

# Neutron Cross-Sections

NEW IN DAVE

**Molecular weight, number density, and scattering and absorption cross sections for PbGeO3**

Options Information pdf reader

Select a chemical formula...  
  
 or type in a new formula

Density (g/cc)  Number density   
 Packing fraction  Wavelength (Å)

Molecular weight	327.837	Wavelength (Å)	4.80000
Number density (10 <sup>24</sup> /cm <sup>3</sup> )	0.0124911	Packed number density (10 <sup>24</sup> /cm <sup>3</sup> )	0.0124911
Mass density (g/cm <sup>3</sup> )	6.80000	Packed mass density (g/cm <sup>3</sup> )	6.80000
Scattering cross section (b)	32.4140	Scattering cross section (cm <sup>-1</sup> )	0.404888
Absorption cross section (b)	6.33122	Absorption cross section (cm <sup>-1</sup> )	0.0790842
Total cross section (b)	38.7452	Total cross section (cm <sup>-1</sup> )	0.483972

**DISCLAIMER**  
 Within this application total scattering cross sections are obtained by summing the total (coherent plus incoherent) bound atom scattering cross sections of the constituent atoms. (There is also an option to exclude the coherent scattering from the total scattering cross section.) This procedure is never completely correct. In general the scattering cross section, which is the double differential scattering cross section integrated over all directions and all final energies, is a function, inter alia, of the incident neutron energy, the temperature of the material, the morphology of the material (e.g. powder, amorphous, single crystal etc), in some cases the orientation of the material magnetic structures of the material. (Magnetic scattering is not taken into consideration, the procedure is probably (possibly) justified. For hydrogenous materials it should be used.) Total absorption cross sections are obtained by summing the absorption cross sections, extent that the cross section goes as 1/v this is OK, but for nuclides that have an n,γ neutron energies, e.g. <sup>113</sup>Cd, it is not correct.

Calculate the cross-section for your sample using intuitive chemical formula syntax

**Unit cell volume and number density calculator**

a, b, c  alpha, beta, gamma

Molecules in unit cell  Crystal system (probably)

Unit cell volume (Å<sup>3</sup>)  Vol. per molecule (Å<sup>3</sup>)

Molecules/cm<sup>3</sup>  Moles/cm<sup>3</sup>

Look up cross-sections, atomic weights and abundances for all elements and isotopes from H to Cm

**Atomic weights and neutron scattering and absorption cross sections**

Select an element to be displayed  Enter the neutron wavelength (Å)

Check the quantities to be displayed

At wt  At no.  Abund.  b\_coh  b\_inc  Sig\_c  Sig\_l  Sig\_S  Sig\_A  Sig\_T

	At wt	At no.	Abund.	b_coh	b_inc	Sig_c	Sig_l	Sig_S	Sig_A	Sig_T
nat-H	1.008	1	...	-3.7390	...	1.7568	80.26	82.02	0.3326	82.353
1H	1.008	1	99.985	-3.7406	25.274	1.7583	80.27	82.03	0.3326	82.363
2H	2.014	1	0.015	6.671	4.04	5.532	2.05	7.64	0.000519	7.641
3H	3.016	1	(12.32 a)	4.792	-1.04	2.89	0.14	3.03	0	3.030
nat-He	4.003	2	...	3.26(3)	...	1.34	0	1.34	0.00747	1.347
3He	3.016	2	0.00014	3.74-1.483<b>b</b>/2.5+2.568<b>b</b>/%	...	4.42	1.6	6	5333(7.)	5339.000
4He	4.003	2	99.99986	3.26	0	1.34	0	1.34	0	1.340
nat-Li	6.941	3	...	-1.90	...	0.454	0.92	1.37	70.5	71.870
6Li	6.015	3	7.5	2.00-0.261<b>b</b>/1.89+0.26<b>b</b>/%	...	0.51	0.46	0.97	940(4.)	940.970
7Li	7.016	3	92.5	-2.22	-2.49	0.619	0.78	1.4	0.0454	1.445
nat-Be	9.012	4	100	7.79	0.12	7.63	0.0018	7.63	0.0076	7.638
nat-B	10.811	5	...	3.30-0.213<b>b</b>/%	...	3.54	1.7	5.24	767(8.)	772.240
10B	10.013	5	20	0.1-1.066<b>b</b>/4.7+1.231<b>b</b>/%	...	0.144	3	3.1	3835(8.)	3838.100
11B	11.009	5	80	6.65	-1.3	5.56	0.21	5.77	0.0055	5.775
nat-C	12.011	6	...	6.6460	...	5.551	0.001	5.551	0.0035	5.555
12C	12.000	6	98.9	6.6511	0	5.559	0	5.559	0.00353	5.563

- Calculate neutron scattering, absorption, and total macroscopic removal cross-sections for your sample
- Simple intuitive chemical formula entry: e.g. CH<sub>4</sub>, <sup>3</sup>He, Fe<sub>10</sub>(OCD<sub>3</sub>)<sub>20</sub>(C<sub>2</sub>D<sub>2</sub>O<sub>2</sub>CI)<sub>10</sub>
- Adjust sample parameters such as wavelength, packing fraction and number density to see effects on cross-sections

- Calculate molecular number density using crystallographic information and use results in the cross-section calculation
- Atomic weights and abundances listed in the cross-sections table
- Also available as a standalone application for use with the IDL Virtual Machine