Name _____ Date _____ Period _____

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Properties Due to IMF

Chemistry

Find the strongest intermolecular force (IMF) in each substance, then use it to answer.
Stronger IMFs: higher boiling and melting points, higher surface tension, slower evaporation. If the strongest IMFs match, the bigger molecule wins.

1. Find the strongest IMF in each substance, then pick the one with the higher boiling point. The first row is done for you.

Pair	Strongest IMF of each	Higher boiling point
HF or F_2	HF: hydrogen bonding; F_2: LDF only	HF
Cl_2 or I_2		
CH_3OH or CH_4		

2. Remember: weaker IMFs mean faster evaporation, and stronger IMFs mean higher surface tension.

Question	Strongest IMF of each	Answer
Which evaporates faster at room temperature: hexane (C_6H_{14}) or water?		
Which has the higher surface tension: water or hexane?		

3. Use "like dissolves like." Decide whether each substance is polar or nonpolar, then answer.

Question	Polar or nonpolar?	Answer
Which dissolves better in water (polar): methanol (CH_3OH) or octane (C_8H_{18})?		
Which dissolves better in hexane (nonpolar): Br_2 or HF?		

4. These three molecules are about the same size (44 to 46 g/mol). Find the strongest IMF in each, then rank them from lowest to highest boiling point.

Molecule	Strongest IMF
propane, $CH_3CH_2CH_3$	
acetaldehyde, CH_3CHO	
ethanol, CH_3CH_2OH	

Lowest _____ < _____ < _____ Highest

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5. At room temperature, fluorine (F_2) is a gas, but iodine (I_2) is a solid. Both are nonpolar. Explain their states of matter using IMFs.

Sentence frame: *Both have only _____ forces. I_2 has many more _____, so its IMFs are _____ and its molecules _____.*

6. A student tested four unknown solids. Use the evidence to name each type of solid.

Word bank: molecular, covalent network, ionic, metallic

Solid	Melting point	Appearance	Conducts as a solid?	Conducts when melted?	Type of solid
A	1710 °C	very hard, clear crystals	no	no	
B	80 °C	soft, white crystals	no	no	
C	801 °C	hard, brittle crystals	no	yes	
D	1085 °C	shiny, bendable	yes	yes	

7. Quartz (SiO_2) and iodine (I_2) are both made of nonmetal atoms joined by covalent bonds. Quartz melts at about 1700 °C, but iodine melts at 114 °C. Explain the difference.

Word bank: molecular solid, covalent network solid, IMFs, covalent bonds

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