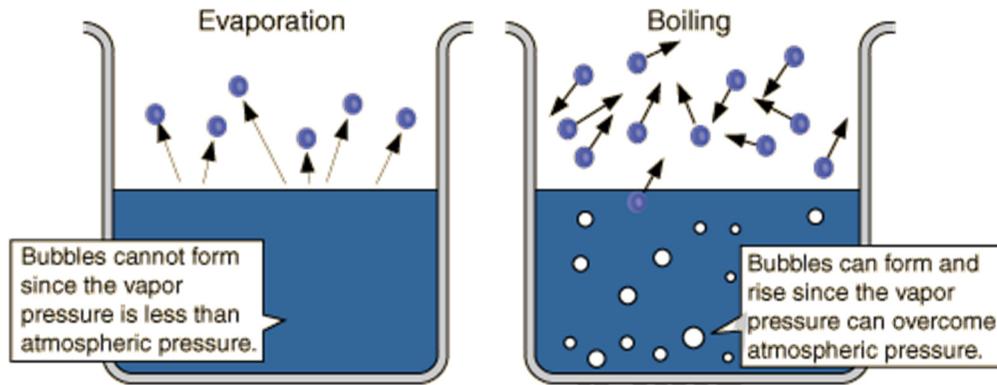
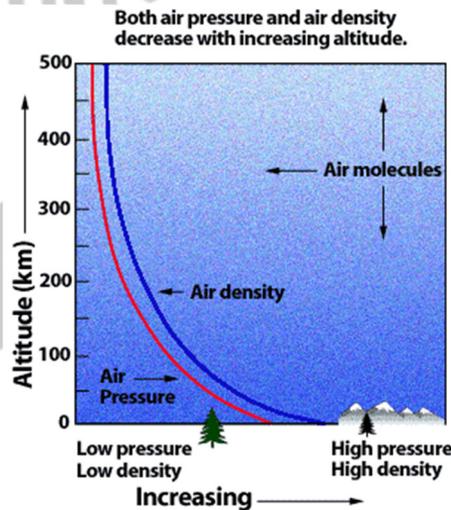


Water: It's Not Boiling Minutes As Much As It's Boiling Temperature

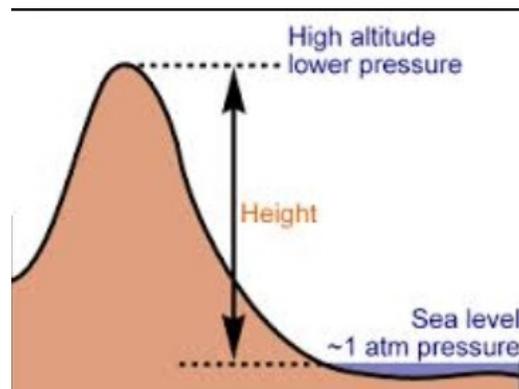
Way back in school we learned that air pressure decreases with a rise in elevation and with the rise in elevation the temperature to boil water decreases. This may all sound like a contradiction, however it is scientific fact. (see http://www.engineeringtoolbox.com/boiling-points-water-altitude-d_1344.html & <http://whatscookingamerica.net/boilpoint.htm>)



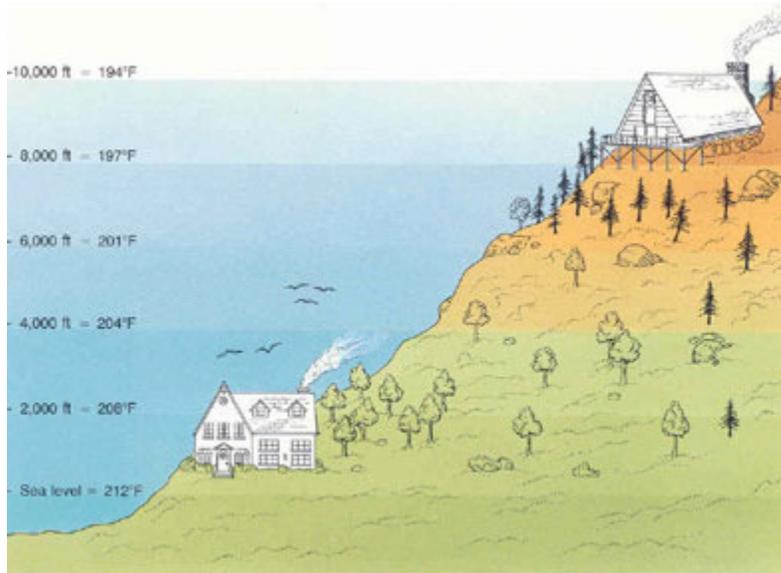
Because the temperature of the boiling water is lower at high elevations than at sea level (due to the decrease in air pressure), it takes longer to cook at higher altitudes than at sea level. The *speed* that food cooks is *not* related to the time it takes to boil.



The length of time to reach boiling is almost the same, *the time it takes to cook once it looks like it's boiling will depend on the altitude at which the food or water is being heated.*



Each 500 foot increase in altitude causes a drop of about 1° in the boiling point of water. So at higher altitudes, other foods and baked goods may take longer or need additional dry ingredients to perform or behave the same as at sea level preparation. We have to adjust for the lower temperatures that water 'boils' at (or actually looks like its boiling) and the lower air pressure.



This is why boiling, simmering and canning, etc. are different or longer at higher elevations, and explains all those altitude/boiling times and pressure tables we see.

Bottom line: It is the temperature at which the water boils at a given altitude (atmosphere pressure) that is the key, NOT the time it takes to actually cook the food or boil water to make it safe.

When it comes to 'safe water' boiling, remember that it is NOT just the altitude we have to consider, it's the type of contaminant we are trying to get out of the water.



Basically, in this scenario, boiling water is only good for bacteria, virus and microscopic life that we will be removing. **Metals and many human-created chemicals will NOT be removed.** In fact some metals, like lead and mercury will be concentrated by boiling, making the water even more deadly.

Many of us have no clue at what altitude we live at and in an emergency this is even more so. So how do we tell?

veloroutes.org Use this page to find the elevation of any location in the world.

[home](#)
[create a route](#) (profiles)
[calculate hill grade](#)

Find elevation of these places:

- [seattle](#)
- [atlanta](#)
- [mt. kilimanjaro](#)
- [mexico city](#)
- [san francisco](#)

Address:

units:

Elevation for **Bozeman, Montana** is **4838** feet

- The latitude for this location is: 45.677778
- The longitude for this location is: -111.047222
- Click [here](#) to create a route at this location.



For finding out what altitude you are at you can go to the USGS web site or just do an internet search on “altitude for [your city]” or the altitude of any address @ <http://veloroutes.org/elevation/>. There are also several iPhone apps that utilize your GPS coordinates to calculate your elevation. Once you have established your altitude, adjust your ‘boiling’ times accordingly or you can address the actual temperature of the water itself.

I prefer using the actual temperature of the water, so I have a Candy Thermometer in my personal, vehicle and household Emergency Kits (go-bags). I use the kind that are stored in their own tube-like container. At home in my kitchen I use a sturdier metal encased version. My advice would be to avoid the “techno” versions (so you don't have to worry about batteries) and stick to the old fashioned types.



Then when the water reaches 212 F (boiling at sea level) I give the normal times. For safe water this is instantaneous to 1 minute at 212 F.

This is my favorite style for home use





For my go-bags I have one of these types that store in their own protective container.

At Sea Level Cooking Terms Temperature of Water:

- **Tepid Water** - 85 to 105°F. The water is comparable to the temperature of the human body.
- **Warm Water** - 115 to 120°F. The water is touchable but not hot.
- **Hot Water** - 130 to 135°F. The water is too hot to touch without injury.
- **Poach** - 160 to 180°F. The water is beginning to move, to shiver.
- **Simmer** - 185 to 200°F. There is movement, and little bubbles appear in the water.
- **Slow boil** - 205°F. There is more movement and noticeably larger bubbles.
- **Real boil** - 212°F. The water is rolling, vigorously bubbling, and steaming.

Note: Adding a little salt to water will cause the water to boil at a *slightly* higher temperature, which can be helpful while cooking especially at high altitudes.



For a quick single page 'cheat sheet' see ***Altitude & Water Boiling Points chart*** (http://formerlynmurbanhomesteader.weebly.com/uploads/2/2/5/0/22509786/altitude_water_boiling_points_chart.pdf). This chart includes some major US cities as altitude references.

TNT

Resources

Engineering Toolbox http://www.engineeringtoolbox.com/boiling-points-water-altitude-d_1344.html

What's Cooking America <http://whatscookingamerica.net/boilpoint.htm>

US Airport Elevations <http://www.pmiusa.biz/pdf/US%20City%20Elevation%20Chart.pdf>

US Elevations and Distances <http://egsc.usgs.gov/isb//pubs/booklets/elvadist/elvadist.html>