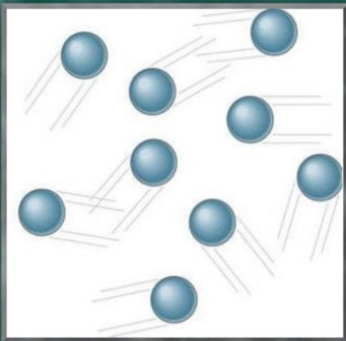
CHEM 1120- 11.1-2

[Spell Card]



Gas Pressure results from gas particles colliding with the surfaces around them

(Force/Area)

Measurements: mmHg, Torr, atm

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CHEM 1120- 11.3

[Spell Card]

Simple gas laws

- **Boyle's Law**
  - Describes pressure and volume relationship
    $P_1 \times V_1 = P_2 \times V_2$
- **Charles's Law**
  - Describes volume and temperature relationship $(V_1/T_1) = (V_2/T_2)$
- **Avogadro's Law**
  - Describes volume and amount (mole) relationship $(V_1/n_1) = (V_2/n_2)$

Forms into the Ideal Gas Law

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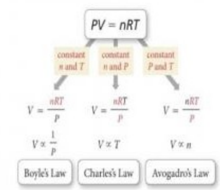
[Trap Card]

Ideal Gas Law



- Simple gas laws can be derived or "reverse-engineered" **if two variables (and *R*) are kept constant** in ideal gas law!

P= atm V=Liters n= moles

R= 0.0821 (L*atm)/(K*mol)- Ideal Gas Law Constant

T= Temperature in Kelvins

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$$P_{total} = P_a + P_b + P_c + \cdots$$
$$= n_a\frac{RT}{V} + n_b\frac{RT}{V} + n_c\frac{RT}{V} + \cdots$$
$$= (n_a + n_b + n_c + \cdots)\frac{RT}{V}$$
$$= (n_{total})\frac{RT}{V}$$

Partial Pressures of a Mixture of Gases is summed up to the Total Pressure

Mole Fraction: Xa = na/n total

98903485

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[Spell Card]

Kinetic Molecular Theory

- Simplest model for the behavior of gases
- A gas is modeled as a collection of particles (either molecules or atoms, depending on the gas) in constant motion

Kinetic Molecular Theory

36069877

CHEM 1120- 11.11

[Spell Card]

Differences between ideal and real gases

- Ideal gas laws assume
  1. no attractions between gas molecules; and
  2. gas molecules do not take up space
     - Based on the kinetic molecular theory
- At low T and high P, these assumptions are not valid

$$[P + a(\frac{n}{V})^2] \times [V - nb] = nRT$$

Correction for intermolecular forces — Correction for particle volume

- **Real gases** – the van der Waals equation

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