More Gas Laws...

Jacques Charles (late 1700's) came up with the Charles' Law that demonstrates how temp affects volume

* under constant pressure & # of molecules, when you ↑ temp, you ↑ volume & vice-versa
- directly proportionate

or $T_1 V_2 = T_2 V_1$

T_1 = initial temp (kelvin)
T_2 = final temp (kelvin)
V_1 = initial vol.
V_2 = final vol.

* Convert all temp values to Kelvin first
* remember $K = °C + 273.15$

ex) $T_1 = 273.15\text{ K}$ $v_1 = 125\text{ ml}$
$T_2 = 298.15\text{ k}$ $V_2 = ?\text{ ml}$

$\frac{(273.15)(x)}{273.15} = \frac{(298.15)(125)}{273.15}$

$= 136.44\text{ ml}$

273.15 + 29 = 302.15

ex) $T_1 =$ ~~29°C~~ $v_1 = 1{,}000\text{ ml}$
$T_2 =$ X $V_2 = 1{,}250\text{ ml}$

$\frac{(302.15)(1250)}{1000} = \frac{X(1{,}000)}{1{,}000}$ = 377.7 K

The G.L. Law

Joseph G.L. (late 1700's) - realized a relationship between pressure and Temp

* Volume & number of molecules remains the same

When you ↑ temp, you ↑ pressure & vice-versa

- directly proportionate

or $P_1 T_2 = P_2 T_1$

P_1 = Initial pressure
P_2 = final pressure
T_1 = Initial temp (kelvin)
T_2 = Final Temp (kelvin)

* Again, make sure temps are in kelvin before solving.

ex) P_1 = 30 kPa T_1 = 300 K
P_2 = X T_2 = 325 K

$$\frac{(30)(325)}{300} = \frac{x(300)}{300} = 32.5 \text{ kPa}$$

ex) P_1 = 35 kPa P_2 = 40 kPa
T_1 = ~~15~~°C T_2 = X
273.15 + 15 = 288.15 K

$$\frac{(35)(x)}{35} = \frac{(40)(288.15)}{35} = 329.31 \text{ K}$$