

Changing States

Change of state is when the physical state of a substance is transformed into another state.

Requires an increase of heat

Melting is a change from solid to liquid



Vaporization is a change from Liquid to gas

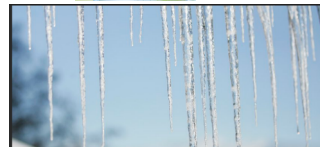


Requires a Loss of heat

condensation - change from gas to liquid



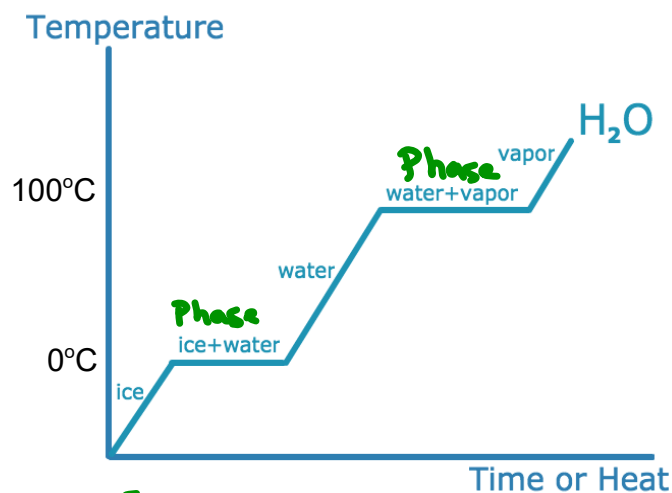
Freezing - change from liquid to solid



Heating Curves

What happens to the temperature of a block of ice when you put a Bunsen burner underneath it?

You might think that the temperature goes up smoothly, but that's not what happens. The graph of temperature against time is called a heating curve. Let's look at the heating curve for water.



Heating Curves

Notice that, in general, the temperature goes up the longer the heating continues. However, there are two horizontal flat parts to the graph. These happen when there is a change of state. The plateaus are also called phase changes

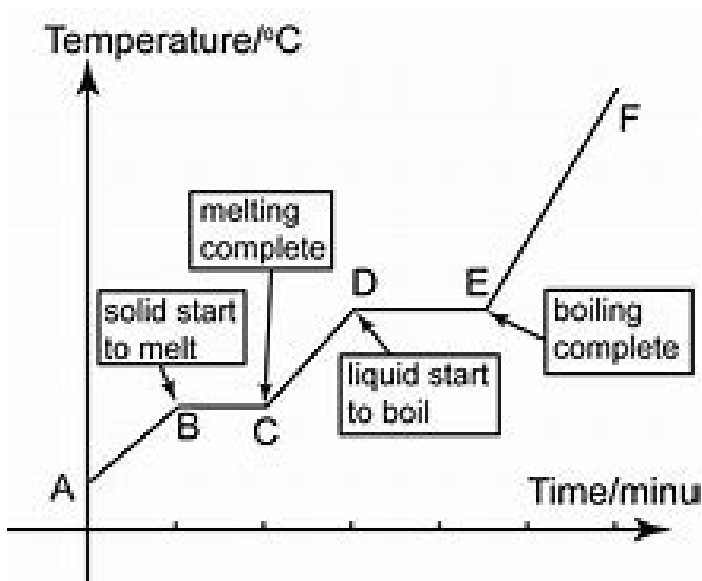
The first change of state (ice+water) is melting (changing from a solid to a liquid). The temperature stays the same while a substance melts.

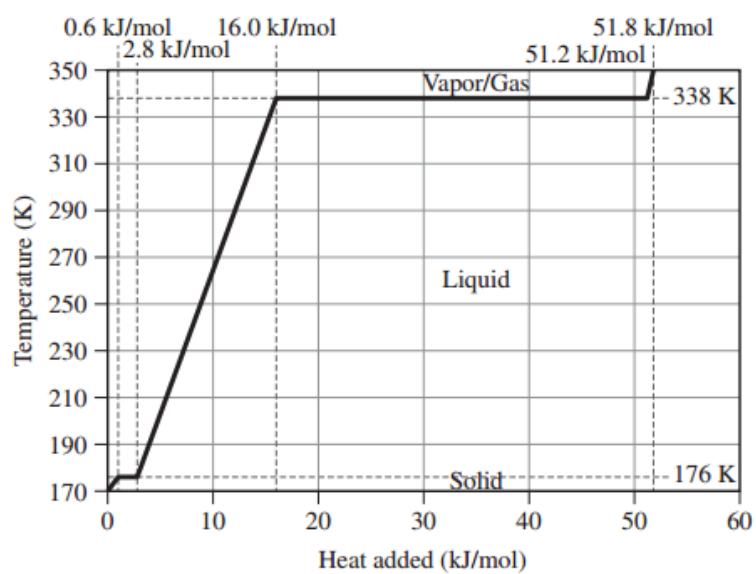
For water, this temperature is 0°C because the melting point for water is 0°C.

Over the course of this line segment, both liquid and solid exist in various ratios, starting at 100% solid and ending at 100% liquid.

The second change of state (water +vapor) is boiling (changing from a liquid to a gas). The temperature stays the same while a substance boils.

For water, this temperature is 100°C because the boiling point for water is 100°C. Over the course of this line segment, both liquid and gas exist in various ratios, starting at 100% liquid and ending at 100% gas.





- 0.53 How much energy in kilojoules is released when 25.0 g of ethanol vapor at 93.0 °C is cooled to -10.0 °C? Ethanol has mp = -114.1 °C, bp = 78.3 °C, $\Delta H_{\text{vap}} = 38.56 \text{ kJ/mol}$, and $\Delta H_{\text{fusion}} = 4.93 \text{ kJ/mol}$. The molar heat capacity is 112.3 J/(K · mol) for the liquid and 65.6 J/(K · mol) for the vapor.

What we do in CHEMISTRY
CLASS later on (High school)

Different substances have different melting points and boiling points, but the shapes of their heating curves are very similar. For example, this is the heating curve for iron, a metal that melts at 1538°C and boils at 2861°C .

