Constants:

$e = 1.6 \times 10^{-19}C;\ \epsilon_0 = 8.85 \times 10^{-12}\ C^2/Nm^2;\ k = \frac{1}{4\pi\epsilon_0} = 9.0 \times 10^9\ N \cdot m^2/C^2$

Unit conversion:

$eV = 1.6 \times 10^{-19}J$

Formulas

- $\vec{F} = k\frac{q_1 q_2}{r^2}\hat{r};\ \vec{E} = k\frac{q_1}{r^2}\hat{r}$ Coulomb's Law
- $\vec{\tau} = \vec{p} \times \vec{E};\ U = -\vec{p} \cdot \vec{E}$ Torque and potential energy of an electric dipole in electric field.
- $\Phi_E = \oint \vec{E} \cdot d\vec{A} = \frac{Q_{encl}}{\epsilon_0}$ Gauss's Law
- $V = \frac{1}{4\pi\epsilon_0}\frac{q}{r}$ Electric potential due to a point charge
- $R = \rho\frac{L}{A}$ Resistivity
- $R = \frac{V}{I}$ Ohm's law
- $\rho = \frac{|\vec{E}|}{|\vec{J}|}$ Ohm's law
- $R(T) = R_0[1 + \alpha(T - T_0)]$ Temperature dependent resistance
- Relationships among $\vec{F}$, $\vec{E}$, U, and V