

CONCEPT: CHEMISTRY GAS LAWS

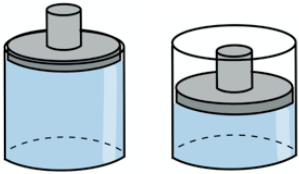
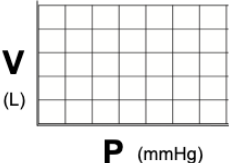
- **Chemistry Gas Laws** are laws that relate together the pressure, volume and temperature of a gas.

□ The *Ideal Gas Law* can be used to determine them.

Chemistry Gas Laws	
Ideal Gas Law $PV = nRT$	Variable Relationships Be Great At Chemistry ☐ B = Boyle's Law = ____ & ____ variables ☐ G = Gay Lussac's Law = ____ & ____ variables ☐ A = Avogadro's Law = ____ & ____ variables ☐ C = Charles' Law = ____ & ____ variables

- **Boyle's Law**: states that V and P are _____ proportional at constant n and T.

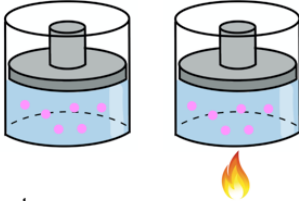
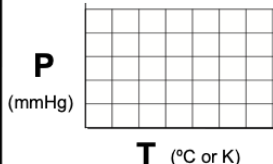
□ Named after Robert Boyle, illustrates how the volume of a container is greatly affected by pressure changes.

Boyle's Law			
Volume-Pressure Relationship $V \propto \square$ [n and T are fixed]	Variables  Volume _____ Pressure _____	V vs. P Plot  V (L) P (mmHg)	Adjusted Formula ☐ ____ = Initial Pressure ☐ ____ = Initial Volume ☐ ____ = Final Pressure ☐ ____ = Final Volume

- **Gay-Lussac's Law** (Amonton's Law): states that P and T are _____ proportional at constant n and V.

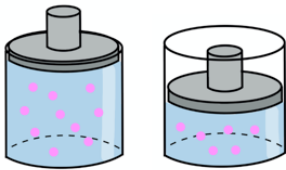
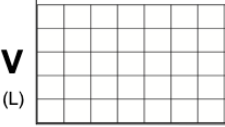
□ As temperature $\uparrow$ gas particles collide with the walls more rapidly, which _____ the pressure.

□ All Gas Law calculations must use the SI unit for temperature in _____.

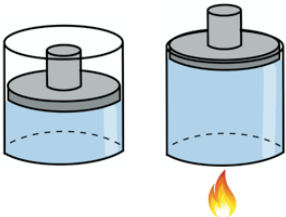
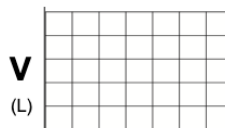
Gay-Lussac's Law			
Pressure-Temperature Relationship $P \propto \square$ [n and V are fixed]	Variables  Temperature _____ Pressure _____	P vs. T Plot  P (mmHg) T (°C or K)	Adjusted Formula ☐ ____ = Initial Pressure ☐ ____ = Initial Temperature ☐ ____ = Final Pressure ☐ ____ = Final Temperature

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- **Avogadro's Law:** states that V and n are _____ proportional at constant P and T .
 - Named after Amedeo Avogadro, shows volumes of gases are connected to their number of molecules.

Avogadro's Law			
Volume–moles Relationship $V \propto \square$ [P and T are fixed]	Variables  Volume _____ moles _____	V vs. n Plot  V (L) n (mol)	Adjusted Formula $\square$ _____ = Initial moles $\square$ _____ = Initial Volume $\square$ _____ = Final moles $\square$ _____ = Final Volume

- **Charles's Law:** states that V and T are _____ proportional at constant n and P .
 - Named after Jacques Charles, illustrates how the volume of a container is greatly affected by temperature.

Charles' Law			
Volume–Temperature Relationship $V \propto \square$ [n and P are fixed]	Variables  Volume _____ Temperature _____	V vs. T Plot  V (L) T (°C or K)	Adjusted Formula $\square$ _____ = Initial Volume $\square$ _____ = Initial Temperature $\square$ _____ = Final Volume $\square$ _____ = Final Temperature

EXAMPLE: A 10.0 L cylinder with a movable piston contains 10.0 g of xenon gas. When an additional 10.0 g of xenon gas are added the volume increases. Which Chemistry Gas Law can be used to justify this result?

- a) Charles's Law b) Avogadro's Law c) Gay-Lussac's Law d) Boyle's Law

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PRACTICE: A 10.0 L cylinder with a movable piston exerts 3.00 atm of pressure. What will happen to the pressure if the volume of the container increases to 20.0 L?

- a) It will double b) It will decrease by half c) It will increase slightly d) No change

PRACTICE: A sealed container with a movable piston contains a gas with a pressure of 1380 torr, a volume of 820 mL and a temperature of 31°C. What would the volume be if the new pressure is now 2.83 atm, while the temperature decreased to 25°C?