Useful equations and constants

$$T_{celcius} = \frac{5}{9}\left(T_{Fahrenheit} - 32\right) \qquad T_{Fahrenheit} = \frac{9}{5}\left(T_{Celcius}\right) + 32 \qquad T_{Kelvin} = T_{Celcius} + 273.15$$

$$c = \lambda\nu \qquad E = h\nu \qquad \lambda = \frac{h}{m\nu}$$

Rydberg Equation: [$R_H = 109{,}678\ cm^{-1}$]

$$\frac{1}{\lambda} = R_H\left(\frac{1}{n_1^2} - \frac{1}{n_2^2}\right)$$

Bohr model of H atom: [$b = 2.18 \times 10^{-18}$ J]

$$E = -\frac{2\pi^2 m_e e^4}{n^2 h^2} = -\frac{b}{n^2}$$

density = mass / volume

1 inch = 2.54 cm

$$KE = \frac{1}{2}mv^2$$

$\Delta E = q + w$

pressure = force / area

$w = -P\Delta V$

$\Delta H = \Delta E + P\Delta V$

heat capacity = (specific heat)*(mass), [units = J °C^{-1}]

van der Waals Gas equation:

$$\left(P + \frac{n^2 a}{V^2}\right)(V - nb) = nRT$$

For a manometer: $(h_B) * (d_B) = (h_A) * (d_A)$

$PV = nRT$ [R = universal gas constant = 0.0821 L atm mol^{-1} K^{-1}]

$P_{total} = P_A + P_B + \ldots\ldots$

$$X_A = \frac{n_A}{n_A + n_B + n_C + \ldots} = \frac{P_A}{P_{total}}$$

1 amu = 1.66054×10^{-24} g

electron: mass (m_e) = $9.1093897 \times 10^{-28}$ g charge (e) = -1.60×10^{-19} C

proton: mass = 1.673×10^{-24} g

neutron: mass = 1.675×10^{-24} g

c = 3.00×10^8 m s^{-1} h = 6.63×10^{-34} J s

1 mole = 6.022×10^{23} = Avogadro's number

1 joule = 1 kg m^2 s^{-2} 1 cal = 4.184 J 1 L atm = 101.0 J

1 atm = Atmospheric pressure at sea level = 14.7 lb in^{-2}
= 1 atm = 101,325 pascals (exactly)
= 760 torr = 760 mm Hg

specific heat, [units = J g^{-1} °C^{-1}]

density of Hg = 13.6 g mL^{-1}

standard molar volume of ideal gas = 22.4 L

For water:

ΔH_{fusion} = 6.01 kJ mol^{-1}

$\Delta H_{vaporization}$ = 43.9 kJ mol^{-1}

specific heat = 4.18 J g^{-1} °C^{-1}