

Chapter 6
Intermolecular Forces: Attractions between Particles
Learning Objectives

8.12.2022

To satisfy the minimum requirements for this course, you should be able to:

1. **Identify and describe the various types of Intermolecular Forces (IMFs).** Be able to:
 - explain the physical origin of the following IMFs: dipole-dipole forces, ion-dipole forces, London dispersion forces, and hydrogen bonds
 - identify the types of IMFs present based on a molecule's structure
 - rank the relative individual strengths of the different types of IMFs
 - identify functional groups within a molecule that give rise to hydrogen bonding and recognize the dominant role of hydrogen bonding (if present) in determining overall properties
 - rank the strength of dispersion forces based on molecular weight, polarizability, or shape
2. **Recognize how intermolecular forces (IMF's) determine physical and chemical properties of substances.** Specifically, be able to:
 - understand the additive nature of IMFs in determining overall properties of a substance
 - explain how intermolecular forces influence properties of molecular substances; especially melting point and boiling point
 - recognize hydration of ions in water as an important example of ion-dipole forces
 - define the following: solubility, solvent and solute
 - explain how hydrogen bonding affects the properties of water
3. **Name and describe the six phase change processes** linking physical states of matter. Be able to:
 - explain what is meant by physical equilibrium, and give a specific example.
 - define boiling point and melting (freezing) point and explain why the boiling point of a liquid depends on the pressure on the surface of the liquid
 - use a phase diagram to predict which phases are present at any given temperature and pressure, identify phase changes as temperature and/or pressure are varied, and identify the critical temperature, critical pressure, and triple point
4. **Describe the following properties of liquids: surface tension, capillary action, and viscosity**
 - understand the role of IMFs in determining the relative magnitudes of these properties for different liquids
5. **Naval Application: Fuels and Lubricating Oils**
 - recognize that heavier hydrocarbons generally have stronger intermolecular forces, higher boiling points, and lower vapor pressures (This NavApp will be expanded on in Chapter 10)