**1. Why is this an isothermal process?**

An isothermal process is when the temperature for an ideal gas remains constant during a process. And if we recall that the internal energy is proportional to the temperature for an ideal gas, the internal energy remains constant if there is no variation in temperature [1]. In the Ratio of Volumes lab, provided by Dr. Kassegne, we pressurized a single vessel of the TH5 Expansion Processes of a Perfect Gas Apparatus, and once stabilized, slowly let air into the second evacuated vessel via the needle valve, V5, until the pressures equalized [2]. Since the air was released from the first vessel slowly, the temperature of the gas remained constant, thus the process is isothermal.

**2. How well do the results obtained compare to the expected results? Give possible reasons for any differences.**

**Error =** $\frac{\left|R-Ro\right|}{Ro}$ **X 100 %**

Using the equation above for percent error, we were able to calculate the difference in our experimental results and the theoretical results from a perfect experiment. As a whole, our results were fairly accurate which shows we took the time to carefully perform the experiment each time. The average percent error was 5.66% with a standard deviation of $\pm $ .49. There is still an error in the experiment, assuming the equipment is perfect, there is the possibility of human error during each run. We had to slowly release the air from the pressurized chamber to the evacuated chamber without being able to see the air flowing or being able to hear the air being released due to the noise from the other labs. This made it difficult for our group to judge the flow of air leaving the pressurized chamber.

**3. Comment on the effect if the rate of change of pressure was sufficient to affect the temperature of the air inside the vessels.**

When a system is pressurized, the molecules of a perfect gas move more slowly because there is less space for the gas molecules to move around. Since we released the air slowly through the needle valve, the air molecules did not move rapidly enough to cause a large enough change in the temperature. The temperature variation recorded by the computer did not vary more than 1°C which shows the flow of air interchanged between the cylinders was slow enough to neglect a temperature change in the system which resulted in an isothermal process.

[1] Nave, Rod. *Hyperphysics*. N.p., Aug. 2000. Web. 17 Sept. 2011. <http://hyperphysics.phy-astr.gsu.edu/hbase/thermo/isoth.html>.

[2] Kassegne, S. “ME495 Lab - Heat Capacity Ratio of Perfect Gas - Expt Number 6." Mechanical

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