**Learning Goals:** Students will be able to: (2 levels of goals listed)

**A. Identifying and Describing Particle behavior as it relates to phase.**

1. Describe differences and similarities between monatomic, diatomic, and polyatomic particle behavior.
2. Describe how the vapor pressure of a liquid or solid is measured.
3. Describe how changing the pressure or temperature can change the state of matter.
4. Given the position on a phase diagram from which the labels are all removed, identify the phase present and determine the microscopic behavior of molecules. And vice versa.

**B. Explaining behavior using Bonding**

1. Develop ideas about why there is variation in inter-particle forces (other references will be needed).
2. Differentiate between non-polar and polar molecular behavior as it relates to phase.
3. Relate changes in the strength of the inter-particle bonding to changes in the phase diagram, vapor pressure, and transition temperatures.

**Directions:**

1. For the learning goals in Section A, design experiments to learn 1-4. For your paper, you should write the learning goal #, a description of the tests that you used, and an explanation of the results that demonstrate your learning. You may use a set of experiments to learn multiple goals - just make sure that it is clear. For example you might state: “ For goals 2 and 3, we ..(description of experiment)..”. Then include diagrams and descriptions that demonstrate that you can do goals.
2. For Section B #6, use your text or other resources to
   1. Define Dipole-Dipole force and London dispersion forces.
   2. Explain which is stronger and why.
   3. Describe how the inter-particle forces (strength) of each could vary.
   4. Identify which type of bonding each of the example (Ne, Ar, O2, H20) particles has.
3. For Section B #5-7, design and describe experiments. Then demonstrate your goal proficiency.

You may want to use the simulation ***Atomic Interactions*** to help with this section.