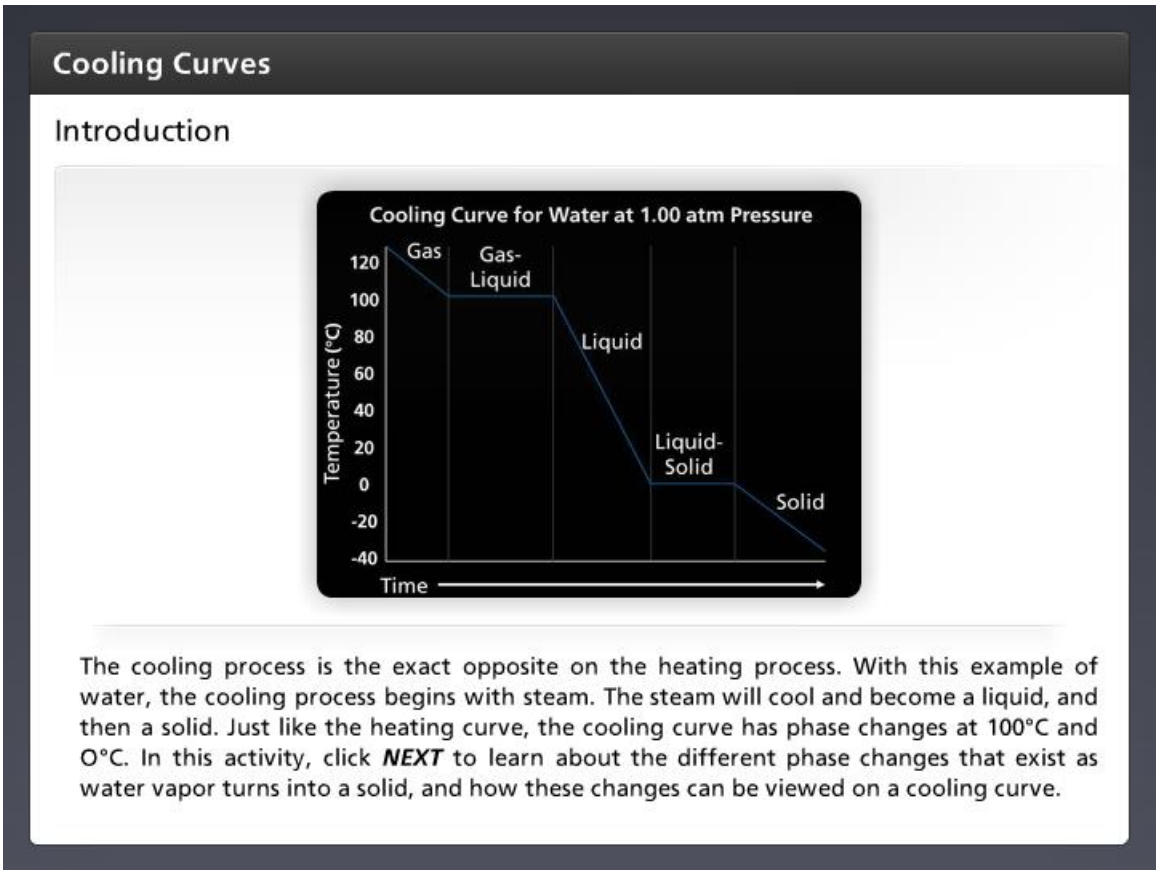
Module 8: Thermochemistry

Topic 6 Content: Cooling Curves Notes

Introduction



The cooling process is the exact opposite on the heating process. With this example of water, the cooling process begins with steam. The steam will cool and become a liquid, and then a solid. Just like the heating curve, the cooling curve has phase changes at 100°C and O°C. In this activity, click ***NEXT*** to learn about the different phase changes that exist as water vapor turns into a solid, and how these changes can be viewed on a cooling curve.

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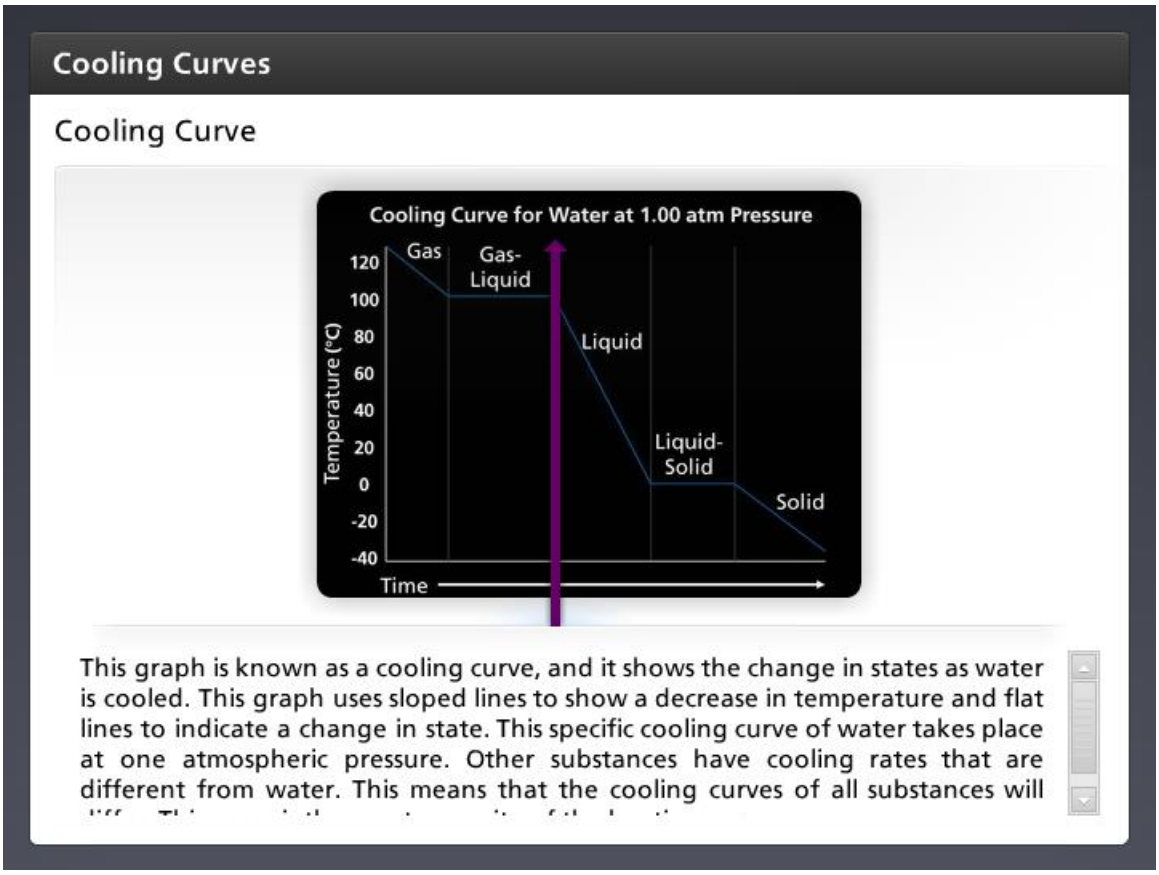
Cooling Curve



This graph is known as a cooling curve, and it shows the change in states as water is cooled. This graph uses sloped lines to show a decrease in temperature and flat lines to indicate a change in state. This specific cooling curve of water takes place at one atmospheric pressure. Other substances have cooling rates that are different from water. This means that the cooling curves of all substances will differ. This curve is the exact opposite of the heating curve.

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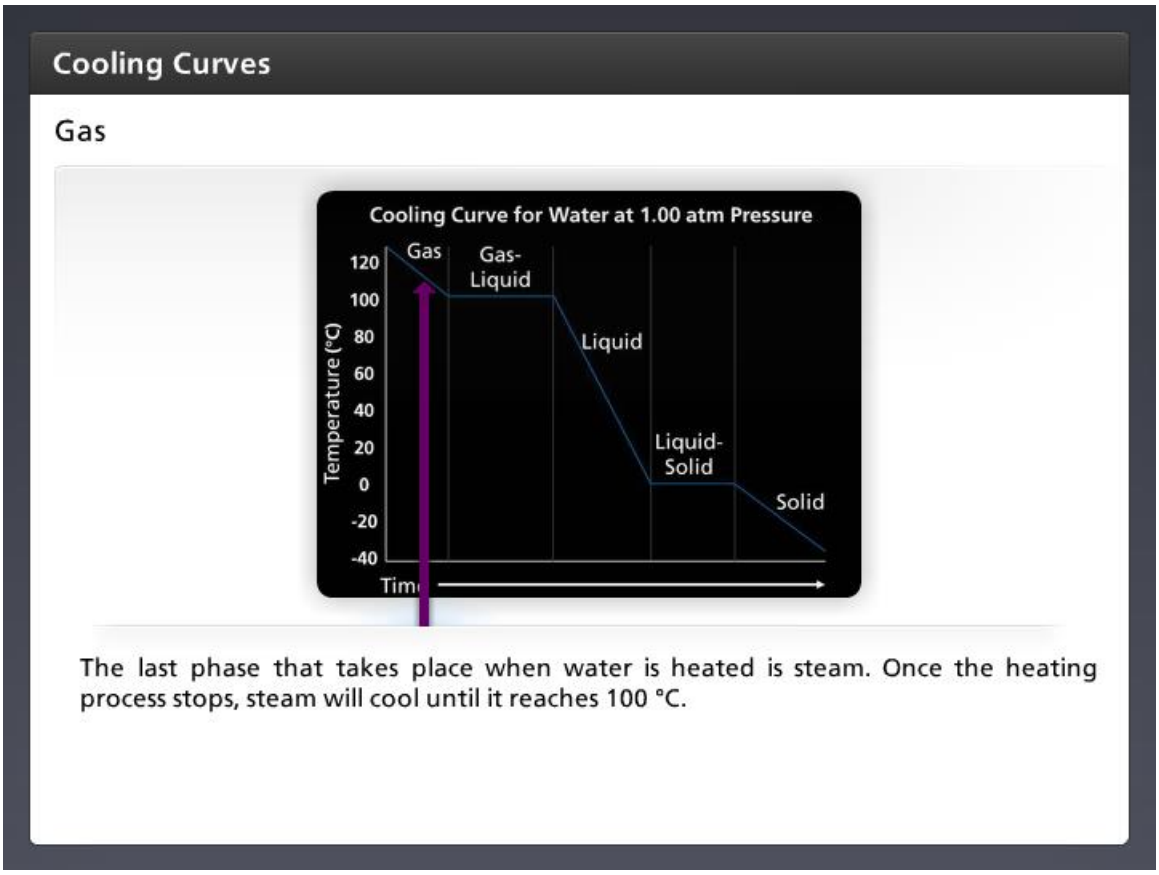
Gas



The last phase that takes place when water is heated is steam. Once the heating process stops, steam will cool until it reaches 100 °C.

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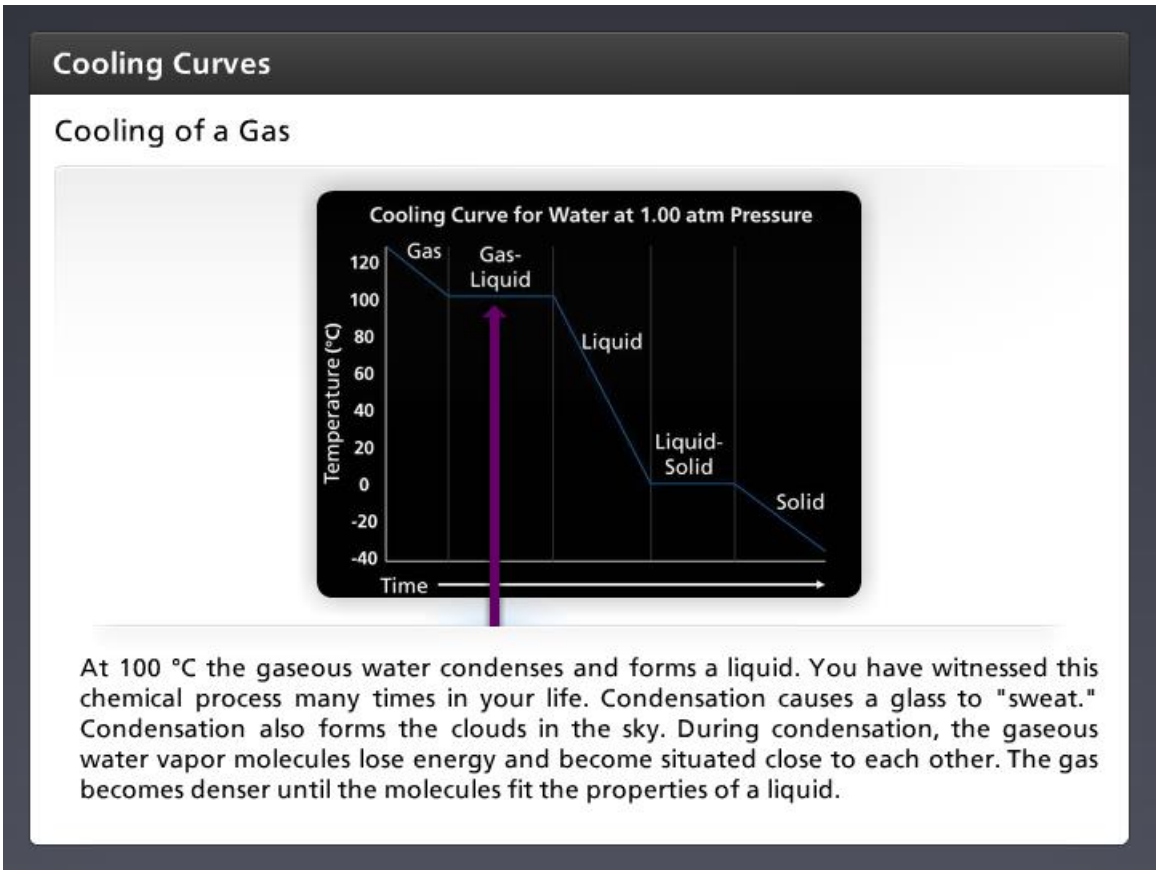
Cooling of a Gas



At 100 °C the gaseous water condenses and forms a liquid. You have witnessed this chemical process many times in your life. Condensation causes a glass to "sweat." Condensation also forms the clouds in the sky. During condensation, the gaseous water vapor molecules lose energy and become situated close to each other. The gas becomes denser until the molecules fit the properties of a liquid.

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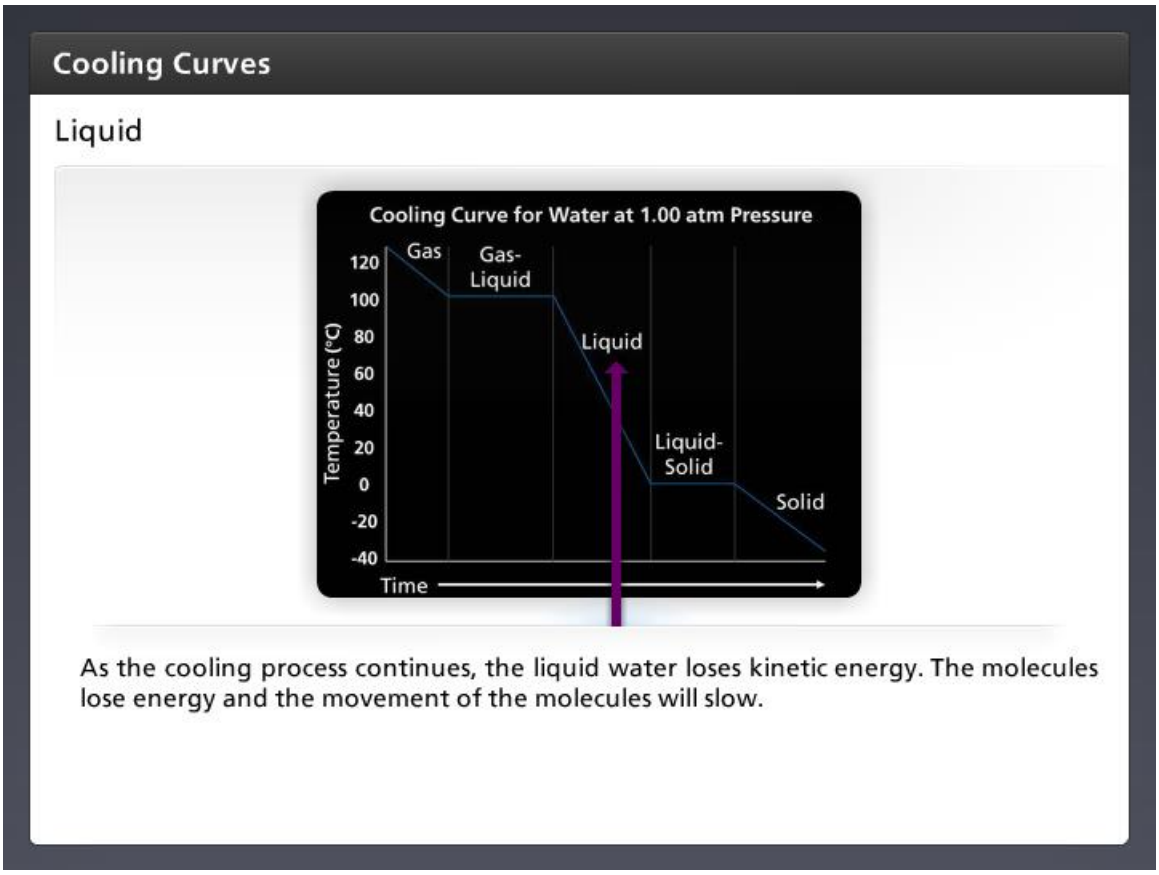
Liquid



As the cooling process continues, the liquid water loses kinetic energy. The molecules lose energy and the movement of the molecules will slow.

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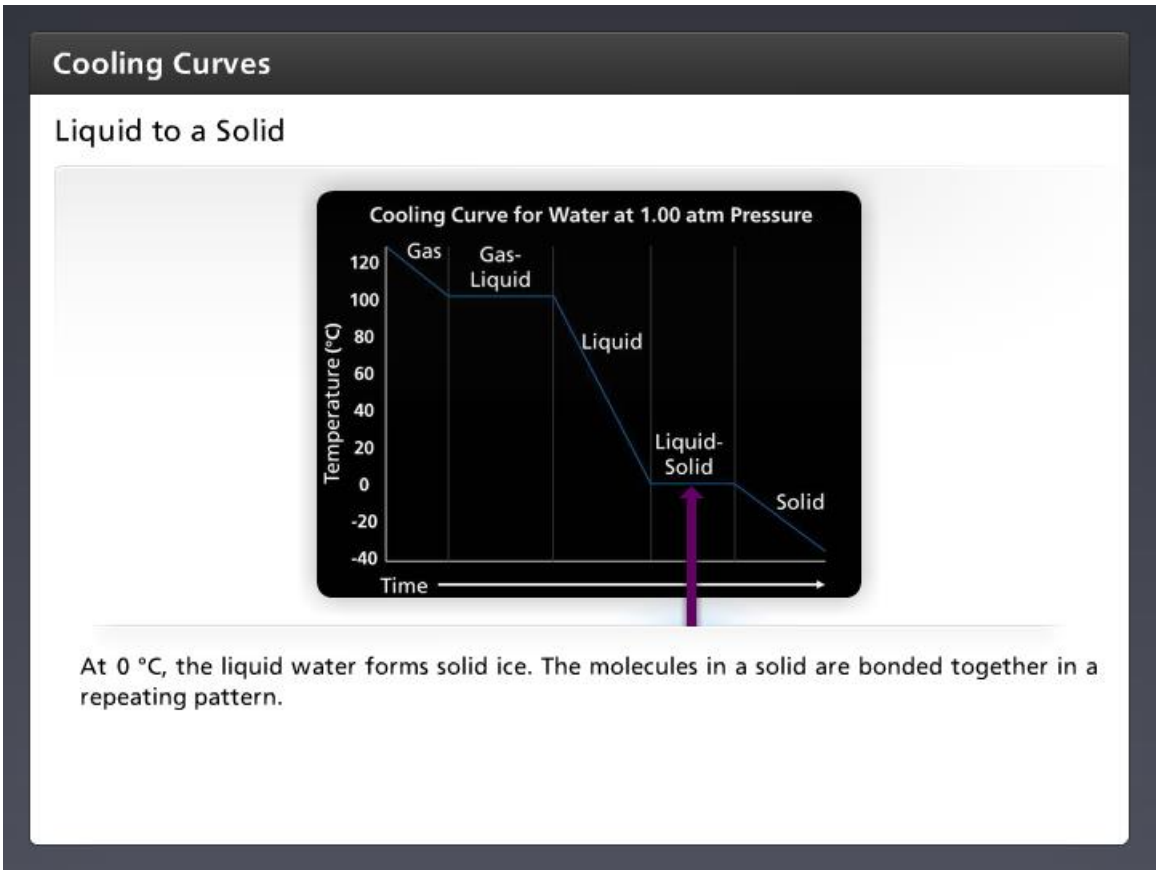
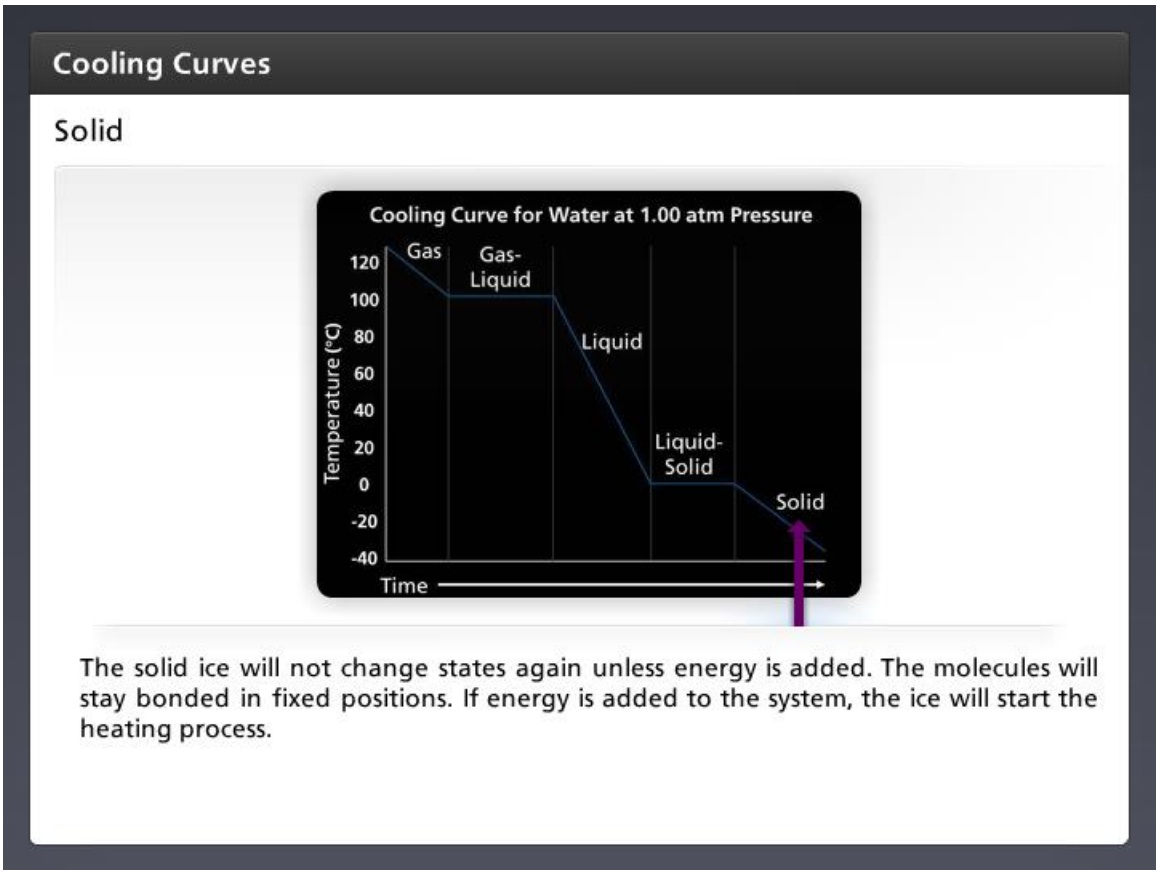
Liquid to a Solid



At 0 °C, the liquid water forms solid ice. The molecules in a solid are bonded together in a repeating pattern.

Solid



The solid ice will not change states again unless energy is added. The molecules will stay bonded in fixed positions. If energy is added to the system, the ice will start the heating process.