**Nuclear Data Section**

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**Date:** 18 May 2022

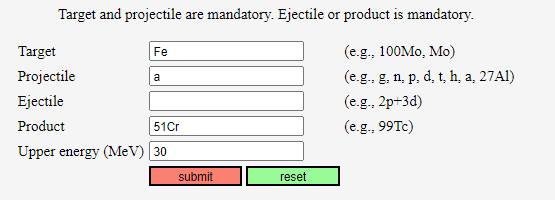
**To:** Distribution

**From:** R. Shimizu, N. Otsuka

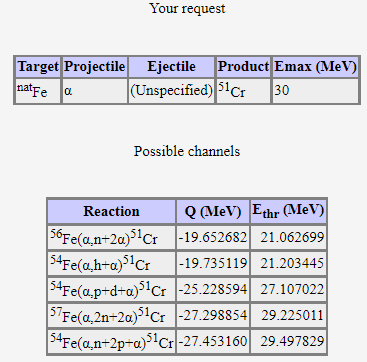
**Subject: Threshold calculator and its application to REACTION SF3 checking**

We often need to list all contributing target and channels to get a particular product nuclide for comparison of measured production cross sections (*e.g*, activation cross sections) with model prediction etc. One of us (RS) developed a threshold calculator (C++) to show all contributing target nuclides and channels with AME2020 mass evaluation as the mass table. Below are screenshots of an input and output on a web interface of this calculator (<https://www.jcprg.org/tcalc/>).

**Example of input**



**Example of output**



Such a tool is useful to check whether REACTION SF3 follow the following EXFOR compilation rules:

1. SF3 should not be X when only one process is possible.
2. SF3 should be X when several processes are possible.

***Examples***

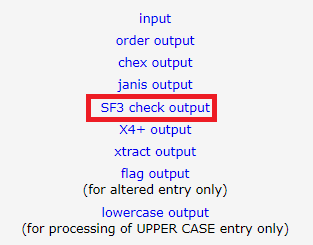
* (79-AU-197(D,**P**)79-AU-198,,SIG)  
  rather than

(79-AU-197(D,**X**)79-AU-198,,SIG)  
below the 197Au(d,nπ+)198Au threshold (~140 MeV).

* (39-Y-89(D,**X**)38-SR-87,,SIG)  
  rather than

(39-Y-89(D,**A**)38-SR-87,,SIG)  
above the 89Y(d,pt)87Sr threshold (~13 MeV).

It is not always trivial to follow these rules for compilers since there exists variety in expressions adopted in the source articles. We implemented checking against **the first rule** by using the newly developed threshold calculator, and it is added to the JCPRG EXFOR compilation tool (<https://www.jcprg.org/exfor/tool/>) which now gives an additional output **SF3 check output**:



By clicking this link, you can see an output like

SF3=X Checker for ACTIV run on 2022-5-8

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Input file: ../exfor/tool/./work/trans-584a.txt

F1456.002: X -> 6N 63-EU-151(A,X)65-TB-149-G,,SIG

F1458.002: X -> N 6-C-12(D,X)7-N-13,,SIG

Program terminated normally

The program currently does not check the energy range, and the message should be utilized with caution *when the incident energy is beyond the pion production threshold*. We wish this new function is useful for preparation of your future preliminary tapes.

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