

# R.A. budget update with SaG4n

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## List of new results

Ranking	Material	Status
8	Kapton	updated (added the NeuCBOT+TALYS-1.95 results)
9	Solder InAg(In 97%)	updated (added the NeuCBOT+TALYS-1.95 results)
17	Mastic rope	done
19	Plywood 2	done
24	Fused silica	done
27	Gd2O <sub>3</sub>	done
48	Aluminium	done

# Kapton

## Composition

Element	Mass fraction, %
H	2.6
C	69.1
N	7.3
O	20.9

Density: 1.42 g/cm<sup>3</sup>

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	<sup>232</sup> Th	3.04E-6	2.50E-6	1.55E-6
	<sup>235</sup> U	2.55E-6	2.20E-6	1.29E-6
	<sup>238</sup> U upper	2.70E-7	2.55E-7	9.1E-8
	<sup>238</sup> U middle	1.86E-6	1.53E-6	9.20E-7
	<sup>238</sup> U lower	1.47E-7	1.66E-6	6.1E-8

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# Solder InAg (In 97%)

## Composition

Element	Mass fraction, %
In	97
Ag	3

Density: 7.38 g/cm<sup>3</sup>

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	<sup>232</sup> Th	4.66E-7	1.3E-11	0
	<sup>235</sup> U	2.58E-6	3.7E-15	0
	<sup>238</sup> U upper	1.7E-9	0	0
	<sup>238</sup> U middle	2.57E-7	1.4E-13	0
	<sup>238</sup> U lower	4.2E-9	1.4E-13	0

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# Mastic rope (presumably pure polyurethane)

## Composition

Element	Mass fraction, %
H	6.6
C	59.1
N	5.1
O	29.2

Density:  $\approx 1.2 \text{ g/cm}^3$

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	$^{232}\text{Th}$	2.29E-6	1.93E-6	1.22E-6
	$^{235}\text{U}$	1.99E-6	1.75E-6	1.06E-6
	$^{238}\text{U}$ upper	2.20E-7	2.11E-7	8.18E-8
	$^{238}\text{U}$ middle	1.41E-6	1.19E-6	7.42E-7
	$^{238}\text{U}$ lower	1.20E-7	1.30E-6	5.46E-8

Will be checked

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# Plywood 2

## Composition

Element	Mass fraction, %
H	6
C	51
N	2
O	42

Density:  $\approx 0.65 \text{ g/cm}^3$

Legend:

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	$^{232}\text{Th}$	1.64E-6	1.47E-6	1.01E-6
	$^{235}\text{U}$	1.57E-6	1.45E-6	9.72E-7
	$^{238}\text{U}$ upper	2.02E-7	1.95E-7	8.74E-8
	$^{238}\text{U}$ middle	1.02E-6	9.27E-7	6.28E-7
	$^{238}\text{U}$ lower	1.10E-7	1.03E-6	5.83E-8

Will be checked

0.0	E-9	E-8	E-7	E-6	E-5
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# Fused silica

## Composition SiO2

Element	Mass fraction, %
O	53.26
Si	46.74

Density:  $\approx 2.203 \text{ g/cm}^3$   
(density for fused quartz)

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	$^{232}\text{Th}$	1.44E-6		1.42E-6
	$^{235}\text{U}$	1.34E-6		1.30E-6
	$^{238}\text{U}$ upper	7.58E-8		7.96E-8
	$^{238}\text{U}$ middle	8.61E-7		8.53E-7
	$^{238}\text{U}$ lower	7.02E-8		6.02E-8

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# Gadolinium oxide ( $Gd_2O_3$ )

## Composition $Gd_2O_3$

Element	Mass fraction, %
O	13.24
Gd	86.76

Density:  $\approx 7.407 \text{ g/cm}^3$

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	$^{232}\text{Th}$	1.80E-7		1.91E-7
	$^{235}\text{U}$	1.92E-7		2.05E-7
	$^{238}\text{U}$ upper	2.28E-8		2.69E-8
	$^{238}\text{U}$ middle	1.15E-7		1.185E-7
	$^{238}\text{U}$ lower	1.56E-8		1.48e-08

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# Aluminium

## Composition

Element	Mass fraction, %
Al	100

Density:  $\approx 2.70 \text{ g/cm}^3$

	RA Chain	NeuCBOT TALYS-1.6	NeuCBOT TALYS-1.95	SaG4n JENDLTENDL01
Neutron yield, neutrons per decay of the parent nucleus	$^{232}\text{Th}$	4.60E-5		1.97E-5
	$^{235}\text{U}$	4.20E-5		1.62E-5
	$^{238}\text{U}$ upper	1.00E-6		2.89E-7
	$^{238}\text{U}$ middle	2.70E-5		1.12E-5
	$^{238}\text{U}$ lower	1.60E-6		4.82E-7

Legend:

0.0	E-9	E-8	E-7	E-6	E-5
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# General remarks

- 1) A link to the neutron budget obtained with SaG4n:  
[neutron bg Oct20 with SaG4n](#)
- 2) All files related to the study will be available in [the CERNBox folder](#)  
(use the standard DarkSide password to log in)