

Definition of R-value in LEXFOR

(N. Otsuka, O. Schwerer, 2016-03-11, Memo CP-D/895)

It is not clear from the current description of the R-value in LEXFOR whether the fissioning system of the neutron field of interest and reference field should be the same. It can be different, and we propose a new description based on Ref.[1]:

Current description

An R-value is a ratio of measurement results for 2 different energies or energy spectra (one of which is considered to be a monitor reaction), each of which is relative to the same standard reaction.

REACTION Coding: coded as an explicit ratio, followed by an entry under RESULT with the code RVAL.

Example:

```
REACTION    ( ( (92-U-238 (N, F) ELEM/MASS, CUM, FY, , FIS) /
              (92-U-238 (N, F) 42-MO-99, CUM, FY, , FIS) ) //
              ( (92-U-238 (N, F) ELEM/MASS, CUM, FY, , MXW) )
              (92-U-238 (N, F) 42-MO-99, CUM, FY, , MXW) ) )
RESULT      (RVAL)
```

New description

The R-value is a double ratio of fission product count rates. The numerator is the activity of any fission product due to fissions in any fissionable material and neutron energy relative to the activity of a reference fission product (e.g., ⁹⁹Mo) from the same material at the same energy. The denominator is the activity ratio of the same two fission products in a reference fissioning isotope (e.g., ²³⁶U) and neutron spectrum (e.g., neutrons in the room temperature).

REACTION Coding: coded as an explicit ratio, followed by an entry under RESULT with the code RVAL.

Example:

```
REACTION    ( ( (94-PU-239 (N, F) 55-CS-137, CUM, FY, , FIS) /
              (94-PU-239 (N, F) 42-MO-99, CUM, FY, , FIS) ) //
              ( (92-U-235 (N, F) 55-CS-137, CUM, FY, , MXW) )
              (92-U-235 (N, F) 42-MO-99, CUM, FY, , MXW) ) )
RESULT      (RVAL)

REACTION    ( ( (92-U-235 (N, F) ELEM/MASS, CUM, FY, , FIS) /
              (92-U-235 (N, F) 42-MO-99, CUM, FY, , FIS) ) //
              ( (92-U-235 (N, F) ELEM/MASS, CUM, FY, , MXW) )
              (92-U-235 (N, F) 42-MO-99, CUM, FY, , MXW) ) )
RESULT      (RVAL)
```

Reference

H.D. Selby et al., Nucl. Data Sheets **111**(2010)2891.