

Summary Questions – Solutions

1. Yes – strength of IMFs also depends on size and shape, not just polarity, so, for example, a very large molecule may have stronger LDFs than the hydrogen bonding forces in a smaller compound
2. Yes – the intermolecular forces weaken as the molecules get further apart; phase change occurs when intermolecular forces weaken (solid to liquid) or break (liquid to gas)
3. $C_{25}H_{52}$, because it has a higher boiling point than water ($400^{\circ}C$ vs $100^{\circ}C$), meaning it needs more energy to break its intermolecular bonds
4. Ar – LDF; HCl – DDF; HF – HBF; $CaCl_2$ – ionic; CH_4 – LDF; CO – DDF; $NaNO_3$ – ionic
5. a. OCS b. SeO_2 c. H_2CO d. CH_3OH
6. a. HBr b. Br_2 c. CH_4
7. Water has higher adhesion than mercury, so water sticks to the glass tube, while mercury has a stronger attraction to itself
8. H_2O_2 has stronger IMFs/bigger molecule so it has a higher viscosity (more “syrupy”), and a higher boiling point (more energy to break intermolecular bonds)
9. a. molecular b. covalent network c. molecular d. molecular e. ionic f. molecular
g. ionic h. ionic
10. a. metallic b. molecular c. ionic d. network covalent e. ionic
11. Ionic
12. Across the rows, the strength of the intermolecular forces (mainly polarity) decreases, so the melting point gets lower and lower. Comparing Row 1 to Row 2, the values for the ionic fluorine compounds are higher because fluorine has a higher electronegativity, so these compounds are more polar. The values for the covalent compounds of fluorine vary due to the shape of the molecules and the strength of the intermolecular forces.
13. A – substance is a gas and is losing kinetic energy (temperature drops)
B – substance is condensing (gas to liquid) and intermolecular bonds are forming between molecules (no temperature change – constant at $125^{\circ}C$)
C – substance is a liquid and is losing kinetic energy (temperature drops)
D – substance is freezing (liquid to solid) and intermolecular bonds are strengthening (no temperature change – constant at $50^{\circ}C$)
E – substance is a solid and is losing kinetic energy (temperature drops)