## CHEM 150: Ch. 10 Ideal Gas Law

## What is the Ideal Gas Law?

Explains how the volume of a gas is affected by changes in pressure ( P ), temperature ( T ), and amount of moles ( n ) as described in the equation $\mathrm{PV}=\mathrm{nRT}$ where R is a gas constant and is the same value for all gases depending on units of the other quantities. Generally,
$\mathrm{P}=$ pressure in units of atmosphere (atm)
$\mathrm{V}=$ volume in units of liter (L)
$\mathrm{n}=$ number of substance in units of moles (mol)
$\mathrm{R}=0.082058 \frac{\mathrm{~L} \cdot \mathrm{~atm}}{\mathrm{~K} \cdot \mathrm{~mol}}$
$\mathrm{T}=$ temperature in units of Kelvin (K)

## Within the ideal gas law other gas laws are present

If R is a gas constant in $\mathrm{PV}=\mathrm{nRT}$ then we can get,
a. Boyle's Law: when n and T are constant

$$
\mathrm{V}=\frac{n R T}{P}(\text { constant } \mathrm{n} \text { and } \mathrm{T})=\mathrm{V} \text { is proportional to } \frac{l}{P}
$$

b. Charles's Law: when n and P are constant

$$
\mathrm{V}=\frac{n R T}{P}(\text { constant } \mathrm{n} \text { and } \mathrm{P})=\mathrm{V} \text { is proportional to } \mathrm{T}
$$

c. Avogadro's Law: when P and T are constant

$$
\mathrm{V}=\frac{n R T}{P}(\text { constant } \mathrm{P} \text { and } \mathrm{T})=\mathrm{V} \text { is proportional to } \mathrm{n}
$$

Therefore, these three laws make up the ideal gas law.

