**Results**

*Mercury Thermometer (constant pressure)*

Four measurements were taken for water temperature and 1-dimensional volume (position of the mercury drop) for a total of measurements. Pressure was held constant at as was the amount of gas, .



An initial volume of at a room temperature of was recorded. The first container, filled with ice water, was poured in the funnel until the thermometer reached equilibrium. Volume of the mercury drop lowered to at a temperature of . Warm water was poured into the funnel next, again giving the thermometer time to reach equilibrium. Once equilibrium was reached, the mercury drop had reached a volume of at a temperature of . Following the hot water, steam was routed into the thermometer, giving a volume reading of and . Figure 1 shows the plot of this data with a linear regression model.

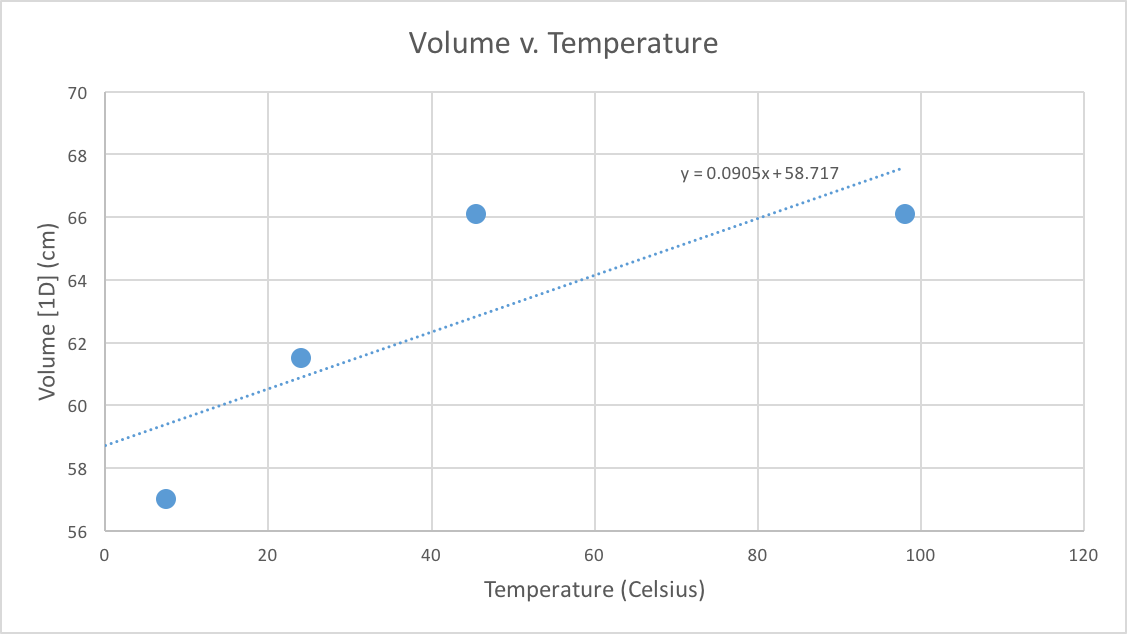


Figure : Mercury Thermometer Volume v. Temperature

*Constant Volume Gas Thermometer (Sphere)*

Similar to the constant pressure mercury thermometer, there were 4 measurements taken for two different parameters in this portion of the experiment. The sphere was held at constant volume. Four measurements were taken for both sphere temperature () and pressure (), resulting in a total of measurements. After all data was obtained, a calculation for absolute zero temperature () at was made.



With the sphere submerged in ice water, it’s temperature was with a pressure of . Following the ice water was warm water submersion with a temperature of and pressure of . This trend was expected to continue as the temperature of the water increased. At boiling, the temperature was recorded to be with a pressure of .

Figure 1 below shows the plotting of the data gained from experiment, along with a calculated value of what absolute zero would be given our values and a linear regression model1.

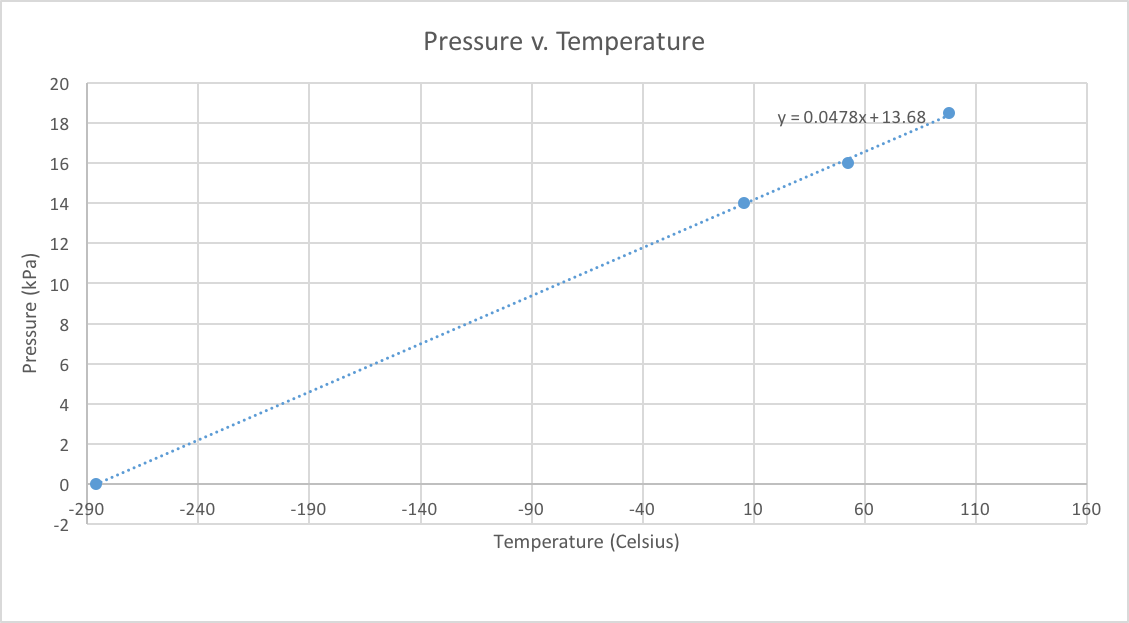


Figure : Pressure v. Temperature with linear regression & absolute zero calculation

The linear regression shows that, using the collected data, absolute zero temperature in Celsius is . There is an error margin of when compared to the known value of absolute zero, .

Appendix

1. This value was calculated using the following expression: where subscripts and represent *freezing* and *boiling*, respectively.