Some Useful Information

Chapters 11 & 12

Ideal Gas Law:

$pV = nRT$ -or- $pV = NkT$

p: pressure measured in Pascal (or in atmospheres)

V: volume measured in m^3 (or in liters)

T: absolute temperature (in Kelvin)

n: number of moles of the ideal gas

N: number of particles (atoms) of the ideal gas ***(Note: Sometimes non-ideal gases are treated as ideal gases, and in this case, N can represent the number of molecules of the gas.)***

k: Boltzmann's Constant: 1.38×10^{-23} J/K = 1.38×10^{-23} (Pa*m^3)/K

R: Universal Gas Constant: 8.31 J/(mol*K) = 0.0821 (L*atm)/(mol*K)

N_A: Avogadro's Number: 6.02×10^{23} particles/mole

$k = R/N_A$

Ideal Gas:

The average kinetic energy for the atoms of an ideal gas is equal to

$K_{avg} = 3/2\ (kT)$,

where k is Boltzmann's Constant and T is the absolute temperature.

For an ideal gas, the total thermal energy of the gas is equal to the total kinetic energy of the moving atoms of the gas.

The total thermal energy of N atoms of an ideal gas is equal to

$E_{th} = NK_{avg} = 3/2\ (NkT)$,

where k is Boltzmann's Constant, and T is the absolute temperature of the gas.