Equation of State for an Ideal Gas

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1. Results

Table 1 contains various quantities, both measured and given, that will be relevant to the analysis. They were collected in a table to assist with lookup.

T is the temperature of the room measured using a digital thermometer. The temperature was initially measured as 71 °F, then converted to kelvins as show in Equation 1.

$$T = \left(\frac{5}{9}(71 - 32) + 273.15\right) \text{ K} = 294.82 \text{ K} \tag{1}$$

P_0 is the atmospheric pressure measured using a digital barometer. The pressure was initially measured as 28.93, then converted to pascals as shown in Equation 2.

$$P_0 = (28.93 \text{ in Hg}) \cdot \frac{25.4 \text{ mm Hg}}{1 \text{ in Hg}} \cdot \frac{101\,325 \text{ Pa}}{760 \text{ mm Hg}} = 97\,968 \text{ Pa} \tag{2}$$

m_p is the mass of the piston & platform, taken from the label on the gas law apparatus. D is the piston diameter, taken from the label on the gas law apparatus.

Some constants that were needed in the analysis were the universal gas constant R and the acceleration due to gravity g. Both values were taken from the lab manual. Note that the value of g used is for the science building, where the experiment was performed.

Table 1: Miscellaneous Quantities

Quantity	Value
T	294.82 K
P_0	97 968 Pa
m_p	35.0 g
D	32.5 mm
R	8.314 J mol^{-1} K^{-1}
g	9.7955 m s^{-2}

2. Analysis