

**MARANDA HIGH SCHOOL**

***Kenya Certificate Of Secondary Education***

 **THE 2024 MOCK EXAMINATION**

**233/1 CHEMISTRY PAPER 1**

 **June, 2024 TIME: 2 Hrs**

**Name**: …………………………………….…….…… Admission No: ……………

**233/1 - CHEMISTRY**

Monday, 3rd June, 2024

Morning

8.00-10.00 Am

**Stream**: ……………………….. **Signature**: ……….........

**Instructions**

1. *Write your* ***name****,* ***admission number, date, stream and signature*** *in the spaces provided above.*
2. *All answers must be written in the spaces provided in the booklet.*
3. ***This paper consists of 12 printed pages with 27 questions. Candidates should check the question paper to ascertain that all the pages are printed as indicated and that no questions are missing***
4. *Candidate should answer the questions in* ***English***
5. *All working* ***MUST*** *be clearly shown where necessary.*
6. *Mathematical tables and silent electronic calculators may be used.*

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**FOR EXAMINERS’USE ONLY**

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| **QUESTIONS** | **MAXIMUM SCORE** | **CANDIDATE’S SCORE** |
|  **1-27** |  **80** |  |

1. (a) Using dot(.) and crosses(x) to represent electrons draw the structure of **POCl3** (2 marks)

 (P=15,0=8, Cl=17)

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(b) Explain why a molecule of H2O can form a bond with H+ to form H3O**+**  (1mark)

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 2.A hydrocarbon contains 80% carbon by mass. Given that 1dm3 of the compound at **s.t.p** has a mass of 1.34g.

 Calculate the molecular formula of the compound. (Molar gas volume at s.t.p. = 22.4dm3, C = 12, H = 1)

 (3marks)

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 3.Write the chemical equation to show the reaction between Lead (II) oxide and the following substances.

 (i) Sodium hydroxide. (1mark)

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 (ii) Dilute hydrochloric acid (1mark)

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 (b) State the property of Lead (II) oxide demonstrated above. (1mark)

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 4. Sulphur (IV) oxide reacts with potassium dichromate (VI) according to the equation below.

 3SO2(g) + Cr2O72-(aq) + 2H+(aq) → 3SO42-(aq) + 2Cr3+(aq) + H2O(I)

 (i) What is the oxidation number of chromium ion in Cr2O72-. (1mark)

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 (ii) State and explain the observation made in the above reaction (2marks)

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 5.Nitrogen(I)oxide is a colourless gas with pleasant smell and causes insensitivity when inhaled, but it is not

 reactive at room temperature. However, it relights a glowing splint

 (a) Explain why the gas relights a glowing splint (1mark)

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 (b) One of the uses of nitric(V) acid is purification of metals such as Gold, explain why Nitric(V) acid is used

 in purification of metals (1mark)

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 (c) To a sample of a salt in a test tube, add 2cm3 of freshly prepared Iron (II) sulphate solution. Slant the

 test tube and slowly add concentrated sulphuric (VI) acid. Which ion does this test aim to confirm? (1 mark)

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 6. Name the apparatus drawn below and give its use



 (a) Name (1mark)

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 (b) Use (1mark)

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 7.When a current of 0.82A was passed for 5 hours through an aqueous solution of metal Z, 2.65g of the

 metal was deposited. Determine the charge on the ion of metal Z. (1 Faraday = 96500 coulombs,

 Relative atomic mass of Z = 52) (3marks)

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 8.The scheme below shows the energy changes that take place between ice, water and steam.

 Study it and answer the questions that follow: -

**H2O(s) H2O(l) H2O(g)**

**ΔH2**

**ΔH1**

**ΔH4**

**ΔH3**

(a) What name is given to the energy change ΔH**1**? (1mark)

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(b) What is the sign ΔH3, give a reason (2marks)

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 9. The table below gives three experiments on the reaction of excess hydrochloric acid and 1.8g of zinc

 done under different conditions. In each the volume of gas was recorded at different time internals

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| --- | --- | --- |
| Experiment | Form of Zinc | Hydrochloric acid solution |
| I | Powder | 1.0M |
| II | Granules | 1.0 M |
| III | Powder | 2.0 M |

On the axis below draw and label three curves that could be obtained from such results.

 (3 marks)

Time (sec)

Volume of H2 (cm3)

10. The solubility of copper (II)sulphate at 75 0C is 55g/100g of water and 19g/100g of water at 150C.

What mass of crystals would be deposited if a saturated solution was made by dissolving X g of Copper (II) sulphate in 150g of water at 75oC then cooled to 150C (3marks)

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11.Potassium is isotopic and has a relative atomic mass (R.A.M) of 39.5, work out the percentage abundance of each isotope. The three isotopes are 39K, 40K and 38K (0.01%) (3marks)

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12.A green solid D was heated until there was no further change. The following observations were made.

(i) A colourless liquid condensed on the cooler parts of the test tube

(ii) A colourless gas which changes acidified potassium dichromate (VI) to green was formed

(iii) Brown residue S was left

(a) Give the identity of solid D (1mark)

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(b) How can you chemically test the colourless liquid (1mark)

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(c) Name the residue S (1mark)

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13.(i) State the most effective method of preventing rusting? (1mark)

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(ii) Explain why galvanizing rather than tinning is a better method of prevention of rusting. (1mark)

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(ii) Write an equation for the formation of rust (1mark)

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14.Nylon polymer has the structure below.

 

(i) Determine the structure of the monomers (2marks)

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(ii) State the type of polymerization. (1mark)

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15.(a) State and explain the function of tartaric acid in baking powder. (2marks)

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(b) By which process does silica gel protect electronic equipment from damage due to moisture. (1mark)

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16.A mixture contains Lead (II) chloride, Iron fillings and Silver chloride. Describe how each of

the substance can be obtained from the mixture. (3marks)

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17.In the industrial extraction of lead metal, the ore is first roasted in a furnace. The solid mixture

obtained is then fed into another furnace together with coke, limestone and scrap Iron. State the function

of each of the following in this process.

(a) Coke (1 mark)

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(b) Limestone (1 mark)

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(c) Scrap Iron (1 mark)

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18.Complete the table below (3 marks)

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| Binary electrolyte  | Cathode equation  | Anode equation | Observation at the anode |
| Lead (II)Iodide | Pb2+(l) + 2e– $→$ Pb(s) |  | Purple vapour |
| Copper (II)Oxide |  | 2O2-(l) $→$ O2(g) + 4e– |  |

19.The table below shows atomic and ionic radii of some elements represented by letters R, S, T and U.

(Not actual symbols). Study it and answer the questions that follow.

|  |  |  |
| --- | --- | --- |
| Element | Atomic radius (nm) | Ionic radius (nm) |
| R | 0.174 | 0.099 |
| S | 0.203 | 0.133 |
| T | 0.099 | 0.181 |
| U | 0.136 | 0.065 |

(a) Classify element U as a metal or non-metal. Explain. (1 mark)

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(b) Which of the elements is the strongest reducing agent? (1 mark)

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(c) Which element forms an anion? (1 mark)

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20.In an experiment, sulphur (IV) oxide gas was bubbled into water followed by hydrogen peroxide. The resulting colourless solution gave a white precipitate when mixed with barium chloride solution. Explain these observations. (3 marks)

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21. (a) When an electric current was passed through molten substances P and Q in different containers

 the observations below were made:

Molten **P** – Conduct electricity and is not decomposed.

Molten **Q** – Conduct electric current and a gas is formed at one of the electrodes.

(a) Suggest the type of bonding present in ( 1 mark )

(i) Substance P………………………………………………………………………………………………

(ii) Substance Q………………………………………………………………………………………………

(b) The cell convention for an electrochemical cell is shown below.

 Zn (s) / Zn2+ (aq) // Pb2+ ( aq) /Pb (s)

(i) Name one substance that can be used as electrolyte in the above cell. ( 1 mark)

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(ii) Which of the electrodes is the anode? ( 1mark)

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22. Radioactive polonium (Po)mass number 212 and atomic number 84 was detected in a sample of

water. The water had an activity of 1000 counts per second.

(a) If the water is boiled, explain whether the activity would be affected or not. (1 mark)

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(b) Given that polonium resulted from Bismuth (Bi) following emission of a beta ( β) particle,

 write a nuclear equation for the decay. (1 mark)

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(c) State one application of radioactivity in the paper industry. (1 mark)

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23.A mixture of magnesium powder and copper powder was reacted with dilute hydrochloric acid. The solution was the filtered.

Name:

(a)(i) The residue (1mark)

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(ii) The filtrate (1mark)

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(b) Write an ionic equation for the reaction that takes place (1mark)

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24.Element A has atomic mass 23 and element B has atomic mass 7 and also have 12 neutrons and 4

neutrons respectively.

(a) Write the electron arrangement of A and B (1mark)

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(b)Which element has higher ionization energy? Explain (2marks)

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25.Study the scheme below and answer the questions that follow

State;

(i)The conditions for process R (1mark)

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(ii)The type of the reaction represented by process S (1mark)

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(iii) Name of compound U (1mark)

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26.Study the set-up below and answer the questions that follow.



After sometimes, the cotton wools X, Y and Z changed colour in turn.

(a) What were the colour changes? (1mark)

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(b)Which cotton wool changed colour first? ( 1 mark)

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(c) Explain why the cotton wools did not change colour at the same time. ( 1 mark)

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27.A sample of unknown compound gas X is shown by analysis to contain Sulphur and oxygen. The gas

requires 28.3 seconds to diffuse through a small aperture into a vacuum. An identical number of

oxygen molecules pass through the same aperture in 20 seconds. Determine the molecular mass of gas X.

(O =16, S = 32) (3marks)

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