Thermodynamics

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> "The subject of thermodynamics is complicated because there are so many different ways of describing the same thing." – Richard Feynman

Ideal Gas Law

When we connect Boyles law with Charles' law and Avogadro's principle we get an interesting relation called the ideal gas law

$$pV = nRT$$

Kinetic theory of gases

If we imagine particles in an ideal gas as solid balls that collide with the walls of a container and eachother with classical mechanics we can derive pressure as

Gas molecules is imagine to be a billiard ball type object that is only moving in the x plane. When it collides with a wall of it's container it collides elastically meaning it has the same momentum but in the other direction The force required to perform this change in momentum is $\vec{F} = \frac{\Delta \vec{p}}{\Delta t}$ The change in momentum is $\Delta p = p_2 - p1$ where $\Delta p = -m\vec{v_x} - m\vec{v_x} = -2m\vec{v_x}$ Δt is time time to go a full length L, hit the wall and come back again so $\Delta t = \frac{2L}{\vec{v_x}}$ $F = \frac{2m\vec{v_x}}{\frac{2L}{\vec{v_x}}} => \frac{m\vec{v_x}^2}{L}$ If we take it that F on each side of the wall should be roughly the same and that we're now operating is 3 dimensions so $v^2 = v_x^2 + v_y^2 + v_z^2$