**Why Does Adding Salt Raise the Boiling Point of Water?**

If you add salt to water, you increase its boiling point. The temperature needs to be increased about one half degree Celsius for every 58 grams of dissolved salt per kilogram of water. This is an example of boiling point elevation. The property isn't exclusive to water -- it occurs anytime you add non-volatile solute (e.g., salt) to a solvent (e.g., water).

**But, How Does It Work?**

Water boils when the molecules are able to overcome the vapor pressure of the surrounding air to move from the liquid phase to the gas phase.

A few different processes occur when you add a solute that increase the amount of energy (heat) needed for water to make the transition.

When you add salt to water, sodium chloride dissociates into sodium and chlorine ions. These charged particles alter the intermolecular forces between water molecules. In addition to affecting the hydrogen bonding between water molecules, there is an ion-dipole interaction to consider. Every water molecule is a dipole, which means one side (the oxygen side) is more negative and the other side (the hydrogen side) is more positive. The positively-charged sodium ions align with the oxygen side a water molecule, while the negatively-charged chlorine ions align with the hydrogen side of a water molecule.

The ion-dipole interaction is stronger than the hydrogen bonding between the water molecules, so more energy is needed to move water away from the ions and into the vapor phase.

Even without a charged solute, adding particles to water raises boiling point because part of the pressure the solution exerts on the atmosphere now comes from solute particles, not just solvent (water) molecules. The water molecules need more energy to produce enough pressure to escape the boundary of the liquid.

The more salt (or any solute) added to water, the more you raise the boiling point. The phenomenon depends on the number of particles formed in the solution. Freezing point depression is another colligative property that works the same way, so if you add salt to water you lower its freezing point as well as raise its boiling point.

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