Table of physical and mathematical constants

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General physical constants

$\mu_0 = 12.566{\cdot}10^{-7}$ H/m (permeability of vacuum)
$c = 2.99792{\cdot}10^{10}$ cm/s (speed of light)
$\varepsilon_0 = 1/(\mu_0 c^2) = 8.8542{\cdot}10^{-12}$ F/m (permittivity of vacuum)
$e = 4.8032{\cdot}10^{-10}$ esu $= 1.6022{\cdot}10^{-19}$ coulomb (electron charge magnitude)
$\hbar c = 197.329$ eV nm (conversion constant)
$m_e = 9.1095{\cdot}10^{-28}$ g (electron mass)
$m_p = 1.6726{\cdot}10^{-24}$ g (proton mass)
$M_a = 1$ g $/N_A = 1.6606{\cdot}10^{-24}$ g $= 9.315{\cdot}10^{11}$ meV$/c^2$ (atomic mass unit)
$\hbar = 6.5822{\cdot}10^{-13}$ meV s (reduced Planck constant)
$k_B = 8.6174{\cdot}10^{-2}$ meV/K $= 1.3805{\cdot}10^{-23}$ J/K (Boltzmann constant)
$r_e = e^2/m_e c^2 = 2.8179{\cdot}10^{-13}$ cm (electron radius)
$\lambda_e = h/m_e c = 2.4263{\cdot}10^{-10}$ cm (electron Compton wavelength)
$\sigma_T = 8\pi r_e^2/3 = 0.66524$ barn (10^{-24}cm^2) (Thomson cross-section)
$\mu_B = e\hbar/2mc = 5.79{\cdot}10^{-2}$ meV/T (Bohr magneton)
$\mu_N = e\hbar/2m_p c = 3.15{\cdot}10^{-5}$ meV/T (nuclear magneton)
$N_A = 6.0225{\cdot}10^{23}$ 1/mol (Avogadro number)
$hc = 2\pi\hbar c = 12.3984$ A keV

Physical units

1 in = 2.54 cm
1 fm $= 10^{-13}$ cm
1 barn $= 10^{-24}$ cm^2
1 eV $= 1.60219 \cdot 10^{-12}$ erg
1 atm = 1.01 dyn/cm^2
1 tesla (T) $= 10^4$ gauss
1 newton $= 10^5$ dyn
1 J (joule) $= 10^7$ erg
1 cal = 4.184 joule
0 C = 273.15 K
1 coulomb $= 2.9979 \cdot 10^9$ esu
1 eV / $k_B = 11605$ K

Mathematical constant

$\pi = 3.141592653589$
$e = 2.718281828$
$\gamma = 0.577215665$

Dimension prefix

10^1 – дека, 10^2 – гекто, 10^3 – кило, 10^6 – мега, 10^9 – гига, 10^{12} – тера, 10^{15} – пета, 10^{18} – экса, 10^{21} – зетта, 10^{24} – иотта
10^{-1} – деци, 10^{-2} – санти, 10^{-3} – милли, 10^{-6} – микро, 10^{-9} – нано, 10^{-12} – пико, 10^{-15} – фемто, 10^{-18} – атто, 10^{-21} – зепто, 10^{-24} – иокто

^{57}Fe nuclear resonant scattering

$E = \hbar\omega = 14.413$ keV (energy of gamma ray)
$\omega = 2.1897 \cdot 10^{19}$ 1/s (frequency)
$k = \omega/c = 7.304 \cdot 10^{8}$ 1/cm (wavenumber)
$\lambda = 2\pi/k = 0.86023 \cdot 10^{-8}$ cm (wavelength)
$\Gamma/\hbar = 7.09 \cdot 10^{6}$ 1/s, $\Gamma = 4.66 \cdot 10^{-6}$ meV (width of energy level)
$E_R = \hbar^2 k^2/2M_{Fe} = 1.96$ meV (recoil energy)

$$g_0 = -\frac{2\pi N_c \eta f_{LM}}{k^3(1+\alpha)V_0}\frac{(2I+1)}{(2I_0+1)} = -6.48 \cdot 10^{-5}, \qquad \mu_{res} = -kg_0 = 4.72 \cdot 10^4 \text{ 1/cm}$$

Here $N_c = 2$ is a number of nuclei inside the unit cell, $\alpha = 8.21$ is a conversion coefficient, $\eta = 0.95$ is an enrichment factor, $V_0 = 8.95 \cdot 10^{-23}$ cm^3 is a volume of unit cell, $I_0 = 1/2$, $I = 3/2$, $f_{LM} = 0.871$ is the Lamb-Mössbauer factor.