

Topics to be familiar with for Test #1

Intermolecular forces and changes in chemical state or phase

Intermolecular forces

- types (ionic, dipole, hydrogen bond, dispersion (London, or Van der Waals))
- predicting types of forces present between molecules based on their structure
- relative strength of different intermolecular forces
- how these relate to properties of substances such as state changes, viscosity, surface tension, etc.
- be able to predict trends in boiling or melting points based on structures of molecules and thus on intermolecular forces
- be able to explain which forces are most important, given structures and values for boiling or melting points
- be able to predict general trends in solubility based on structures of molecules and thus on intermolecular forces

Energy consumption or release that accompanies change in state (breaking intermolecular interactions *consumes* energy; forming them *releases* it)

Does the temperature of a substance change *while* it is changing state?

The concept of *critical temperature* and *pressure*

Vapor pressure

- what it is
- how it is established at the molecular level
- how it relates to:
 - temperature
 - *boiling point*
 - atmospheric pressure
 - *volatility*

General familiarity with *phase diagrams*, ability to extract data from them or build one from data

Solutions and their properties

The concept of *solution*

The meaning of: *solubility, solvation, solute, solvent, saturation, supersaturation, concentration, molarity, molality, mass percent, parts per million, colligative* (you should be able to interconvert between the various measures of concentration)

The breaking and making of intermolecular interactions in the process of solvation

Dependence of solubility on

- temperature
- pressure

Colligative properties (because we did not get as far into this today as I had hoped, I will decrease the point value associated with it on the test, and will drop osmotic pressure altogether)

- the concept
- effect of solute on vapor pressure of solvent
 - concept and computation via *Raoult's law* (formula will be given)
 - calculating *mole fractions*
- effect of solute on boiling point of solvent
 - concept and computation (formula and constant will be given)
- effect of solute on freezing point of solvent
 - concept and computation (formula and constant will be given)

(items that are *italicized and underlined* are important terms that I expect you to understand)