SECTION B

Answer any **two** questions from this section in the spaces provided.

B5 The table shows the boiling points of some members of the homologous series of alkenes.

alkene	number of carbon atoms	relative molecular mass	boiling point/^{O}C
ethene	2	28	-105
propene	3	42	-50
butene	4	56	-5
propene	5	70	30
hexene	6	84	55

(a) **(i)** State the general formula of alkenes.

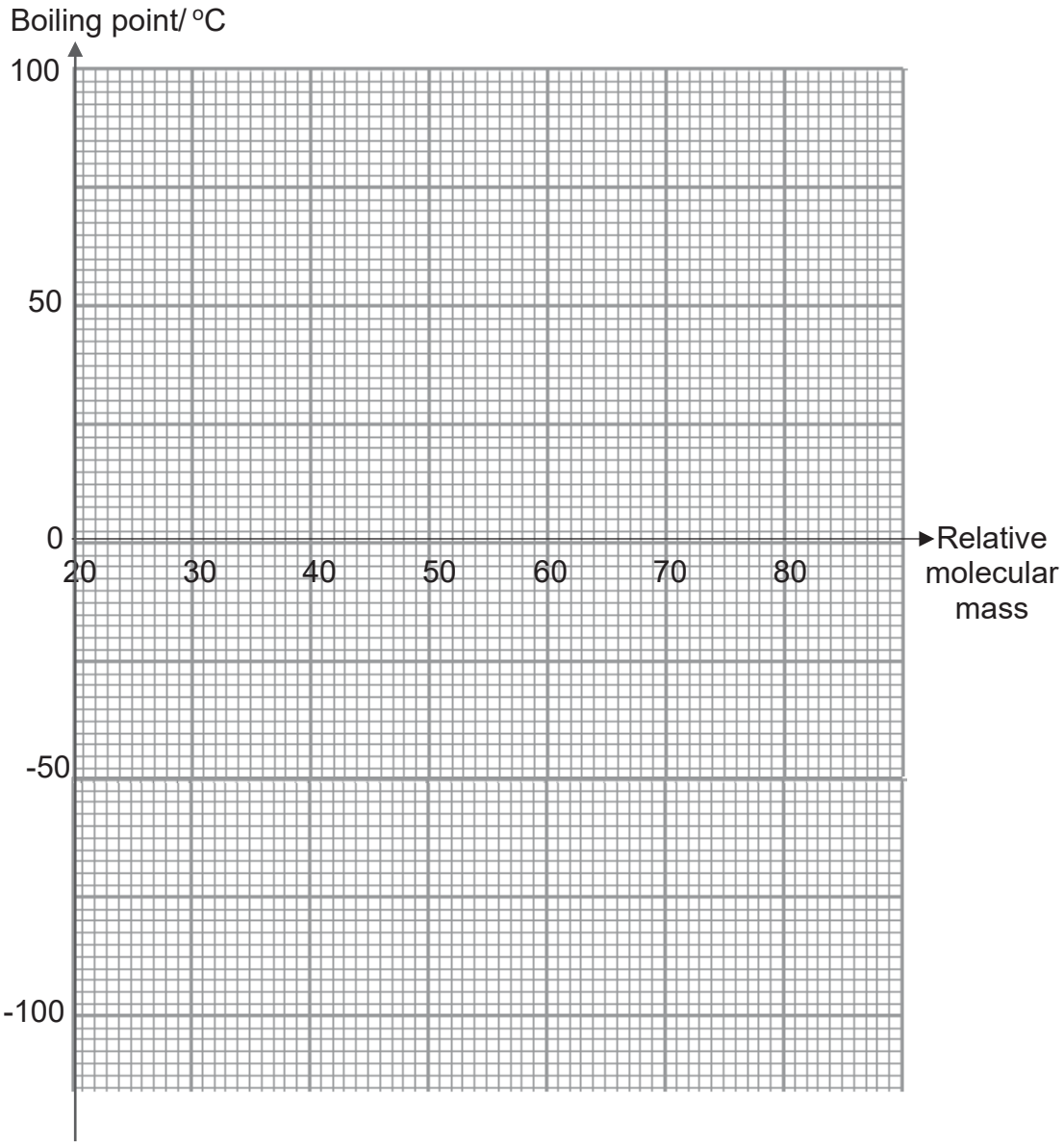
…..……..…..……[1]

(ii) Hence, deduce the chemical formula of hexene, which is an alkene containing 6 carbon atoms.

…..……..…..……[1]

(b) **(i)** Plot a graph of boiling point against relative molecular mass, marking each point with a cross (x). [1]

(ii) Draw a **curved best fit line**, taking into account all your plotted points. [1]



(iii) With reference the graph, describe the relationship between the relative molecular mass and the boiling point.

……..

……..….[1]

(iv) Hence, by showing your working clearly, deduce if the boiling point of ethane is higher or lower than that of ethene.

……...

……...

……..….[2]

(c) Alkenes can be produced from the cracking of long chain hydrocarbons like heptadecane, $C_{17}H_{36}$.

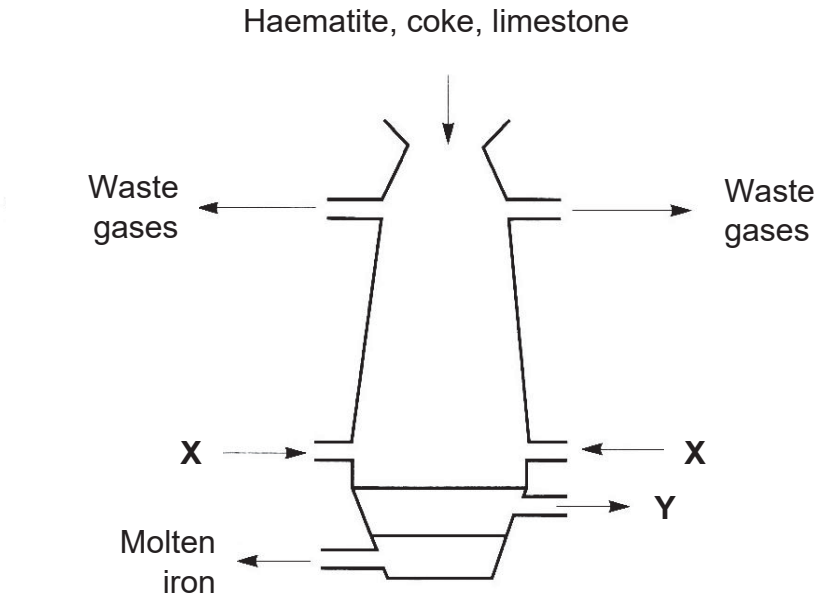
The cracking of hepadecane can be represented by the equation shown below.

$$C_{17}H_{36} \rightarrow C_6H_{14} + C_8H_{16} + \mathbf{X}$$

Draw the structural formula of **X**.

[1]

B6 The diagram below shows the extraction of iron in a blast furnace. Iron is extracted by reducing haematite with carbon.



(a) **(i)** Name substances **X** and **Y**.

X: …… **Y**: …… [1]

(ii) What is the purpose of adding limestone to the blast furnace?

……..[1]

(iii) Balance the following equation which shows the main reaction that occurs in the blast furnace.

…….Fe_2O_3 + …….CO → …….Fe + …….CO_2 [1]

(b) Name a metal that cannot be extracted by reducing the metal oxide using carbon.

…… [1]

(c) The chemical name for haematite is iron(III) oxide, Fe_2O_3.

(i) Draw a "**dot and cross**" diagram to show the bonding in haematite. Show only the outermost shell.

[2]

(ii) Based on your answer in **(c)(i)**, would you expect haematite to have a low or high melting point? Explain your answer.

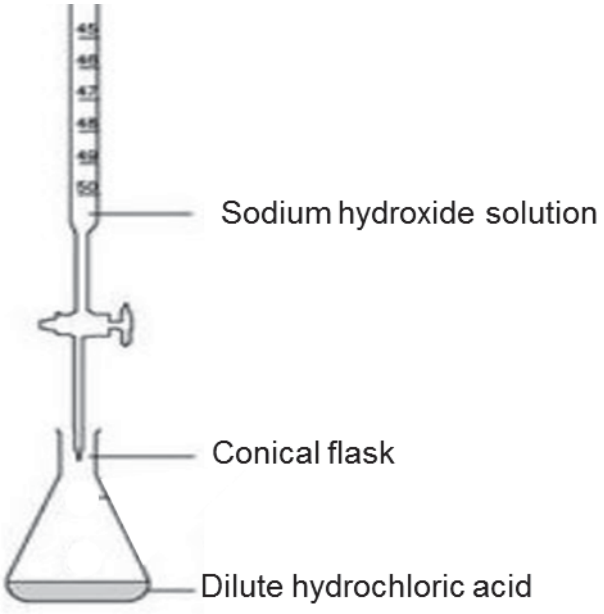
……...

……...

……...

……..[2]

B7 The diagram shows the apparatus used to react solutions of hydrochloric acid and sodium hydroxide to form sodium chloride.



In the experiment, 7 cm^3 of sodium hydroxide solution was added slowly from a burette to 10 cm^3 of dilute hydroxide acid. The pH was measured for every 1 cm^3 of sodium hydroxide solution added.

(a) **(i)** Name the salt preparation method shown in the experiment above.

.....[1]

(ii) Write the balanced chemical equation for the reaction.

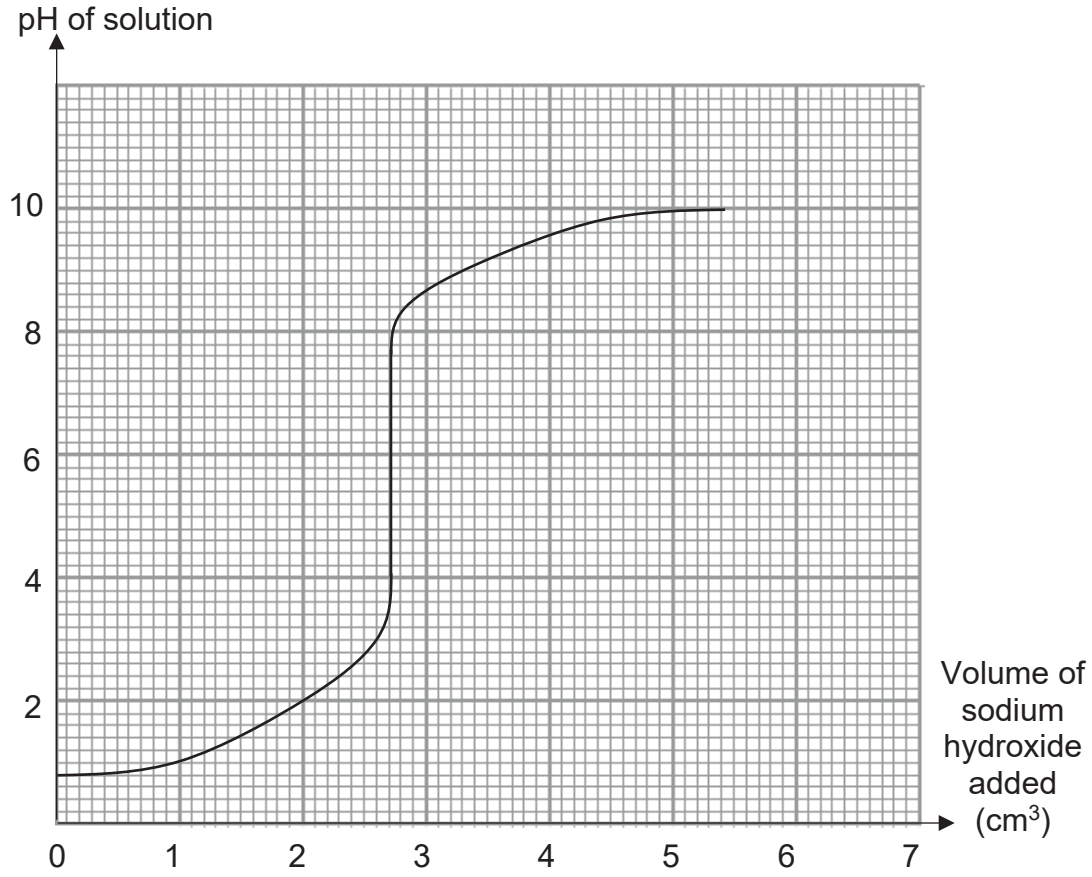
.....[1]

(iii) Name another salt that can be produced using the same method as mentioned in **(a)(i).**

.....[1]

The graph shown below was plotted based on the results obtained from the experiment.

(b)



(i) From the graph, determine the volume of sodium hydroxide solution needed to exactly neutralise the dilute hydrochloric acid.

……[1]

(ii) At the end of the experiment, a few drops of universal indicator were added to the conical flask. Determine the colour observed.

……[1]

(c) Sodium chloride can also be produced by reacting solid sodium with gaseous chlorine to form solid sodium chloride.

The balanced chemical equation for this reaction is shown below.

$$2\ Na\ (\ldots\ldots) + Cl_2\ (\ldots\ldots\ldots) \rightarrow 2\ NaCl\ (\ldots\ldots\ldots)$$

(i) Complete the equation above by filling in the state symbols. [1]

(ii) Calculate the mass of chlorine gas needed to produce 146.25 g of sodium chloride.

Mass of chlorine gas: …….. g [2]

END OF PAPER