Section B

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

4 (a) Chromium can be used as a protective metal for both steel and pure iron. Fig. 4.1 shows the arrangement of atoms in steel.

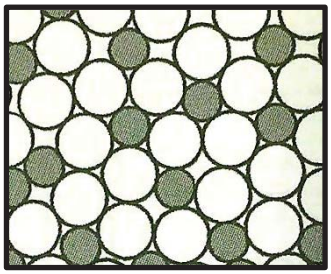

Fig. 4.1

(i) Steel is much harder than pure iron.

Use ideas about the arrangement of atoms in steel to explain why. [2]

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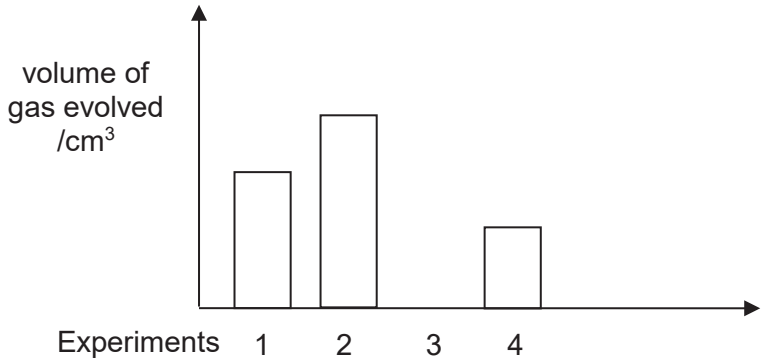
……

(ii) Stainless steel is an alloy of iron which contains approximately 20% chromium mixed with iron and some small amounts of other metals. Suggest how chromium can be used as a protective metal. [2]

……

……

(b) In four different experiments 1, 2, 3 and 4, equal amounts of four different powdered metals were separately added to equal volumes of a dilute acid. The volume of gas collected in the first few seconds is shown in the bar chart below.



The four metals used are magnesium, iron, silver and zinc.

(i) Name the metal used in [2]

Experiment 1 ……

Experiment 2 ……

Experiment 3 ……

Experiment 4 ……...

(ii) Name the gas produced and describe a positive test to identify the gas. [2]

name of gas: ……..

positive test of gas: ..……

……...

5 **(a)** Coal-fire power station emit sulfur dioxide into the atmosphere. Sulfur dioxide is a pollutant that damages the environment.

(i) Write a balanced chemical equation for the formation of sulfur dioxide. State symbols are not required. [1]

……...

(ii) What type of oxide is sulfur dioxide classified as? [1]

Type of oxide: ……..... oxide

(iii) Explain how sulfur dioxide damages the environment based on your answer in **(a)(ii)**. [2]

……..

……..

(b) Both sulfur and oxygen belong to the same group but different periods in the Periodic Table.

Using their electronic configurations, explain why

(i) sulfur and oxygen belong to the same group,

……...

……...

(ii) sulfur and oxygen belong to different periods.

……...

……...

[2]

(c) The element sodium belongs to the same period as sulfur but in different group. [2]

Sodium reacts vigourosly with water to form an alkali and a gas.

Name these products.

Alkali: ……

Gas: ……

6 (a) The hydrocarbons propene, C_3H_6, and butene, C_xH_y, are members of the same homologous series.

(i) Write down the values for *x* and *y*. [1]

x : …….. *y* : ……..

(ii) State two general properties of an homologous series. [2]

1. ……..

……...

2. ……..

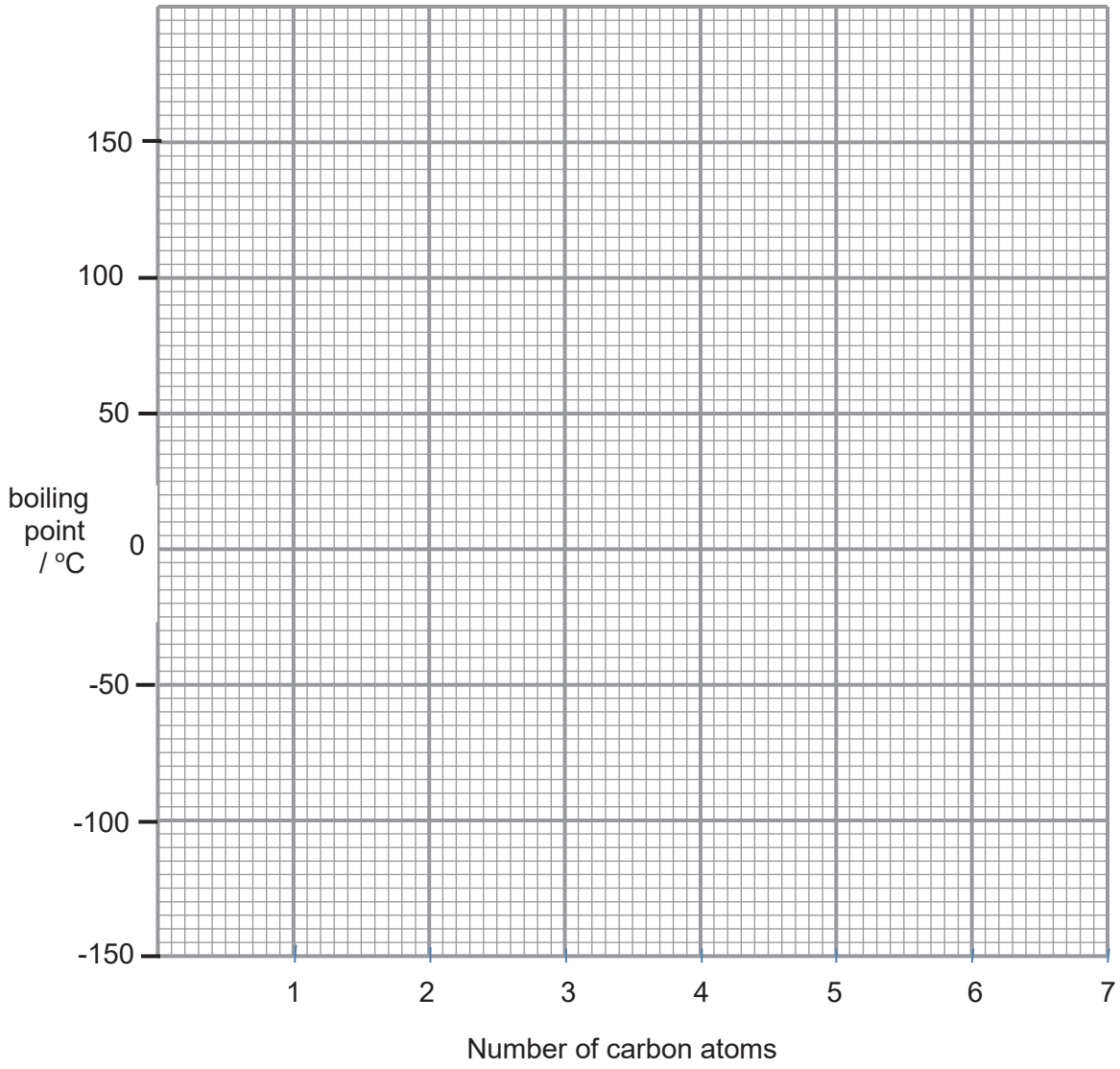
……...

(b) The table shows the boiling points of some members of the homologous series of alkenes.

Number of carbon atoms in the alkene	Boiling point / °C
2	-100
3	-25
4	
5	65
6	95
7	105

(i) Plot a graph of boiling point against the number of carbon atoms, marking each point with a cross (x).

Draw a curved line of best fit for your plotted points. [2]



(ii) Use your graph to predict the boiling point of the alkene with 4 carbon atoms. [1]

boiling point = ……°C

(iii) Explain the general trend in boiling points shown by your graph. [1]

……...

……...

(iv) State the colour change observed when a few drops of aqueous bromine is added to a 25 cm^3 of any alkene solution. [1]

Initial colour of aqueous bromine: …….

Final colour of the reaction mixture: …….