PHYSICS PHOR PHUN
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PHASE BEHAVIOR

MATH AND SCIENCE TUTORING
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Gas laws

Standard Temperature and Pressure (STP)
0 ºC (273.15 K), 1 atmosphere (atm)

Molar volume
V_{mol} = 22.414 L/mol

Avogadro's number (N_A)
$N_A = 6.022 \times 10^{23}$ "things"

Ideal gas constant (R)
$R = 8.206 \times 10^{-2}$ atm L/mol K

Boyle's law
$P_1V_1 = P_2V_2$

Charles' law
$\frac{V_1}{T_1} = \frac{V_2}{T_2}$

Gay-Lussac's law
$\frac{P_1}{T_1} = \frac{P_2}{T_2}$

combined gas law
$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$

Avagadro's law
$V = nR$

ideal gas law
$PV = nRT$

Kinetic Molecular Theory

1. Particles in a gas are hard spheres with insignificant volume;
-interparticle distances are huge compared to particle sizes.
2. The motion of the particles is rapid, constant, and random;
-Temperature is the average kinetic energy of the particles.
3. All collisions in a gas are perfectly elastic;
-Pressure is the result of the particles hitting their container.

Intermolecular forces

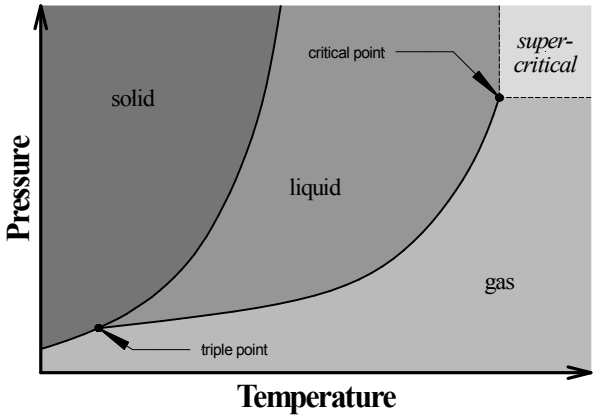
Hydrogen bonding: *partial charge attractions between H and N, O, or F.*
Dipole-dipole: *partial charge attractions between polar molecules.*
Dispersion: *transient dipoles from electron motion in long molecules.*

Phase changes

Phases of matter

solid liquid gas *supercritical* *plasma*

Phase diagrams



Phase changes