Atomic Theory Formula Sheet:

Speed of Light:

$$c = 3.0\ x\ 10^{8}\ m/s$$

$$c = \lambda\nu \qquad E = mc^2$$

λ – Wavelength ν – Frequency E – Energy

Energy of a Photon:

$$h = 6.626\ x\ 10^{-34}\ J * s$$

$$E = h\nu \qquad E = \frac{hc}{\lambda}$$

The Photoelectric Effect:

$E_0 - Work\ Function$
$\nu_0 - Threshold\ Frequency$

$1eV = 1.602\ x\ 10^{-19}\ J$
$1\ nm = 1\ x\ 10^{-9}\ m$

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

Kinetic Energy:

$$KE = E_{photon} - E_0$$

$$KE = h\nu - h\nu_0$$

$$KE = \frac{hc}{\lambda} - E_0$$

Maximum Wavelength Needed to Free an Electron:

$$\lambda_0 = \frac{hc}{E_0}$$

Wavenumber: (cm^{-1} or m^{-1})

$$\bar{\nu} = \frac{1}{\lambda}$$

De Broglie Wavelength:

$$\lambda = \frac{h}{mv}$$

Photon Momentum:

$$p = mv \qquad p = \frac{h}{\lambda}$$

Bohr Model of H atom:

Photon Energy:

$$E = -2.178\ x\ 10^{-18}\ J\left[\frac{1}{{n_F}^2} - \frac{1}{{n_I}^2}\right]$$

Heisenberg's Uncertainty Principle:

$$\Delta x\ \Delta p \geq \frac{h}{4\pi}$$

Useful Data:

Subatomic Particle:	Rest Mass:	Atomic Mass Unit:
Electron	$9.109\ x\ 10^{-31}\ kg$	0.000549 amu
Proton	$1.6726\ x\ 10^{-27}\ kg$	1.007276 amu
Neutron	$1.6749\ x\ 10^{-27}\ kg$	1.008665 amu