NAME: ……………………………………………. INDEX NO:…………………….…..

 CANDIDATE’S SIGNATURE…………………

 DATE: ………………………………………….

**233/1**

**CHEMISTRY**

**Paper 1**

**(Theory)**

**Sept/Oct, 2024**

**Time: 2 Hours**

**MOI GIRLS’ HIGH SCHOOL – ELDORET**

**K. C. S. E. Trial Examination**

233/1

CHEMISTRY

Paper 1

(Theory)

Time: 2 Hours

***INSTRUCTIONS TO CANDIDATES***

*1. Write your name, index number in the spaces provided above.*

*2. Sign and write the date of the examination in the spaces provided above*

*3. Answer* ***ALL*** *the questions in the spaces provided*

*4. Mathematical table and silent non – programmable electronic calculators* ***may be*** *used.*

*5. All working* ***MUST*** *be clearly shown where necessary.*

**For Examiners Use Only**

|  |  |
| --- | --- |
| **MAXIMUM SCORE** | **ATTAINED SCORE** |
| **80** |  |

1. Starting with iron fillings describe how to prepare dry sample of Ferrous ammonium sulphate (3 marks)

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2. Study the diagram below and use it to answer the questions that follow.

1. State and explain the colour of Region A (2 marks)

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1. The base is one of the main parts of a Bunsen burner. State the adaptation to its function (1 mark)

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3. The diagram below shows oxidation of ammonia in presence of a catalyst.

1. State one observation made in the conical flask (1 mark)

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1. Write an equation for the reaction that occurs (1 mark)

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1. Explain one way of reducing the pollution effect in the above set up

 (1 mark)

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4. a) Write a chemical equation for the reaction that takes placew when a gas jar full of moist Sulphur (IV) oxide is inverted over a gas jar containing hydrogen sulphide gas. (1 mark)

 b) Which of the two gases in the above reaction is an oxidizing agent? Explain. (2 marks)

5. a) State Boyle’s law. (1 mark)

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 b) Sketch a graph of Boyle’s law (1 mark)

 Volume

 (in cm3)

 Pressure (in mmHg)

 c) A gas occupies 500cm3 at a pressure of 760mmHg. If the pressure is doubled, what volume would the gas occupy? (1 mark)

6. a) State Hess’s law (1 mark)

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 b) Study the information below and use it to answer the questions that follow.

 CaCl2(s) Ca2+(g) + 2Cl-(g) ΔH1 = 2237kJ/mol

 CaCl2(s) CaCl2(aq) ΔH2 = -82.9kJ/mol

 2Cl-(g) 2Cl-(aq) ΔH3 = -762kJ/mol

1. Name the ethalpies ΔH1 and ΔH2

ΔH1 = (½ mark)

ΔH2 = (½ mark)

1. Determine the enthalpy for the reaction

Ca2+(g) Ca2+(aq) (2 marks)

7. a) Define the following terms as used in radio activity (1 mark)

 i) Radio isotopes

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 ii) Nuclide

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b) Radon, (Rn) undergoes alpha decay taking 20 days for the original mass to reduce to 6.25%. Calculate the half life of Radon (2 marks)

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8. Describe an experiment that can be used to separate a mixture of sodium chloride, Iodine, iron fillings and lead(II) chloride. (3 marks)

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9. a) Define the term hydrogen bond (1 mark)

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 b) In terms of structure and bonding, explain why ethanol has a higher boiling point than dimethylether despite them having same molecular mass (2 marks)

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10. Study the figure below and use it to answer questions that follow.

1. Name solid R ………………………………………………………..(1 mark)
2. Write the equation for the reaction that produces oxygen gas (1 mark)

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1. Give any other pair of reagent that can be used to prepare oxygen gas.

 (1 mark)

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11. a) Define the term “Electron affinity” (1 mark)

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 b) Explain why the electron affinity of halogen decreases down the group.

 (2 marks)

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12. 15cm3 of concentrated hydrochloric acid was diluted to 100cm3. 20cm3 of the dilute acid required 25.0cm3 of 0.2M potassium hydroxide for complete neutralization

1. Explain the correct method of diluting the concentrated hydrochloric acid.

 (1 mark)

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1. Determine the concentration of the concentrated acid (2 marks)

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13. a) State Gay-Lussac’s law (1 mark)

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b) 200cm3 of ethane gas were mixed with 60cm3 of oxygen and the mixture ignited to complete reaction according to the equation.

 C2H4(g) + 3O2(g) 2CO2(g) + 2H2O(g)

 Determine the total volume of the gases at the end of the reaction (2 marks)

14. The diagram below shows a cross-section of a dry cell. Study it and answer the questions that follow.

1. Zinc can is lined with ammonium chloride and zinc chloride paste. What happens if solid mixture was used. Explain (1 mark)

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1. Write an equation for the reaction in which the electrons are gained.

 (1 mark)

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1. Give **one** advantage of lead-acid accumulator over a dry cell (1 mark)

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

1. Give two observations made in the combustion tube. (2 marks)

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1. Describe a chemical test used to identify product E (1 mark)

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16. 2502(g) + O2(g) 2SO3(g) ΔH = -192kJ

 Explain the effect on the yield of Sulphur (VI) oxide gas when;

1. Temperature is lowered (1 mark)

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1. Pressure is increased. (1 mark)

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1. Name the catalyst for the reaction (1 mark)

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17. (i) Define the term rate of a reaction (1 mark)

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 ii) Describe how an increase in concentration increases the rate of a reaction

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18. a) Using structure and bonding explain why Sulphur (IV) oxide is a gas at room temperature whereas phosphorous (V) oxide is a solid. (2 marks)

b) Using a diagram showing the structure of chlorine, distinguish between covalent and van-der waal forces. (1 mark)

19. Study the diagram below and answer questions that follow.

1. State the observations made in; (1 mark)

Test tube 1

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Test tube 2

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1. Explain the observations made in the test tubes above (2 marks)

Test tube 1:

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 Test tube 2:

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20. Study the set up below and answer questions that follow.

1. In which set up did electrolysis occur. Explain (2 marks)

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1. In set up I when molten Aluminum was used in place of magnesium, the brightness of bulb increased. Explain (1 mark)

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21. A hydrocarbon contains 80% carbon by mass. Given that 2dm3 of the compound at STP 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) (3 marks)

22. The solubility of copper (II) sulphate at 75°c is 55g/100g of water and 19g/100g of water at 15°C.

 What mass of crystals would be deposited if a saturated solution was made by dissolving Xg of copper (II) sulphate in 150g of water at 75°C then cooled to 15°C

 (3 marks)

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

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

1. Using oxidation numbers, identify the species that undergo reduction in the above equation (2 marks)
2. State and explain the observations made in the above reaction (1 mark)

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24. 10g of CaCO3 were heated to constant mass.

 i) Write the equation for the decomposition of calcium carbonate (1 mark)

 ii) Determine the mass of calcium oxide solid produced (2 marks)

 (C = 12, O = 16, Ca = 40)

25. a) Draw a structural formula of a product formed when bromine water reacts with ethene gas (1 mark)

 b) Polychloroethene has a molar mass of 7375. By drawing its repeat unit, determine the number of monomers in the polymer (2 marks)

 (C = 12, H = 1, Cl = 35.5)

26. You are provided with an actal tablet. Describe how it’s pH can be determined in the laboratory (3 marks)

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27. The diagram below is a set-up in the laboratory for the preparation of N2O gas. Study it and use it to answer questions that follow.

1. Identify **two** errors in the set-up (1 mark)

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1. Explain how N2O produced relights a glowing splint. (2 marks)

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