**Nuclear Data Section**

**International Atomic Energy Agency**

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**Memo CP-D/929**

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**To:** Distribution

**From:** N. Otsuka, O. Schwerer

**Subject:** **Mass yield (MAS,FY and SEC,FY)**

**Reference:** CP-D/710, CP-D/298

The definitions of two quantities MAS,FY (Mass yield of fission fragment as sum of independent yields) and SEC,FY (Post-neutron-emission fission-product) are the same as discussed in Memo CP-D/710. After this memo, we have looked for a reason to keep these two quantity codes in the dictionary, but could not find a clear evidence describing the original idea of Meinhart Lammer who proposed MAS,FY in 1998 in Memo CP-D/298. It could be for two different derivations (*e.g.*, direct measurement of the mass yield, or summing up the independent yield for a given mass chain). However the measurement method should not be reflected in different REACTION coding.

There are still only 5 entries having REACTION codes with SF5=MAS, and one possible solution could be to make this modifier and two quantity codes (MAS,FY and PAR/MAS,FY,LF) obsolete and to add “mass yield” in the expansion of SEC,FY.

**Dictionary 31 (Branches)**

MAS (*Obsolete*)

**Dictionary 236 (Quantities)**

MAS,FY (*Obsolete*. Used in 13981, 14088, A0108 and O1442)

PAR/MAS,FY,LF (*Obsolete*. Used only in 14044.003)

SEC,FY (Addition of “(mass yield)” in its expansion)

|  |  |  |
| --- | --- | --- |
| **EXFOR #** | **REACTION (SF5-SF8)** | **Comments** |
| 13981.002 | MAS,FY | Use PRE,FY (declared as *pre-neutron-emission mass-yield* by authors) |
| 14044.003 | PAR/MAS,FY,LF,REL/MXW | Use SEC,FY/DE,\*F,MXW/MSC (declared as *post-neutron-emission masses* by authors) |
| 14088.002 | MAS,FY | ? (The source article is not available at NDS.) |
| 14088.003 | MAS,FY | ? (The source article is not available at NDS) |
| A0108.245 | MAS,FY | Use SEC,FY (online separation at GSI) |
| O1442.002 | MAS,FY | Use SEC,FY (Time-of-flight at JINR) |

Because SEC,FY means the mass yield, we expect MASS is always in REACTION SF4 when SEC,FY is used. The following table summarizes the EXFOR data sets where REACTION SF5=\*SEC\* and SF6=FY but MASS is not in SF4 (\*: wildcard). Note that the presence of MASS in SF4 is not always required if FY is accompanied by another parameter code in SF6 (*e.g.*, 92-U-235(N,F),SEC,FY/DE,HF).

**List of EXFOR data sets where SF5=\*SEC\* and SF6=FY but MASS is not in SF4**

|  |  |  |  |
| --- | --- | --- | --- |
| **EXFOR #** | **REACTION** | **SF5-SF8 must be** | **Remark** |
| 14063.002 | 92-U-235(N,F)42-MO-99,SEC,FY | SEC → CUM or (CUM) | 99Mo decay gamma counting by an NaI(Tl) crystal. |
| 14063.003 | 92-U-238(N,F)42-MO-99,SEC,FY | SEC → CUM or (CUM) |
| 21544.012 | 94-PU-239(N,F),SEC,FY,,MXW/MSC | (No correction proposed because MSC in SF8.) | Relative mass yield of the light fragment at a given kinetic energy range. |
| 22119.002 | 92-U-232(N,F)ELEM/MASS,SEC,FY,,SPA | SEC → CUM, (CUM) or IND | Decay gamma counting by a HPGe detector |
| 22425.028 | 95-AM-241(N,F)ELEM/MASS,SEC,FY,,MXW,DERIV | SEC → CUM, (CUM) or IND | Decay gamma counting by a HPGe detector |
| 22425.029 | 95-AM-241(N,F)ELEM/MASS,SEC,FY,,EPI,DERIV | SEC → CUM, (CUM) or IND |
| 22792.002 | 92-U-235(N,F)ELEM/MASS,SEC,FY,,MXW | SEC → CUM, (CUM) or IND | Decay gamma counting by a Ge(Li) detector |
| 22792.003 | (90-TH-232(N,F)ELEM/MASS,SEC,FY,,FST)/  (92-U-235(N,F)56-BA-140,SEC,FY,,FST) | SEC → CUM, (CUM) or IND |
| 22792.004 | 90-TH-232(N,F)ELEM/MASS,SEC,FY,,FST | SEC → CUM, (CUM) or IND |
| A0108.025 | 82-PB-0(92-U-238,F)ELEM,SEC,FY | SEC → CHG | Online mass spectrometry (FRS, GSI) |

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