



## UNIVERSAL PHYSICAL CONSTANTS

(Uncertainty <1 ppm except for  $\sigma$ , 50 ppm, and for  $G$ , 150 ppm).

Speed of light in vacuum	$c = 2.99792458 \cdot 10^8 \text{ m} \cdot \text{s}^{-1}$ (exact)
Planck's constant	$h = 6.62607015 \cdot 10^{-34} \text{ J} \cdot \text{s}$ (exact)
Boltzmann's constant	$k = 1.380649 \cdot 10^{-23} \text{ J} \cdot \text{K}^{-1}$ (exact)
Avogadro's constant	$N_A = 6.02214076 \cdot 10^{23} \text{ mol}^{-1}$ (exact)
Universal gas constant	$R = kN_A = 8.314467 \text{ J} \cdot \text{mol}^{-1} \cdot \text{K}^{-1}$
Electron charge	$e = 1.602176634 \cdot 10^{-19} \text{ C}$ (exact)
Electron mass at rest	$m_e = 9.109383 \cdot 10^{-31} \text{ kg}$
Proton mass / Electron mass	$m_p/m_e = 1836.153$
Faraday's constant	$F = eN_A = 96485.3 \text{ C} \cdot \text{mol}^{-1}$
Stefan-Boltzmann's constant	$\sigma = 2\pi^5 k^4 / (15c^2 h^3) = 5.67037 \cdot 10^{-8} \text{ W} \cdot \text{m}^{-2} \cdot \text{K}^{-4}$
First radiation constant	$A = 2\pi h c^2 = 3.7418 \cdot 10^{-16} \text{ W} \cdot \text{m}^2$
Second radiation constant	$B = hc/k = 0.014388 \text{ m} \cdot \text{K}$
Wien's displacement constant	$C = f(A, B) = 2.8976 \cdot 10^{-3} \text{ m} \cdot \text{K}$
Gravitation constant	$G = 6.6742 \cdot 10^{-11} \text{ m}^3 \cdot \text{kg}^{-1} \cdot \text{s}^{-2}$

### References:

2019 redefinition of the SI base units ([Wiki](#))

Physical constants ([Wiki](#))

<http://physics.nist.gov/cuu/index.html>