States of Matter Simulation

Background: In this simulation the behavior of particles of matter can be observed as heat is added or removed from a system containing particles of different atoms and molecules.

Simulator Setup: The setup shows a cylinder with a thermometer indicating the temperature inside the cylinder as well as a heating/cooling apparatus under the cylinder that can be used to add or remove heat.

Observations: When particles inside the simulator are in their solid state, the particles are closely packed together and are slightly vibrating. When heat is added to the cylinder, the particles begin to vibrate faster and begin moving apart from each other as it changes from solid to liquid. When the particles are in their liquid state they are more spread apart from each other than in the solid state and are vibrating at a faster rate. When more heat is added the particles move even farther apart from each other and vibrate faster. Finally, the state changes from liquid to gas at which point the particles move around the cylinder in a random manner, and exhibit no attraction between particles. When heat is removed from the system, the opposite observations can be made. When the particles are in their gaseous state and the cylinder is cooled, the particles begin vibrating more slowly and start to pack together more closely until they are in their liquid state. As the cylinder cools further, the vibrations slow down even more until the particles are closely packed together, once again in their solid state.