**Why does water boil at a lower temperature at altitude?
Does food cook faster at a higher altitude?
Let's boil an egg...**

The temperature of boiling water at sea level is 212 degrees Fahrenheit, or 100 degrees Celsius.

The atmosphere of air surrounding the earth creates a pressure against us and all objects on earth. This pressure at sea level is one atmosphere, (14.696 pounds per square inch (psi)), or if measured in mercury - 760mm (approx. 30 inches of mercury) in a column. It is the density of the atmosphere, or air, that causes the pressure.

As you increase altitude, the density of the air becomes thinner, and this thinner or less dense air then exerts LESS pressure. So, the higher the altitude the less dense the air and pressure decreases, until in space - no air, no density, no pressure.

Now, to boil water requires energy, this energy is in the form of heat and may have been produced by gas flame, electrical, solar, burning wood etc. As the water molecules are heated, the energy of the water molecules is increased, and they will vibrate or become more agitated, until finally the water molecules will break loose from the surrounding liquid water and rise up as steam. The water will also move quite violently due to the expanding dissolved gases that are contained in the water - hence the bubbles seen moving rapidly to the top of the boiling water.

So, you have introduced energy into the water to such a point that the bonding energy between the water molecules has exceeded the bonding threshold, and they have broken away and coalesced into steam.

**What have been the influences on the water?**

Pressure from the atmosphere at sea level - this has helped compress the water molecules together into a liquid.

The bonding energy between each water molecule.

As you increase altitude, the external pressure on the water is decreased, therefore it will take less energy to break the water molecules free from their bonded energy. If it takes less energy, then it will take less heat, as this is the energy we are introducing. If less heat is required, then less temperature is required, then the water will boil at a lower temperature

**How about that egg we want to cook on top of a high mountain, say at 10,000 feet?**

We now know that the water will boil at a lower temperature on top of the mountain at lets say, 185 degrees Fahrenheit. To hard-boil an egg at sea level takes say, five minutes at 212 degrees Fahrenheit.

Now, there is a very good law in chemistry that states "You cannot get something for nothing" (the left-hand value of an equation must equal the right-hand value). Time multiplied by temperature equals a hardboiled egg. That is to say, 212 times 5 equals a hardboiled egg.

If the temperature of the boiling water on the mountaintop is 185 degrees Fahrenheit, then the time taken to cook the egg will have to INCREASE to get our hardboiled egg. Our equation to equal a hardboiled egg cannot change. (185 times extended time equals hardboiled egg.) It is no different to cooking a piece of steak or cooking the potatoes. You can cook at a low temperature for a long time, or a high temperature for a short time.

It is time and temperature that does the cooking. It has nothing to do with whether the water is boiling. That is only a physical phenomenon that you can see. You have to measure for temperature and time, as these are the two factors that determine when the egg is hardboiled.