Department of Chemistry

Imperial College of Science, Technology and Medicine

Physical Constants and Derived Quantities for use in Examinations

Speed of light	c	2.997×10^{8} m s^{-1}
Pressure	1 atm	1.013×10^{5} N m^{-2}
Avogadro constant	N_A	6.022×10^{23} $mo1^{-1}$
Boltzmann constant	k_B	1.380×10^{-23} J K^{-1}
Gas constant	$R = k_B N_A$	8.314 J K^{-1} mol^{-1}
	R	8.205×10^{-2} dm^3 atm $K^{-1}mol^{-1}$
Planck constant	h	6.626×10^{-34} J s
	$\hbar = h/2\pi$	1.054×10^{-34} J s
Atomic mass unit	m_u	1.660×10^{-27} kg
Mass of electron	m_e	9.109×10^{-31} kg
Mass of proton	m_p	1.672×10^{-27} kg
Elementary charge	e	1.602×10^{-19} C
Electron-Volt	eV	1.602×10^{-19} J
Faraday constant	$F = eN_A$	9.648×10^{4} C mol^{-1}
	RT/F at 25°C	25.693 mV
	2.3026RT/F at 25°C	59.159 mV
Debye-Hückel constant		
for water at 298.2 K	A	0.509 $mol^{-1/2}$ $kg^{1/2}$
Vacuum permittivity	$\varepsilon_0 = 1/c^2\mu_0$	8.854×10^{-12} J^{-1} C^2m^{-1}
	$4\pi\varepsilon_0$	1.112×10^{-10} J^{-1} C^2 m^{-1}
Bohr magneton	$\mu_B = e\hbar/2m_e$	9.274×10^{-24} J T^{-1}
Nuclear magneton	$\mu_N = e\hbar/2M_p$	5.050×10^{-27} J T^{-1}
Bohr radius	$a_0 = 4\pi\varepsilon_0\hbar^2/m_e e^2$	5.291×10^{-11} m
Rydberg Constant	$R_\infty = m_e e^4/8h^3 c\varepsilon_0^2$	1.097×10^{5} cm^{-1}