Physics 151 Reading Assignment for November 30 Sections 12.2-12.3

Please notice that this file is two pages long.

12.2 - The Atomic Model of an Ideal gas

- From this section, you should mostly concentrate on the "Pressure" section.
- Pressure = "average" force on a container due to a gas. (Note: liquids also exert a pressure on their container. The definition and behavior is mostly the same as that of a gas.)
- Containers have pressure on "both" sides - the difference between the two is what determine the magnitude and direction of the net force.
- Unit of Pressure - Pascal ($Pa = N/m^2$). There are other units, mostly in chemistry or in the U.S. These are atmosphere (atm), millimeters of mercury ($mm\,Hg$) also called the torr, and pounds per square inch (psi). See textbook for conversions.
- The ideal gas law (in its Physics form) $PV = Nk_BT$.

12.3 - Ideal-Gas Processes

- Here we are always talking about a gas that is cannot escape its container, so the number of molecules must remain constant.

- Making a plot of pressure versus volume (a pV diagram) allows use to find the work done by the gas.
- A constant-volume process is a vertical line on a pV diagram and corresponds to the gas doing no work.
- A constant-pressure process is called isobaric. Isobaric processes are horizontal lines on a pV diagram. The gas does work $W_{gas} = p\Delta V$ during an isobaric process.
- A constant-temperature process is called isothermal. Isothermal processes are hyperbolas on a pV diagram. The gas does work during an isothermal process, but finding the area requires calculus, so we won't deal with that aspect.
- An adiabatic process is one for which there is not heat, *i.e.*, $Q = 0$. We won't do much with them either, except to let you know that an adiabatic expansion lowers the temperature of gas, while an adiabatic compression raises the temperature.