PHYSICS 3204

QUANTUM PHYSICS

Universal Wave Equation	**$v = f\lambda$** f is frequency (hz or S^{-1}) v= speed of the wave (m/s) λ = wave length (m)
Photon of Energy	**E = hf** f is frequency (hz or S^{-1}) h is plank's constant (6.63×10^{-34} J s) *Using the Universal Wave Equation* $E = \frac{hc}{\lambda}$ c is the speed of light (3.0×10^{8} m/s)
photoelectric effect	**$E_{kmax} = eV_{stop}$** E_{kmax} is the maximum kinetic energy (Joules) e is the charge of an electron (1.60×10^{-19} C) **V_{stop}** is the stopping potential (Volts) The electric potential energy of one electron that has been stopped is equal to its original kinetic energy
	f_o cut off frequency Note if the frequency of light is less that f_o than no electrons will be liberate- **NO PHOTOELECTRIC EFFECT**
	$E_{photon} = E_{kmax} + W_o$ E_{photon} is energy of photon (joules) E_{kmax} is the maximum kinetic energy (Joules) ($E_k = \frac{1}{2}mv^2$) W_o = to work function. This amount of energy is required to liberate an electron
Compton Effect	$\vec{p} = \frac{h}{\lambda}$ (Momentum of a photon)
de Broglie (reverse of Compton)	$\lambda = \frac{h}{mv}$
Bohr's radius Equation	$r_n = (5.3x10^{-11})n^2$ The radius of the electron orbit

Energy of an electron at a certain orbit level (n)	$E_n = -\frac{13.6}{n^2}$ Ev
Energy of an electron when radius (r) is known	$E_e = \frac{ke^2}{2r}$
Energy lost as an electron drops from an upper to a lower level	$\Delta E = E_u - E_L$
Isotopic Notation	${}^{A}_{Z}X$ A = Atomic Mass Number Z= # of protons
Unified Atomic Mass Units	1 u = 1.6605×10^{-27} kg
Einstein's Theory of Relativity	$E = mc^2$ E = Energy (Joules, J) m = Mass, (Kilograms, kg) C = speed of light (3.0×10^8 m/s)
Mass difference	Mass difference = Calculate atomic Mass- Unified atomic Mass The energy difference during creation of atoms
Transmutation	1) Alpha Decay ${}^{A}_{Z}X \rightarrow {}^{a-4}_{a-2}Y + {}^{4}_{2}He$ 2) Beta$^-$ Decay ${}^{A}_{Z}X \rightarrow {}^{A}_{Z=1}Y + {}^{0}_{-1}e$ 3)Beta Decay ${}^{A}_{Z}X \rightarrow {}^{A}_{Z-1}Y + {}^{0}_{+1}e$ 4) Simply add δ (gamma ray to the right had side
Radioactive Decay	$N = N_0 \left(\frac{1}{2}\right)^{\frac{t}{t_{\frac{1}{2}}}}$