



Explore

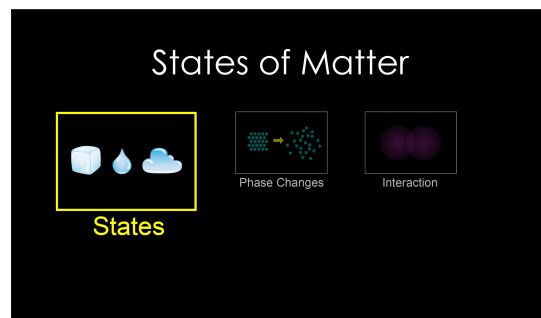
Name: _____ Date: _____

Changes in State

Let's examine the motion of water particles as heat is added or removed from the system by using a computer model to simulate particle movement.

Directions

1. Access the University of Colorado Boulder PhET simulation called "States of Matter" through the site.
 - a. <https://phet.colorado.edu/en/simulation/states-of-matter>
 - b. Double-click on States to obtain the correct screen.
 - c. Change the temperature indicator from kelvin to Celsius.
 - d. Change the "Atoms and Molecules" section to water.
2. Start with water in its solid state for the substance.
3. Make a drawing and write your observations about the molecules in the solid in the space below.



4. Add heat to the system by adjusting the heat at the bottom of the simulator. As the heat increases, make a drawing and write your observations in the space below about the behavior of the molecules. Continue to add heat until the temperature reaches 500 degrees C.



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5. Once this temperature has been reached, make a drawing and write your observations about the molecules behavior in the space below.

6. Remove heat from the system by controlling the heat at the bottom of the simulator. As the temperature drops, make a drawing and write your observations about the behavior of the molecules in the space below.



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7. When the temperature has decreased to its lowest point, make a drawing and write your observations about the behavior of the molecules.

8. Choose neon from the box. Observe the behavior of the molecules when heated and cooled.
- Neon is considered a pure substance. What do you observe about the molecules?
 - Could the other molecules in this simulation (argon, oxygen, and water) be considered pure substances? Explain your thinking.



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Conclusion Questions

1. Our substance started out as a solid. How did the molecules behave?
2. What happened to the molecules as heat was added?
3. When the heat was at its highest point, how did the molecules behave?
4. Since we started as a solid, what other states of matter did we observe?
5. When you started to remove heat from the container, how did the molecules behave?
6. When all the heat had been removed from the container, how did the molecules behave?
7. When you first started removing heat, the substance was a gas. What states of matter did you see as all the heat was removed?