Equations and Constants

Avogadro's Number 6.022×10^{23} /mol

Ideal Gas Law $PV = nRT$ $R = 0.082057 \frac{L \cdot atm}{mol \cdot K} = 8.314 \frac{J}{mol \cdot K}$

General Gas Law $\frac{P_1 V_1}{T_1} = \frac{P_2 V_2}{T_2}$ mole fraction $X_A = \frac{n_A}{n_T} = \frac{P_A}{P_T}$

kinetic energy $= \frac{1}{2} mu^2$ 1 joule = 1 J = 1 $kg \frac{m^2}{s^2}$

root mean square velocity of gaseous molecules $u_{rms} = \sqrt{\frac{3RT}{W}}$ $\frac{u_1}{u_2} = \sqrt{\frac{W_2}{W_1}}$

1 atm = 760 torr = 760 mm of Hg = 14.7 psi= 101.3 kPa

specific heat = $s = \frac{q}{m \cdot \Delta T}$ specific heat of water is $1.00 \frac{cal}{g.C^\circ}$ 1 cal = 4.184 J

work = $w = -P \cdot \Delta V$ $\Delta E = q + w$ $\Delta H = q_P$ 1 L·atm = 101.3 J

photon energy = $E = h\nu$ $h = 6.626 \times 10^{-34}$ J·s

for electromagnetic radiation $c = \lambda\nu = 2.998 \times 10^8$ m/s

Energy levels for the hydrogen atom $E_n = -\frac{2.178 \times 10^{-18} \text{ J}}{n^2}$

de Broglie wavelength $\lambda = \frac{h}{m \cdot u}$ electron mass = 9.109×10^{-28} g