

**How does the salinity of
water affect the boiling
time?**

Hypothesis

I hypothesized that the amount of salt will not affect how fast the water boils. Salt will not make a perceptible difference in the time it takes to boil (a decrease in boiling time by at least 1 minute). My hypothesis is testable because I can easily acquire and change the amount of salt that I put into water. In order for water to boil, its vapor pressure has to equal the pressure of the atmosphere. This is why water boils at a lower temperature on top of Mount Everest than it does at sea level. When salt is added, it makes it harder for the water molecules to escape from the pot and enter the gas phase, which happens when water boils.

Rationale

I want to investigate this question because I've noticed that when people boil water they boil it in a pot normally, but they don't put anything in it either for flavor or to make it boil faster. I know salt makes ice melt faster so I want to investigate if salt also has the ability to make water boil faster. I think that if salt made a substantial difference in the reduction of boiling time of water, people might start to put salt in their water to boil or flavor it. This would help to make food faster, it would boil water and flavor food faster. This can be useful if somebody is in a rush to make food, especially a large portion.

Overview

(During this whole experiment I will take lots of pictures for evidence). First, get out listed materials. Then, measure 2 quarts of water and pour it in the pot while making sure not to spill any. I will measure and pour 50 grams of table salt into the pot with water. I will stir the pot with minimal force for about 10 seconds. Then I will put the stove on high and start the stopwatch. When the water starts a slow rolling boil, I will end the stopwatch, turn the stove off and record the results. I will empty the contents of the pot, and put it on another burner for 5 minutes to cool. I will repeat this experiment 4 more times, doubling the amount of salt each time, and at the end, I will make a control with no salt.

Variables

Independent variable: Amount of salt, changed by increasing amount

Dependent variable: Boiling time of water, measured with stopwatch

Controlled variables:

- a. Pots - Nobody will touch the pot, it will be clean. x1 8qt pot
- b. Water - 2qt water for each trial, no spills, same source
- c. Stove - Nobody will touch the burners except me
- d. Stopwatch - I will start the stopwatch at the appropriate time and make sure that it works, prior to the experiment
- e. Camera - I will take a sufficient amount of pictures
- f. Salt - I will measure the appropriate amount of salt for each trial, without spilling, it will all be from the same source

Materials

1. 1 Measuring Cup
2. 1, 8 Quart, Stainless Steel Pot
3. Paper and pencil
4. 1 Stopwatch
5. 1 Camera
6. 750g Salt
7. 12 Quarts of Room Temperature Water
8. 1 Tablespoon
9. 1 Spatchula

I will keep myself and others safe by watching the stove the whole time it is on

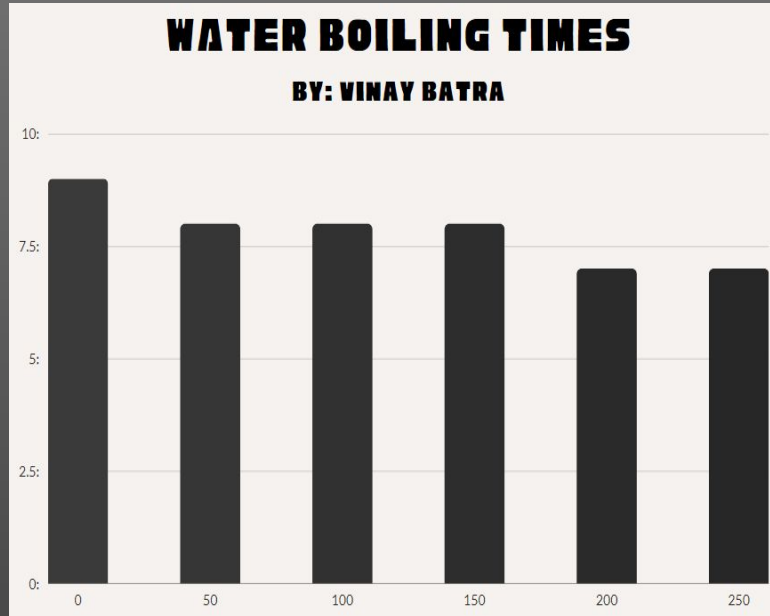
Procedure

1. Prepare materials and remember to take pictures
2. Measure and pour 2qt room temperature water into pot
3. Measure and pour 50 grams of table salt into pot
4. Stir pot for 10 seconds with minimal force
5. Put stove on high and start stopwatch
6. When you see bubbles rising to the surface, stop timer and record results and observations
7. Empty the contents of the pot and set it on another burner for 5 minutes to cool
8. Repeat steps 2-7, four more times, doubling the amount of salt with every trial, use the same pot
9. At the end of 5 trials boil a control, using 2qt water and no salt

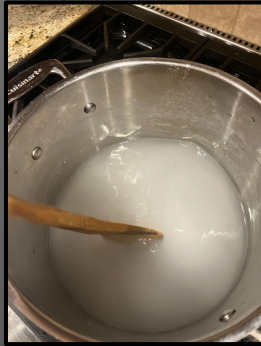
Data

Boiling Times:

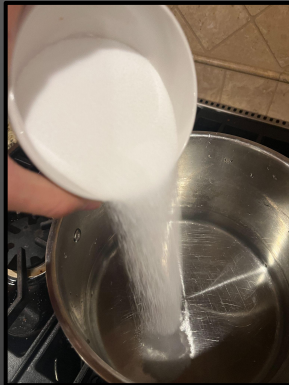
1. 0g - 9:33
1. 50g - 8:52
2. 100g - 8:29
3. 150g - 8:00
4. 200g - 7:32
5. 250g - 7:08



Photos



(Left) The control pot,
without salt. (Right)
The pot with 50
grams of salt in it,
while being stirred



Materials Used

Analysis

After doing some research I was able to interpret my results and understand why salt makes water boil faster. In order for water to boil, its vapor pressure has to equal the pressure of the atmosphere. This is why water boils at a lower temperature on top of Mount Everest than it does at sea level. When salt is added, it makes it harder for the water molecules to escape from the pot and enter the gas phase, which happens when water boils. This is why the more salt you add, the quicker water boils.

Conclusion

To summarize my experiment, my hypothesis: “Salt will not make a perceptible difference in the time it takes to boil” was proven incorrect.

Every time I added salt to the water, the boiling time decreased. Since I was controlling all other variables, the only thing that could affect the water was the salt.

Therefore, salt makes water boil faster.

In my experiment high salinity made water boil faster.

This can be good if you want to boil water faster and also have a salty flavor in your drink or food. But, it can be bad because if you add too much salt it becomes non-potable

Bibliography

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