

BASIC SCIENCE REFERENCES

reference tables

Fundamental Physical Constants

Universal Constants

Velocity of light in vacuum $\left(c := 299792458 \cdot \frac{\text{m}}{\text{sec}} \right)$

Permeability of vacuum $\left(\mu_0 := 4 \cdot \pi \cdot 10^{-7} \cdot \frac{\text{newton}}{\text{amp}^2} \right)$

Permittivity of vacuum $\left(\epsilon_0 := 8.854187817 \cdot 10^{-12} \cdot \frac{\text{farad}}{\text{m}} \right)$

Newtonian constant of gravitation $\left(G := 6.6742 \cdot 10^{-11} \cdot \frac{\text{m}^3}{\text{kg} \cdot \text{sec}^2} \right)$

Planck's constant (h) $\left(h := 6.6260693 \cdot 10^{-34} \cdot \text{joule} \cdot \text{sec} \right)$

Electromagnetic Constants

Elementary charge $\left(e := 1.60217653 \cdot 10^{-19} \cdot \text{coul} \right)$

Magnetic flux quantum $\left(\Phi_0 := 2.06783372 \cdot 10^{-15} \cdot \text{weber} \right)$

Bohr magneton $\left(927.400949 \cdot 10^{-26} \cdot \frac{\text{joule}}{\text{tesla}} \right)$

Nuclear magneton $\left(5.05078343 \cdot 10^{-27} \cdot \frac{\text{joule}}{\text{tesla}} \right)$

Atomic Constants

Fine-structure constant	$\left(\alpha := 7.297352568 \cdot 10^{-3}\right)$
Rydberg constant	$\left(R := 10973731.568525 \cdot \text{m}^{-1}\right)$
Bohr radius	$\left(a_0 := 0.5291772108 \cdot 10^{-10} \cdot \text{m}\right)$
Hartree energy	$\left(E_h := 4.35974417 \cdot 10^{-18} \cdot \text{joule}\right)$
Quantum of circulation	$\left(3.636947550 \cdot 10^{-4} \cdot \frac{\text{m}^2}{\text{sec}}\right)$

Electron

Electron mass	$\left(m_e := 9.1093826 \cdot 10^{-31} \cdot \text{kg}\right)$
Electron charge to mass quotient	$\left(-1.75882012 \cdot 10^{11} \cdot \frac{\text{coul}}{\text{kg}}\right)$
Compton wavelength	$\left(2.426310238 \cdot 10^{-12} \cdot \text{m}\right)$
Classical electron radius	$\left(r_e := 2.817940325 \cdot 10^{-15} \cdot \text{m}\right)$
Electron magnetic moment	$\left(\mu_e := -928.476412 \cdot 10^{-26} \cdot \frac{\text{joule}}{\text{tesla}}\right)$

Muon

Muon mass	$\left(m_\mu := 1.88353140 \cdot 10^{-28} \cdot \text{kg}\right)$
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Proton

Proton mass $\left(m_p := 1.67262171 \cdot 10^{-27} \cdot \text{kg}\right)$

Ratio of proton mass to electron mass (1836.15267261)

Proton Compton wavelength $\left(1.3214098555 \cdot 10^{-15} \cdot \text{m}\right)$

Proton magnetic moment $\left(1.41060671 \cdot 10^{-26} \cdot \frac{\text{joule}}{\text{tesla}}\right)$

Proton gyromagnetic ratio $\left(2.67522205 \cdot 10^8 \cdot (\text{sec} \cdot \text{tesla})^{-1}\right)$

Neutron

Neutron mass $\left(m_n := 1.67492728 \cdot 10^{-27} \cdot \text{kg}\right)$

Neutron Compton wavelength $\left(1.3195909067 \cdot 10^{-15} \cdot \text{m}\right)$

Physico-Chemical Constants

Avogadro constant $\left(N_A := 6.0221415 \cdot 10^{23} \cdot \text{mole}^{-1}\right)$

Atomic mass constant $\left(\text{AMU} := 1.66053886 \cdot 10^{-27} \cdot \text{kg}\right)$

Faraday constant $\left(96485.3383 \cdot \frac{\text{coul}}{\text{mole}}\right)$

Molar gas constant $\left(8.314472 \cdot \frac{\text{joule}}{\text{mole} \cdot \text{K}}\right)$

Boltzmann's constant $\left(k_{\text{b}} := 1.3806505 \cdot 10^{-23} \cdot \frac{\text{joule}}{\text{K}} \right)$

Molar volume of ideal gas
at STP $\left(22.413996 \cdot 10^{-3} \cdot \frac{\text{m}^3}{\text{mole}} \right)$

Stefan-Boltzmann constant $\left(\sigma := 5.670400 \cdot 10^{-8} \cdot \frac{\text{watt}}{\text{m}^2 \cdot \text{K}^4} \right)$

First radiation constant $\left(3.74177138 \cdot 10^{-16} \cdot \text{watt} \cdot \text{m}^2 \right)$

Second radiation constant $\left(1.4387752 \cdot 10^{-2} \cdot \text{m} \cdot \text{K} \right)$

* Green parentheses in this file indicate annotations to an expression. To read an annotation, right-click on the entire expression within the parentheses and choose View/Edit Annotation. If the expression is copied to another file, the annotation will be preserved.

Data from *The NIST Reference on Constants, Units, and Uncertainty*,
from *CODATA Recommended Values of the Fundamental Constants -
2002*, by Peter J. Mohr and Barry N. Taylor, National Institute of
Standards and Technology.
