List of conversion factors for neutron scattering

The table is read horizontally, e.g. **l = 1Å** corresponds to **v = 3956 m/s** or to **E = 81.807 meV**, etc.

		l	***k***	**v**	**T**	***ν***	***w***	***ν*/c**	**E**	
		Å	1/Å	m/s	K	THz	rad/s	1/cm	meV	kJ/mol
Wave-length l	1 Å	1	6.28318	3956	949.3	19.78	1.243×10^{14}	659.8	81.805	7.893
Wave-vector *k*	1/Å	6.28318	1	629.6	24.046	0.5010	3.148×10^{12}	16.71	2.072	0.1999
Velo-city v	1 m/s	3956	1.589×10^{-3}	1	6.066×10^{5}	1.265×10^{-6}	7.948×10^{6}	4.216×10^{-5}	5.227×10^{-6}	5.044×10^{-7}
Tempe-rature T	1 K	30.81	0.2039	128.4	1	0.02084	1.309×10^{11}	0.6950	8.617×10^{-2}	8.314×10^{-3}
Fre-quency *ν*	1 THz	4.4475	1.4127	889.5	48.00	1	6.283×10^{12}	33.36	4.136	0.3990
Angul. frequ. *w*	1 rad/s	11.15×10^{6}	5.64×10^{-7}	3.549×10^{-4}	7.64×10^{-12}	0.1592×10^{-12}	1	5.309×10^{-12}	6.582×10^{-13}	6.351×10^{-14}
Wave-number *ν*/c	1/cm	25.69	0.2446	154.01	1.439	0.02998	1.884×10^{11}	1	0.1240	1.196×10^{-2}
Energy E	1 meV	9.045	0.6947	437.4	11.604	0.2418	1.519×10^{12}	8.0655	1	0.0965
	1 kJ/mol	2.809	2.237	1.408×10^{3}	120.3	2.506	1.575×10^{13}	83.59	10.36	1

Wavelength: l ; $E = h^2/2ml^2$ $l \sim 1/\sqrt{E}$ **Temperature T ;** $E = kB\,T$ $T \sim E$

Velocity: v ; $E = \frac{1}{2}\,mv^2$ $v \sim \sqrt{E}$ **Frequency** ν ; $\nu = w/2\pi$ $\nu \sim E$

n Wavevector: k ; $k = 2\pi/l$ $k \sim \sqrt{E}$ **Angular frequency** w ; $E = H\,w$ $w \sim E$

$m=1.674954\cdot10^{-24}$ g; $H=h/2\pi$, $h=6.626176\cdot10^{-34}$ Js **Optical wavenumber** ν/c $\nu/c \sim E$

(source: M. Bée, "Quasielastic Neutron scattering", Adam Hilger, Bristol and Philadelphia, 1988)

Typical values for cold and thermal neutron ranges

	Energy	Wavelength	n-Wavevector	Velocity	Frequency
cold neutrons:	E = 1 meV	l = 9.0446 Å	k = 0.6947 1/Å	v = 437 m/s	ν = 0.2418 THz
	E = 5 meV	l = 4.0449 Å	k = 1.5534 1/Å	v = 978 m/s	ν = 1.2090 THz
thermal neutrons:	E = 25 meV	l = 1.8089 Å	k = 3.4734 1/Å	v = 2187 m/s	ν = 6.045 THz
	E = 50 meV	l = 1.2791 Å	k = 4.9122 1/Å	v = 3093 m/s	ν = 12.090 THz

Monochromator d-spacings

Monochromator		dhkl
Germanium	(311)	1.71 Å
Copper	(220)	1.28 Å
Graphite	(002)	3.35 Å
Heussler (Cu2MnAl)	(111)	3.43 Å
Fe3Si	(111)	3.27 Å

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