

Neutron Spectrum & Cross sections

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1 Quiz

1.1 Questions

- Determine the change in lethargy when the neutron energy is changed from 100 keV to 40 keV.
- Classify neutron energy spectrum into different regions.
- Which one of the following represents the range of continuum region?

(a) $0.001 < E_n < 25$ MeV	(b) $0.1 < E_n < 25$ MeV
(c) $0.01 < E_n < 25$ MeV	(d) $1 < E_n < 25$ MeV
- Write the relationship between cross section and neutron energy in thermal or low-energy region.
- Write the formula to determine average cross section across a range of neutron energies.
- Which among the following fuel categories has the highest relative neutron flux per unit lethargy at low neutron energies?

(a) metals	(b) metal oxides	(c) metal carbides
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1.2 Answers

- Change in lethargy is given by

$$\Delta u = u_1 - u_2 = \ln\left(\frac{E_2}{E_1}\right) = \ln\left(\frac{100}{40}\right) = 0.916$$

- (i) Low energy region; (ii) resonance region & (iii) continuum region
- (c) $0.01 < E_n < 25$ MeV
- $\sigma \propto \frac{1}{\sqrt{E}}$
- $\sigma = \frac{\int \sigma(E)\phi(E)dE}{\int \phi(E)dE}$
- (b) metal oxides