**BENZENE HIGH SCHOOL, KIBOGA**

UGANDA ADVANCED CERTIFICATE OF EDUCATION

END OF TERM I EXAMINATIONS 2024

**S.5 CHEMISTRY PAPER 1**

2 Hours 15 Minutes

**INSTRUCTIONS TO LEARNERS**

* *This paper consists of* **two** *sections A and B.*
* *Answer all questions in both sections.*
* *All working must be shown clearly.*

**SECTION A (40 Marks)**

1. Complete the following nuclear reaction equations
2. ………………………………………………… (01 mark)
3. ………………………………………………… (01 mark)
4. ………………………………………………… (01 mark)
5. ………………………………………………… (01 mark)
6. Complete the following equations and write a mechanism for the reaction in each case.
7. ....…………………………………………………… (03 marks)

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1. ……………………………………………………………… (03 marks)

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1. (a) Complete the table below. (04½ marks)

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| --- | --- | --- | --- |
| Element | Formula | Nature of oxide | Structure of oxide |
|  |  |  |  |
| P |  |  |  |
|  |  |  |  |

1. Write an equation for the reaction between the oxide of aluminium and sodium hydroxide. (01mark)

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1. Explain the following.
2. Magnesium has a higher melting point than sodium. (02½ marks)

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1. Silicon has an abnormally high melting point. (02½ marks)

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1. A hydrocarbon P, with molecular formula , reacts with oxygen according to the following equation.

When 20cm³ of P was exploded with 200cm³ of an excess amount of oxygen, it burnt completely with a sooty flame. The volume of the residual gas after cooling to room temperature was 160cm³. When aqueous potassium hydroxide was added, the volume of the gas that finally remained was 20cm³.

1. Calculate the molecular formula of P. (03marks)

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1. When P was treated with bromine in the presence of iron (II) chloride, the bromine was decolorized. Identify P. (01mark)

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1. (a). Sodium (24) which is used as an electrolytic tracer decays by emission of a beta particle and two gamma rays with half-life of 15 hours. Write the nuclear reaction for the decay of sodium (24). (01 mark)

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1. 2.4g of sodium (24) were allowed to disintegrate for 72 hours. Calculate the mass of the radioactive isotope that decayed. (04 marks)

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1. State any two other uses of radioactive isotopes. (01 mark)

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1. Complete the following equations and in each case outline a suitable mechanism for the reaction.
2. ……………………………………………………… (03 marks)

Mechanism

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1. …………………………………………………………….. (03 marks)

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1. ……………………………………………………… (03½ marks)

Mechanism

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**SECTION B**

***Attempt all questions in this section.***

1. (a) Define the term compressibility factor. (01 mark)

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1. Draw a graph of compressibility factor (Z) against pressure; include curves for carbon dioxide, hydrogen and ideal gas. (02 marks)

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1. Account for the observed shape of the curve for;
2. Carbon dioxide (03 marks)

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1. Hydrogen (02 marks)

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1. (a) State Dalton’s law of partial pressure. (01 mark)

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1. Define the following terms as applied to gases;
2. Partial pressure (01 mark)

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1. Mole fraction (01 mark)

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1. 12 g of Nitrogen, 0.4 g of Hydrogen and 9 g of oxygen are put in a 1 litre vessel at a pressure of 22.4 atmospheres. Calculate the partial pressure of the respective gases. (06 marks)

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1. The table below shows the atomic radii of elements in group II in the periodic table.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Element | Be | Mg | Ca | Sr | Ba |
| Atomic radius (nm) | 0.112 | 0.160 | 0.197 | 0.125 | 0.221 |

1. (i) State how the atomic radii of the elements vary in the graph. (01 mark)

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1. Explain your answer in (a) (i) above. (03 marks)

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1. State three properties of in which beryllium is different from the rest of the group (II) elements. (03 marks)

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1. Explain how the atomic radius affects reactivity of group (II) elements with water. (02)

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1. A compound Q on combustion gave 0.629 g of carbon dioxide and 0.257 g of water.
2. Determine the empirical formula of Q. (02½ marks)

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1. When 0.10 g of Q was vapourised, it occupied a volume of 53.3 cm3 at s.t.p.
2. Determine the molecular mass of Q. (02½ marks)

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1. Determine the molecular formula of Q. (02 marks)

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1. Name compound Q. (0½ marks)

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1. Q reacts with bromine water.
2. State what is observed. (0½ marks)

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1. Write an equation for the reaction. (01 mark)

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1. Suggest the possible mechanism for the reaction. (02½ marks)

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1. (a) Write any possible structures for the following compounds.
2. (01 mark)

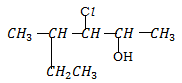
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1. (01 mark)

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1. You are provided with the following compounds, identify their IUPAC names.
2.  (01 mark)

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1.  (01 mark)

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**END**

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