

Exercise walk-through

2.2

Intermolecular forces (Topic 7)

Pearson Edexcel · International A-Level · Chemistry

Check the sign and denominator

Your turn

The solution gains 1.20 kJ while 0.0200 mol reacts. What is the molar reaction enthalpy?

- A. $+60.0 \text{ kJ mol}^{-1}$
- B. $-60.0 \text{ kJ mol}^{-1}$
- C. $-0.0240 \text{ kJ mol}^{-1}$
- D. $-1.20 \text{ kJ mol}^{-1}$

Supplied IR data: carbon environments

Bond / environment	Supplied region / cm^{-1}
Alkane C–H	2850–3000
Alkene C–H	3000–3100
Aldehyde C–H	2700–2900
C=C	1620–1680
C=O	1680–1750

Independent identification

Your turn

$\text{C}_3\text{H}_6\text{O}$ has a carbonyl IR absorption and gives a positive Fehling's test. Which structure fits all evidence?

- A. CH_3COCH_3
- B. $\text{CH}_3\text{CH}_2\text{CHO}$
- C. $\text{CH}_3\text{CH}_2\text{CH}_2\text{OH}$
- D. CH_3COOH

Exercises 2.1·2.3

2.1 Name the attraction present in every molecular substance and state its origin. [2]

2.2 Compare whether pure CH_3OH and pure CH_3OCH_3 can hydrogen-bond to their own molecules. Explain. [3]

2.3 Explain why boiling temperature generally increases from HCl to HBr to HI . [2]

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2.1 London forces: instantaneous dipoles induce dipoles in neighbouring particles.

2.2 Compare whether pure CH_3OH and pure CH_3OCH_3 can hydrogen-bond to their own molecules. Explain. [3]

2.2 Methanol can: it has an O–H donor and oxygen lone pairs. The ether lacks H bonded to N/O/F, so its pure molecules cannot form this hydrogen-bond network; it can accept hydrogen bonds from water.

2.3 Explain why boiling temperature generally increases from HCl to HBr to HI. [2]

2.3 Larger, more polarisable electron clouds/more electrons give stronger London attractions requiring more energy to overcome.

Exercises 3.1·3.2

3.1 Pentane and 2,2-dimethylpropane are isomers. Predict which usually has the lower boiling temperature and explain why equal electron counts do not make their attractions identical. [3]

3.2 Explain why ice floats on liquid water near 0 °C and why a polar halogenoalkane can still dissolve poorly in water. [4]

Exercises 3.1·3.2

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3.1 2,2-dimethylpropane is more compact and has less effective intermolecular contact, so London attractions between molecules are weaker.

3.2 Explain why ice floats on liquid water near 0 °C and why a polar halogenoalkane can still dissolve poorly in water. [4]

3.2 An open hydrogen-bonded arrangement keeps ice molecules further apart, giving lower density than liquid water. Halogenoalkane molecules cannot replace the water hydrogen-bond network effectively; bond polarity alone does not guarantee sufficiently favourable new attractions.