Answer on Question #43465 – Physics - Other

How can physical state of matter be changed?

Solution:

The states of matter are solid, liquid, gas and plasma. Since there is some debate on whether plasma should be classified as a state of matter and since it is not commonly experienced, we will not discuss its properties here.

When heat is applied to a material, its change in state typically goes from solid to liquid to gas. There are some exceptions where the material will go directly from a solid to a gas.

When a material is cooled, its change in state typically goes from gas to liquid to solid. There are some exceptions where the material will go directly from a gas to a solid.

Start from:	**Change to:**	**Name**
solid	liquid	**melting**
liquid	solid	**freezing**
liquid	gas	**boiling**
gas	liquid	**condensation**
solid	gas (skipping liquid phase)	**sublimation**
gas	solid (skipping liquid phase)	**deposition**

Change in temperature

When a material reaches the temperature at which a change in state occurs, the temperature will remain the same until all the energy is used to change the state.

Melting

When a solid is heated, its temperature rises until it reaches its melting point. Any additional heat added to the material will not raise the temperature until all of the material is melted.

Thus, if you heat some ice, its temperature will rise until it reaches 0° C (32° F). Then the ice will stay at that temperature until all the ice is melted. The heat energy is used to melt the ice and not to raise the temperature. After the ice is

melted, the temperature of the water will continue to rise as more heat is applied.

Boiling

When a liquid is heated, its temperature rises until it reaches its boiling point. The temperature will then remain at that point until all of the liquid is boiled away.

For example, the temperature of a pot of water will increase until it reaches 100° C (212° F). It will stay there until all the water is boiled away. The temperature of the steam can then be increased.

Cooling

Likewise, when a gas is cooled, its temperature will drop until it reaches the condensation point. Any additional cooling or heat loss will not lower the temperature until all of the gas is condensed into the liquid state.

Then the temperature of the liquid will continue to drop as more cooling is applied. Once the liquid reaches the freezing point, the temperature will remain at that point until all of the liquid is solidified. Then the temperature of the solid can continue to decrease.