

CHAPTER 10

LIQUIDS, SOLIDS, AND CHANGES OF STATE

We will spend three lecture days on this chapter.

- ❖ Day 1. Sections 1 – 3: Polar covalent bonds and dipole moments, intermolecular forces, some properties of liquids.
- ❖ Day 2. Sections 4 – 6: Phase changes, evaporation, vapor pressure and boiling point
- ❖ Day 3. Sections 8 – 11: Unit cells and packing of spheres, structures of some ionic lattices, network covalent lattices, phase diagrams.

- Section 10.1**
- Read how scientists calculate the percent ionic character from a dipole moment. We will not be repeating these calculations, however.
 - Using only VSEPR geometries and electronegativity trends, determine whether a molecule is expected to be polar and have a dipole moment.
 - Give the direction of a dipole moment.

- Section 10.2**
- Identify the major type of intermolecular forces present in substances, and determine which of two substances exhibits the stronger intermolecular force.
 - Relate relative strengths of intermolecular forces to physical properties of molecules.

- Section 10.3**
- Describe viscosity and surface tension, and relate these properties to intermolecular forces.
 - Do Problems 2, 4, 5, 6, 32 – 38 even, 44, 46, 48

- Section 10.4**
- Describe fusion, freezing, vaporization, condensation, sublimation, and deposition.
 - For a phase change, determine whether enthalpy is increasing or decreasing and whether entropy is increasing or decreasing.
 - Use the $\Delta G = \Delta H - T\Delta S$ equation to calculate the entropy change for a phase change or the temperature (boiling point, melting point, sublimation point) at which the phase change occurs.

- Section 10.5**
- Use the Clausius-Clapeyron equation to calculate vapor pressure or heat of vaporization.
 - Do Problems 9, 10, 50 – 60, even

- Section 10.6**
- Classify solids as ionic, molecular, covalent network, or metallic, and give the major forces of attraction of each.

Skip Section 10.7

- Section 10.8**
- Identify unit cells.
 - For metals crystallizing in one of the three cubic unit cells, determine the number of atoms, mass, volume, density, atomic radius, and packing efficiency.



“Sometimes it’s easier if you break the work up into little chunks.”

Section 10.9 □ From unit cell information for ionic solids, determine the types and numbers of ions, the oxidation state and geometry around each ion, and the formula of the ionic compound.

□ Do Problems 11 – 13, 15, 16, 74, 76, 78, 82 – 94, even.

Section 10.10 □ Describe structure of the allotropes of carbon and SiO_2 .

Section 10.11 □ Sketch a phase diagram, labeling the axes and each of the regions, and locate the triple point, critical point, normal melting point, and the normal boiling point.

□ Use phase diagrams to describe physical changes.

□ Do Problems 17 – 18, 96 – 106, even.

