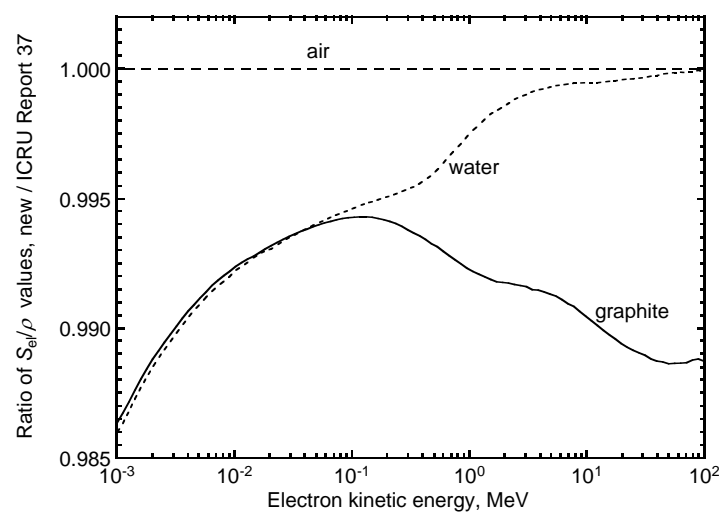


Density-effect files for PEGS4

The attached files for the density effect in the electronic stopping powers of electrons or positrons in air, graphite and water have been excerpted (and expanded by log-log interpolation) from the data tables in the forthcoming ICRU report "Key data for ionizing-radiation dosimetry: measurement standards and applications". Draft v14e of January 2016 has been used.

The mean excitation energies of graphite and water have been changed to 81 eV and 78 eV, respectively. The value for air remains unchanged (85.7 eV).

When the two quantities are used to calculate S_{el}/ρ and the new values are compared with ICRU-37 data, there are mostly small, but not insignificant changes in the values for water, especially at low energies as can be seen in the figure. Changes in the values for graphite can be of particular importance as there are substantial differences in the entire energy range. No changes occur for air.



Note the special case of graphite, for which the density effect δ is evaluated at the crystallite density of 2.265 g/cm^3 , and so will the electronic stopping powers. In the density-effect file, however, the **true mass density** of the graphite being simulated must be inserted in the second line (without changing the δ values), as this is the value taken to build the relevant PEGS4 data file. In the attached file it has been set at $\rho=1.700 \text{ g/cm}^3$ but as is well-known it may vary between about 1.7 and 1.8 g/cm^3 .

carbon_graphite (denseff for 2.265 g_cm3)

113 81.0 1.700 1

6 1.000

1.00E-03, 2.470E-04 1.25E-03, 3.094E-04 1.50E-03, 3.719E-04 1.75E-03, 4.348E-04

2.00E-03, 4.978E-04 2.50E-03, 6.248E-04 3.00E-03, 7.522E-04 3.50E-03, 8.809E-04

4.00E-03, 1.010E-03 4.50E-03, 1.141E-03 5.00E-03, 1.272E-03 5.50E-03, 1.404E-03

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