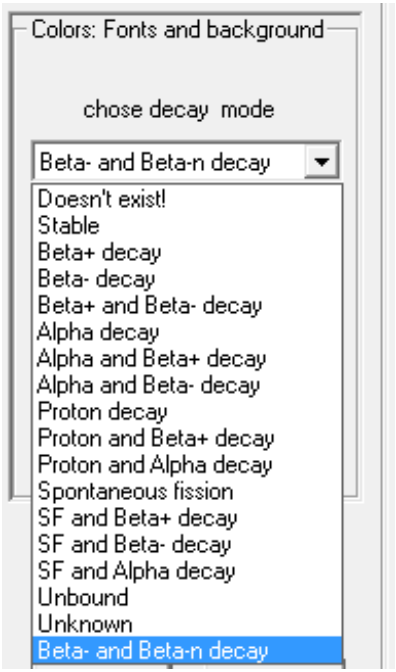
Decay Branching Ratio

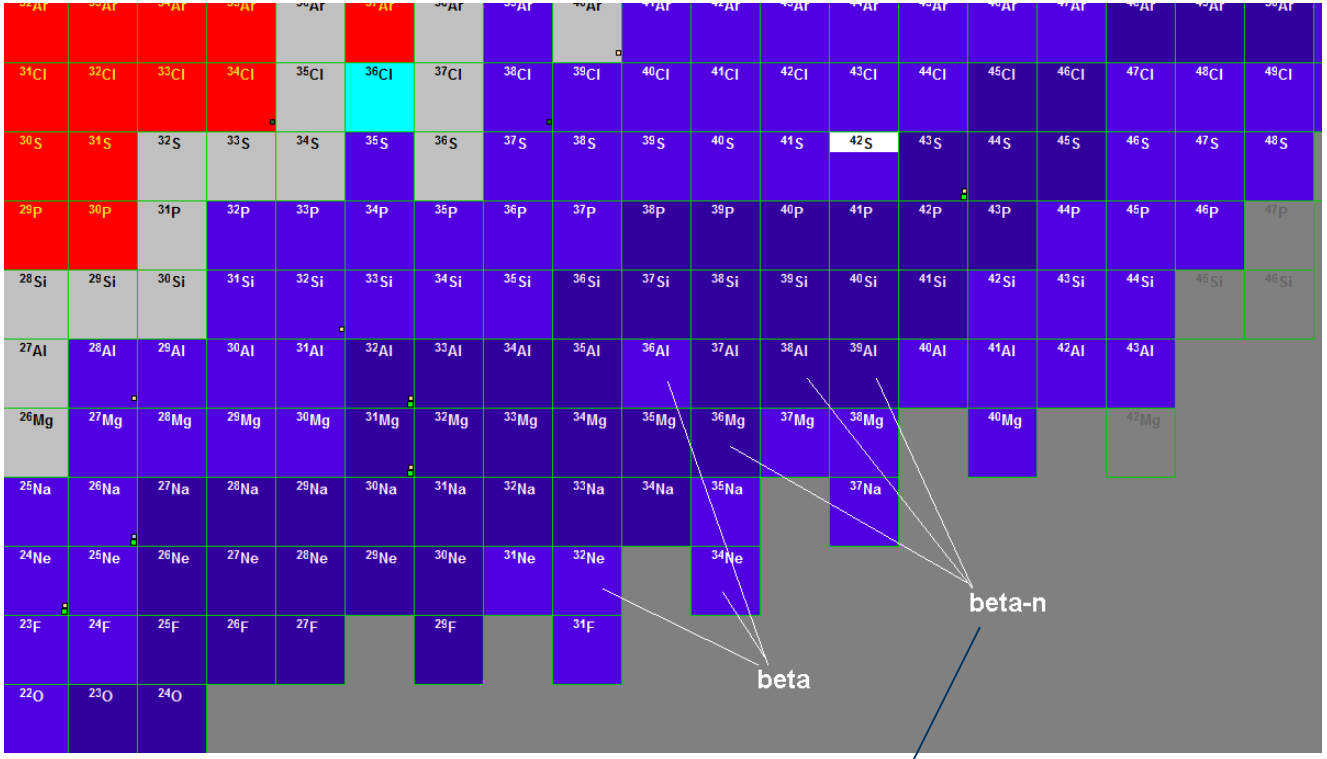
v.9.10.342
from 08/09/16

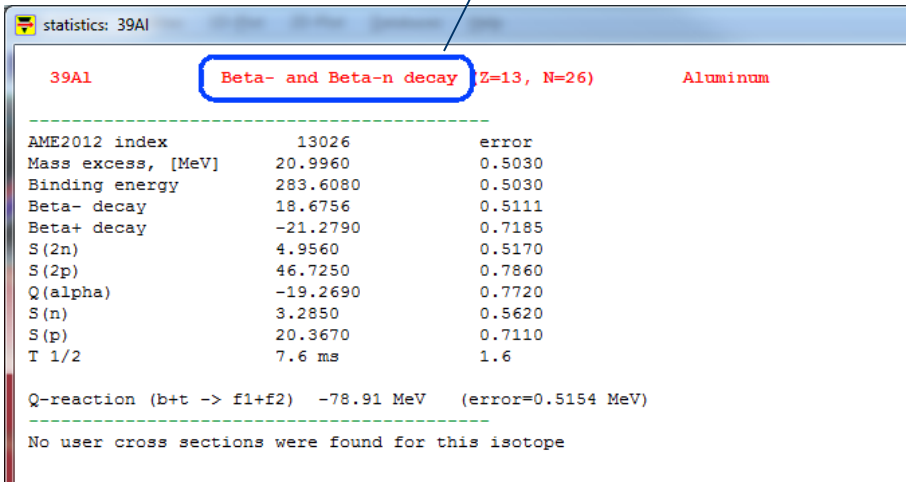
update

1. Beta-Delayed Neutron Emission is new decay mode in LISE^{++}
2. Beta-Delayed Proton Emission is new decay mode in LISE^{++}
3. Decay branching ratio database
4. Editor of Decay branching ratio database
5. Using the Decay branching ratio database in Radiation Residue calculations

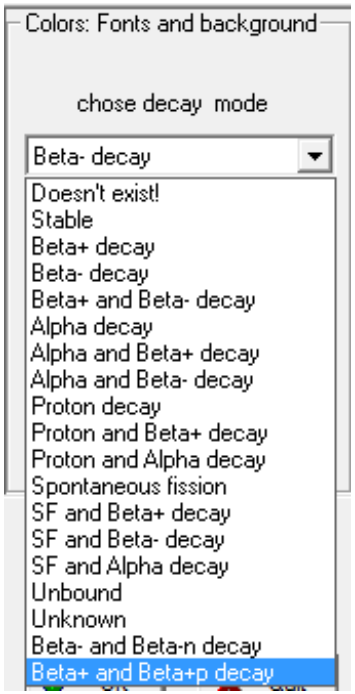
Beta-Delayed Neutron Emission is new decay mode in LISE++

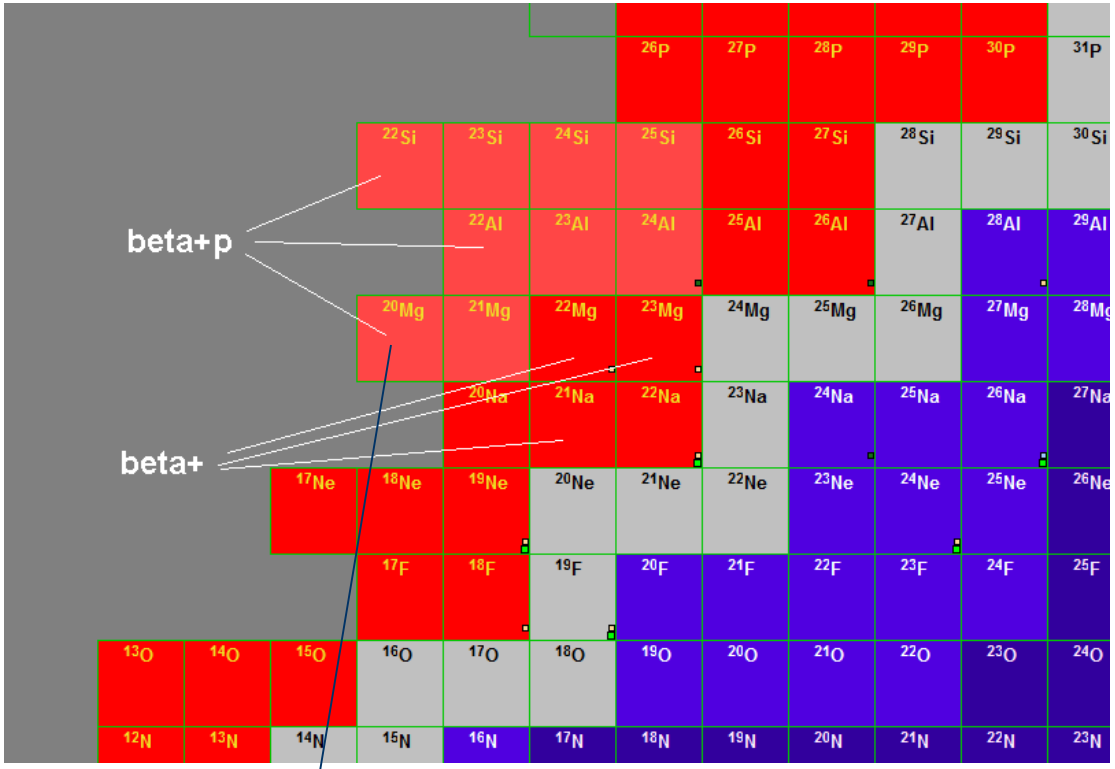


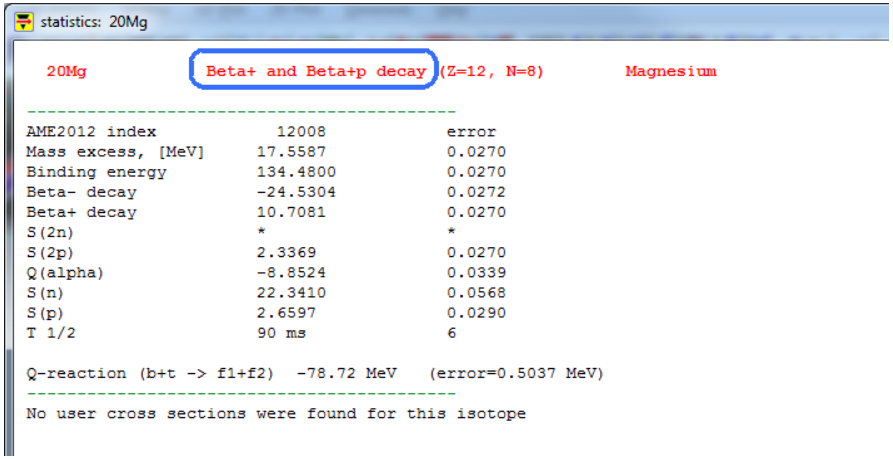




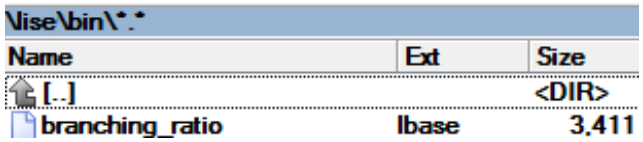
Beta-Delayed Proton Emission is new decay mode in LISE++

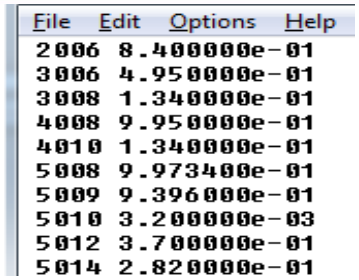






Decay branching ratio database





P_n for $2 \le Z \le 28$ are taken from

Nuclear Data Sheets 128 (2015) 131–184

Evaluation of Beta-Delayed Neutron Emission Probabilities and Half-Lives for Z = 2 – 28

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[2] *TRIUMF, Vancouver, British Columbia V6T 2A3, Canada*
[3] *Department of Physics, TANDAR Laboratory, C.N.E.A., Buenos Aires, Argentina*
[4] *National Nuclear Data Center, Brookhaven National Laboratory, Upton, NY 11973-5000, USA*

We present an evaluation and compilation of β-delayed neutron probabilities and half-lives for nuclei in the region $Z = 2 - 28$ (^{8}He – ^{80}Ni). This article includes the recommended values of these quantities as well as a compiled list of experimental measurements for each nucleus in the region for which β-delayed neutron emission is possible. The literature cut-off for this work is August 15th, 2015. Some notable cases as well as new standards for β-delayed neutron measurements in this mass region are also discussed.

Other branching ratios and P_n for $38 \le Z$ are taken from NNDC

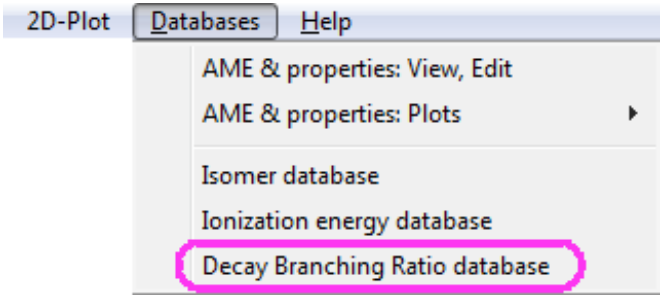
Ratios for higher Z will be entered soon.

www.nndc.bnl.gov/nudat2/wcbyz.jsp?z=38 workshop on isot

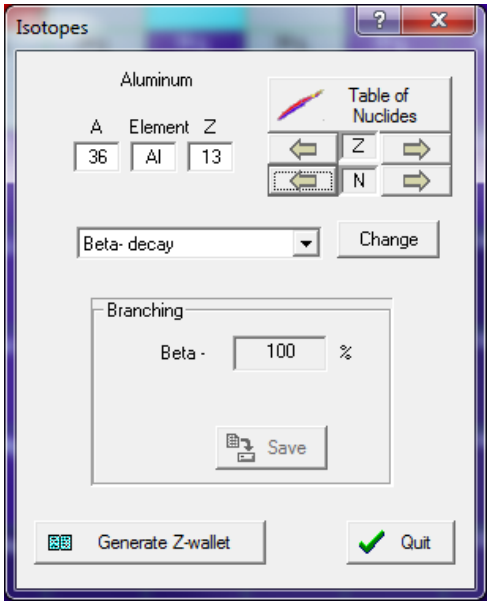
Results for Z=38

Nucleus	E(level) (MeV)	Jπ	Δ(MeV)	$T_{1/2}$	Abundance	Decay Modes
$^{73}_{38}$Sr	0.0000		-31.9500 Syst	> 25 ms		ε : 100.00 % εp > 0.00 %
$^{74}_{38}$Sr	0.0000	0+	-40.8270 Syst	> 1.2 µS		ε
$^{75}_{38}$Sr	0.0000	(3/2-)	-46.6186	88 ms 3		ε : 100.00 % εp : 5.20 %
$^{76}_{38}$Sr	0.0000	0+	-54.2476	7.89 s 7		ε : 100.00 % εp : 3.4E-5 %
$^{77}_{38}$Sr	0.0000	5/2+	-57.8034	9.0 s 2		ε : 100.00 % εp < 0.25 %
$^{78}_{38}$Sr	0.0000	0+	-63.1739	160 s 8		ε : 100.00 %
$^{79}_{38}$Sr	0.0000	3/2(-)	-65.4768	2.25 m 10		ε : 100.00 %
$^{80}_{38}$Sr	0.0000	0+	-70.3114	106.3 m 15		ε : 100.00 %
$^{81}_{38}$Sr	0.0000	1/2-	-71.5281	22.3 m 4		ε : 100.00 %
$^{82}_{38}$Sr	0.0000	0+	-76.0099	25.34 d 2		ε : 100.00 %
$^{83}_{38}$Sr	0.0000	7/2+	-76.7976	32.41 h 3		ε : 100.00 %
$^{83m}_{38}$Sr	0.2591	1/2-	-76.5385	4.95 s 12		IT : 100.00 %
$^{84}_{38}$Sr	0.0000	0+	-80.6493	STABLE	0.56% 1	
$^{85}_{38}$Sr	0.0000	9/2+	-81.1032	64.850 d 7		ε : 100.00 %
$^{85m}_{38}$Sr	0.2387	1/2-	-80.8645	67.63 m 4		IT : 86.60 % ε : 13.40 %
$^{86}_{38}$Sr	0.0000	0+	-84.5232	STABLE	9.86% 1	
$^{87}_{38}$Sr	0.0000	9/2+	-84.8800	STABLE	7.00% 1	
$^{87m}_{38}$Sr	0.3885	1/2-	-84.4915	2.815 h 12		IT : 99.70 % ε : 0.30 %

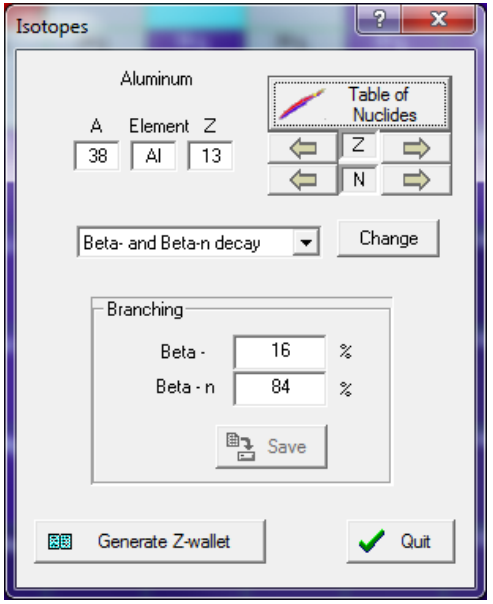
Decay Branching Ratio Database Editor



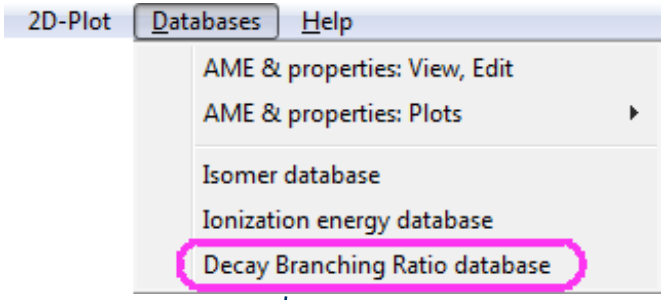
One branch decay

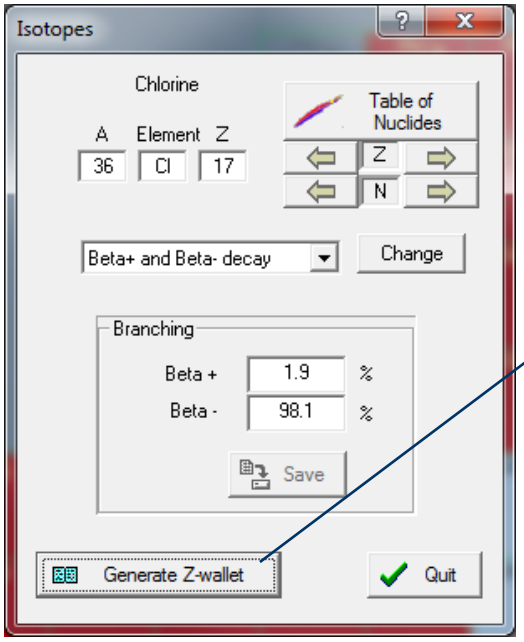


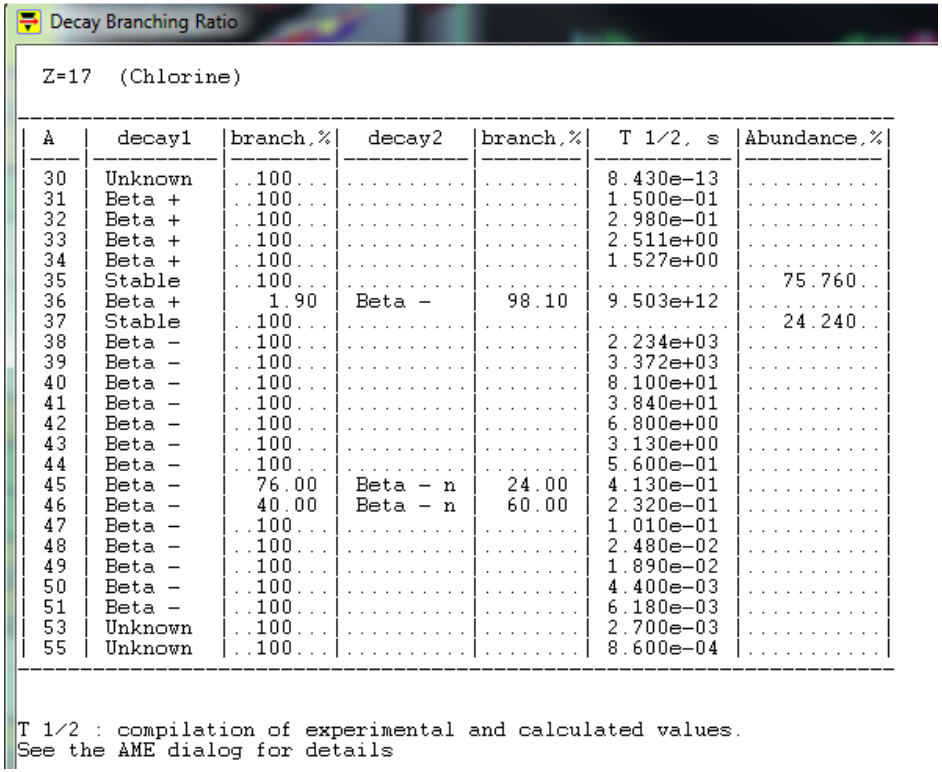
Two branches decay



Decay Branching Ratio Database Editor : Z-wallet





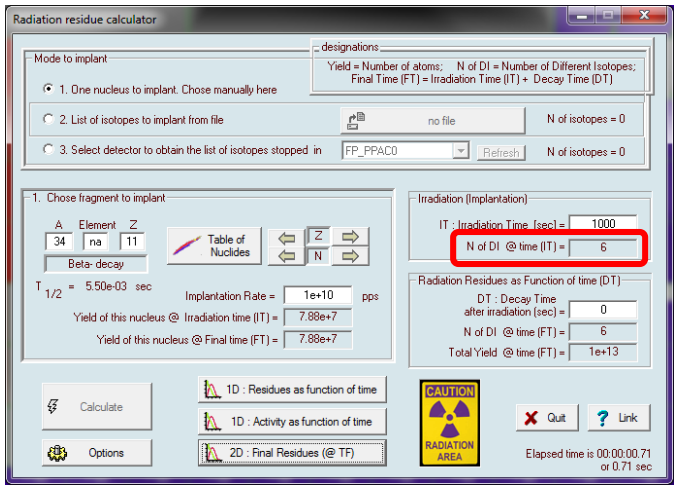


A	decay1	branch,%	decay2	branch,%	T 1/2, s	Abundance,%
30	Unknown	100			8.430e-13	
31	Beta +	100			1.500e-01	
32	Beta +	100			2.980e-01	
33	Beta +	100			2.511e+00	
34	Beta +	100			1.527e+00	
35	Stable	100				75.760
36	Beta +	1.90	Beta -	98.10	9.503e+12	
37	Stable	100				24.240
38	Beta -	100			2.234e+03	
39	Beta -	100			3.372e+03	
40	Beta -	100			8.100e+01	
41	Beta -	100			3.840e+01	
42	Beta -	100			6.800e+00	
43	Beta -	100			3.130e+00	
44	Beta -	100			5.600e-01	
45	Beta -	76.00	Beta - n	24.00	4.130e-01	
46	Beta -	40.00	Beta - n	60.00	2.320e-01	
47	Beta -	100			1.010e-01	
48	Beta -	100			2.480e-02	
49	Beta -	100			1.890e-02	
50	Beta -	100			4.400e-03	
51	Beta -	100			6.180e-03	
53	Unknown	100			2.700e-03	
55	Unknown	100			8.600e-04	

Using the Decay branching ratio database in Radiation Residue calculations

β- n *case*

v.9.10.331. No Decay Branch Database

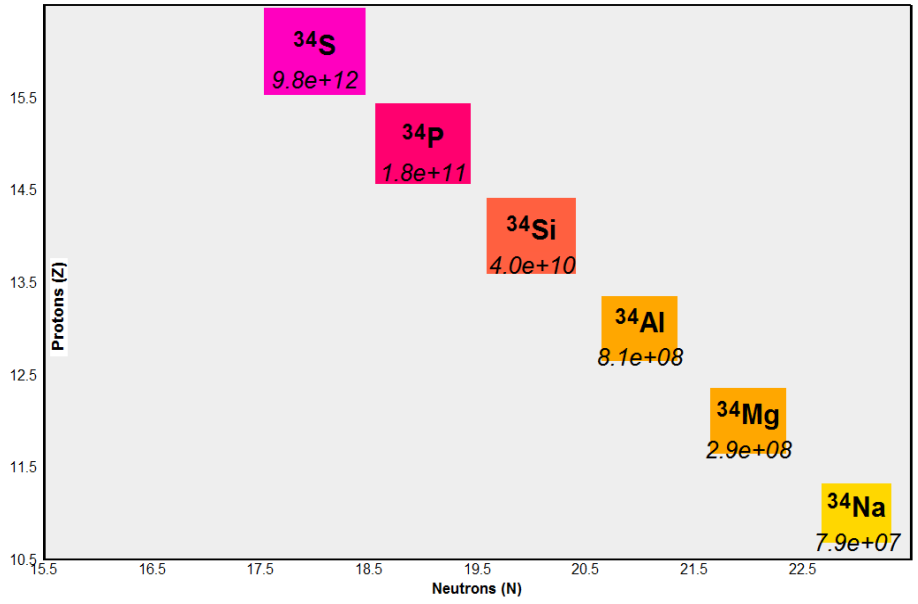


Radioactive decay residues

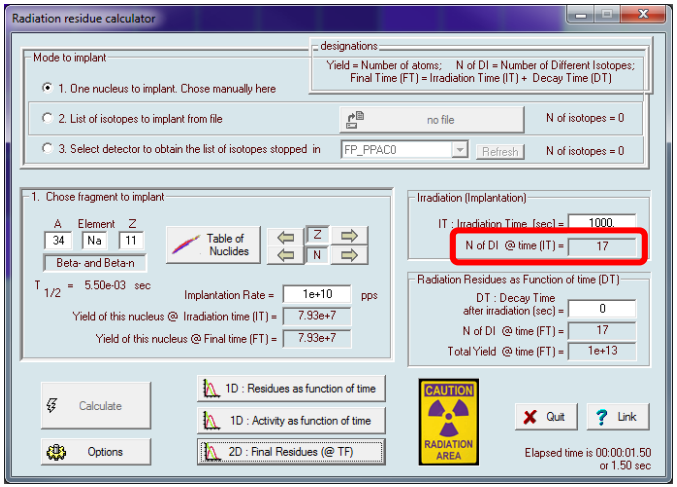
Initial isotope: ^{34}Na

Irradiation Time (IT) = 1.00e+03 sec; Decay Time (DT) = 1.00e-06 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

N_Implant=100, N_Resid=1000, Abs.Error=1.0e-11, Rel.Error=1.0e-03, Threshold=1.0e-10, Model="ODE"



v.9.10.341. With Decay Branch Database

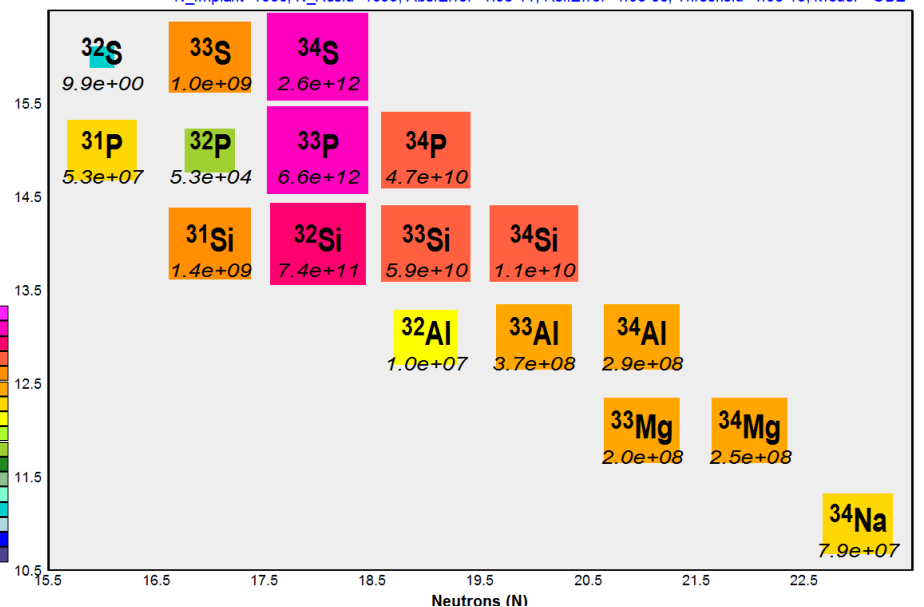


Radioactive decay residues

Initial isotope: ^{34}Na

Irradiation Time (IT) = 1.00e+03 sec; Decay Time (DT) = 1.00e-06 sec; Irr.Rate = 1.00e+10 pps; Plot All isotop

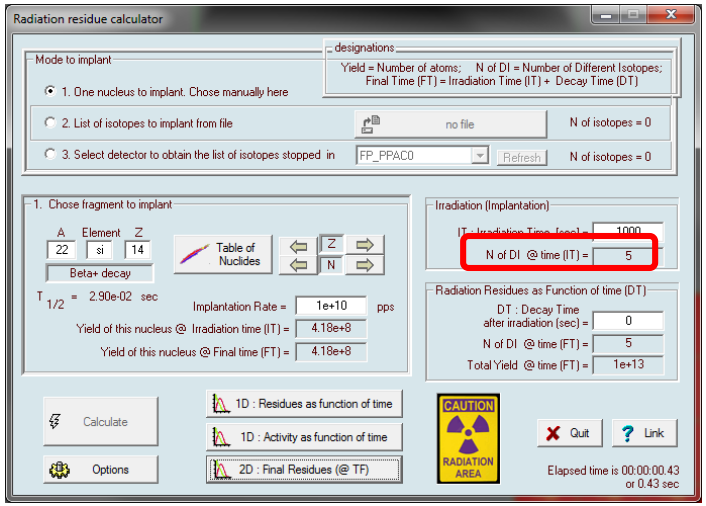
N_Implant=1000, N_Resid=1000, Abs.Error=1.0e-11, Rel.Error=1.0e-03, Threshold=1.0e-10, Model="ODE"



Using the Decay branching ratio database in Radiation Residue calculations

β+ p *case*

v.9.10.331. No Decay Branch Database

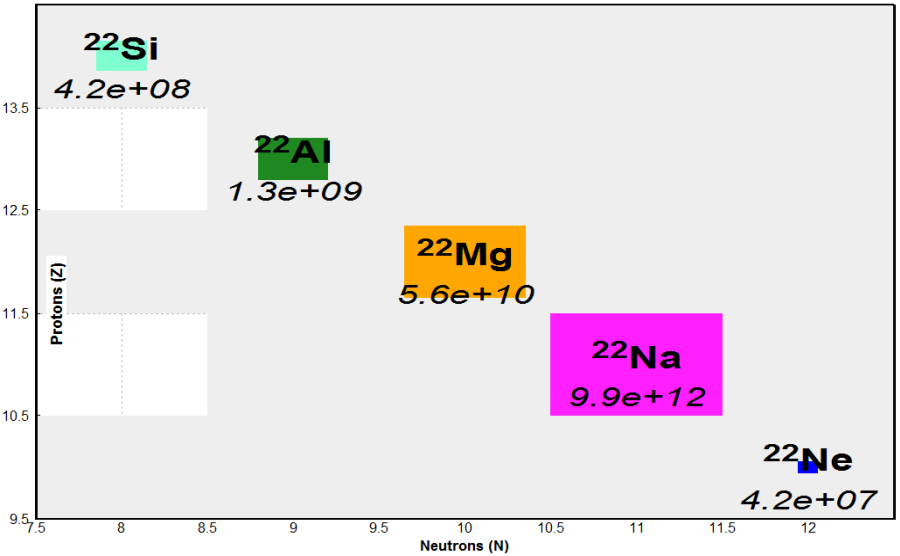


Radioactive decay residues

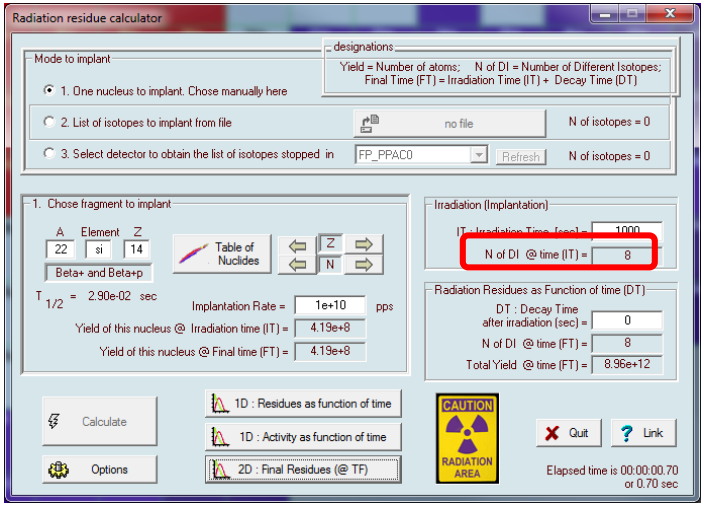
Initial isotope: ^{22}Si

Irradiation Time (IT) = 1.00e+03 sec; Decay Time (DT) = 1.00e-06 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

N_Implant=100, N_Resid=100, Abs.Error=1.0e-11, Rel.Error=1.0e-03, Threshold=1.0e-10, Model="ODE"



v.9.10.341. With Decay Branch Database



Radioactive decay residues

Initial isotope: ^{22}Si

Irradiation Time (IT) = 1.00e+03 sec; Decay Time (DT) = 1.00e-06 sec; Irr.Rate = 1.00e+10 pps; Plot All isotopes

N_Implant=100, N_Resid=100, Abs.Error=1.0e-11, Rel.Error=1.0e-03, Threshold=1.0e-10, Model="ODE"