flower extract. Study it and answer the questions

that follow

Y

Red

Yellow

X

1. Explain the different positions of red and yellow pigments. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

b) Describe how the solid yellow pigment can be obtained in the chromatogram (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

25. When excess chlorine gas is bubbled through cold dilute sodium hydroxide solution, the resulting solution acts as a bleaching agent.

(a)Write an equation for the reaction between chlorine gas and sodium hydroxide solution. (1 mark)

…………………………………………………………………………………………………………

(b)Explain how the resulting solution acts as a bleaching agent. (2 marks)

…………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

26. The table below gives some properties of four substances. Study it and answer the questions that follow:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Substance** | **M.P 0C** | **B.P 0 C** | **Electrical Conductivity** | |
| **Solid** | **Liquid** |
| W | 1723 | 2230 | Poor | Good |
| X | 993 | 1695 | Poor | Poor |
| Y | * 183 | * 164 | Poor | Poor |
| Z | 1083 | 2567 | Good | Good |

1. Which substance is suitable for making cooking pans? Explain. (11/2 marks) ……………………………………………………………………………………………………………………………………………………………………………………………………………………
2. Which substance is likely to have a giant atomic structure? Explain. (11/2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

27. 17g of Zinc carbonate was reacted with 50 cm3 of 4M nitric acid .Calculate the mass of Zinc Carbonate that remained unreacted. (Zn = 65, C = 12, O = 16) (3 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

28. A certain element Z forms an ion of type Z3-. If the element is in period 3.

(a) Write the electronic configuration of Z3-. (1 mark)

………………………………………………………………………………………………………

(b) How do the sizes of Z and Z3- compare. Explain your answer. (2 marks)

………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

29. A sample of copper turnings was found to have contaminated with copper II oxide .Describe how a sample of copper metal can be separated from the mixture. (2 marks)

……………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………………

**THIS IS THE LAST PRINTED PAGE**