Latent Heat of Vaporization of Water Addendum

Thermometer Calibration

Anthony Roitman

January 18, 2022

Intro

This document describes the procedure for calibrating the thermometer used in Lab 2: Latent Heat of Vaporization of Water. This procedure can be done before or after the main experiment. As students, you are not expected to perform any of steps in the procedure below yourselves. However, you will need the results of the calibration for your data analysis. You should also provide a summary of the calibration in your lab notebook and in the Methods section in your lab report.

Equipment

- reference barometer and thermometer
- room temperature water
- ice bath
- All of the equipment mentioned in the main lab manual.

Procedure

1. Read the ambient air pressure and temperature from the reference barometer and thermometer in the laboratory.
2. By consulting a phase diagram, record the boiling temperature and the freezing temperature of water at the measured pressure.
3. Open the air valve (V) so that the pressure in the flask (F) equals to the ambient pressure.

4. Turn on the heating element, and wait for the water to boil. Let the temperature stabilize.

5. Record the measured temperature on the thermometer. Compare this to the actual boiling point

6. Remove the thermometer from the flask (F). Wait for it to cool down. Put the thermometer into the room temperature water.

7. Record the measured temperature, and compare this to the actual room temperature from step (1).

8. put the thermometer in the ice bath. Record the measured and actual temperature.

Analysis

Do these tasks at the start of your analysis for this lab:

- Fit a linear function of the form $y = mx + b$ to your actual vs. measured temperature data.
- Now, for all values of $T_{measured}$ that you measured, calculate the T_{actual} like so:

$$T_{actual} = mT_{measured} + b$$

- Now, perform the rest of the analysis mentioned in the lab manual.