

Physical Science 1120

1. _____

Calibrating A Thermometer

2. _____

3. _____

4. _____

Introduction:

This lab exercise examines the physical property of temperature by calibrating an alcohol thermometer at the boiling and freezing points of water.

Procedure:

1. Fill the glass beaker about half full of tap water and place it on the hot plate.
2. Place the unmarked thermometer in the water and heat the water to its boiling point.
3. While waiting for the water to boil, fill another beaker about $\frac{1}{4}$ full of ice water.
4. Wait until the water on the hot plate reaches equilibrium (the thermometer is not changing anymore) and use the overhead marker to make a mark on the thermometer at the alcohol's top.
5. Dry off the bottom of the thermometer being careful not to erase the boiling point mark.
6. Place the thermometer in the ice bath and wait for the alcohol to stabilize at its lower level. Once the thermometer has reached its lower level make a mental note of where this point is since you may have to remove the thermometer and dry it off again.
7. Now put the thermometer back into the ice water but only enough so that the freezing point stays dry. Once the thermometer stabilizes make a mark on the thermometer at point.
8. Make sure the thermometer is dry. Place the thermometer on the bottom of this lab sheet and copy the upper and lower marks onto the lab sheet.
9. Place the thermometer on a towel on the lab bench so that it will come to room temperature. Go to procedure 10 on the back of this sheet.

10. The bottom mark on the paper represents 0 degrees centigrade and the upper mark represents 100⁰ C. Use the millimeter scale on the ruler to mark off 10 equal segments between the upper and lower marks.
11. When your thermometer stabilizes at room temperature place it on your scale and estimate what the room temperature is. _____⁰C This will be your experimental value (**E**).
12. Ask your instructor for the actual room temperature (**A**) and write it here. _____⁰C
13. Use these two values in the percent error formula and solve for the % error.

$$\frac{|A - E|}{A} \times 100 \% = \quad = \text{_____ \% error}$$

- Q1. Does an elevation above sea level **Raise** or **Lower** the boiling point of water? Circle one.
- Q2. Does an elevation above sea level **Raise** or **Lower** air pressure?

If you answered Raise to either question 1 or 2, ask your instructor for an explanation.

- Q3. Water freezes at 0⁰ Celsius, how many degrees is this in the Fahrenheit scale?
_____ ⁰F
- Q4. At sea level pure water boils at 100⁰ C, how many degrees is this in the Fahrenheit scale? _____ ⁰F
- Q5. Absolute zero degrees is 0⁰ Kelvin, how many degrees is this in the Celsius scale?
_____ ⁰C
- Q6. Explain how orange growers use water's heat of fusion to save their orange groves during times when the air temperature falls below 0⁰C.
- Q7. Explain the latent heat of vaporization of water.