Gas Laws

Kinetic Molecular Theory of Gases

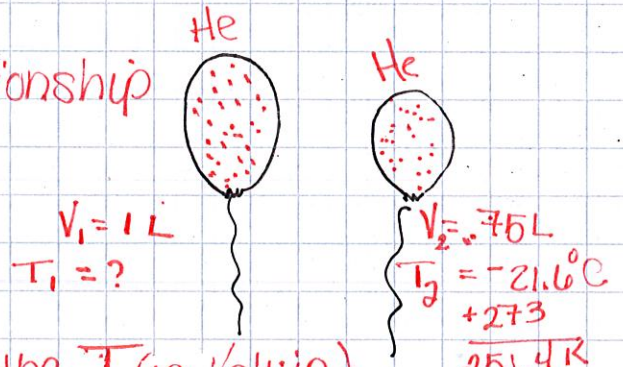
assumptions:

(1) Gas particles behave like hard, spherical objects in constant, random motion.
(2) Gas particles move in a straight line until they collide w/ another particle or the walls of their container
(3) The particles are tiny compared to the amount of space between them.
(4) Collisions b/w particles are perfectly elastic. No energy is lost.
(5) The average kinetic energy of all the particles depends on the temperature of the gas ONLY!

Individual Gas Laws

(1) Volume - Temperature Relationship

If T ↓, the V ↓
If T ↑, the V ↑



Charles's Law

V is directly proportional to the T (in Kelvin) at constant P

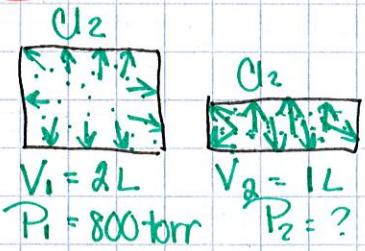
$$\frac{V_1}{T_1} = \frac{V_2}{T_2}$$

to convert °C to K: add 273

$$V_1 T_2 = V_2 T_1$$

(2) Pressure - Volume Relationship

If V ↓, the P ↑
If V ↑, the P ↓



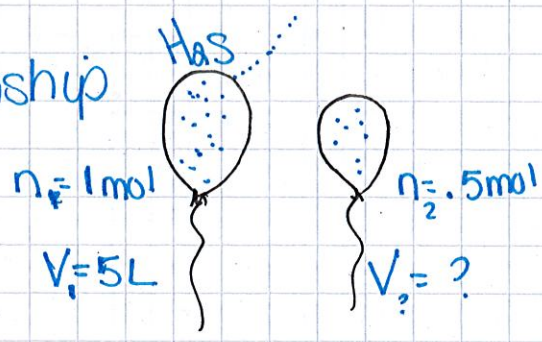
Boyle's Law

P is inversely proportional to the V at constant T

$$P_1 V_1 = P_2 V_2$$

(3) #moles - Volume Relationship (n)

If n ↑, the V = ↑
If n ↓, the V = ↓



Avogaro's Law

V is directly proportional to the # moles (n) of gas at STP

$$n_1V_2 = n_2V_1$$

$$\frac{n_1}{V_1} = \frac{n_2}{V_2}$$