

# Boil Boil and Toil Lab Report

## Problem:

Which is the factor that has the greatest influence on the boiling point of water?

## Hypothesis:

Our hypothesis is that the most important factor in the boiling of water is elevation. In this experiment, elevation is the factor that will have the greatest influence in determining the boiling point of water because the higher the elevation, the less air pressure there is so the greater the boiling point is.

## Materials:

1. Bunsen Burner
2. 200 mL beaker
3. Flask
4. 600 mL of distilled water
5. Lighter or matches
6. Metal screen
7. 2 thermometers
8. Ring stand
9. Goggles
10. Brush
11. Watch
12. Calculator
13. 2 clamps
14. Oxygen
15. Gas

## Procedure

1. Set a thermometer to find room temperature and record room temperature.
2. Put 200mL of distilled water in a beaker.
3. Transfer the 200mL of water into the flask.
4. Hold the flask with a clamp and place in the ring stand.
5. Put a calibrated thermometer attached to the clamp in the ring stand.
6. Turn the gas valve on.
7. Light up the Bunsen Burner with matches or a lighter.
8. Place the Bunsen Burner under the metal screen.
9. Take time and record the temperature of the water every 30 seconds.

10. Repeat step number 9 until the temperature of the water becomes constant, boiling point is reached.
11. Repeat the same procedure two or three times.

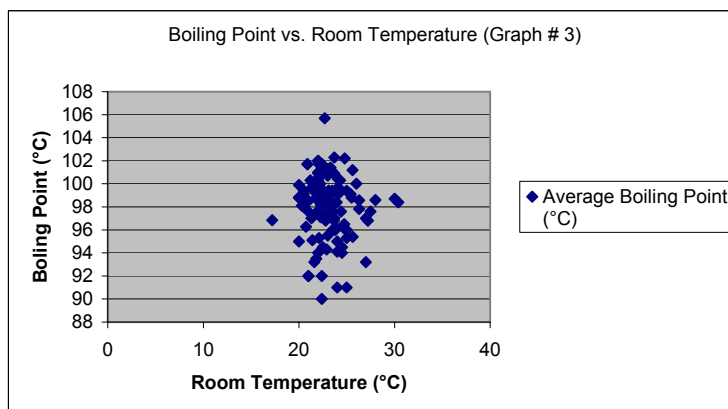
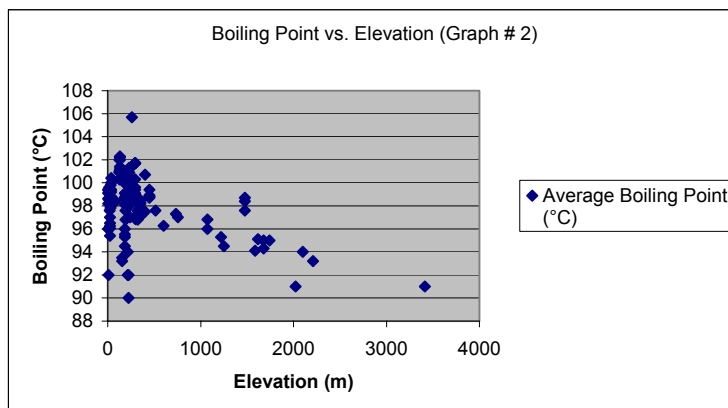
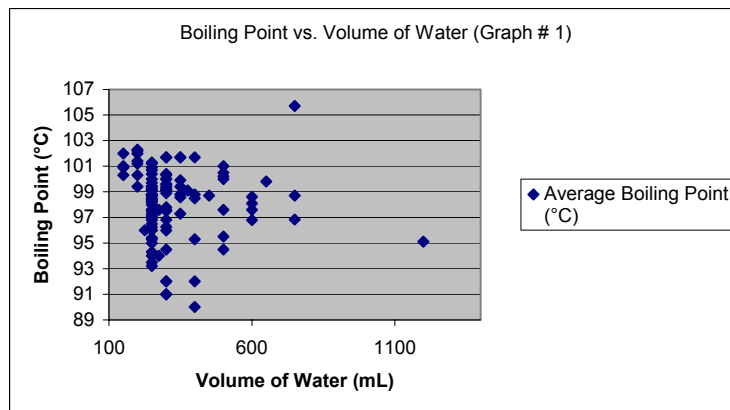
Data Table 1

<b>Thermometer Calibration Data</b>	<b>Experiment #1</b>	<b>Experiment #2</b>	<b>Experiment #3</b>	
Temperature recorded for ice-water mixture (C)	6°C	7°C	7°C	
Amount to add or subtract (circle one) to temperature readings	6°C	7°C	7°C	
<b>Class Data</b>				
Heating Device Used by Entire Class	Bunsen burner			
Volume of Water Used by Entire Class (mL)	200 mL			
Elevation of Colegio Roosevelt (meters)	130 m			
<b>Experiment Data</b>	Experiment #1	Experiment #2	Experiment #3	Average Temperatures
Average Room Temp. (°C) (include calibration corrections)	21°C	26°C	26°C	24.3°C
Average Boiling Point (°C) (include calibration corrections)	99°C	100°C	100°C	99.7°C

### **Analysis:**

We are trying to find out what is the main factor in the boiling of water. We think that elevation is the factor that will have the most control in determining the boiling point of water because the higher the elevation, the less air pressure there is so the lower the boiling point is. What we did to find out if our hypothesis was correct was first to set a thermometer to find room temperature and record it. After that we put 200mL of distilled water in a beaker and after transferred the water into a flask. We placed the flask in the ring stand by holding it with a clamp. Then we put a calibrated thermometer in the ring stand. The thermometer was attached to a clamp. After that we turned the gas valve on. We lit up the Bunsen Burner a lighter. Subsequently we placed the Bunsen Burner under the metal screen, which was on the ring stand. Last of all, we recorded what the temperature of the thermometer was every 30 seconds. A pattern that our group saw was that the temperature of the water always boiled around 99°C to 100°C. We reject our hypothesis because from our data we have seen that the higher the elevation, the less temperature it takes to boil water (refer to graph 2.) Possible errors could have been the inaccurate equipment or the inaccuracy of the recording of the temperature because the mercury seen from another angle and not straight forward, could tell you another temperature.

School Name	Class Name	City	State	Country	Date	Heating Device	Vol. of H <sub>2</sub> O	Elevation	Ave. Room Temp	Ave. Boiling Point
Aspen Middle School	6th grade Outdoor Education	Shrine Mountain Hut	Colorado	United States	14-Apr-00	pan	300	3413.76	25	91



### Conclusion:

As a conclusion to our experiment, we think that the factor that makes the boiling point vary, is altitude. As shown on graph number two, the vast majority of the boiling points around 100 are around 0-500 meters above sea level. Before beginning this experiment, as a group

we thought that the higher the elevation, the higher the boiling point. Our hypothesis was incorrect in one way because the truth is that the higher the elevation, the lower the boiling point. Even though the controlling factor in these experiments was the elevation of each school. Our class got an average boiling point of 100.3°C. The results were that way because our school is almost at sea level, boiling point at sea level is around 100°C. If we would do our experiment in the Andes, at about 4,000 meters above sea level, the boiling point would be about 90°C or below. This is because the higher the elevation you are at, the lower the boiling point. In this experiment, accuracy of measurements is very important because it can show us if our hypothesis is right or wrong, it can also make the data table wrong. The thermometers we used were not as accurate, so when they were calibrated, they were not zeroed out. That could have made us get confused and subtract the wrong temperature. In this experiment, we would have changed the thermometers, and probably we would have changed them because they are not very accurate. In a future experiment, we would like to test the level of humidity vs. boiling point. Some new things we learned by doing this experiment prepared so many times, were that the elevation is indeed the controlling factor. We also learned that it is very good to repeat an experiment so many times to get more accurate answers by averaging all of the temperatures than just to base the conclusion or analysis on only one temperature. We had a lot of fun doing all these fun experiments and will use our learned knowledge in future experiments/activities.

Heating device average - boiling point (°C)

Hot Plate	Bunsen Burner	Alcohol Burner	Stove
98.61589041°C	98.99529412°C	95.9675°C	94.16666667°C

