

Intermolecular Forces & Properties

INSTRUCTOR / SELF-STUDY ANSWER KEY

Answers and reasoning appear in red. Use these to discuss why incorrect choices are incorrect.

Part A — Concept checks

1. Which force acts between every pair of molecules?

Answer: C. London dispersion — Temporary dipoles create dispersion attractions in all particles.

2. Which pure liquid exhibits hydrogen bonding?

Answer: B. NH_3 — NH_3 has N-H bonds and an N lone pair.

3. Which molecule is nonpolar overall?

Answer: C. CO_2 — Linear CO_2 has bond dipoles that cancel.

4. Strongest characteristic IMF in pure HCl (besides dispersion)?

Answer: B. dipole-dipole — HCl is polar, but it is not a conventional H-bond donor under this rule.

5. Why does I_2 have stronger dispersion forces than F_2 ?

Answer: B. iodine is more polarizable — A larger electron cloud is more polarizable.

6. Which change usually requires overcoming intermolecular attractions?

Answer: A. boiling a molecular liquid — Vaporization separates molecules from one another.

Part B — Application and explanation

7. Why is the boiling point of water much higher than that of H_2S ?

Model solution: H_2O forms an extensive hydrogen-bond network, while H_2S cannot form comparable conventional hydrogen bonding; intermolecular attractions differ substantially. Final answer: Hydrogen bonding in water

8. Explain why this guideline matters, with an example of what could go wrong if you ignore it: Do not confuse intermolecular forces with covalent bonds within a molecule. Boiling generally separates molecules, not atoms within molecules.

Model explanation: Do not confuse intermolecular forces with covalent bonds within a molecule. Boiling generally separates molecules, not atoms within molecules. Example/check: London dispersion forces exist in all atoms and molecules and tend to strengthen as electron clouds become larger and more polarizable.

REFERENCE RELATIONSHIP

all particles have dispersion forces; H bonding requires H bonded to N, O or F