

File

Memo CP-D/128

1984-05-03

To: Distribution

From: M. Lammer and H.D. Lemmel
[Handwritten signatures]

Subject: Delayed Neutron Emission Probability

Reference: Memo CP-C/118

In the proposal of Memo CP-D/118, 2 physics quantities are confused, namely:

- 1) The delayed-neutron emission probability or Pn-value, which depends only on the decay properties of the delayed-neutron precursor and the neutron binding energy of its daughter (see illustration on first page of LEXFOR entry on delayed fission neutrons). Hence, the Pn-value is a decay quantity and independent of the way of formation of the delayed neutron precursor.
- 2) The partial delayed neutron yield (whose coding has been defined in LEXFOR), associated with an individual precursor, is the product of its cumulative fission yield and the Pn-value, and therefore dependent on the fission reaction through which the precursor is formed.

Clearance: J.J. Schmidt *[Handwritten signature]*

Distribution:

S. Pearlstein, NNDC
N. Tubbs, NEA-DB
V.N. Manokhin, CJD
F.E. Chukreev, CAJaD
A. Hashizume, RIKEN
B.S. Ishkanov, CDFE
H. Tanaka, Study Group

NDS: D.E. Cullen
D. Gandarias Gruz
M. Lammer
H.D. Lemmel
K. Okamoto
M. Oshomuvwe
V. Pronyaev
J.J. Schmidt
O. Schwerer
M. Seits
3 spare copies

In the proposed LEXFOR entry of Memo CP-C/118 both terms are used for the same quantity. Furthermore, there seems to be an error in CP-C/118 page 1, where two different quantity codes with the same explanation are proposed to be added to Dict. 36.

The coding of Pn values in EXFOR and the corresponding LEXFOR has already been proposed in Memo 4C-3/123 (page 3, item 5), but was, at that time, rejected in Memo 4C-1/61.

Although decay quantities are not the primary scope of EXFOR, EXFOR does contain a few decay quantities (such as spontaneous fission yields) if these are closely related to reaction data. We therefore support the idea of coding Pn values in EXFOR and submit the following proposal.

- Addition of the particle code B- in dictionary 29:
B- (BETA - PARTICLE)
- Addition of the code PN in dictionary 32
PN PN-VALUE or DELAYED NEUTRON EMISSION PROBABILITY
- Addition of the following quantity code to dictionary 36 (under "special quantities for fission?"):
,PN NO DELAYED NEUTRON EMISSION PROBABILITY

Proposed LEXFOR entry:

Delayed neutron emission probability (Pn-value)

Definition: Neutron yield per beta decay for a given precursor nucleus.

Reaction coding: $(Z-S-A(O,B-))Z'-S'-A, ,PN$

Units: NO-DIM. If given in percent, values to be entered in EXFOR must be divided by 100 to convert them into a fraction.

The precursor nucleus Z-S-A before beta-decay is coded in the target field. The neutron-emitting daughter nucleus Z'-S'-A is coded in the reaction-product field.

The delayed neutron emission probability is a decay quantity of the fission product nuclei independent of the fissioning target nucleus. It is related to the following fission yield data by

$$P_n = \frac{\text{absolute delayed neutron yield}}{\text{cumulative yield}}$$

$$= ((92-U-235(N,F)Z-S-A,DL/PAR,NU)/ \\ (92-U-235(N,F)Z-S-A,CUM,FY))$$

where Z-S-A is that fission product nucleus (= precursor nucleus) which is coded in the target field of Pn.

We propose to discuss the matter at the forthcoming technical NRDC Meeting.