

Universal curve of G_{th} – Formulae

E. Martinho, J. Salgado, I.F. Gonçalves: *Universal curve of thermal neutron self-shielding factors in foils, wires, spheres and cylinders*. Journal of Radioanalytical and Nuclear Chemistry **261** (2004) 637-643

$$G_{th}(z) = \frac{1}{1 + \left(\frac{z}{1.029}\right)^{1.009}}$$

with

$$z = y \Sigma_t \left(\frac{\Sigma_a}{\Sigma_t}\right)^{0.85}$$

where y is given by:

Geometry <i>(dimension)</i>	y <i>(cm)</i>
Foils <i>(thickness = t)</i>	$y = 1.5 t$
Wires <i>(radius = R)</i>	$y = 2 R$
Spheres <i>(radius = R)</i>	$y = R$
Cylinders <i>(radius = R; height = h)</i> $(1 \leq h/R \leq 3)$	$y = 1.6 \frac{Rh}{R+h}$

Σ_t and Σ_a are, respectively, the total and absorption macroscopic cross-sections averaged over the thermal neutron spectrum.

Note: The self-shielding factor for 2200 m/s neutrons can be estimated by using the corresponding cross sections in the calculation of the variable z .