

LEXFOR “Activation”

(N. Otsuka, O. Schwerer, 2023-03-07, Memo CP-D/1076)

LEXFOR “Activation” defines activation as

“Activation is the production of a radioactive residual nucleus as a result of a reaction, which is determined by measuring a specific decay radiation emitted by the product”.

Here we summarize some typical questionable uses of the method code ACTIV.

1. Prompt gamma production data (e.g., 12799, 22431, 31493, 40802, O2161)

I know material analysis utilizing prompt gammas from neutron captures is known as the prompt gamma activation analysis (PGAA). But I believe we do not use ACTIV to determination of prompt gamma production cross sections

2. Foil activation for characterization of neutron field (22278, 22753, 23091)

Double differential cross sections are measured in these three works. EXFOR 22278 and 22753 use foil activation to determine angular distribution of the neutron flux. EXFOR 23091 uses foil activation for incident neutron fluence determination through $^{27}\text{Al}(n,\alpha)^{24}\text{Na}$.

3. Foil activation for outgoing neutron detection (C1832, D0909, E2706, M0335)

Outgoing neutrons are measured by foil activations. Multiple foil activation and unfolding were done in EXFOR D0909 and E2706 to obtain outgoing neutron spectra.

We propose the following addition to LEXFOR:

The method code ACTIV is not used for the following cases:

- Measurement of prompt gamma production data (though it is sometimes measured for application to “prompt gamma activation analysis”).
- Characterization of the incident neutron field by foil activation. This may be mentioned under the keyword INC-SPECT.
- Detection of outgoing neutron by foil activation. If multiple foil activation and unfolding are used to determine neutron spectra, it may be mentioned under the keyword ANALYSIS with the code UNFLD.