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Memo CP-C/333

DATE: January 16, 2004
TO: Distribution
FROM: V. McLane
SUBJECT: Quasi-metastable states (CP-C/331, CP-D/378)

I agree with Otto's comments with the following clarification. The quasi-isomeric state data are the result of activation measurements, so what is measured is the half-life and decay radiations. If the level energy is given, it is only additional information (similar to other metastable states). Therefore, the heading LVL, and others of that type may be used, but not E-LVL. Conversely, if the data are not the result of an activation measurement, this formalism should not be used. Half-life, in this case, is additional information and may be given in free text as before.

There has been no agreement to allow LVL, LVL-INI, and LVL-FIN to be entered under LEVEL-PROP. The rules for which headings can be used are strictly put down in the Manual. Do we really need these under LEVEL-PROP since they are, in any case, only additional information, and most likely taken from another reference? In my opinion, when the level properties are taken from, *e.g.*, Table of Isotopes, and are simply additional information, that is, not needed to identify the level, this keyword should not be used. (We are not in the nuclear structure compilation business).

An EXFOR Manual update, and a LEXFOR update for Isomeric State follows. I will update partial reactions accordingly.

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Updates to LEXFOR entry on Isomeric States

Definition: An isomeric state is defined as a long-lived energy state, where long-lived is, generally, accepted as having a half-life greater than ~0.1 second.

A *metastable state* is an excited state having a half-life of the order of 0.1 seconds or longer. The term ‘isomeric states’ refers to the ground and all known metastable states.

Add at end of entry

Quasi-metastable states (metastable states with a measurable half-life less than 0.1 seconds.

When activation data are measured for quasi-metastable states, that is, the half-life and decay radiations are measured for the level, the excited state is specified using an isomer extension of the type L, L1, *etc.*, in the isomer code in REACTION subfield 4. The significance of the extension is simply to link the levels with the decay data, and would be significant only within a given data set.

Examples:

BIB	
REACTION	1 (39-Y-89(N,2N)39-Y-88-L1,,SIG)
	2 (39-Y-89(N,2N)39-Y-88-L2,,SIG)
	G (39-Y-89(N,2N)39-Y-88-G,,SIG)
SAMPLE	99.99% enriched Y2O3 sample.
DECAY-DATA1	(39-Y-88-L1,320.MICROSEC,DG,392.7)
	2 (39-Y-88-L2,14.6MSEC,DG,232.2,,DG,442.8)
	G (39-Y-88-G,107.D,DG,898.,,DG,1836.)
ENDBIB	

BIB	
REACTION	(81-TL-203(N,2N)81-TL-202-L/G,,SIG/RAT)
SAMPLE	99.99% enriched TlCl sample.
DECAY-DATA	(81-TL-202-L,536.MICROSEC,DG,459.6,,DG,490.7)
	(81-TL-202-G,12.5D,DG,439.7,,DG,969.6)
ENDBIB	

Update to EXFOR Manual Chapter 6.

Coding of nuclides and compounds

Nuclides appear in the coding of many keywords. The general code format is Z-S-A-X, where:

- Z is the charge number; up to 3 digits, no leading zeros
- S is the element symbol; 1 or 2 characters (Dictionary 8)
- A is the mass number; up to 3 digits, no leading zeroes. A single zero denotes natural isotopic composition (limited to special cases as given under the specific keyword).
- X is an isomer code denoting the isomeric state (this subfield may be omitted)
X may have the following values:
 - G for ground state (of a nucleus which has a metastable state)
 - M if only one metastable state is regarded
 - M1 for the first metastable state
 - M2 for the second, *etc.*
 - T for sum of all isomers (limited to use within an isomeric ratio in SF4 of the reaction string)
 - L if only one quasi-metastable state is regarded
 - L1 for the first quasi-metastable state, *etc.*