Energy Equivalents

	Relevant unit			
	J	kg	m^{-1}	Hz
1 J	$(1\ \mathrm{J}) =$ $1\ \mathrm{J}$	$(1\ \mathrm{J})/c^2 =$ $1.112\,650\,056\ldots \times 10^{-17}$ kg	$(1\ \mathrm{J})/hc =$ $5.034\,117\,01(22) \times 10^{24}\ \mathrm{m}^{-1}$	$(1\ \mathrm{J})/h =$ $1.509\,190\,311(67) \times 10^{33}$ Hz
1 kg	$(1\ \mathrm{kg})c^2 =$ $8.987\,551\,787\ldots \times 10^{16}$ J	$(1\ \mathrm{kg}) =$ 1 kg	$(1\ \mathrm{kg})c/h =$ $4.524\,438\,73(20) \times 10^{41}\ \mathrm{m}^{-1}$	$(1\ \mathrm{kg})c^2/h =$ $1.356\,392\,608(60) \times 10^{50}$ Hz
1 m^{-1}	$(1\ \mathrm{m}^{-1})hc =$ $1.986\,445\,684(88) \times 10^{-25}$ J	$(1\ \mathrm{m}^{-1})h/c =$ $2.210\,218\,902(98) \times 10^{-42}$ kg	$(1\ \mathrm{m}^{-1}) =$ $1\ \mathrm{m}^{-1}$	$(1\ \mathrm{m}^{-1})c =$ $299\,792\,458$ Hz
1 Hz	$(1\ \mathrm{Hz})h =$ $6.626\,069\,57(29) \times 10^{-34}$ J	$(1\ \mathrm{Hz})h/c^2 =$ $7.372\,496\,68(33) \times 10^{-51}$ kg	$(1\ \mathrm{Hz})/c =$ $3.335\,640\,951\ldots \times 10^{-9}\ \mathrm{m}^{-1}$	$(1\ \mathrm{Hz}) =$ 1 Hz
1 K	$(1\ \mathrm{K})k =$ $1.380\,6488(13) \times 10^{-23}$ J	$(1\ \mathrm{K})k/c^2 =$ $1.536\,1790(14) \times 10^{-40}$ kg	$(1\ \mathrm{K})k/hc =$ $69.503\,476(63)\ \mathrm{m}^{-1}$	$(1\ \mathrm{K})k/h =$ $2.083\,6618(19) \times 10^{10}$ Hz
1 eV	$(1\ \mathrm{eV}) =$ $1.602\,176\,565(35) \times 10^{-19}$ J	$(1\ \mathrm{eV})/c^2 =$ $1.782\,661\,845(39) \times 10^{-36}$ kg	$(1\ \mathrm{eV})/hc =$ $8.065\,544\,29(18) \times 10^{5}\ \mathrm{m}^{-1}$	$(1\ \mathrm{eV})/h =$ $2.417\,989\,348(53) \times 10^{14}$ Hz
1 u	$(1\ \mathrm{u})c^2 =$ $1.492\,417\,954(66) \times 10^{-10}$ J	$(1\ \mathrm{u}) =$ $1.660\,538\,921(73) \times 10^{-27}$ kg	$(1\ \mathrm{u})c/h =$ $7.513\,006\,6042(53) \times 10^{14}\ \mathrm{m}^{-1}$	$(1\ \mathrm{u})c^2/h =$ $2.252\,342\,7168(16) \times 10^{23}$ Hz
1 E_h	$(1\ E_\mathrm{h}) =$ $4.359\,744\,34(19) \times 10^{-18}$ J	$(1\ E_\mathrm{h})/c^2 =$ $4.850\,869\,79(21) \times 10^{-35}$ kg	$(1\ E_\mathrm{h})/hc =$ $2.194\,746\,313\,708(11) \times 10^{7}\ \mathrm{m}^{-1}$	$(1\ E_\mathrm{h})/h =$ $6.579\,683\,920\,729(33) \times 10^{15}$ Hz

The values of some energy equivalents derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 2010 CODATA adjustment of the values of the constants; 1 eV $= (e/\mathrm{C})$ J, 1 u $= m_\mathrm{u} = \frac{1}{12}m(^{12}\mathrm{C}) = 10^{-3}$ kg mol$^{-1}/N_\mathrm{A}$, and $E_\mathrm{h} = 2R_\infty hc = \alpha^2 m_\mathrm{e} c^2$ is the Hartree energy (hartree).

Energy Equivalents

	Relevant unit			
	K	eV	u	E_h
1 J	(1 J)/k = $7.242\,9716(66) \times 10^{22}$ K	(1 J) = $6.241\,509\,34(14) \times 10^{18}$ eV	(1 J)/c^2 = $6.700\,535\,85(30) \times 10^{9}$ u	(1 J) = $2.293\,712\,48(10) \times 10^{17}$ E_h
1 kg	(1 kg)c^2/k = $6.509\,6582(59) \times 10^{39}$ K	(1 kg)c^2 = $5.609\,588\,85(12) \times 10^{35}$ eV	(1 kg) = $6.022\,141\,29(27) \times 10^{26}$ u	(1 kg)c^2 = $2.061\,485\,968(91) \times 10^{34}$ E_h
1 m^{-1}	(1 m^{-1})hc/k = $1.438\,7770(13) \times 10^{-2}$ K	(1 m^{-1})hc = $1.239\,841\,930(27) \times 10^{-6}$ eV	(1 m^{-1})h/c = $1.331\,025\,051\,20(94) \times 10^{-15}$ u	(1 m^{-1})hc = $4.556\,335\,252\,755(23) \times 10^{-8}$ E_h
1 Hz	(1 Hz)h/k = $4.799\,2434(44) \times 10^{-11}$ K	(1 Hz)h = $4.135\,667\,516(91) \times 10^{-15}$ eV	(1 Hz)h/c^2 = $4.439\,821\,6689(31) \times 10^{-24}$ u	(1 Hz)h = $1.519\,829\,846\,0045(76) \times 10^{-16}$ E_h
1 K	(1 K) = 1 K	(1 K)k = $8.617\,3324(78) \times 10^{-5}$ eV	(1 K)k/c^2 = $9.251\,0868(84) \times 10^{-14}$ u	(1 K)k = $3.166\,8114(29) \times 10^{-6}$ E_h
1 eV	(1 eV)/k = $1.160\,4519(11) \times 10^{4}$ K	(1 eV) = 1 eV	(1 eV)/c^2 = $1.073\,544\,150(24) \times 10^{-9}$ u	(1 eV) = $3.674\,932\,379(81) \times 10^{-2}$ E_h
1 u	(1 u)c^2/k = $1.080\,954\,08(98) \times 10^{13}$ K	(1 u)c^2 = $931.494\,061(21) \times 10^{6}$ eV	(1 u) = 1 u	(1 u)c^2 = $3.423\,177\,6845(24) \times 10^{7}$ E_h
1 E_h	(1 E_h)/k = $3.157\,7504(29) \times 10^{5}$ K	(1 E_h) = $27.211\,385\,05(60)$ eV	(1 E_h)/c^2 = $2.921\,262\,3246(21) \times 10^{-8}$ u	(1 E_h) = 1 E_h

The values of some energy equivalents derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 2010 CODATA adjustment of the values of the constants; 1 eV = (e/C) J, 1 u = $m_\mathrm{u} = \frac{1}{12}m(^{12}\mathrm{C}) = 10^{-3}$ kg mol$^{-1}/N_\mathrm{A}$, and $E_\mathrm{h} = 2R_\infty hc = \alpha^2 m_\mathrm{e} c^2$ is the Hartree energy (hartree).