

Total Neutron Cross-Section and Transmission Simulation for Poly- & Mono-Magnesium and Zirconium Crystals

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The present study deals with the design and validation of a computer code "HEXA_FILTERS" written in "FORTRAN-77" programming language and used to carry out the calculation of the total cross-sections of Mg and Zr having poly or mono-crystalline form as a function of neutron energy at room (R.T.) and liquid nitrogen (L.N.) temperatures.

An overall agreement is indicated between the calculated neutron cross-sections and experimental data. Calculation shows that 20 cm thick polycrystalline Mg cooled at liquid nitrogen temperature was found to be a good filter for neutron wavelengths longer than 0.56 nm. While 15 cm of Zr, with much less transmission, for neutrons with wavelengths longer than 0.56 nm. It was also found that 10 cm of Mg and Zr thick mono-crystals cut along their (0 0 2) plane, with 0.3° FWHM on the mosaic spread and cooled at L.N., are a good thermal neutron filter, with high effect-to-noise ratio.