

Energy Equivalents

	J	kg	m^{-1}	Hz
1 J	$(1 \text{ J}) =$ 1 J	$(1 \text{ J})/c^2 =$ $1.112\ 650\ 056\dots \times 10^{-17} \text{ kg}$	$(1 \text{ J})/hc =$ $5.034\ 117\ 20(86) \times 10^{24} \text{ m}^{-1}$	$(1 \text{ J})/h =$ $1.509\ 190\ 37(26) \times 10^{33} \text{ Hz}$
1 kg	$(1 \text{ kg})c^2 =$ $8.987\ 551\ 787\dots \times 10^{16} \text{ J}$	$(1 \text{ kg}) =$ 1 kg	$(1 \text{ kg})c/h =$ $4.524\ 438\ 91(77) \times 10^{41} \text{ m}^{-1}$	$(1 \text{ kg})c^2/h =$ $1.356\ 392\ 66(23) \times 10^{50} \text{ Hz}$
1 m^{-1}	$(1 \text{ m}^{-1})hc =$ $1.986\ 445\ 61(34) \times 10^{-25} \text{ J}$	$(1 \text{ m}^{-1})h/c =$ $2.210\ 218\ 81(38) \times 10^{-42} \text{ kg}$	$(1 \text{ m}^{-1}) =$ 1 m^{-1}	$(1 \text{ m}^{-1})c =$ $299\ 792\ 458 \text{ Hz}$
1 Hz	$(1 \text{ Hz})h =$ $6.626\ 0693(11) \times 10^{-34} \text{ J}$	$(1 \text{ Hz})h/c^2 =$ $7.372\ 4964(13) \times 10^{-51} \text{ kg}$	$(1 \text{ Hz})/c =$ $3.335\ 640\ 951\dots \times 10^{-9} \text{ m}^{-1}$	$(1 \text{ Hz}) =$ 1 Hz
1 K	$(1 \text{ K})k =$ $1.380\ 6505(24) \times 10^{-23} \text{ J}$	$(1 \text{ K})k/c^2 =$ $1.536\ 1808(27) \times 10^{-40} \text{ kg}$	$(1 \text{ K})k/hc =$ $69.503\ 56(12) \text{ m}^{-1}$	$(1 \text{ K})k/h =$ $2.083\ 6644(36) \times 10^{10} \text{ Hz}$
1 eV	$(1 \text{ eV}) =$ $1.602\ 176\ 53(14) \times 10^{-19} \text{ J}$	$(1 \text{ eV})/c^2 =$ $1.782\ 661\ 81(15) \times 10^{-36} \text{ kg}$	$(1 \text{ eV})/hc =$ $8.065\ 544\ 45(69) \times 10^5 \text{ m}^{-1}$	$(1 \text{ eV})/h =$ $2.417\ 989\ 40(21) \times 10^{14} \text{ Hz}$
1 u	$(1 \text{ u})c^2 =$ $1.492\ 417\ 90(26) \times 10^{-10} \text{ J}$	$(1 \text{ u}) =$ $1.660\ 538\ 86(28) \times 10^{-27} \text{ kg}$	$(1 \text{ u})c/h =$ $7.513\ 006\ 608(50) \times 10^{14} \text{ m}^{-1}$	$(1 \text{ u})c^2/h =$ $2.252\ 342\ 718(15) \times 10^{23} \text{ Hz}$
1 E_{h}	$(1 E_{\text{h}}) =$ $4.359\ 744\ 17(75) \times 10^{-18} \text{ J}$	$(1 E_{\text{h}})/c^2 =$ $4.850\ 869\ 60(83) \times 10^{-35} \text{ kg}$	$(1 E_{\text{h}})/hc =$ $2.194\ 746\ 313\ 705(15) \times 10^7 \text{ m}^{-1}$	$(1 E_{\text{h}})/h =$ $6.579\ 683\ 920\ 721(44) \times 10^{15} \text{ Hz}$

Derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 2002 CODATA adjustment of the values of the constants; $1 \text{ eV} = (e/C) \text{ J}$, $1 \text{ u} = m_{\text{u}} = \frac{1}{12}m(^{12}\text{C}) = 10^{-3} \text{ kg mol}^{-1}/N_A$, and $E_{\text{h}} = 2R_{\infty}hc = \alpha^2 m_e c^2$ is the Hartree energy (hartree).

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	K	eV	u	E_h
1 J	$(1 \text{ J})/k = 7.242\,963(13) \times 10^{22} \text{ K}$	$(1 \text{ J}) = 6.241\,509\,47(53) \times 10^{18} \text{ eV}$	$(1 \text{ J})/c^2 = 6.700\,5361(11) \times 10^9 \text{ u}$	$(1 \text{ J}) = 2.293\,712\,57(39) \times 10^{17} E_h$
1 kg	$(1 \text{ kg})c^2/k = 6.509\,650(11) \times 10^{39} \text{ K}$	$(1 \text{ kg})c^2 = 5.609\,588\,96(48) \times 10^{35} \text{ eV}$	$(1 \text{ kg}) = 6.022\,1415(10) \times 10^{26} \text{ u}$	$(1 \text{ kg})c^2 = 2.061\,486\,05(35) \times 10^{34} E_h$
1 m ⁻¹	$(1 \text{ m}^{-1})hc/k = 1.438\,7752(25) \times 10^{-2} \text{ K}$	$(1 \text{ m}^{-1})hc = 1.239\,841\,91(11) \times 10^{-6} \text{ eV}$	$(1 \text{ m}^{-1})h/c = 1.331\,025\,0506(89) \times 10^{-15} \text{ u}$	$(1 \text{ m}^{-1})hc = 4.556\,335\,252\,760(30) \times 10^{-8} E_h$
1 Hz	$(1 \text{ Hz})h/k = 4.799\,2374(84) \times 10^{-11} \text{ K}$	$(1 \text{ Hz})h = 4.135\,667\,43(35) \times 10^{-15} \text{ eV}$	$(1 \text{ Hz})h/c^2 = 4.439\,821\,667(30) \times 10^{-24} \text{ u}$	$(1 \text{ Hz})h = 1.519\,829\,846\,006(10) \times 10^{-16} E_h$
1 K	$(1 \text{ K}) = 1 \text{ K}$	$(1 \text{ K})k = 8.617\,343(15) \times 10^{-5} \text{ eV}$	$(1 \text{ K})k/c^2 = 9.251\,098(16) \times 10^{-14} \text{ u}$	$(1 \text{ K})k = 3.166\,8153(55) \times 10^{-6} E_h$
1 eV	$(1 \text{ eV})/k = 1.160\,4505(20) \times 10^4 \text{ K}$	$(1 \text{ eV}) = 1 \text{ eV}$	$(1 \text{ eV})/c^2 = 1.073\,544\,171(92) \times 10^{-9} \text{ u}$	$(1 \text{ eV}) = 3.674\,932\,45(31) \times 10^{-2} E_h$
1 u	$(1 \text{ u})c^2/k = 1.080\,9527(19) \times 10^{13} \text{ K}$	$(1 \text{ u})c^2 = 931.494\,043(80) \times 10^6 \text{ eV}$	$(1 \text{ u}) = 1 \text{ u}$	$(1 \text{ u})c^2 = 3.423\,177\,686(23) \times 10^7 E_h$
1 E_h	$(1 E_h)/k = 3.157\,7465(55) \times 10^5 \text{ K}$	$(1 E_h) = 27.211\,3845(23) \text{ eV}$	$(1 E_h)/c^2 = 2.921\,262\,323(19) \times 10^{-8} \text{ u}$	$(1 E_h) = 1 E_h$

Derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 2002 CODATA adjustment of the values of the constants; $1 \text{ eV} = (e/C) \text{ J}$, $1 \text{ u} = m_u = \frac{1}{12}m(^{12}\text{C}) = 10^{-3} \text{ kg mol}^{-1}/N_A$, and $E_h = 2R_\infty hc = \alpha^2 m_e c^2$ is the Hartree energy (hartree).