$$E_T = E_C + E_P$$

$$E_C = \frac{1}{2}mv^2\ [Joule]\ ,\left[kg\frac{m^2}{s^2}\right],[Nm]$$

$$E_P = mgh$$

$$\rho = mv\ \left[kg\frac{m}{s}\right]$$

$$E = \frac{F}{q}\ \left[\frac{N}{C}\right]$$

$$B = qE\ [Tesla]$$

Valores predeterminados

$$\mu_0 = 4\pi \times 10^{-7}\ \left[\frac{Tm}{A}\right]$$

$$\mathcal{E}_0 = 8.85 \times 10^{-12}\ \left[\frac{Cob^2}{Nm^2}\right]$$

$$C = \frac{1}{\sqrt{\mu_0\mathcal{E}_0}} = 300 \times 10^6\ {}^{m}/_{s} = 3 \times 10^8\ {}^{m}/_{s}\ (velocidad\ de\ la\ luz)$$

$$\frac{|E|}{|B|} = C = 3 \times 10^8\ {}^{m}/_{s}$$

$$\lambda = \frac{[mm]}{\times 10^{-3}}\ ,\frac{[\mu m]}{\times 10^{-6}}\ ,\frac{[nm]}{\times 10^{-9}}\ ,\frac{[pm]}{\times 10^{-12}}$$

$$1\text{Å} = 1 \times 10^{-10}m$$

$$f = \ [Hz]\ ,[s^{-1}]\ ,\left[\frac{ciclos}{s}\right]\ ,\frac{[MHz]}{\times 10^6}\ ,\frac{[GHz]}{\times 10^9}$$

$$me^- = 9.11 \times 10^{-31}kg\ ;\ me^+ = me^0 = 1.67 \times 10^{-27}kg$$

$$h = 6.63 \times 10^{-34}\ [J * s]\ (constante\ de\ Planck)$$

W (eV)

Cs = 1.9	Ca = 2.9	Pb = 4.14	Fe = 4.5	C = 4.8	Ni = 5
K =2.1	U = 3.6	Ag = 4.3	Hg = 4.5	Si = 4.8	Pt = 6.35
Na = 2.3	Al = 4.08	Zn = 4.31	Cu = 4.7	Co = 5	

Radiación del cuerpo negro

$$E_n = nhf$$

Ley de Stephan – Boltzman

$$P = \sigma T^4 \; ; \; \sigma = 5.67 \times 10^{-8} \left[\frac{W}{m^2 K^4}\right]$$

Ley de Wien

$$\lambda_{max} \, T = 2.898 \times 10^{-3} \, mK \; ; K = \; ℃ + 273$$

$$1eV = 1..6 \times 10^{-19} \, [J]$$

Efecto fotoeléctrico

$$f \geq 10^{15} \, Hz \; (abajo \; de \; esta \; frecuencia \; no \; hay \; efecto \; fotoelectrico)$$

$$I_{luz} = \frac{W}{m^2} \; ; \; E_C = \frac{1}{2} m v^2 \; > eV_0$$

$$eV_0 = \; E_C \begin{cases} eV_0 = E - W \\ E_C = E - W \end{cases} ; E = \frac{hc}{\lambda} = \frac{1240 eV nm}{\lambda} \; ; \; E_C = \frac{1}{2} m v^2 \; \rightarrow v = \sqrt{\frac{2E_C}{m}}$$

$$W = hf_0 \; ; \; f_0 = \frac{c}{\lambda_0} \; ; W = \frac{hc}{\lambda_0}$$

$$\#fotones = \frac{I_{luz}}{E} \left[\frac{Watts}{\frac{m^2}{J}}\right] , \left[\frac{fotones}{sm^2}\right]$$

$$\#fotones = \frac{P}{E} \left[\frac{Watts}{J}\right] , \left[\frac{fotones}{s}\right]$$

Rayos X o Rayos Röutgen

$$f = \frac{c}{\lambda_{min}} \; ; \; \lambda_{min} = \frac{c}{f} \; ; \; \lambda_{min} = (30nm, 0.03nm)$$

$$E = hf_{max} \; ; hf_{max} = \; E_C = eV_2 \; ; \; \frac{hc}{\lambda_{min}} = eV_2$$

Efecto Compton

$$E_i = \frac{hc}{\lambda_i} = hf_i \; ; \; \rho = \frac{h}{\lambda_i}$$

$$E_S = \frac{hc}{\lambda_S} = hf_S \; ; \; \rho = \frac{h}{\lambda_S}$$

$$\Delta\lambda = \lambda_S - \lambda_i \; ; \; \lambda_S - \lambda_i = \frac{h}{mc}(1 - \cos\theta)$$

$$\theta \begin{cases} \theta = 0° \rightarrow \Delta\lambda = 0 \\ \theta = 90° \rightarrow \Delta\lambda = \lambda_C \uparrow\downarrow \\ \theta = 180° \rightarrow \Delta\lambda = 2\lambda_C \end{cases}$$

$$E_i + mc^2 = E_S + mc^2 + E_C$$

$$E = \frac{mc^2}{\sqrt{1 - \frac{v^2}{c^2}}}$$

$$\sum Px \rightarrow P_i = Ps\cos\theta + P\bar{e}\cos\phi$$

$$\sum Ps\sin\theta - Pe\sin\phi$$

$$\rho e\cos\phi = \rho i - Ps\cos\theta \; ; \; \rho e = \frac{\rho i - \rho e\cos\theta}{\cos\phi}$$

$$\rho s\sin\theta = \left(\frac{\rho i - \rho s\cos\theta}{\cos\phi}\right)\sin\phi \; ; \; \frac{\cos\theta}{\cos\phi} = \tan\phi$$

$$\therefore \; \rho\sin\theta = (\rho i - \rho s\cos\theta)\tan\phi$$

$$Por\ lo\ que: \frac{\rho s\sin\theta}{\rho i - \rho s\cos\theta} = \tan\phi \; ; \; \frac{\frac{h}{\lambda_S}\sin\theta}{\frac{h}{\lambda_i} - \frac{h}{\lambda_S}\cos\theta} = \tan\phi$$

$$\frac{(\lambda_i\lambda_S)\frac{h}{\lambda_S}\sin\theta}{h\lambda_S - h\lambda_i\cos\theta} = \tan\phi$$

$$Angulo\ del\ electron: \frac{\lambda_i\sin\theta}{\lambda_S - \lambda_i\cos\theta} = \tan\phi$$