NAMILYANGO COLLEGE

B.O.T 1 EXAMS

P 525/2
CHEMISTRY
PAPER 2 S.6
2 HOURS

ATTEMPT ALL QUESTIONS

1. (a) In a laboratory preparation of 2, 3 – dibromobutane, 50g of but-2-ene gas was passed into 80g of liquid bromine covered by a layer of water.

(i) What colour change took place? (1 mark)

(ii) Write the equation for the reaction between bromine and the alkene and indicate the mechanism for the reaction. (3 marks)

(iii) What name is given to the mechanism in (a) (ii) ? (1 mark)

(iv) Assuming that all the bromine reacted with the alkene calculate the mass of 2, 3 – dibromobutane formed (3 marks)

(v) If the actual mass of 2, 3 – dibromobutane obtained was 43.2g, calculate the percentage yield of 2, 3 – dibromobritane (2 marks)

(b) Describe briefly how to obtain a pure sample of 2, 3 – dibromobutane from the reaction mentioned in (a) (3 marks)

(c) 2, 3 – dibromobutane was heated under reflux with excess aqueous sodium hydroxide solution.

(i) Write the equation for the reaction that took place and name the main organic product according to the I.U..P.A.C system (3 marks)

(ii) What would be the main organic product if excess ethanolic potassium hydroxide solution was used instead of sodium hydroxide solution? (2 marks)

(d) Write the structural formulae and names of two postional isomers of 2, 3 – dibromobutane (2 marks)

2. (a) Give one reason in each case to explain why the elements of group II of the Periodic Table

(i) are divalent
(ii) form mainly ionic compound
(iii) do not form many complex compounds (8 marks)

(b) Although lithium is in group I of the Periodic Table, it resembles elements of group II in some of its properties.

(i) State two properties in which lithium resembles group II elements (2 marks)

(ii) Give one reason for the anomalous behaviour of lithium (1 mark)

(c) Explain why lithium ion has a smaller electrical conductivity than caesium ion when bothions are in aqueous solution (2 marks)

(d) Compare the reactivity of the elements of group I and group II with water and indicate the trend in the reactivity within each (5 marks)

3. (a) Write equations to show how the following compounds can be synthesized and in each case, indicate the conditions for the reaction

(i)

from benzene (3 marks)

(ii)

+ (4 marks)

(iii) $CH_3CH_2CH_2CH_2I$ to $CH_3CH_2CH_3$ (4 marks)

(b) Complete the following and in each case write a mechanism

(i) $CH_3CH_2CH = CH_2 \xrightarrow[2.\ H_2O]{1.\ Br_2\ (s)}$ (4 marks)

(ii) $CH_3CH_2Br \xrightarrow[\text{heat}]{\text{NaOH (aq)}}$ (2 marks)

(ii) $BrCH_2CH_2Br \xrightarrow[\text{heat}]{\text{KOH/alcohol}}$ (3 marks)

4. Explain each of the following:

(a) Although ionization energy generally increases across the periodic Table, the first ionization energy of boron is less than that of beryllium (5 marks)

(b) Both valence electrons of magnesium occupy the same energy level yet the second ionization energy of magnesium is greater than its first ionization energy (3 marks)

(c) Calcium forms compounds containing Ca^{2+} ions, but none containing Ca^{2+} ions even though its first ionization energy is lower than the second ionization energy (3 marks)

(d) Ethene reacts with bromine to form 1, 2 – dibromoethane but when the reaction is carried out in the presence of sodium chloride solution, 1 – bromo – 2 – chloroethane is formed (5 marks)

(e) Beryllium belongs to group II in the Periodic Table and yet its chemistry and that of its compounds resembles that of aluminium (4 marks)

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