Learning Goals:
1. Know the five properties of liquids
2. What is an intermolecular bond or attraction? What are the three types of intermolecular bonds or attractions? What are the requirements for each intermolecular attraction to occur?
3. Given the formula of a substance, predict what type(s) of intermolecular attractions occur.
4. Know the relative strength of dispersion forces, dipole forces and hydrogen bonding.
5. Be able to relate strengths of intermolecular attractions to properties like vapor pressure, boiling point, viscosity and surface tension. Know how each of the previous properties are defined.
6. Know the five properties of solids.
7. Know the difference between ionic, molecular and metallic crystalline solids and be able to classify given formulas into each category.
8. **Omit Sec 13.6** Changes of Physical State
9. Know the molecular shape of water, its approximate bond angle, and that it is a polar molecule.
10. Know the unusual characteristics of water liquid vs. water solid: Density, melting point and boiling point. Be able to explain what causes these unusual properties.
11. **Omit Sec. 13.9** on Chemical Properties of Water
12. **Omit Sec. 13.10** on Hydrates

Extra Practice:

_____ 1. Which one of the following substances would have the **highest** vapor pressure?
   a) HC_2H_3O_2(l) acetic acid  b) H_2O(l) water  c) C_6H_6(l) benzene
   d) CH_3OH(l) methanol  e) CH_3COCH_3(l) acetone

_____ 2. Which one of the following would have hydrogen bonding?
   a) HC_2H_3O_2(l) acetic acid  b) CH_3C_6H_5 toluene  c) C_6H_6(l) benzene
   d) CH_3OH(l) methanol  e) CH_3COCH_3(l) acetone

_____ 3. Which one of the following would have the **highest** boiling point?
   a) HC_2H_3O_2(l) acetic acid  b) CH_3C_6H_5 toluene  c) C_6H_6(l) benzene
   d) CH_3OH(l) methanol  e) CH_3COCH_3(l) acetone

_____ 4. Which one of the following would be a **molecular crystalline solid**?
   a) C_6H_12O_6 glucose  b) ZnSO_4(s)  c) Mg(s)  d) LiCl(s)

_____ 5. Which property would be indicative of a **metallic crystalline solid**?
   a) conductor of electricity only when melted or in solution
   b) generally soluble or slightly soluble in water
   c) low melting points
   d) malleable and ductile

**Answers:** 1) c since it is nonpolar and only has dispersion forces; 2) d since it has an O–H bond; 3) d since it has hydrogen bonding; 4) a since it has only nonmetals in the formula; 5) d (a is for ionic, b is for ionic, c is for molecular)