Phase Diagrams

Let's say that, for some reason, you want to know what phase of matter a substance will be under some conditions of pressure and temperature. If you want this info, you need a phase diagram. Let's take a look at one of these fancy diagrams so we can learn how it works:

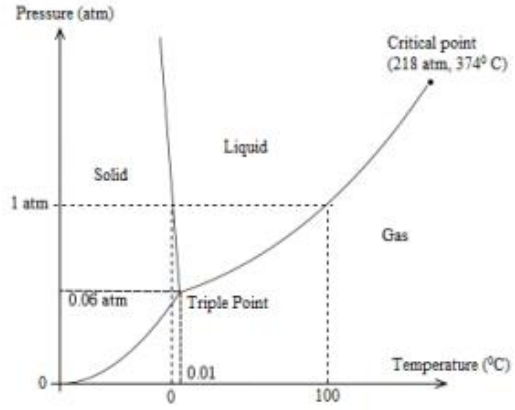

Figure 13.12: *The phase diagram of water.*

Some of the main features of phase diagrams include the following:

- The lines: Each line that marks the border between two phase changes denotes the conditions under which both phases of matter can stably exist.[15]
- The **normal melting point**: The temperature at which the compound melts at a pressure of one atmosphere. In this diagram, the normal melting point is 0^0 C.
- The **normal boiling point**: The temperature at which the compound boils at a pressure of one atmosphere. In this diagram, the normal boiling point is 100^0 C.
- **Triple point**: The conditions of temperature and pressure at which all three phases of matter can stably exist. For water, the triple point is 0.06 atm and 0.01^0 C, which is why you've never seen all three phases of water in equilibrium.
- **Critical point**: The conditions of temperature and pressure past which it's impossible to distinguish between the liquid and gas phase of the material. This occurs because the material has too much energy to stick together (which is true of gases) but is crammed so tightly together that intermolecular forces between the particles are strong. Under these conditions, the material is said to be a supercritical fluid.