

Thickness as Independent Variable (A14)

(N. Otsuka, 2015-04-16, Memo CP-D/873)

Concerning the following action to me from the NRDC 2014 meeting (A14):

Assess required corrections in dictionaries in order to treat the sample thickness as an independent variable (WP2014-34).

I identify the following four time-of-flight spectrum quantities as thickness dependent quantities:

Code	Expansion	Remark
, TRN	Transmission	
, TRN, , RYL	Reaction yield	Obsolete
, TRN/TMP	Transmission, temperature dependent	
, RYL	Reaction yield	

They currently belong to the reaction type CS+ “Cross section (non-standard)”. In order to treat sample thickness as an independent variable of these quantities, I introduced the following changes to my working dictionaries

- 0 → 1 for the first digit of the plotting flags for THICKNESS in Dict. 24
- Addition of a new reaction type code TOF having independent variable family flag 6 (other variable) in Dict. 213
- CS+ → TOF for the reaction type of the four quantities listed above

I processed a sample entry with these working dictionaries by ZCHEX, and confirmed that ZCHEX makes an error message as expected. I conclude the above-mentioned changes in dictionaries solve the problem, and propose the following new reaction type code:

Dictionary 213 (Reaction type)

TOF Time-of-flight spectrum

Additional remark: I expected the family flag (e.g., K for sample thickness) in dictionary 24 has been used for this type of checking, but I cannot see an actual role of this flag in ZCHEX output.

Sample input

```

TRANS                20150106                00000 0 0
ENTRY                00001 20150106          00001 0 1
SUBENT              00001001 20150106          00001 1 1
BIB                  7 8                      00001 1 2
TITLE               Sample input to test sample temperature and thickness
                   as independent variables    00001 1 3
                   00001 1 4
INSTITUTE           (3ZZZIAE)                 00001 1 5
REFERENCE           (W,OTUKA,2015)           00001 1 6
AUTHOR              (N.Otuka)                00001 1 7
ERR-ANALYS         No information on uncertainty given 00001 1 8
STATUS              (NCHKD)                  00001 1 9
HISTORY             (20150106C)              00001 1 10
ENDBIB              8 0                      00001 1 11
NOCOMMON            0 0                      00001 1 12
ENDSUBENT           11 0                     00001 199999
SUBENT              00001002 20150106          00001 2 1
BIB                  2 3                      00001 2 2
REACTION            (10-NE-0(N,TOT),,SIG/TMP) 00001 2 3
                   Temperature dependent cross sections with TEMP 00001 2 4
FACILITY            (REAC,2GERMUN)            00001 2 5
ENDBIB              3 0                      00001 2 6
COMMON              1 3                      00001 2 7
TEMP                00001 2 8
K                   00001 2 9
2.0000E+01         00001 2 10
ENDCOMMON           3 0                      00001 2 11
DATA                2 2                      00001 2 12
EN                  DATA                    00001 2 13
MEV                  B                        00001 2 14
3.0000E-10 3.6000E-01 00001 2 15
3.7000E-10 3.9000E-01 00001 2 16
ENDDATA             4 0                      00001 2 17
ENDSUBENT           16 0                     00001 299999
SUBENT              00001003 20150106          00001 3 1
BIB                  2 3                      00001 3 2
REACTION            (10-NE-0(N,TOT),,SIG/TMP) 00001 3 3
                   Temperature dependent cross sections without TEMP 00001 3 4
FACILITY            (REAC,2GERMUN)            00001 3 5
ENDBIB              3 0                      00001 3 6
NOCOMMON            0 0                      00001 3 7
DATA                2 2                      00001 3 8
EN                  DATA                    00001 3 9
MEV                  B                        00001 3 10
3.0000E-10 3.6000E-01 00001 3 11
3.7000E-10 3.9000E-01 00001 3 12
ENDDATA             4 0                      00001 3 13
ENDSUBENT           12 0                     00001 399999
SUBENT              00001004 20150106          00001 4 1
BIB                  2 3                      00001 4 2
REACTION            (90-TH-232(N,TOT),,TRN,,AV) 00001 4 3
                   Transmission with THICKNESS 00001 4 4
FACILITY            (REAC,4ZZZDUB)            00001 4 5
ENDBIB              3 0                      00001 4 6
NOCOMMON            0 0                      00001 4 7
DATA                4 2                      00001 4 8
EN-MIN              EN-MAX THICKNESS DATA    00001 4 9
EV                  EV      ATOMS/B NO-DIM    00001 4 10
2.150E+00 4.6500E+00 1.3030E-02 0.838 00001 4 11
4.650E+00 1.0000E+01 2.6550E-02 0.703 00001 4 12
ENDDATA             4 0                      00001 4 13
ENDSUBENT           12 0                     00001 499999
SUBENT              00001005 20150106          00001 5 1
BIB                  2 3                      00001 5 2
REACTION            (90-TH-232(N,TOT),,TRN,,AV) 00001 5 3
                   Transmission without THICKNESS 00001 5 4
FACILITY            (REAC,4ZZZDUB)            00001 5 5
ENDBIB              3 0                      00001 5 6
NOCOMMON            0 0                      00001 5 7
DATA                3 2                      00001 5 8
EN-MIN              EN-MAX DATA             00001 5 9
EV                  EV      NO-DIM           00001 5 10
2.150E+00 4.6500E+00 0.838 00001 5 11
4.650E+00 1.0000E+01 0.703 00001 5 12

```

ENDDATA	4	0	00001	5	13
ENDSUBENT	12	0	00001	599999	
ENDENTRY	5	0	00001999999999		
ENDTRANS	1	0	Z99999999999999		

Sample output

ZCHEX (Version 2011-01-31) run on 06-Jan-2015

Input file: ../sample.txt
File labeled: TRANS 20150106

ENTRY 00001

1 First pass completed with no fatal errors
- Second pass checking -

ENTRY 00001
** Missing independent variable OTHER 00001003
** Missing independent variable OTHER 00001005

Tape statistics

# of records----->	77
# of entries----->	1
# of subentries----->	5
# of new data subentries->	4