Fundamental Physical Constants — Physico-chemical constants

Quantity	Symbol	Value	Unit	Relative std. uncert. u_r
Avogadro constant	N_A, L	$6.022\,141\,79(30) \times 10^{23}$	mol^{-1}	5.0×10^{-8}
atomic mass constant				
$m_u = \frac{1}{12}m(^{12}\text{C}) = 1\ \text{u}$	m_u	$1.660\,538\,782(83) \times 10^{-27}$	kg	5.0×10^{-8}
$= 10^{-3}\ \text{kg mol}^{-1}/N_A$				
energy equivalent	$m_u c^2$	$1.492\,417\,830(74) \times 10^{-10}$	J	5.0×10^{-8}
in MeV		$931.494\,028(23)$	MeV	2.5×10^{-8}
Faraday constant[1] $N_A e$	F	$96\,485.3399(24)$	C mol^{-1}	2.5×10^{-8}
molar Planck constant	$N_A h$	$3.990\,312\,6821(57) \times 10^{-10}$	J s mol^{-1}	1.4×10^{-9}
	$N_A hc$	$0.119\,626\,564\,72(17)$	J m mol^{-1}	1.4×10^{-9}
molar gas constant	R	$8.314\,472(15)$	$\text{J mol}^{-1}\ \text{K}^{-1}$	1.7×10^{-6}
Boltzmann constant R/N_A	k	$1.380\,6504(24) \times 10^{-23}$	J K^{-1}	1.7×10^{-6}
in eV K^{-1}		$8.617\,343(15) \times 10^{-5}$	eV K^{-1}	1.7×10^{-6}
	k/h	$2.083\,6644(36) \times 10^{10}$	Hz K^{-1}	1.7×10^{-6}
	k/hc	$69.503\,56(12)$	$\text{m}^{-1}\ \text{K}^{-1}$	1.7×10^{-6}
molar volume of ideal gas RT/p				
$T = 273.15\ \text{K},\ p = 101.325\ \text{kPa}$	V_m	$22.413\,996(39) \times 10^{-3}$	$\text{m}^3\ \text{mol}^{-1}$	1.7×10^{-6}
Loschmidt constant N_A/V_m	n_0	$2.686\,7774(47) \times 10^{25}$	m^{-3}	1.7×10^{-6}
$T = 273.15\ \text{K},\ p = 100\ \text{kPa}$	V_m	$22.710\,981(40) \times 10^{-3}$	$\text{m}^3\ \text{mol}^{-1}$	1.7×10^{-6}
Sackur-Tetrode constant				
(absolute entropy constant)[2]				
$\frac{5}{2} + \ln[(2\pi m_u k T_1/h^2)^{3/2} k T_1/p_0]$				
$T_1 = 1\ \text{K},\ p_0 = 100\ \text{kPa}$	S_0/R	$-1.151\,7047(44)$		3.8×10^{-6}
$T_1 = 1\ \text{K},\ p_0 = 101.325\ \text{kPa}$		$-1.164\,8677(44)$		3.8×10^{-6}
Stefan-Boltzmann constant				
$(\pi^2/60)k^4/\hbar^3 c^2$	σ	$5.670\,400(40) \times 10^{-8}$	$\text{W m}^{-2}\ \text{K}^{-4}$	7.0×10^{-6}
first radiation constant $2\pi hc^2$	c_1	$3.741\,771\,18(19) \times 10^{-16}$	W m^2	5.0×10^{-8}
first radiation constant for spectral radiance $2hc^2$	c_{1L}	$1.191\,042\,759(59) \times 10^{-16}$	$\text{W m}^2\ \text{sr}^{-1}$	5.0×10^{-8}
second radiation constant hc/k	c_2	$1.438\,7752(25) \times 10^{-2}$	m K	1.7×10^{-6}
Wien displacement law constants				
$b = \lambda_{max} T = c_2/4.965\,114\,231...$	b	$2.897\,7685(51) \times 10^{-3}$	m K	1.7×10^{-6}
$b' = \nu_{max}/T = 2.821\,439\,372...\,c/c_2$	b'	$5.878\,933(10) \times 10^{10}$	Hz K^{-1}	1.7×10^{-6}

[1] The numerical value of F to be used in coulometric chemical measurements is $96\,485.3401(48)$ [5.0×10^{-8}] when the relevant current is measured in terms of representations of the volt and ohm based on the Josephson and quantum Hall effects and the internationally adopted conventional values of the Josephson and von Klitzing constants K_{J-90} and R_{K-90} given in the “Adopted values” table.

[2] The entropy of an ideal monoatomic gas of relative atomic mass A_r is given by $S = S_0 + \frac{3}{2}R \ln A_r - R \ln(p/p_0) + \frac{5}{2}R \ln(T/\text{K})$.