ChE 891/2

Experimental Methods in Nanotechnology

Homework 8
Due 9 April 2008

1. The coherent neutron scattering length density of hydrogen in nature is listed as -3.7390 fm (1 fm = 10^{-15} m), however, we know that pure ^{1}H has a scattering length of -3.7406 fm, why is there a difference? Include in your description numerical calculations. Also, what does it mean when the scattering length is negative?

2. Plot the coherent scattering length for both neutron and x-ray scattering for the first 25 elements. Can you explain the general trends.

3. Find the typical wavelengths for neutrons from the literature and report your results. Also, find the flux for various neutron sources around the World.

4. Determine if neutrons can harm samples.

Please give the references to any archival journal or book in your homework solution.