

R.A. budget:
Neutron yield evaluation
for the reinforced PU foam
with SaG4n and NeuCBOT
(after the composition correction)

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15.12.2020

Compositions Reinforced PU foam

55% PU foam
 $\rho = 0.100 \text{ g/cm}^3$

Element	Mass fraction, %
H	3.6
C	32.5
N	2.8
O	37.6
Si	11.7
Ca	5.0
Al	5.0
B	1.4
Mg	0.3

90% PU foam
 $\rho = 0.100 \text{ g/cm}^3$

Element	Mass fraction, %
H	5.94
C	53.19
N	4.59
O	31.07
Si	2.60
Ca	1.12
Al	1.11
B	0.31
Mg	0.07

α source characteristics

5 sets of the α particle energies and intensities: predefined Chain_Th232, Chain_U235 and

^{238}U upper

```
SOURCE 0 11
1.0 18
92238 4.198 79.0
92238 4.151 20.9
92238 4.038 0.078
92234 4.7746 71.38
92234 4.7224 28.42
92234 4.6035 0.2
92234 4.2773 4e-05
92234 4.1506 2.6e-05
92234 4.1086 7e-06
90230 4.687 76.3
90230 4.6205 23.4
90230 4.4798 0.12
90230 4.4384 0.03
90230 4.3718 0.00097
90230 4.2783 8e-06
90230 4.2485 1.03e-05
90230 3.8778 3.4e-06
90230 3.8294 1.4e-06
ENDSOURCE
```

^{238}U middle

```
SOURCE 0 1
1.0 24
88226 4.78434 93.84
88226 4.601 6.16
88226 4.34 0.0065
88226 4.191 0.001
88226 4.16 0.00027
86222 5.48948 99.92
86222 4.986 0.078
86222 4.826 0.0005
84218 6.00235 99.97890022
84218 5.181 0.00109978
85218 6.756 0.00071928
85218 6.693 0.017982
85218 6.653 0.00127872
86218 7.1292 1.9974e-05
86218 6.5311 2.54e-08
83214 5.516 0.009408
83214 5.452 0.012936
83214 5.273 0.001392
83214 5.184 0.0001464
83214 5.023 5.04e-05
83214 4.941 6e-05
84214 7.68682 99.96550252
84214 6.9022 0.010397504
84214 6.6098 5.99856e-05
ENDSOURCE
```

^{238}U lower

```
SOURCE 0 1
1.0 5
82210 3.72 1.9e-06
83210 4.694 5.2e-05
83210 4.656 7.8e-05
84210 5.30433 99.99987
84210 4.51658 0.001039998648
ENDSOURCE
```

Conversion factors
to use
the NeuCBOT normalization
(per decay of the parent nucleus):

^{232}Th : 6

^{235}U : 7

$^{238}\text{U}_{\text{upper}}$: 3

$^{238}\text{U}_{\text{middle}}$: 4

$^{238}\text{U}_{\text{lower}}$: 1

Other input parameters

Number of initial α particles = 2×10^7

Bias factor = 10^4

Maximum allowed step length: 0.0001 cm

Uniform distribution of α particles in the source volume

Size of the world cube side: 2000 cm

Reinforced PU foam

	RA Chain	Data library / PU foam fraction	SaG4n JENDLTENDL01 step 0.001 cm Incorrect composition	SaG4n JENDLTENDL01 step 0.0001 cm
Neutron yield, 10^{-7} neutrons per decay of the parent nucleus	^{232}Th	55% (1)	23.46	---
		90% (2)	6.72	18.59
	^{235}U	55% (1)	23.24	---
		90% (2)	6.02	17.50
	^{238}U upper	55% (1)	3.06	---
		90% (2)	0.69	1.91
	^{238}U middle	55% (1)	14.72	---
		90% (2)	4.12	11.53
	^{238}U lower	55% (1)	1.92	---
		90% (2)	0.42	1.19