Energy Equivalents

	J	kg	m^{-1}	Hz
1 J	$(1\ \text{J}) =$ $1\ \text{J}$	$(1\ \text{J})/c^2 =$ $1.112\,650\,056 \times 10^{-17}\ \text{kg}$	$(1\ \text{J})/hc =$ $5.034\,117\,62(39) \times 10^{24}\ \text{m}^{-1}$	$(1\ \text{J})/h =$ $1.509\,190\,50(12) \times 10^{33}\ \text{Hz}$
1 kg	$(1\ \text{kg})c^2 =$ $8.987\,551\,787 \times 10^{16}\ \text{J}$	$(1\ \text{kg}) =$ $1\ \text{kg}$	$(1\ \text{kg})c/h =$ $4.524\,439\,29(35) \times 10^{41}\ \text{m}^{-1}$	$(1\ \text{kg})c^2/h =$ $1.356\,392\,77(11) \times 10^{50}\ \text{Hz}$
1 m^{-1}	$(1\ \text{m}^{-1})hc =$ $1.986\,445\,44(16) \times 10^{-25}\ \text{J}$	$(1\ \text{m}^{-1})h/c =$ $2.210\,218\,63(17) \times 10^{-42}\ \text{kg}$	$(1\ \text{m}^{-1}) =$ $1\ \text{m}^{-1}$	$(1\ \text{m}^{-1})c =$ $299\,792\,458\ \text{Hz}$
1 Hz	$(1\ \text{Hz})h =$ $6.626\,068\,76(52) \times 10^{-34}\ \text{J}$	$(1\ \text{Hz})h/c^2 =$ $7.372\,495\,78(58) \times 10^{-51}\ \text{kg}$	$(1\ \text{Hz})/c =$ $3.335\,640\,952 \times 10^{-9}\ \text{m}^{-1}$	$(1\ \text{Hz}) =$ $1\ \text{Hz}$
1 K	$(1\ \text{K})k =$ $1.380\,6503(24) \times 10^{-23}\ \text{J}$	$(1\ \text{K})k/c^2 =$ $1.536\,1807(27) \times 10^{-40}\ \text{kg}$	$(1\ \text{K})k/hc =$ $69.503\,56(12)\ \text{m}^{-1}$	$(1\ \text{K})k/h =$ $2.083\,6644(36) \times 10^{10}\ \text{Hz}$
1 eV	$(1\ \text{eV}) =$ $1.602\,176\,462(63) \times 10^{-19}\ \text{J}$	$(1\ \text{eV})/c^2 =$ $1.782\,661\,731(70) \times 10^{-36}\ \text{kg}$	$(1\ \text{eV})/hc =$ $8.065\,544\,77(32) \times 10^{5}\ \text{m}^{-1}$	$(1\ \text{eV})/h =$ $2.417\,989\,491(95) \times 10^{14}\ \text{Hz}$
1 u	$(1\ \text{u})c^2 =$ $1.492\,417\,78(12) \times 10^{-10}\ \text{J}$	$(1\ \text{u}) =$ $1.660\,538\,73(13) \times 10^{-27}\ \text{kg}$	$(1\ \text{u})c/h =$ $7.513\,006\,658(57) \times 10^{14}\ \text{m}^{-1}$	$(1\ \text{u})c^2/h =$ $2.252\,342\,733(17) \times 10^{23}\ \text{Hz}$
1 E_h	$(1\ E_\text{h}) =$ $4.359\,743\,81(34) \times 10^{-18}\ \text{J}$	$(1\ E_\text{h})/c^2 =$ $4.850\,869\,19(38) \times 10^{-35}\ \text{kg}$	$(1\ E_\text{h})/hc =$ $2.194\,746\,313\,710(17) \times 10^{7}\ \text{m}^{-1}$	$(1\ E_\text{h})/h =$ $6.579\,683\,920\,735(50) \times 10^{15}\ \text{Hz}$

Derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 1998 CODATA adjustment of the values of the constants;
1 eV = (e/C) J, 1 u = $m_\text{u} = \frac{1}{12}m(^{12}\text{C}) = 10^{-3}\ \text{kg mol}^{-1}/N_\text{A}$, and $E_\text{h} = 2R_\infty hc = \alpha^2 m_\text{e} c^2$ is the Hartree energy (hartree).

Source: Peter J. Mohr and Barry N. Taylor, CODATA Recommended Values of the Fundamental Physical Constants: 1998, *Journal of Physical and Chemical Reference Data*, Vol. 28, No. 6, 1999 and *Reviews of Modern Physics*, Vol. 72, No. 2, 2000.

Energy Equivalents

	K	eV	u	E_h
1 J	$(1\ \text{J})/k =$ $7.242\,964(13) \times 10^{22}$ K	$(1\ \text{J}) =$ $6.241\,509\,74(24) \times 10^{18}$ eV	$(1\ \text{J})/c^2 =$ $6.700\,536\,62(53) \times 10^{9}$ u	$(1\ \text{J}) =$ $2.293\,712\,76(18) \times 10^{17}\ E_h$
1 kg	$(1\ \text{kg})c^2/k =$ $6.509\,651(11) \times 10^{39}$ K	$(1\ \text{kg})c^2 =$ $5.609\,589\,21(22) \times 10^{35}$ eV	$(1\ \text{kg}) =$ $6.022\,141\,99(47) \times 10^{26}$ u	$(1\ \text{kg})c^2 =$ $2.061\,486\,22(16) \times 10^{34}\ E_h$
1 m^{-1}	$(1\ \text{m}^{-1})hc/k =$ $1.438\,7752(25) \times 10^{-2}$ K	$(1\ \text{m}^{-1})hc =$ $1.239\,841\,857(49) \times 10^{-6}$ eV	$(1\ \text{m}^{-1})h/c =$ $1.331\,025\,042(10) \times 10^{-15}$ u	$(1\ \text{m}^{-1})hc =$ $4.556\,335\,252\,750(35) \times 10^{-8}\ E_h$
1 Hz	$(1\ \text{Hz})h/k =$ $4.799\,2374(84) \times 10^{-11}$ K	$(1\ \text{Hz})h =$ $4.135\,667\,27(16) \times 10^{-15}$ eV	$(1\ \text{Hz})h/c^2 =$ $4.439\,821\,637(34) \times 10^{-24}$ u	$(1\ \text{Hz})h =$ $1.519\,829\,846\,003(12) \times 10^{-16}\ E_h$
1 K	$(1\ \text{K}) =$ 1 K	$(1\ \text{K})k =$ $8.617\,342(15) \times 10^{-5}$ eV	$(1\ \text{K})k/c^2 =$ $9.251\,098(16) \times 10^{-14}$ u	$(1\ \text{K})k =$ $3.166\,8153(55) \times 10^{-6}\ E_h$
1 eV	$(1\ \text{eV})/k =$ $1.160\,4506(20) \times 10^{4}$ K	$(1\ \text{eV}) =$ 1 eV	$(1\ \text{eV})/c^2 =$ $1.073\,544\,206(43) \times 10^{-9}$ u	$(1\ \text{eV}) =$ $3.674\,932\,60(14) \times 10^{-2}\ E_h$
1 u	$(1\ \text{u})c^2/k =$ $1.080\,9528(19) \times 10^{13}$ K	$(1\ \text{u})c^2 =$ $931.494\,013(37) \times 10^{6}$ eV	$(1\ \text{u}) =$ 1 u	$(1\ \text{u})c^2 =$ $3.423\,177\,709(26) \times 10^{7}\ E_h$
1 E_h	$(1\ E_h)/k =$ $3.157\,7465(55) \times 10^{5}$ K	$(1\ E_h) =$ $27.211\,3834(11)$ eV	$(1\ E_h)/c^2 =$ $2.921\,262\,304(22) \times 10^{-8}$ u	$(1\ E_h) =$ $1\ E_h$

Derived from the relations $E = mc^2 = hc/\lambda = h\nu = kT$, and based on the 1998 CODATA adjustment of the values of the constants;
1 eV = (e/C) J, 1 u = $m_u = \frac{1}{12}m(^{12}\text{C}) = 10^{-3}$ kg mol^{-1}/N_A, and $E_h = 2R_\infty hc = \alpha^2 m_e c^2$ is the Hartree energy (hartree).

Source: Peter J. Mohr and Barry N. Taylor, CODATA Recommended Values of the Fundamental Physical Constants: 1998, *Journal of Physical and Chemical Reference Data*, Vol. 28, No. 6, 1999 and *Reviews of Modern Physics*, Vol. 72, No. 2, 2000.