GCSE Chemistry A (Gateway Science)

J248/01 Chemistry A C1-C3 and C7 (Foundation Tier)

Question Set 9

1 Look at the data about some hydrocarbons.

Hydrocarbon	Number of carbon atoms in molecule	Molecular formula	Boiling point (°C)
ethane	2	C_2H_6	–88
propane	3	C_3H_8	–42
pentane	5	C_5H_{12}	36
hexane	6	C_6H_{14}	69

(a) Butane contains 4 carbon atoms.

Use the table to suggest the molecular formula of butane.

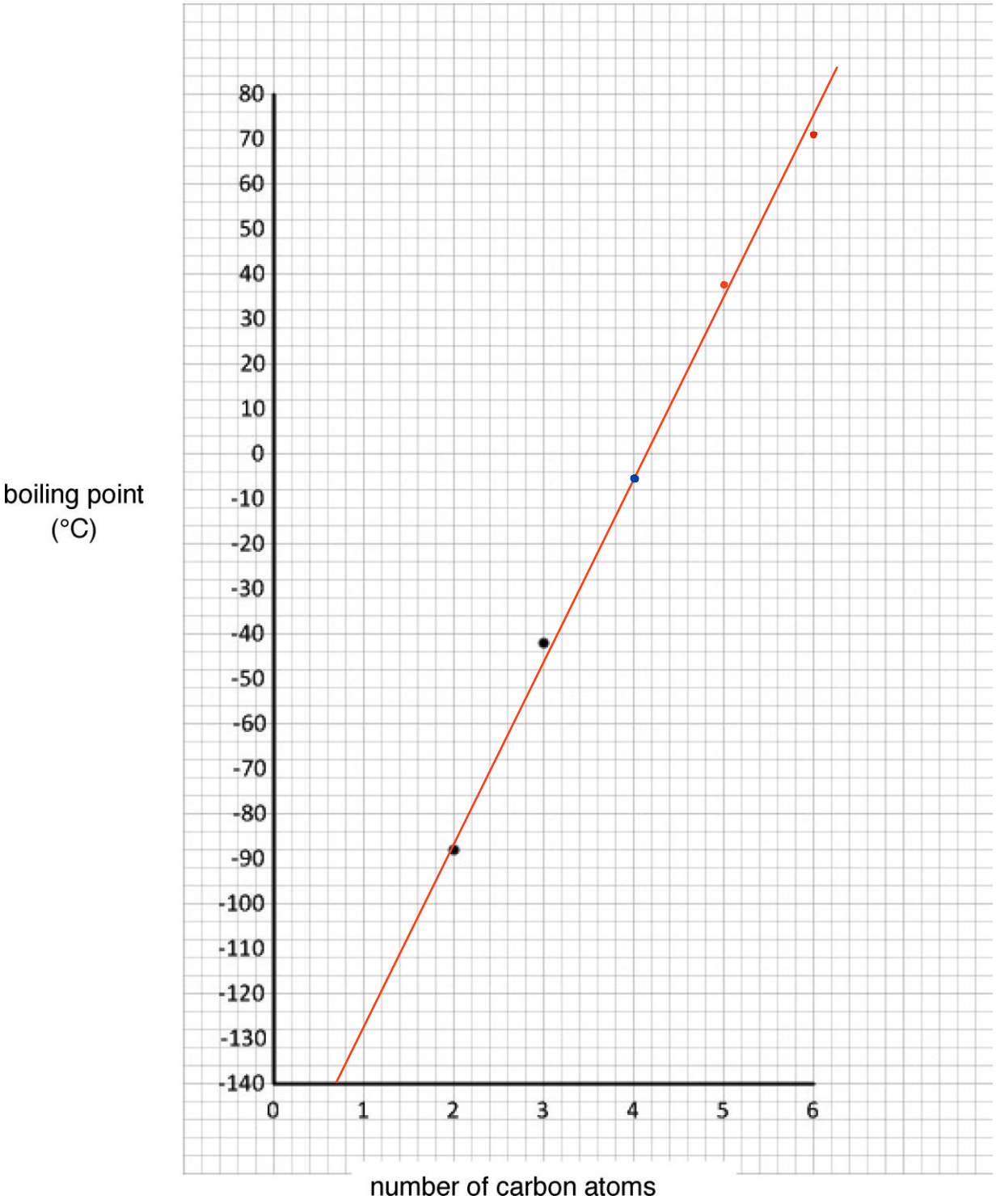
[1]

C_4H_{10}

(b) The boiling points of ethane and propane have been plotted on the graph.

(i) Plot the boiling points for pentane and hexane on the graph.

Draw the line of best fit. **[2]**



(ii) Use your graph to estimate the boiling point of butane.

Answer: ~ 7 °C **[1]**

(iii) Describe the relationship between the number of carbon atoms in a molecule and its boiling point.

Use ideas about forces between molecules to explain your answer.

As the number of carbon atoms increases the boiling point increases because larger molecules have greater intermolecular forces

[2]

(c) Propane burns in oxygen, O_2.

Carbon dioxide and water are made.

Write a **balanced symbol** equation for this reaction.

$C_3H_8 + 5O_2 \longrightarrow 3CO_2 + 4H_2O$

[2]

(d) Propane gives out 50 000 J/g when it reacts with oxygen.

- A propane burner is used to boil water to make a cup of tea.
- 63 000 J of energy are needed to boil the water.
- There is only 3 g of propane in the burner.

Do a calculation to find out if there is enough propane in the burner to boil the water.

[3]

50 000 × 3 = 150000 J > 63000 J
The burner can provide 150000 J
∴ There is enough energy to boil water

or

mass of fuel needed to boil water = $\frac{63000}{50000}$

= 1.2 g

∴ burner has 3 g > 1.2 g thus has enough fuel

Total Marks for Question Set 9: 11