MKSA System of Units

Newtonian gravitational const.	G	$6.674 \times 10^{-11}\,\mathrm{N \cdot m^2/kg^2}$	
Avogadro number	N_A	$6.022141 \times 10^{23}\,\mathrm{mol^{-1}}$	
Boltzmann constant	k	$1.38065 \times 10^{-23}\,\mathrm{J/K}$	$8.61733 \times 10^{-5}\,\mathrm{eV/K}$
speed of light in vacuum	c	$2.99792 \times 10^{8}\,\mathrm{m/s}$	
reduced Planck's constant	$\hbar(=h/2\pi)$	$1.05449 \times 10^{-34}\,\mathrm{J \cdot s}$	
		$6.58151 \times 10^{-22}\,\mathrm{MeV \cdot s}$	
elementary charge	e	$1.6022 \times 10^{-19}\,\mathrm{C}$	$1.6022 \times 10^{-20}\,\mathrm{emu}$
		$4.8032 \times 10^{-10}\,\mathrm{esu}$	
electron mass	m_e	$9.10938 \times 10^{-31}\,\mathrm{kg}$	$0.5109989\,\mathrm{MeV}/c^2$
unified atomic mass unit	u	$1.660539 \times 10^{-27}\,\mathrm{kg}$	$931.4941\,\mathrm{MeV}/c^2$
vacuum permittivity	ε_0	$8.854187817 \times 10^{-12}\,\mathrm{F/m}$	electric constant
Fermi coupling constant	$G_F/(\hbar c)^3$	$1.16638 \times 10^{-5}\,\mathrm{GeV^{-2}}$	
Fine structure constant	α	0.00729735257	$(137.036)^{-1}$

Unit Conversion

1 inch =2.54 cm 1 pound(lb) = 0.4535923 kg

Dimensions

Length (m)	$[L]$	Mass (kg)	$[M]$
Time (s)	$[T]$	Current (A)	$[J]$
Momentum (N·s)	$[MLT^{-1}]$	Force (N)	$[MLT^{-2}]$
Work (J)	$[ML^2T^{-2}]$	Angular momentum (N·m·s)	$[ML^2T^{-1}]$
Power (W)	$[ML^2T^{-3}]$		
Moment (N·m)	$[ML^2T^{-2}]$	Moment of inertia (kg·m^2)	$[ML^2]$
Pressure (Pa =N/m^2)	$[ML^{-1}T^{-2}]$		
Permittivity (F/m)	$[M^{-1}L^{-3}T^4J^2]$	Charge (C)	$[TJ]$
Electric field strength (V/m)	$[MLT^{-3}J^{-1}]$	Electric flux density (C/m^2)	$[L^{-2}TJ]$
Electric potential (V)	$[ML^2T^{-3}J^{-1}]$	Electric capacity (F)	$[M^{-1}L^{-2}T^4J^2]$
Electric resistance (Ω)	$[ML^2T^{-3}J^{-2}]$	Permeability (H/m)	$[MLT^{-2}J^{-2}]$
Magnetic charge (Wb)	$[ML^2T^{-2}J^{-1}]$	Magnetic field strength (A/m)	$[L^{-1}J]$
Magnetic vector potential	$[MLT^{-2}J^{-1}]$		
Magnetic flux density (T)	$[MT^{-2}J^{-1}]$	Magnetic flux (Wb =T·m^2)	$[ML^2T^{-2}J^{-1}]$
Inductance (H =Wb/A)	$[ML^2T^{-2}J^{-2}]$		
Temperature (K)	$[\theta]$	Expansion coefficient (K^{-1})	$[\theta^{-1}]$
Thermal capacity (J/K)	$[ML^2T^{-2}\theta^{-1}]$	Entropy (J/K)	$[ML^2T^{-2}\theta^{-1}]$
Thermal conductivity (W/m·K)	$[MLT^{-3}\theta^{-1}]$		

Electromagnetic Units

$$\vec{F} = q\vec{E} \qquad \vec{F} = m\,\vec{H} \qquad \frac{\partial\rho}{\partial t} + \boldsymbol{\nabla}\cdot\vec{j} = 0$$

$$\vec{F} = \frac{1}{h_1\epsilon_0}\frac{q\,q'}{r^2}\frac{\vec{r}}{r} \qquad \vec{F} = \frac{1}{h_2\mu_0}\frac{m\,m'}{r^2}\frac{\vec{r}}{r} \qquad \vec{F} = \frac{1}{h_3 k}\frac{m\,\vec{j}\times\vec{r}}{r^3}$$

$$\Rightarrow\ \boldsymbol{\nabla}\cdot\vec{E} = \frac{4\pi}{h_1\epsilon_0}\rho \qquad \boldsymbol{\nabla}\times\vec{H} = \frac{4\pi}{h_3 k}\vec{j} + \frac{h_1\epsilon_0}{h_3 k}\frac{\partial\vec{E}}{\partial t} \qquad \boldsymbol{\nabla}\times\vec{E} = -\frac{h_2\mu_0}{h_3 k}\frac{\partial\vec{H}}{\partial t}$$

$$\vec{F} = q\,\vec{E} + \frac{h_2\mu_0}{h_3 k}\,q\vec{v}\times\vec{H}\ :\ \text{Lorentz force} \qquad \frac{h_3^2}{h_1 h_2}\frac{k^2}{\mu_0\epsilon_0} = c^2$$

$$S = \frac{h_3 k}{4\pi}\vec{E}\times\vec{H} + \frac{h_1\epsilon_0}{h_3 k}\frac{\partial\vec{E}}{\partial t} \qquad E = \frac{1}{8\pi}\big(h_1\epsilon_0\vec{E}^{\,2} + h_2\mu_0\vec{H}^{\,2}\big) \qquad \alpha = \frac{e^2}{h_1\epsilon_0\hbar c}$$

	MKSA	esu	emu	Gauss	Heaviside-Lorentz
$h_1 = h_2 = h_3 =$	4π	1	1	1	4π
ϵ_0	$\frac{1}{\mu_0 c^2}$	1	$\frac{1}{c^2}$	1	1
μ_0	$\frac{4\pi}{10^7}$	$\frac{1}{c^2}$	1	1	1
k	1	1	1	c	c
$\boldsymbol{\nabla}\cdot\vec{D} =$	ρ	$4\pi\rho$	$4\pi\rho$	$4\pi\rho$	ρ
$\boldsymbol{\nabla}\cdot\vec{B} =$	0	0	0	0	0
$\boldsymbol{\nabla}\times\vec{H} =$	$\vec{j} + \frac{1}{c}\frac{\partial\vec{D}}{\partial t}$	$4\pi\vec{j} + \frac{\partial\vec{D}}{\partial t}$	$4\pi\vec{j} + \frac{\partial\vec{D}}{\partial t}$	$\frac{4\pi}{c}\vec{j} + \frac{1}{c}\frac{\partial\vec{D}}{\partial t}$	$\frac{1}{c}\vec{j} + \frac{1}{c}\frac{\partial\vec{D}}{\partial t}$
$\boldsymbol{\nabla}\times\vec{E} =$	$-\frac{\partial\vec{B}}{\partial t}$	$-\frac{\partial\vec{B}}{\partial t}$	$-\frac{\partial\vec{B}}{\partial t}$	$-\frac{1}{c}\frac{\partial\vec{B}}{\partial t}$	$-\frac{1}{c}\frac{\partial\vec{B}}{\partial t}$
$\vec{D} =$	$\epsilon\vec{E}$	$\frac{\epsilon}{\epsilon_0}\vec{E}$	$\frac{\epsilon}{\epsilon_0 c^2}\vec{E}$	$\frac{\epsilon}{\epsilon_0}\vec{E}$	$\frac{\epsilon}{\epsilon_0}\vec{E}$
$\vec{B} =$	$\mu\vec{H}$	$\frac{\mu}{\mu_0 c^2}\vec{H}$	$\frac{\mu}{\mu_0}\vec{H}$	$\frac{\mu}{\mu_0}\vec{H}$	$\frac{\mu}{\mu_0}\vec{H}$

Natural Units

$$\hbar = c = 1 \qquad [L^{-1}] = [T^{-1}] = [M]$$

$$1\,\text{MeV} = 1.60\times10^{-13}\,\text{J} = 1.78\times10^{-30}\,\text{kg}\cdot c^2$$

$$1\text{sec} = 3.00\times10^{8}\,\text{m} = 3.00\times10^{23}\,\text{fm}$$

$$1\text{sec}^{-1} = 6.58151\times10^{-22}\,\text{MeV} \qquad 1\,\text{sec} = 1.52\times10^{21}\,\text{MeV}^{-1}$$

$$\hbar\,c = 197\,\text{MeV}\cdot\text{fm} \qquad \frac{e^2}{4\pi\epsilon_0\,\hbar\,c} \to \frac{e^2}{4\pi} = \frac{1}{137} \qquad e = \sqrt{4\pi/137} = 0.303$$