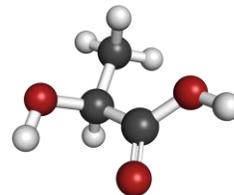


Name: _____ Date: _____
Chemistry

Class Notes

Intermolecular Forces



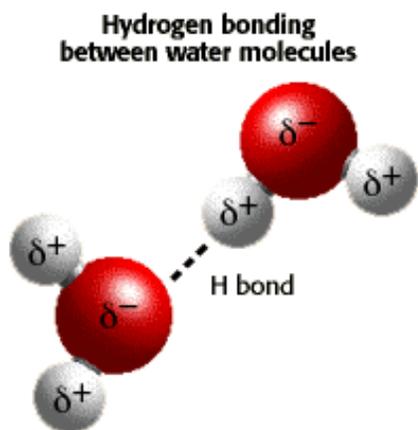
Intermolecular forces (IMFs) are attractions between the individual molecules, ions or polyatomic ions of a substance. Compared to intramolecular forces (chemical bonds) IMFs are very weak, but if it were not for the existence of IMFs condensed phases of matter (liquid and solid) would not exist. Intermolecular forces help explain many physical characteristics such as:

- melting point
- boiling point
- freezing point
- surface tension
- cohesiveness
- adhesiveness
- evaporation
- viscosity

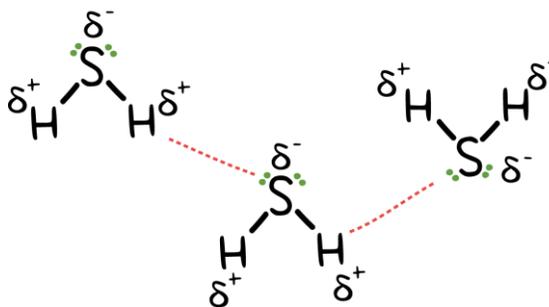
Types of IMFs

The strongest intermolecular forces are the ion interactions which are attractive forces involving ions. These forces are ion-ion and ion-dipole forces. **Ion-ion** forces are between ions in an ionic compound caused by the attraction between the anion and the cation. **Ion-dipole** forces are between ions of an ionic compound and a dipole. Both forces are strong and are the reason many compounds have a high boiling point.

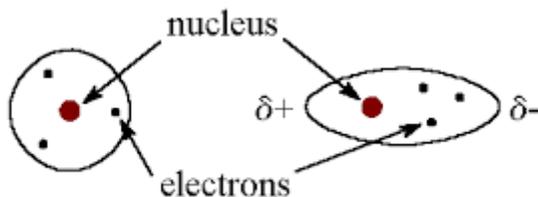
Van der Waals forces refers to the intermolecular forces of covalent compounds collectively and consist of hydrogen bonds, dipole-dipole and dispersion forces (London forces). **Hydrogen bonds** are the strongest Van der Waals force, formed when polar molecules having chemical bonds between hydrogen and either nitrogen, fluorine or oxygen are attracted to each other. Examples are: NH_3 , HF or H_2O .



The dipole-dipole force is the next strongest Van der Waals force formed by the attraction between polar molecules. It is created when the partial positive (δ^+) end of one dipole is attracted to the partial negative (δ^-) end of another dipole.



Dispersion forces also known as London forces are the weakest forces and are present in all compounds. Dispersion forces are created by the attraction of momentary dipoles. Momentary dipoles are created when the electrons in an atom are overwhelming to one side creating a slight (δ^-) and (δ^+) charge. These momentary are then temporarily attracted to each other forming a very weak bond.



Check Up

DIRECTIONS: Draw the molecule; determine the polarity and the main intermolecular force.

CH₄

NH₃

H₂O

polarity: _____

polarity: _____

polarity: _____

IMF: _____

IMF: _____

IMF: _____

“Imagination is more important than knowledge. For knowledge is limited to all we know and understand, while imagination embraces the entire world, and all there ever will be to know and understand.”

--Albert Einstein