AQA – Halogenoalkanes – AS Chemistry P2

1.

0	2

Bromoethane reacts with potassium cyanide to form compound **D**.

$$CH_3CH_2Br + KCN \rightarrow CH_3CH_2CN + KBr$$
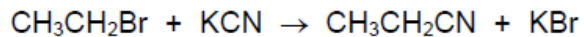
Compound **D**

0	2	.	1

Outline the mechanism for this reaction.

[2 marks]

0	2	.	2

Give the IUPAC name of **D**.

[1 mark]

_____

0	2	.	3

Calculate the percentage atom economy for the formation of **D** in this reaction.

Give your answer to the appropriate number of significant figures.
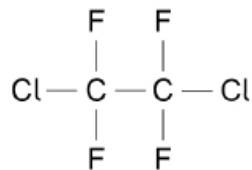
[2 marks]

% atom economy _____

1

2. June/ 2019/Paper_2/No.9

| 0 | 9 |

The compound 1,2-dichlorotetrafluoroethane is a CFC that was previously used in refrigerators as a coolant.

$$Cl-\underset{\underset{F}{|}}{\overset{\overset{F}{|}}{C}}-\underset{\underset{F}{|}}{\overset{\overset{F}{|}}{C}}-Cl$$

| 0 | 9 | . | 1 |

Molecules of 1,2-dichlorotetrafluoroethane can break down in the upper atmosphere to form chlorine radicals.

Give an equation to show the breakdown of one molecule of 1,2-dichlorotetrafluoroethane to form one chlorine radical and one other species.

[1 mark]

_____

| 0 | 9 | . | 2 |

Give **two** equations to show how chlorine radicals catalyse the decomposition of ozone.

[2 marks]

_____

_____

2

0 9 . 3 Butane can be used as a replacement for CFCs in refrigerators.

During its use, the butane is repeatedly converted from liquid to gas and then back to liquid. Liquid butane expands as it turns into a gas.

- Calculate the volume, in cm^3, of 38.8 g of butane gas at 272 K and 101 kPa (the gas constant $R = 8.31$ J K^{-1} mol^{-1})
  (M_r of butane = 58.0)

- Calculate the volume, in cm^3, of 38.8 g of liquid butane.
  (density of liquid butane = 0.60 g cm^{-3})

- Use your answers to calculate the factor by which butane expands in volume when it changes from a liquid to a gas.

Show your working.
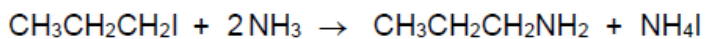
[6 marks]

Volume of butane gas _____ cm^3

Volume of liquid butane _____ cm^3

Expansion factor _____

3. June/ 2021/Paper_2/No.5

0	5

This question is about the synthesis of propylamine ($CH_3CH_2CH_2NH_2$) by the reaction of 1-iodopropane ($CH_3CH_2CH_2I$) with an excess of ammonia.

$$CH_3CH_2CH_2I + 2NH_3 \rightarrow CH_3CH_2CH_2NH_2 + NH_4I$$

0	5	.	1

Name and outline the mechanism for this reaction.

[5 marks]

Name of mechanism_____

Outline of mechanism

| 0 | 5 |.| 2 | 1-iodopropane is a liquid at room temperature.

Calculate the number of molecules in 5.0 cm^3 of 1-iodopropane (M_r = 169.9).
Give your answer in standard form.

For 1-iodopropane, density = 1.75 g cm^{-3}

The Avogadro constant, L = 6.022 x 10^{23} mol^{-1}

[2 marks]

Number of molecules _____

| 0 | 5 |.| 3 | In an experiment, 10.3 g of 1-iodopropane (M_r = 169.9) are reacted with an excess of ammonia. 2.3 g of propylamine (M_r = 59.0) are produced.

Calculate the percentage yield in this experiment.

[2 marks]

Percentage yield _____

6