

Dictionary Restructuring

1. Single particle dictionary proposal, CP-C/287
2. Reform of Nuclides Dictionary 27, CP-C/303, CP-D/338, CP-C/301, CP-A/124

(Minor modifications by NDS are in *bold italics*.)

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Memo CP-C/287

DATE: June 28, 2001
TO: Distribution
FROM: V. McLane
SUBJECT: Single particle dictionary proposal

As discussed at the NRDC Technical meeting, I am submitting the following proposal for the combining of the EXFOR particle dictionaries into one dictionary. (This proposal may look suspiciously like the current Archive Dictionaries).

Merge EXFOR dictionaries *13 (for BIB keywords other than REACTION)*, *28 (incident particles)*, *29 (Product particles)*, and *33 (particle considered)* into a complete particle dictionary: Dictionary 33. All codes that exist in any of the dictionaries will be included in the combined dictionary. Add allowed subfield flags (similar to Dictionary 27). The format of the dictionary would be as follows.

Dictionary 33: PARTICLES

Column	12-15	Allowed use flags
12		D: BIB keyword other than REACTION (<i>PART-DET, RAD-DET, DECAY-DATA, DECAY-MON, EN-SEC</i>)
13	2:	REACTION SF2
14	3:	REACTION SF3
15	7:	REACTION SF7

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Memo CP-C/303

DATE: May 3, 2002
TO: Distribution
FROM: V. McLane
SUBJECT: Modification of Dictionary 8 and 27
(Re: Memo CP-A/124, CP-C/301, and CP-D/388))

Regarding my statement in Memo CP-C/301, since we are at the point of reinventing our databases, it is good time to rethink the way we are doing many things. Maintaining Dictionary 27 in its present state is a duplication of the work done for the Nuclear Wallet Cards.

I propose to link the Nuclear Wallet Cards Database with the EXFOR system. This database is available to all and contains all the information needed to check on whether:

- a nuclide is known,
- it is stable,
- it has metastable states.

Other useful information contained in the Wallet Cards, such as half-life, could be used in the future for checking purposes. The Wallet Cards also contains the isotopic abundance for naturally occurring isotopes and the ground state spin and parity, which are needed for computation format programs.

If need be, we can reformat the Wallet Card Database to be more useful for the Network needs.

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Memo CP-D/338

26 April 2002

From: O. Schwerer
To: Distribution
Subject: **Modification of Dictionary 8 and 27**
(Reply to Memos CP-C/301 and CP-A/124)

General remark: The dates on CP-C memos often appear incorrect. In this case, memo CP-C/301 is dated November 29, 2001 and is replying to memo CP-A/124 dated 14 April 2002.

Remarks on the proposed reform / elimination of the nuclide dictionary 27.

- 1) The basic idea of simplification is welcomed since it will not only reduce the number of error messages but also the work of the dictionary updates to be done at NDS.
- 2) In the reference to the description of the current dictionary 27 (obviously taken from the latest version of the NNDC EXFOR manual), I notice 2 inconsistencies:
 - a) Col.15 (flag '3') - valid also for REACTION SF7: This is in contradiction with what the same manual says about REACTION SF7, "Particle Considered" (page 7.5), which says "Codes are taken from Dictionary 33". No nuclide codes from dictionary 27 are allowed in SF7. There are no such cases in the NDS or NNDC master file, and I do not remember a change of this rule.
 - b) Col.17 - flag 'F' for fission product: not implemented, this flag does not exist in the file, and I do not remember a conclusion to this effect. It may be useful but it would be lost again with the new proposal.
- 3) I hesitate to get rid of the "Stable" flag. For DECAY-DATA it is good to check that no decay information is given for stable nuclei (except X-ray data). It is not clear to me what is meant in memo CP-C/301 by the sentence "*The nuclear structure databases would be used to check on whether a nuclide is stable or radioactive and whether a known isomer exists.*" Who would do this check? A new EXFOR check program on the fly? I do not expect much change in the number of known stable isotopes, so I don't see the advantage of getting rid of this flag.
- 4) Presently in many cases, the range of nuclides in dict. 27 has one or more gaps. E.g., for Pa, we have isotopes 213-218 and then from 221 up, or Rn: 201-217 and 223. In some cases also the Chart of Nuclides has gaps in between isotopes of an element. If we want to keep some meaning to checking nuclides, we may have to allow more than 1 range of isotopes.
- 5) In CP-C/301, last line of item 2, "Columns 35-43": "SF3 or SF4" should read "SF2 or SF3". (In SF4, the nuclide codes must be used, not the particle codes.)

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Memo CP-C/301

DATE: April 18, 2002
TO: Distribution
FROM: V. McLane
SUBJECT: Modification of Dictionary 8 and 27
(Reply to Memo CP-A/124)

NNDC and NDS are currently in the process of evaluating links between the nuclear reaction and nuclear structure databases. Given the limitation on manpower, it seems illogical to duplicate the information stored in these databases. Therefore, I am making the following modification to the proposal of Memo CP-A/124.

1. Eliminate Dictionary 27, as proposed.
2. Modify the Dictionary 8, as follows:
 - Key: Z-symbol (A6)
 - Columns 1-3: integer Z (I3)
 - Columns 4-5: symbol (A2)
 - Columns 6-25: Element name (A20)
 - Columns 26-32: Range of known nuclei (I3,'-',I3)
 - Column 34: Natural mixture allowed flag (A1).
 - Column 35-43: Isotopes not used in SF3 or SF4 (3I3).

We would add 0-G and 0-NN to dictionary 8 (1-D and 1-T need not be added as they will not exist in the new CINDA system).

The Compound dictionary would be modified to eliminate the CMP and OXI codes which may be added to any nuclide. I am also suggesting adding stainless steel.

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NNDC File

The nuclear structure databases would be used to check on whether a nuclide is stable or radioactive and whether a known isomer exists.

Examples of records in the reformatted dictionaries follow.

Dictionary 8 (Elements)

0-G	0G Gamma ray	0-	0	0		
0-NN	0NNNeutron	1-	1	1		
1-H	1H Hydrogen	1-	6	N	1	2 3
2-HE	2HEHelium	3-	10	N	3	4 6
3-LI	3LILithium	4-	12	N		
4-BE	4BEBeryllium	5	-14			
5-B	5B Boron	7-	19	N		
6-C	6C Carbon	8-	22	N		
7-N	7N Nitrogen	10-	24	N		
8-O	8O Oxygen	12-	26	N		
9-F	9F Fluorine	14-	29			
10-NE	10NENeon	16-	32	N		
11-NA	11NASodium	18-	35			
12-MG	12MGMagnesium	20-	37	N		
13-AL	13ALAluminium	21-	40			
14-SI	14SISilicon	22-	42	N		
15-P	15P Phosphorus	24-	46			
16-S	16S Sulfur	26-	49	N		
17-CL	17CLChlorine	28-	51	N		
18-AR	18ARArgon	30-	53	N		
19-K	19K Potassium	32-	54	N		
20-CA	20CACalcium	34-	56	N		

Dictionary 9 (Compounds)

1-H-BNZ	Benzene	C6H6	
1-H-CXX	Organic Compound		
1-H-MTH	Methane	CH4	
1-H-PFN	Paraffin)		
1-H-PHL	Phenyl		
1-H-PLE	Polyethylene		
1-H-TXX	Tritium Compound		
1-H-WTR	Water, Ice, Steam	H2O	
7-N-AIR	Air		
7-N-AMM	Ammonium Compound		
26-FE-SS	Stainless Steel		(added)
40-ZR-ALY	Zircalloy		
40-ZR-HYD	Zirconium Hydride		

MEMO CP-A/124

14-Apr-2002

To: **Distribution**
From: **F.E. Chukreev**
Subject: **Modification of Dictionary 8 and Dictionary 27**
(Action A10 of last Technical Meeting)

The development experimental technique permits accelerate practically any nucleus. Now our science has possibility to accelerate radioactive projectiles and I believe, that irradiation radioactive targets by radioactive beams will be possible after some time. Consequently we will must add numerous corrections in 27-th Dictionary constantly. To exclude the corrections I propose to refuse from 27-th Dictionary and to modify 8-th Dictionary.

Let us see Columns 12-26 of the 27-th dictionary. My remarks for Manual page are shown by red color.

Columns 12-26 have the following structure:

Column 12 (*Paranthesis*

13-23 Each column contains either a flag or blank:

13 used for REACTION SF1 (SF2=0)

Any nuclide can be used as target in suitable accelerator. Therefore the label is not needed.

1 indicates validity,

X indicates a warning for unusual use.

14 used for REACTION SF2.

Any nuclide can be used as beam in suitable accelerator. Therefore the label is not needed too.

2 indicates validity.

15 used for REACTION SF3, REACTION SF4, REACTION SF7, plus other keywords which allow nuclide codes⁸.

Z code is needed only. Subfields SF3 and SF4 can contain any nuclide

3 indicates validity,

V virtual (not yet found)

Z indicates validity except for those cases where the particle codes are used instead of the corresponding nuclide codes¹.

16 used for REACTION SF1 (SF2=0).

As I understand SF2=0 means radioactive decay. Consequently, any unstable nuclide must have the label.

¹ DECAY-DATA, DECAY-MON, EN-SEC, EMS-SEC, HALF-LIFE, MOM-SEC, PART-DET, RAD-DET

But 27-th dictionary has the label for little number of radioactive nuclides and some stable ones (N-15 and O-17, for example). If a label in 23-th column is absent, then radioactive decay is possible. Therefore the label is not needed too.

4 indicates validity.

17 used to indicate a fission product

If SF3=F, then SF4 is fission product. Therefore the label is not needed too.

F indicates validity.

(18-21 are presently unused)

22 used for CINDA

Is it needed for EXFOR?

C indicates validity,

T indicates validity for theoretical work only.

23 used to indicate a stable isotope. **It is needed**

S indicates stability.

24-25 isomer field:

The conception of "isomer" was extended in last years. I met isomers with half-life some nanoseconds in literature. Similar isomers can exist in any nuclide practically. Therefore the label is not needed too.

either blank, indicating that the nuclide has no isomeric states

or a number, right justified, indicating the maximum number of metastable states (*i.e.*, number of isomeric states not including the ground state).

or A, indicating one or more short-lived isomers (<1 sec.), but no long-lived isomers.

26) parenthesis

Conclusion: Only Z and S labels are needed now.

Therefore I would like to propose to use 8-th dictionary with a little modification only. Let us see one example. Today we have in 8-th Dictionary:

55-CS (Cesium)

We can modify the record:

55-CS (Cesium) [S134, 112-151]

S134 means that 55-CS-134 is stable.

Cesium isotopes with mass 112-151 are known.

Second example:

1-H (Hydrogen)

The record must be modified as

1-H (Hydrogen) [SZ1,SZ2,Z3,1-3].

SZ1 means that 1-H-1 is stable and P must be used in SF2 and SF3. Z3 means that tritium is radioactive nuclide and T must be used in SF2,SF3

Proposed modification of 8-th Dictionary will permit exclude 27-th Dictionary and numerous corrections of it.

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