

### Useful Relations

$$1 \text{ J-s}^2 = 1 \text{ kg-m}^2$$

Kinetic Energy:  $E_{kinetic} = 1/2mv^2$

Potential Energy:  $E_{potential} = mgh$

Momentum:  $p = mv$

Photoelectric Effect:  $E_{kinetic} = h\nu - h\nu_0$

DeBroglie Relation:  $p = h/\lambda$

Hydrogen Spectrum:  $E = -2.180 \times 10^{-18} \left( \frac{1}{n_f^2} - \frac{1}{n_i^2} \right)$  Joules

Photon Energy:  $E_{photon} = h\nu = hc/\lambda$

### Useful Constants

Gas Constant:  $R = 0.082058 \text{ L-atm/K-mol}$

Planck's Constant:  $h = 6.63 \times 10^{-34} \text{ J-s}$

Gravity:  $g = 9.81 \text{ m/s}^2$

Speed of light:  $c = 3.00 \times 10^8 \text{ m/s}$