

## Indication of Quantities at other than the Room Temperature (TMP)

(N. Otsuka, O. Schwerer, 2017-04-13, Memo CP-D/928)

The LEXFOR “Sample” explains the coding rule of temperature-dependent quantities and sample temperature as follows:

At low energies, the data may be dependent on the temperature of the sample. In this case, the data should be coded using the parameter code TMP in reaction SF6. Note that TMP should be omitted for data measured at the room temperature (~300 K) and for thermal scattering data (THS in reaction SF3). The sample temperature is coded in the data section under the heading TEMP.

We observe some problems in the current coding procedure:

- There are many data sets coded with REACTION SF3=THS but without sample temperatures under TEMP. It is not clear when the thermal scattering data require the sample temperature (TEMP).
- For the check programs the sample temperature cannot be treated as a necessary independent variable, required by the reaction types of the thermal scattering data, as long as they are specified only by REACTION SF3=THS without a specific code in REACTION SF5-SF8.
- Some thermal scattering data are published without the sample temperature (e.g., 13920.002-003, 13921.036-045 in PRELIM.1422). We want to avoid coding of a sample temperature assumed by the compiler if possible.
- Almost all parameter codes express physical quantities themselves without an additional SF6 code (e.g., SIG → cross section, DA → angular differential cross section). However TMP (expanded as “temperature-dependent quantity” in Dictionary 32) itself cannot be any physical quantity.

We propose the following changes in the dictionary to improve the situation:

1. Treat the code TMP not as a parameter (SF6) but as a modifier (SF8).
2. Use a quantity code with the modifier TMP when the quantity is temperature dependent and sample temperature is other than the room temperature (~300 K).
3. Require the sample temperature (TEMP) as an independent variable of the quantity codes having the modifier TMP. Namely their reaction types are defined with the independent variable family code 6 (“Other variable”). N.B. “Other variable” includes not only sample temperature but also other variables such as sample thickness, half-life, and therefore checking programs cannot know which variable is actually required.

We propose deletion of “and for thermal scattering data (THS in reaction SF3)” from the LEXFOR “Sample”:

At low energies, the data may be dependent on the temperature of the sample. In this case, the data should be coded using the ~~parameter code~~ modifier TMP in ~~reaction SF6~~ REACTION SF8. Note that TMP should be omitted for data measured at room temperature (~300 K) ~~and for thermal scattering data (THS in reaction SF3)~~. The sample temperature is coded ~~in the data section~~ under the heading TEMP.

Accordingly, the corresponding sentence in LEXFOR “Thermal Neutron Scattering” should say

The sample temperature should be given using the data-heading TEMP and the modifier TMP should be in REACTION SF8 when it is different from room temperature (~300 K).

and the note “The code TMP is always omitted when THS is coded in SF3.” must be deleted.

**Dictionary 32 (Parameters)**

TMP (Obsolete)

**Dictionary 34 (Modifiers)**

TMP at temperature other than the room temperature

**Dictionary 213 (Reaction types)**

CSS Cross section at other than the room temperature (nonstandard)  
 FAT (Delete. Only PRE,DA/TMP,FF,LEG/RS belongs to this reaction type)  
 FLT (Delete. Only ,DA/TMP,FF,LEG/RS belongs to this reaction type)  
 TOT Time-of-flight spectrum at other than the room temperature

**Dictionary 236 (Quantities)**

,SIF/TMP (Obsolete. Used in 41427.)  
 ,SIF,,TMP Self-indication function at other than the room temperature  
 ,SIG/TMP (Obsolete. Used in 31 entries.)  
 ,SIG,,TMP Cross section at other than the room temperature  
 ,SIG/TMP,,SFC (Obsolete. Used in O1379.)  
 ,SIG,,SFC/TMP S-factor for cross section at other than the room temperature  
 ,TRN/TMP (Obsolete. Used in 13733, 22954-22956)  
 ,TRN,,TMP Transmission at other than the room temperature  
 BA,SIG/TMP (Delete. Used in 21167.002 where SF5=BA must be deleted.)  
 FA,SIG/TMP (Delete. Not used.)  
 ,DA/TMP,FF,LEG/RS (Delete. Used in 41295.002 with SF8=MSC)  
 PRE,DA/TMP,FF,LEG/RS (Delete. Used only in 41357.002 where SF8=MSC should replace SF8=FCT)

Quantity	Reaction Type	Dimension	Subentry
, SIF, , TMP	TOT	NO	41427.002-003
, SIG, , TMP	CST	B	(31 entries)
, SIG, , SFC/TMP	CSS	B*E	O1379.002-003
, TRN, , TMP	TOT	NO	13733.011-012 22954.002-003, 005 22955.002-003 22956.003, 005, 007