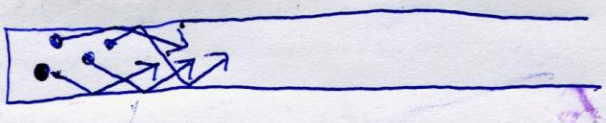
Tests back Friday...

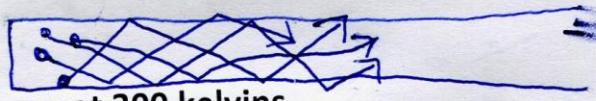
Purpose: How does temperature affect pressure of a gas.

warm up

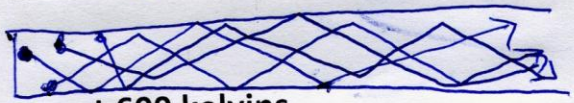
1. How helium would behave in three long tubes: (Copy and then add some particles so that each tube has 4 particles bouncing along.)



gas at 150 kelvins



gas at 300 kelvins



gas at 600 kelvins

2. Particle model of what causes pressure:

a. pressure is caused by... particles hitting walls, ~~[illegible]~~

[or hitting your hand, hitting a balloon, etcetra]

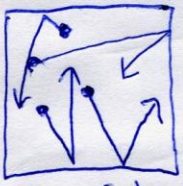
b. To increase the pressure on the wall, hit it with

twice as many hits

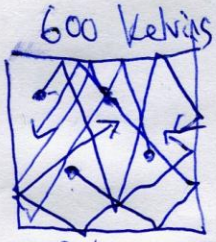
or

twice as hard hits

3. How helium would behave in ~~three~~ two closed boxes.



four hits
Low pressure



sixteen hits
High pressure

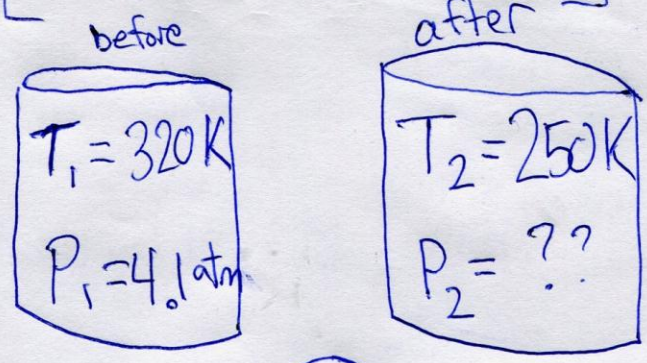
4. A law for this.

- (P) is pressure (T) is temperature

$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

5. Example

If a tuna fish can is initially at 320 kelvins and initial pressure is 4.1 atm, what will the new pressure be if it is cooled to 250 kelvins?



$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

$$T_2 \cdot \frac{P_1}{T_1} = \frac{P_2}{T_2} \cdot T_2$$

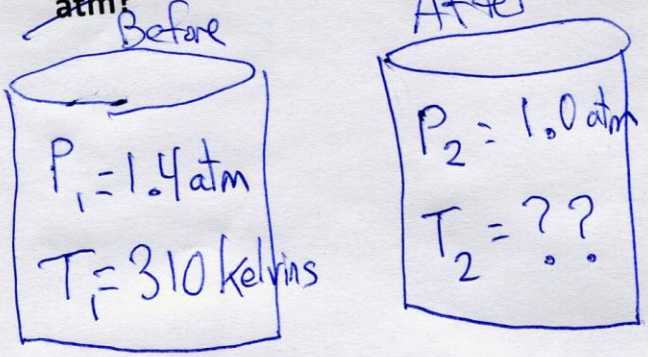
$$\frac{T_2 P_1}{T_1} = P_2$$

$$\frac{(250\text{K})(4.1\text{atm})}{(320\text{K})} = P_2$$

$$3.2\text{atm} = P_2$$

6. Example

If you have a can that is at 1.4 atm and 310 kelvins, what temperature would make the pressure in the can be 1.0 atm?



$$\frac{P_1}{T_1} = \frac{P_2}{T_2}$$

flip it

$$\frac{T_1}{P_1} = \frac{T_2}{P_2}$$

$$P_2 \cdot \frac{T_1}{P_1} = \frac{T_2 \cdot P_2}{P_2}$$

$$\frac{P_2 \cdot T_1}{P_1} = T_2$$

$$\frac{(1.0\,\text{atm})(310\,K)}{(1.4\,\text{atm})} = T_2$$

$$220\,K = T_2$$