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Update of RIPL Nuclear Levels Segment

Prepared by

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December 2015

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ABSTRACT

This update of the Nuclear Levels Segment of the Reference Input Parameter Library (RIPL) addresses the issue of levels with unknown energy, extends the Ground States properties with Nubase2012 data, and calculates the Internal Conversion Factor of gamma transition using BrIcc. The software implementation relies on a relational database.

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1 Introduction

In the Consultancy Meeting on *Recommended Input Parameters for Fission Cross-Section Calculation*, held at the IAEA in Vienna, 17-18 December 2013, it was recommended to address the issue of levels with unknown energy in the Nuclear Levels Segment of the Reference Input Parameter Library (RIPL) (Refs. [1] – [4]). This gave rise to the opportunity to make some other modifications to the library in order to address issues reported since the last update [4], to revise the data sources including new evaluated data, and to update some parts of the algorithms.

2 Data Sources and Data Cleaning

Data are taken from Nubase2012 [5], Atomic Mass Evaluation AME2012 [6], and ENSDF [7] (April 2014 snapshot). Nubase2012 provides the most recent evaluation for ground states and isomers, whilst ENSDF includes the entire level-schema. Appendix 1 contains a comparison of half-life and Jp values for a set of relevant libraries.
Data from Nubase2012 and ENSDF libraries are selected and merged according to the following criteria:

2.1. Nuclides included

All Nubase2012 nuclides are included. Some of these nuclides have properties taken from neighbors trend, and in some cases the half-life is not given. They are nevertheless included to insure that each sequence with fixed A, Z, or N has no holes.

2.2. Ground States and their isomers

Ground State (GS) data for all nuclides are taken from Nubase2012, and proton and neutron separation energies from AME2012.
GS isomer ordering is the one adopted in Nubase2012, which in few cases differs from ENSDF. Isomers above the GS are the ones present in ENSDF.

2.3. Removal of uncertain energy assignment

ENSDF assigns a +X (or Y,Z,W, …) to levels for which the energy cannot be determined.
One of the main tasks of this new RIPL discrete levels generation is to assign, when possible, these energies, or otherwise remove these levels from the database. It is worth noting that all these levels were removed from the RIPL database in the previous version, which lead to specific problems specially for odd-odd nuclei.
As first step to accomplish the task, Nubase2012 isomers were scanned to check if they matched any of the ENSDF unknown energy states. In these cases, if Nubase2012 defines the excitation energy, this is used to obtain a value for X. In a few cases, Nubase2012 presents isomers with the same energy as the GS, but quotes an uncertainty. In such cases this uncertainty was taken as isomer energy.

The same X value shifts all the levels in the same band, and the energy-shift is reported in the level line (see below for the format description).

2.4. Removed levels

Levels with unknown energy
All levels with unknown energy left, after the process described above had been applied, were discarded.

Levels after a critical energy gap
A threshold energy gap TEG is defined for each mass A:

$$TEG(A) = F \times 30 / A^{0.67} \text{ MeV}$$
$$\text{where } F = 4.5$$

If between two consecutive levels there is an energy gap which is > 8 MeV and > TEG(A), all levels above this gap are removed.
Table 1 shows the nuclides affected by the above procedure. The column "F_{min}" indicates the minimum value for F to have the gap above the threshold.

Table 1. Nuclides for which the levels above the threshold energy-gap threshold were removed.

#	Nuclide	Level #	Gap [keV]	Threshold [keV]	F_{min}
1	32-Ar	2	22833.0	13239.86	7.76
2	48-Ca	244	10707.0	10090.25	4.78
3	59-MN	3	25849.3	8787.45	13.24
4	57-Ni	163	16700.0	8992.86	8.36
5	85-Kr	74	8208.0	6880.55	5.37
6	93-Y	44	16586.0	6478.14	11.52
7	89-Zr	146	10500.0	6671.79	7.08
8	95-Zr	79	8418.2	6386.44	5.93
9	97-Nb	60	8800.0	6297.91	6.29
10	93-Tc	129	13250.0	6478.14	9.20
11	116-In	73	11774.1	5586.59	9.48
12	117-In	75	10757.5	5554.55	8.72
13	118-Sn	148	8750.0	5522.97	7.13
14	121-Sn	140	10902.0	5430.85	9.03
15	123-Sn	89	12207.0	5371.52	10.23
16	121-Sb	211	9301.2	5430.85	7.71
17	125-Sb	60	9806.9	5313.79	8.31
18	125-I	132	9010.0	5313.79	7.63
19	129-I	47	11216.0	5202.82	9.70
20	143-Pr	22	13156.0	4855.78	12.19
21	161-Tb	68	15061.0	4484.98	15.11
22	169-Tm	149	9101.7	4341.60	9.43
23	170-Tm	258	11627.9	4324.47	12.10
24	173-Lu	81	9416.0	4274.08	9.91
25	179-Ta	158	10853.3	4177.56	11.69
26	192-Os	113	8566.2	3985.86	9.67
27	192-Au	39	9488.5	3985.86	10.71
28	208-Po	95	22816.3	3777.73	27.18
29	209-Po	39	11969.8	3765.61	14.30
30	209-At	62	30305.0	3765.61	36.22
31	230-Pa	1	17763.0	3531.64	22.63

2.5. Removal of energy degeneration

After the steps described above, any two levels having the same energy were split by 0.1 keV.

3 Algorithm Changes

The core algorithms to calculate the maximum number of complete levels and fill the unknown spin and parities are the same as the previous release (Refs [1] – [4]). Some modifications affected the following parts:

3.1 Gamma conversion coefficients

The total internal conversion coefficients (ICC), when not present in ENSDF, are now calculated using BRICC (Ref. [8]). A call to the BRICC-Slave software package using the BrIccFO dataset is made for each unknown ICC. This replaces the previous use of the Hager-Seltzer (HS) dataset with spline interpolation, and affects gamma energies above the pair-creation threshold.

Replacing HS with Frozen Orbital (FO) in calculating ICC, could raise inconsistencies if the mixing, one of the input parameters of FO, was itself calculated with HF.

Given that:

- ~ 2 000 gammas out of ~ 250 000 where evaluated before ENSDF introduced the use of BRICC;
- For many of those gammas the mixing was derived from the angular distribution, not using HF;
- In any case, the ICC was not reported because deemed not relevant (< 1.e-4 according to ENSDF practice).

It was decided to keep the use of BRICC for each unevaluated ICC.

3.2 Gamma intensities

When the value of relative intensity is given in ENSDF with a "<", the value is now reported in the gamma record (previously 0 was taken as value).

3.3 Decays

All decay modes are included for any level. The format of the decay branching (BR) ratio field was changed from F10.6 to E10.4 to allow very small BR.

3.4 Level record: additional fields and format changes

Additional information is given at the end of the level record: the energy shift applied when assigning a value to the X, Y, … occurrences (see 2.3), and the band(s) to which the level is member. Up to 3 bands can be specified.

The format of the half-life field was changed from E10.2 to E10.3, and the format of the decay BR F10.4 to E10.4.

The Fortran format of the level record now reads (bold and underlined for fields with different format; italics, bold and underlined for additional ones):

`(i3,1x,f10.6,1x,f5.1,i3,1x,(`**`e10.3`**`),i3,1x,a1,1x,a4,1x,a18,i3,10(1x,a2,1x,`
`e10.4``,1x,a7),`***`f10.6,1x,3(i1,1x)`***`)`

4 Software Implementation

The Nuclear Data Section maintains a relational database containing nuclear structure and decay data. Amongst other libraries, data from ENSDF and Nubase are available there, and accessible without the burden of parsing the complicated ENSDF format. Besides that, a relational database provides an optimal environment for merging and comparing data.

To take advantage of this opportunity, the original Fortran software was rewritten in Java, which allows:

- Direct connection to the SQL-database where ENSDF and Nubase2012 are stored; data extraction and library merging is performed mainly with SQL statements.
- Seamless integration with the BRICC-slave package.
- Avoiding the use of commercial compiler and libraries required with the original code.

Two minor corrections where made in the z000.dat, where data for some Z = 110 nuclides were present, and to nMax for ^{213}Fr, ^{215}Fr, ^{216}Rn, ^{216}Ra, ^{226}Ra, and ^{226}Th.

5 Record Format Summary

Refer to Ref. [9] for the ENSDF format details.

5.1 Identification

Each isotope begins with an identification record. The corresponding Fortran format is: **(a5,6i5,2f12.6)**

Example:

SYM	A	Z	Nol	Nog	Nmax	Nc	Sn[MeV]	Sp[MeV]
22Mg	22	12	17	18	9	4	19.382000	5.497000

SYM Mass number and symbol of the element
A Mass number
Z Atomic number
Nol Number of levels in the decay scheme
Nog Number of gamma rays in the decay scheme
Nmax Maximum number of levels up to which the level scheme is complete
Nc Number of a level up to which spins and parities are unique
Sn Neutron separation energy in MeV
Sp Proton separation energy in MeV

5.2 Level

The level record follows the identification record. The Fortran format is (bold and underlined for the ones with different format; italics, bold and underlined for the additional ones):

(i3,1x,f10.6,1x,f5.1,i3,1x,(**e10.3**),i3,1x,a1,1x,a4,1x,a18,i3,10(1x,a2,1x,**e10.4**,1x,a7),***f10.6,1x,3(i1,1x)***)

Example:

```
N1  Elv[MeV]  s   p   T1/2    Ng  J  unc  spins   nd  m  perc     mode

1  0.000000  0.0  1  3.86E+00  0          0+      1  =  100.0000 %EC+%B+
```

```
ESh[MeV] band
0.000100 3
```

Each level record may contain the following quantities:

Nl Sequential number of a level
Elv Energy of the level in MeV
s Level spin (unique). Unknown and undetermined spins are entered as -1.0
p Parity (unique). If the parity of the level was unknown, an equal probability is assigned to positive or negative. The method of choice is not coded.
T1/2 Half-life of the level (if known). All known half-lives or level widths are converted into seconds. Half-lives of stable nuclei are given as -1.0E+0.
Ng Number of gamma rays de-exciting the level.
J Flag for spin estimation method.
unc Flag for an uncertain level energy. The ENSDF notation X+, Y+, Z+ etc. for different bands.
spins Original spins from the ENSDF file.
nd Number of decay modes of the level (if known). Values from 0 to 1 are possible; 0 means that the level may decay via gamma-emission and other decay modes are not known.
m Decay percentage modifier; informs a user about major uncertainties, and are taken from ENSDF. They can have the following values: =, <, >, ? (unknown, but expected), AP (approximate), GE (greater or equal), LE (less or equal), LT (less then), SY (value from systematics).
Perc Percentage decay of different decay modes. As a general rule the various decay modes add up 100%. There are, however, two exceptions:
(i) when a small percentage decay is present, the sum may be slightly more than 100% due to rounding error,
(ii) when ß-decay is followed by a heavier particle emission, the percentage of the beta-delayed particle emission is given as a portion of the ß-decay and the sum can be substantially larger than 100%. When the modifier is "?" the sum is indefinite.
Mode Short indication of decay modes of a level
ESh **New field.** The energy shift applied to remove degeneration, in MeV (see 2.3)
band **New field.** Sequential number of the band(s) to which the level is member

5.3 Gamma

Gamma records may follow the level record. The corresponding FORTRAN format is
`(39x,i4,1x,f10.3,3(1x,e10.3))`

Example:

```
Nf     Eg[MeV]        Pg           Pe           ICC
3       0.055      4.267E02     1.301E01     2.050E+00
```

Nf Sequential number of the final state
Eg Gamma-ray energy in MeV
Pg Probability that a level decays through the given gamma-ray emission. Pg is the ratio of the total electromagnetic decay of the level to the intensity of the gamma-ray.
Pe Probability that a level decays with the given electromagnetic transition. The sum of electromagnetic decays is normalized to 1 unless the level has other decay modes than the electromagnetic one.
ICC Internal conversion coefficient of a transition.
Pe = Pg * (1 + ICC)

6 Conclusions

Difficulties in extracting computer readable data from the ENSDF library, already mentioned in Refs. [1] and [9], have burdened the effort of updating the RIPL Nuclear Level Segment, and to address the issue of levels with unknown energy. The use of a relational database, whereby various data libraries are accessed via SQL, has proven an efficient way to filter and merge data and implement the modifications suggested by users' feedback.

Authors acknowledge helpful suggestions, validation of intermediate sets and useful discussions with A. Koning and T. Kawano.

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APPENDIX 1: Comparison of Data Libraries

Ground states from Nubase2012 are compared against JEFF 3.1.1 (Ref. [11]), Endf/B-VII (Ref. [13]), and ENSDF (April 2014) [14]. The purpose is to have a picture of included nuclides, and of any major differences in half-lives or spin-parity assignments. The new RIPL version is also included to check the consistency of the algorithm described in Section 2. Only Ground States are included in this comparison.
Half-life values of each library are converted into Nubase2012 units.

For a detailed explanation of the criteria adopted in each library, the reader is referred to the publications mentioned above.

Legend
Gray fields indicate a nuclide not included in the library.
Light gray fields indicate a major difference with Nubase2012. Minor differences caused by rounding errors are not considered.

# indicates a value derived from trends in values on neighboring nuclides.
(…) indicates an uncertain assignment.

Half-life units:
s = seconds; m = minutes; h = hours; d = days; y = years; 1 y = 31 556 926 s or 365.2422 d
subunits:

ms :10^{-3} s millisecond	ky : 10^{3} y kiloyear
ms: 10^{-6} s microsecond	My :10^{6} y megayear
ns : 10^{-9} s nanosecond	Gy :10^{9} y gigayear
ps : 10^{-12} s picosecond	Ty : 10^{12} y terayear
fs : 10^{-15} s femtosecond	Py : 10^{15} y petayear
as : 10^{-18} s attosecond	Ey : 10^{18} y exayear
zs : 10^{-21} s zeptosecond	Zy : 10^{21} y zettayear
ys : 10^{-24} s yoctosecond	Yy : 10^{24} y yottayear

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	**Units**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**
1-n	613.9 ± *0.6*	s	1/2+	613.9	0.5 +	613.9 ± *0.6*	0.5 +	613.9 ± *0.6*	0.5 +	613.9 ± *0.6*	0.5 +
1-H	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
2-H	stable		1+	stable	1.0 +	stable	1.0 +	stable	1.0 +		1+
3-H	12.32 ± *0.02*	y	1/2+	12.32	0.5 +	12.33 ± *0.02*	0.5 +	12.32 ± *0.02*	0.5 +	12.32 ±*0.02*	1/2+
3-He	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
3-Li	p-unst				?						
4-H	139 ± *10.0*	ys	2-	139	2	139 ± *10.0*	2.0 -	**99.1 ± *19.4***	2.0 -		2-
4-He	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
4-Li	91 ± *9.0*	ys	2-	91	2	91 ± *9.0*	2.0 -	**76 ± *0.0***	2.0 -		2-
5-H	>910	ys	(1/2+)	910	0.5 +	910 ± *0.0*	0.5 +	**79.9 ± *29.5***	**? -**		
5-He	700 ± *30.0*	ys	3/2-	700	1.5	700 ± *30.0*	1.5 -	**760 ± *25.3***	1.5 -	704 ± *0.0*	3/2-
5-Li	370 ± *30.0*	ys	3/2-	370	1.5	370 ± *30.0*	1.5 -	**307 ± *0.0***	1.5 -	371 ± *0.0*	3/2-
5-Be			1/2+#		0.5 +	**1E-9 ± *1.0E-9***	0.5 +	**1E-9 ± *0.0***	0.5 +		
6-H	290 ± *70.0*	ys	2-#	290	2	290 ± *70.0*	2.0 -	285 ± *71.2*	2.0 -	285 ±*57.0*	(2-)
6-He	806.92 ± *0.24*	ms	0+	806.9	0.0 +	808.10 ± *2.0*	0.0 +	806.70 ± *0.1*	0.0 +	806.70 ±*1.5*	0+
6-Li	stable		1+	stable	1.0 +	stable	1.0 +	stable	1.0 +		1+
6-Be	5.0 ± *0.3*	zs	0+	5	0.0 +	5 ± *0.3*	0.0 +	5.0 ± *0.32*	0.0 +	5.0 ± *0.3*	0+
6-B	p-unst#		2-#		2	**1E-9 ± *1.0E-9***	2.0 -	**1E-9 ± *0.0***	**? -**		
7-H	500#	ys	1/2+#	500	0.5 +	**23.0 ± *0.6***	0.5 +	**23.0 ± *0.6***	0.5 +		
7-He	3.1 ± *0.4*	zs	(3/2)-	3.1	1.5	**2.9 ± *0.5***	1.5 -	**3.0 ± *0.41***	1.5 -	**3.0 ±*0.36***	(3/2)-
7-Li	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
7-Be	53.22 ± *0.06*	d	3/2-	53.22	1.5	53.22 ± *0.06*	1.5 -	53.22 ± *0.06*	1.5 -	53.22 ±*0.06*	3/2-
7-B	570 ± *140.0*	ys	(3/2-)	570	1.5	**350 ± *50.0***	1.5 -	**326 ± *46.5***	1.5 -	**326 ±*40.7***	(3/2-)
8-He	119.1 ± *1.2*	ms	0+	119.1	0.0 +	**122 ± *2.0***	0.0 +	119.1 ± *1.2*	0.0 +	119.1 ±*1.2*	0+
8-Li	839.40 ± *0.36*	ms	2+	839.4	2.0 +	838 ± *6.0*	2.0 +	838 ± *6.0*	2.0 +	839.90 ±*0.9*	2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
8-Be	81.9 ± *3.7*	as	0+	81.9	0.0 +	**70 ± *20.0***	0.0 +	81.8 ± *3.67*	0.0 +	81.9 ±*3.52*	0+
8-B	770 ± *3.0*	ms	2+	770	2.0 +	770 ± *3.0*	2.0 +	770 ± *3.0*	2.0 +	770 ± *3.0*	2+
8-C	3.5 ± *1.4*	zs	0+	3.5	0.0 +	**2 ± *0.4***	0.0 +	**2.0 ± *0.43***	0.0 +	**2.0 ±*0.35***	0+
9-He	8 ± *5.0*	zs	1/2-	8	0.5	**7 ± *4.0***	0.5 -	**7 ± *4.0***	**0.5 +**		**1/2+**
9-Li	178.3 ± *0.4*	ms	3/2-	178.3	1.5	178.3 ± *0.4*	1.5 -	178.3 ± *0.4*	1.5 -	178.3 ±*0.4*	3/2-
9-Be	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
9-B	800 ± *300.0*	zs	3/2-	800	1.5	800 ± *300.0*	1.5 -	**844 ± *328.0***	1.5 -	**845 ±*237.0***	3/2-
9-C	126.5 ± *0.9*	ms	(3/2-)	126.5	1.5	126.5 ± *0.9*	1.5 -	126.5 ± *0.9*	1.5 -	126.5 ±*0.9*	(3/2-)
10-He	3.1 ± *2.0*	zs	0+	3.1	0.0 +	**2.7 ± *1.8***	0.0 +	**1.5 ± *1.0***	0.0 +	**1.5 ±*0.61***	(0+)
10-Li	2.0 ± *0.5*	zs	(1-;2-)	2	**?**	2 ± *0.5*	**? -**	2 ± *0.0*	**? -**		(1-,2-)
10-Be	1.51 ± *0.04*	My	0+	1.51	0.0 +	**1.60 ± *0.2***	0.0 +	1.51 ± *0.06*	0.0 +	1.51 ±*0.04*	0+
10-B	stable		3+	stable	3.0 +	stable	3.0 +	stable	3.0 +		3+
10-C	19.306 ± *0.0040*	s	0+	19.31	0.0 +	19.255 ±*0.053*	0.0 +	19.290 ±*0.012*	0.0 +	19.290 ±*0.012*	0+
10-N	200 ± *140.0*	ys	(2-)	200	2	200 ± *140.0*	2.0 -	200 ± *0.0*	**? -**		
11-Li	8.75 ± *0.14*	ms	3/2-	8.75	1.5	8.75 ± *0.14*	1.5 -	8.59 ± *0.14*	1.5 -	8.75 ±*0.14*	3/2-
11-Be	13.76 ± *0.07*	s	1/2+	13.76	0.5 +	13.81 ± *0.08*	0.5 +	13.81 ± *0.08*	0.5 +	13.76 ±*0.07*	1/2+
11-B	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
11-C	20.364 ± *0.014*	m	3/2-	20.367	1.5	20.370 ±*0.029*	1.5 -	20.385 ± *0.02*	1.5 -	20.364 ±*0.014*	3/2-
11-N	550 ± *20.0*	ys	1/2+	550	0.5 +	**590 ± *210.0***	0.5 +	**313 ± *0.0***	0.5 +	550 ±*19.2*	1/2+
12-Li	<10	ns		10	?	10 ± *0.0*	? -	10 ± *0.0*	? -		
12-Be	21.50 ± *0.04*	ms	0+	21.5	0.0 +	21.30 ± *0.1*	0.0 +	21.30 ± *0.1*	0.0 +	21.30 ±*0.1*	0+
12-B	20.20 ± *0.02*	ms	1+	20.2	1.0 +	20.20 ± *0.02*	1.0 +	20.20 ± *0.02*	1.0 +	20.20 ±*0.02*	1+
12-C	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
12-N	11.000 ± *0.016*	ms	1+	11	1.0 +	11 ± *0.016*	1.0 +	11 ± *0.016*	1.0 +	11 ±*0.016*	1+
12-O	>6.3	zs	0+	6.3	0.0 +	**0.58 ± *0.03***	0.0 +	**1.1 ± *0.71***	0.0 +	**1.1 ±*0.44***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
13-Li			3/2-#		1.5						
13-Be	1.0 ± *0.7*	zs	(1/2-)	1	0.5	**5.0E+11 ±*1.0E11***	**0.5 +**	**2.7 ± *1.8***	0.5 -	**2.7 ±*1.8***	(1/2-)
13-B	17.33 ± *0.17*	ms	3/2-	17.33	1.5	17.33 ± *0.17*	1.5 -	17.36 ± *0.16*	1.5 -	17.33 ±*0.17*	3/2-
13-C	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
13-N	9.965 ± *0.0040*	m	1/2-	9.965	0.5	9.967 ±*0.0037*	0.5 -	9.965 ±*0.0040*	0.5 -	9.965 ±*0.0040*	1/2-
13-O	8.58 ± *0.05*	ms	(3/2-)	8.58	1.5	8.58 ± *0.05*	1.5 -	8.58 ± *0.05*	1.5 -	8.58 ±*0.05*	(3/2-)
14-Be	4.35 ± *0.17*	ms	0+	4.35	0.0 +	4.35 ± *0.17*	0.0 +	4.35 ± *0.17*	0.0 +	4.35 ±*0.17*	
14-B	12.5 ± *0.5*	ms	2-	12.5	2	12.5 ± *0.5*	2.0 -	12.5 ± *0.5*	2.0 -	12.5 ±*0.5*	2-
14-C	5.70 ± *0.03*	ky	0+	5.7	0.0 +	5.70 ± *0.03*	0.0 +	5.70 ± *0.03*	0.0 +	5.70 ±*0.03*	0+
14-N	stable		1+	stable	1.0 +	stable	1.0 +	stable	1.0 +		1+
14-O	70.621 ± *0.014*	s	0+	70.62	0.0 +	70.606 ±*0.018*	0.0 +	70.606 ±*0.018*	0.0 +	70.606 ±*0.018*	0+
14-F	500 ± *60.0*	ys	2-	500	2	**1.00E+15 ±*1.0E15***	2.0 -	500 ± *55.0*	2.0 -		
15-Be	<200ns	ns		200	?	200 ± *0.0*	? -	200 ± *0.0*	? -		
15-B	9.93 ± *0.07*	ms	3/2-	9.93	1.5	9.87 ± *0.07*	1.5 -	9.93 ± *0.07*	**? -**	9.93 ±*0.07*	
15-C	2.449 ± *0.0050*	s	1/2+	2.449	0.5 +	2.449 ±*0.0050*	0.5 +	2.449 ±*0.0050*	0.5 +	2.449 ±*0.0050*	1/2+
15-N	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
15-O	122.24 ± *0.16*	s	1/2-	122.2	0.5	122.46 ± *0.36*	0.5 -	122.24 ± *0.16*	0.5 -	122.24 ±*0.16*	1/2-
15-F	410 ± *60.0*	ys	1/2+	410	0.5 +	410 ± *60.0*	0.5 +	**456 ± *91.1***	0.5 +	**456 ±*76.0***	(1/2+)
16-Be	650 ± *130.0*	ys	0+	650	0.0 +	**2.00E+17 ±*0.0***	0.0 +	**2.00E+17 ±*0.0***	0.0 +		
16-B	<190	ps	0-#	190	0	190 ± *0.0*	0.0 -	190 ± *0.0*	0.0 -	190 ± *0.0*	0-
16-C	747 ± *8.0*	ms	0+	747	0.0 +	747 ± *8.0*	0.0 +	747 ± *8.0*	0.0 +	747 ± *8.0*	0+
16-N	7.13 ± *0.02*	s	2-	7.13	2	7.13 ± *0.02*	2.0 -	7.13 ± *0.02*	2.0 -	7.13 ±*0.02*	2-
16-O	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
16-F	11 ± *6.0*	zs	0-	11	0	11 ± *6.0*	0.0 -	11 ± *5.7*	0.0 -	11 ± *3.8*	0-
16-Ne	9	zs	0+	9	0.0 +	9 ± *0.0*	0.0 +	**4 ± *1.0***	0.0 +	**4 ± *0.9***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	**Units**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**
17-B	5.08 ± *0.05*	ms	(3/2-)	5.08	1.5	5.08 ± *0.05*	1.5 -	5.08 ± *0.05*	1.5 -	5.08 ±*0.05*	(3/2-)
17-C	193 ± *5.0*	ms	(3/2+)	193	1.5 +	193 ± *5.0*	1.5 +	193 ± *13.0*	**? -**	193 ±*13.0*	
17-N	4.173 ± *0.0040*	s	1/2-	4.173	0.5	4.170 ±*0.0040*	0.5 -	4.171 ±*0.0030*	0.5 -	4.173 ±*0.0040*	1/2-
17-O	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
17-F	64.49 ± *0.16*	s	5/2+	64.49	2.5 +	64.49 ± *0.16*	2.5 +	64.49 ± *0.16*	2.5 +	64.49 ±*0.16*	5/2+
17-Ne	109.2 ± *0.6*	ms	1/2-	109.2	0.5	109.2 ± *0.6*	0.5 -	109.2 ± *0.6*	0.5 -	109.2 ±*0.6*	1/2-
18-B	<26	ns	(2-)	26	2	26 ± *0.0*	**4.0 -**	26 ± *0.0*	**4.0 -**		
18-C	92 ± *2.0*	ms	0+	92	0.0 +	92 ± *2.0*	0.0 +	92 ± *2.0*	0.0 +	92 ± *2.0*	(0+)
18-N	619.2 ± *1.9*	ms	1-	619.2	1	622 ± *9.0*	1.0 -	624 ± *12.0*	1.0 -	624 ±*12.0*	1-
18-O	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
18-F	109.771 ± *0.02*	m	1+	109.767	1.0 +	109.728 ±*0.018*	1.0 +	109.770 ±*0.05*	1.0 +	109.770 ± *0.05*	1+
18-Ne	1.6656 ± *0.0019*	s	0+	1.666	0.0 +	1.6720 ±*0.0080*	0.0 +	1.6720 ±*0.0080*	0.0 +	1.6720 ±*0.0080*	0+
18-Na	1.3 ± *0.4*	zs	1-#	1.3	1	1.3 ± *0.4*	1.0 -	1.3 ± *0.4*	1.0 -		
19-B	2.92 ± *0.13*	ms	3/2-#	2.92	1.5	2.92 ± *0.13*	1.5 -	2.92 ± *0.13*	1.5 -		
19-C	46.2 ± *2.3*	ms	(1/2+)	46.2	0.5 +	46.2 ± *2.3*	0.5 +	**49 ± *4.0***	**? -**		
19-N	336 ± *3.0*	ms	1/2-	336	0.5	**271 ± *8.0***	0.5 -	**271 ± *8.0***	**? -**	**271 ±*8.0***	
19-O	26.464 ± *0.0090*	s	5/2+	26.46	2.5 +	26.910 ± *0.08*	2.5 +	26.880 ± *0.05*	2.5 +	26.880 ±*0.05*	5/2+
19-F	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
19-Ne	17.262 ± *0.0070*	s	1/2+	17.26	0.5 +	17.220 ± *0.02*	0.5 +	17.220 ± *0.02*	0.5 +	17.220 ±*0.02*	1/2+
19-Na	>1	as	5/2+#	1	2.5 +	**4E+10 ± *0.0***	2.5 +	**4E+10 ± *0.0***	2.5 +		
19-Mg	5 ± *3.0*	ps	1/2-#	5	0.5			**4 ± *2.0***	**? -**		
20-B					?						
20-C	16 ± *3.0*	ms	0+	16	0.0 +	16 ± *3.0*	0.0 +	**15 ± *5.5***	0.0 +	**14 ± *0.0***	
20-N	136 ± *3.0*	ms		136	?	**130 ± *7.0***	? -	**130 ± *7.0***	? -	**130 ±*7.0***	
20-O	13.51 ± *0.05*	s	0+	13.51	0.0 +	13.51 ± *0.05*	0.0 +	13.51 ± *0.05*	0.0 +	13.51 ±*0.05*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
20-F	11.163 ± *0.0080*	s	2+	11.16	2.0 +	11.030 ± *0.03*	2.0 +	11.163 ±*0.0080*	2.0 +	11.070 ±*0.06*	2+
20-Ne	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
20-Na	447.9 ± *2.3*	ms	2+	447.9	2.0 +	447.9 ± *2.3*	2.0 +	447.9 ± *2.3*	2.0 +	447.9 ±*2.3*	2+
20-Mg	90 ± *6.0*	ms	0+	90	0.0 +	90 ± *6.0*	0.0 +	91 ± *2.4*	0.0 +	91 ± *2.4*	0+
21-B	<260ns	ns	3/2-#	260	1.5						
21-C	<30ns	ns	1/2+#	30	0.5 +	30 ± *0.0*	0.5 +	30 ± *0.0*	0.5 +		
21-N	83 ± *8.0*	ms	(1/2-)	83	0.5	**87 ± *6.0***	0.5 -	**85 ± *7.0***	0.5 -	83 ± *8.0*	(1/2-)
21-O	3.42 ± *0.1*	s	(5/2+)	3.42	2.5 +	3.42 ± *0.1*	2.5 +	3.42 ± *0.1*	2.5 +	3.42 ±*0.1*	(5/2+)
21-F	4.158 ± *0.02*	s	5/2+	4.158	2.5 +	4.158 ± *0.02*	2.5 +	4.158 ± *0.02*	2.5 +	4.158 ±*0.02*	5/2+
21-Ne	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
21-Na	22.49 ± *0.04*	s	3/2+	22.49	1.5 +	22.49 ± *0.04*	1.5 +	22.49 ± *0.04*	1.5 +	22.49 ±*0.04*	3/2+
21-Mg	122 ± *2.0*	ms	5/2+	122	2.5 +	122 ± *3.0*	2.5 +	122 ± *3.0*	2.5 +	122 ± *3.0*	5/2+
21-Al	<35ns	ns	5/2+#	35	2.5 +	35 ± *0.0*	**0.5 +**	35 ± *0.0*	2.5 +	35 ± *0.0*	(5/2+)
22-C	6.2 ± *1.3*	ms	0+	6.2	0.0 +	6.2 ± *1.3*	0.0 +	6.2 ± *1.3*	0.0 +	6.1 ± *0.0*	0+
22-N	24 ± *5.0*	ms		24	?	**14 ± *1.4***	? -	24 ± *5.0*	? -	24 ± *5.0*	
22-O	2.25 ± *0.09*	s	0+	2.25	0.0 +	2.25 ± *0.15*	0.0 +	2.25 ± *0.09*	0.0 +	2.25 ±*0.09*	0+
22-F	4.23 ± *0.04*	s	(4+)	4.23	4.0 +	4.23 ± *0.04*	**? -**	4.23 ± *0.04*	4.0 +	4.23 ±*0.04*	(4+)
22-Ne	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
22-Na	2.6027 ± *0.0010*	y	3+	2.6026	3.0 +	2.6027 ±*0.0010*	3.0 +	2.6028 ±*0.0010*	3.0 +	2.6027 ±*0.0010*	3+
22-Mg	3.8755 ± *0.0012*	s	0+	3.876	0.0 +	3.8570 ±*0.0090*	0.0 +	3.8755 ±*0.0012*	0.0 +	3.8755 ±*0.0012*	0+
22-Al	91.1 ± *0.5*	ms	(4)+	91.1	4.0 +	**59.0 ± *3.0***	**3.0 +**	**59.0 ± *3.0***	**3.0 +**	**59 ± *3.0***	(3)+
22-Si	29 ± *2.0*	ms	0+	29	0.0 +	29 ± *2.0*	0.0 +	29 ± *2.0*	0.0 +	29 ± *2.0*	0+
23-C			3/2+#		1.5 +						

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
23-N	13.9 ± *1.4*	ms	1/2-#	13.9	0.5	**14.5 ± *1.4***	0.5 -	**14.5 ± *1.4***	**? -**	14.1 ±*1.5*	
23-O	97 ± *8.0*	ms	1/2+	97	0.5 +	**90 ± *40.0***	0.5 +	**91 ± *37.0***	0.5 +	**82 ± *0.0***	1/2+
23-F	2.23 ± *0.14*	s	5/2+	2.23	2.5 +	2.23 ± *0.14*	**? -**	2.23 ± *0.14*	2.5 +	2.23 ±*0.14*	5/2+
23-Ne	37.14 ± *0.05*	s	5/2+	37.14	2.5 +	37.20 ± *0.2*	2.5 +	37.24 ± *0.12*	2.5 +	37.24 ±*0.12*	5/2+
23-Na	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
23-Mg	11.317 ± *0.011*	s	3/2+	11.32	1.5 +	11.317 ±*0.011*	1.5 +	11.317 ±*0.011*	1.5 +	11.317 ±*0.011*	3/2+
23-Al	470 ± *30.0*	ms	5/2+	470	2.5 +	470 ± *30.0*	2.5 +	470 ± *30.0*	2.5 +	470 ±*30.0*	5/2+
23-Si	42.3 ± *0.4*	ms	3/2+#	42.3	1.5 +	**0.0000423 ±*4.0E-7***	1.5 +	42.3 ± *0.4*	**? -**	42.3 ±*0.4*	(5/2)+
24-N	<52ns	ns		52	?	52 ± *0.0*	? -	52 ± *0.0*	? -	52 ± *0.0*	
24-O	65 ± *5.0*	ms	0+	65	0.0 +	65 ± *5.0*	0.0 +	65 ± *5.0*	0.0 +	65 ± *5.0*	0+
24-F	384 ± *16.0*	ms	(1;2;3)+	384	**?**	**400 ± *50.0***	**? -**	390 ± *70.0*	**? -**	390 ±*70.0*	(3+)
24-Ne	3.38 ± *0.02*	m	0+	3.38	0.0 +	3.38 ± *0.02*	0.0 +	3.38 ± *0.02*	0.0 +	3.38 ±*0.02*	0+
24-Na	14.997 ± *0.012*	h	4+	14.997	4.0 +	14.957 ±*0.0020*	4.0 +	14.997 ±*0.012*	4.0 +	14.997 ±*0.012*	4+
24-Mg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
24-Al	2.053 ± *0.0040*	s	4+	2.053	4.0 +	2.053 ±*0.0040*	4.0 +	2.053 ±*0.0040*	4.0 +	2.053 ±*0.0040*	4+
24-Si	140 ± *8.0*	ms	0+	140	0.0 +	140 ± *8.0*	0.0 +	140 ± *8.0*	0.0 +	140 ± *8.0*	0+
24-P			1+#		1.0 +	**1E-9 ± *1.0E-9***	1.0 +	**0.007 ± *0.0***	1.0 +		
25-N	<260ns	ns	1/2-#	260	0.5	260 ± *0.0*	0.5 -	260 ± *0.0*	**? -**		
25-O	2.8 ± *0.5*	zs	3/2+#	2.8	1.5 +	**5.0E+13 ±*0.0***	1.5 +	**5.0E+13 ±*0.0***	1.5 +		
25-F	80 ± *9.0*	ms	(5/2+)	80	2.5 +	**50 ± *6.0***	2.5 +	**50 ± *6.0***	2.5 +	80 ± *9.0*	5/2+
25-Ne	602 ± *8.0*	ms	1/2+	602	0.5 +	602 ± *8.0*	**1.5 +**	602 ± *8.0*	0.5 +	602 ± *8.0*	1/2+
25-Na	59.1 ± *0.6*	s	5/2+	59.1	2.5 +	59.6 ± *0.7*	2.5 +	59.1 ± *0.6*	2.5 +	59.1 ±*0.6*	5/2+
25-Mg	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
25-Al	7.183 ± *0.012*	s	5/2+	7.183	2.5 +	7.183 ± *0.012*	2.5 +	7.183 ± *0.012*	2.5 +	7.183 ±*0.012*	5/2+
25-Si	220 ± *3.0*	ms	5/2+	220	2.5 +	220 ± *3.0*	2.5 +	220 ± *3.0*	2.5 +	220 ± *3.0*	5/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
25-P	<30ns	ns	1/2+#	30	0.5 +	30 ± *0.0*	0.5 +	30 ± *0.0*	0.5 +	30 ± *0.0*	(1/2+)
26-O	90	zs	0+	90	0.0 +	**4.0E+13 ±*0.0***	0.0 +	**4.0E+13 ±*0.0***	0.0 +		0+
26-F	9.7 ± *0.7*	ms	(1+)	9.7	1.0 +	**10 ± *1.4***	1.0 +	9.6 ± *0.8*	1.0 +	9.7 ± *0.7*	(1+)
26-Ne	197 ± *1.0*	ms	0+	197	0.0 +	197 ± *1.0*	0.0 +	197 ± *1.0*	0.0 +	197 ± *1.0*	0+
26-Na	1.0713 ± *2E-4*	s	3+	1.071	3.0 +	1.0800 ± *0.01*	3.0 +	1.0770 ±*0.0050*	3.0 +	1.0770 ±*0.0050*	3+
26-Mg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
26-Al	717 ± *24.0*	ky	5+	717	5.0 +	717 ± *24.0*	5.0 +	717 ± *24.0*	5.0 +	717 ±*24.0*	5+
26-Si	2.2283 ± *0.0027*	s	0+	2.228	0.0 +	2.2340 ±*0.013*	0.0 +	2.2340 ±*0.013*	0.0 +	2.2340 ±*0.013*	0+
26-P	43.7 ± *0.6*	ms	(3+)	43.7	3.0 +	**30 ± *25.0***	3.0 +	43.7 ± *0.6*	3.0 +	**20 ± *0.0***	(3+)
26-S	<79ns	ns	0+	79	0.0 +	**1.0E+7 ± *0.0***	0.0 +	**1.0E+7 ±*1000000.0***	0.0 +		
27-O	<260ns	ns	3/2+#	260	1.5 +	260 ± *0.0*	1.5 +	260 ± *0.0*	**? -**		
27-F	4.9 ± *0.2*	ms	5/2+#	4.9	2.5 +	4.9 ± *0.2*	2.5 +	**5 ± *0.2***	2.5 +	**5 ± *0.2***	(5/2+)
27-Ne	31.5 ± *1.3*	ms	(3/2+)	31.5	1.5 +	32 ± *2.0*	1.5 +	32 ± *2.0*	1.5 +	31.5 ±*1.3*	(3/2+)
27-Na	301 ± *6.0*	ms	5/2+	301	2.5 +	301 ± *6.0*	2.5 +	301 ± *6.0*	2.5 +	301 ± *6.0*	5/2+
27-Mg	9.458 ± *0.012*	m	1/2+	9.458	0.5 +	9.458 ± *0.012*	0.5 +	9.458 ± *0.012*	0.5 +	9.458 ±*0.012*	1/2+
27-Al	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
27-Si	4.15 ± *0.04*	s	5/2+	4.15	2.5 +	4.16 ± *0.02*	2.5 +	4.16 ± *0.02*	2.5 +	4.15 ±*0.04*	5/2+
27-P	260 ± *80.0*	ms	1/2+	260	0.5 +	260 ± *80.0*	0.5 +	260 ± *80.0*	0.5 +	260 ±*80.0*	1/2+
27-S	15.5 ± *1.5*	ms	(5/2+)	15.5	2.5 +	**21 ± *4.0***	2.5 +	15.5 ± *1.5*	2.5 +	15.5 ±*1.5*	(5/2+)
28-O	<100ns	ns	0+	100	0.0 +	100 ± *0.0*	0.0 +	100 ± *0.0*	0.0 +		
28-F	<40ns	ns		40	?	40 ± *0.0*	? -	40 ± *0.0*	? -	**4.6E-11 ± *0.0***	
28-Ne	18.9 ± *0.4*	ms	0+	18.9	0.0 +	**18.3 ± *2.2***	0.0 +	18.9 ± *0.4*	0.0 +	**20 ± *1.0***	0+
28-Na	30.5 ± *0.4*	ms	1+	30.5	1.0 +	30.5 ± *0.4*	1.0 +	30.5 ± *0.4*	1.0 +	30.5 ±*0.4*	1+
28-Mg	20.915 ± *0.0090*	h	0+	20.914	0.0 +	20.900 ± *0.03*	0.0 +	20.915	0.0 +	20.915 ±*0.0090*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
								±0.0090			
28-Al	2.2414 ± *0.0012*	m	3+	2.2417	3.0 +	2.2410 ±*0.0030*	3.0 +	2.2414 ±*0.0012*	3.0 +	2.2450 ±*0.0020*	3+
28-Si	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
28-P	270.3 ± *0.5*	ms	3+	270.3	3.0 +	270.3 ± *0.5*	3.0 +	270.3 ± *0.5*	3.0 +	270.3 ±*0.5*	3+
28-S	125 ± *10.0*	ms	0+	125	0.0 +	125 ± *10.0*	0.0 +	125 ± *10.0*	0.0 +	125 ±*10.0*	0+
28-Cl			1+#		1.0 +	**1E-9 ± *1.0E-9***	1.0 +	**0.002 ± *0.0***	1.0 +		
29-F	2.5 ± *0.3*	ms	5/2+#	2.5	2.5 +	**2.6 ± *0.3***	2.5 +	2.5 ± *0.4*	2.5 +	2.5 ± *0.3*	
29-Ne	14.7 ± *0.4*	ms	3/2+#	14.7	1.5 +	**15.6 ± *0.5***	1.5 +	14.8 ± *0.3*	1.5 +	**15 ± *3.0***	(3/2+)
29-Na	44.1 ± *0.9*	ms	3/2(+#)	44.1	1.5 +	44.9 ± *1.2*	1.5 +	44.9 ± *1.2*	1.5 +	44.1 ±*0.9*	3/2+
29-Mg	1.30 ± *0.12*	s	3/2+	1.3	1.5 +	1.30 ± *0.12*	1.5 +	1.30 ± *0.12*	1.5 +	1.30 ±*0.12*	3/2+
29-Al	6.56 ± *0.06*	m	5/2+	6.56	2.5 +	6.56 ± *0.06*	2.5 +	6.56 ± *0.06*	2.5 +	6.56 ±*0.06*	5/2+
29-Si	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
29-P	4.142 ± *0.015*	s	1/2+	4.142	0.5 +	4.142 ± *0.015*	0.5 +	4.142 ±*0.0010*	0.5 +	4.142 ±*0.015*	1/2+
29-S	188 ± *4.0*	ms	5/2+#	188	2.5 +	187 ± *4.0*	2.5 +	187 ± *4.0*	2.5 +	188 ± *4.0*	(5/2+)
29-Cl	<20ns	ns	3/2+#	20	1.5 +	20 ± *0.0*	1.5 +	20 ± *0.0*	1.5 +	20 ± *0.0*	(3/2+)
30-F	<260ns	ns		260	?	260 ± *0.0*	? -	260 ± *0.0*	? -		
30-Ne	7.3 ± *0.3*	ms	0+	7.3	0.0 +	**5.8 ± *0.2***	0.0 +	7.3 ± *0.3*	0.0 +	7.3 ± *0.3*	0+
30-Na	48.4 ± *1.7*	ms	2+	48.4	2.0 +	48.4 ± *1.7*	2.0 +	48 ± *2.0*	2.0 +	48 ± *2.0*	2+
30-Mg	313 ± *4.0*	ms	0+	313	0.0 +	**335 ± *17.0***	0.0 +	**335 ± *17.0***	0.0 +	**335 ±*17.0***	0+
30-Al	3.62 ± *0.06*	s	3+	3.62	3.0 +	3.65 ± *0.06*	3.0 +	3.62 ± *0.06*	3.0 +	3.62 ±*0.06*	3+
30-Si	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
30-P	2.498 ± *0.0040*	m	1+	2.498	1.0 +	2.498 ±*0.0040*	1.0 +	2.498 ±*0.0040*	1.0 +	2.498 ±*0.0040*	1+
30-S	1.1759 ± *0.0017*	s	0+	1.176	0.0 +	1.1780 ±*0.0050*	0.0 +	1.1780 ±*0.0050*	0.0 +	1.1780 ±*0.0050*	0+
30-Cl	<30ns	ns	3+#	30	3.0 +	30 ± *0.0*	3.0 +	30 ± *0.0*	3.0 +	30 ± *0.0*	(3+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
30-Ar	<20ns	ns	0+	20	0.0 +	20 ± *0.0*	0.0 +	20 ± *0.0*	0.0 +		
31-F	1# ± *2E-4*	ms	5/2+#	1	2.5 +	1 ± *0.0*	2.5 +	**0.0003 ± *0.0***	**? -**	**0.0003 ± *0.0***	
31-Ne	3.4 ± *0.8*	ms	7/2-#	3.4	3.5	3.4 ± *0.8*	3.5 -	3.4 ± *0.8*	**? -**	3.4 ± *0.8*	(3/2-)
31-Na	17.0 ± *0.4*	ms	3/2(+#)	17	1.5 +	17 ± *0.4*	1.5 +	17 ± *0.4*	1.5 +	**17.4 ±*0.4***	3/2(+)
31-Mg	232 ± *15.0*	ms	1/2+	232	0.5 +	230 ± *20.0*	**1.5 +**	232 ± *15.0*	0.5 +	236 ±*20.0*	1/2(+)
31-Al	644 ± *25.0*	ms	5/2+	644	2.5 +	644 ± *25.0*	**? -**	644 ± *25.0*	**? -**	644 ±*25.0*	5/2(+)
31-Si	157.3 ± *0.3*	m	3/2+	157.3	1.5 +	157.2 ± *0.6*	1.5 +	157.3 ± *0.3*	1.5 +	157.4 ±*0.26*	3/2+
31-P	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
31-S	2.572 ± *0.013*	s	1/2+	2.572	0.5 +	2.572 ± *0.013*	0.5 +	2.572 ± *0.013*	0.5 +	2.553 ±*0.0018*	1/2+
31-Cl	150 ± *25.0*	ms	3/2+	150	1.5 +	150 ± *25.0*	1.5 +	150 ± *25.0*	**? -**	**190 ±*1.0***	3/2+
31-Ar	14.4 ± *0.6*	ms	5/2(+#)	14.4	2.5 +	14.4 ± *0.6*	2.5 +	**15.1 ± *1.3***	2.5 +	14.4 ±*0.6*	5/2+
32-Ne	3.5 ± *0.9*	ms	0+	3.5	0.0 +	3.5 ± *0.9*	0.0 +	3.5 ± *0.9*	0.0 +	3.5 ± *0.9*	0+
32-Na	12.9 ± *0.3*	ms	(3-)	12.9	3	12.9 ± *0.7*	**? -**	**13.2 ± *0.4***	**? -**	**13.2 ±*0.4***	(3-,4-)
32-Mg	86 ± *5.0*	ms	0+	86	0.0 +	**95 ± *16.0***	0.0 +	86 ± *5.0*	0.0 +	86 ± *5.0*	0+
32-Al	33.0 ± *0.2*	ms	1+	33	1.0 +	33 ± *4.0*	1.0 +	33 ± *0.2*	1.0 +	33 ± *0.2*	1+
32-Si	153 ± *19.0*	y	0+	153	0.0 +	**132 ± *13.0***	0.0 +	153 ± *19.0*	0.0 +	153 ±*19.0*	0+
32-P	14.263 ± *0.0030*	d	1+	14.259	1.0 +	14.270 ± *0.04*	1.0 +	14.263 ±*0.0030*	1.0 +	14.268 ±*0.0050*	1+
32-S	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
32-Cl	298 ± *1.0*	ms	1+	298	1.0 +	298 ± *1.0*	1.0 +	298 ± *1.0*	1.0 +	298 ± *1.0*	1+
32-Ar	98 ± *2.0*	ms	0+	98	0.0 +	98 ± *2.0*	0.0 +	98 ± *2.0*	0.0 +	98 ± *2.0*	0+
32-K			1+#		1.0 +	**1E-9 ± *1.0E-9***	1.0 +	**0.003 ± *0.0***	**? -**		
33-Ne	<260ns	ns	7/2-#	260	3.5	260 ± *0.0*	3.5 -	**180 ± *0.0***	**? -**	**180 ±*0.0***	
33-Na	8.2 ± *0.4*	ms	(3/2+)	8.2	1.5 +	8.2 ± *0.2*	1.5 +	**8 ± *0.3***	1.5 +	**8 ± *0.4***	(3/2+)
33-Mg	90.5 ± *1.6*	ms	3/2-	90.5	1.5	90.5 ± *1.6*	**3.5 -**	90.5 ± *1.6*	1.5 -	90.5 ±*1.6*	3/2-
33-Al	41.7 ± *0.2*	ms	(5/2)+	41.7	2.5 +	41.7 ± *0.2*	2.5 +	41.7 ± *0.2*	2.5 +	41.7 ±*0.2*	(5/2)+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
33-Si	6.18 ± *0.18*	s	3/2+	6.18	1.5 +	6.18 ± *0.18*	1.5 +	6.11 ± *0.21*	1.5 +	6.11 ±*0.21*	3/2+
33-P	25.35 ± *0.11*	d	1/2+	25.35	0.5 +	25.38 ± *0.04*	0.5 +	25.34 ± *0.12*	0.5 +	25.35 ±*0.11*	1/2+
33-S	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
33-Cl	2.511 ± *0.0040*	s	3/2+	2.511	1.5 +	2.511 ±*0.0030*	1.5 +	2.511 ±*0.0030*	1.5 +	2.511 ±*0.0040*	3/2+
33-Ar	173.0 ± *2.0*	ms	1/2+	173	0.5 +	173.0 ± *2.0*	0.5 +	173.0 ± *2.0*	0.5 +	173 ± *2.0*	1/2+
33-K	<25ns	ns	3/2+#	25	1.5 +	25 ± *0.0*	1.5 +	25 ± *0.0*	1.5 +	25 ± *0.0*	
34-Ne	1# ± *0.0015*	ms	0+	1	0.0 +	1 ± *0.0*	0.0 +	**0.00006 ±*0.0***	0.0 +	**0.00006 ± *0.0***	0+
34-Na	5.5 ± *1.0*	ms	1+	5.5	1.0 +	5.5 ± *1.0*	1.0 +	5.5 ± *1.0*	**? -**	5.5 ± *1.0*	
34-Mg	20 ± *10.0*	ms	0+	20	0.0 +	20 ± *10.0*	0.0 +	20 ± *10.0*	0.0 +	20 ± *10.0*	0+
34-Al	56.3 ± *0.5*	ms	(4-)	56.3	4	56.3 ± *0.5*	4.0 -	**42 ± *6.0***	**? -**	56.3 ±*0.5*	(4-)
34-Si	2.77 ± *0.2*	s	0+	2.77	0.0 +	2.77 ± *0.2*	0.0 +	2.77 ± *0.2*	0.0 +	2.77 ±*0.2*	0+
34-P	12.43 ± *0.1*	s	1+	12.43	1.0 +	12.40 ± *0.1*	1.0 +	12.43 ± *0.08*	1.0 +	12.43 ±*0.1*	1+
34-S	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
34-Cl	1.5266 ± *4E-4*	s	0+	1.527	0.0 +	1.5260 ±*0.0030*	0.0 +	1.5264 ±*0.0014*	0.0 +	1.5266 ±*4.0E-4*	0+
34-Ar	843.8 ± *0.4*	ms	0+	843.8	0.0 +	844.5 ± *3.4*	0.0 +	844.5 ± *3.4*	0.0 +	843.8 ±*0.4*	0+
34-K	<40ns	ns	1+#	40	1.0 +	40 ± *0.0*	1.0 +	**25 ± *0.0***	1.0 +	**25 ± *0.0***	
34-Ca	<35ns	ns	0+	35	0.0 +	35 ± *0.0*	0.0 +	35 ± *0.0*	0.0 +	35 ± *0.0*	0+
35-Na	1.5 ± *0.5*	ms	3/2+#	1.5	1.5 +	1.5 ± *0.5*	1.5 +	1.5 ± *0.5*	**? -**	1.5 ± *0.5*	
35-Mg	70 ± *40.0*	ms	7/2-#	70	3.5	70 ± *40.0*	3.5 -	70 ± *40.0*	3.5 -	70 ± *40.0*	(5/2-)
35-Al	37.2 ± *0.8*	ms	5/2+#	37.2	2.5 +	**38.6 ± *0.4***	2.5 +	**38.6 ± *0.4***	**? -**	37.2 ±*0.8*	(5/2+)
35-Si	780 ± *120.0*	ms	7/2-#	780	3.5	780 ± *120.0*	3.5 -	780 ± *120.0*	**? -**	780 ±*120.0*	(7/2-)
35-P	47.3 ± *0.8*	s	1/2+	47.3	0.5 +	47.3 ± *0.7*	0.5 +	47.3 ± *0.7*	0.5 +	47.3 ±*0.8*	1/2+
35-S	87.37 ± *0.04*	d	3/2+	87.37	1.5 +	87.32 ± *0.16*	1.5 +	87.51 ± *0.12*	1.5 +	87.37 ±*0.04*	3/2+
35-Cl	stable		3/2+		1.5 +	stable	1.5 +	stable	1.5 +		3/2+
35-Ar	1.7756 ± *0.0010*	s	3/2+	1.776	1.5 +	1.7750 ±*0.0040*	1.5 +	1.7750	1.5 +	1.7756 ±*0.0010*	3/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
								±0.0040			
35-K	178 ± *8.0*	ms	3/2+	178	1.5 +	178 ± *8.0*	1.5 +	178 ± *8.0*	1.5 +	178 ± *8.0*	(3/2)+
35-Ca	25.7 ± *0.2*	ms	1/2+#	25.7	0.5 +	25.7 ± *0.2*	0.5 +	25.7 ± *0.2*	**? -**	25.7 ±*0.2*	(1/2+)
36-Na	<180ns	ns		180	?	**260 ± *0.0***	? -	180 ± *0.0*	? -	180 ± *0.0*	
36-Mg	3.9 ± *1.3*	ms	0+	3.9	0.0 +	**5 ± *0.0***	0.0 +	3.9 ± *1.3*	0.0 +	3.9 ± *1.3*	0+
36-Al	90 ± *40.0*	ms		90	?	90 ± *40.0*	? -	90 ± *40.0*	? -	90 ± *40.0*	
36-Si	450 ± *60.0*	ms	0+	450	0.0 +	450 ± *60.0*	0.0 +	450 ± *60.0*	0.0 +	450 ±*60.0*	0+
36-P	5.6 ± *0.3*	s	(4-)	5.6	4	5.6 ± *0.3*	4.0 -	5.6 ± *0.3*	4.0 -	5.6 ± *0.3*	4-
36-S	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
36-Cl	301.3 ± *1.5*	ky	2+	301.3	2.0 +	301.0 ± *3.0*	2.0 +	301.0 ± *2.0*	2.0 +	301.3 ±*1.5*	2+
36-Ar	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
36-K	341 ± *3.0*	ms	2+	341	2.0 +	342 ± *2.0*	2.0 +	342 ± *2.0*	2.0 +	341 ± *3.0*	2+
36-Ca	101.2 ± *1.5*	ms	0+	101.2	0.0 +	102.0 ± *2.0*	0.0 +	102.0 ± *2.0*	0.0 +	101.2 ±*2.0*	0+
36-Sc					?	**1E-9 ± *1.0E-9***	? -	**0.009 ± *0.0***	? -		
37-Na	1# ± *0.0015*	ms	3/2+#	1	1.5 +	1 ± *0.0*	1.5 +	**0.00006 ±*0.0***	**? -**	**0.00006 ± *0.0***	
37-Mg	8 ± *4.0*	ms	7/2-#	8	3.5	**4E+1 ± *0.0***	3.5 -	**0.0003 ± *0.0***	3.5 -	8 ± *4.0*	
37-Al	10.7 ± *1.3*	ms	3/2+#	10.7	1.5 +	**20 ± *0.0***	1.5 +	10.7 ± *1.3*	**? -**	10.7 ±*1.3*	
37-Si	90 ± *60.0*	ms	7/2-#	90	3.5	90 ± *60.0*	3.5 -	90 ± *60.0*	3.5 -	90 ± *60.0*	
37-P	2.31 ± *0.13*	s	1/2+#	2.31	0.5 +	2.31 ± *0.13*	0.5 +	2.31 ± *0.13*	**? -**	2.31 ±*0.13*	(1/2+)
37-S	5.05 ± *0.02*	m	7/2-	5.05	3.5	4.99 ± *0.02*	3.5 -	5.05 ± *0.02*	3.5 -	5.05 ±*0.02*	7/2-
37-Cl	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
37-Ar	35.011 ± *0.019*	d	3/2+	35.012	1.5 +	35.040 ± *0.03*	1.5 +	35.040 ± *0.04*	1.5 +	35.011 ±*0.019*	3/2+
37-K	1.225 ± *0.0070*	s	3/2+	1.225	1.5 +	1.226 ±*0.0070*	1.5 +	1.226 ±*0.0070*	1.5 +	1.225 ±*0.0070*	3/2+
37-Ca	181.1 ± *1.0*	ms	3/2+#	181.1	1.5 +	181.1 ± *1.0*	1.5 +	181.1 ± *1.0*	1.5 +	181.1 ±*1.0*	(3/2+)
37-Sc			7/2-#		3.5	**1E-9 ± *1.0E-9***	3.5 -	**0.06 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
38-Mg	1# ± *2E-4*	ms	0+	1	0.0 +	1 ± *0.0*	0.0 +	**0.0003 ± *0.0***	0.0 +	**0.0003 ± *0.0***	0+
38-Al	7.6 ± *0.6*	ms		7.6	?	**40 ± *0.0***	? -	7.6 ± *0.6*	? -	7.6 ± *0.6*	
38-Si	90# ± *0.0010*	ms	0+	90	0.0 +	90 ± *0.0*	0.0 +	**0.0010 ± *0.0***	0.0 +	**0.0010 ± *0.0***	0+
38-P	640 ± *140.0*	ms	(0- to 4-)	640	**?**	640 ± *140.0*	**? -**	640 ± *140.0*	**? -**	640 ±*140.0*	(0-:4-)
38-S	170.3 ± *0.7*	m	0+	170.3	0.0 +	170.3 ± *0.7*	0.0 +	170.3 ± *0.7*	0.0 +	170.3 ±*0.7*	0+
38-Cl	37.24 ± *0.05*	m	2-	37.23	2	37.20 ± *0.1*	2.0 -	37.23 ± *0.014*	2.0 -	37.24 ±*0.05*	2-
38-Ar	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
38-K	7.636 ± *0.018*	m	3+	7.637	3.0 +	7.610 ± *0.04*	3.0 +	7.636 ± *0.018*	3.0 +	7.636 ±*0.018*	3+
38-Ca	443.77 ± *0.36*	ms	0+	443.8	0.0 +	440 ± *8.0*	0.0 +	440 ± *12.0*	0.0 +	440 ±*12.0*	0+
38-Sc	<300ns	ns	2-#	300	2	300 ± *0.0*	2.0 -	**4.23E+7 ±*0.0***	**? -**		
38-Ti	<120ns	ns	0+	120	0.0 +	120 ± *0.0*	0.0 +	120 ± *60.0*	0.0 +		
39-Mg	<180ns	ns	7/2-#	180	3.5	**260 ± *0.0***	3.5 -	180 ± *0.0*	**? -**	180 ± *0.0*	
39-Al	7.6 ± *1.6*	ms	3/2+#	7.6	1.5 +	**10 ± *0.0***	1.5 +	**0.0076 ±*0.0016***	**? -**	7.6 ± *1.6*	
39-Si	47.5 ± *2.0*	ms	7/2-#	47.5	3.5	**90 ± *0.0***	3.5 -	47.5 ± *2.0*	**? -**	47.5 ±*2.0*	
39-P	282 ± *24.0*	ms	1/2+#	282	0.5 +	**190 ± *50.0***	0.5 +	280 ± *40.0*	0.5 +	280 ±*40.0*	(1/2+)
39-S	11.5 ± *0.5*	s	(7/2)-	11.5	3.5	11.5 ± *0.5*	**? -**	11.5 ± *0.5*	3.5 -	11.5 ±*0.5*	(7/2)-
39-Cl	56.2 ± *0.6*	m	3/2+	56.2	1.5 +	55.6 ± *0.2*	1.5 +	55.6 ± *0.2*	1.5 +	56.2 ±*0.6*	3/2+
39-Ar	269 ± *3.0*	y	7/2-	269	3.5	269 ± *9.0*	3.5 -	269 ± *3.0*	3.5 -	269 ± *3.0*	7/2-
39-K	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
39-Ca	860.3 ± *0.8*	ms	3/2+	860.3	1.5 +	859.6 ± *1.4*	1.5 +	859.6 ± *1.4*	1.5 +	859.6 ±*1.4*	3/2+
39-Sc	<300	ns	7/2-#	300	3.5	300 ± *0.0*	3.5 -	300 ± *0.0*	3.5 -	300 ± *0.0*	(7/2-)
39-Ti	28.5 ± *0.9*	ms	3/2+#	28.5	1.5 +	**31 ± *4.0***	1.5 +	**32 ± *5.0***	1.5 +	**31 ± *0.0***	(3/2+)
40-Mg	1# ± *1E-4*	ms	0+	1	0.0 +	1 ± *0.0*	0.0 +	**0.0002 ± *0.0***	0.0 +	**0.0002 ± *0.0***	0+
40-Al	10# ± *2E-4*	ms		10	?	10 ± *0.0*	? -	**0.00026 ±*0.0***	? -	**0.00026 ± *0.0***	
40-Si	33.0 ± *1.0*	ms	0+	33	0.0 +	33 ± *1.0*	0.0 +	33 ± *1.0*	0.0 +	33 ± *1.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
40-P	150 ± *8.0*	ms	(2-;3-)	150	**?**	150 ± *8.0*	**? -**	**125 ± *25.0***	**? -**	150 ± *8.0*	(2-,3-)
40-S	8.8 ± *2.2*	s	0+	8.8	0.0 +	8.8 ± *2.2*	0.0 +	8.8 ± *2.2*	0.0 +	8.8 ± *2.2*	0+
40-Cl	1.35 ± *0.02*	m	2-	1.35	2	1.35 ± *0.02*	2.0 -	1.35 ± *0.02*	2.0 -	1.35 ±*0.02*	2-
40-Ar	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
40-K	1.248 ± *0.0030*	Gy	4-	1.248	4	1.265 ± *0.02*	4.0 -	1.248 ±*0.0030*	4.0 -	1.248 ±*0.0030*	4-
40-Ca	stable ± *1E29*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
40-Sc	182.3 ± *0.7*	ms	4-	182.3	4	182.3 ± *0.7*	4.0 -	182.3 ± *0.8*	4.0 -	182.3 ±*0.7*	4-
40-Ti	52.4 ± *0.3*	ms	0+	52.4	0.0 +	53.3 ± *1.5*	0.0 +	53.3 ± *1.5*	0.0 +	53.3 ±*1.5*	0+
40-V			2-#		2	**1E-9 ± *1.0E-9***	2.0 -	**0.008 ± *0.0***	**? -**		
41-Al	2# ± *2E-4*	ms	3/2+#	2	1.5 +	2 ± *0.0*	1.5 +	**0.0003 ± *0.0***	**? -**	**0.0003 ± *0.0***	
41-Si	20.0 ± *2.5*	ms	7/2-#	20	3.5	**30 ± *0.0***	3.5 -	20 ± *2.5*	**? -**	**0.000200 ± *0.0***	
41-P	100 ± *5.0*	ms	1/2+#	100	0.5 +	**150 ± *15.0***	0.5 +	100 ± *5.0*	0.5 +	100 ± *5.0*	(1/2+)
41-S	1.99 ± *0.05*	s	7/2-#	1.99	3.5	1.99 ± *0.05*	3.5 -	1.99 ± *0.05*	3.5 -	1.99 ±*0.05*	(7/2-)
41-Cl	38.4 ± *0.8*	s	(1/2+)	38.4	0.5 +	38.4 ± *0.8*	**? -**	38.4 ± *0.8*	0.5 +	38.4 ±*0.8*	(1/2+)
41-Ar	109.61 ± *0.04*	m	7/2-	109.62	3.5	109.60 ± *0.4*	3.5 -	109.61 ± *0.04*	3.5 -	109.61 ±*0.04*	7/2-
41-K	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
41-Ca	99.4 ± *1.5*	ky	7/2-	99.4	3.5	**103 ± *4.0***	3.5 -	**102 ± *7.0***	3.5 -	**102 ±*7.0***	7/2-
41-Sc	596.3 ± *1.7*	ms	7/2-	596.3	3.5	596.3 ± *1.7*	3.5 -	596.3 ± *1.7*	3.5 -	596.3 ±*1.7*	7/2-
41-Ti	82.6 ± *0.5*	ms	3/2+	82.6	1.5 +	**80.9 ± *1.2***	1.5 +	**80.4 ± *0.9***	1.5 +	**80.4 ±*0.9***	3/2+
41-V			7/2-#		3.5	**1E-9 ± *1.0E-9***	3.5 -	**0.02 ± *0.0***	**? -**		
42-Al	1# ± *1E-4*	ms		1	?	1 ± *0.0*	? -	**0.0002 ± *0.0***	? -	**0.0002 ± *0.0***	
42-Si	12.5 ± *3.5*	ms	0+	12.5	0.0 +	**5 ± *0.0***	0.0 +	12.5 ± *3.5*	0.0 +	12.5 ±*3.5*	0+
42-P	48.5 ± *1.5*	ms		48.5	?	**120 ± *30.0***	? -	48.5 ± *1.5*	? -	**110 ±*30.0***	
42-S	1.013 ± *0.015*	s	0+	1.013	0.0 +	**0.001013 ±*1.5E-5***	0.0 +	1.013 ± *0.015*	0.0 +	1.013 ±*0.015*	0+
42-Cl	6.8 ± *0.3*	s	2-#	6.8	2	6.8 ± *0.3*	**? -**	6.8 ± *0.3*	**? -**	6.8 ± *0.3*	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
42-Ar	32.9 ± *1.1*	y	0+	32.9	0.0 +	33.0 ± *2.0*	0.0 +	32.9 ± *1.1*	0.0 +	32.9 ±*1.1*	0+
42-K	12.360 ± *0.012*	h	2-	12.361	2	12.359 ±*0.0030*	2.0 -	12.360 ±*0.012*	2.0 -	12.360 ±*0.012*	2-
42-Ca	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
42-Sc	681.3 ± *0.7*	ms	0+	681.3	0.0 +	680.8 ± *0.3*	0.0 +	680.8 ± *0.3*	0.0 +	681.3 ±*0.7*	0+
42-Ti	208.14 ± *0.45*	ms	0+	208.1	0.0 +	**199 ± *6.0***	0.0 +	**199 ± *6.0***	0.0 +	**199 ±*6.0***	0+
42-V	<55ns	ns	2-#	55	2	55 ± *0.0*	2.0 -	55 ± *0.0*	**? -**	55 ± *0.0*	
42-Cr	13.3 ± *1.0*	ms	0+	13.3	0.0 +	**14 ± *3.0***	0.0 +	**14 ± *3.0***	0.0 +	13.3 ±*1.0*	0+
43-Al	1# ± *1E-4*	ms	3/2+#	1	1.5 +					**0.0002 ± *0.0***	
43-Si	15# ± *2E-4*	ms	3/2-#	15	1.5	15 ± *0.0*	1.5 -	**0.000060 ±*0.0***	**? -**	**0.000060 ± *0.0***	
43-P	35.8 ± *1.3*	ms	1/2+#	35.8	0.5 +	**33 ± *3.0***	0.5 +	36.5 ± *1.5*	0.5 +	36.5 ±*1.5*	(1/2+)
43-S	265 ± *13.0*	ms	3/2-#	265	1.5	260 ± *15.0*	1.5 -	**280 ± *30.0***	**? -**	**220 ±*65.0***	
43-Cl	3.13 ± *0.09*	s	(3/2+)	3.13	1.5 +	3.07 ± *0.07*	1.5 +	3.13 ± *0.09*	**0.5 +**	3.13 ±*0.09*	(1/2+)
43-Ar	5.37 ± *0.06*	m	(5/2-)	5.37	2.5	5.37 ± *0.06*	2.5 -	5.37 ± *0.06*	2.5 -	5.37 ±*0.06*	(5/2-)
43-K	22.3 ± *0.1*	h	3/2+	22.3	1.5 +	22.2 ± *0.2*	1.5 +	22.3 ± *0.1*	1.5 +	22.3 ±*0.1*	3/2+
43-Ca	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
43-Sc	3.891 ± *0.012*	h	7/2-	3.892	3.5	3.891 ± *0.012*	3.5 -	3.891 ± *0.012*	3.5 -	3.891 ±*0.012*	7/2-
43-Ti	509 ± *5.0*	ms	7/2-	509	3.5	509 ± *5.0*	3.5 -	509 ± *5.0*	3.5 -	509 ± *5.0*	7/2-
43-V	79.3 ± *2.4*	ms	7/2-#	79.3	3.5	80 ± *0.0*	3.5 -	**800 ± *0.0***	**? -**	**800 ±*0.0***	
43-Cr	21.1 ± *0.3*	ms	(3/2+)	21.1	1.5 +	**21.6 ± *0.7***	1.5 +	**21.6 ± *0.7***	1.5 +	**21.6 ±*0.7***	(3/2+)
44-Si	10# ± *3E-4*	ms	0+	10	0.0 +	10 ± *0.0*	0.0 +	**0.00036 ±*0.0***	0.0 +	**0.00036 ± *0.0***	0+
44-P	18.5 ± *2.5*	ms		18.5	?	**30 ± *0.0***	? -	18.5 ± *2.5*	? -	18.5 ±*2.5*	
44-S	100 ± *1.0*	ms	0+	100	0.0 +	**123 ± *10.0***	0.0 +	100 ± *1.0*	0.0 +	100 ± *1.0*	0+
44-Cl	560 ± *110.0*	ms	(2-)	560	2	560 ± *110.0*	**? -**	560 ± *110.0*	**? -**	560 ±*110.0*	(2-)
44-Ar	11.87 ± *0.05*	m	0+	11.87	0.0 +	11.87 ± *0.05*	0.0 +	11.87 ± *0.05*	0.0 +	11.87 ±*0.05*	0+
44-K	22.13 ± *0.19*	m	2-	22.13	2	22.13 ± *0.19*	2.0 -	22.13 ± *0.19*	2.0 -	22.13 ±*0.19*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
44-Ca	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
44-Sc	3.97 ± *0.04*	h	2+	3.97	2.0 +	3.97 ± *0.04*	2.0 +	3.97 ± *0.04*	2.0 +	3.97 ±*0.04*	2+
44-Ti	59.1 ± *0.3*	y	0+	59.1	0.0 +	60.0 ± *1.1*	0.0 +	60.0 ± *1.1*	0.0 +	59.1 ±*0.3*	0+
44-V	111 ± *7.0*	ms	(2)+	111	2.0 +	111 ± *7.0*	2.0 +	111 ± *7.0*	2.0 +	111 ± *7.0*	(2)+
44-Cr	42.8 ± *0.6*	ms	0+	42.8	0.0 +	**54 ± *4.0***	0.0 +	**53.5 ± *3.5***	0.0 +	42.8 ±*0.6*	0+
44-Mn	<105ns	ns	2-#	105	2	105 ± *0.0*	2.0 -	105 ± *0.0*	2.0 -	105 ± *0.0*	
45-Si	1#	ms	3/2-#	1	1.5						
45-P	8# ± *2E-4*	ms	1/2+#	8	0.5 +	8 ± *0.0*	0.5 +	**0.0002 ± *0.0***	**? -**	**0.0002 ± *0.0***	
45-S	68 ± *2.0*	ms	3/2-#	68	1.5	**82 ± *13.0***	1.5 -	68 ± *2.0*	**? -**	68 ± *2.0*	
45-Cl	413 ± *25.0*	ms	3/2+#	413	1.5 +	**400 ± *40.0***	1.5 +	413 ± *25.0*	**0.5 +**	413 ±*25.0*	(1/2+)
45-Ar	21.48 ± *0.15*	s	(5/2-;7/2-)	21.48	**?**	21.48 ± *0.15*	**? -**	21.48 ± *0.15*	**? -**	21.48 ±*0.15*	5/2-,7/2-
45-K	17.8 ± *0.6*	m	3/2+	17.8	1.5 +	**17.3 ± *0.6***	1.5 +	17.8 ± *0.61*	1.5 +	17.8 ±*0.61*	3/2+
45-Ca	162.61 ± *0.09*	d	7/2-	162.62	3.5	163 ± *1.0*	3.5 -	162.61 ± *0.09*	3.5 -	162.61 ±*0.09*	7/2-
45-Sc	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
45-Ti	184.8 ± *0.5*	m	7/2-	184.8	3.5	184.8 ± *0.6*	3.5 -	184.8 ± *0.5*	3.5 -	184.8 ±*0.5*	7/2-
45-V	547 ± *6.0*	ms	7/2-	547	3.5	539 ± *18.0*	3.5 -	547 ± *6.0*	3.5 -	547 ± *6.0*	7/2-
45-Cr	60.9 ± *0.4*	ms	7/2-#	60.9	3.5	**50 ± *6.0***	3.5 -	60.9 ± *0.4*	3.5 -	60.9 ±*0.4*	(7/2-)
45-Mn	<70ns	ns	7/2-#	70	3.5	70 ± *0.0*	3.5 -	70 ± *35.0*	3.5 -		
45-Fe	2.2 ± *0.3*	ms	3/2+#	2.2	1.5 +	**4.9 ± *1.5***	1.5 +	**2.0 ± *0.35***	1.5 +	**1.9 ±*0.0***	(3/2+)
46-P	4# ± *2E-4*	ms		4	?	4 ± *0.0*	? -	**0.0002 ± *0.0***	? -		
46-S	50 ± *8.0*	ms	0+	50	0.0 +	**30 ± *0.0***	0.0 +	50 ± *8.0*	0.0 +	50 ± *8.0*	0+
46-Cl	232 ± *2.0*	ms		232	?	**220 ± *40.0***	? -	232 ± *2.0*	? -	232 ± *2.0*	**(2-)**
46-Ar	8.4 ± *0.6*	s	0+	8.4	0.0 +	8.4 ± *0.6*	0.0 +	8.4 ± *0.6*	0.0 +	8.4 ± *0.6*	0+
46-K	105 ± *10.0*	s	2(-)	105	2	105 ± *10.0*	2.0 -	105 ± *10.0*	2.0 -	105 ±*10.0*	(2-)
46-Ca	stable ± *3E27*		0+	stable	0.0 +	stable	0.0 +	**0 ± *0.0***	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
46-Sc	83.79 ± *0.04*	d	4+	83.78	4.0 +	83.79 ± *0.02*	4.0 +	83.79 ± *0.04*	4.0 +	83.79 ±*0.04*	4+
46-Ti	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
46-V	422.64 ± *0.05*	ms	0+	422.6	0.0 +	422.5 ± *0.11*	0.0 +	422.5 ± *0.11*	0.0 +	422.5 ±*0.11*	0+
46-Cr	257 ± *55.0*	ms	0+	257	0.0 +	260 ± *60.0*	0.0 +	260 ± *60.0*	0.0 +	260 ±*60.0*	0+
46-Mn	36.2 ± *0.4*	ms	(4+)	36.2	4.0 +	**37 ± *3.0***	4.0 +	**34.5 ± *4.5***	4.0 +	36.2 ±*0.4*	(4+)
46-Fe	13.0 ± *2.0*	ms	0+	13	0.0 +	**9 ± *4.0***	0.0 +	13 ± *2.0*	0.0 +	13 ± *2.0*	0+
47-P	2#	ms	3/2+#	2	1.5 +						
47-S	20# ± *2E-4*	ms	3/2-#	20	1.5	20 ± *0.0*	1.5 -				
47-Cl	101 ± *5.0*	ms	3/2+#	101	1.5 +	**200 ± *0.0***	1.5 +	101 ± *6.0*	**? -**	101 ± *6.0*	
47-Ar	1.23 ± *0.03*	s	(3/2)-	1.23	1.5	**0.580 ± *0.12***	1.5 -	1.23 ± *0.03*	1.5 -	1.23 ±*0.03*	(3/2)-
47-K	17.50 ± *0.24*	s	1/2+	17.5	0.5 +	17.5 ± *0.24*	0.5 +	17.5 ± *0.24*	0.5 +	17.5 ±*0.24*	1/2+
47-Ca	4.536 ± *0.0030*	d	7/2-	4.536	3.5	4.538 ±*0.0020*	3.5 -	4.536 ±*0.0030*	3.5 -	4.536 ±*0.0030*	7/2-
47-Sc	3.3492 ± *6E-4*	d	7/2-	3.3495	3.5	3.3510 ±*0.0020*	3.5 -	3.3492 ±*6.0E-4*	3.5 -	3.3492 ±*6.0E-4*	7/2-
47-Ti	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
47-V	32.6 ± *0.3*	m	3/2-	32.6	1.5	32.6 ± *0.3*	1.5 -	32.6 ± *0.3*	1.5 -	32.6 ±*0.3*	3/2-
47-Cr	500 ± *15.0*	ms	3/2-	500	1.5	500 ± *15.0*	1.5 -	500 ± *15.0*	1.5 -	500 ±*15.0*	3/2-
47-Mn	88.0 ± *1.3*	ms	5/2-#	88	2.5	**100 ± *50.0***	2.5 -	**100 ± *50.0***	2.5 -	**100 ±*50.0***	(5/2-)
47-Fe	21.9 ± *0.2*	ms	7/2-#	21.9	3.5	21.8 ± *0.7*	3.5 -	21.9 ± *0.2*	3.5 -	21.8 ±*0.7*	(7/2-)
47-Co			7/2-#		3.5	**1E-9 ± *1.0E-9***	3.5 -				
48-S	10# ± *2E-4*	ms	0+	10	0.0 +	10 ± *0.0*	0.0 +	**0.00020 ±*0.0***	0.0 +	**0.00020 ± *0.0***	
48-Cl	100# ± *2E-4*	ms		100	?	100 ± *0.0*	? -	**0.000200 ±*0.0***	? -	**0.000200 ± *0.0***	
48-Ar	475 ± *40.0*	ms	0+	475	0.0 +	**500 ± *0.0***	0.0 +	475 ± *40.0*	0.0 +	475 ±*40.0*	0+
48-K	6.8 ± *0.2*	s	(1-)	6.8	1	6.8 ± *0.2*	**2.0 -**	6.8 ± *0.2*	**2.0 -**	6.8 ± *0.2*	(2-)
48-Ca	53 ± *17.0*	Ey	0+	53	0.0 +	53 ± *17.0*	0.0 +	**23 ± *9.0***	0.0 +	**19 ± *0.0***	0+
48-Sc	43.67 ± *0.09*	h	6+	43.67	6.0 +	43.67 ± *0.09*	6.0 +	43.67 ± *0.09*	6.0 +	43.67 ±*0.09*	6+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
48-Ti	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
48-V	15.9735 ± *0.0025*	d	4+	15.9722	4.0 +	15.9740 ±*0.0030*	4.0 +	15.9735 ±*0.0025*	4.0 +	15.9735 ± *0.0025*	4+
48-Cr	21.56 ± *0.03*	h	0+	21.56	0.0 +	21.56 ± *0.03*	0.0 +	21.56 ± *0.03*	0.0 +	21.56 ±*0.03*	0+
48-Mn	158.1 ± *2.2*	ms	4+	158.1	4.0 +	158.1 ± *2.2*	4.0 +	158.1 ± *2.2*	4.0 +	158.1 ±*2.2*	4+
48-Fe	45.3 ± *0.6*	ms	0+	45.3	0.0 +	**44 ± *7.0***	0.0 +	**44 ± *7.0***	0.0 +	**44 ± *7.0***	0+
48-Co			6+#		6.0 +	**1E-9 ± *1.0E-9***	6.0 +				
48-Ni	2.8 ± *0.8*	ms	0+	2.8	0.0 +	**10 ± *0.0***	0.0 +	**2.1 ± *0.0***	0.0 +	**2.1 ±*0.0***	0+
49-S	<200ns	ns	3/2-#	200	1.5	200 ± *0.0*	1.5 -	200 ± *0.0*	**? -**		
49-Cl	50# ± *2E-4*	ms	3/2+#	50	1.5 +	50 ± *0.0*	1.5 +	**0.00017 ±*0.0***	**? -**	**0.00017 ± *0.0***	
49-Ar	170 ± *50.0*	ms	3/2-#	170	1.5	170 ± *50.0*	1.5 -	170 ± *50.0*	**? -**	170 ±*50.0*	
49-K	1.26 ± *0.05*	s	1/2(-)	1.26	0.5	1.26 ± *0.05*	**1.5 +**	1.26 ± *0.05*	**1.5 +**	1.26 ±*0.05*	**(1/2+,3/2+)**
49-Ca	8.718 ± *0.0060*	m	3/2-	8.718	1.5	8.720 ± *0.02*	1.5 -	8.718 ±*0.0060*	1.5 -	8.718 ±*0.0060*	3/2-
49-Sc	57.18 ± *0.13*	m	7/2-	57.18	3.5	57.20 ± *0.2*	3.5 -	57.18 ± *0.13*	3.5 -	57.18 ±*0.13*	7/2-
49-Ti	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
49-V	330 ± *15.0*	d	7/2-	330	3.5	330 ± *20.0*	3.5 -	330 ± *15.0*	3.5 -	330 ±*15.0*	7/2-
49-Cr	42.3 ± *0.1*	m	5/2-	42.3	2.5	41.9 ± *0.3*	2.5 -	42.3 ± *0.1*	2.5 -	42.3 ±*0.1*	5/2-
49-Mn	382 ± *7.0*	ms	5/2-	382	2.5	382 ± *7.0*	2.5 -	382 ± *7.0*	2.5 -	382 ± *7.0*	5/2-
49-Fe	64.7 ± *0.3*	ms	(7/2-)	64.7	3.5	**70 ± *3.0***	3.5 -	64.7 ± *0.3*	3.5 -	64.7 ±*0.3*	(7/2-)
49-Co	<35ns	ns	7/2-#	35	3.5	35 ± *0.0*	3.5 -	35 ± *0.0*	**? -**		
49-Ni	7.5 ± *1.0*	ms	7/2-#	7.5	3.5	**13 ± *4.0***	3.5 -	7.5 ± *1.0*	**? -**	7.5 ± *1.0*	
50-Cl	20# ± *6E-4*	ms		20	?	20 ± *0.0*	? -	20 ± *2.0*	? -	**0.00062 ± *0.0***	
50-Ar	85 ± *30.0*	ms	0+	85	0.0 +	85 ± *30.0*	0.0 +	85 ± *30.0*	0.0 +	85 ± *30.0*	0+
50-K	472 ± *4.0*	ms	0(-)	472	0	472 ± *4.0*	**? -**	472 ± *4.0*	**? -**	472 ± *4.0*	(0-,1-,2-)
50-Ca	13.9 ± *0.6*	s	0+	13.9	0.0 +	13.9 ± *0.6*	0.0 +	13.9 ± *0.6*	0.0 +	13.9 ±*0.6*	0+
50-Sc	102.5 ± *0.5*	s	5+	102.5	5.0 +	102.5 ± *0.5*	5.0 +	102.5 ± *0.5*	5.0 +	102.5 ±*0.5*	5+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
50-Ti	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
50-V	150 ± *40.0*	Py	6+	150	6.0 +	**140 ± *40.0***	6.0 +	**140 ± *35.0***	6.0 +	**140 ±*0.0***	6+
50-Cr	stable ± *4E25*		0+		0.0 +	**6E+24 ± *0.0***	0.0 +	stable	0.0 +	**4E+25 ±*0.0***	0+
50-Mn	283.19 ± *0.1*	ms	0+	283.2	0.0 +	283.88 ± *0.46*	0.0 +	283.19 ± *0.1*	0.0 +	283.19 ±*0.1*	0+
50-Fe	155 ± *11.0*	ms	0+	155	0.0 +	155 ± *11.0*	0.0 +	155 ± *11.0*	0.0 +	155 ±*11.0*	0+
50-Co	38.8 ± *0.2*	ms	(6+)	38.8	6.0 +	**44 ± *4.0***	6.0 +	**44 ± *4.0***	6.0 +	38.8 ±*0.2*	(6+)
50-Ni	18.5 ± *1.2*	ms	0+	18.5	0.0 +	**9.10 ± *1.8***	0.0 +	**12 ± *3.0***	0.0 +	18.5 ±*1.2*	0+
51-Cl	2# ± *2E-4*	ms	3/2+#	2	1.5 +	2 ± *0.0*	1.5 +	**0.0002 ± *0.0***	1.5 +	**0.0002 ± *0.0***	(3/2+)
51-Ar	60# ± *2E-4*	ms	3/2-#	60	1.5	60 ± *0.0*	1.5 -	**0.00020 ±*0.0***	**? -**	**80 ± *0.0***	
51-K	365 ± *5.0*	ms	(3/2+)	365	1.5 +	365 ± *5.0*	1.5 +	365 ± *5.0*	**? -**	365 ± *5.0*	(1/2+,3/2+)
51-Ca	10.0 ± *0.8*	s	(3/2-)	10	1.5	10 ± *0.8*	1.5 -	10 ± *0.8*	1.5 -	10 ± *0.8*	(3/2-)
51-Sc	12.4 ± *0.1*	s	(7/2)-	12.4	3.5	12.4 ± *0.1*	3.5 -	12.4 ± *0.1*	3.5 -	12.4 ±*0.1*	(7/2)-
51-Ti	5.76 ± *0.01*	m	3/2-	5.76	1.5	5.80 ± *0.03*	1.5 -	5.76 ± *0.01*	1.5 -	5.76 ±*0.01*	3/2-
51-V	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
51-Cr	27.7010 ± *0.0011*	d	7/2-	27.6968	3.5	27.7030 ±*0.0030*	3.5 -	27.7010 ±*0.0011*	3.5 -	27.7010 ± *0.0011*	7/2-
51-Mn	46.2 ± *0.1*	m	5/2-	46.2	2.5	46.2 ± *0.1*	2.5 -	46.2 ± *0.1*	2.5 -	46.2 ±*0.1*	5/2-
51-Fe	305 ± *5.0*	ms	5/2-	305	2.5	**1.83E+7 ±*300000.0***	2.5 -	305 ± *5.0*	2.5 -	305 ± *5.0*	5/2-
51-Co	68.8 ± *1.9*	ms	7/2-#	68.8	3.5	**60 ± *0.0***	3.5 -	**0.000200 ±*0.0***	3.5 -	**0.000200 ± *0.0***	(7/2-)
51-Ni	23.8 ± *0.2*	ms	7/2-#	23.8	3.5	**30 ± *0.0***	3.5 -	**0.000200 ±*0.0***	3.5 -	**0.000200 ± *0.0***	(7/2-)
52-Ar	10#	ms	0+	10	0.0 +	10 ± *0.0*	0.0 +	10 ± *0.0*	0.0 +	**0.00062 ± *0.0***	0+
52-K	110 ± *4.0*	ms	(2-)	110	2	**105 ± *5.0***	2.0 -	**105 ± *5.0***	2.0 -	**105 ±*5.0***	(2-)
52-Ca	4.6 ± *0.3*	s	0+	4.6	0.0 +	4.6 ± *0.3*	0.0 +	4.6 ± *0.3*	0.0 +	4.6 ± *0.3*	0+
52-Sc	8.2 ± *0.2*	s	3(+)	8.2	3.0 +	8.2 ± *0.2*	3.0 +	8.2 ± *0.2*	3.0 +	8.2 ± *0.2*	3(+)
52-Ti	1.7 ± *0.1*	m	0+	1.7	0.0 +	1.7 ± *0.1*	0.0 +	1.7 ± *0.1*	0.0 +	1.7 ± *0.1*	0+
52-V	3.743 ± *0.0050*	m	3+	3.743	3.0 +	3.745 ±*0.0050*	3.0 +	3.743 ±*0.0050*	3.0 +	3.743 ±*0.0050*	3+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
52-Cr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
52-Mn	5.591 ± *0.0030*	d	6+	5.591	6.0 +	5.595 ±*0.0030*	6.0 +	5.591 ±*0.0030*	6.0 +	5.591 ±*0.0030*	6+
52-Fe	8.275 ± *0.0080*	h	0+	8.275	0.0 +	8.275 ±*0.0080*	0.0 +	8.275 ±*0.0080*	0.0 +	8.275 ±*0.0080*	0+
52-Co	115 ± *23.0*	ms	(6+)	115	6.0 +	115 ± *23.0*	6.0 +	115 ± *23.0*	6.0 +	115 ±*23.0*	(6+)
52-Ni	40.8 ± *0.2*	ms	0+	40.8	0.0 +	**38 ± *5.0***	0.0 +	**38 ± *5.0***	0.0 +	40.8 ±*0.2*	0+
52-Cu			3+#		3.0 +	**1E-9 ± *1.0E-9***	3.0 +	**0.007 ± *0.0***	3.0 +		
53-Ar	3# ± *6E-4*	ms	5/2-#	3	2.5	3 ± *0.0*	2.5 -	3 ± *0.3*	2.5 -	**0.0006 ± *0.0***	
53-K	30 ± *5.0*	ms	(3/2+)	30	1.5 +	30 ± *5.0*	1.5 +	30 ± *5.0*	1.5 +	30 ± *5.0*	(3/2+)
53-Ca	461 ± *90.0*	ms	3/2-#	461	1.5	**90 ± *15.0***	1.5 -	**90 ± *15.0***	**? -**	**90 ±*15.0***	(3/2-,5/2-)
53-Sc	2.4 ± *0.6*	s	(7/2-)	2.4	3.5	**3 ± *0.0***	3.5 -	**3 ± *0.0***	3.5 -	**3 ± *0.0***	(7/2-)
53-Ti	32.7 ± *0.9*	s	(3/2)-	32.7	1.5	32.7 ± *0.9*	1.5 -	32.7 ± *0.9*	1.5 -	32.7 ±*0.9*	(3/2)-
53-V	1.543 ± *0.014*	m	7/2-	1.543	3.5	**1.620 ± *0.04***	3.5 -	1.543 ± *0.014*	3.5 -	1.543 ±*0.014*	7/2-
53-Cr	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
53-Mn	3.7 ± *0.4*	My	7/2-	3.7	3.5	3.7 ± *0.21*	3.5 -	3.7 ± *0.4*	3.5 -	3.7 ±*0.04*	7/2-
53-Fe	8.51 ± *0.02*	m	7/2-	8.51	3.5	8.51 ± *0.07*	3.5 -	8.51 ± *0.02*	3.5 -	8.51 ±*0.02*	7/2-
53-Co	242 ± *8.0*	ms	7/2-#	242	3.5	240 ± *20.0*	3.5 -	240 ± *20.0*	3.5 -	240 ± *9.0*	(7/2-)
53-Ni	55.2 ± *0.7*	ms	7/2-#	55.2	3.5	**45 ± *15.0***	3.5 -	**45 ± *15.0***	3.5 -	55.2 ±*0.7*	(7/2-)
53-Cu	<300ns	ns	3/2-#	300	1.5	300 ± *0.0*	1.5 -	300 ± *0.0*	1.5 -	**130 ±*0.0***	
54-K	10 ± *5.0*	ms	2-#	10	2	10 ± *5.0*	2.0 -	10 ± *5.0*	**? -**	10 ± *5.0*	
54-Ca	90 ± *6.0*	ms	0+	90	0.0 +	**50 ± *0.0***	0.0 +	**86 ± *7.0***	0.0 +		0+
54-Sc	526 ± *15.0*	ms	(3)+	526	3.0 +	**260 ± *30.0***	3.0 +	**360 ± *60.0***	**? -**	**292 ±*42.0***	(3,4)+
54-Ti	1.5 ± *0.4*	s	0+	1.5	0.0 +	1.5 ± *0.4*	0.0 +	1.5 ± *0.4*	0.0 +	1.5 ± *0.4*	0+
54-V	49.8 ± *0.5*	s	3+	49.8	3.0 +	49.8 ± *0.5*	3.0 +	49.8 ± *0.5*	3.0 +	49.8 ±*0.5*	3+
54-Cr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
54-Mn	312.05 ± *0.04*	d	3+	312.04	3.0 +	312.13 ± *0.03*	3.0 +	312.05 ± *0.04*	3.0 +	312.05 ±*0.04*	3+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
54-Fe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
54-Co	193.28 ± *0.07*	ms	0+	193.3	0.0 +	193.23 ± *0.14*	0.0 +	193.28 ± *0.07*	0.0 +	193.28 ±*0.07*	0+
54-Ni	104 ± *7.0*	ms	0+	104	0.0 +	104 ± *7.0*	0.0 +	104 ± *7.0*	0.0 +	104 ± *7.0*	0+
54-Cu	<75ns	ns	3+#	75	3.0 +	75 ± *0.0*	3.0 +	75 ± *0.0*	3.0 +	75 ± *0.0*	(3+)
54-Zn	1.8 ± *0.5*	ms	0+	1.8	0.0 +	**0.0000010 ±*1.0E-6***	0.0 +	**3.7 ± *1.3***	0.0 +	**3.2 ±*0.0***	0+
55-K	3# ± *6E-4*	ms	3/2+#	3	1.5 +	3 ± *0.0*	1.5 +	3 ± *0.0*	1.5 +	**0.0004 ± *0.0***	
55-Ca	22 ± *2.0*	ms	5/2-#	22	2.5	**30 ± *0.0***	2.5 -	22 ± *2.0*	2.5 -	22 ± *2.0*	(5/2-)
55-Sc	96 ± *2.0*	ms	(7/2)-	96	3.5	**1.2E+2 ±*40.0***	3.5 -	**1.1E+2 ± *6.0***	3.5 -	**1.1E+2 ± *6.0***	(7/2-)
55-Ti	1.3 ± *0.1*	s	(1/2)-	1.3	0.5	**0.49 ± *0.09***	**1.5 -**	1.3 ± *0.1*	**? -**	1.3 ± *0.1*	(1/2)-
55-V	6.54 ± *0.15*	s	7/2-#	6.54	3.5	6.54 ± *0.15*	3.5 -	6.54 ± *0.15*	3.5 -	6.54 ±*0.15*	(7/2-)
55-Cr	3.497 ± *0.0030*	m	3/2-	3.497	1.5	3.540 ± *0.03*	1.5 -	3.497 ±*0.0030*	1.5 -	3.497 ±*0.0030*	3/2-
55-Mn	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
55-Fe	2.744 ± *0.0090*	y	3/2-	2.744	1.5	2.735 ± *0.022*	1.5 -	2.744 ±*0.0090*	1.5 -	2.744 ±*0.0090*	3/2-
55-Co	17.53 ± *0.03*	h	7/2-	17.53	3.5	17.53 ± *0.03*	3.5 -	17.53 ± *0.03*	3.5 -	17.53 ±*0.03*	7/2-
55-Ni	204.7 ± *1.7*	ms	7/2-	204.7	3.5	204.0 ± *3.0*	3.5 -	204.7 ± *3.7*	3.5 -	204.7 ±*3.7*	7/2-
55-Cu	27 ± *8.0*	ms	3/2-#	27	1.5	**40 ± *0.0***	1.5 -	**40 ± *0.0***	1.5 -	**40 ± *0.0***	3/2-
55-Zn	19.8 ± *1.3*	ms	5/2-#	19.8	2.5	20 ± *0.0*	2.5 -	20 ± *0.0*	2.5 -	20 ± *0.0*	5/2-
56-K	1# ± *6E-4*	ms	2-#	1	2					**0.0006 ± *0.0***	
56-Ca	11 ± *2.0*	ms	0+	11	0.0 +	**10 ± *0.0***	0.0 +	**10 ± *1.0***	0.0 +	11 ± *2.0*	0+
56-Sc	26 ± *6.0*	ms	(1+)	26	1.0 +	**80 ± *0.0***	**3.0 +**	**60 ± *7.0***	**? -**	26 ± *6.0*	(1+)
56-Ti	200 ± *5.0*	ms	0+	200	0.0 +	**164 ± *24.0***	0.0 +	200 ± *5.0*	0.0 +	200 ± *5.0*	0+
56-V	216 ± *4.0*	ms	(1+)	216	1.0 +	216 ± *4.0*	1.0 +	216 ± *4.0*	1.0 +	216 ± *4.0*	1+
56-Cr	5.94 ± *0.1*	m	0+	5.94	0.0 +	5.94 ± *0.1*	0.0 +	5.94 ± *0.1*	0.0 +	5.94 ±*0.1*	0+
56-Mn	2.5789 ± *1E-4*	h	3+	2.5789	3.0 +	2.5824 ±*0.0048*	3.0 +	2.5789 ±*1.0E-4*	3.0 +	2.5789 ±*1.0E-4*	3+
56-Fe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
56-Co	77.236 ± *0.026*	d	4+	77.234	4.0 +	77.310 ± *0.19*	4.0 +	77.233 ±*0.027*	4.0 +	77.236 ±*0.026*	4+
56-Ni	6.075 ± *0.01*	d	0+	6.075	0.0 +	6.075 ± *0.01*	0.0 +	6.075 ± *0.01*	0.0 +	6.075 ±*0.01*	0+
56-Cu	93 ± *3.0*	ms	(4+)	93	4.0 +	93 ± *3.0*	4.0 +	94 ± *3.0*	4.0 +	93 ± *3.0*	(4+)
56-Zn	30.0 ± *1.7*	ms	0+	30	0.0 +	**36 ± *10.0***	0.0 +	**0.000500 ±*0.0***	0.0 +	30 ± *1.7*	0+
56-Ga			3+#		3.0 +	**1E-9 ± *1.0E-9***	3.0 +	**0.006 ± *0.0***	**? -**		
57-Ca	5# ± *6E-4*	ms	5/2-#	5	2.5	5 ± *0.0*	2.5 -	5 ± *0.5*	**? -**	**0.0006 ± *0.0***	
57-Sc	22 ± *2.0*	ms	7/2-#	22	3.5	**13 ± *4.0***	3.5 -	**13 ± *4.0***	**? -**	**13 ± *4.0***	
57-Ti	95 ± *8.0*	ms	5/2-#	95	2.5	**60 ± *16.0***	2.5 -	**60 ± *16.0***	**? -**	**98 ± *5.0***	(5/2-)
57-V	350 ± *10.0*	ms	(3/2-)	350	1.5	350 ± *10.0*	1.5 -	350 ± *10.0*	1.5 -	**320 ±*30.0***	(7/2-)
57-Cr	21.1 ± *1.0*	s	(3/2)-	21.1	1.5	21.1 ± *1.0*	1.5 -	21.1 ± *1.0*	**? -**	21.1 ±*1.0*	(3/2)-
57-Mn	85.4 ± *1.8*	s	5/2-	85.4	2.5	85.4 ± *1.8*	2.5 -	85.4 ± *1.8*	2.5 -	85.4 ±*1.8*	5/2-
57-Fe	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
57-Co	271.74 ± *0.06*	d	7/2-	271.76	3.5	271.80 ± *0.05*	3.5 -	271.74 ± *0.06*	3.5 -	271.74 ±*0.06*	7/2-
57-Ni	35.60 ± *0.06*	h	3/2-	35.61	1.5	35.90 ± *0.3*	1.5 -	35.60 ± *0.06*	1.5 -	35.60 ±*0.06*	3/2-
57-Cu	196.3 ± *0.7*	ms	3/2-	196.3	1.5	196.3 ± *0.7*	1.5 -	196.3 ± *0.7*	1.5 -	196.3 ±*0.7*	3/2-
57-Zn	38 ± *4.0*	ms	7/2-#	38	3.5	38 ± *4.0*	3.5 -	38 ± *4.0*	3.5 -	**40 ±*10.0***	(7/2-)
57-Ga			1/2-#		0.5	**1E-9 ± *1.0E-9***	0.5 -	**0.01 ± *0.0***	**? -**		
58-Ca	3# ± *6E-4*	ms	0+	3	0.0 +					**0.0006 ± *0.0***	0+
58-Sc	12 ± *5.0*	ms	3+#	12	3.0 +	12 ± *5.0*	3.0 +	12 ± *5.0*	3.0 +	12 ± *5.0*	
58-Ti	55 ± *6.0*	ms	0+	55	0.0 +	54 ± *7.0*	0.0 +	**59 ± *9.0***	0.0 +	**59 ± *9.0***	0+
58-V	191 ± *10.0*	ms	(1+)	191	1.0 +	191 ± *8.0*	**3.0 +**	**185 ± *10.0***	1.0 +	191 ±*10.0*	(1+)
58-Cr	7.0 ± *0.3*	s	0+	7	0.0 +	7 ± *0.3*	0.0 +	7 ± *0.3*	0.0 +	7 ± *0.3*	0+
58-Mn	3.0 ± *0.1*	s	1+	3	1.0 +	**65 ± *0.5***	**3.0 +**	3 ± *0.1*	1.0 +	3 ± *0.1*	1+
58-Fe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
58-Co	70.86 ± *0.06*	d	2+	70.86	2.0 +	70.86 ± *0.07*	2.0 +	70.86 ± *0.06*	2.0 +	70.86 ±*0.06*	2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
58-Ni	stable ± *2E28*		0+	stable	0.0 +	**2E+28 ± *0.0***	0.0 +	stable	0.0 +		0+
58-Cu	3.204 ± *0.0070*	s	1+	3.204	1.0 +	3.204 ±*0.0070*	1.0 +	3.204 ±*0.0070*	1.0 +	3.204 ±*0.0070*	1+
58-Zn	86 ± *8.0*	ms	0+	86	0.0 +	**84 ± *9.0***	0.0 +	**84 ± *9.0***	0.0 +	86 ± *8.0*	0+
58-Ga			2+#		2.0 +	**1E-9 ± *1.0E-9***	2.0 +	**0.02 ± *0.0***	**? -**		
58-Ge			0+		0.0 +	**1E-9 ± *1.0E-9***	0.0 +	**0.02 ± *0.0***	0.0 +		
59-Sc	10# ± *6E-4*	ms	7/2-#	10	3.5	10 ± *0.0*	3.5 -	10 ± *1.0*	**? -**	**0.00036 ± *0.0***	
59-Ti	28.5 ± *1.9*	ms	5/2-#	28.5	2.5	**30 ± *2.5***	2.5 -	**30 ± *3.0***	2.5 -	**58 ±*17.0***	
59-V	95 ± *6.0*	ms	(5/2-)	95	2.5	**75 ± *7.0***	**3.5 -**	**75 ± *7.0***	**? -**	**75 ± *7.0***	(5/2-,3/2-)
59-Cr	1050 ± *90.0*	ms	(1/2-)	1050	0.5	**460 ± *50.0***	**2.5 -**	**460 ± *50.0***	0.5 -	**460 ±*50.0***	(1/2-)
59-Mn	4.59 ± *0.05*	s	(5/2)-	4.59	2.5	4.59 ± *0.05*	2.5 -	4.59 ± *0.05*	2.5 -	4.59 ±*0.05*	(5/2)-
59-Fe	44.495 ± *0.0090*	d	3/2-	44.491	1.5	44.495 ±*0.0080*	1.5 -	44.495 ±*0.0090*	1.5 -	44.495 ±*0.0090*	3/2-
59-Co	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
59-Ni	101 ± *13.0*	ky	3/2-	101	1.5	**76.0 ± *5.0***	1.5 -	**76.0 ± *5.0***	1.5 -	**76.0 ±*5.0***	3/2-
59-Cu	81.5 ± *0.5*	s	3/2-	81.5	1.5	81.5 ± *0.5*	1.5 -	81.5 ± *0.5*	1.5 -	81.5 ±*0.5*	3/2-
59-Zn	182.0 ± *1.8*	ms	3/2-	182	1.5	182 ± *1.8*	1.5 -	182 ± *1.8*	1.5 -	182 ± *1.8*	3/2-
59-Ga	<43ns	ns	3/2-#	43	1.5	**1 ± *1.0***	1.5 -	**4.2E+7 ± *0.0***	**? -**		
59-Ge			7/2-#		3.5	**1E-9 ± *1.0E-9***	3.5 -	**0.04 ± *0.0***	**? -**		
60-Sc	3# ± *6E-4*	ms	3+#	3	3.0 +	3 ± *0.0*	3.0 +	3 ± *0.3*	**? -**	**0.0004 ± *0.0***	
60-Ti	22.2 ± *1.6*	ms	0+	22.2	0.0 +	22 ± *2.0*	0.0 +	22 ± *2.0*	0.0 +		0+
60-V	122 ± *18.0*	ms	3+#	122	3.0 +	122 ± *18.0*	3.0 +	**68 ± *5.0***	**? -**	**40 ±*15.0***	
60-Cr	490 ± *10.0*	ms	0+	490	0.0 +	**560 ± *60.0***	0.0 +	490 ± *10.0*	0.0 +	490 ±*10.0*	0+
60-Mn	280 ± *20.0*	ms	1+	280	1.0 +	**5.10E+4 ±*6000.0***	**0.0 +**	**5.10E+4 ±*6000.0***	**0.0 +**	280 ±*20.0*	1+
60-Fe	2.62 ± *0.04*	My	0+	2.62	0.0 +	**1.50 ± *0.3***	0.0 +	**1.50 ± *0.3***	0.0 +	**1.50 ±*0.3***	0+
60-Co	5.2712 ± *4E-4*	y	5+	5.2698	5.0 +	5.2710 ±*0.0010*	5.0 +	5.2712	5.0 +	5.2712	5+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
								±3.8331E-4		*±3.8331E-4*	
60-Ni	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
60-Cu	23.7 ± *0.4*	m	2+	23.7	2.0 +	23.7 ± *0.4*	2.0 +	23.7 ± *0.4*	2.0 +	23.7 ±*0.4*	2+
60-Zn	2.38 ± *0.05*	m	0+	2.38	0.0 +	2.38 ± *0.05*	0.0 +	2.38 ± *0.05*	0.0 +	2.38 ±*0.05*	0+
60-Ga	70 ± *10.0*	ms	(2+)	70	2.0 +	70 ± *13.0*	2.0 +	70 ± *15.0*	2.0 +	70 ± *13.0*	(2+)
60-Ge	30# ± *1E-4*	ms	0+	30	0.0 +	30 ± *0.0*	0.0 +	30 ± *3.0*	0.0 +	**0.00011 ± *0.0***	0+
60-As			5+#		5.0 +	**1E-9 ± *1.0E-9***	5.0 +	**0.008 ± *0.0***	**? -**		
61-Sc	2# ± *6E-4*	ms	7/2-#	2	3.5					**0.0004 ± *0.0***	
61-Ti	15 ± *4.0*	ms	1/2-#	15	0.5	**10 ± *0.0***	0.5 -	**0.00030 ±*0.0***	**? -**	15 ± *4.0*	(1/2-)
61-V	47.0 ± *1.2*	ms	3/2-#	47	1.5	47 ± *1.2*	**3.5 -**	47 ± *1.0*	1.5 -	47 ± *1.2*	(3/2-)
61-Cr	243 ± *9.0*	ms	(5/2-)	243	2.5	**261 ± *15.0***	2.5 -	**270 ± *20.0***	**? -**	243 ±*11.0*	(5/2-)
61-Mn	670 ± *40.0*	ms	(5/2)-	670	2.5	670 ± *40.0*	2.5 -	670 ± *40.0*	2.5 -	670 ±*40.0*	(5/2)-
61-Fe	5.98 ± *0.06*	m	3/2-	5.98	1.5	5.98 ± *0.06*	**? -**	5.98 ± *0.06*	**? -**	5.98 ±*0.06*	3/2-,5/2-
61-Co	1.650 ± *0.0050*	h	7/2-	1.65	3.5	1.650 ±*0.0050*	3.5 -	1.650 ±*0.0050*	3.5 -	1.650 ±*0.0050*	7/2-
61-Ni	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
61-Cu	3.333 ± *0.0050*	h	3/2-	3.333	1.5	3.333 ±*0.0050*	1.5 -	3.333 ±*0.0050*	1.5 -	3.333 ±*0.0050*	3/2-
61-Zn	89.1 ± *0.2*	s	3/2-	89.1	1.5	89.1 ± *0.2*	1.5 -	89.1 ± *0.2*	1.5 -	89.1 ±*0.2*	3/2-
61-Ga	168 ± *3.0*	ms	3/2-	168	1.5	168 ± *3.0*	1.5 -	168 ± *3.0*	1.5 -	167 ± *3.0*	3/2-
61-Ge	44 ± *6.0*	ms	3/2-#	44	1.5	**39 ± *12.0***	1.5 -	**39 ± *12.0***	1.5 -	44 ± *6.0*	(3/2-)
61-As			3/2-#		1.5	**1E-9 ± *1.0E-9***	1.5 -	**0.02 ± *0.0***	**? -**		
62-Ti	10# ± *6E-4*	ms	0+	10	0.0 +	10 ± *0.0*	0.0 +	10 ± *1.0*	0.0 +	**0.00062 ± *0.0***	0+
62-V	33.6 ± *2.3*	ms	3+#	33.6	3.0 +	33.5 ± *2.0*	3.0 +	**0.000150 ±*0.0***	**? -**	33.6 ±*2.3*	
62-Cr	206 ± *12.0*	ms	0+	206	0.0 +	**199 ± *9.0***	0.0 +	**190 ± *30.0***	0.0 +	206 ±*12.0*	0+
62-Mn	92 ± *13.0*	ms	(1+)	92	1.0 +	**8.8E+2 ±*150.0***	**3.0 +**	**6.7E+2 ± *5.0***	**? -**	92 ± *13.0*	(1+)
62-Fe	68 ± *2.0*	s	0+	68	0.0 +	68 ± *2.0*	0.0 +	68 ± *2.0*	0.0 +	68 ± *2.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
62-Co	1.54 ± *0.1*	m	(2)+	1.54	2.0 +	**1.5 ± *0.04***	2.0 +	**1.5 ± *0.04***	2.0 +	1.54 ±*0.1*	(2)+
62-Ni	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
62-Cu	9.67 ± *0.03*	m	1+	9.67	1.0 +	9.75 ± *0.01*	1.0 +	9.67 ± *0.0080*	1.0 +	9.67 ±*0.03*	1+
62-Zn	9.193 ± *0.015*	h	0+	9.192	0.0 +	9.260 ± *0.02*	0.0 +	9.260 ± *0.02*	0.0 +	9.193 ±*0.015*	0+
62-Ga	116.121 ± *0.021*	ms	0+	116.1	0.0 +	116.120 ± *0.3*	0.0 +	116.120 ± *0.3*	0.0 +	116.121 ± *0.021*	0+
62-Ge	129 ± *35.0*	ms	0+	129	0.0 +	130 ± *40.0*	0.0 +	**0.000150 ±*0.0***	0.0 +	129 ±*35.0*	0+
62-As			1+#		1.0 +	**1E-9 ± *1.0E-9***	1.0 +	**0.03 ± *0.0***	**? -**		
63-Ti	3# ± *6E-4*	ms	1/2-#	3	0.5	3 ± *0.0*	0.5 -	3 ± *0.3*	**? -**	**0.0004 ± *0.0***	
63-V	18.3 ± *1.9*	ms	7/2-#	18.3	3.5	**17 ± *3.0***	3.5 -	**17 ± *3.0***	3.5 -	**17 ± *3.0***	7/2-
63-Cr	129 ± *2.0*	ms	1/2-#	129	0.5	129 ± *2.0*	0.5 -	129 ± *2.0*	0.5 -	129 ± *2.0*	1/2-
63-Mn	275 ± *4.0*	ms	5/2-#	275	2.5	275 ± *4.0*	2.5 -	**290 ± *20.0***	2.5 -	275 ± *4.0*	5/2-
63-Fe	6.1 ± *0.6*	s	(5/2-)	6.1	2.5	6.1 ± *0.6*	2.5 -	6.1 ± *0.6*	2.5 -	6.1 ± *0.6*	(5/2-)
63-Co	26.9 ± *0.4*	s	7/2-	26.9	3.5	27.4 ± *0.5*	3.5 -	27.4 ± *0.5*	3.5 -	27.4 ±*0.5*	7/2-
63-Ni	101.2 ± *1.5*	y	1/2-	101.2	0.5	100.6 ± *1.4*	0.5 -	101.2 ± *1.5*	0.5 -	101.2 ±*1.5*	1/2-
63-Cu	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
63-Zn	38.47 ± *0.05*	m	3/2-	38.47	1.5	38.40 ± *0.1*	1.5 -	38.47 ± *0.05*	1.5 -	38.47 ±*0.05*	3/2-
63-Ga	32.4 ± *0.5*	s	(3/2-)	32.4	1.5	32.4 ± *0.5*	1.5 -	32.4 ± *0.5*	1.5 -	32.4 ±*0.5*	3/2-
63-Ge	142 ± *8.0*	ms	3/2-#	142	1.5	142 ± *8.0*	1.5 -	142 ± *8.0*	1.5 -	**150 ±*9.0***	3/2-
63-As	<43ns	ns	3/2-#	43	1.5	**1 ± *1.0***	1.5 -	**9.2E+7 ± *0.0***	1.5 -	43 ± *0.0*	3/2-
64-V	19 ± *8.0*	ms		19	?	**10 ± *0.0***	? -	19 ± *8.0*	? -	19 ± *8.0*	
64-Cr	43 ± *1.0*	ms	0+	43	0.0 +	43 ± *1.0*	0.0 +	43 ± *1.0*	0.0 +	43 ± *1.0*	0+
64-Mn	88.8 ± *2.4*	ms	(1+)	88.8	1.0 +	88.8 ± *2.5*	1.0 +	90 ± *4.0*	1.0 +	90 ± *4.0*	(1+)
64-Fe	2.0 ± *0.2*	s	0+	2	0.0 +	2 ± *0.2*	0.0 +	2 ± *0.2*	0.0 +	2 ± *0.2*	0+
64-Co	300 ± *30.0*	ms	1+	300	1.0 +	300 ± *30.0*	1.0 +	300 ± *30.0*	1.0 +	300 ±*30.0*	1+
64-Ni	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
64-Cu	12.701 ± *0.0020*	h	1+	12.7	1.0 +	12.701 ±*0.0020*	1.0 +	12.701 ±*0.0020*	1.0 +	12.701 ±*0.0020*	1+
64-Zn	stable ± *2E26*		0+	stable	0.0 +	**7E+25 ± *0.0***	0.0 +	stable	0.0 +		0+
64-Ga	2.627 ± *0.012*	m	0(+#)	2.627	0.0 +	2.627 ± *0.012*	0.0 +	2.627 ± *0.012*	0.0 +	2.627 ±*0.012*	0+
64-Ge	63.7 ± *2.5*	s	0+	63.7	0.0 +	63.7 ± *2.5*	0.0 +	63.7 ± *2.5*	0.0 +	63.7 ±*2.5*	0+
64-As	40 ± *30.0*	ms	0+#	40	0.0 +	40 ± *30.0*	0.0 +	**36 ± *25.0***	**? -**	**18 ± *0.0***	
64-Se	30# ± *1E-4*	ms	0+	30	0.0 +					**0.00018 ± *0.0***	0+
65-V	10# ± *6E-4*	ms	5/2-#	10	2.5	10 ± *0.0*	2.5 -	10 ± *1.0*	**? -**	**0.00036 ± *0.0***	
65-Cr	27.5 ± *2.1*	ms	1/2-#	27.5	0.5	27 ± *3.0*	0.5 -	27 ± *3.0*	0.5 -	27 ± *3.0*	(1/2-)
65-Mn	92 ± *1.0*	ms	5/2-#	92	2.5	92 ± *1.0*	2.5 -	92 ± *1.0*	**? -**	92 ± *1.0*	(5/2-)
65-Fe	810 ± *50.0*	ms	(1/2-)	810	0.5	**1.30E+3 ±*300.0***	0.5 -	810 ± *50.0*	0.5 -	810 ±*50.0*	(1/2-)
65-Co	1.16 ± *0.03*	s	(7/2)-	1.16	3.5	**1.20 ± *0.06***	3.5 -	1.16 ± *0.03*	3.5 -	1.16 ±*0.03*	(7/2)-
65-Ni	2.5175 ± *5E-4*	h	5/2-	2.5175	2.5	2.5200 ±*0.0010*	2.5 -	2.5172 ±*2.6E-4*	2.5 -	2.5175 ±*5.0E-4*	5/2-
65-Cu	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
65-Zn	243.93 ± *0.09*	d	5/2-	243.98	2.5	244.15 ± *0.09*	2.5 -	243.93 ± *0.09*	2.5 -	243.93 ±*0.09*	5/2-
65-Ga	15.2 ± *0.2*	m	3/2-	15.2	1.5	15.2 ± *0.2*	1.5 -	15.2 ± *0.2*	1.5 -	15.2 ±*0.2*	3/2-
65-Ge	30.9 ± *0.5*	s	3/2-	30.9	1.5	30.9 ± *0.5*	1.5 -	30.9 ± *0.5*	1.5 -	30.9 ±*0.5*	3/2-
65-As	170 ± *30.0*	ms	3/2-#	170	1.5	170 ± *30.0*	1.5 -	**128 ± *16.0***	**? -**	**128 ±*16.0***	
65-Se	33 ± *4.0*	ms	3/2-#	33	1.5	**50 ± *0.0***	1.5 -	**50 ± *0.0***	**? -**	33 ± *4.0*	(3/2-)
66-V	5# ± *6E-4*	ms		5	?					**0.0004 ± *0.0***	
66-Cr	23.8 ± *1.8*	ms	0+	23.8	0.0 +	**10 ± *6.0***	0.0 +	**10 ± *6.0***	0.0 +	**10 ± *6.0***	0+
66-Mn	64.2 ± *0.8*	ms	(1+)	64.2	1.0 +	64.4 ± *1.8*	**? -**	64 ± *2.0*	**? -**	65 ± *2.0*	
66-Fe	351 ± *6.0*	ms	0+	351	0.0 +	**440 ± *40.0***	0.0 +	**440 ± *60.0***	0.0 +	**440 ±*60.0***	0+
66-Co	194 ± *17.0*	ms	(1+)	194	1.0 +	**233 ± *17.0***	**3.0 +**	**200 ± *20.0***	**3.0 +**	**200 ±*20.0***	(3+)
66-Ni	54.6 ± *0.3*	h	0+	54.6	0.0 +	54.4 ± *0.5*	0.0 +	54.6 ± *0.3*	0.0 +	54.6 ±*0.3*	0+
66-Cu	5.120 ± *0.014*	m	1+	5.12	1.0 +	5.100 ± *0.01*	1.0 +	5.120 ± *0.014*	1.0 +	5.120 ±*0.014*	1+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
66-Zn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
66-Ga	9.304 ± *0.0080*	h	0+	9.303	0.0 +	9.490 ± *0.07*	0.0 +	9.490 ± *0.03*	0.0 +	9.490 ±*0.03*	0+
66-Ge	2.26 ± *0.05*	h	0+	2.26	0.0 +	2.26 ± *0.05*	0.0 +	2.26 ± *0.05*	0.0 +	2.26 ±*0.05*	0+
66-As	95.77 ± *0.23*	ms	(0+)	95.77	0.0 +	95.77 ± *0.23*	0.0 +	95.79 ± *0.22*	**? -**	95.77 ±*0.23*	[0+]
66-Se	33 ± *12.0*	ms	0+	33	0.0 +	33 ± *12.0*	0.0 +	33 ± *12.0*	0.0 +	**42 ±*12.0***	0+
67-Cr	10# ± *3E-4*	ms	1/2-#	10	0.5	10 ± *0.0*	0.5 -	**50 ± *5.0***	**? -**		
67-Mn	46.7 ± *2.3*	ms	5/2-#	46.7	2.5	**45 ± *4.0***	2.5 -	47 ± *2.0*	2.5 -	47 ± *2.0*	(5/2-)
67-Fe	394 ± *9.0*	ms	(1/2-)	394	0.5	394 ± *9.0*	0.5 -	**416 ± *29.0***	**2.5 +**	**600 ±*0.0***	**(5/2+)**
67-Co	329 ± *28.0*	ms	(7/2-)	329	3.5	**425 ± *20.0***	3.5 -	**425 ± *20.0***	3.5 -	**425 ±*20.0***	(7/2-)
67-Ni	21 ± *1.0*	s	1/2-	21	0.5	21 ± *1.0*	0.5 -	21 ± *1.0*	0.5 -	21 ± *1.0*	(1/2)-
67-Cu	61.83 ± *0.12*	h	3/2-	61.83	1.5	61.90 ± *0.1*	1.5 -	61.83 ± *0.12*	1.5 -	61.83 ±*0.12*	3/2-
67-Zn	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
67-Ga	3.2617 ± *5E-4*	d	3/2-	3.2616	1.5	3.2612 ±*6.0E-4*	1.5 -	3.2617 ±*5.0E-4*	1.5 -	3.2617 ±*5.0E-4*	3/2-
67-Ge	18.9 ± *0.3*	m	1/2-	18.9	0.5	18.9 ± *0.3*	0.5 -	18.9 ± *0.3*	0.5 -	18.9 ±*0.3*	1/2-
67-As	42.5 ± *1.2*	s	(5/2-)	42.5	2.5	42.5 ± *1.2*	2.5 -	42.5 ± *1.2*	2.5 -	42.5 ±*1.2*	(5/2-)
67-Se	133 ± *11.0*	ms	5/2-#	133	2.5	133 ± *11.0*	2.5 -	**136 ± *12.0***	**? -**	**136 ±*12.0***	
67-Br			1/2-#		0.5	**1E-9 ± *1.0E-9***	0.5 -	**0.04 ± *0.0***	**? -**		
68-Cr	5# ± *6E-4*	ms	0+	5	0.0 +					**0.0004 ± *0.0***	0+
68-Mn	28.4 ± *2.7*	ms		28.4	?	28 ± *4.0*	? -	28 ± *4.0*	? -	28 ± *3.0*	**>3**
68-Fe	188 ± *4.0*	ms	0+	188	0.0 +	187 ± *6.0*	0.0 +	187 ± *6.0*	0.0 +	188 ± *4.0*	0+
68-Co	200 ± *20.0*	ms	(7-)	200	7	199 ± *21.0*	7.0 -	199 ± *21.0*	7.0 -	200 ±*20.0*	(7-)
68-Ni	29 ± *2.0*	s	0+	29	0.0 +	29 ± *2.0*	0.0 +	29 ± *2.0*	0.0 +	29 ± *2.0*	0+
68-Cu	30.9 ± *0.6*	s	1+	30.9	1.0 +	31.1 ± *1.5*	1.0 +	31.1 ± *1.5*	1.0 +	30.9 ±*0.6*	1+
68-Zn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
68-Ga	67.71 ± *0.08*	m	1+	67.72	1.0 +	67.65 ± *0.06*	1.0 +	67.71 ± *0.09*	1.0 +	67.71 ±*0.08*	1+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
68-Ge	270.93 ± *0.13*	d	0+	270.95	0.0 +	270.95 ± *0.16*	**0.0 -**	270.95 ± *0.16*	0.0 +	270.93 ±*0.13*	0+
68-As	151.6 ± *0.8*	s	3+	151.6	3.0 +	151.6 ± *0.8*	3.0 +	151.6 ± *0.8*	3.0 +	151.6 ±*0.8*	3+
68-Se	35.5 ± *0.7*	s	0+	35.5	0.0 +	35.5 ± *0.7*	0.0 +	35.5 ± *0.7*	0.0 +	35.5 ±*0.7*	0+
68-Br	<1.5us	us	3+#	1.5	3.0 +	1.5 ± *0.0*	3.0 +	**1.2 ± *0.0***	**? -**		
69-Mn	16.0 ± *2.8*	ms	5/2-#	16	2.5	**14 ± *4.0***	2.5 -	**14 ± *4.0***	2.5 -	**14 ± *4.0***	5/2-
69-Fe	110 ± *5.0*	ms	1/2-#	110	0.5	109 ± *9.0*	0.5 -	109 ± *9.0*	0.5 -	**170 ±*30.0***	**1/2-**
69-Co	227 ± *11.0*	ms	7/2-#	227	3.5	227 ± *13.0*	3.5 -	**220 ± *20.0***	3.5 -	**270 ±*50.0***	7/2-
69-Ni	11.5 ± *0.3*	s	9/2+	11.5	4.5 +	11.4 ± *0.3*	4.5 +	11.4 ± *0.3*	**? -**	11.4 ±*0.3*	9/2+
69-Cu	2.85 ± *0.15*	m	3/2-	2.85	1.5	2.85 ± *0.15*	1.5 -	2.85 ± *0.15*	1.5 -	2.85 ±*0.15*	3/2-
69-Zn	56.4 ± *0.9*	m	1/2-	56.4	0.5	56.4 ± *0.7*	0.5 -	56.4 ± *0.9*	0.5 -	56.4 ±*0.9*	1/2-
69-Ga	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
69-Ge	39.05 ± *0.1*	h	5/2-	39.06	2.5	39.05 ± *0.1*	2.5 -	39.05 ± *0.1*	2.5 -	39.05 ±*0.1*	5/2-
69-As	15.2 ± *0.2*	m	5/2-	15.2	2.5	15.2 ± *0.16*	2.5 -	15.2 ± *0.16*	2.5 -	15.2 ±*0.2*	5/2-
69-Se	27.4 ± *0.2*	s	(1/2-)	27.4	0.5	27.4 ± *0.2*	**1.5 -**	27.4 ± *0.2*	**1.5 -**	27.4 ±*0.2*	(1/2-,3/2-)
69-Br	<24	ns	(1/2-)	24	0.5	24 ± *0.0*	0.5 -	24 ± *0.0*	**? -**	24 ± *0.0*	
69-Kr	27.4 ± *2.9*	ms	(5/2-)	27.4	2.5	**32 ± *10.0***	2.5 -	**32 ± *10.0***	**? -**	**32 ±*10.0***	
70-Mn	10# ± *6E-4*	ms		10	?					**0.00036 ± *0.0***	
70-Fe	77 ± *9.0*	ms	0+	77	0.0 +	**94 ± *17.0***	0.0 +	**94 ± *17.0***	0.0 +	**94 ±*17.0***	0+
70-Co	112.7 ± *4.5*	ms	(6-)	112.7	6	**119.0 ± *6.0***	6.0 -	**119.0 ± *6.0***	6.0 -	**119 ±*6.0***	(6-)
70-Ni	6.0 ± *0.3*	s	0+	6	0.0 +	6 ± *0.3*	0.0 +	6 ± *0.3*	0.0 +	6 ± *0.3*	0+
70-Cu	44.5 ± *0.2*	s	6-	44.5	6	44.5 ± *0.2*	6.0 -	44.5 ± *0.2*	6.0 -	44.5 ±*0.2*	(6-)
70-Zn	stable		0+		0.0 +	stable	0.0 +	**0 ± *0.0***	0.0 +	**4E+23 ±*0.0***	0+
70-Ga	21.14 ± *0.03*	m	1+	21.13	1.0 +	21.14 ± *0.03*	1.0 +	21.14 ± *0.03*	1.0 +	21.14 ±*0.03*	1+
70-Ge	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
70-As	52.6 ± *0.3*	m	4(+#)	52.6	4.0 +	52.6 ± *0.3*	4.0 +	52.6 ± *0.3*	4.0 +	52.6 ±*0.3*	4+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
70-Se	41.1 ± *0.3*	m	0+	41.1	0.0 +	41.1 ± *0.3*	0.0 +	41.1 ± *0.3*	0.0 +	41.1 ±*0.3*	0+
70-Br	79.1 ± *0.8*	ms	0+	79.1	0.0 +	79.1 ± *0.8*	0.0 +	79.1 ± *0.8*	0.0 +	79.1 ±*0.8*	0+
70-Kr	52 ± *17.0*	ms	0+	52	0.0 +	52 ± *17.0*	0.0 +	52 ± *17.0*	0.0 +	52 ± *17.0*	0+
71-Mn	5# ± *4E-4*	ms	5/2-#	5	2.5					**0.0006 ± *0.0***	
71-Fe	28 ± *5.0*	ms	7/2+#	28	3.5 +	**30 ± *0.0***	3.5 +	28 ± *5.0*	3.5 +	28 ± *5.0*	
71-Co	80 ± *3.0*	ms	7/2-#	80	3.5	**97 ± *2.0***	3.5 -	79 ± *5.0*	**? -**	80 ± *3.0*	(7/2-)
71-Ni	2.56 ± *0.03*	s	(9/2+)	2.56	4.5 +	2.56 ± *0.03*	**0.5 -**	2.56 ± *0.03*	**? -**	2.56 ±*0.03*	(9/2+)
71-Cu	19.4 ± *1.4*	s	3/2-	19.4	1.5	19.4 ± *1.4*	1.5 -	19.5 ± *1.6*	1.5 -	19.4 ±*1.6*	3/2(-)
71-Zn	2.45 ± *0.1*	m	1/2-	2.45	0.5	2.45 ± *0.1*	0.5 -	2.45 ± *0.1*	0.5 -	2.45 ±*0.1*	1/2-
71-Ga	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
71-Ge	11.43 ± *0.03*	d	1/2-	11.43	0.5	11.43 ± *0.03*	0.5 -	11.43 ± *0.03*	0.5 -	11.43 ±*0.03*	1/2-
71-As	65.30 ± *0.07*	h	5/2-	65.31	2.5	65.28 ± *0.15*	2.5 -	65.30 ± *0.07*	2.5 -	65.30 ±*0.07*	5/2-
71-Se	4.74 ± *0.05*	m	(5/2-)	4.74	2.5	4.74 ± *0.05*	2.5 -	4.74 ± *0.05*	2.5 -	4.74 ±*0.05*	(5/2-)
71-Br	21.4 ± *0.6*	s	(5/2)-	21.4	2.5	21.4 ± *0.6*	2.5 -	21.4 ± *0.6*	2.5 -	21.4 ±*0.6*	(5/2)-
71-Kr	100 ± *3.0*	ms	(5/2)-	100	2.5	**64 ± *8.0***	2.5 -	100 ± *3.0*	2.5 -	100 ± *3.0*	(5/2-)
71-Rb			5/2-#		2.5	**1E-9 ± *1.0E-9***	2.5 -	**1E-9 ± *0.0***	**? -**		
72-Fe	10# ± *3E-4*	ms	0+	10	0.0 +	10 ± *0.0*	0.0 +	**0.00015 ±*0.0***	0.0 +	**0.00015 ± *0.0***	0+
72-Co	59.9 ± *1.7*	ms	6-#	59.9	6	**90 ± *20.0***	**? -**	59.9 ± *1.7*	**? -**	59.9 ±*1.7*	[6-,7-]
72-Ni	1.57 ± *0.05*	s	0+	1.57	0.0 +	1.57 ± *0.05*	0.0 +	1.57 ± *0.05*	0.0 +	1.57 ±*0.05*	0+
72-Cu	6.63 ± *0.03*	s	2-	6.63	2	6.60 ± *0.1*	**1.0 +**	6.63 ± *0.03*	**2.0 -**	6.63 ±*0.03*	**-2**
72-Zn	46.5 ± *0.1*	h	0+	46.5	0.0 +	46.5 ± *0.1*	0.0 +	46.5 ± *0.1*	0.0 +	46.5 ±*0.1*	0+
72-Ga	14.10 ± *0.02*	h	3-	14.1	3	14.10 ± *0.01*	3.0 -	14.10 ± *0.01*	3.0 -	14.10 ±*0.02*	3-
72-Ge	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
72-As	26.0 ± *0.1*	h	2-	26	2	26 ± *0.1*	2.0 -	26 ± *0.1*	2.0 -	26 ± *0.1*	2-
72-Se	8.40 ± *0.08*	d	0+	8.4	0.0 +	8.40 ± *0.08*	0.0 +	8.40 ± *0.08*	0.0 +	8.40 ±*0.08*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
72-Br	78.6 ± *2.4*	s	1+	78.6	1.0 +	78.6 ± *2.4*	1.0 +	78.6 ± *2.4*	1.0 +	78.6 ±*2.4*	1+
72-Kr	17.16 ± *0.18*	s	0+	17.16	0.0 +	17.16 ± *0.18*	0.0 +	17.10 ± *0.2*	0.0 +	17.10 ±*0.2*	0+
72-Rb	<1.5us	us	1+#	1.5	1.0 +	1.5 ± *0.0*	**3.0 +**	**1.2 ± *0.0***	**3.0 +**		
73-Fe	5# ± *4E-4*	ms	7/2+#	5	3.5 +					**0.0006 ± *0.0***	
73-Co	41 ± *3.0*	ms	7/2-#	41	3.5	**80 ± *0.0***	3.5 -	41 ± *4.0*	**? -**	**0.00015 ± *0.0***	
73-Ni	840 ± *30.0*	ms	(9/2+)	840	4.5 +	840 ± *30.0*	4.5 +	840 ± *30.0*	**4.5 -**	840 ±*30.0*	(9/2+)
73-Cu	4.2 ± *0.3*	s	3/2-	4.2	1.5	4.2 ± *0.3*	1.5 -	4.2 ± *0.3*	1.5 -	4.2 ± *0.3*	(3/2-)
73-Zn	23.5 ± *1.0*	s	(1/2)-	23.5	0.5	23.5 ± *1.0*	0.5 -	23.5 ± *1.0*	0.5 -	23.5 ±*1.0*	(1/2)-
73-Ga	4.86 ± *0.03*	h	1/2-	4.86	0.5	4.86 ± *0.03*	**1.5 -**	4.86 ± *0.03*	**1.5 -**	4.86 ±*0.03*	3/2-
73-Ge	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+
73-As	80.30 ± *0.06*	d	3/2-	80.3	1.5	80.30 ± *0.06*	1.5 -	80.30 ± *0.06*	1.5 -	80.30 ±*0.06*	3/2-
73-Se	7.15 ± *0.08*	h	9/2+	7.15	4.5 +	7.15 ± *0.08*	4.5 +	7.15 ± *0.08*	4.5 +	7.15 ±*0.08*	9/2+
73-Br	3.4 ± *0.2*	m	1/2-	3.4	0.5	3.4 ± *0.2*	0.5 -	3.4 ± *0.3*	0.5 -	3.4 ± *0.2*	1/2-
73-Kr	27.3 ± *1.0*	s	3/2-	27.3	1.5	27.3 ± *1.0*	1.5 -	27.3 ± *1.0*	1.5 -	27.3 ±*1.0*	3/2-
73-Rb	<30ns	ns	3/2-#	30	1.5	30 ± *0.0*	1.5 -	30 ± *0.0*	**? -**	30 ± *0.0*	
73-Sr	>25	ms	1/2-#	25	0.5	25 ± *0.0*	0.5 -	25 ± *0.0*	**? -**	25 ± *0.0*	
74-Fe	2# ± *4E-4*	ms	0+	2	0.0 +					**0.0006 ± *0.0***	0+
74-Co	30 ± *3.0*	ms		30	?	**50 ± *0.0***	? -	30 ± *3.0*	? -	30 ± *3.0*	
74-Ni	680 ± *120.0*	ms	0+	680	0.0 +	680 ± *120.0*	0.0 +	680 ± *180.0*	0.0 +	680 ±*180.0*	0+
74-Cu	1.63 ± *0.05*	s	2-	1.63	2	**1.59 ± *0.01***	**1.0 +**	**1.75 ± *0.06***	**? -**	1.63 ±*0.05*	**(1+,3+)**
74-Zn	95.6 ± *1.2*	s	0+	95.6	0.0 +	95.6 ± *1.2*	0.0 +	95.6 ± *1.2*	0.0 +	95.6 ±*1.2*	0+
74-Ga	8.12 ± *0.12*	m	3-	8.12	3	8.12 ± *0.12*	3.0 -	8.12 ± *0.12*	3.0 -	8.12 ±*0.12*	(3-)
74-Ge	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
74-As	17.77 ± *0.02*	d	2-	17.77	2	17.78 ± *0.03*	2.0 -	17.77 ± *0.02*	2.0 -	17.77 ±*0.02*	2-
74-Se	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
74-Br	25.4 ± *0.3*	m	(0-)	25.4	0	25.4 ± *0.3*	0.0 -	25.4 ± *0.3*	0.0 -	25.4 ±*0.3*	(0-)
74-Kr	11.50 ± *0.11*	m	0+	11.5	0.0 +	11.5 ± *0.11*	0.0 +	11.5 ± *0.11*	0.0 +	11.5 ±*0.11*	0+
74-Rb	64.776 ± *0.03*	ms	0+	64.78	0.0 +	64.900 ± *0.5*	0.0 +	64.776 ± *0.03*	0.0 +	64.776 ±*0.03*	0+
74-Sr	50# ± *0.0015*	ms	0+	50	0.0 +	50 ± *0.0*	0.0 +	**0.0012 ± *0.0***	0.0 +	**0.0012 ± *0.0***	0+
75-Co	30 ± *11.0*	ms	7/2-#	30	3.5	**40 ± *0.0***	3.5 -	**34 ± *0.0***	**3.5 -**	30 ± *11.0*	
75-Ni	341 ± *22.0*	ms	7/2+#	341	3.5 +	**600 ± *200.0***	3.5 +	**600 ± *200.0***	**3.5 -**	344 ±*25.0*	
75-Cu	1.2238 ± *0.0028*	s	5/2-	1.224	2.5	1.2240 ±*0.0030*	**1.5 -**	1.2240 ±*0.0030*	**1.5 -**	1.2240 ±*0.0030*	5/2(-)
75-Zn	10.2 ± *0.2*	s	(7/2+)	10.2	3.5 +	10.2 ± *0.2*	3.5 +	10.2 ± *0.2*	3.5 +	10.2 ±*0.2*	(7/2+)
75-Ga	126 ± *2.0*	s	3/2-	126	1.5	126 ± *2.0*	1.5 -	126 ± *2.0*	1.5 -	126 ± *2.0*	3/2-
75-Ge	82.78 ± *0.04*	m	1/2-	82.78	0.5	82.78 ± *0.04*	0.5 -	82.78 ± *0.04*	0.5 -	82.78 ±*0.04*	1/2-
75-As	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
75-Se	119.779 ± *0.0040*	d	5/2+	119.792	2.5 +	119.640 ±*0.24*	2.5 +	119.790 ±*0.04*	2.5 +	119.780 ± *0.05*	5/2+
75-Br	96.7 ± *1.3*	m	3/2-	96.7	1.5	96.7 ± *1.3*	1.5 -	96.7 ± *1.3*	1.5 -	96.7 ±*1.3*	3/2-
75-Kr	4.29 ± *0.17*	m	5/2+	4.29	2.5 +	4.29 ± *0.17*	2.5 +	4.29 ± *0.17*	2.5 +	**4.60 ±*0.07***	5/2+
75-Rb	19.0 ± *1.2*	s	(3/2-)	19	1.5	19 ± *1.2*	1.5 -	19 ± *1.2*	1.5 -	19 ± *1.2*	3/2(-)
75-Sr	88 ± *3.0*	ms	(3/2-)	88	1.5	88 ± *3.0*	1.5 -	88 ± *3.0*	1.5 -	88 ± *3.0*	(3/2-)
76-Co	20# ± *4E-4*	ms		20	?					**0.00063 ± *0.0***	
76-Ni	236 ± *17.0*	ms	0+	236	0.0 +	**470 ± *390.0***	0.0 +	238 ± *16.5*	0.0 +	238 ± *0.0*	0+
76-Cu	637.7 ± *5.5*	ms	(3;4)	637.7	**?**	641 ± *6.0*	**? -**	**653 ± *24.0***	**? -**	641 ± *6.0*	
76-Zn	5.7 ± *0.3*	s	0+	5.7	0.0 +	5.7 ± *0.3*	0.0 +	5.7 ± *0.3*	0.0 +	5.7 ± *0.3*	0+
76-Ga	32.6 ± *0.6*	s	2-	32.6	2	32.6 ± *0.6*	**? -**	32.6 ± *0.6*	**? -**	32.6 ±*0.6*	**(2+,3+)**
76-Ge	1.58 ± *0.17*	Zy	0+	stable	0.0 +	1.58 ± *0.17*	0.0 +	stable	0.0 +		0+
76-As	1.0778 ± *0.0020*	d	2-	1.0778	2	1.0925 ±*0.0033333*	2.0 -	1.0933 ±*0.00375*	2.0 -	1.0933 ±*0.00375*	2-
76-Se	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
76-Br	16.2 ± *0.2*	h	1-	16.2	1	16.2 ± *0.2*	1.0 -	16.2 ± *0.2*	1.0 -	16.2 ±*0.2*	1-
76-Kr	14.8 ± *0.1*	h	0+	14.8	0.0 +	14.8 ± *0.1*	0.0 +	14.8 ± *0.1*	0.0 +	14.8 ±*0.1*	0+
76-Rb	36.5 ± *0.6*	s	1(-)	36.5	1	36.5 ± *0.6*	1.0 -	36.5 ± *0.6*	1.0 -	36.5 ±*0.6*	1(-)
76-Sr	7.89 ± *0.07*	s	0+	7.89	0.0 +	**8.90 ± *0.3***	0.0 +	7.89 ± *0.07*	0.0 +	7.89 ±*0.07*	0+
76-Y	500# ± *200.0*	ns	1-#	500	1	500 ± *0.0*	**? -**	**200 ± *0.0***	**? -**	**200 ±*0.0***	
77-Ni	124 ± *30.0*	ms	9/2+#	124	4.5 +	**300 ± *0.0***	4.5 +	**61 ± *0.0***	**? -**	**128 ±*0.0***	
77-Cu	467.9 ± *2.1*	ms	5/2-	467.9	2.5	469.0 ± *8.0*	**1.5 -**	469.0 ± *8.0*	**? -**	467.9 ±*2.1*	5/2-
77-Zn	2.08 ± *0.05*	s	(7/2+)	2.08	3.5 +	2.08 ± *0.05*	3.5 +	2.08 ± *0.05*	3.5 +	2.08 ±*0.05*	(7/2+)
77-Ga	13.2 ± *0.2*	s	3/2(-)	13.2	1.5	13 ± *0.3*	1.5 -	13.2 ± *0.2*	**1.5 -**	13.2 ±*0.2*	3/2(-)
77-Ge	11.211 ± *0.0030*	h	7/2+	11.211	3.5 +	11.300 ± *0.01*	3.5 +	11.300 ± *0.01*	3.5 +	11.211 ±*0.0030*	7/2+
77-As	38.79 ± *0.05*	h	3/2-	38.78	1.5	38.83 ± *0.05*	1.5 -	38.83 ± *0.05*	1.5 -	38.79 ±*0.05*	3/2-
77-Se	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
77-Br	57.04 ± *0.12*	h	3/2-	57.03	1.5	57.04 ±*0.0050*	1.5 -	57.04 ±*0.0050*	1.5 -	57.04 ±*0.12*	3/2-
77-Kr	74.4 ± *0.6*	m	5/2+	74.4	2.5 +	74.4 ± *0.6*	2.5 +	74.4 ± *0.6*	2.5 +	74.4 ±*0.6*	5/2+
77-Rb	3.78 ± *0.04*	m	3/2-	3.78	1.5	3.77 ± *0.04*	1.5 -	3.77 ± *0.04*	1.5 -	3.78 ±*0.04*	3/2-
77-Sr	9.0 ± *0.2*	s	5/2(+)	9	2.5 +	9 ± *0.2*	2.5 +	9 ± *0.2*	2.5 +	9 ± *0.2*	5/2(+)
77-Y	63 ± *17.0*	ms	5/2+#	63	2.5 +	63 ± *17.0*	2.5 +	62 ± *17.0*	2.5 +	**57 ± *0.0***	(5/2+)
78-Ni	140 ± *80.0*	ms	0+	140	0.0 +	**200 ± *0.0***	0.0 +	**110 ± *80.0***	0.0 +	**110 ±*0.0***	0+
78-Cu	335 ± *11.0*	ms	(6-)	335	6	**342 ± *11.0***	**? -**	335 ± *11.0*	**? -**	335 ±*11.0*	(4-,5-,6-)
78-Zn	1.47 ± *0.15*	s	0+	1.47	0.0 +	1.47 ± *0.15*	0.0 +	1.47 ± *0.15*	0.0 +	1.47 ±*0.15*	0+
78-Ga	5.09 ± *0.05*	s	2-	5.09	2	5.09 ± *0.05*	**3.0 +**	5.09 ± *0.05*	**3.0 +**	5.09 ±*0.05*	**(3+)**
78-Ge	88.0 ± *1.0*	m	0+	88	0.0 +	88 ± *1.0*	0.0 +	88 ± *1.0*	0.0 +	88 ± *1.0*	0+
78-As	90.7 ± *0.2*	m	2-	90.7	2	90.7 ± *0.2*	2.0 -	90.7 ± *0.2*	2.0 -	90.7 ±*0.2*	2-
78-Se	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
78-Br	6.45 ± *0.04*	m	1+	6.45	1.0 +	6.46 ± *0.04*	1.0 +	6.45 ± *0.04*	1.0 +	6.45 ±*0.04*	1+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
78-Kr	stable ± *3E27*		0+	stable	0.0 +	**3E+27 ± *0.0***	0.0 +	stable	0.0 +		0+
78-Rb	17.66 ± *0.03*	m	0(+)	17.67	0.0 +	17.66 ± *0.08*	0.0 +	17.66 ± *0.03*	0.0 +	17.66 ±*0.03*	0(+)
78-Sr	156.1 ± *2.7*	s	0+	156.1	0.0 +	159 ± *8.0*	0.0 +	**150 ± *18.0***	0.0 +	**160 ±*8.0***	0+
78-Y	54 ± *5.0*	ms	(0+)	54	0.0 +	54 ± *5.0*	0.0 +	**50 ± *8.0***	0.0 +	53 ± *8.0*	(0+)
78-Zr	50# ± *2E-4*	ms	0+	50	0.0 +	50 ± *0.0*	0.0 +	**0.00020 ±*0.0***	0.0 +	**0.00017 ± *0.0***	0+
79-Ni	100# ± *4E-4*	ms	5/2+#	100	2.5 +					**0.000635 ± *0.0***	
79-Cu	220 ± *19.0*	ms	5/2-#	220	2.5	**188 ± *25.0***	**1.5 -**	**188 ± *25.0***	**? -**	**188 ±*25.0***	
79-Zn	995 ± *19.0*	ms	(9/2+)	995	4.5 +	995 ± *19.0*	4.5 +	995 ± *19.0*	**4.5 -**	995 ±*19.0*	(9/2+)
79-Ga	2.847 ± *0.0030*	s	3/2-	2.847	1.5	2.847 ±*0.0030*	1.5 -	2.847 ±*0.0030*	1.5 -	2.847 ±*0.0030*	(3/2-)
79-Ge	18.98 ± *0.03*	s	(1/2)-	18.98	0.5	18.98 ± *0.03*	0.5 -	18.98 ± *0.03*	0.5 -	18.98 ±*0.03*	(1/2)-
79-As	9.01 ± *0.15*	m	3/2-	9.01	1.5	9.01 ± *0.15*	1.5 -	9.01 ± *0.15*	1.5 -	9.01 ±*0.15*	3/2-
79-Se	335 ± *18.0*	ky	7/2+	335	3.5 +	**377 ± *19.0***	3.5 +	**295 ± *38.0***	3.5 +	**295 ±*38.0***	7/2+
79-Br	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
79-Kr	35.04 ± *0.1*	h	1/2-	35.03	0.5	35.04 ± *0.1*	0.5 -	35.04 ± *0.1*	0.5 -	35.04 ±*0.1*	1/2-
79-Rb	22.9 ± *0.5*	m	5/2+	22.9	2.5 +	22.9 ± *0.5*	2.5 +	22.9 ± *0.5*	2.5 +	22.9 ±*0.5*	5/2+
79-Sr	2.25 ± *0.1*	m	3/2(-)	2.25	1.5	2.25 ± *0.1*	1.5 -	2.25 ± *0.1*	1.5 -	2.25 ±*0.1*	3/2(-)
79-Y	14.8 ± *0.6*	s	5/2+#	14.8	2.5 +	14.8 ± *0.6*	2.5 +	14.8 ± *0.6*	2.5 +	14.8 ±*0.6*	(5/2+)
79-Zr	56 ± *30.0*	ms	5/2+#	56	2.5 +	56 ± *30.0*	2.5 +	56 ± *30.0*	**? -**	56 ± *30.0*	
80-Cu	210 ± *80.0*	ms		210	?	**100 ± *0.0***	? -	**170 ± *0.0***	? -	**0.000300 ± *0.0***	
80-Zn	550 ± *11.0*	ms	0+	550	0.0 +	545 ± *16.0*	0.0 +	540 ± *20.0*	0.0 +	540 ±*20.0*	0+
80-Ga	2.03 ± *0.09*	s	(6-)	2.03	6	**1.70 ± *0.011***	**3.0 -**	**1.68 ± *0.014***	**3.0 -**	**1.68 ±*0.014***	**-3**
80-Ge	29.5 ± *0.4*	s	0+	29.5	0.0 +	29.5 ± *0.4*	0.0 +	29.5 ± *0.4*	0.0 +	29.5 ±*0.4*	0+
80-As	15.2 ± *0.2*	s	1+	15.2	1.0 +	15.2 ± *0.2*	1.0 +	15.2 ± *0.2*	1.0 +	15.2 ±*0.2*	1+
80-Se	stable		0+	stable	0.0 +	stable	0.0 +	**0 ± *0.0***	0.0 +		0+
80-Br	17.68 ± *0.02*	m	1+	17.68	1.0 +	17.60 ± *0.05*	1.0 +	17.68 ± *0.02*	1.0 +	17.68 ±*0.02*	1+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
80-Kr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
80-Rb	33.4 ± *0.7*	s	1+	33.4	1.0 +	34 ± *4.0*	1.0 +	34 ± *4.0*	1.0 +	33.4 ±*0.7*	1+
80-Sr	106.3 ± *1.5*	m	0+	106.3	0.0 +	106.3 ± *1.5*	0.0 +	106.3 ± *1.5*	0.0 +	106.3 ±*1.5*	0+
80-Y	30.1 ± *0.5*	s	4-	30.1	4	**35 ± *2.0***	4.0 -	30.1 ± *0.5*	4.0 -	30.1 ±*0.5*	(4-)
80-Zr	4.6 ± *0.6*	s	0+	4.6	0.0 +	4.6 ± *0.6*	0.0 +	4.6 ± *0.6*	0.0 +	4.6 ± *0.6*	0+
81-Cu	50# ± *4E-4*	ms	5/2-#	50	2.5			**28 ± *0.0***	**? -**	**0.00063 ± *0.0***	
81-Zn	304 ± *13.0*	ms	(5/2+)	304	2.5 +	**290 ± *50.0***	2.5 +	**320 ± *50.0***	**2.5 -**	**320 ±*50.0***	(5/2+)
81-Ga	1.217 ± *0.0050*	s	5/2-	1.217	2.5	1.217 ±*0.0050*	2.5 -	1.217 ±*0.0050*	2.5 -	1.217 ±*0.0050*	(5/2-)
81-Ge	8 ± *2.0*	s	9/2+#	8	4.5 +	8 ± *2.0*	4.5 +	8 ± *0.0*	4.5 +	8 ± *0.6*	(9/2+)
81-As	33.3 ± *0.8*	s	3/2-	33.3	1.5	33.3 ± *0.8*	1.5 -	33.3 ± *0.8*	1.5 -	33.3 ±*0.8*	3/2-
81-Se	18.45 ± *0.12*	m	1/2-	18.45	0.5	18.39 ± *0.13*	0.5 -	18.45 ± *0.12*	0.5 -	18.45 ±*0.12*	1/2-
81-Br	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
81-Kr	229 ± *11.0*	ky	7/2+	229	3.5 +	**210 ± *10.0***	3.5 +	229 ± *11.0*	3.5 +	229 ±*11.0*	7/2+
81-Rb	4.572 ± *0.0040*	h	3/2-	4.572	1.5	4.576 ±*0.0050*	1.5 -	4.572 ±*0.0040*	1.5 -	4.572 ±*0.0040*	3/2-
81-Sr	22.3 ± *0.4*	m	1/2-	22.3	0.5	22.3 ± *0.4*	0.5 -	22.3 ± *0.4*	0.5 -	22.3 ±*0.4*	1/2-
81-Y	70.4 ± *1.0*	s	(5/2+)	70.4	2.5 +	70.4 ± *1.0*	2.5 +	70.4 ± *1.0*	2.5 +	70.4 ±*1.0*	(5/2+)
81-Zr	5.5 ± *0.4*	s	(3/2-)	5.5	1.5	5.5 ± *0.4*	1.5 -	5.5 ± *0.4*	1.5 -	5.5 ± *0.4*	(3/2-)
81-Nb	<44ns	ns	3/2-#	44	1.5	44 ± *0.0*	1.5 -	**8.0E+8 ±*8.0E7***	**? -**	**2.0E+2 ± *0.0***	
82-Cu	50# ± *4E-4*	ms		50	?					**0.00064 ± *0.0***	
82-Zn	228 ± *10.0*	ms	0+	228	0.0 +	**100 ± *0.0***	0.0 +	**52 ± *0.0***	0.0 +	228 ±*10.0*	0+
82-Ga	599 ± *2.0*	ms	(1;2;3)	599	**?**	599 ± *2.0*	**? -**	599 ± *2.0*	**? -**	599 ± *2.0*	**(1,2,3)**
82-Ge	4.56 ± *0.26*	s	0+	4.56	0.0 +	4.55 ± *0.3*	0.0 +	4.56 ± *0.26*	0.0 +	4.56 ±*0.26*	0+
82-As	19.1 ± *0.5*	s	(1+)	19.1	1.0 +	19.1 ± *0.5*	1.0 +	19.1 ± *0.5*	1.0 +	19.1 ±*0.5*	(1+)
82-Se	97 ± *5.0*	Ey	0+	stable	0.0 +	**1.2E+2 ±*17.0***	0.0 +	stable	0.0 +		0+
82-Br	35.282 ± *0.0070*	h	5-	35.278	5	35.320 ± *0.03*	5.0 -	35.282 ±*0.0070*	5.0 -	35.282 ±*0.0070*	5-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
82-Kr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
82-Rb	1.273 ± *0.0020*	m	1+	1.273	1.0 +	1.273 ±*0.0020*	1.0 +	1.258 ± *2.0E-4*	1.0 +	1.258 ±*2.0E-4*	1+
82-Sr	25.36 ± *0.03*	d	0+	25.36	0.0 +	25.55 ± *0.15*	0.0 +	25.35 ± *0.03*	0.0 +	25.35 ±*0.03*	0+
82-Y	8.30 ± *0.2*	s	1+	8.3	1.0 +	8.30 ± *0.2*	1.0 +	8.30 ± *0.2*	1.0 +	8.30 ±*0.2*	1+
82-Zr	32 ± *5.0*	s	0+	32	0.0 +	32 ± *5.0*	0.0 +	32 ± *5.0*	0.0 +	32 ± *5.0*	0+
82-Nb	50 ± *5.0*	ms	(0+)	50	0.0 +	50 ± *5.0*	0.0 +	50 ± *5.0*	0.0 +	50 ± *5.0*	(0+)
83-Zn	127 ± *20.0*	ms	5/2+#	127	2.5 +	**80 ± *0.0***	2.5 +	**43.0 ± *0.0***	**? -**	**117 ±*20.0***	
83-Ga	308.1 ± *1.0*	ms	3/2-#	308.1	1.5	308 ± *1.0*	1.5 -	308.1 ± *1.0*	**? -**	308.1 ±*1.0*	
83-Ge	1.85 ± *0.06*	s	(5/2+)	1.85	2.5 +	1.85 ± *0.06*	2.5 +	1.85 ± *0.06*	**2.5 -**	1.85 ±*0.06*	(5/2)+
83-As	13.4 ± *0.3*	s	3/2-#	13.4	1.5	13.4 ± *0.3*	1.5 -	13.4 ± *0.3*	**? -**	13.4 ±*0.3*	(5/2-,3/2-)
83-Se	22.3 ± *0.3*	m	9/2+	22.3	4.5 +	22.3 ± *0.3*	4.5 +	22.3 ± *0.3*	4.5 +	22.3 ±*0.3*	9/2+
83-Br	2.40 ± *0.02*	h	3/2-	2.4	1.5	2.40 ± *0.02*	1.5 -	2.40 ± *0.02*	1.5 -	2.40 ±*0.02*	3/2-
83-Kr	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+
83-Rb	86.2 ± *0.1*	d	5/2-	86.2	2.5	86.2 ± *0.1*	2.5 -	86.2 ± *0.1*	2.5 -	86.2 ±*0.1*	5/2-
83-Sr	32.41 ± *0.03*	h	7/2+	32.42	3.5 +	32.41 ± *0.03*	3.5 +	32.41 ± *0.03*	3.5 +	32.41 ±*0.03*	7/2+
83-Y	7.08 ± *0.06*	m	9/2+	7.08	4.5 +	7.08 ± *0.06*	4.5 +	7.08 ± *0.06*	4.5 +	7.08 ±*0.06*	9/2+
83-Zr	41.6 ± *2.4*	s	1/2-#	41.6	0.5	41.6 ± *2.4*	0.5 -	41.6 ± *2.4*	0.5 -	41.6 ±*2.4*	(1/2-)
83-Nb	4.1 ± *0.3*	s	(5/2+)	4.1	2.5 +	4.1 ± *0.3*	2.5 +	4.1 ± *0.3*	2.5 +	4.1 ± *0.3*	(5/2+)
83-Mo	23 ± *19.0*	ms	3/2-#	23	1.5	23 ± *19.0*	1.5 -	**20 ± *17.0***	**? -**	**4.0E+2 ± *0.0***	
84-Zn	50# ± *4E-4*	ms	0+	50	0.0 +					**0.00063 ± *0.0***	0+
84-Ga	85 ± *10.0*	ms	0-#	85	0	85 ± *10.0*	**? -**	85 ± *10.0*	**0.0 -**	85 ± *10.0*	(0-)
84-Ge	954 ± *14.0*	ms	0+	954	0.0 +	954 ± *14.0*	0.0 +	954 ± *14.0*	0.0 +	954 ±*14.0*	0+
84-As	4.02 ± *0.03*	s	(3)(+#)	4.02	3.0 +	4.02 ± *0.03*	3.0 +	**4.20 ± *0.5***	**3.0 -**	**4.20 ±*0.5***	**(3-)**
84-Se	3.26 ± *0.1*	m	0+	3.26	0.0 +	**3.10 ± *0.1***	0.0 +	3.26 ± *0.1*	0.0 +	3.26 ±*0.1*	0+
84-Br	31.76 ± *0.08*	m	2-	31.77	2	31.80 ± *0.08*	2.0 -	31.76 ± *0.08*	2.0 -	31.76 ±*0.08*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
84-Kr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
84-Rb	32.82 ± *0.07*	d	2-	32.82	2	**33.5 ± *0.6***	2.0 -	32.82 ± *0.07*	2.0 -	32.82 ±*0.07*	2-
84-Sr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
84-Y	39.5 ± *0.8*	m	(6+)	39.5	6.0 +	**0.0767 ±*0.00333***	**1.0 +**	39.5 ± *0.8*	6.0 +	39.5 ±*0.8*	(6+)
84-Zr	25.8 ± *0.5*	m	0+	25.8	0.0 +	25.9 ± *0.7*	0.0 +	25.9 ± *0.7*	0.0 +	25.8 ±*0.5*	0+
84-Nb	9.8 ± *0.9*	s	(1+)	9.8	1.0 +	**12 ± *3.0***	**3.0 +**	9.8 ± *0.9*	**? -**	9.8 ± *0.9*	(1+,2+,3+)
84-Mo	2.3 ± *0.3*	s	0+	2.3	0.0 +	**0.0038 ±*9.0E-4***	0.0 +	**3.8 ± *0.9***	0.0 +	2.3 ± *0.3*	0+
85-Zn	50# ± *4E-4*	ms	5/2+#	50	2.5 +						
85-Ga	93 ± *7.0*	ms	3/2-#	93	1.5	**50 ± *0.0***	1.5 -	**48 ± *0.0***	**1.5 -**	**0.00015 ± *0.0***	(3/2-)
85-Ge	540 ± *50.0*	ms	5/2+#	540	2.5 +	540 ± *50.0*	2.5 +	535 ± *47.0*	**? -**	535 ±*47.0*	
85-As	2.021 ± *0.01*	s	3/2-#	2.021	1.5	2.040 ± *0.02*	1.5 -	2.021 ± *0.01*	**1.5 -**	2.021 ±*0.01*	(3/2-)
85-Se	31.7 ± *0.9*	s	5/2+#	31.7	2.5 +	31.7 ± *0.9*	2.5 +	31.7 ± *0.9*	2.5 +	31.7 ±*0.9*	(5/2+)
85-Br	2.90 ± *0.06*	m	3/2-	2.9	1.5	2.90 ± *0.06*	1.5 -	2.90 ± *0.06*	1.5 -	2.90 ±*0.06*	3/2-
85-Kr	10.776 ± *0.0030*	y	9/2+	10.777	4.5 +	10.752 ±*0.023*	4.5 +	10.756 ±*0.018*	4.5 +	10.756 ±*0.018*	9/2+
85-Rb	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
85-Sr	64.853 ± *0.0080*	d	9/2+	64.85	4.5 +	64.849 ±*0.0040*	4.5 +	64.840 ± *0.02*	4.5 +	64.840 ±*0.02*	9/2+
85-Y	2.68 ± *0.05*	h	(1/2)-	2.68	0.5	2.68 ± *0.05*	0.5 -	2.68 ± *0.05*	0.5 -	2.68 ±*0.05*	(1/2)-
85-Zr	7.86 ± *0.04*	m	7/2+	7.86	3.5 +	7.86 ± *0.04*	3.5 +	7.86 ± *0.04*	3.5 +	7.86 ±*0.04*	7/2+
85-Nb	20.9 ± *0.7*	s	(9/2+)	20.9	4.5 +	20.9 ± *0.7*	4.5 +	20.9 ± *0.7*	4.5 +	20.9 ±*0.7*	(9/2+)
85-Mo	3.2 ± *0.2*	s	(1/2-)	3.2	0.5	3.2 ± *0.2*	0.5 -	3.2 ± *0.2*	0.5 -	**1.5E-7 ±*0.0***	(9/2+)
85-Tc	<110ns	ns	1/2-#	110	0.5	110 ± *0.0*	0.5 -	**5.00E+8 ±*5.0E7***	**? -**		
86-Ga	30# ± *3E-4*	ms		30	?	30 ± *0.0*	? -	**29 ± *0.0***	? -	**0.00015 ± *0.0***	
86-Ge	219 ± *40.0*	ms	0+	219	0.0 +	**300 ± *0.0***	0.0 +	**95 ± *0.0***	0.0 +	**0.000150 ± *0.0***	0+
86-As	945 ± *8.0*	ms		945	?	945 ± *8.0*	? -	945 ± *8.0*	? -	945 ± *8.0*	
86-Se	14.3 ± *0.3*	s	0+	14.3	0.0 +	**15.3 ± *0.9***	0.0 +	14.3 ± *0.3*	0.0 +	14.3 ±*0.3*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
86-Br	55.1 ± *0.4*	s	(1-)	55.1	1	55 ± *0.8*	**2.0 -**	55 ± *0.8*	**2.0 -**	55.1 ±*0.4*	(1-)
86-Kr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
86-Rb	18.642 ± *0.018*	d	2-	18.646	2	18.640 ± *0.02*	2.0 -	18.631 ±*0.018*	2.0 -	18.642 ±*0.018*	2-
86-Sr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
86-Y	14.74 ± *0.02*	h	4-	14.74	4	14.74 ± *0.02*	4.0 -	14.74 ± *0.02*	4.0 -	14.74 ±*0.02*	4-
86-Zr	16.5 ± *0.1*	h	0+	16.5	0.0 +	16.5 ± *0.1*	0.0 +	16.5 ± *0.1*	0.0 +	16.5 ±*0.1*	0+
86-Nb	88 ± *1.0*	s	(6+)	88	6.0 +	88 ± *1.0*	6.0 +	88 ± *1.0*	6.0 +	88 ± *1.0*	(6+)
86-Mo	19.6 ± *1.1*	s	0+	19.6	0.0 +	19.6 ± *1.1*	0.0 +	19.6 ± *1.1*	0.0 +	19.6 ±*1.1*	0+
86-Tc	55 ± *6.0*	ms	(0+)	55	0.0 +	55 ± *6.0*	0.0 +	54 ± *7.0*	0.0 +	54 ± *7.0*	(0+)
87-Ga	10# ± *4E-4*	ms	3/2-#	10	1.5					**0.00063 ± *0.0***	
87-Ge	150# ± *3E-4*	ms	5/2+#	150	2.5 +	150 ± *0.0*	2.5 +	**140 ± *14.0***	**2.5 -**	**140 ±*0.0***	(5/2+)
87-As	610 ± *120.0*	ms	3/2-#	610	1.5	610 ± *110.0*	1.5 -	**560 ± *80.0***	**1.5 -**	**560 ±*80.0***	(3/2-)
87-Se	5.50 ± *0.12*	s	5/2+#	5.5	2.5 +	5.5 ± *0.12*	2.5 +	5.5 ± *0.12*	2.5 +	5.5 ±*0.12*	(5/2+)
87-Br	55.65 ± *0.13*	s	(5/2-)	55.65	2.5	55.70 ± *0.2*	**1.5 -**	55.65 ± *0.13*	**1.5 -**	55.65 ±*0.13*	3/2-
87-Kr	76.3 ± *0.5*	m	5/2+	76.3	2.5 +	76.3 ± *0.5*	2.5 +	76.3 ± *0.5*	2.5 +	76.3 ±*0.5*	5/2+
87-Rb	49.23 ± *0.22*	Gy	3/2-	49.24	1.5	**48.10 ± *0.9***	1.5 -	**48.10 ± *0.9***	1.5 -	**48.10 ±*0.9***	3/2-
87-Sr	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+
87-Y	79.8 ± *0.3*	h	1/2-	79.8	0.5	79.8 ± *0.2*	0.5 -	79.8 ± *0.3*	0.5 -	79.8 ±*0.3*	1/2-
87-Zr	1.68 ± *0.01*	h	(9/2)+	1.68	4.5 +	1.68 ± *0.01*	4.5 +	1.68 ± *0.01*	4.5 +	1.68 ±*0.01*	(9/2)+
87-Nb	3.75 ± *0.09*	m	(1/2-)	3.75	0.5	3.75 ± *0.09*	0.5 -	3.75 ± *0.09*	0.5 -	3.75 ±*0.09*	(1/2-)
87-Mo	14.05 ± *0.23*	s	7/2+#	14.05	3.5 +	14.02 ± *0.26*	3.5 +	14.02 ± *0.26*	3.5 +	14.02 ±*0.26*	7/2+
87-Tc	2.18 ± *0.16*	s	9/2+#	2.18	4.5 +	2.20 ± *0.2*	**0.5 -**	2.20 ± *0.2*	4.5 +	2.20 ±*0.2*	(9/2+)
87-Ru	50# ± *0.0015*	ms	1/2-#	50	0.5	50 ± *0.0*	0.5 -	**0.0015 ± *0.0***	**? -**		
88-Ge	100# ± *3E-4*	ms	0+	100	0.0 +	**80 ± *0.0***	0.0 +	**66 ± *0.0***	0.0 +	**0.000300 ± *0.0***	0+
88-As	270 ± *150.0*	ms		270	?	**300 ± *0.0***	? -	**112 ± *0.0***	? -	**200 ±*0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
88-Se	1.53 ± *0.06*	s	0+	1.53	0.0 +	1.53 ± *0.06*	0.0 +	1.53 ± *0.06*	0.0 +	1.53 ±*0.06*	0+
88-Br	16.29 ± *0.06*	s	(2-)	16.29	2	16.5 ± *0.1*	2.0 -	16.29 ± *0.06*	2.0 -	16.29 ±*0.06*	(2-)
88-Kr	2.84 ± *0.03*	h	0+	2.84	0.0 +	2.84 ± *0.03*	0.0 +	2.84 ± *0.03*	0.0 +	2.84 ±*0.03*	0+
88-Rb	17.773 ± *0.011*	m	2-	17.767	2	17.800 ± *0.1*	2.0 -	17.773 ±*0.011*	2.0 -	17.773 ±*0.011*	2-
88-Sr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
88-Y	106.626 ± *0.021*	d	4-	106.62	4	106.629 ±*0.021*	4.0 -	106.626 ±*0.021*	4.0 -	106.626 ± *0.021*	4-
88-Zr	83.4 ± *0.3*	d	0+	83.4	0.0 +	83 ± *0.4*	0.0 +	83.4 ± *0.3*	0.0 +	83.4 ±*0.3*	0+
88-Nb	14.55 ± *0.06*	m	(8+)	14.55	8.0 +	14.5 ± *0.1*	8.0 +	14.55 ± *0.06*	8.0 +	14.55 ±*0.06*	(8+)
88-Mo	8.0 ± *0.2*	m	0+	8	0.0 +	8 ± *0.2*	0.0 +	8 ± *0.2*	0.0 +	8 ± *0.2*	0+
88-Tc	6.4 ± *0.8*	s	(6+)	6.4	6.0 +	**5.8 ± *0.2***	**? -**	**5.8 ± *0.2***	**3.0 +**	6.4 ± *0.8*	(6+)
88-Ru	1.3 ± *0.3*	s	0+	1.3	0.0 +	1.3 ± *0.3*	0.0 +	1.3 ± *0.25*	0.0 +	**1.2 ±*0.0***	0+
89-Ge	50# ± *3E-4*	ms	3/2+#	50	1.5 +	50 ± *0.0*	1.5 +	**39 ± *0.0***	**? -**	**0.00030 ± *0.0***	
89-As	200# ± *1E-4*	ms	3/2-#	200	1.5	200 ± *0.0*	1.5 -	**59.0 ± *0.0***	**? -**	**0.000300 ± *0.0***	
89-Se	410 ± *40.0*	ms	5/2+#	410	2.5 +	410 ± *40.0*	2.5 +	410 ± *40.0*	**2.5 -**	**430 ±*50.0***	(5/2+)
89-Br	4.40 ± *0.03*	s	(3/2-;5/2-)	4.4	**?**	4.37 ± *0.05*	1.5 -	4.40 ± *0.03*	**? -**	4.36 ±*0.022*	(3/2-,5/2-)
89-Kr	3.15 ± *0.04*	m	3/2(+)	3.15	1.5 +	3.15 ± *0.04*	1.5 +	3.15 ± *0.04*	1.5 +	3.15 ±*0.04*	3/2(+)
89-Rb	15.15 ± *0.12*	m	3/2-	15.15	1.5	15.40 ± *0.2*	1.5 -	15.15 ± *0.12*	1.5 -	15.32 ±*0.1*	3/2-
89-Sr	50.53 ± *0.07*	d	5/2+	50.53	2.5 +	50.57 ± *0.03*	2.5 +	50.53 ± *0.07*	2.5 +	50.56 ±*0.025*	5/2+
89-Y	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
89-Zr	78.41 ± *0.12*	h	9/2+	78.42	4.5 +	78.40 ± *0.2*	4.5 +	78.41 ± *0.12*	4.5 +	78.41 ±*0.12*	9/2+
89-Nb	2.03 ± *0.07*	h	(9/2+)	2.03	4.5 +	2.03 ± *0.07*	4.5 +	2.03 ± *0.07*	4.5 +	2.03 ±*0.07*	(9/2+)
89-Mo	2.11 ± *0.1*	m	(9/2+)	2.11	4.5 +	2.11 ± *0.1*	4.5 +	2.11 ± *0.1*	4.5 +	2.11 ±*0.1*	(9/2+)
89-Tc	12.8 ± *0.9*	s	(9/2+)	12.8	4.5 +	12.8 ± *0.9*	4.5 +	12.8 ± *0.9*	4.5 +	12.8 ±*0.9*	(9/2+)
89-Ru	1.5 ± *0.2*	s	(9/2+)	1.5	4.5 +	**1.4 ± *0.11***	**3.5 +**	1.5 ± *0.2*	4.5 +	1.5 ± *0.2*	(9/2+)
89-Rh	10# ± *0.0015*	ms	7/2+#	10	3.5 +	10 ± *0.0*	3.5 +	**0.0015 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
90-Ge	50# ± *4E-4*	ms	0+	50	0.0 +					**0.00064 ± *0.0***	0+
90-As	80# ± *3E-4*	ms		80	?	80 ± *0.0*	? -	**43 ± *0.0***	? -	**0.00030 ± *0.0***	
90-Se	210 ± *80.0*	ms	0+	210	0.0 +	**300 ± *0.0***	0.0 +	**161 ± *0.0***	0.0 +	**195 ±*0.0***	0+
90-Br	1.910 ± *0.01*	s		1.91	?	1.900 ± *0.04*	**1.0 -**	1.920 ± *0.02*	? -	1.910 ±*0.01*	
90-Kr	32.32 ± *0.09*	s	0+	32.32	0.0 +	32.32 ± *0.09*	0.0 +	32.32 ± *0.09*	0.0 +	32.32 ±*0.09*	0+
90-Rb	158 ± *5.0*	s	0-	158	0	158 ± *5.0*	0.0 -	158 ± *5.0*	0.0 -	158 ± *5.0*	0-
90-Sr	28.79 ± *0.06*	y	0+	28.79	0.0 +	28.79 ± *0.06*	0.0 +	28.79 ± *0.06*	0.0 +	28.79 ±*0.06*	0+
90-Y	64.00 ± *0.21*	h	2-	64	2	64.10 ± *0.08*	2.0 -	64 ± *0.21*	2.0 -	64 ± *0.21*	2-
90-Zr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
90-Nb	14.60 ± *0.05*	h	8+	14.6	8.0 +	14.60 ± *0.05*	8.0 +	14.60 ± *0.05*	8.0 +	14.60 ±*0.05*	8+
90-Mo	5.56 ± *0.09*	h	0+	5.56	0.0 +	5.56 ± *0.09*	0.0 +	5.67 ± *0.05*	0.0 +	5.56 ±*0.09*	0+
90-Tc	49.2 ± *0.4*	s	(8+)	49.2	8.0 +	**8.70 ± *0.2***	**1.0 +**	**8.70 ± *0.2***	**1.0 +**		(8+)
90-Ru	11 ± *3.0*	s	0+	11	0.0 +	11 ± *3.0*	0.0 +	**12 ± *0.9***	0.0 +	11 ± *3.0*	0+
90-Rh	15 ± *7.0*	ms	0+#	15	0.0 +	15 ± *7.0*	0.0 +	15 ± *6.5*	**? -**	**0.00015 ± *0.0***	
91-As	50# ± *3E-4*	ms	3/2-#	50	1.5	50 ± *0.0*	1.5 -	**44 ± *0.0***	**? -**		
91-Se	270 ± *50.0*	ms	1/2+#	270	0.5 +	270 ± *50.0*	0.5 +	270 ± *50.0*	**? -**	270 ±*50.0*	
91-Br	541 ± *5.0*	ms	5/2-#	541	2.5	538 ± *13.0*	**1.5 -**	541 ± *5.0*	**? -**	543 ± *4.0*	
91-Kr	8.57 ± *0.04*	s	5/2(+)	8.57	2.5 +	8.57 ± *0.04*	2.5 +	8.57 ± *0.04*	2.5 +	8.57 ±*0.04*	5/2(+)
91-Rb	58.4 ± *0.4*	s	3/2(-)	58.4	1.5	58.4 ± *0.4*	1.5 -	58.4 ± *0.4*	1.5 -	58.2 ±*0.3*	3/2(-)
91-Sr	9.63 ± *0.05*	h	5/2+	9.63	2.5 +	9.63 ± *0.05*	2.5 +	9.63 ± *0.05*	2.5 +	9.65 ±*0.06*	5/2+
91-Y	58.51 ± *0.06*	d	1/2-	58.51	0.5	58.51 ± *0.06*	0.5 -	58.51 ± *0.06*	0.5 -	58.51 ±*0.06*	1/2-
91-Zr	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
91-Nb	680 ± *130.0*	y	9/2+	680	4.5 +	680 ± *130.0*	4.5 +	680 ± *130.0*	4.5 +	680 ±*130.0*	9/2+
91-Mo	15.49 ± *0.01*	m	9/2+	15.49	4.5 +	15.49 ± *0.01*	4.5 +	15.49 ± *0.01*	4.5 +	15.49 ±*0.01*	9/2+
91-Tc	3.14 ± *0.02*	m	(9/2)+	3.14	4.5 +	3.14 ± *0.02*	4.5 +	3.14 ± *0.02*	4.5 +	3.14 ±*0.02*	(9/2)+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
91-Ru	9 ± *1.0*	s	(9/2+)	9	4.5 +	9 ± *1.0*	4.5 +	**8 ± *0.4***	4.5 +	**8 ± *0.4***	(9/2+)
91-Rh	1.60 ± *0.15*	s	7/2+#	1.6	3.5 +	**1.74 ± *0.14***	3.5 +	**1.47 ± *0.22***	**4.5 +**	**1.47 ±*0.22***	(9/2+)
91-Pd	10# ± *0.0015*	ms	7/2+#	10	3.5 +	10 ± *0.0*	3.5 +	**0.0010 ± *0.0***	**? -**		
92-As	30# ± *3E-4*	ms		30	?	30 ± *0.0*	? -	**27 ± *0.0***	? -		
92-Se	100# ± *3E-4*	ms	0+	100	0.0 +	100 ± *0.0*	0.0 +	**93 ± *0.0***	0.0 +		0+
92-Br	343 ± *15.0*	ms	(2-)	343	2	343 ± *15.0*	2.0 -	343 ± *15.0*	**2.0 -**	**314 ±*16.0***	
92-Kr	1.840 ± *0.0080*	s	0+	1.84	0.0 +	1.840 ±*0.0080*	0.0 +	1.840 ±*0.0080*	0.0 +	1.840 ±*0.0080*	0+
92-Rb	4.492 ± *0.02*	s	0-	4.492	0	4.492 ± *0.02*	0.0 -	4.492 ± *0.02*	0.0 -	4.480 ±*0.03*	0-
92-Sr	2.66 ± *0.04*	h	0+	2.66	0.0 +	2.71 ± *0.01*	0.0 +	2.71 ± *0.01*	0.0 +	2.61 ±*0.017*	0+
92-Y	3.54 ± *0.01*	h	2-	3.54	2	3.54 ± *0.02*	2.0 -	3.54 ± *0.01*	2.0 -	3.54 ±*0.01*	2-
92-Zr	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
92-Nb	34.7 ± *2.4*	My	(7)+	34.7	7.0 +	35.0 ± *3.0*	7.0 +	34.7 ± *2.4*	7.0 +	34.7 ±*2.4*	7+
92-Mo	stable ± *5E27*		0+	stable	0.0 +	**6E+27 ± *0.0***	0.0 +	stable	0.0 +		0+
92-Tc	4.25 ± *0.15*	m	(8)+	4.25	8.0 +	4.25 ± *0.15*	8.0 +	4.25 ± *0.15*	8.0 +	4.25 ±*0.15*	(8)+
92-Ru	3.65 ± *0.05*	m	0+	3.65	0.0 +	3.65 ± *0.05*	0.0 +	3.65 ± *0.05*	0.0 +	3.65 ±*0.05*	0+
92-Rh	4.66 ± *0.25*	s	(6+)	4.66	6.0 +	**4.30 ± *1.3***	6.0 +	4.66 ± *0.25*	**? -**	4.66 ±*0.25*	(GE6+)
92-Pd	1.1 ± *0.3*	s	0+	1.1	0.0 +	1.1 ± *0.3*	0.0 +	**0.80 ± *0.3***	0.0 +	**1 ± *0.0***	0+
93-Se	50# ± *3E-4*	ms	1/2+#	50	0.5 +	50 ± *0.0*	0.5 +	**62 ± *0.0***	**0.5 -**		(1/2+)
93-Br	102 ± *10.0*	ms	5/2-#	102	2.5	102 ± *10.0*	**1.5 -**	102 ± *10.0*	**2.5 -**	102 ±*10.0*	(5/2-)
93-Kr	1.286 ± *0.01*	s	1/2+	1.286	0.5 +	1.286 ± *0.01*	0.5 +	1.286 ± *0.01*	0.5 +	1.286 ±*0.01*	1/2+
93-Rb	5.84 ± *0.02*	s	5/2-	5.84	2.5	5.80 ± *0.04*	2.5 -	5.84 ± *0.02*	2.5 -	5.84 ±*0.02*	5/2-
93-Sr	7.43 ± *0.03*	m	5/2+	7.43	2.5 +	7.42 ± *0.024*	2.5 +	7.42 ± *0.024*	2.5 +	7.43 ±*0.03*	5/2+
93-Y	10.18 ± *0.08*	h	1/2-	10.18	0.5	10.18 ± *0.08*	0.5 -	10.18 ± *0.08*	0.5 -	10.18 ±*0.08*	1/2-
93-Zr	1.61 ± *0.05*	My	5/2+	1.61	2.5 +	**1.53 ± *0.1***	2.5 +	**1.53 ± *0.1***	2.5 +	1.61 ±*0.05*	5/2+
93-Nb	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
93-Mo	4.0 ± *0.8*	ky	5/2+	4	2.5 +	4.0 ± *0.8*	2.5 +	4.0 ± *0.8*	2.5 +	4.0 ± *0.8*	5/2+
93-Tc	2.75 ± *0.05*	h	9/2+	2.75	4.5 +	2.75 ± *0.05*	4.5 +	2.75 ± *0.05*	4.5 +	2.75 ±*0.05*	9/2+
93-Ru	59.7 ± *0.6*	s	(9/2)+	59.7	4.5 +	59.7 ± *0.6*	4.5 +	59.7 ± *0.6*	4.5 +	59.7 ±*0.6*	(9/2)+
93-Rh	13.9 ± *1.6*	s	9/2+#	13.9	4.5 +	13.9 ± *1.6*	4.5 +	**11.9 ± *0.7***	4.5 +	**12.2 ±*0.7***	(9/2+)
93-Pd	1.15 ± *0.05*	s	(9/2+)	1.15	4.5 +	**1.07 ± *0.12***	4.5 +	**1.30 ± *0.2***	**? -**	**1 ± *0.09***	(9/2+)
93-Ag	5# ± *0.0015*	ms	9/2+#	5	4.5 +	5 ± *0.0*	4.5 +	**0.002 ± *0.0***	**? -**		
94-Se	20# ± *3E-4*	ms	0+	20	0.0 +	20 ± *0.0*	0.0 +	**59 ± *0.0***	0.0 +	**0.00015 ± *0.0***	0+
94-Br	70 ± *20.0*	ms		70	?	70 ± *20.0*	? -	70 ± *20.0*	? -	70 ± *20.0*	
94-Kr	212 ± *5.0*	ms	0+	212	0.0 +	210 ± *4.0*	0.0 +	212 ± *5.0*	0.0 +	212 ± *5.0*	0+
94-Rb	2.702 ± *0.0050*	s	3(-)	2.702	3	2.702 ±*0.0070*	3.0 -	2.702 ±*0.0050*	3.0 -	2.702 ±*0.0050*	3(-)
94-Sr	75.3 ± *0.2*	s	0+	75.3	0.0 +	75.3 ± *0.4*	0.0 +	75.3 ± *0.2*	0.0 +	75.3 ±*0.2*	0+
94-Y	18.7 ± *0.1*	m	2-	18.7	2	18.7 ± *0.1*	2.0 -	18.7 ± *0.1*	2.0 -	18.7 ±*0.1*	2-
94-Zr	stable ± *3E24*		0+	stable	0.0 +	**2E+23 ± *0.0***	0.0 +	stable	0.0 +		0+
94-Nb	20.3 ± *1.6*	ky	6+	20.3	6.0 +	20.0 ± *2.46*	6.0 +	20.3 ± *1.6*	6.0 +	20.3 ±*1.6*	6+
94-Mo	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
94-Tc	293 ± *1.0*	m	7+	293	7.0 +	293 ± *1.0*	7.0 +	293 ± *1.0*	7.0 +	293 ± *1.0*	7+
94-Ru	51.8 ± *0.6*	m	0+	51.8	0.0 +	51.8 ± *0.6*	0.0 +	51.8 ± *0.6*	0.0 +	51.8 ±*0.6*	0+
94-Rh	70.6 ± *0.6*	s	(4+)	70.6	4.0 +	70.6 ± *0.6*	**3.0 +**	70.6 ± *0.6*	4.0 +	70.6 ±*0.6*	(4+)
94-Pd	9.0 ± *0.5*	s	0+	9	0.0 +	9 ± *0.5*	0.0 +	9 ± *0.5*	0.0 +	9 ± *0.5*	0+
94-Ag	37 ± *18.0*	ms	0+#	37	0.0 +	37 ± *18.0*	0.0 +	**35 ± *17.0***	0.0 +	**26 ± *0.0***	(0+)
95-Se	10# ± *4E-4*	ms	3/2+#	10	1.5 +					**0.00039 ± *0.0***	
95-Br	50# ± *3E-4*	ms	5/2-#	50	2.5	50 ± *0.0*	**1.5 -**	**66 ± *0.0***	**? -**	**0.00015 ± *0.0***	
95-Kr	114 ± *3.0*	ms	1/2(+)	114	0.5 +	114 ± *3.0*	0.5 +	114 ± *3.0*	0.5 +	114 ± *3.0*	1/2(+)
95-Rb	377.7 ± *0.8*	ms	5/2-	377.7	2.5	381 ± *3.0*	2.5 -	377.7 ± *0.8*	2.5 -	377.7 ±*0.8*	5/2-
95-Sr	23.90 ± *0.14*	s	1/2+	23.9	0.5 +	23.90 ± *0.14*	0.5 +	23.90 ± *0.14*	0.5 +	23.90 ±*0.14*	1/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
95-Y	10.3 ± *0.1*	m	1/2-	10.3	0.5	10.3 ± *0.1*	0.5 -	10.3 ± *0.1*	0.5 -	10.3 ±*0.1*	1/2-
95-Zr	64.032 ± *0.0060*	d	5/2+	64.028	2.5 +	64.032 ±*0.0060*	2.5 +	64.032 ±*0.0060*	2.5 +	64.032 ±*0.0060*	5/2+
95-Nb	34.991 ± *0.0060*	d	9/2+	34.988	4.5 +	34.991 ±*0.0060*	4.5 +	34.991 ±*0.0060*	4.5 +	34.991 ±*0.0060*	9/2+
95-Mo	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
95-Tc	20.0 ± *0.1*	h	9/2+	20	4.5 +	20 ± *0.1*	4.5 +	20 ± *0.1*	4.5 +	20 ± *0.1*	9/2+
95-Ru	1.643 ± *0.013*	h	5/2+	1.643	2.5 +	1.643 ± *0.014*	2.5 +	1.643 ± *0.013*	2.5 +	1.643 ±*0.013*	5/2+
95-Rh	5.02 ± *0.1*	m	(9/2)+	5.02	4.5 +	5.02 ± *0.1*	4.5 +	5.02 ± *0.1*	4.5 +	5.02 ±*0.1*	9/2+
95-Pd	7.5 ± *0.5*	s	9/2+#	7.5	4.5 +	**10 ± *0.0***	4.5 +	**10 ± *1.0***	**? -**	**5 ± *3.0***	(9/2+)
95-Ag	1.76 ± *0.09*	s	(9/2+)	1.76	4.5 +	1.74 ± *0.13*	4.5 +	**2 ± *0.1***	**? -**	1.75 ±*0.12*	(9/2+)
95-Cd	90 ± *40.0*	ms	9/2+#	90	4.5 +	**5 ± *0.0***	4.5 +	**5 ± *0.5***	**? -**		
96-Br	20# ± *3E-4*	ms		20	?	20 ± *0.0*	? -	**42 ± *0.0***	? -	**0.00015 ± *0.0***	
96-Kr	80 ± *8.0*	ms	0+	80	0.0 +	80 ± *7.0*	0.0 +	80 ± *6.0*	0.0 +	80 ± *8.0*	0+
96-Rb	201 ± *1.0*	ms	2-	201	2	199 ± *3.0*	**2.0 +**	203 ± *3.0*	**2.0 +**	203 ± *3.0*	2(-)
96-Sr	1.07 ± *0.01*	s	0+	1.07	0.0 +	1.06 ± *0.03*	0.0 +	1.07 ± *0.01*	0.0 +	1.07 ±*0.01*	0+
96-Y	5.34 ± *0.05*	s	0-	5.34	0	5.34 ± *0.05*	0.0 -	5.34 ± *0.05*	0.0 -	5.34 ±*0.05*	0-
96-Zr	20 ± *4.0*	Ey	0+	20	0.0 +	**39 ± *9.0***	0.0 +	20 ± *4.0*	0.0 +	20 ± *4.0*	0+
96-Nb	23.35 ± *0.05*	h	6+	23.35	6.0 +	23.35 ± *0.05*	6.0 +	23.35 ± *0.05*	6.0 +	23.35 ±*0.05*	6+
96-Mo	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
96-Tc	4.28 ± *0.07*	d	7+	4.28	7.0 +	4.28 ± *0.07*	7.0 +	4.28 ± *0.07*	7.0 +	4.28 ±*0.07*	7+
96-Ru	stable ± *2E24*		0+	stable	0.0 +	**2E+24 ± *0.0***	0.0 +	stable	0.0 +		0+
96-Rh	9.90 ± *0.1*	m	6+	9.9	6.0 +	9.90 ± *0.1*	6.0 +	9.90 ± *0.1*	6.0 +	9.90 ±*0.1*	6+
96-Pd	122 ± *2.0*	s	0+	122	0.0 +	122 ± *2.0*	0.0 +	122 ± *2.0*	0.0 +	122 ± *2.0*	0+
96-Ag	4.44 ± *0.04*	s	(8)+	4.44	8.0 +	4.45 ± *0.04*	**? -**	4.40 ± *0.06*	8.0 +	4.40 ±*0.06*	(8)+
96-Cd	880 ± *90.0*	ms	0+	880	0.0 +	**1.00E+3 ±*0.0***	0.0 +	**1.00E+3**	0.0 +	**1.03E+3 ± *0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
								±100.0			
97-Br	10# ± *3E-4*	ms	5/2-#	10	2.5	10 ± *0.0*	**1.5 -**	**40 ± *0.0***	**1.5 -**	**0.00030 ± *0.0***	(3/2-)
97-Kr	62.2 ± *3.2*	ms	3/2+#	62.2	1.5 +	63 ± *4.0*	1.5 +	63 ± *4.0*	1.5 +	63 ± *4.0*	(3/2+)
97-Rb	169.1 ± *0.6*	ms	3/2+	169.1	1.5 +	169.9 ± *0.7*	1.5 +	169.1 ± *0.6*	1.5 +	169.1 ±*0.6*	3/2+
97-Sr	429 ± *5.0*	ms	1/2+	429	0.5 +	429 ± *5.0*	0.5 +	429 ± *5.0*	0.5 +	429 ± *5.0*	1/2+
97-Y	3.75 ± *0.03*	s	1/2-	3.75	0.5	3.75 ± *0.02*	0.5 -	3.75 ± *0.03*	0.5 -	3.75 ±*0.03*	(1/2-)
97-Zr	16.749 ± *0.0080*	h	1/2+	16.75	0.5 +	16.744 ±*0.011*	0.5 +	16.749 ±*0.0080*	0.5 +	16.749 ±*0.0080*	1/2+
97-Nb	72.1 ± *0.7*	m	9/2+	72.1	4.5 +	72.1 ± *0.7*	4.5 +	72.1 ± *0.7*	4.5 +	72.1 ±*0.7*	9/2+
97-Mo	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
97-Tc	4.21 ± *0.16*	My	9/2+	4.21	4.5 +	**2.60 ± *0.4***	4.5 +	4.21 ± *0.16*	4.5 +	4.21 ±*0.16*	9/2+
97-Ru	2.8370 ± *0.0014*	d	5/2+	2.8368	2.5 +	**2.9000 ± *0.1***	2.5 +	2.8300 ± *0.23*	2.5 +	2.8300 ±*0.23*	5/2+
97-Rh	30.7 ± *0.6*	m	9/2+	30.7	4.5 +	30.7 ± *0.6*	4.5 +	30.7 ± *0.6*	4.5 +	30.7 ±*0.6*	9/2+
97-Pd	3.10 ± *0.09*	m	5/2+#	3.1	2.5 +	3.10 ± *0.09*	2.5 +	3.10 ± *0.09*	2.5 +	3.10 ±*0.09*	(5/2+)
97-Ag	25.5 ± *0.3*	s	9/2+#	25.5	4.5 +	25.3 ± *0.3*	4.5 +	25.5 ± *0.3*	4.5 +	25.5 ±*0.3*	(9/2+)
97-Cd	1.10 ± *0.08*	s	(9/2+)	1.1	4.5 +	**2.80 ± *0.6***	4.5 +	**2.80 ± *0.6***	**? -**	**2.80 ±*0.6***	(9/2+)
97-In	50 ± *30.0*	ms	9/2+#	50	4.5 +	**5 ± *0.0***	4.5 +	**5 ± *0.5***	**? -**		
98-Br	5# ± *4E-4*	ms		5	?					**0.0006 ± *0.0***	
98-Kr	42.8 ± *3.6*	ms	0+	42.8	0.0 +	**46 ± *8.0***	0.0 +	**46 ± *8.0***	0.0 +	**46 ± *8.0***	0+
98-Rb	114 ± *5.0*	ms	(0)(-#)	114	0	114 ± *5.0*	**? -**	114 ± *5.0*	**? -**	114 ± *5.0*	**(0,1)**
98-Sr	653 ± *2.0*	ms	0+	653	0.0 +	653 ± *2.0*	0.0 +	653 ± *2.0*	0.0 +	653 ± *2.0*	0+
98-Y	548 ± *2.0*	ms	(0)-	548	0	**590 ± *30.0***	0.0 -	548 ± *2.0*	0.0 -	548 ± *2.0*	(0)-
98-Zr	30.7 ± *0.4*	s	0+	30.7	0.0 +	30.7 ± *0.4*	0.0 +	30.7 ± *0.4*	0.0 +	30.7 ±*0.4*	0+
98-Nb	2.86 ± *0.06*	s	1+	2.86	1.0 +	2.86 ± *0.06*	1.0 +	2.86 ± *0.06*	1.0 +	2.86 ±*0.06*	1+
98-Mo	stable ± *3E21*		0+	stable	0.0 +	**3E+21 ± *0.0***	0.0 +	stable	0.0 +		0+
98-Tc	4.2 ± *0.3*	My	(6)+	4.2	6.0 +	4.2 ± *0.3*	6.0 +	4.2 ± *0.3*	6.0 +	4.2 ± *0.3*	(6)+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
98-Ru	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
98-Rh	8.72 ± *0.12*	m	(2)+	8.72	2.0 +	8.72 ± *0.12*	2.0 +	8.72 ± *0.12*	2.0 +	8.72 ±*0.12*	(2)+
98-Pd	17.7 ± *0.3*	m	0+	17.7	0.0 +	17.7 ± *0.3*	0.0 +	17.7 ± *0.3*	0.0 +	17.7 ±*0.3*	0+
98-Ag	47.5 ± *0.3*	s	(5+)	47.5	5.0 +	47.5 ± *0.3*	**6.0 +**	47.5 ± *0.3*	**6.0 +**	47.5 ±*0.3*	(6+)
98-Cd	9.2 ± *0.3*	s	0+	9.2	0.0 +	9.2 ± *0.3*	0.0 +	9.2 ± *0.3*	0.0 +	9.2 ± *0.3*	0+
98-In	37 ± *5.0*	ms	0+#	37	0.0 +	**45 ± *23.0***	0.0 +	**43 ± *21.0***	**? -**	**32 ± *0.0***	
99-Kr	40 ± *11.0*	ms	5/2-#	40	2.5	40 ± *11.0*	**1.5 +**	**27 ± *20.0***	**? -**	**13 ± *0.0***	
99-Rb	54 ± *4.0*	ms	(5/2+)	54	2.5 +	**50 ± *0.7***	2.5 +	54 ± *4.0*	2.5 +	54 ± *4.0*	(5/2+)
99-Sr	269 ± *1.0*	ms	3/2+	269	1.5 +	270 ± *10.0*	1.5 +	270 ± *10.0*	1.5 +	269 ± *1.0*	3/2+
99-Y	1.484 ± *0.0070*	s	5/2+	1.484	2.5 +	1.477 ±*0.0050*	2.5 +	1.470 ±*0.0070*	2.5 +	1.484 ±*0.0070*	(5/2+)
99-Zr	2.1 ± *0.1*	s	1/2+	2.1	0.5 +	**2.2 ± *0.1***	0.5 +	2.1 ± *0.1*	0.5 +	2.1 ± *0.1*	(1/2+)
99-Nb	15.0 ± *0.2*	s	9/2+	15	4.5 +	15 ± *0.2*	4.5 +	15 ± *0.2*	4.5 +	15 ± *0.2*	9/2+
99-Mo	65.976 ± *0.024*	h	1/2+	65.972	0.5 +	65.940 ± *0.01*	0.5 +	65.976 ±*0.024*	0.5 +	65.976 ±*0.024*	1/2+
99-Tc	211.1 ± *1.2*	ky	9/2+	211.1	4.5 +	214.0 ± *8.0*	4.5 +	211.1 ± *1.2*	4.5 +	211.1 ±*1.2*	9/2+
99-Ru	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
99-Rh	16.1 ± *0.2*	d	(1/2-)	16.1	0.5	16.1 ± *0.2*	0.5 -	16.1 ± *0.2*	0.5 -	16.1 ±*0.2*	1/2-
99-Pd	21.4 ± *0.2*	m	(5/2)+	21.4	2.5 +	21.4 ± *0.2*	2.5 +	21.4 ± *0.2*	2.5 +	21.4 ±*0.2*	(5/2)+
99-Ag	2.07 ± *0.05*	m	(9/2)+	2.07	4.5 +	2.07 ± *0.05*	4.5 +	2.07 ± *0.05*	4.5 +	2.07 ±*0.05*	(9/2)+
99-Cd	16 ± *3.0*	s	5/2+#	16	2.5 +	16 ± *3.0*	2.5 +	16 ± *3.0*	2.5 +	16 ± *3.0*	(5/2+)
99-In	3.1 ± *0.2*	s	9/2+#	3.1	4.5 +	3.1 ± *0.8*	4.5 +	**3.0 ± *0.75***	4.5 +	**3 ± *0.8***	
99-Sn	5# ± *1E-4*	ms	9/2+#	5	4.5 +	5 ± *0.0*	4.5 +	5 ± *0.5*	**? -**		
100-Kr	12 ± *8.0*	ms	0+	12	0.0 +	**10 ± *0.0***	0.0 +	**7 ± *7.0***	0.0 +	**7 ± *0.0***	0+
100-Rb	48 ± *3.0*	ms	(3+);4-#	48	**?**	**51 ± *8.0***	3.0 +	**51 ± *8.0***	**? -**	**51 ± *8.0***	**(3+,4-)**
100-Sr	202 ± *3.0*	ms	0+	202	0.0 +	202 ± *3.0*	0.0 +	202 ± *3.0*	0.0 +	202 ± *3.0*	0+
100-Y	735 ± *7.0*	ms	(1-)	735	1	735 ± *7.0*	**? -**	735 ± *7.0*	**? -**	735 ± *7.0*	1-,2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
100-Zr	7.1 ± *0.4*	s	0+	7.1	0.0 +	7.1 ± *0.4*	0.0 +	7.1 ± *0.4*	0.0 +	7.1 ± *0.4*	0+
100-Nb	1.5 ± *0.2*	s	1+	1.5	1.0 +	1.5 ± *0.2*	1.0 +	1.5 ± *0.2*	1.0 +	1.5 ± *0.2*	1+
100-Mo	7.3 ± *0.4*	Ey	0+	7.3	0.0 +	**9.9 ± *0.7***	0.0 +	7.3 ± *0.4*	0.0 +	7.3 ± *0.4*	0+
100-Tc	15.46 ± *0.19*	s	1+	15.46	1.0 +	**15.80 ± *0.1***	1.0 +	15.46 ± *0.19*	1.0 +	15.46 ±*0.19*	1+
100-Ru	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
100-Rh	20.8 ± *0.1*	h	1-	20.8	1	20.8 ± *0.1*	1.0 -	20.8 ± *0.1*	1.0 -	20.8 ±*0.1*	1-
100-Pd	3.63 ± *0.09*	d	0+	3.63	0.0 +	3.63 ± *0.09*	0.0 +	3.63 ± *0.09*	0.0 +	3.63 ±*0.09*	0+
100-Ag	2.01 ± *0.09*	m	(5)+	2.01	5.0 +	2.01 ± *0.09*	5.0 +	2.01 ± *0.09*	5.0 +	2.01 ±*0.09*	(5)+
100-Cd	49.1 ± *0.5*	s	0+	49.1	0.0 +	49.1 ± *0.5*	0.0 +	49.1 ± *0.5*	0.0 +	49.1 ±*0.5*	0+
100-In	5.85 ± *0.16*	s	6+#	5.85	6.0 +	5.90 ± *0.2*	6.0 +	5.90 ± *0.2*	**? -**	5.90 ±*0.2*	(6+,7+)
100-Sn	1.11 ± *0.15*	s	0+	1.11	0.0 +	1.10 ± *0.4*	0.0 +	**0.860 ± *0.0***	0.0 +	**0.860 ±*0.0***	0+
101-Kr	5# ± *4E-4*	ms		5	?					**0.0006 ± *0.0***	
101-Rb	31.8 ± *3.3*	ms	3/2+#	31.8	1.5 +	32 ± *4.0*	1.5 +	32 ± *5.0*	1.5 +	32 ± *5.0*	(3/2+)
101-Sr	113.8 ± *1.7*	ms	(5/2-)	113.8	2.5	**118.0 ± *3.0***	2.5 -	**118.0 ± *3.0***	2.5 -	**118 ±*3.0***	(5/2-)
101-Y	426 ± *20.0*	ms	5/2+	426	2.5 +	**450 ± *20.0***	2.5 +	**450 ± *20.0***	**2.5 -**	**450 ±*20.0***	(5/2+)
101-Zr	2.3 ± *0.1*	s	3/2+	2.3	1.5 +	2.3 ± *0.1*	1.5 +	2.3 ± *0.1*	1.5 +	2.3 ± *0.1*	(3/2+)
101-Nb	7.1 ± *0.3*	s	(5/2#)+	7.1	2.5 +	7.1 ± *0.3*	2.5 +	7.1 ± *0.3*	2.5 +	7.1 ± *0.3*	(5/2+)
101-Mo	14.61 ± *0.03*	m	1/2+	14.61	0.5 +	14.61 ± *0.03*	0.5 +	14.61 ± *0.03*	0.5 +	14.61 ±*0.03*	1/2+
101-Tc	14.22 ± *0.01*	m	9/2+	14.22	4.5 +	14.20 ± *0.1*	4.5 +	14.20 ± *0.1*	4.5 +	14.22 ±*0.01*	9/2+
101-Ru	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
101-Rh	3.3 ± *0.3*	y	1/2-	3.3	0.5	**3.2 ± *0.3***	0.5 -	3.3 ± *0.3*	0.5 -	3.3 ± *0.3*	1/2-
101-Pd	8.47 ± *0.06*	h	5/2+	8.47	2.5 +	8.47 ± *0.06*	2.5 +	8.47 ± *0.06*	2.5 +	8.47 ±*0.06*	5/2+
101-Ag	11.1 ± *0.3*	m	9/2+	11.1	4.5 +	11.1 ± *0.3*	4.5 +	11.1 ± *0.3*	4.5 +	11.1 ±*0.3*	9/2+
101-Cd	1.36 ± *0.05*	m	5/2+#	1.36	2.5 +	1.36 ± *0.05*	2.5 +	1.36 ± *0.05*	2.5 +	1.36 ±*0.05*	(5/2+)
101-In	15.1 ± *1.1*	s	9/2+#	15.1	4.5 +	15.1 ± *1.1*	4.5 +	15.1 ± *0.3*	4.5 +	15.1 ±*0.3*	(9/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
101-Sn	1.97 ± *0.16*	s	(7/2+)	1.97	3.5 +	**3 ± *1.0***	**2.5 +**	**1.70 ± *0.3***	**2.5 +**	**1.70 ±*0.3***	(5/2+)
102-Rb	37 ± *3.0*	ms		37	?	37 ± *5.0*	? -	37 ± *3.0*	? -	37 ± *3.0*	
102-Sr	69 ± *6.0*	ms	0+	69	0.0 +	69 ± *6.0*	0.0 +	69 ± *6.0*	0.0 +	69 ± *6.0*	0+
102-Y	298 ± *9.0*	ms	(2-)	298	2	300 ± *10.0*	**? -**	**360 ± *40.0***	**? -**	**360 ±*40.0***	**HIGH J**
102-Zr	2.9 ± *0.2*	s	0+	2.9	0.0 +	2.9 ± *0.2*	0.0 +	2.9 ± *0.2*	0.0 +	2.9 ± *0.2*	0+
102-Nb	4.3 ± *0.4*	s	(4+)	4.3	4.0 +	**1.3 ± *0.2***	**1.0 +**	4.3 ± *0.4*	4.0 +	4.3 ± *0.4*	(4+)
102-Mo	11.3 ± *0.2*	m	0+	11.3	0.0 +	11.3 ± *0.2*	0.0 +	11.3 ± *0.2*	0.0 +	11.3 ±*0.2*	0+
102-Tc	5.28 ± *0.15*	s	1+	5.28	1.0 +	5.28 ± *0.15*	1.0 +	5.28 ± *0.15*	1.0 +	5.28 ±*0.15*	1+
102-Ru	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
102-Rh	207.0 ± *1.5*	d	(1-;2-)	206.9	2	**1060 ± *15.0***	**6.0 +**	207.3 ± *1.7*	**? -**	207.3 ±*1.7*	(1-,2-)
102-Pd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
102-Ag	12.9 ± *0.3*	m	5(+)	12.9	5.0 +	12.9 ± *0.3*	5.0 +	12.9 ± *0.3*	5.0 +	12.9 ±*0.3*	5(+)
102-Cd	5.5 ± *0.5*	m	0+	5.5	0.0 +	5.5 ± *0.5*	0.0 +	5.5 ± *0.5*	0.0 +	5.5 ± *0.5*	0+
102-In	23.3 ± *0.1*	s	(6+)	23.3	6.0 +	**22 ± *1.0***	6.0 +	23.3 ± *0.1*	6.0 +	23.3 ±*0.1*	(6+)
102-Sn	3.8 ± *0.2*	s	0+	3.8	0.0 +	**4.6 ± *1.4***	0.0 +	**4.5 ± *0.7***	0.0 +	3.8 ± *0.2*	0+
103-Rb	20# ± *4E-4*	ms	3/2+#	20	1.5 +					**0.00063 ± *0.0***	
103-Sr	90 ± *40.0*	ms	5/2+#	90	2.5 +	**50 ± *0.0***	**? -**	**68 ± *0.0***	**? -**	**0.00015 ± *0.0***	
103-Y	239 ± *12.0*	ms	5/2+#	239	2.5 +	**224 ± *19.0***	2.5 +	**230 ± *20.0***	2.5 +	**230 ±*20.0***	(5/2+)
103-Zr	1.38 ± *0.07*	s	5/2-#	1.38	2.5	**1.30 ± *0.1***	2.5 -	**1.30 ± *0.1***	**2.5 -**	**1.30 ±*0.1***	(5/2-)
103-Nb	1.5 ± *0.2*	s	5/2+#	1.5	2.5 +	1.5 ± *0.2*	2.5 +	1.5 ± *0.2*	2.5 +	1.5 ± *0.2*	(5/2+)
103-Mo	67.5 ± *1.5*	s	3/2+	67.5	1.5 +	67.9 ± *0.6*	1.5 +	67.5 ± *1.5*	1.5 +	67.5 ±*1.5*	(3/2+)
103-Tc	54.2 ± *0.8*	s	5/2+	54.2	2.5 +	54.2 ± *0.8*	2.5 +	54.2 ± *0.8*	2.5 +	54.2 ±*0.8*	5/2+
103-Ru	39.247 ± *0.013*	d	3/2+	39.248	1.5 +	39.260 ± *0.02*	1.5 +	39.247 ±*0.0030*	1.5 +	39.247 ±*0.013*	3/2+
103-Rh	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
103-Pd	16.991 ± *0.019*	d	5/2+	16.991	2.5 +	16.980 ± *0.02*	2.5 +	16.991 ±*0.019*	2.5 +	16.991 ±*0.019*	5/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
103-Ag	65.7 ± *0.7*	m	7/2+	65.7	3.5 +	65.7 ± *0.7*	3.5 +	65.7 ± *0.7*	3.5 +	65.7 ±*0.7*	7/2+
103-Cd	7.3 ± *0.1*	m	5/2+#	7.3	2.5 +	7.3 ± *0.1*	2.5 +	7.3 ± *0.1*	2.5 +	7.3 ± *0.1*	(5/2)+
103-In	60 ± *1.0*	s	9/2+#	60	4.5 +	60 ± *1.0*	4.5 +	**65 ± *7.0***	4.5 +	**65 ± *7.0***	(9/2)+
103-Sn	7.0 ± *0.2*	s	5/2+#	7	2.5 +	7 ± *3.0*	2.5 +	7 ± *0.2*	2.5 +	7 ± *0.2*	(5/2+)
103-Sb	<50ns	ns	5/2+#	50	2.5 +	**1.0E+8 ± *0.0***	2.5 +	**1.5E+3 ± *0.0***	**? -**		
104-Sr	44 ± *8.0*	ms	0+	44	0.0 +	**30 ± *0.0***	0.0 +	**43 ± *0.0***	0.0 +		
104-Y	197 ± *4.0*	ms		197	?	**130 ± *20.0***	**0.0 -**	**180 ± *60.0***	? -	**180 ±*60.0***	
104-Zr	920 ± *28.0*	ms	0+	920	0.0 +	**1.20E+3 ±*300.0***	0.0 +	**1.20E+3 ±*300.0***	0.0 +	**1.20E+3 ± *300.0***	0+
104-Nb	4.9 ± *0.3*	s	(1+)	4.9	1.0 +	4.9 ± *0.3*	1.0 +	4.9 ± *0.3*	1.0 +	4.9 ± *0.3*	(1+)
104-Mo	60 ± *2.0*	s	0+	60	0.0 +	60 ± *2.0*	0.0 +	60 ± *2.0*	0.0 +	60 ± *2.0*	0+
104-Tc	18.3 ± *0.3*	m	(3+)	18.3	3.0 +	18.3 ± *0.3*	3.0 +	18.3 ± *0.3*	3.0 +	18.3 ±*0.3*	(3+)
104-Ru	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
104-Rh	42.3 ± *0.4*	s	1+	42.3	1.0 +	42.3 ± *0.4*	1.0 +	42.3 ± *0.4*	1.0 +	42.3 ±*0.4*	1+
104-Pd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
104-Ag	69.2 ± *1.0*	m	5+	69.2	5.0 +	69.2 ± *1.0*	5.0 +	69.2 ± *1.0*	5.0 +	69.2 ±*1.0*	5+
104-Cd	57.7 ± *1.0*	m	0+	57.7	0.0 +	57.7 ± *1.0*	0.0 +	57.7 ± *1.0*	0.0 +	57.7 ±*1.0*	0+
104-In	1.80 ± *0.03*	m	(6+)	1.8	6.0 +	1.80 ± *0.03*	**? -**	1.80 ± *0.03*	6.0 +	1.80 ±*0.03*	(6+)
104-Sn	20.8 ± *0.5*	s	0+	20.8	0.0 +	20.8 ± *0.5*	0.0 +	20.8 ± *0.5*	0.0 +	20.8 ±*0.5*	0+
104-Sb	470 ± *130.0*	ms		470	?	470 ± *130.0*	? -	**460 ± *130.0***	? -	**440 ±*0.0***	
105-Sr	50 ± *30.0*	ms		50	?	**20 ± *0.0***	? -	**56 ± *0.0***	? -		
105-Y	84 ± *5.0*	ms	5/2+#	84	2.5 +	**1.5E+2 ±*20.0***	2.5 +	**88 ± *0.0***	**? -**		
105-Zr	670 ± *28.0*	ms		670	?	**600 ± *200.0***	**2.5 +**	**600 ± *100.0***	? -	**600 ±*100.0***	
105-Nb	2.95 ± *0.06*	s	5/2+#	2.95	2.5 +	2.95 ± *0.06*	2.5 +	2.95 ± *0.06*	2.5 +	2.95 ±*0.06*	(5/2+)
105-Mo	35.6 ± *1.6*	s	(5/2-)	35.6	2.5	35.6 ± *1.6*	2.5 -	35.6 ± *1.6*	2.5 -	35.6 ±*1.6*	(5/2-)
105-Tc	7.6 ± *0.1*	m	(3/2-)	7.6	1.5	7.6 ± *0.1*	1.5 -	7.6 ± *0.1*	1.5 -	7.6 ± *0.1*	(3/2-)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
105-Ru	4.44 ± *0.02*	h	3/2+	4.44	1.5 +	4.44 ± *0.02*	1.5 +	4.44 ± *0.02*	1.5 +	4.44 ±*0.02*	3/2+
105-Rh	35.357 ± *0.037*	h	7/2+	35.361	3.5 +	35.360 ± *0.06*	3.5 +	35.360 ± *0.06*	3.5 +	35.360 ±*0.06*	7/2+
105-Pd	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
105-Ag	41.29 ± *0.07*	d	1/2-	41.28	0.5	41.30 ± *0.1*	0.5 -	41.29 ± *0.07*	0.5 -	41.29 ±*0.07*	1/2-
105-Cd	55.5 ± *0.4*	m	5/2+	55.5	2.5 +	55.5 ± *0.4*	2.5 +	55.5 ± *0.4*	2.5 +	55.5 ±*0.4*	5/2+
105-In	5.07 ± *0.07*	m	9/2+	5.07	4.5 +	5.07 ± *0.07*	4.5 +	5.07 ± *0.07*	4.5 +	5.07 ±*0.07*	9/2+
105-Sn	34 ± *1.0*	s	(5/2+)	34	2.5 +	34 ± *1.0*	2.5 +	34 ± *1.0*	2.5 +	34 ± *1.0*	(5/2+)
105-Sb	1.12 ± *0.16*	s	(5/2+)	1.12	2.5 +	1.12 ± *0.16*	2.5 +	**1.22 ± *0.11***	2.5 +	**1.22 ±*0.11***	(5/2+)
105-Te	633 ± *66.0*	ns	(7/2+)	633	3.5 +	**1.00E+3 ±*0.0***	**2.5 +**	**620 ± *70.0***	**2.5 +**	**620 ±*70.0***	(5/2+)
106-Sr	20# ± *4E-4*	ms	0+	20	0.0 +					**0.00039 ± *0.0***	0+
106-Y	72 ± *20.0*	ms		72	?	**50 ± *0.0***	? -	**66 ± *0.0***	? -	**0.00015 ± *0.0***	
106-Zr	187 ± *11.0*	ms	0+	187	0.0 +	**900 ± *200.0***	0.0 +	**270 ± *0.0***	0.0 +	**191 ±*19.0***	0+
106-Nb	1050 ± *100.0*	ms	2+#	1050	2.0 +	**920 ± *40.0***	2.0 +	**930 ± *40.0***	**? -**	**930 ±*40.0***	
106-Mo	8.73 ± *0.12*	s	0+	8.73	0.0 +	8.73 ± *0.12*	0.0 +	8.73 ± *0.12*	0.0 +	8.73 ±*0.12*	0+
106-Tc	35.6 ± *0.6*	s	(1;2)	35.6	**?**	36 ± *1.0*	**? -**	35.6 ± *0.6*	**? -**	35.6 ±*0.6*	**(1,2)**
106-Ru	371.8 ± *0.18*	d	0+	371.8	0.0 +	372.6 ± *1.0*	0.0 +	371.8 ± *1.8*	0.0 +	371.8 ±*1.8*	0+
106-Rh	30.07 ± *0.35*	s	1+	30.07	1.0 +	30 ± *0.2*	1.0 +	30.07 ± *0.35*	1.0 +	30.07 ±*0.35*	1+
106-Pd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
106-Ag	23.96 ± *0.04*	m	1+	23.97	1.0 +	24 ± *0.1*	1.0 +	23.96 ± *0.04*	1.0 +	23.96 ±*0.04*	1+
106-Cd	stable ± *1E28*		0+	stable	0.0 +	**2E+26 ± *0.0***	0.0 +	stable	0.0 +		0+
106-In	6.2 ± *0.1*	m	7+	6.2	7.0 +	6.2 ± *0.1*	7.0 +	6.2 ± *0.1*	7.0 +	6.2 ± *0.1*	7+
106-Sn	1.92 ± *0.08*	m	0+	1.92	0.0 +	1.92 ± *0.0833*	0.0 +	1.92 ± *0.0833*	0.0 +	1.92 ±*0.0833*	0+
106-Sb	600 ± *200.0*	ms	(2+)	600	2.0 +	600 ± *200.0*	**4.0 +**	600 ± *200.0*	2.0 +	600 ±*200.0*	(2+)
106-Te	80 ± *13.0*	us	0+	80	0.0 +	**60 ± *30.0***	0.0 +	**60 ± *30.0***	0.0 +	**70 ±*17.0***	0+
107-Sr	10# ± *4E-4*	ms		10	?					**0.00040 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
107-Y	45 ± *12.0*	ms	5/2+#	45	2.5 +	**30 ± *0.0***	2.5 +	**30 ± *3.0***	2.5 +	**30 ± *0.0***	(5/2+)
107-Zr	138 ± *4.0*	ms		138	?	**240 ± *40.0***	**2.5 +**	**150 ± *15.0***	? -	**150 ±*0.0***	
107-Nb	296 ± *7.0*	ms	5/2+#	296	2.5 +	300 ± *9.0*	2.5 +	300 ± *9.0*	**? -**	300 ± *9.0*	
107-Mo	3.5 ± *0.5*	s	(5/2+)	3.5	2.5 +	3.5 ± *0.5*	**3.5 -**	3.5 ± *0.5*	**2.5 -**	3.5 ± *0.5*	(5/2+)
107-Tc	21.2 ± *0.2*	s	3/2-#	21.2	1.5	21.2 ± *0.2*	1.5 -	21.2 ± *0.2*	1.5 -	21.2 ±*0.2*	(3/2-)
107-Ru	3.75 ± *0.05*	m	(5/2)+	3.75	2.5 +	3.75 ± *0.05*	2.5 +	3.75 ± *0.05*	2.5 +	3.75 ±*0.05*	(5/2)+
107-Rh	21.7 ± *0.4*	m	7/2+	21.7	3.5 +	21.7 ± *0.4*	3.5 +	21.7 ± *0.4*	3.5 +	21.7 ±*0.4*	7/2+
107-Pd	6.5 ± *0.3*	My	5/2+	6.5	2.5 +	6.5 ± *0.3*	2.5 +	6.5 ± *0.3*	2.5 +	6.5 ± *0.3*	5/2+
107-Ag	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
107-Cd	6.50 ± *0.02*	h	5/2+	6.5	2.5 +	6.52 ± *0.02*	2.5 +	6.5 ± *0.02*	2.5 +	6.5 ±*0.02*	5/2+
107-In	32.4 ± *0.3*	m	9/2+	32.4	4.5 +	32.4 ± *0.3*	4.5 +	32.4 ± *0.3*	4.5 +	32.4 ±*0.3*	9/2+
107-Sn	2.90 ± *0.05*	m	(5/2+)	2.9	2.5 +	2.90 ± *0.05*	2.5 +	2.90 ± *0.05*	2.5 +	2.90 ±*0.05*	(5/2+)
107-Sb	4.0 ± *0.2*	s	5/2+#	4	2.5 +	**4.6 ± *0.8***	2.5 +	4 ± *0.2*	2.5 +	4 ± *0.2*	(5/2+)
107-Te	3.1 ± *0.1*	ms	5/2+#	3.1	2.5 +	3.1 ± *0.1*	2.5 +	3.1 ± *0.1*	**? -**	3.1 ± *0.1*	
107-I	20#	us	5/2+#	20	2.5 +						
108-Y	60 ± *40.0*	ms		60	?	**20 ± *0.0***	? -	**48 ± *0.0***	? -	**0.00063 ± *0.0***	
108-Zr	73 ± *4.0*	ms	0+	73	0.0 +	**80 ± *0.0***	0.0 +	**80 ± *8.0***	0.0 +	73 ± *4.0*	0+
108-Nb	210 ± *5.0*	ms	(2+)	210	2.0 +	**193 ± *17.0***	2.0 +	**193 ± *17.0***	2.0 +	**193 ±*17.0***	(2+)
108-Mo	1.105 ± *0.01*	s	0+	1.105	0.0 +	1.090 ± *0.02*	0.0 +	1.090 ± *0.02*	0.0 +	1.090 ±*0.02*	0+
108-Tc	5.17 ± *0.07*	s	(2)+	5.17	2.0 +	5.17 ± *0.07*	2.0 +	5.17 ± *0.07*	**2.0 -**	5.17 ±*0.07*	(2)+
108-Ru	4.55 ± *0.05*	m	0+	4.55	0.0 +	4.55 ± *0.05*	0.0 +	4.55 ± *0.05*	0.0 +	4.55 ±*0.05*	0+
108-Rh	16.8 ± *0.5*	s	1+	16.8	1.0 +	16.8 ± *0.5*	1.0 +	16.8 ± *0.5*	1.0 +	16.8 ±*0.5*	1+
108-Pd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
108-Ag	2.382 ± *0.011*	m	1+	2.382	1.0 +	2.400 ± *0.02*	1.0 +	2.382 ± *0.011*	1.0 +	2.382 ±*0.011*	1+
108-Cd	stable ± *1E25*		0+	stable	0.0 +	**1E+25 ± *0.0***	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
108-In	58.0 ± *1.2*	m	7+	58	7.0 +	58 ± *1.2*	7.0 +	58 ± *1.2*	7.0 +	58 ± *1.2*	7+
108-Sn	10.30 ± *0.08*	m	0+	10.3	0.0 +	10.30 ± *0.08*	0.0 +	10.30 ± *0.08*	0.0 +	10.30 ±*0.08*	0+
108-Sb	7.4 ± *0.3*	s	(4+)	7.4	4.0 +	7.4 ± *0.3*	4.0 +	7.4 ± *0.3*	4.0 +	7.4 ± *0.3*	(4+)
108-Te	2.1 ± *0.1*	s	0+	2.1	0.0 +	2.1 ± *0.1*	0.0 +	2.1 ± *0.1*	0.0 +	2.1 ± *0.1*	0+
108-I	36 ± *6.0*	ms	1+#	36	1.0 +	36 ± *6.0*	1.0 +	36 ± *6.0*	**1.0 -**	36 ± *6.0*	**-1**
109-Y	15# ± *4E-4*	ms	5/2+#	15	2.5 +					**0.00039 ± *0.0***	
109-Zr	80 ± *30.0*	ms		80	?	**60 ± *0.0***	? -	**1.2E+2 ± *0.0***	? -		
109-Nb	101 ± *9.0*	ms	5/2+#	101	2.5 +	**190 ± *60.0***	2.5 +	**190 ± *30.0***	**2.5 -**	**190 ±*30.0***	**(5/2)**
109-Mo	700 ± *14.0*	ms	5/2+#	700	2.5 +	**500 ± *200.0***	2.5 +	**530 ± *60.0***	**3.5 -**	**530 ±*60.0***	**(7/2-)**
109-Tc	1.14 ± *0.03*	s	3/2-#	1.14	1.5	**0.860 ± *0.04***	1.5 -	**0.860 ± *0.04***	**2.5 -**	**0.860 ±*0.04***	**(5/2+)**
109-Ru	34.5 ± *1.0*	s	5/2+#	34.5	2.5 +	34.5 ± *0.5*	2.5 +	34.5 ± *0.5*	2.5 +	34.5 ±*1.0*	(5/2+)
109-Rh	80 ± *2.0*	s	7/2+	80	3.5 +	80 ± *2.0*	3.5 +	80 ± *2.0*	3.5 +	80 ± *2.0*	7/2+
109-Pd	13.7012 ± *0.0024*	h	5/2+	13.7	2.5 +	13.7012 ±*0.0024*	2.5 +	13.7012 ±*0.0024*	2.5 +	13.7012 ± *0.0024*	5/2+
109-Ag	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
109-Cd	461.4 ± *1.2*	d	5/2+	461.3	2.5 +	462.6 ± *0.7*	2.5 +	461.4 ± *1.2*	2.5 +	461.4 ±*1.2*	5/2+
109-In	4.167 ± *0.018*	h	9/2+	4.167	4.5 +	4.200 ± *0.1*	4.5 +	4.167 ± *0.018*	4.5 +	4.167 ±*0.018*	9/2+
109-Sn	18.0 ± *0.2*	m	5/2(+#)	18	2.5 +	18 ± *0.2*	2.5 +	18 ± *0.2*	2.5 +	18 ± *0.2*	5/2+
109-Sb	17.0 ± *0.7*	s	5/2+#	17	2.5 +	16.7 ± *0.15*	2.5 +	17 ± *0.7*	2.5 +	17 ± *0.7*	(5/2+)
109-Te	4.6 ± *0.3*	s	(5/2+)	4.6	2.5 +	4.6 ± *0.3*	2.5 +	4.6 ± *0.3*	2.5 +	4.6 ± *0.3*	(5/2+)
109-I	103 ± *5.0*	us	1/2+	103	0.5 +	103 ± *5.0*	**2.5 +**	103 ± *5.0*	0.5 +	103 ± *5.0*	1/2+
109-Xe	13 ± *2.0*	ms	7/2+#	13	3.5 +					13 ± *2.0*	(7/2+)
110-Zr	42 ± *13.0*	ms	0+	42	0.0 +	**30 ± *0.0***	0.0 +	**98 ± *0.0***	0.0 +	**37 ± *0.0***	0+
110-Nb	82 ± *4.0*	ms	(5)(+#)	82	5.0 +	**1.7E+2 ±*20.0***	**2.0 +**	**1.7E+2 ±*20.0***	**? -**	82 ± *4.0*	**-5**
110-Mo	296 ± *17.0*	ms	0+	296	0.0 +	300 ± *40.0*	0.0 +	300 ± *40.0*	0.0 +	296 ±*17.0*	0+
110-Tc	900 ± *13.0*	ms	(2+;3+)	900	3.0 +	**920 ± *30.0***	2.0 +	**920 ± *30.0***	**2.0 -**	900 ±*13.0*	(2,3+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
110-Ru	12.04 ± *0.17*	s	0+	12.04	0.0 +	**11.60 ± *0.6***	0.0 +	**11.60 ± *0.6***	0.0 +	12.04 ±*0.17*	0+
110-Rh	3.35 ± *0.12*	s	(1+)	3.35	1.0 +	**28.5 ± *1.5***	**4.0 +**	**3.20 ± *0.2***	1.0 +	3.35 ±*0.12*	(1+)
110-Pd	stable ± *1E25*		0+	stable	0.0 +	**2E+25 ± *0.0***	0.0 +	stable	0.0 +		0+
110-Ag	24.56 ± *0.11*	s	1+	24.56	1.0 +	24.56 ± *0.11*	1.0 +	24.60 ± *0.2*	1.0 +	24.56 ±*0.11*	1+
110-Cd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
110-In	4.92 ± *0.08*	h	7+	4.92	7.0 +	4.90 ± *0.1*	7.0 +	4.90 ± *0.1*	7.0 +	4.92 ±*0.08*	7+
110-Sn	4.154 ± *0.0040*	h	0+	4.153	0.0 +	4.100 ± *0.1*	0.0 +	4.110 ± *0.1*	0.0 +	4.154 ±*0.0040*	0+
110-Sb	23.6 ± *0.3*	s	(3+)	23.6	3.0 +	**23 ± *0.4***	**4.0 +**	**23 ± *0.4***	**? -**	23.6 ±*0.3*	(3+)
110-Te	18.6 ± *0.8*	s	0+	18.6	0.0 +	18.6 ± *0.8*	0.0 +	18.6 ± *0.8*	0.0 +	18.6 ±*0.8*	0+
110-I	664 ± *24.0*	ms	(1+)	664	1.0 +	**650 ± *20.0***	1.0 +	**650 ± *20.0***	**? -**	664 ±*24.0*	(1+)
110-Xe	93 ± *3.0*	ms	0+	93	0.0 +	**3.1E+2 ±*190.0***	0.0 +	93 ± *3.0*	0.0 +	93 ± *3.0*	0+
111-Zr	30# ± *4E-4*	ms		30	?					**0.00039 ± *0.0***	
111-Nb	52 ± *6.0*	ms	5/2+#	52	2.5 +	**80 ± *0.0***	2.5 +	**80 ± *8.0***	2.5 +	**80 ± *0.0***	(5/2+)
111-Mo	186 ± *9.0*	ms	1/2+#	186	0.5 +	**500 ± *200.0***	**2.5 +**	**200 ± *20.0***	**? -**	**200 ±*0.0***	
111-Tc	350 ± *11.0*	ms	3/2-#	350	1.5	**290 ± *20.0***	1.5 -	**290 ± *20.0***	**2.5 -**	**290 ±*20.0***	**(5/2+)**
111-Ru	2.12 ± *0.07*	s	5/2+	2.12	2.5 +	2.12 ± *0.07*	2.5 +	2.12 ± *0.07*	**2.5 -**	2.12 ±*0.07*	5/2+
111-Rh	11 ± *1.0*	s	(7/2+)	11	3.5 +	**12 ± *1.0***	3.5 +	11 ± *1.0*	3.5 +	11 ± *1.0*	(7/2+)
111-Pd	23.4 ± *0.2*	m	5/2+	23.4	2.5 +	23.4 ± *0.2*	2.5 +	23.4 ± *0.2*	2.5 +	23.4 ±*0.2*	5/2+
111-Ag	7.45 ± *0.01*	d	1/2-	7.45	0.5	7.45 ± *0.01*	0.5 -	7.45 ± *0.01*	0.5 -	7.45 ±*0.01*	1/2-
111-Cd	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
111-In	2.8047 ± *4E-4*	d	9/2+	2.8044	4.5 +	2.8047 ±*5.0E-4*	4.5 +	2.8047 ±*4.0E-4*	4.5 +	2.8047 ±*4.0E-4*	9/2+
111-Sn	35.3 ± *0.6*	m	7/2+	35.3	3.5 +	35.3 ± *0.6*	3.5 +	35.3 ± *0.6*	3.5 +	35.3 ±*0.6*	7/2+
111-Sb	75 ± *1.0*	s	(5/2+)	75	2.5 +	75 ± *1.0*	2.5 +	75 ± *1.0*	2.5 +	75 ± *1.0*	(5/2+)
111-Te	26.2 ± *0.6*	s	(5/2)+	26.2	2.5 +	**19.3 ± *0.4***	2.5 +	**19.3 ± *0.4***	2.5 +	**19.3 ±*0.4***	(5/2)+
111-I	2.5 ± *0.2*	s	5/2+#	2.5	2.5 +	2.5 ± *0.2*	2.5 +	2.5 ± *0.2*	2.5 +	2.5 ± *0.2*	(5/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
111-Xe	740 ± *200.0*	ms	5/2+#	740	2.5 +	740 ± *200.0*	2.5 +	**810 ± *200.0***	**3.5 +**	740 ±*200.0*	
112-Zr	15# ± *4E-4*	ms	0+	15	0.0 +					**0.00039 ± *0.0***	0+
112-Nb	35 ± *8.0*	ms	2+#	35	2.0 +	**60 ± *0.0***	2.0 +	**69 ± *0.0***	2.0 +	**0.00015 ± *0.0***	(2+)
112-Mo	121 ± *12.0*	ms	0+	121	0.0 +	**1.00E+3 ±*200.0***	0.0 +	**287 ± *0.0***	0.0 +		0+
112-Tc	290 ± *11.0*	ms	2+#	290	2.0 +	290 ± *20.0*	2.0 +	**280 ± *30.0***	**? -**	**280 ±*30.0***	
112-Ru	1.75 ± *0.07*	s	0+	1.75	0.0 +	1.75 ± *0.07*	0.0 +	1.75 ± *0.07*	0.0 +	1.75 ±*0.07*	0+
112-Rh	3.4 ± *0.4*	s	1+	3.4	1.0 +	**2.1 ± *0.3***	1.0 +	**2.1 ± *0.3***	**1.0 -**	**2.1 ±*0.3***	1+
112-Pd	21.03 ± *0.05*	h	0+	21.03	0.0 +	**20.30 ± *0.2***	0.0 +	21.03 ± *0.05*	0.0 +	21.03 ±*0.05*	0+
112-Ag	3.130 ± *0.0090*	h	2(-)	3.131	2	3.130 ±*0.0090*	2.0 -	3.130 ±*0.0090*	2.0 -	3.130 ±*0.0090*	2(-)
112-Cd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
112-In	14.97 ± *0.1*	m	1+	14.97	1.0 +	14.70 ± *0.7*	1.0 +	14.97 ± *0.1*	1.0 +	14.97 ±*0.1*	1+
112-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
112-Sb	51.4 ± *1.0*	s	3+	51.4	3.0 +	51.4 ± *1.0*	3.0 +	51.4 ± *1.0*	3.0 +	51.4 ±*1.0*	3+
112-Te	2.0 ± *0.2*	m	0+	2	0.0 +	2 ± *0.2*	0.0 +	2 ± *0.2*	0.0 +	2 ± *0.2*	0+
112-I	3.42 ± *0.11*	s	1+#	3.42	1.0 +	3.42 ± *0.11*	1.0 +	3.42 ± *0.11*	**? -**	3.42 ±*0.11*	
112-Xe	2.7 ± *0.8*	s	0+	2.7	0.0 +	2.7 ± *0.8*	0.0 +	2.7 ± *0.8*	0.0 +	2.7 ± *0.8*	
112-Cs	490 ± *35.0*	us	1+#	490	1.0 +	**500 ± *100.0***	1.0 +	**500 ± *100.0***	**? -**	**500 ±*100.0***	(0+,3+)
113-Nb	20# ± *3E-4*	ms	5/2+#	20	2.5 +	**30 ± *0.0***	2.5 +	**30 ± *3.0***	**? -**	**30 ± *0.0***	
113-Mo	79 ± *6.0*	ms	3/2+#	79	1.5 +	**1.0E+2 ± *0.0***	**? -**	**1.0E+2 ±*10.0***	**? -**	**1.0E+2 ± *0.0***	
113-Tc	169 ± *18.0*	ms	5/2+#	169	2.5 +	**130 ± *40.0***	2.5 +	**160 ± *45.0***	**? -**	**160 ±*0.0***	**GT 5/2**
113-Ru	800 ± *50.0*	ms	(1/2+)	800	0.5 +	800 ± *60.0*	**2.5 +**	800 ± *50.0*	0.5 +	800 ±*50.0*	(1/2+)
113-Rh	2.80 ± *0.12*	s	(7/2+)	2.8	3.5 +	2.80 ± *0.12*	3.5 +	2.80 ± *0.12*	**3.5 -**	2.80 ±*0.12*	(7/2+)
113-Pd	93 ± *5.0*	s	(5/2+)	93	2.5 +	**91 ± *2.0***	2.5 +	93 ± *5.0*	2.5 +	93 ± *5.0*	(5/2+)
113-Ag	5.37 ± *0.05*	h	1/2-	5.37	0.5	5.37 ± *0.05*	0.5 -	5.37 ± *0.05*	0.5 -	5.37 ±*0.05*	1/2-
113-Cd	8.04 ± *0.05*	Py	1/2+	8.04	0.5 +	**7.70 ± *0.3***	0.5 +	8.04 ± *0.05*	0.5 +	8.04 ±*0.05*	1/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
113-In	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+
113-Sn	115.09 ± *0.03*	d	1/2+	115.09	0.5 +	115.09 ± *0.04*	0.5 +	115.09 ± *0.03*	0.5 +	115.09 ±*0.03*	1/2+
113-Sb	6.67 ± *0.07*	m	5/2+	6.67	2.5 +	6.67 ± *0.07*	2.5 +	6.67 ± *0.07*	2.5 +	6.67 ±*0.07*	5/2+
113-Te	1.7 ± *0.2*	m	(7/2+)	1.7	3.5 +	1.7 ± *0.2*	3.5 +	1.7 ± *0.2*	3.5 +	1.7 ± *0.2*	(7/2+)
113-I	6.6 ± *0.2*	s	5/2+#	6.6	2.5 +	6.6 ± *0.2*	2.5 +	6.6 ± *0.2*	2.5 +	6.6 ± *0.2*	5/2+
113-Xe	2.74 ± *0.08*	s	5/2+#	2.74	2.5 +	2.74 ± *0.08*	2.5 +	2.74 ± *0.08*	2.5 +	2.74 ±*0.08*	(5/2+)
113-Cs	16.7 ± *0.7*	us	(3/2+)	16.7	1.5 +	16.7 ± *0.7*	**2.5 +**	16.7 ± *0.7*	1.5 +	16.7 ±*0.7*	(3/2+)
114-Nb	15# ± *4E-4*	ms	0+	15	0.0 +					**0.00039 ± *0.0***	
114-Mo	63 ± *11.0*	ms	0+	63	0.0 +	**80 ± *0.0***	0.0 +	**80 ± *8.0***	0.0 +	**60 ± *0.0***	0+
114-Tc	90 ± *20.0*	ms	(1+)	90	1.0 +	**2.0E+2 ±*40.0***	**2.0 +**	**1.5E+2 ±*30.0***	**? -**	**1.0E+2 ± *20.0***	**(GE 4)**
114-Ru	540 ± *30.0*	ms	0+	540	0.0 +	530 ± *60.0*	0.0 +	**520 ± *50.0***	0.0 +	540 ±*30.0*	0+
114-Rh	1.85 ± *0.05*	s	1+	1.85	1.0 +	1.85 ± *0.05*	1.0 +	1.85 ± *0.05*	**1.0 -**	1.85 ±*0.05*	1+
114-Pd	2.42 ± *0.06*	m	0+	2.42	0.0 +	2.42 ± *0.06*	0.0 +	2.42 ± *0.06*	0.0 +	2.42 ±*0.06*	0+
114-Ag	4.6 ± *0.1*	s	1+	4.6	1.0 +	4.6 ± *0.1*	1.0 +	4.6 ± *0.1*	1.0 +	4.6 ± *0.1*	1+
114-Cd	stable ± *2E24*		0+	stable	0.0 +	**2E+25 ± *0.0***	0.0 +	stable	0.0 +		0+
114-In	71.9 ± *0.1*	s	1+	71.9	1.0 +	71.9 ± *0.1*	1.0 +	71.9 ± *0.1*	1.0 +	71.9 ±*0.1*	1+
114-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
114-Sb	3.49 ± *0.03*	m	3+	3.49	3.0 +	3.49 ± *0.03*	3.0 +	3.49 ± *0.03*	3.0 +	3.49 ±*0.03*	3+
114-Te	15.2 ± *0.7*	m	0+	15.2	0.0 +	15.2 ± *0.7*	0.0 +	15.2 ± *0.7*	0.0 +	15.2 ±*0.7*	0+
114-I	2.1 ± *0.2*	s	1+	2.1	1.0 +	2.1 ± *0.2*	1.0 +	2.1 ± *0.2*	1.0 +	2.1 ± *0.2*	1+
114-Xe	10.0 ± *0.4*	s	0+	10	0.0 +	10 ± *0.4*	0.0 +	10 ± *0.4*	0.0 +	10 ± *0.4*	0+
114-Cs	570 ± *20.0*	ms	(1+)	570	1.0 +	570 ± *20.0*	1.0 +	570 ± *20.0*	1.0 +	570 ±*20.0*	(1+)
114-Ba	530 ± *230.0*	ms	0+	530	0.0 +	530 ± *230.0*	0.0 +	**430 ± *225.0***	0.0 +	**430 ±*0.0***	0+
115-Nb	10# ± *4E-4*	ms	5/2+#	10	2.5 +						
115-Mo	90 ± *50.0*	ms		90	?	**60 ± *0.0***	? -	**92 ± *0.0***	? -	**51 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
115-Tc	85 ± *14.0*	ms	3/2-#	85	1.5	**2.7E+2 ±*50.0***	**2.5 +**	**73 ± *27.0***	**? -**	**83 ± *0.0***	
115-Ru	322 ± *19.0*	ms	(3/2+)	322	1.5 +	**700 ± *200.0***	**2.5 +**	**740 ± *80.0***	**? -**	318 ±*19.0*	(3/2+)
115-Rh	990 ± *50.0*	ms	(7/2+)	990	3.5 +	990 ± *50.0*	3.5 +	990 ± *50.0*	**3.5 -**	990 ±*50.0*	(7/2+)
115-Pd	25 ± *2.0*	s	(1/2+)	25	0.5 +	25 ± *2.0*	**2.5 +**	25 ± *2.0*	**2.5 -**	25 ± *2.0*	(1/2)+
115-Ag	20.0 ± *0.5*	m	1/2-	20	0.5	20 ± *0.5*	0.5 -	20 ± *0.5*	0.5 -	20 ± *0.5*	1/2-
115-Cd	53.46 ± *0.05*	h	1/2+	53.47	0.5 +	53.46 ± *0.1*	0.5 +	53.46 ± *0.05*	0.5 +	53.46 ±*0.05*	1/2+
115-In	441 ± *25.0*	Ty	9/2+	441	4.5 +	441 ± *25.0*	4.5 +	441 ± *25.0*	4.5 +	441 ±*25.0*	9/2+
115-Sn	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
115-Sb	32.1 ± *0.3*	m	5/2+	32.1	2.5 +	32.1 ± *0.3*	2.5 +	32.1 ± *0.3*	2.5 +	32.1 ±*0.3*	5/2+
115-Te	5.8 ± *0.2*	m	7/2+	5.8	3.5 +	5.8 ± *0.2*	3.5 +	5.8 ± *0.2*	3.5 +	5.8 ± *0.2*	7/2+
115-I	1.3 ± *0.2*	m	5/2+#	1.3	2.5 +	1.3 ± *0.2*	2.5 +	1.3 ± *0.2*	2.5 +	1.3 ± *0.2*	(5/2+)
115-Xe	18 ± *4.0*	s	(5/2+)	18	2.5 +	18 ± *4.0*	2.5 +	18 ± *4.0*	2.5 +	18 ± *4.0*	(5/2+)
115-Cs	1.4 ± *0.8*	s	9/2+#	1.4	4.5 +	1.4 ± *0.8*	4.5 +	1.4 ± *0.8*	**? -**	1.4 ± *0.8*	
115-Ba	450 ± *50.0*	ms	5/2+#	450	2.5 +	450 ± *50.0*	2.5 +	450 ± *50.0*	2.5 +	450 ±*50.0*	(5/2+)
116-Mo	20# ± *4E-4*	ms	0+	20	0.0 +					**0.00039 ± *0.0***	0+
116-Tc	59 ± *13.0*	ms	2+#	59	2.0 +	**1.2E+2 ±*20.0***	2.0 +	**90 ± *9.0***	**? -**	**56 ± *0.0***	
116-Ru	210 ± *30.0*	ms	0+	210	0.0 +	**1.70E+3 ±*300.0***	0.0 +	**204 ± *30.5***	0.0 +	**204 ±*0.0***	0+
116-Rh	685 ± *39.0*	ms	1+	685	1.0 +	680 ± *60.0*	1.0 +	680 ± *60.0*	**1.0 -**	680 ±*60.0*	1+
116-Pd	11.8 ± *0.4*	s	0+	11.8	0.0 +	11.8 ± *0.4*	0.0 +	11.8 ± *0.4*	0.0 +	11.8 ±*0.4*	0+
116-Ag	3.83 ± *0.08*	m	(0-)	3.83	0	**2.68 ± *0.1***	**2.0 -**	**3.95 ±*0.0833***	0.0 -	3.83 ±*0.0833*	(0-)
116-Cd	30 ± *4.0*	Ey	0+	30	0.0 +	**34 ± *3.0***	0.0 +	**31 ± *4.0***	0.0 +	**33 ± *4.0***	0+
116-In	14.10 ± *0.03*	s	1+	14.1	1.0 +	14.20 ± *0.3*	1.0 +	14.10 ± *0.03*	1.0 +	14.10 ±*0.03*	1+
116-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
116-Sb	15.8 ± *0.8*	m	3+	15.8	3.0 +	15.8 ± *0.8*	3.0 +	15.8 ± *0.8*	3.0 +	15.8 ±*0.8*	3+
116-Te	2.49 ± *0.04*	h	0+	2.49	0.0 +	2.49 ± *0.04*	0.0 +	2.49 ± *0.04*	0.0 +	2.49 ±*0.04*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
116-I	2.91 ± *0.15*	s	1+	2.91	1.0 +	2.91 ± *0.15*	1.0 +	2.91 ± *0.15*	1.0 +	2.91 ±*0.15*	1+
116-Xe	59 ± *2.0*	s	0+	59	0.0 +	59 ± *2.0*	0.0 +	59 ± *2.0*	0.0 +	59 ± *2.0*	0+
116-Cs	700 ± *40.0*	ms	(1+)	700	1.0 +	700 ± *40.0*	1.0 +	700 ± *40.0*	1.0 +	700 ±*40.0*	(1+)
116-Ba	1.3 ± *0.2*	s	0+	1.3	0.0 +	1.3 ± *0.2*	0.0 +	1.3 ± *0.2*	0.0 +	1.3 ± *0.2*	0+
116-La	10#	ms		10	?						
117-Mo	10# ± *4E-4*	ms		10	?					**0.00039 ± *0.0***	
117-Tc	130 ± *70.0*	ms	3/2-#	130	1.5	**40 ± *0.0***	1.5 -	**40 ± *4.0***	**2.5 -**	**40 ± *0.0***	**(5/2+)**
117-Ru	143 ± *18.0*	ms	3/2+#	143	1.5 +	**340 ± *70.0***	**2.5 +**	142 ± *17.5*	**? -**	142 ± *0.0*	
117-Rh	421 ± *30.0*	ms	7/2+#	421	3.5 +	**440 ± *40.0***	3.5 +	**440 ± *40.0***	**3.5 -**	**440 ±*40.0***	(7/2+)
117-Pd	4.3 ± *0.3*	s	(3/2+)	4.3	1.5 +	4.3 ± *0.3*	**2.5 +**	4.3 ± *0.3*	**2.5 -**	4.3 ± *0.3*	(5/2+)
117-Ag	73.6 ± *1.4*	s	1/2-#	73.6	0.5	73.6 ± *1.4*	0.5 -	72.8 ± *1.35*	0.5 -	72.8 ±*0.0*	(1/2-)
117-Cd	2.49 ± *0.04*	h	1/2+	2.49	0.5 +	2.49 ± *0.04*	0.5 +	2.49 ± *0.04*	0.5 +	2.49 ±*0.04*	1/2+
117-In	43.2 ± *0.3*	m	9/2+	43.2	4.5 +	43.2 ± *0.3*	4.5 +	43.2 ± *0.3*	4.5 +	43.2 ±*0.3*	9/2+
117-Sn	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
117-Sb	2.80 ± *0.01*	h	5/2+	2.8	2.5 +	2.80 ± *0.01*	2.5 +	2.80 ± *0.01*	2.5 +	2.80 ±*0.01*	5/2+
117-Te	62 ± *2.0*	m	1/2+	62	0.5 +	62 ± *2.0*	0.5 +	62 ± *2.0*	0.5 +	62 ± *2.0*	1/2+
117-I	2.22 ± *0.04*	m	(5/2)+	2.22	2.5 +	2.22 ± *0.04*	2.5 +	2.22 ± *0.04*	2.5 +	2.22 ±*0.04*	(5/2)+
117-Xe	61 ± *2.0*	s	5/2(+)	61	2.5 +	61 ± *2.0*	2.5 +	61 ± *2.0*	2.5 +	61 ± *2.0*	5/2(+)
117-Cs	8.4 ± *0.6*	s	9/2+#	8.4	4.5 +	8.4 ± *0.6*	4.5 +	8.4 ± *0.6*	4.5 +	8.4 ± *0.6*	(9/2+)
117-Ba	1.75 ± *0.07*	s	(3/2)(+#)	1.75	1.5 +	1.75 ± *0.07*	1.5 +	1.75 ± *0.07*	**1.5 -**	1.75 ±*0.07*	**(3/2)**
117-La	21.7 ± *1.8*	ms	(3/2+)	21.7	1.5 +	**23.5 ± *2.6***	**? -**	**23.5 ± *2.6***	**? -**	**23.5 ±*2.6***	**(3/2+,3/2-)**
118-Tc	30# ± *3E-4*	ms	2+#	30	2.0 +	30 ± *0.0*	2.0 +	**66 ± *0.0***	**? -**	**38 ± *0.0***	
118-Ru	130 ± *40.0*	ms	0+	130	0.0 +	**700 ± *200.0***	0.0 +	**123 ± *41.5***	0.0 +	**123 ±*0.0***	0+
118-Rh	281 ± *17.0*	ms	(4-,10)(+#)	281	**?**	**320 ± *60.0***	**1.0 +**	**266 ± *21.5***	**? -**	**266 ±*0.0***	
118-Pd	1.9 ± *0.1*	s	0+	1.9	0.0 +	1.9 ± *0.1*	0.0 +	1.9 ± *0.1*	0.0 +	1.9 ± *0.1*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
118-Ag	3.76 ± *0.15*	s	1-	3.76	1	3.76 ± *0.15*	1.0 -	3.76 ± *0.15*	**1.0 -**	3.76 ±*0.15*	1(-)
118-Cd	50.3 ± *0.2*	m	0+	50.3	0.0 +	50.3 ± *0.2*	0.0 +	50.3 ± *0.2*	0.0 +	50.3 ±*0.2*	0+
118-In	5.0 ± *0.5*	s	1+	5	1.0 +	5 ± *0.3*	1.0 +	5 ± *0.3*	1.0 +	5 ± *0.5*	1+
118-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
118-Sb	3.6 ± *0.1*	m	1+	3.6	1.0 +	3.6 ± *0.1*	1.0 +	3.6 ± *0.1*	1.0 +	3.6 ± *0.1*	1+
118-Te	6.00 ± *0.02*	d	0+	6	0.0 +	6 ± *0.02*	0.0 +	6 ± *0.02*	0.0 +	6 ± *0.02*	0+
118-I	13.7 ± *0.5*	m	2-	13.7	2	13.7 ± *0.5*	2.0 -	13.7 ± *0.5*	2.0 -	13.7 ±*0.5*	2-
118-Xe	3.8 ± *0.9*	m	0+	3.8	0.0 +	3.8 ± *0.9*	0.0 +	3.8 ± *0.9*	0.0 +	3.8 ± *0.9*	0+
118-Cs	14 ± *2.0*	s	2	14	2.0 ?	14 ± *2.0*	**? -**	14 ± *2.0*	2.0 -	14 ± *2.0*	**2**
118-Ba	5.2 ± *0.2*	s	0+	5.2	0.0 +	5.2 ± *0.2*	0.0 +	**5.5 ± *0.2***	0.0 +	**5.5 ±*0.2***	0+
118-La	200#	ms		200	?	200 ± *0.0*	? -	**1.00E+3 ±*100.0***	? -		
119-Tc	20# ± *4E-4*	ms	3/2-#	20	1.5					**0.00039 ± *0.0***	
119-Ru	170# ± *3E-4*	ms		170	?	**190 ± *40.0***	**2.5 +**	**162 ± *0.0***	? -	**0.000300 ± *0.0***	
119-Rh	171 ± *18.0*	ms	7/2+#	171	3.5 +	**300 ± *0.0***	3.5 +	171 ± *18.0*	**3.5 -**	171 ±*18.0*	(7/2+)
119-Pd	920 ± *80.0*	ms	3/2+#	920	1.5 +	920 ± *130.0*	**? -**	920 ± *10.0*	**? -**	920 ±*10.0*	
119-Ag	6.0 ± *0.5*	s	1/2-#	6	0.5	6 ± *0.5*	0.5 -	**2.1 ± *0.1***	**3.5 +**	**2.1 ±*0.1***	**(7/2+)**
119-Cd	2.69 ± *0.02*	m	1/2+	2.69	0.5 +	2.69 ± *0.02*	**1.5 +**	2.69 ± *0.02*	**1.5 +**	2.69 ±*0.02*	1/2+
119-In	2.4 ± *0.1*	m	9/2+	2.4	4.5 +	2.4 ± *0.1*	4.5 +	2.4 ± *0.1*	4.5 +	2.4 ± *0.1*	9/2+
119-Sn	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
119-Sb	38.19 ± *0.22*	h	5/2+	38.19	2.5 +	38.30 ± *0.2*	2.5 +	38.19 ± *0.22*	2.5 +	38.19 ±*0.22*	5/2+
119-Te	16.05 ± *0.05*	h	1/2+	16.05	0.5 +	16.05 ± *0.05*	0.5 +	16.05 ± *0.05*	0.5 +	16.05 ±*0.05*	1/2+
119-I	19.1 ± *0.4*	m	5/2+	19.1	2.5 +	19.1 ± *0.4*	2.5 +	19.1 ± *0.4*	2.5 +	19.1 ±*0.4*	5/2+
119-Xe	5.8 ± *0.3*	m	5/2(+)	5.8	2.5 +	5.8 ± *0.3*	2.5 +	5.8 ± *0.3*	2.5 +	5.8 ± *0.3*	(5/2+)
119-Cs	43.0 ± *0.2*	s	9/2+	43	4.5 +	43 ± *0.2*	4.5 +	43 ± *0.2*	4.5 +	43 ± *0.2*	9/2+
119-Ba	5.4 ± *0.3*	s	(5/2+)	5.4	2.5 +	5.4 ± *0.3*	2.5 +	5.4 ± *0.3*	2.5 +	5.4 ± *0.3*	(5/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
119-La	1#	s	11/2-#	1	5.5	1 ± *0.0*	5.5 -	**2 ± *0.2***	**? -**		
119-Ce	200#	ms	5/2+#	200	2.5 +	200 ± *0.0*	2.5 +	200 ± *20.0*	**? -**		
120-Tc	10# ± *4E-4*	ms	0+	10	0.0 +					**0.00039 ± *0.0***	
120-Ru	80# ± *3E-4*	ms	0+	80	0.0 +	80 ± *0.0*	0.0 +	**1.5E+2 ± *0.0***	0.0 +	**0.00015 ± *0.0***	0+
120-Rh	126 ± *8.0*	ms		126	?	**170 ± *30.0***	**3.5 +**	**136 ± *13.5***	? -	**136 ±*0.0***	
120-Pd	492 ± *33.0*	ms	0+	492	0.0 +	500 ± *100.0*	0.0 +	500 ± *100.0*	0.0 +	500 ±*100.0*	0+
120-Ag	1.23 ± *0.04*	s	3(+#)	1.23	3.0 +	1.23 ± *0.04*	3.0 +	1.23 ± *0.04*	**3.0 -**	1.23 ±*0.04*	3(+)
120-Cd	50.80 ± *0.21*	s	0+	50.8	0.0 +	50.80 ± *0.21*	0.0 +	50.80 ± *0.21*	0.0 +	50.80 ±*0.21*	0+
120-In	3.08 ± *0.08*	s	1+	3.08	1.0 +	3.08 ± *0.08*	1.0 +	3.08 ± *0.08*	1.0 +	3.08 ±*0.08*	1+
120-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
120-Sb	15.89 ± *0.04*	m	1+	15.89	1.0 +	15.90 ± *0.1*	1.0 +	15.89 ± *0.04*	1.0 +	15.89 ±*0.04*	1+
120-Te	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
120-I	81.67 ± *0.18*	m	2-	81.67	2	81.60 ± *0.2*	2.0 -	81.60 ± *0.2*	2.0 -	81.60 ±*0.2*	2-
120-Xe	46.0 ± *0.6*	m	0+	46	0.0 +	**40 ± *1.0***	0.0 +	**40 ± *1.0***	0.0 +	**40 ± *1.0***	0+
120-Cs	60.4 ± *0.6*	s	2(-#)	60.4	2	61.2 ± *1.8*	**2.0 +**	61.3 ± *1.1*	**2.0 +**	61.3 ±*1.1*	**2(+)**
120-Ba	24 ± *2.0*	s	0+	24	0.0 +	24 ± *2.0*	0.0 +	24 ± *2.0*	0.0 +	24 ± *2.0*	0+
120-La	2.8 ± *0.2*	s		2.8	?	2.8 ± *0.2*	? -	2.8 ± *0.2*	? -	2.8 ± *0.2*	
120-Ce	250#	ms	0+	250	0.0 +	250 ± *150.0*	0.0 +	250 ± *25.0*	0.0 +		
121-Ru	60# ± *4E-4*	ms		60	?					**0.00039 ± *0.0***	
121-Rh	160 ± *60.0*	ms	7/2+#	160	3.5 +	**250 ± *50.0***	3.5 +	**151 ± *62.5***	**? -**	**151 ±*0.0***	
121-Pd	285 ± *24.0*	ms	3/2+#	285	1.5 +	**600 ± *100.0***	**2.5 +**	285 ± *24.0*	**? -**	285 ±*24.0*	
121-Ag	780 ± *20.0*	ms	7/2+#	780	3.5 +	780 ± *10.0*	3.5 +	780 ± *20.0*	3.5 +	780 ±*20.0*	(7/2+)
121-Cd	13.5 ± *0.3*	s	(3/2+)	13.5	1.5 +	13.5 ± *0.3*	1.5 +	13.5 ± *0.3*	1.5 +	13.5 ±*0.3*	(3/2+)
121-In	23.1 ± *0.6*	s	9/2+	23.1	4.5 +	23.1 ± *0.6*	4.5 +	23.1 ± *0.6*	4.5 +	23.1 ±*0.6*	9/2+
121-Sn	27.03 ± *0.04*	h	3/2+	27.03	1.5 +	27.03 ± *0.04*	1.5 +	27.03 ± *0.04*	1.5 +	27.03 ±*0.04*	3/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
121-Sb	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
121-Te	19.17 ± *0.04*	d	1/2+	19.17	0.5 +	19.16 ± *0.05*	0.5 +	19.17 ± *0.04*	0.5 +	19.17 ±*0.04*	1/2+
121-I	2.12 ± *0.01*	h	5/2+	2.12	2.5 +	2.12 ± *0.01*	2.5 +	2.12 ± *0.01*	2.5 +	2.12 ±*0.01*	5/2+
121-Xe	40.1 ± *2.0*	m	5/2(+)	40.1	2.5 +	40.1 ± *0.2*	2.5 +	40.1 ± *2.0*	2.5 +	40.1 ±*2.0*	5/2(+)
121-Cs	155 ± *4.0*	s	3/2(+)	155	1.5 +	155 ± *4.0*	1.5 +	155 ± *4.0*	1.5 +	155 ± *4.0*	3/2(+)
121-Ba	29.7 ± *1.5*	s	5/2(+)	29.7	2.5 +	29.7 ± *1.5*	2.5 +	29.7 ± *1.5*	2.5 +	29.7 ±*1.5*	5/2(+)
121-La	5.3 ± *0.2*	s	11/2-#	5.3	5.5	5.3 ± *0.2*	5.5 -	5.3 ± *0.2*	**? -**	5.3 ± *0.2*	
121-Ce	1.1 ± *0.1*	s	(5/2)(+#)	1.1	2.5 +	1.1 ± *0.1*	2.5 +	1.1 ± *0.1*	**? -**	1.1 ± *0.1*	**(5/2)**
121-Pr	12 ± *5.0*	ms	(3/2)	12	1.5 ?	**6.0E+2 ±*300.0***	**1.5 -**	**1.4E+3 ±*800.0***	**1.5 -**	**10 ± *0.0***	**(3/2)**
122-Ru	40# ± *4E-4*	ms	0+	40	0.0 +					**0.00039 ± *0.0***	0+
122-Rh	80# ± *3E-4*	ms		80	?	**50 ± *0.0***	? -	**1.1E+2 ± *0.0***	? -	**0.00030 ± *0.0***	
122-Pd	175 ± *16.0*	ms	0+	175	0.0 +	**300 ± *0.0***	0.0 +	175 ± *16.0*	0.0 +	175 ±*16.0*	0+
122-Ag	529 ± *13.0*	ms	(3+)	529	3.0 +	**480 ± *80.0***	3.0 +	529 ± *13.0*	3.0 +	529 ±*13.0*	(3+)
122-Cd	5.24 ± *0.03*	s	0+	5.24	0.0 +	5.24 ± *0.03*	0.0 +	5.24 ± *0.03*	0.0 +	5.24 ±*0.03*	0+
122-In	1.5 ± *0.3*	s	1+	1.5	1.0 +	1.5 ± *0.3*	1.0 +	1.5 ± *0.3*	1.0 +	1.5 ± *0.3*	1+
122-Sn	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
122-Sb	2.7238 ± *2E-4*	d	2-	2.7234	2	2.7000 ± *0.01*	2.0 -	2.7238 ±*2.0E-4*	2.0 -	2.7238 ±*2.0E-4*	2-
122-Te	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
122-I	3.63 ± *0.06*	m	1+	3.63	1.0 +	3.63 ± *0.06*	1.0 +	3.63 ± *0.06*	1.0 +	3.63 ±*0.06*	1+
122-Xe	20.1 ± *0.1*	h	0+	20.1	0.0 +	20.1 ± *0.1*	0.0 +	20.1 ± *0.1*	0.0 +	20.1 ±*0.1*	0+
122-Cs	21.18 ± *0.19*	s	1+	21.18	1.0 +	21.20 ± *0.2*	1.0 +	21.18 ± *0.19*	1.0 +	21.18 ±*0.19*	1+
122-Ba	1.95 ± *0.15*	m	0+	1.95	0.0 +	1.95 ± *0.15*	0.0 +	1.95 ± *0.15*	0.0 +	1.95 ±*0.15*	0+
122-La	8.6 ± *0.5*	s		8.6	?	8.7 ± *0.7*	? -	8.6 ± *0.5*	? -	8.6 ± *0.5*	
122-Ce	2#	s	0+	2	0.0 +	2 ± *0.0*	0.0 +	**3 ± *0.0***	0.0 +		0+
122-Pr	500#	ms		500	?	500 ± *0.0*	? -	500 ± *50.0*	? -		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
123-Ru	20# ± *4E-4*	ms		20	?					**0.00039 ± *0.0***	
123-Rh	60# ± *4E-4*	ms	7/2+#	60	3.5 +			**49 ± *0.0***	**? -**	**0.00040 ± *0.0***	
123-Pd	180 ± *40.0*	ms	3/2+#	180	1.5 +	**200 ± *0.0***	**? -**	**244 ± *0.0***	**? -**	**0.000150 ± *0.0***	
123-Ag	300 ± *5.0*	ms	7/2+#	300	3.5 +	**310 ± *10.0***	3.5 +	300 ± *5.0*	**? -**	300 ± *5.0*	(7/2+)
123-Cd	2.10 ± *0.02*	s	(3/2+)	2.1	1.5 +	2.10 ± *0.02*	1.5 +	2.10 ± *0.02*	1.5 +	2.10 ±*0.02*	(3/2+)
123-In	6.17 ± *0.05*	s	(9/2)+	6.17	4.5 +	**5.98 ± *0.06***	4.5 +	6.17 ± *0.05*	4.5 +	6.17 ±*0.05*	(9/2)+
123-Sn	129.2 ± *0.4*	d	11/2-	129.2	5.5	129.2 ± *0.4*	5.5 -	129.2 ± *0.4*	5.5 -	129.2 ±*0.4*	11/2-
123-Sb	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
123-Te	stable ± *6E22*		1/2+		0.5 +	**3E+24 ± *0.0***	0.5 +	**0 ± *0.0***	0.5 +	**3E+24 ±*0.0***	1/2+
123-I	13.2235 ± *0.0019*	h	5/2+	13.2222	2.5 +	13.2234 ±*0.0037*	2.5 +	13.2234 ±*0.0019*	2.5 +	13.2235 ± *0.0019*	5/2+
123-Xe	2.08 ± *0.02*	h	1/2+	2.08	0.5 +	2.08 ± *0.02*	0.5 +	2.08 ± *0.02*	0.5 +	2.08 ±*0.02*	(1/2)+
123-Cs	5.88 ± *0.03*	m	1/2+	5.88	0.5 +	5.91 ± *0.05*	0.5 +	5.88 ± *0.03*	0.5 +	5.88 ±*0.03*	1/2+
123-Ba	2.7 ± *0.4*	m	5/2+	2.7	2.5 +	2.7 ± *0.4*	2.5 +	2.7 ± *0.4*	2.5 +	2.7 ± *0.4*	5/2(+)
123-La	17 ± *3.0*	s	11/2-#	17	5.5	17 ± *3.0*	5.5 -	17 ± *3.0*	**? -**	17 ± *3.0*	
123-Ce	3.8 ± *0.2*	s	(5/2)(+#)	3.8	2.5 +	3.8 ± *0.2*	2.5 +	3.8 ± *0.2*	**2.5 -**	3.8 ± *0.2*	**(5/2)**
123-Pr	800#	ms	3/2+#	800	1.5 +	800 ± *0.0*	1.5 +	800 ± *80.0*	**? -**		
124-Ru	10# ± *4E-4*	ms	0+	10	0.0 +					**0.00040 ± *0.0***	0+
124-Rh	40# ± *4E-4*	ms		40	?					**0.00039 ± *0.0***	
124-Pd	50 ± *30.0*	ms	0+	50	0.0 +	**1.0E+2 ± *0.0***	0.0 +	**38 ± *29.0***	0.0 +	**38 ± *0.0***	
124-Ag	172 ± *5.0*	ms	3+#	172	3.0 +	172 ± *5.0*	3.0 +	172 ± *5.0*	**? -**	172 ± *5.0*	**|>2**
124-Cd	1.25 ± *0.02*	s	0+	1.25	0.0 +	1.25 ± *0.02*	0.0 +	1.25 ± *0.02*	0.0 +	1.25 ±*0.02*	0+
124-In	3.12 ± *0.09*	s	(1)+	3.12	1.0 +	3.11 ± *0.1*	**3.0 +**	3.12 ± *0.1*	1.0 +	3.12 ±*0.09*	(1)+
124-Sn	stable ± *3E24*		0+	stable	0.0 +	**3E+24 ± *0.0***	0.0 +	stable	0.0 +		0+
124-Sb	60.20 ± *0.03*	d	3-	60.2	3	60.20 ± *0.03*	3.0 -	60.20 ± *0.03*	3.0 -	60.20 ±*0.03*	3-
124-Te	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
124-I	4.1760 ± *3E-4*	d	2-	4.1759	2	4.1760 ±*3.0E-4*	2.0 -	4.1760 ±*3.0E-4*	2.0 -	4.1760 ±*3.0E-4*	2-
124-Xe	stable ± *6E21*		0+	0	0.0 +	**6E+21 ± *0.0***	0.0 +	stable	0.0 +	**5E+21 ±*0.0***	0+
124-Cs	30.9 ± *0.4*	s	1+	30.9	1.0 +	30.9 ± *0.4*	1.0 +	30.8 ± *0.5*	1.0 +	30.9 ±*0.4*	1+
124-Ba	11.0 ± *0.5*	m	0+	11	0.0 +	11 ± *0.5*	0.0 +	11 ± *0.5*	0.0 +	11 ± *0.5*	0+
124-La	29.21 ± *0.17*	s	(7-;8-)	29.21	**?**	29.21 ± *0.17*	**? -**	29.21 ± *0.17*	8.0 -	**21 ± *4.0***	
124-Ce	9.1 ± *1.2*	s	0+	9.1	0.0 +	9.1 ± *1.2*	0.0 +	**6 ± *2.0***	0.0 +	**6 ± *2.0***	0+
124-Pr	1.2 ± *0.2*	s		1.2	?	1.2 ± *0.2*	? -	1.2 ± *0.2*	? -	1.2 ± *0.2*	
124-Nd	500#	ms	0+	500	0.0 +	500 ± *0.0*	0.0 +	500 ± *50.0*	0.0 +		
125-Rh	20# ± *4E-4*	ms	7/2+#	20	3.5 +					**0.00039 ± *0.0***	
125-Pd	80# ± *4E-4*	ms	3/2+#	80	1.5 +			**4.0E+2 ± *0.0***	**? -**	**0.00023 ± *0.0***	
125-Ag	166 ± *7.0*	ms	7/2+#	166	3.5 +	166 ± *7.0*	3.5 +	166 ± *7.0*	**4.5 -**	166 ± *7.0*	(9/2+)
125-Cd	680 ± *40.0*	ms	3/2+#	680	1.5 +	**650 ± *20.0***	1.5 +	680 ± *40.0*	1.5 +	680 ±*40.0*	(3/2+)
125-In	2.36 ± *0.04*	s	9/2+	2.36	4.5 +	2.36 ± *0.04*	4.5 +	2.36 ± *0.04*	4.5 +	2.36 ±*0.04*	9/2+
125-Sn	9.64 ± *0.03*	d	11/2-	9.64	5.5	9.64 ± *0.03*	5.5 -	9.64 ± *0.03*	5.5 -	9.64 ±*0.03*	11/2-
125-Sb	2.7586 ± *3E-4*	y	7/2+	2.7585	3.5 +	2.7586 ±*2.5E-4*	3.5 +	2.7586 ±*2.5001E-4*	3.5 +	2.7586 ±*2.5E-4*	7/2+
125-Te	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
125-I	59.407 ± *0.01*	d	5/2+	59.41	2.5 +	59.407 ±*0.0090*	2.5 +	59.400 ± *0.01*	2.5 +	59.407 ±*0.01*	5/2+
125-Xe	16.9 ± *0.2*	h	1/2(+)	16.9	0.5 +	16.9 ± *0.2*	0.5 +	16.9 ± *0.2*	0.5 +	16.9 ±*0.2*	1/2(+)
125-Cs	46.7 ± *0.1*	m	1/2(+)	46.7	0.5 +	46.7 ± *0.1*	0.5 +	46.7 ± *0.1*	0.5 +	46.7 ±*0.1*	1/2(+)
125-Ba	3.3 ± *0.3*	m	1/2(+#)	3.3	0.5 +	**3.5 ± *0.4***	0.5 +	**3.5 ± *0.4***	0.5 +	3.3 ± *0.3*	1/2(+)
125-La	64.8 ± *1.2*	s	11/2-#	64.8	5.5	64.8 ± *1.2*	5.5 -	64.8 ± *1.2*	**? -**	64.8 ±*1.2*	**(3/2+)**
125-Ce	9.7 ± *0.3*	s	(7/2-)	9.7	3.5	**9.3 ± *0.3***	3.5 -	**10 ± *0.4***	**2.5 +**	9.7 ± *0.3*	(7/2-)
125-Pr	3.3 ± *0.7*	s	3/2+#	3.3	1.5 +	3.3 ± *0.7*	1.5 +	3.3 ± *0.7*	**? -**	3.3 ± *0.7*	
125-Nd	650 ± *150.0*	ms	(5/2)(+#)	650	2.5 +	**600 ± *150.0***	2.5 +	**600 ± *150.0***	**2.5 -**	650 ±*150.0*	**(5/2)**
126-Rh	10# ± *4E-4*	ms		10	?					**0.00040 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
126-Pd	60# ± *4E-4*	ms	0+	60	0.0 +			**2.5E+2 ± *0.0***	0.0 +	**0.00023 ± *0.0***	0+
126-Ag	55 ± *10.0*	ms	2+#	55	2.0 +	**1.1E+2 ±*12.0***	**3.0 +**	**1.1E+2 ±*12.0***	**? -**	**1.1E+2 ± *12.0***	
126-Cd	515 ± *17.0*	ms	0+	515	0.0 +	515 ± *17.0*	0.0 +	515 ± *17.0*	0.0 +	515 ±*17.0*	0+
126-In	1.53 ± *0.01*	s	3(+#)	1.53	3.0 +	1.53 ± *0.01*	3.0 +	1.53 ± *0.01*	3.0 +	1.53 ±*0.01*	3(+)
126-Sn	230 ± *14.0*	ky	0+	230	0.0 +	230 ± *14.0*	0.0 +	230 ± *14.0*	0.0 +	230 ±*14.0*	0+
126-Sb	12.35 ± *0.06*	d	(8-)	12.35	8	12.40 ± *0.1*	8.0 -	12.35 ± *0.06*	8.0 -	12.35 ±*0.06*	(8-)
126-Te	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
126-I	12.93 ± *0.05*	d	2-	12.93	2	12.98 ± *0.05*	2.0 -	12.93 ± *0.05*	2.0 -	12.93 ±*0.05*	2-
126-Xe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
126-Cs	1.64 ± *0.02*	m	1+	1.64	1.0 +	1.64 ± *0.02*	1.0 +	1.64 ± *0.02*	1.0 +	1.64 ±*0.02*	1+
126-Ba	100 ± *2.0*	m	0+	100	0.0 +	100 ± *2.0*	0.0 +	100 ± *2.0*	0.0 +	100 ± *2.0*	0+
126-La	54 ± *2.0*	s	(5)(+#)	54	5.0 +	54 ± *2.0*	5.0 +	54 ± *2.0*	5.0 +	54 ± *2.0*	(5+)
126-Ce	51.0 ± *0.3*	s	0+	51	0.0 +	51 ± *0.3*	0.0 +	51 ± *0.3*	0.0 +	51 ± *0.3*	0+
126-Pr	3.12 ± *0.18*	s	(4;5;6)	3.12	**?**	3.12 ± *0.18*	**? -**	3.14 ± *0.22*	**? -**	3.14 ±*0.22*	**GE 4**
126-Nd	1# ± *2E-7*	s	0+	1	0.0 +	1 ± *0.0*	0.0 +	**2E-7 ± *0.0***	0.0 +		0+
126-Pm	500#	ms		500	?	500 ± *0.0*	? -	500 ± *50.0*	? -		
127-Pd	40# ± *4E-4*	ms	3/2+#	40	1.5 +					**0.00039 ± *0.0***	
127-Ag	79 ± *3.0*	ms	7/2+#	79	3.5 +	79 ± *3.0*	3.5 +	**1.1E+2 ±*25.0***	**? -**	**1.1E+2 ± *25.0***	
127-Cd	370 ± *70.0*	ms	3/2+#	370	1.5 +	370 ± *70.0*	1.5 +	370 ± *70.0*	**1.5 -**	370 ±*70.0*	(3/2+)
127-In	1.09 ± *0.01*	s	9/2(+)	1.09	4.5 +	1.09 ± *0.01*	4.5 +	1.09 ± *0.01*	4.5 +	1.09 ±*0.01*	(9/2+)
127-Sn	2.10 ± *0.04*	h	11/2-	2.1	5.5	2.10 ± *0.04*	5.5 -	2.10 ± *0.04*	5.5 -	2.10 ±*0.04*	11/2-
127-Sb	3.85 ± *0.05*	d	7/2+	3.85	3.5 +	3.85 ± *0.05*	3.5 +	3.85 ± *0.05*	3.5 +	3.85 ±*0.05*	7/2+
127-Te	9.35 ± *0.07*	h	3/2+	9.35	1.5 +	9.35 ± *0.06*	1.5 +	9.35 ± *0.07*	1.5 +	9.35 ±*0.07*	3/2+
127-I	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
127-Xe	36.346 ± *0.0030*	d	1/2+	36.343	0.5 +	36.400 ± *0.1*	0.5 +	36.400 ± *0.1*	0.5 +	36.346 ±*0.0030*	1/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
127-Cs	6.25 ± *0.1*	h	1/2+	6.25	0.5 +	6.25 ± *0.1*	0.5 +	6.25 ± *0.1*	0.5 +	6.25 ±*0.1*	1/2+
127-Ba	12.7 ± *0.4*	m	1/2+	12.7	0.5 +	12.7 ± *0.4*	0.5 +	12.7 ± *0.4*	0.5 +	12.7 ±*0.4*	1/2+
127-La	5.1 ± *0.1*	m	(11/2-)	5.1	5.5	5.1 ± *0.1*	5.5 -	5.1 ± *0.1*	5.5 -	5.1 ± *0.1*	(11/2-)
127-Ce	34 ± *2.0*	s	(1/2+)	34	0.5 +	**29 ± *2.0***	**2.5 +**	**31 ± *2.0***	**2.5 +**	34 ± *2.0*	(1/2+)
127-Pr	4.2 ± *0.3*	s	3/2+#	4.2	1.5 +	4.2 ± *0.3*	1.5 +	4.2 ± *0.3*	**? -**	4.2 ± *0.3*	
127-Nd	1.8 ± *0.4*	s	5/2+#	1.8	2.5 +	1.8 ± *0.4*	2.5 +	1.8 ± *0.4*	**? -**	1.8 ± *0.4*	
127-Pm	1#	s	5/2+#	1	2.5 +	1 ± *0.0*	2.5 +	1 ± *0.1*	**? -**		
128-Pd	20# ± *4E-4*	ms	0+	20	0.0 +					**0.00039 ± *0.0***	0+
128-Ag	58 ± *5.0*	ms		58	?	58 ± *5.0*	? -	58 ± *5.0*	? -	58 ± *5.0*	
128-Cd	280 ± *40.0*	ms	0+	280	0.0 +	280 ± *40.0*	0.0 +	280 ± *40.0*	0.0 +	280 ±*40.0*	0+
128-In	840 ± *60.0*	ms	(3)+	840	3.0 +	840 ± *60.0*	3.0 +	840 ± *60.0*	3.0 +	840 ±*60.0*	(3)+
128-Sn	59.07 ± *0.14*	m	0+	59.07	0.0 +	59.07 ± *0.14*	0.0 +	59.07 ± *0.14*	0.0 +	59.07 ±*0.14*	0+
128-Sb	9.01 ± *0.04*	h	8-	9.01	8	9.01 ± *0.03*	8.0 -	9.01 ± *0.03*	8.0 -	9.01 ±*0.04*	8-
128-Te	2.2 ± *0.3*	Yy	0+	2.2	0.0 +	2.2 ± *0.3*	0.0 +	**0.0000088 ±*4.0E-7***	0.0 +	**7.7 ±*0.4***	0+
128-I	24.99 ± *0.02*	m	1+	24.98	1.0 +	24.99 ± *0.02*	1.0 +	24.99 ± *0.02*	1.0 +	24.99 ±*0.02*	1+
128-Xe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
128-Cs	3.640 ± *0.014*	m	1+	3.64	1.0 +	3.620 ± *0.02*	1.0 +	3.620 ± *0.02*	1.0 +	3.660 ±*0.02*	1+
128-Ba	2.43 ± *0.05*	d	0+	2.43	0.0 +	2.43 ± *0.05*	0.0 +	2.43 ± *0.05*	0.0 +	2.43 ±*0.05*	0+
128-La	5.18 ± *0.14*	m	(5+)	5.18	5.0 +	5.18 ± *0.14*	5.0 +	5.18 ± *0.14*	5.0 +	5.18 ±*0.14*	(5+)
128-Ce	3.93 ± *0.02*	m	0+	3.93	0.0 +	3.93 ± *0.02*	0.0 +	3.93 ± *0.02*	0.0 +	3.93 ±*0.02*	0+
128-Pr	2.84 ± *0.09*	s	(3+)	2.84	3.0 +	2.85 ± *0.09*	**4.0 -**	2.85 ± *0.09*	**4.0 -**	2.84 ±*0.09*	**4,5,6**
128-Nd	5#	s	0+	5	0.0 +	5 ± *0.0*	0.0 +	5 ± *0.0*	0.0 +	5 ± *0.0*	0+
128-Pm	1.0 ± *0.3*	s	(5;6;7)(+#)	1	**?**	1 ± *0.3*	**6.0 +**	1 ± *0.3*	**? -**	1 ± *0.3*	
128-Sm	500#	ms	0+	500	0.0 +	500 ± *0.0*	0.0 +	500 ± *0.0*	0.0 +		
129-Ag	44 ± *7.0*	ms	7/2+#	44	3.5 +	44 ± *7.0*	3.5 +	**46 ± *7.0***	**4.5 -**	**46 ± *0.0***	(9/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
129-Cd	242 ± *8.0*	ms	3/2+	242	1.5 +	242 ± *8.0*	1.5 +	**270 ± *40.0***	**1.5 -**	**270 ±*40.0***	(3/2+)
129-In	611 ± *4.0*	ms	(9/2+)	611	4.5 +	610 ± *10.0*	4.5 +	610 ± *10.0*	4.5 +	610 ±*10.0*	(9/2+)
129-Sn	2.23 ± *0.04*	m	3/2+	2.23	1.5 +	2.23 ± *0.03*	1.5 +	2.23 ± *0.04*	1.5 +	2.23 ±*0.04*	(3/2+)
129-Sb	4.40 ± *0.01*	h	7/2+	4.4	3.5 +	4.36 ± *0.03*	3.5 +	4.40 ± *0.01*	3.5 +	4.40 ±*0.01*	7/2+
129-Te	69.6 ± *0.3*	m	3/2+	69.6	1.5 +	69.6 ± *0.2*	1.5 +	69.6 ± *0.2*	1.5 +	69.6 ±*0.3*	3/2+
129-I	15.7 ± *0.4*	My	7/2+	15.7	3.5 +	**16.1 ± *0.7***	3.5 +	15.7 ± *0.4*	3.5 +	15.7 ±*0.4*	7/2+
129-Xe	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
129-Cs	32.06 ± *0.06*	h	1/2+	32.06	0.5 +	32.20 ± *0.2*	0.5 +	32.06 ± *0.06*	0.5 +	32.06 ±*0.06*	1/2+
129-Ba	2.23 ± *0.11*	h	1/2+	2.23	0.5 +	**2.38 ± *0.11***	0.5 +	2.23 ± *0.11*	0.5 +	2.23 ±*0.11*	1/2+
129-La	11.6 ± *0.2*	m	3/2+	11.6	1.5 +	11.6 ± *0.2*	1.5 +	11.6 ± *0.2*	1.5 +	11.6 ±*0.2*	3/2+
129-Ce	3.5 ± *0.3*	m	(5/2+)	3.5	2.5 +	3.5 ± *0.5*	2.5 +	3.5 ± *0.5*	2.5 +	3.5 ± *0.5*	5/2+
129-Pr	30 ± *4.0*	s	(3/2+)	30	1.5 +	30 ± *4.0*	1.5 +	**32 ± *3.0***	**5.5 -**	30 ± *4.0*	**(11/2-)**
129-Nd	6.8 ± *0.6*	s	5/2+#	6.8	2.5 +	**4.9 ± *0.2***	2.5 +	**4.9 ± *0.2***	2.5 +	**4.9 ±*0.2***	(5/2+)
129-Pm	2.4 ± *0.9*	s	(5/2-)	2.4	2.5	**3 ± *0.0***	**2.5 +**	2.4 ± *0.9*	2.5 -	2.4 ± *0.9*	(5/2-)
129-Sm	550 ± *100.0*	ms	(3/2+;1/2+)	550	**?**	550 ± *100.0*	**2.5 +**	550 ± *100.0*	**? -**	550 ±*100.0*	(1/2+,3/2+)
130-Ag	35 ± *10.0*	ms	0+	35	0.0 +	**50 ± *0.0***	**? -**	**50 ± *5.0***	**? -**	**50 ± *0.0***	
130-Cd	162 ± *7.0*	ms	0+	162	0.0 +	162 ± *7.0*	0.0 +	162 ± *7.0*	0.0 +	162 ± *7.0*	0+
130-In	290 ± *20.0*	ms	1(-)	290	1	290 ± *20.0*	1.0 -	290 ± *20.0*	1.0 -	290 ±*20.0*	1(-)
130-Sn	3.72 ± *0.07*	m	0+	3.72	0.0 +	3.73 ± *0.07*	0.0 +	3.72 ± *0.07*	0.0 +	3.72 ±*0.07*	0+
130-Sb	39.5 ± *0.8*	m	(8-)	39.5	8	39.5 ± *0.8*	8.0 -	39.5 ± *0.8*	8.0 -	39.5 ±*0.8*	(8-)
130-Te	790 ± *100.0*	Ey	0+	790	0.0 +	**7.90E+5 ±*100000.0***	0.0 +	**0 ± *0.0***	0.0 +	790 ± *0.0*	0+
130-I	12.36 ± *0.01*	h	5+	12.36	5.0 +	12.36 ± *0.01*	5.0 +	12.36 ± *0.01*	5.0 +	12.36 ±*0.01*	5+
130-Xe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
130-Cs	29.21 ± *0.04*	m	1+	29.22	1.0 +	29.21 ± *0.04*	1.0 +	29.21 ± *0.04*	1.0 +	29.21 ±*0.04*	1+
130-Ba	stable ± *1E29*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
130-La	8.7 ± *0.1*	m	3(+)	8.7	3.0 +	8.7 ± *0.1*	3.0 +	8.7 ± *0.1*	3.0 +	8.7 ± *0.1*	3(+)
130-Ce	22.9 ± *0.5*	m	0+	22.9	0.0 +	22.9 ± *0.5*	0.0 +	22.9 ± *0.5*	0.0 +	22.9 ±*0.5*	0+
130-Pr	40.0 ± *0.4*	s	(6;7)(+#)	40	**?**	40 ± *0.4*	**? -**	40 ± *4.0*	**? -**	40 ± *0.4*	(5+)
130-Nd	21 ± *3.0*	s	0+	21	0.0 +	21 ± *3.0*	0.0 +	21 ± *3.0*	0.0 +	**13 ± *3.0***	0+
130-Pm	2.6 ± *0.2*	s	(5+;6+;4+)	2.6	**?**	2.6 ± *0.2*	**? -**	2.6 ± *0.2*	**? -**	2.6 ± *0.2*	**(4,5,6)**
130-Sm	1#	s	0+	1	0.0 +	1 ± *0.0*	0.0 +	1 ± *0.1*	0.0 +		0+
130-Eu	1.0 ± *0.4*	ms	(1+)	1	1.0 +	**1.1 ± *0.5***	**2.0 +**	1 ± *0.39*	1.0 +	**0.90 ±*0.0***	(1+)
131-Cd	68 ± *3.0*	ms	7/2-#	68	3.5	68 ± *3.0*	3.5 -	68 ± *3.0*	**3.5 -**	68 ± *3.0*	(7/2-)
131-In	280 ± *30.0*	ms	(9/2+)	280	4.5 +	280 ± *30.0*	4.5 +	280 ± *30.0*	**4.5 -**	280 ±*30.0*	(9/2+)
131-Sn	56.0 ± *0.5*	s	3/2+	56	1.5 +	56 ± *0.5*	1.5 +	56 ± *0.5*	**1.5 -**	56 ± *0.5*	(3/2+)
131-Sb	23.03 ± *0.04*	m	(7/2+)	23.03	3.5 +	23.03 ± *0.04*	3.5 +	23.03 ± *0.04*	3.5 +	23.03 ±*0.04*	(7/2+)
131-Te	25.0 ± *0.1*	m	3/2+	25	1.5 +	25 ± *0.1*	1.5 +	25 ± *0.1*	1.5 +	25 ± *0.1*	3/2+
131-I	8.0252 ± *6E-4*	d	7/2+	8.0255	3.5 +	8.0233 ±*0.0019*	3.5 +	8.0252 ±*6.0E-4*	3.5 +	8.0252 ±*6.0E-4*	7/2+
131-Xe	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
131-Cs	9.689 ± *0.016*	d	5/2+	9.689	2.5 +	9.690 ± *0.02*	2.5 +	9.689 ± *0.016*	2.5 +	9.689 ±*0.016*	5/2+
131-Ba	11.52 ± *0.01*	d	1/2+	11.52	0.5 +	11.55 ± *0.05*	0.5 +	11.5 ± *0.06*	0.5 +	11.5 ±*0.06*	1/2+
131-La	59 ± *2.0*	m	3/2+	59	1.5 +	59 ± *2.0*	1.5 +	59 ± *2.0*	1.5 +	59 ± *2.0*	3/2+
131-Ce	10.3 ± *0.3*	m	7/2+	10.3	3.5 +	10.2 ± *0.3*	3.5 +	10.3 ± *0.3*	3.5 +	10.3 ±*0.3*	7/2+
131-Pr	1.50 ± *0.03*	m	3/2+#	1.5	1.5 +	1.5 ± *0.03*	1.5 +	1.51 ± *0.02*	1.5 +	1.51 ±*0.02*	(3/2+)
131-Nd	25.4 ± *0.9*	s	(5/2)(+#)	25.4	2.5 +	**33 ± *3.0***	2.5 +	**26 ± *1.1***	2.5 +	25.4 ±*0.9*	(5/2+)
131-Pm	6.3 ± *0.8*	s	(11/2-)	6.3	5.5	6.3 ± *0.8*	**2.5 +**	6.3 ± *0.8*	5.5 -	6.3 ± *0.8*	(11/2-)
131-Sm	1.2 ± *0.2*	s	5/2+#	1.2	2.5 +	1.2 ± *0.2*	2.5 +	1.2 ± *0.2*	**? -**	1.2 ± *0.2*	
131-Eu	17.8 ± *1.9*	ms	3/2+	17.8	1.5 +	17.8 ± *1.9*	1.5 +	17.8 ± *1.9*	1.5 +	17.8 ±*1.9*	3/2+
132-Cd	97 ± *10.0*	ms	0+	97	0.0 +	97 ± *10.0*	0.0 +	97 ± *10.0*	0.0 +	97 ± *10.0*	0+
132-In	207 ± *4.0*	ms	(7-)	207	7	**201 ± *13.0***	7.0 -	207 ± *6.0*	7.0 -	207 ± *6.0*	(7-)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
132-Sn	39.7 ± *0.8*	s	0+	39.7	0.0 +	39.7 ± *0.5*	0.0 +	39.7 ± *0.8*	0.0 +	39.7 ±*0.8*	0+
132-Sb	2.79 ± *0.07*	m	(4)+	2.79	4.0 +	2.79 ± *0.05*	4.0 +	2.79 ± *0.07*	4.0 +	2.79 ±*0.07*	(4)+
132-Te	3.204 ± *0.013*	d	0+	3.204	0.0 +	3.204 ± *0.013*	0.0 +	3.204 ± *0.013*	0.0 +	3.204 ±*0.013*	0+
132-I	2.295 ± *0.013*	h	4+	2.295	4.0 +	2.295 ± *0.013*	4.0 +	2.295 ± *0.013*	4.0 +	2.295 ±*0.013*	4+
132-Xe	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
132-Cs	6.480 ± *0.0060*	d	2+	6.48	2.0 +	6.530 ± *0.02*	2.0 +	6.480 ±*0.0060*	2.0 +	6.480 ±*0.0060*	2+
132-Ba	stable ± *9E27*		0+		0.0 +	stable	0.0 +	stable	0.0 +	**9E+28 ±*0.0***	0+
132-La	4.8 ± *0.2*	h	2-	4.8	2	4.8 ± *0.2*	2.0 -	4.8 ± *0.2*	2.0 -	4.8 ± *0.2*	2-
132-Ce	3.51 ± *0.11*	h	0+	3.51	0.0 +	3.51 ± *0.11*	0.0 +	3.51 ± *0.11*	0.0 +	3.51 ±*0.11*	0+
132-Pr	1.49 ± *0.11*	m	(2+)	1.49	2.0 +	1.49 ± *0.11*	2.0 +	**1.60 ± *0.3***	2.0 +	**1.60 ±*0.3***	(2)+
132-Nd	1.56 ± *0.1*	m	0+	1.56	0.0 +	**1.47 ± *0.117***	0.0 +	1.57 ± *0.133*	0.0 +	1.57 ±*0.133*	0+
132-Pm	6.2 ± *0.6*	s	(3+)	6.2	3.0 +	6.3 ± *0.7*	3.0 +	6.2 ± *0.6*	3.0 +	6.2 ± *0.6*	(3+)
132-Sm	4.0 ± *0.3*	s	0+	4	0.0 +	4 ± *0.3*	0.0 +	4 ± *0.3*	0.0 +	4 ± *0.3*	0+
132-Eu	100#	ms		100	?	100 ± *0.0*	? -	100 ± *10.0*	? -		
133-Cd	57 ± *10.0*	ms	7/2-#	57	3.5					57 ± *10.0*	(7/2-)
133-In	165 ± *3.0*	ms	(9/2+)	165	4.5 +	165 ± *3.0*	4.5 +	165 ± *3.0*	**4.5 -**	165 ± *3.0*	(9/2+)
133-Sn	1.46 ± *0.03*	s	(7/2-)	1.46	3.5	1.45 ± *0.03*	3.5 -	1.46 ± *0.03*	3.5 -	1.46 ±*0.03*	7/2-
133-Sb	2.34 ± *0.05*	m	7/2+#	2.34	3.5 +	**2.5 ± *0.1***	3.5 +	**2.5 ± *0.1***	3.5 +	2.34 ±*0.05*	(7/2+)
133-Te	12.5 ± *0.3*	m	3/2+#	12.5	1.5 +	12.4 ± *0.3*	1.5 +	12.5 ± *0.3*	1.5 +	12.5 ±*0.3*	(3/2+)
133-I	20.83 ± *0.08*	h	7/2+	20.83	3.5 +	20.80 ± *0.1*	3.5 +	20.80 ± *0.1*	3.5 +	20.83 ±*0.08*	7/2+
133-Xe	5.2475 ± *5E-4*	d	3/2+	5.2477	1.5 +	5.2440 ±*0.0040*	1.5 +	5.2430 ±*0.0010*	1.5 +	5.2475 ±*5.0E-4*	3/2+
133-Cs	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
133-Ba	10.551 ± *0.011*	y	1/2+	10.552	0.5 +	10.540 ± *0.01*	0.5 +	10.516 ±*0.019165*	0.5 +	10.551 ±*0.011*	1/2+
133-La	3.912 ± *0.0080*	h	5/2+	3.911	2.5 +	3.912 ±*0.0080*	2.5 +	3.912 ±*0.0080*	2.5 +	3.912 ±*0.0080*	5/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
133-Ce	97 ± *4.0*	m	1/2+	97	0.5 +	97 ± *4.0*	0.5 +	97 ± *4.0*	0.5 +	97 ± *4.0*	1/2+
133-Pr	6.5 ± *0.3*	m	(3/2+)	6.5	1.5 +	6.5 ± *0.3*	1.5 +	6.5 ± *0.3*	1.5 +	6.5 ± *0.3*	(3/2+)
133-Nd	70 ± *10.0*	s	(7/2+)	70	3.5 +	70 ± *10.0*	3.5 +	70 ± *10.0*	3.5 +	70 ± *10.0*	(7/2+)
133-Pm	13.5 ± *2.1*	s	(3/2+)	13.5	1.5 +	**15 ± *3.0***	1.5 +	**15 ± *3.0***	**5.5 -**	13.5 ±*2.1*	(3/2+)
133-Sm	2.89 ± *0.16*	s	(5/2+)	2.89	2.5 +	2.90 ± *0.17*	2.5 +	**3.70 ± *0.7***	2.5 +	2.89 ±*0.16*	(5/2+)
133-Eu	200#	ms	11/2-#	200	5.5	200 ± *0.0*	5.5 -	**1.00E+3 ±*100.0***	**? -**		
133-Gd	10#	ms	5/2+#	10	2.5 +						
134-In	140 ± *4.0*	ms	high	140	?	140 ± *4.0*	? -	140 ± *4.0*	? -	140 ± *4.0*	(4- TO 7-)
134-Sn	1.050 ± *0.011*	s	0+	1.05	0.0 +	1.050 ± *0.011*	0.0 +	1.050 ± *0.011*	0.0 +	1.050 ±*0.011*	0+
134-Sb	780 ± *60.0*	ms	(0-)	780	0	780 ± *60.0*	0.0 -	780 ± *60.0*	0.0 -	780 ±*60.0*	(0-)
134-Te	41.8 ± *0.8*	m	0+	41.8	0.0 +	41.8 ± *0.8*	0.0 +	41.8 ± *0.8*	0.0 +	41.8 ±*0.8*	0+
134-I	52.5 ± *0.2*	m	(4)+	52.5	4.0 +	52.5 ± *0.2*	4.0 +	52.5 ± *0.2*	4.0 +	52.5 ±*0.2*	(4)+
134-Xe	stable ± *3E23*		0+	0	0.0 +	**3E+23 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +	**2E+30 ±*0.0***	0+
134-Cs	2.0652 ± *4E-4*	y	4+	2.0652	4.0 +	2.0651 ±*6.0E-4*	4.0 +	2.0652 ±*4.0001E-4*	4.0 +	2.0652 ±*4.0E-4*	4+
134-Ba	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
134-La	6.45 ± *0.16*	m	1+	6.45	1.0 +	6.45 ± *0.16*	1.0 +	6.45 ± *0.16*	1.0 +	6.45 ±*0.16*	1+
134-Ce	3.16 ± *0.04*	d	0+	3.16	0.0 +	3.16 ± *0.04*	0.0 +	3.16 ± *0.04*	0.0 +	3.16 ±*0.04*	0+
134-Pr	17 ± *2.0*	m	2-	17	2	17 ± *2.0*	2.0 -	17 ± *2.0*	2.0 -	17 ± *2.0*	2-
134-Nd	8.5 ± *1.5*	m	0+	8.5	0.0 +	8.5 ± *1.5*	0.0 +	8.5 ± *1.5*	0.0 +	8.5 ± *1.5*	0+
134-Pm	22 ± *1.0*	s	(5+)	22	5.0 +	**5 ± *0.0***	**2.0 +**	**5 ± *0.5***	**2.0 +**	**5 ± *0.0***	(2+)
134-Sm	9.5 ± *0.8*	s	0+	9.5	0.0 +	**10 ± *1.0***	0.0 +	9.5 ± *0.8*	0.0 +	9.5 ± *0.8*	0+
134-Eu	500 ± *200.0*	ms		500	?	500 ± *200.0*	? -	500 ± *200.0*	? -	500 ±*200.0*	
134-Gd	400#	ms	0+	400	0.0 +	400 ± *0.0*	0.0 +	400 ± *40.0*	0.0 +		0+
135-In	92 ± *10.0*	ms	9/2+#	92	4.5 +	92 ± *10.0*	4.5 +	92 ± *10.0*	**? -**	92 ± *10.0*	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
135-Sn	530 ± *20.0*	ms	7/2-#	530	3.5	530 ± *20.0*	3.5 -	530 ± *20.0*	**3.5 -**	530 ±*20.0*	(7/2-)
135-Sb	1.679 ± *0.015*	s	(7/2+)	1.679	3.5 +	**1.740 ± *0.03***	3.5 +	1.679 ± *0.015*	3.5 +	1.679 ±*0.015*	(7/2+)
135-Te	19.0 ± *0.2*	s	(7/2-)	19	3.5	19 ± *0.2*	3.5 -	19 ± *0.2*	3.5 -	19 ± *0.2*	(7/2-)
135-I	6.58 ± *0.03*	h	7/2+	6.58	3.5 +	6.57 ± *0.02*	3.5 +	6.57 ± *0.02*	3.5 +	6.58 ±*0.03*	7/2+
135-Xe	9.14 ± *0.02*	h	3/2+	9.14	1.5 +	9.14 ± *0.02*	1.5 +	9.14 ± *0.02*	1.5 +	9.14 ±*0.02*	3/2+
135-Cs	2.3 ± *0.3*	My	7/2+	2.3	3.5 +	2.3 ± *0.3*	3.5 +	2.3 ± *0.3*	3.5 +	2.3 ± *0.3*	7/2+
135-Ba	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
135-La	19.5 ± *0.2*	h	5/2+	19.5	2.5 +	19.5 ± *0.2*	2.5 +	19.5 ± *0.2*	2.5 +	19.5 ±*0.2*	5/2+
135-Ce	17.7 ± *0.3*	h	1/2(+)	17.7	0.5 +	17.7 ± *0.3*	0.5 +	17.7 ± *0.3*	0.5 +	17.7 ±*0.3*	1/2(+)
135-Pr	24 ± *1.0*	m	3/2(+)	24	1.5 +	24 ± *2.0*	1.5 +	24 ± *1.0*	1.5 +	24 ± *1.0*	3/2(+)
135-Nd	12.4 ± *0.6*	m	9/2(-)	12.4	4.5	12.4 ± *0.6*	4.5 -	12.4 ± *0.6*	4.5 -	12.4 ±*0.6*	9/2(-)
135-Pm	49 ± *3.0*	s	(5/2+;3/2+)	49	2.5 +	49 ± *3.0*	**? -**	49 ± *3.0*	**? -**	49 ± *3.0*	(3/2+,5/2+)
135-Sm	10.3 ± *0.5*	s	(7/2+)	10.3	3.5 +	10.3 ± *0.5*	3.5 +	10.3 ± *0.5*	**? -**	10.3 ±*0.5*	(3/2+,5/2+)
135-Eu	1.5 ± *0.2*	s	11/2-#	1.5	5.5	1.5 ± *0.2*	5.5 -	1.5 ± *0.2*	**? -**	1.5 ± *0.2*	
135-Gd	1.1 ± *0.2*	s	(5/2+)	1.1	2.5 +	1.1 ± *0.2*	**1.5 -**	1.1 ± *0.2*	2.5 +	1.1 ± *0.2*	(5/2+)
135-Tb	1.01 ± *0.28*	ms	(7/2-)	1.01	3.5			**995 ± *275.0***	**? -**	**0.940 ±*0.0***	(7/2-)
136-Sn	290 ± *13.0*	ms	0+	290	0.0 +	**250 ± *30.0***	0.0 +	**250 ± *30.0***	0.0 +	**250 ±*30.0***	0+
136-Sb	923 ± *14.0*	ms	1-#	923	1	923 ± *14.0*	1.0 -	923 ± *14.0*	**1.0 -**	923 ±*14.0*	1-
136-Te	17.63 ± *0.08*	s	0+	17.63	0.0 +	17.5 ± *0.2*	0.0 +	17.5 ± *0.2*	0.0 +	17.63 ±*0.08*	0+
136-I	83.4 ± *1.0*	s	(1-)	83.4	1	83.4 ± *1.0*	1.0 -	83.4 ± *1.0*	1.0 -	83.4 ±*1.0*	(1-)
136-Xe	stable ± *3E29*		0+		0.0 +	**7E+27 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +	**1E+28 ±*0.0***	0+
136-Cs	13.16 ± *0.03*	d	5+	13.16	5.0 +	13.03 ± *0.07*	5.0 +	13.16 ± *0.03*	5.0 +	13.16 ±*0.03*	5+
136-Ba	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
136-La	9.87 ± *0.03*	m	1+	9.87	1.0 +	9.87 ± *0.03*	1.0 +	9.87 ± *0.03*	1.0 +	9.87 ±*0.03*	1+
136-Ce	stable ± *1E24*		0+		0.0 +	**2E+21 ± *0.0***	0.0 +	stable	0.0 +	**2E+21 ±*0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
136-Pr	13.1 ± *0.1*	m	2+	13.1	2.0 +	13.1 ± *0.1*	2.0 +	13.1 ± *0.1*	2.0 +	13.1 ±*0.1*	2+
136-Nd	50.7 ± *0.3*	m	0+	50.7	0.0 +	50.6 ± *0.33*	0.0 +	50.6 ± *0.33*	0.0 +	50.6 ±*0.33*	0+
136-Pm	107 ± *6.0*	s	(5)(+#)	107	5.0 +	107 ± *6.0*	**5.0 -**	**47 ± *2.0***	**2.0 +**	**47 ± *2.0***	(2+)
136-Sm	47 ± *2.0*	s	0+	47	0.0 +	47 ± *2.0*	0.0 +	47 ± *2.0*	0.0 +	47 ± *2.0*	0+
136-Eu	3.3 ± *0.3*	s	(7+)	3.3	7.0 +	**3.8 ± *0.3***	**3.0 +**	**3.8 ± *0.3***	**3.0 +**	3.3 ± *0.3*	(7+)
136-Gd	1# ± *2E-7*	s	0+	1	0.0 +	1 ± *0.5*	0.0 +	**0.00002 ±*0.0***	0.0 +	**2E-7 ±*0.0***	(0+)
136-Tb	200#	ms		200	?	200 ± *0.0*	? -	200 ± *20.0*	? -		
137-Sn	273 ± *7.0*	ms	5/2-#	273	2.5	**190 ± *60.0***	2.5 -	**190 ± *60.0***	**? -**	**190 ±*60.0***	
137-Sb	484 ± *22.0*	ms	7/2+#	484	3.5 +	**450 ± *50.0***	3.5 +	**450 ± *50.0***	**3.5 -**	**450 ±*50.0***	(7/2+)
137-Te	2.49 ± *0.05*	s	3/2-#	2.49	1.5	2.49 ± *0.05*	1.5 -	2.49 ± *0.05*	**3.5 -**	2.49 ±*0.05*	(7/2-)
137-I	24.13 ± *0.12*	s	7/2+#	24.13	3.5 +	24.51 ± *0.06*	3.5 +	24.5 ± *0.2*	3.5 +	24.5 ±*0.2*	(7/2+)
137-Xe	3.818 ± *0.013*	m	7/2-	3.818	3.5	3.818 ± *0.013*	3.5 -	3.818 ± *0.013*	3.5 -	3.818 ±*0.013*	7/2-
137-Cs	30.08 ± *0.09*	y	7/2+	30.08	3.5 +	30.04 ± *0.03*	3.5 +	30.08 ± *0.09*	3.5 +	30.08 ±*0.09*	7/2+
137-Ba	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
137-La	60 ± *20.0*	ky	7/2+	60	3.5 +	60 ± *20.0*	3.5 +	60 ± *20.0*	3.5 +	60 ± *20.0*	7/2+
137-Ce	9.0 ± *0.3*	h	3/2+	9	1.5 +	9 ± *0.3*	1.5 +	9 ± *0.3*	1.5 +	9 ± *0.3*	3/2+
137-Pr	1.28 ± *0.03*	h	5/2+	1.28	2.5 +	1.28 ± *0.02*	2.5 +	1.28 ± *0.02*	2.5 +	1.28 ±*0.03*	5/2+
137-Nd	38.5 ± *1.5*	m	1/2+	38.5	0.5 +	38.5 ± *1.5*	0.5 +	38.5 ± *1.5*	0.5 +	38.5 ±*1.5*	1/2+
137-Pm	2#	m	5/2+#	2	2.5 +	2 ± *0.0*	2.5 +	2 ± *0.1*	**5.5 -**	2 ± *0.1*	**11/2-**
137-Sm	45 ± *1.0*	s	(9/2-)	45	4.5	45 ± *1.0*	4.5 -	45 ± *1.0*	4.5 -	45 ± *1.0*	(9/2-)
137-Eu	8.4 ± *0.5*	s	11/2-#	8.4	5.5	8.4 ± *0.5*	5.5 -	**11 ± *2.0***	5.5 -	**11 ± *2.0***	(11/2-)
137-Gd	2.2 ± *0.2*	s	(7/2)(+#)	2.2	3.5 +	2.2 ± *0.2*	3.5 +	2.2 ± *0.2*	**3.5 -**	2.2 ± *0.2*	**(7/2)**
137-Tb	600#	ms	11/2-#	600	5.5	600 ± *0.0*	5.5 -	600 ± *60.0*	**? -**		
138-Sn	100# ± *4E-4*	ms	0+	100	0.0 +					**0.000408 ± *0.0***	0+
138-Sb	350 ± *15.0*	ms	2-#	350	2	**500 ± *0.0***	2.0 -	**168 ± *0.0***	**? -**	**0.000300 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
138-Te	1.4 ± *0.4*	s	0+	1.4	0.0 +	1.4 ± *0.4*	0.0 +	1.4 ± *0.4*	0.0 +	1.4 ± *0.4*	0+
138-I	6.23 ± *0.03*	s	(1-)	6.23	1	**6.46 ± *0.06***	**2.0 -**	6.23 ± *0.03*	**2.0 -**	6.23 ±*0.03*	(2-)
138-Xe	14.08 ± *0.08*	m	0+	14.08	0.0 +	14.08 ± *0.08*	0.0 +	14.08 ± *0.08*	0.0 +	14.08 ±*0.08*	0+
138-Cs	33.41 ± *0.18*	m	3-	33.42	3	33.41 ± *0.18*	3.0 -	33.41 ± *0.18*	3.0 -	33.41 ±*0.18*	3-
138-Ba	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
138-La	102 ± *1.0*	Gy	5+	102	5.0 +	102 ± *1.0*	5.0 +	102 ± *1.0*	5.0 +	102 ± *1.0*	5+
138-Ce	stable ± *1E24*		0+		0.0 +	stable	0.0 +	stable	0.0 +	**3E+21 ±*0.0***	0+
138-Pr	1.45 ± *0.05*	m	1+	1.45	1.0 +	1.45 ± *0.05*	1.0 +	1.45 ± *0.05*	1.0 +	1.45 ±*0.05*	1+
138-Nd	5.04 ± *0.09*	h	0+	5.04	0.0 +	5.04 ± *0.09*	0.0 +	5.04 ± *0.09*	0.0 +	5.04 ±*0.09*	0+
138-Pm	10 ± *2.0*	s	1+#	10	1.0 +	10 ± *2.0*	1.0 +	10 ± *2.0*	**? -**	10 ± *2.0*	
138-Sm	3.1 ± *0.2*	m	0+	3.1	0.0 +	3.1 ± *0.2*	0.0 +	3.1 ± *0.2*	0.0 +	3.1 ± *0.2*	0+
138-Eu	12.1 ± *0.6*	s	(6-)	12.1	6	12.1 ± *0.6*	6.0 -	12.1 ± *0.6*	6.0 -	12.1 ±*0.6*	(6-)
138-Gd	4.7 ± *0.9*	s	0+	4.7	0.0 +	4.7 ± *0.9*	0.0 +	4.7 ± *0.9*	0.0 +	4.7 ± *0.9*	0+
138-Tb	800# ± *2E-4*	ms		800	?	800 ± *0.0*	? -	**0.000200 ±*0.0***	? -	**0.000200 ± *0.0***	
138-Dy	200#	ms	0+	200	0.0 +	200 ± *0.0*	0.0 +	200 ± *0.0*	0.0 +		
139-Sb	93 ± *13.0*	ms	7/2+#	93	3.5 +	**3.0E+2 ± *0.0***	3.5 +	**1.3E+2 ± *0.0***	**? -**	**0.00015 ± *0.0***	
139-Te	500# ± *1E-4*	ms	5/2-#	500	2.5	500 ± *0.0*	2.5 -	**347 ± *0.0***	**3.5 -**	**0.000150 ± *0.0***	(7/2-)
139-I	2.282 ± *0.01*	s	7/2+#	2.282	3.5 +	2.300 ± *0.03*	3.5 +	2.280 ± *0.011*	**3.5 -**	2.280 ±*0.011*	(7/2+)
139-Xe	39.68 ± *0.14*	s	3/2-	39.68	1.5	39.68 ± *0.14*	1.5 -	39.68 ± *0.14*	1.5 -	39.68 ±*0.14*	3/2-
139-Cs	9.27 ± *0.05*	m	7/2+	9.27	3.5 +	9.27 ± *0.05*	3.5 +	9.27 ± *0.05*	3.5 +	9.27 ±*0.05*	7/2+
139-Ba	83.25 ± *0.08*	m	(7/2-)	83.25	3.5	83.06 ± *0.28*	3.5 -	83.06 ± *0.28*	3.5 -	83.06 ±*0.28*	7/2-
139-La	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
139-Ce	137.641 ± *0.02*	d	3/2+	137.616	1.5 +	137.641 ±*0.02*	1.5 +	137.641 ±*0.02*	1.5 +	137.641 ± *0.02*	3/2+
139-Pr	4.41 ± *0.04*	h	5/2+	4.41	2.5 +	4.41 ± *0.04*	2.5 +	4.41 ± *0.04*	2.5 +	4.41 ±*0.04*	5/2+
139-Nd	29.7 ± *0.5*	m	3/2+	29.7	1.5 +	29.7 ± *0.5*	1.5 +	29.7 ± *0.5*	1.5 +	29.7 ±*0.5*	3/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
139-Pm	4.15 ± *0.05*	m	(5/2)+	4.15	2.5 +	4.15 ± *0.05*	2.5 +	4.15 ± *0.05*	2.5 +	4.15 ±*0.05*	(5/2)+
139-Sm	2.57 ± *0.1*	m	1/2+	2.57	0.5 +	2.57 ± *0.1*	0.5 +	2.57 ± *0.1*	0.5 +	2.57 ±*0.1*	1/2+
139-Eu	17.9 ± *0.6*	s	(11/2)-	17.9	5.5	17.9 ± *0.6*	5.5 -	17.9 ± *0.6*	5.5 -	17.9 ±*0.6*	(11/2)-
139-Gd	5.7 ± *0.3*	s	9/2-#	5.7	4.5	5.7 ± *0.4*	4.5 -	5.8 ± *0.9*	4.5 -	5.8 ± *0.9*	(9/2-)
139-Tb	1.6 ± *0.2*	s	11/2-#	1.6	5.5	1.6 ± *0.2*	5.5 -	1.6 ± *0.2*	**? -**	1.6 ± *0.2*	
139-Dy	600 ± *200.0*	ms	(7/2+)	600	3.5 +	600 ± *200.0*	3.5 +	600 ± *200.0*	3.5 +	600 ±*200.0*	(7/2+)
140-Sb	100# ± *4E-4*	ms	2-#	100	2					**0.000407 ± *0.0***	
140-Te	300# ± *3E-4*	ms	0+	300	0.0 +	300 ± *0.0*	0.0 +	304 ± *0.0*	0.0 +		0+
140-I	860 ± *40.0*	ms	(4-)	860	4	860 ± *40.0*	**3.0 -**	860 ± *40.0*	**4.0 -**	860 ±*40.0*	(4-)
140-Xe	13.60 ± *0.1*	s	0+	13.6	0.0 +	13.60 ± *0.1*	0.0 +	13.60 ± *0.1*	0.0 +	13.60 ±*0.1*	0+
140-Cs	63.7 ± *0.3*	s	1-	63.7	1	63.7 ± *0.3*	1.0 -	63.7 ± *0.3*	1.0 -	63.7 ±*0.3*	1-
140-Ba	12.7527 ± *0.0023*	d	0+	12.7546	0.0 +	12.7650 ±*0.015*	0.0 +	12.7527 ±*0.0023*	0.0 +	12.7527 ± *0.0023*	0+
140-La	40.285 ± *0.0030*	h	3-	40.278	3	40.285 ±*0.0050*	3.0 -	40.285 ±*0.00288*	3.0 -	40.285 ±*0.00288*	3-
140-Ce	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
140-Pr	3.39 ± *0.01*	m	1+	3.39	1.0 +	3.39 ± *0.01*	1.0 +	3.39 ± *0.01*	1.0 +	3.39 ±*0.01*	1+
140-Nd	3.37 ± *0.02*	d	0+	3.37	0.0 +	3.37 ± *0.02*	0.0 +	3.37 ± *0.02*	0.0 +	3.37 ±*0.02*	0+
140-Pm	9.2 ± *0.2*	s	1+	9.2	1.0 +	9.2 ± *0.2*	1.0 +	**3.6E+2 ± *3.0***	**8.0 -**	9.2 ± *0.2*	1+
140-Sm	14.82 ± *0.12*	m	0+	14.82	0.0 +	14.82 ± *0.12*	0.0 +	14.82 ± *0.12*	0.0 +	14.82 ±*0.12*	0+
140-Eu	1.51 ± *0.02*	s	1+	1.51	1.0 +	1.51 ± *0.02*	1.0 +	1.51 ± *0.02*	1.0 +	1.51 ±*0.02*	1+
140-Gd	15.8 ± *0.4*	s	0+	15.8	0.0 +	15.8 ± *0.4*	0.0 +	15.8 ± *0.4*	0.0 +	15.8 ±*0.4*	0+
140-Tb	2.32 ± *0.16*	s	(7+)	2.32	7.0 +	**2.40 ± *0.2***	**? -**	**2.40 ± *0.2***	7.0 +	**2.40 ±*0.2***	(7+)
140-Dy	700#	ms	0+	700	0.0 +	700 ± *400.0*	0.0 +	**840 ± *0.0***	0.0 +		0+
140-Ho	6 ± *3.0*	ms	8+#	6	8.0 +	6 ± *3.0*	8.0 +	6 ± *3.0*	**? -**	6 ± *3.0*	**(6-,0-,8+)**
141-Te	150# ± *1E-4*	ms	5/2-#	150	2.5	**100 ± *0.0***	2.5 -	**213 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
141-I	430 ± *20.0*	ms	7/2+#	430	3.5 +	430 ± *20.0*	3.5 +	430 ± *20.0*	**? -**	430 ±*20.0*	
141-Xe	1.73 ± *0.01*	s	5/2(-#)	1.73	2.5	1.73 ± *0.01*	2.5 -	1.73 ± *0.01*	2.5 -	1.73 ±*0.01*	5/2(-)
141-Cs	24.84 ± *0.16*	s	7/2+	24.84	3.5 +	24.84 ± *0.17*	3.5 +	24.84 ± *0.17*	3.5 +	24.84 ±*0.16*	7/2+
141-Ba	18.27 ± *0.07*	m	3/2-	18.27	1.5	18.27 ± *0.07*	1.5 -	18.27 ± *0.07*	1.5 -	18.27 ±*0.07*	3/2-
141-La	3.92 ± *0.03*	h	(7/2+)	3.92	3.5 +	3.92 ± *0.03*	3.5 +	3.92 ± *0.03*	3.5 +	3.92 ±*0.03*	(7/2+)
141-Ce	32.508 ± *0.013*	d	7/2-	32.512	3.5	32.5 ± *0.01*	3.5 -	32.508 ±*0.0010*	3.5 -	32.508 ±*0.013*	7/2-
141-Pr	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
141-Nd	2.49 ± *0.03*	h	3/2+	2.49	1.5 +	2.49 ± *0.03*	1.5 +	2.49 ± *0.03*	1.5 +	2.49 ±*0.03*	3/2+
141-Pm	20.90 ± *0.05*	m	5/2+	20.9	2.5 +	20.90 ± *0.05*	2.5 +	20.90 ± *0.05*	2.5 +	20.90 ±*0.05*	5/2+
141-Sm	10.2 ± *0.2*	m	1/2+	10.2	0.5 +	10.2 ± *0.2*	0.5 +	10.2 ± *0.2*	0.5 +	10.2 ±*0.2*	1/2+
141-Eu	40.7 ± *0.7*	s	5/2+	40.7	2.5 +	40.7 ± *0.7*	2.5 +	40.7 ± *0.7*	2.5 +	40.7 ±*0.7*	5/2+
141-Gd	14 ± *4.0*	s	(1/2+)	14	0.5 +	14 ± *4.0*	0.5 +	14 ± *4.0*	0.5 +	14 ± *4.0*	1/2+
141-Tb	3.5 ± *0.2*	s	(5/2-)	3.5	2.5	3.5 ± *0.2*	2.5 -	3.5 ± *0.2*	2.5 -	3.5 ± *0.2*	(5/2-)
141-Dy	900 ± *140.0*	ms	(9/2-)	900	4.5	900 ± *200.0*	4.5 -	900 ± *200.0*	4.5 -	900 ±*200.0*	(9/2-)
141-Ho	4.1 ± *0.3*	ms	(7/2-)	4.1	3.5	4.1 ± *0.3*	3.5 -	4.1 ± *0.3*	3.5 -	4.1 ± *0.3*	7/2-
142-Te	100# ± *1E-4*	ms	0+	100	0.0 +	**50 ± *0.0***	0.0 +	**200 ± *0.0***	0.0 +		0+
142-I	222 ± *12.0*	ms	2-#	222	2	**200 ± *0.0***	2.0 -	222 ± *12.0*	**? -**	222 ±*12.0*	
142-Xe	1.23 ± *0.02*	s	0+	1.23	0.0 +	1.22 ± *0.02*	0.0 +	1.23 ± *0.02*	0.0 +	1.23 ±*0.02*	0+
142-Cs	1.684 ± *0.014*	s	0-	1.684	0	1.684 ± *0.014*	0.0 -	1.684 ± *0.014*	0.0 -	1.684 ±*0.014*	0-
142-Ba	10.6 ± *0.2*	m	0+	10.6	0.0 +	10.6 ± *0.2*	0.0 +	10.6 ± *0.2*	0.0 +	10.6 ±*0.2*	0+
142-La	91.1 ± *0.5*	m	2-	91.1	2	91.1 ± *0.5*	2.0 -	91.1 ± *0.5*	2.0 -	91.1 ±*0.5*	2-
142-Ce	stable ± *1E24*		0+		0.0 +	**2E+24 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +	**2E+24 ±*0.0***	0+
142-Pr	19.12 ± *0.04*	h	2-	19.12	2	19.12 ± *0.04*	2.0 -	19.12 ± *0.04*	2.0 -	19.12 ±*0.04*	2-
142-Nd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
142-Pm	40.5 ± *0.5*	s	1+	40.5	1.0 +	40.5 ± *0.5*	1.0 +	40.5 ± *0.5*	1.0 +	40.5 ±*0.5*	1+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
142-Sm	72.49 ± *0.05*	m	0+	72.48	0.0 +	72.49 ± *0.05*	0.0 +	72.49 ± *0.05*	0.0 +	72.49 ±*0.05*	0+
142-Eu	2.36 ± *0.1*	s	1+	2.36	1.0 +	2.34 ± *0.12*	1.0 +	2.34 ± *0.12*	1.0 +	2.34 ±*0.12*	1+
142-Gd	70.2 ± *0.6*	s	0+	70.2	0.0 +	70.2 ± *0.6*	0.0 +	70.2 ± *0.6*	0.0 +	70.2 ±*0.6*	0+
142-Tb	597 ± *17.0*	ms	1+	597	1.0 +	597 ± *17.0*	1.0 +	597 ± *17.0*	1.0 +	597 ±*17.0*	1+
142-Dy	2.3 ± *0.3*	s	0+	2.3	0.0 +	2.3 ± *0.3*	0.0 +	2.3 ± *0.3*	0.0 +	2.3 ± *0.3*	0+
142-Ho	400 ± *100.0*	ms	(7-;8+)	400	**?**	400 ± *100.0*	**? -**	400 ± *100.0*	**? -**	400 ±*100.0*	**(7-,8+)**
142-Er	10#	us	0+	10	0.0 +						
143-Te	100# ± *4E-4*	ms	7/2+#	100	3.5 +					**0.000408 ± *0.0***	
143-I	130 ± *45.0*	ms	7/2+#	130	3.5 +	**100 ± *0.0***	3.5 +	**296 ± *0.0***	**? -**	130 ±*45.0*	
143-Xe	511 ± *6.0*	ms	5/2-	511	2.5	511 ± *6.0*	2.5 -	**300 ± *30.0***	**2.5 -**	511 ± *6.0*	5/2-
143-Cs	1.791 ± *0.0070*	s	3/2+	1.791	1.5 +	1.791 ±*0.0070*	1.5 +	1.791 ±*0.0070*	1.5 +	1.791 ±*0.0070*	3/2+
143-Ba	14.5 ± *0.3*	s	5/2-	14.5	2.5	14.5 ± *0.3*	2.5 -	14.5 ± *0.3*	2.5 -	14.5 ±*0.3*	5/2-
143-La	14.2 ± *0.1*	m	(7/2)+	14.2	3.5 +	14.1 ± *0.16*	3.5 +	14.2 ± *0.1*	3.5 +	14.2 ±*0.1*	(7/2)+
143-Ce	33.039 ± *0.0060*	h	3/2-	33.028	1.5	33.039 ±*0.0060*	1.5 -	33.039 ±*0.0060*	1.5 -	33.039 ±*0.0060*	3/2-
143-Pr	13.57 ± *0.02*	d	7/2+	13.56	3.5 +	13.56 ± *0.01*	3.5 +	13.57 ± *0.02*	3.5 +	13.57 ±*0.02*	7/2+
143-Nd	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
143-Pm	265 ± *7.0*	d	5/2+	265	2.5 +	266 ± *8.0*	2.5 +	265 ± *7.0*	2.5 +	265 ± *7.0*	5/2+
143-Sm	8.75 ± *0.06*	m	3/2+	8.75	1.5 +	8.75 ± *0.08*	1.5 +	8.75 ± *0.08*	1.5 +	8.75 ±*0.06*	3/2+
143-Eu	2.59 ± *0.02*	m	5/2+	2.59	2.5 +	2.59 ± *0.02*	2.5 +	2.59 ± *0.02*	2.5 +	2.59 ±*0.02*	5/2+
143-Gd	39 ± *2.0*	s	(1/2)+	39	0.5 +	39 ± *2.0*	0.5 +	39 ± *2.0*	0.5 +	39 ± *2.0*	(1/2)+
143-Tb	12 ± *1.0*	s	(11/2-)	12	5.5	12 ± *1.0*	5.5 -	12 ± *1.0*	5.5 -	12 ± *1.0*	(11/2-)
143-Dy	5.6 ± *1.0*	s	(1/2+)	5.6	0.5 +	5.6 ± *1.0*	0.5 +	**3.2 ± *0.6***	0.5 +	5.6 ± *1.0*	(1/2+)
143-Ho	300# ± *2E-4*	ms	11/2-#	300	5.5	300 ± *0.0*	5.5 -	**0.000200 ±*0.0***	**? -**		(11/2-)
143-Er	200#	ms	9/2-#	200	4.5	200 ± *0.0*	4.5 -	200 ± *0.0*	**? -**		
144-I	100# ± *1E-4*	ms	1-#	100	1	**50 ± *0.0***	1.0 -	**194 ± *0.0***	**? -**	**0.000300 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
144-Xe	388 ± *7.0*	ms	0+	388	0.0 +	388 ± *7.0*	0.0 +	**1.15E+3 ±*200.0***	0.0 +	**1.15E+3 ± *200.0***	0+
144-Cs	994 ± *6.0*	ms	1(-)	994	1	994 ± *4.0*	1.0 -	994 ± *6.0*	**1.0 -**	994 ± *6.0*	1(-)
144-Ba	11.5 ± *0.2*	s	0+	11.5	0.0 +	11.5 ± *0.2*	0.0 +	11.5 ± *0.2*	0.0 +	11.5 ±*0.2*	0+
144-La	40.8 ± *0.4*	s	(3-)	40.8	3	40.8 ± *0.4*	3.0 -	40.8 ± *0.4*	3.0 -	40.8 ±*0.4*	(3-)
144-Ce	284.91 ± *0.05*	d	0+	284.95	0.0 +	285 ± *0.2*	0.0 +	284.91 ± *0.05*	0.0 +	284.91 ±*0.05*	0+
144-Pr	17.28 ± *0.05*	m	0-	17.28	0	17.28 ± *0.02*	0.0 -	17.28 ± *0.05*	0.0 -	17.28 ±*0.05*	0-
144-Nd	2.29 ± *0.16*	Py	0+	2.29	0.0 +	2.29 ± *0.16*	0.0 +	2.29 ± *0.16*	0.0 +	2.29 ±*0.16*	0+
144-Pm	363 ± *14.0*	d	5-	363	5	363 ± *14.0*	5.0 -	363 ± *14.0*	5.0 -	363 ±*14.0*	5-
144-Sm	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
144-Eu	10.2 ± *0.1*	s	1+	10.2	1.0 +	10.2 ± *0.1*	1.0 +	10.2 ± *0.1*	1.0 +	10.2 ±*0.1*	1+
144-Gd	4.47 ± *0.06*	m	0+	4.47	0.0 +	4.47 ± *0.06*	0.0 +	4.47 ± *0.06*	0.0 +	4.47 ±*0.06*	0+
144-Tb	~1	s	1+	1	1.0 +	1 ± *0.0*	1.0 +	1 ± *0.1*	1.0 +	1 ± *0.0*	1+
144-Dy	9.1 ± *0.4*	s	0+	9.1	0.0 +	9.1 ± *0.4*	0.0 +	9.1 ± *0.4*	0.0 +	9.1 ± *0.4*	0+
144-Ho	700 ± *100.0*	ms	(5-)	700	5	700 ± *100.0*	**? -**	700 ± *100.0*	5.0 -	700 ±*100.0*	(5-)
144-Er	400# ± *2E-4*	ms	0+	400	0.0 +	400 ± *200.0*	0.0 +	**0.000200 ±*0.0***	0.0 +	**0.000200 ± *0.0***	0+
144-Tm	2.3 ± *0.9*	us	(10+)	2.3	10.0 +					**1.9 ±*0.0***	(10+)
145-I	100# ± *4E-4*	ms	7/2+#	100	3.5 +			**127 ± *0.0***	**? -**	**0.000407 ± *0.0***	
145-Xe	188 ± *4.0*	ms	3/2-#	188	1.5	188 ± *4.0*	1.5 -	188 ± *4.0*	**? -**	188 ± *4.0*	
145-Cs	582 ± *6.0*	ms	3/2+	582	1.5 +	**594 ± *13.0***	1.5 +	587 ± *5.0*	1.5 +	587 ± *5.0*	3/2+
145-Ba	4.31 ± *0.16*	s	5/2-	4.31	2.5	4.31 ± *0.16*	2.5 -	4.31 ± *0.16*	2.5 -	4.31 ±*0.16*	5/2-
145-La	24.8 ± *2.0*	s	(5/2+)	24.8	2.5 +	24.8 ± *2.0*	2.5 +	24.8 ± *2.0*	**2.5 -**	24.8 ±*2.0*	(5/2+)
145-Ce	3.01 ± *0.06*	m	5/2-#	3.01	2.5	2.95 ± *0.06*	**1.5 -**	3.01 ± *0.06*	2.5 -	3.01 ±*0.06*	(5/2-)
145-Pr	5.984 ± *0.01*	h	7/2+	5.983	3.5 +	5.984 ± *0.01*	3.5 +	5.984 ± *0.01*	3.5 +	5.984 ±*0.01*	7/2+
145-Nd	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
145-Pm	17.7 ± *0.4*	y	5/2+	17.7	2.5 +	17.7 ± *0.4*	2.5 +	17.7 ± *0.4*	2.5 +	17.7 ±*0.4*	5/2+
145-Sm	340 ± *3.0*	d	7/2-	340	3.5	340 ± *3.0*	3.5 -	340 ± *3.0*	3.5 -	340 ± *3.0*	7/2-
145-Eu	5.93 ± *0.04*	d	5/2+	5.93	2.5 +	5.93 ± *0.04*	2.5 +	5.93 ± *0.04*	2.5 +	5.93 ±*0.04*	5/2+
145-Gd	23.0 ± *0.4*	m	1/2+	23	0.5 +	23 ± *0.4*	0.5 +	23 ± *0.4*	0.5 +	23 ± *0.4*	1/2+
145-Tb	30.9 ± *0.6*	s	(11/2-)	30.9	5.5	**1.20E+3 ±*0.0***	**1.5 +**	30.9 ± *0.6*	5.5 -		**(3/2+)**
145-Dy	9.5 ± *1.0*	s	(1/2+)	9.5	0.5 +	9.5 ± *1.0*	0.5 +	**6 ± *2.0***	0.5 +	**6 ± *2.0***	(1/2+)
145-Ho	2.4 ± *0.1*	s	11/2-#	2.4	5.5	2.4 ± *0.1*	5.5 -	2.4 ± *0.1*	5.5 -	2.4 ± *0.1*	(11/2-)
145-Er	900 ± *300.0*	ms	1/2+#	900	0.5 +	900 ± *300.0*	0.5 +	stable	0.5 +		(1/2+)
145-Tm	3.17 ± *0.2*	us	(11/2-)	3.17	5.5	**3.10 ± *0.3***	5.5 -	**3.10 ± *0.3***	5.5 -	3.17 ±*0.2*	(11/2-)
146-Xe	146 ± *6.0*	ms	0+	146	0.0 +	146 ± *6.0*	0.0 +	**369 ± *0.0***	0.0 +		0+
146-Cs	323 ± *6.0*	ms	1-	323	1	323 ± *6.0*	1.0 -	321 ± *2.0*	**1.0 -**	321 ± *2.0*	1-
146-Ba	2.22 ± *0.07*	s	0+	2.22	0.0 +	2.22 ± *0.07*	0.0 +	2.22 ± *0.07*	0.0 +	2.22 ±*0.07*	0+
146-La	6.27 ± *0.1*	s	2-	6.27	2	6.27 ± *0.1*	2.0 -	6.27 ± *0.1*	2.0 -	6.27 ±*0.1*	2-
146-Ce	13.52 ± *0.13*	m	0+	13.52	0.0 +	13.52 ± *0.13*	0.0 +	13.52 ± *0.13*	0.0 +	13.52 ±*0.13*	0+
146-Pr	24.15 ± *0.18*	m	(2)-	24.15	2	24.15 ± *0.18*	2.0 -	24.15 ± *0.18*	2.0 -	24.15 ±*0.18*	(2)-
146-Nd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
146-Pm	5.53 ± *0.05*	y	3-	5.53	3	5.53 ± *0.0493*	3.0 -	5.53 ± *0.05*	3.0 -	5.53 ±*0.05*	3-
146-Sm	68 ± *7.0*	My	0+	68	0.0 +	**1.0E+2 ± *8.0***	0.0 +	**1.0E+2 ± *5.0***	0.0 +	**1.0E+2 ± *5.0***	0+
146-Eu	4.61 ± *0.03*	d	4-	4.61	4	4.59 ± *0.03*	4.0 -	4.59 ± *0.03*	4.0 -	4.61 ±*0.03*	4-
146-Gd	48.27 ± *0.1*	d	0+	48.28	0.0 +	48.27 ± *0.1*	0.0 +	48.27 ± *0.1*	0.0 +	48.27 ±*0.1*	0+
146-Tb	8 ± *4.0*	s	1+	8	1.0 +	8 ± *4.0*	1.0 +	8 ± *4.0*	1.0 +	8 ± *4.0*	1+
146-Dy	33.2 ± *0.7*	s	0+	33.2	0.0 +	**29 ± *3.0***	0.0 +	**29 ± *3.0***	0.0 +	**29 ± *3.0***	0+
146-Ho	2.8 ± *0.5*	s	(6-)	2.8	6	**3.6 ± *0.3***	**10.0 +**	**3.6 ± *0.3***	**10.0 +**	**3.6 ±*0.3***	**(10+)**
146-Er	1.7 ± *0.6*	s	0+	1.7	0.0 +	1.7 ± *0.6*	0.0 +	1.7 ± *0.6*	0.0 +	1.7 ± *0.6*	0+
146-Tm	155 ± *20.0*	ms	(1+)	155	1.0 +	**240 ± *30.0***	**6.0 -**	**80 ± *10.0***	**5.0 -**	**235 ±*27.0***	**(6-)**

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
147-Xe	130 ± *80.0*	ms	3/2-#	130	1.5	130 ± *80.0*	1.5 -	**100 ± *75.0***	**1.5 -**	**100 ±*0.0***	(3/2-)
147-Cs	230 ± *1.0*	ms	(3/2+)	230	1.5 +	**225 ± *5.0***	1.5 +	230 ± *1.0*	**1.5 -**	230 ± *1.0*	(3/2+)
147-Ba	894 ± *10.0*	ms	(3/2+)	894	1.5 +	893 ± *1.0*	1.5 +	894 ± *10.0*	**1.5 -**	894 ±*10.0*	**(3/2-)**
147-La	4.06 ± *0.04*	s	(5/2+)	4.06	2.5 +	4.01 ± *0.0080*	2.5 +	4.06 ± *0.04*	**1.5 +**	4.06 ±*0.04*	(3/2+)
147-Ce	56.4 ± *1.0*	s	(5/2-)	56.4	2.5	57 ± *2.0*	2.5 -	56.4 ± *1.0*	2.5 -	56.4 ±*1.0*	(5/2-)
147-Pr	13.4 ± *0.3*	m	5/2+#	13.4	2.5 +	13.4 ± *0.4*	**1.5 +**	13.4 ± *0.3*	2.5 +	13.4 ±*0.3*	(5/2+)
147-Nd	10.98 ± *0.01*	d	5/2-	10.98	2.5	10.98 ± *0.01*	2.5 -	10.98 ± *0.01*	2.5 -	10.98 ±*0.01*	5/2-
147-Pm	2.6234 ± *2E-4*	y	7/2+	2.6235	3.5 +	2.6234 ±*2.0E-4*	3.5 +	2.6235 ±*2.0E-4*	3.5 +	2.6234 ±*2.0E-4*	7/2+
147-Sm	106.6 ± *0.7*	Gy	7/2-	106.6	3.5	106.0 ± *2.0*	3.5 -	106.0 ± *2.0*	3.5 -	106.0 ±*1.1*	7/2-
147-Eu	24.1 ± *0.6*	d	5/2+	24.1	2.5 +	24 ± *1.0*	2.5 +	24.1 ± *0.6*	2.5 +	24.1 ±*0.6*	5/2+
147-Gd	38.06 ± *0.12*	h	7/2-	38.06	3.5	38.06 ± *0.12*	3.5 -	38.06 ± *0.12*	3.5 -	38.06 ±*0.12*	7/2-
147-Tb	1.64 ± *0.03*	h	(1/2+)	1.64	0.5 +	**1.70 ± *0.1***	0.5 +	1.64 ± *0.03*	0.5 +	1.64 ±*0.03*	(1/2+)
147-Dy	67 ± *7.0*	s	(1/2+)	67	0.5 +	**40 ± *10.0***	0.5 +	**40 ± *10.0***	0.5 +	67 ± *7.0*	(1/2+)
147-Ho	5.8 ± *0.4*	s	(11/2-)	5.8	5.5	5.8 ± *0.4*	5.5 -	5.8 ± *0.4*	5.5 -	5.8 ± *0.4*	(11/2-)
147-Er	3.2 ± *1.2*	s	(1/2+)	3.2	0.5 +	**2.5 ± *0.0***	0.5 +	**2.5 ± *0.2***	**5.5 -**	**2.5 ±*0.0***	(1/2+)
147-Tm	580 ± *30.0*	ms	11/2-	580	5.5	580 ± *30.0*	5.5 -	580 ± *30.0*	5.5 -	580 ±*30.0*	11/2-
148-Xe	100# ± *4E-4*	ms	0+	100	0.0 +					**0.000408 ± *0.0***	0+
148-Cs	146 ± *6.0*	ms		146	?	146 ± *6.0*	? -	146 ± *6.0*	? -	146 ± *6.0*	
148-Ba	612 ± *17.0*	ms	0+	612	0.0 +	612 ± *17.0*	0.0 +	612 ± *17.0*	0.0 +	612 ±*17.0*	0+
148-La	1.26 ± *0.08*	s	(2-)	1.26	2	1.26 ± *0.08*	2.0 -	1.26 ± *0.08*	2.0 -	1.26 ±*0.08*	(2-)
148-Ce	56 ± *1.0*	s	0+	56	0.0 +	56 ± *1.0*	0.0 +	56 ± *1.0*	0.0 +	56 ± *1.0*	0+
148-Pr	2.29 ± *0.02*	m	1-	2.29	1	2.29 ± *0.02*	1.0 -	2.29 ± *0.02*	1.0 -	2.29 ±*0.02*	1-
148-Nd	stable ± *9E25*		0+	stable	0.0 +	**9E+25 ± *0.0***	0.0 +	stable	0.0 +		0+
148-Pm	5.368 ± *0.0020*	d	1-	5.368	1	5.368 ±*0.0080*	1.0 -	5.368 ±*0.0020*	1.0 -	5.368 ±*0.0020*	1-
148-Sm	7 ± *3.0*	Py	0+	7	0.0 +	7 ± *2.0*	0.0 +	7 ± *2.0*	0.0 +	7 ± *3.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
148-Eu	54.5 ± *0.5*	d	5-	54.5	5	54.5 ± *0.5*	5.0 -	54.5 ± *0.5*	5.0 -	54.5 ±*0.5*	5-
148-Gd	70.9 ± *1.0*	y	0+	70.9	0.0 +	**74.6 ± *3.0***	0.0 +	**74.6 ± *3.0***	0.0 +	**74.6 ±*3.0***	0+
148-Tb	60 ± *1.0*	m	2-	60	2	60 ± *1.0*	2.0 -	60 ± *1.0*	2.0 -	60 ± *1.0*	2-
148-Dy	3.3 ± *0.2*	m	0+	3.3	0.0 +	3.3 ± *0.2*	0.0 +	3.3 ± *0.2*	0.0 +	3.3 ± *0.2*	0+
148-Ho	2.2 ± *1.1*	s	(1+)	2.2	1.0 +	2.2 ± *1.1*	1.0 +	2.2 ± *1.1*	1.0 +	2.2 ± *1.1*	(1+)
148-Er	4.6 ± *0.2*	s	0+	4.6	0.0 +	4.6 ± *0.2*	0.0 +	4.6 ± *0.2*	0.0 +	4.6 ± *0.2*	0+
148-Tm	700 ± *200.0*	ms	(10+)	700	10.0 +	700 ± *200.0*	10.0 +	700 ± *200.0*	10.0 +	700 ±*200.0*	(10+)
148-Yb	250#	ms	0+	250	0.0 +	250 ± *150.0*	0.0 +	250 ± *25.0*	0.0 +		
149-Cs	150# ± *50.0*	ms	3/2+#	150	1.5 +	150 ± *0.0*	1.5 +	**50 ± *0.0***	**? -**	**50 ± *0.0***	
149-Ba	344 ± *7.0*	ms	3/2-#	344	1.5	344 ± *7.0*	1.5 -	344 ± *7.0*	**? -**	344 ± *7.0*	
149-La	1.05 ± *0.03*	s	(3/2-)	1.05	1.5	1.05 ± *0.03*	**2.5 +**	1.05 ± *0.03*	**1.5 -**	1.05 ±*0.03*	(3/2-)
149-Ce	5.3 ± *0.2*	s	3/2-#	5.3	1.5	5.3 ± *0.2*	1.5 -	5.3 ± *0.2*	**1.5 -**	5.3 ± *0.2*	(3/2-)
149-Pr	2.26 ± *0.07*	m	(5/2+)	2.26	2.5 +	2.26 ± *0.07*	2.5 +	2.26 ± *0.07*	2.5 +	2.26 ±*0.07*	(5/2+)
149-Nd	1.728 ± *0.0010*	h	5/2-	1.728	2.5	1.728 ±*0.0010*	2.5 -	1.728 ±*0.0010*	2.5 -	1.728 ±*0.0010*	5/2-
149-Pm	53.08 ± *0.05*	h	7/2+	53.08	3.5 +	53.08 ± *0.05*	3.5 +	53.08 ± *0.05*	3.5 +	53.08 ±*0.05*	7/2+
149-Sm	stable ± *6E22*		7/2-	stable	3.5	**6E+22 ± *0.0***	3.5 -	stable	3.5 -		7/2-
149-Eu	93.1 ± *0.4*	d	5/2+	93.1	2.5 +	93.1 ± *0.4*	2.5 +	93.1 ± *0.4*	2.5 +	93.1 ±*0.4*	5/2+
149-Gd	9.28 ± *0.1*	d	7/2-	9.28	3.5	9.28 ± *0.1*	3.5 -	9.28 ± *0.1*	3.5 -	9.28 ±*0.1*	7/2-
149-Tb	4.118 ± *0.025*	h	1/2+	4.117	0.5 +	4.118 ± *0.025*	0.5 +	4.118 ± *0.025*	0.5 +	4.118 ±*0.025*	1/2+
149-Dy	4.20 ± *0.14*	m	7/2(-)	4.2	3.5	4.20 ± *0.14*	3.5 -	4.20 ± *0.14*	3.5 -	4.20 ±*0.14*	(7/2-)
149-Ho	21.1 ± *0.2*	s	(11/2-)	21.1	5.5	21.1 ± *0.2*	5.5 -	21.1 ± *0.2*	5.5 -	21.1 ±*0.2*	(11/2-)
149-Er	4 ± *2.0*	s	(1/2+)	4	0.5 +	4 ± *2.0*	0.5 +	4 ± *2.0*	0.5 +	4 ± *2.0*	(1/2+)
149-Tm	900 ± *200.0*	ms	(11/2-)	900	5.5	900 ± *200.0*	5.5 -	900 ± *200.0*	5.5 -	900 ±*200.0*	(11/2-)
149-Yb	700 ± *200.0*	ms	(1/2+)	700	0.5 +	700 ± *200.0*	**? -**	700 ± *200.0*	**? -**	700 ±*200.0*	(1/2+,3/2+)
150-Cs	100# ± *50.0*	ms		100	?	100 ± *0.0*	? -	**50 ± *0.0***	? -	**50 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
150-Ba	300	ms	0+	300	0.0 +	300 ± *0.0*	0.0 +	300 ± *0.0*	0.0 +	300 ± *0.0*	0+
150-La	510 ± *30.0*	ms	(3+)	510	3.0 +	510 ± *30.0*	3.0 +	**860 ± *50.0***	**? -**	**590 ±*110.0***	(3+)
150-Ce	4.0 ± *0.6*	s	0+	4	0.0 +	4 ± *0.6*	0.0 +	4 ± *0.6*	0.0 +	4 ± *0.6*	0+
150-Pr	6.19 ± *0.16*	s	(1)-	6.19	1	6.10 ± *0.4*	1.0 -	6.19 ± *0.16*	1.0 -	6.19 ±*0.16*	(1-)
150-Nd	6.7 ± *0.7*	Ey	0+	6.7	0.0 +	**21 ± *5.0***	0.0 +	**7.9 ± *0.7***	0.0 +	**9.1 ±*0.7***	0+
150-Pm	2.68 ± *0.02*	h	(1-)	2.68	1	2.68 ± *0.02*	1.0 -	2.68 ± *0.02*	1.0 -	2.70 ±*0.015*	(1-)
150-Sm	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
150-Eu	36.9 ± *0.9*	y	5(-)	36.9	5	36.4 ± *0.712*	5.0 -	36.9 ± *0.9*	5.0 -	36.9 ±*0.9*	5-
150-Gd	1.79 ± *0.08*	My	0+	1.79	0.0 +	1.82 ± *0.17*	0.0 +	1.79 ± *0.08*	0.0 +	1.79 ±*0.08*	0+
150-Tb	3.48 ± *0.16*	h	(2-)	3.48	2	3.48 ± *0.16*	2.0 -	3.48 ± *0.16*	2.0 -	3.48 ±*0.16*	(2)-
150-Dy	7.17 ± *0.05*	m	0+	7.17	0.0 +	7.17 ± *0.05*	0.0 +	7.17 ± *0.02*	0.0 +	7.17 ±*0.05*	0+
150-Ho	76.8 ± *1.8*	s	2-	76.8	2	76.8 ± *1.8*	2.0 -	**72 ± *4.0***	2.0 -	**72 ± *4.0***	(2)-
150-Er	18.5 ± *0.7*	s	0+	18.5	0.0 +	18.5 ± *0.7*	0.0 +	18.5 ± *0.7*	0.0 +	18.5 ±*0.7*	0+
150-Tm	3#	s	(1+)	3	1.0 +	3 ± *0.0*	1.0 +	**2 ± *0.2***	**6.0 -**	**2 ± *0.06***	**(6-)**
150-Yb	700# ± *2E-4*	ms	0+	700	0.0 +	700 ± *300.0*	0.0 +	**0.000200 ±*0.0***	0.0 +	**0.000200 ± *0.0***	0+
150-Lu	46 ± *6.0*	ms	(5-;6-)	46	**?**	46 ± *6.0*	**? -**	**43 ± *5.0***	**2.0 +**	**45 ± *3.0***	**(2+)**
151-Cs	60# ± *50.0*	ms	3/2+#	60	1.5 +	60 ± *0.0*	1.5 +	**50 ± *0.0***	**? -**	**50 ± *0.0***	
151-Ba	200# ± *3E-4*	ms	3/2-#	200	1.5	200 ± *0.0*	1.5 -	**259 ± *0.0***	**? -**	**0.000300 ± *0.0***	
151-La	300# ± *3E-4*	ms	5/2+#	300	2.5 +	300 ± *0.0*	2.5 +	**778 ± *0.0***	**? -**	**0.000300 ± *0.0***	
151-Ce	1.76 ± *0.06*	s	(3/2-)	1.76	1.5	**1.02 ± *0.06***	1.5 -	1.76 ± *0.06*	**2.5 -**	1.76 ±*0.06*	**(5/2+)**
151-Pr	18.90 ± *0.07*	s	(3/2-)	18.9	1.5	18.90 ± *0.07*	1.5 -	18.90 ± *0.07*	1.5 -	18.90 ±*0.07*	(3/2-)
151-Nd	12.44 ± *0.07*	m	3/2+	12.44	1.5 +	12.44 ± *0.07*	1.5 +	12.44 ± *0.07*	1.5 +	12.44 ±*0.07*	3/2+
151-Pm	28.40 ± *0.04*	h	5/2+	28.39	2.5 +	28.40 ± *0.04*	2.5 +	28.40 ± *0.04*	2.5 +	28.40 ±*0.04*	5/2+
151-Sm	90 ± *8.0*	y	5/2-	90	2.5	90 ± *6.0*	2.5 -	90 ± *8.0*	2.5 -	90 ± *8.0*	5/2-
151-Eu	stable ± *5E25*		5/2+		2.5 +	stable	2.5 +	**0 ± *0.0***	2.5 +	**5E+25 ±*0.0***	5/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
151-Gd	123.9 ± *1.0*	d	7/2-	123.8	3.5	124 ± *1.0*	3.5 -	124 ± *1.0*	3.5 -	123.9 ±*1.0*	7/2-
151-Tb	17.609 ± *0.0010*	h	1/2(+)	17.608	0.5 +	17.609 ±*0.014*	0.5 +	17.609 ±*0.014*	0.5 +	17.609 ±*0.014*	1/2(+)
151-Dy	17.9 ± *0.3*	m	7/2(-)	17.9	3.5	17.9 ± *0.3*	3.5 -	17.9 ± *0.3*	3.5 -	17.9 ±*0.3*	7/2(-)
151-Ho	35.2 ± *0.1*	s	11/2(-)	35.2	5.5	35.2 ± *0.1*	5.5 -	35.2 ± *0.1*	5.5 -	35.2 ±*0.1*	(11/2-)
151-Er	23.5 ± *2.0*	s	(7/2-)	23.5	3.5	23.5 ± *1.3*	3.5 -	23.5 ± *2.0*	3.5 -	23.5 ±*2.0*	(7/2-)
151-Tm	4.17 ± *0.11*	s	(11/2-)	4.17	5.5	4.17 ± *0.1*	5.5 -	4.17 ± *0.11*	5.5 -	4.17 ±*0.11*	(11/2-)
151-Yb	1.6 ± *0.5*	s	(1/2+)	1.6	0.5 +	1.6 ± *0.5*	0.5 +	1.6 ± *0.1*	0.5 +	1.6 ± *0.1*	(1/2+)
151-Lu	80.6 ± *2.0*	ms	11/2-#	80.6	5.5	80.6 ± *1.9*	5.5 -	80.6 ± *2.0*	5.5 -	80.6 ±*2.0*	11/2-
152-Ba	100# ± *4E-4*	ms	0+	100	0.0 +	100 ± *0.0*	0.0 +	**228 ± *0.0***	0.0 +	**0.000406 ± *0.0***	0+
152-La	200# ± *1E-4*	ms		200	?	**280 ± *60.0***	**2.0 -**	**451 ± *0.0***	? -	**0.000150 ± *0.0***	
152-Ce	1.1 ± *0.3*	s	0+	1.1	0.0 +	1.1 ± *0.3*	0.0 +	**1.4 ± *0.2***	0.0 +	**1.4 ±*0.2***	0+
152-Pr	3.63 ± *0.12*	s	4+	3.63	4.0 +	3.63 ± *0.12*	**4.0 -**	3.63 ± *0.12*	**4.0 -**	3.63 ±*0.12*	(4-)
152-Nd	11.4 ± *0.2*	m	0+	11.4	0.0 +	11.4 ± *0.2*	0.0 +	11.4 ± *0.2*	0.0 +	11.4 ±*0.2*	0+
152-Pm	4.12 ± *0.08*	m	1+	4.12	1.0 +	4.12 ± *0.08*	1.0 +	4.12 ± *0.08*	1.0 +	4.12 ±*0.08*	1+
152-Sm	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
152-Eu	13.537 ± *0.0060*	y	3-	13.537	3	13.525 ±*0.014*	3.0 -	13.537 ±*0.0060001*	3.0 -	13.537 ±*0.0060*	3-
152-Gd	108 ± *8.0*	Ty	0+	108	0.0 +	108 ± *8.0*	0.0 +	108 ± *8.0*	0.0 +	108 ± *8.0*	0+
152-Tb	17.5 ± *0.1*	h	2-	17.5	2	17.5 ± *0.1*	2.0 -	17.5 ± *0.1*	2.0 -	17.5 ±*0.1*	2-
152-Dy	2.38 ± *0.02*	h	0+	2.38	0.0 +	2.38 ± *0.02*	0.0 +	2.38 ± *0.02*	0.0 +	2.38 ±*0.02*	0+
152-Ho	161.8 ± *0.3*	s	2-	161.8	2	161.8 ± *0.3*	2.0 -	161.8 ± *0.3*	2.0 -	161.8 ±*0.3*	2-
152-Er	10.3 ± *0.1*	s	0+	10.3	0.0 +	10.3 ± *0.1*	0.0 +	10.3 ± *0.1*	0.0 +	10.3 ±*0.1*	0+
152-Tm	8.0 ± *1.0*	s	(2#)-	8	2	8 ± *1.0*	2.0 -	8 ± *1.0*	2.0 -	8 ± *1.0*	(2)-
152-Yb	3.04 ± *0.06*	s	0+	3.04	0.0 +	3.04 ± *0.06*	0.0 +	3.04 ± *0.06*	0.0 +	3.04 ±*0.06*	0+
152-Lu	650 ± *70.0*	ms	(5-;6-)	650	**?**	650 ± *70.0*	**? -**	**700 ± *100.0***	**? -**	**700 ±*100.0***	(5-,6-)
153-Ba	80#	ms	5/2-#	80	2.5	80 ± *0.0*	2.5 -	**1.6E+2 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
153-La	150# ± *1E-4*	ms	5/2+#	150	2.5 +	150 ± *0.0*	2.5 +	**342 ± *0.0***	**? -**	**0.000100 ± *0.0***	
153-Ce	500# ± *1E-4*	ms	3/2-#	500	1.5	**1.50E+3 ±*300.0***	1.5 -	**979 ± *0.0***	**? -**	**0.000100 ± *0.0***	
153-Pr	4.28 ± *0.11*	s	5/2-#	4.28	2.5	4.28 ± *0.11*	2.5 -	4.28 ± *0.11*	**? -**	4.28 ±*0.11*	
153-Nd	31.6 ± *1.0*	s	(3/2)-	31.6	1.5	31.6 ± *1.0*	1.5 -	31.6 ± *1.0*	1.5 -	31.6 ±*1.0*	(3/2)-
153-Pm	5.25 ± *0.02*	m	5/2-	5.25	2.5	5.25 ± *0.02*	2.5 -	5.25 ± *0.02*	2.5 -	5.25 ±*0.02*	5/2-
153-Sm	46.284 ± *0.0040*	h	3/2+	46.278	1.5 +	46.284 ±*0.0026*	1.5 +	46.5 ± *0.21*	1.5 +	46.284 ±*0.0040*	3/2+
153-Eu	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
153-Gd	240.4 ± *1.0*	d	3/2-	240.4	1.5	240.4 ± *1.0*	1.5 -	240.4 ± *1.0*	1.5 -	240.4 ±*1.0*	3/2-
153-Tb	2.34 ± *0.01*	d	5/2+	2.34	2.5 +	2.34 ± *0.01*	2.5 +	2.34 ± *0.01*	2.5 +	2.34 ±*0.01*	5/2+
153-Dy	6.4 ± *0.1*	h	7/2(-)	6.4	3.5	6.4 ± *0.1*	3.5 -	6.4 ± *0.1*	3.5 -	6.4 ± *0.1*	7/2(-)
153-Ho	2.01 ± *0.03*	m	11/2-	2.01	5.5	2.01 ± *0.03*	5.5 -	2.01 ± *0.03*	5.5 -	2.01 ±*0.03*	11/2-
153-Er	37.1 ± *0.2*	s	7/2(-)	37.1	3.5	37.1 ± *0.2*	3.5 -	37.1 ± *0.2*	3.5 -	37.1 ±*0.2*	(7/2-)
153-Tm	1.48 ± *0.01*	s	(11/2-)	1.48	5.5	1.48 ± *0.01*	5.5 -	1.48 ± *0.01*	5.5 -	1.48 ±*0.01*	(11/2-)
153-Yb	4.2 ± *0.2*	s	7/2-#	4.2	3.5	4.2 ± *0.2*	3.5 -	4.2 ± *0.2*	3.5 -	4.2 ± *0.2*	7/2-
153-Lu	900 ± *200.0*	ms	11/2-	900	5.5	900 ± *200.0*	5.5 -	900 ± *200.0*	5.5 -	900 ±*200.0*	11/2-
153-Hf	400# ± *2E-4*	ms	1/2+#	400	0.5 +	400 ± *0.0*	0.5 +	**0.00600 ±*0.0***	**? -**	**0.0000600 ± *0.0***	
154-La	100#	ms		100	?	100 ± *0.0*	? -	**228 ± *0.0***	? -		
154-Ce	300# ± *1E-4*	ms	0+	300	0.0 +	**2.00E+3 ±*400.0***	0.0 +	**775 ± *0.0***	0.0 +	**0.000100 ± *0.0***	
154-Pr	2.3 ± *0.1*	s	(3+)	2.3	3.0 +	2.3 ± *0.1*	**? -**	2.3 ± *0.1*	**3.0 -**	2.3 ± *0.1*	(3+)
154-Nd	25.9 ± *0.2*	s	0+	25.9	0.0 +	25.9 ± *0.2*	0.0 +	25.9 ± *0.2*	0.0 +	25.9 ±*0.2*	0+
154-Pm	1.73 ± *0.1*	m	(0-;1-)	1.73	1	1.73 ± *0.1*	**? -**	1.73 ± *0.1*	**? -**	**2.68 ±*0.07***	**(3,4)**
154-Sm	stable ± *7E25*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
154-Eu	8.601 ± *0.01*	y	3-	8.6	3	8.593 ±*0.003833*	3.0 -	8.601 ± *0.01*	3.0 -	8.601 ±*0.01*	3-
154-Gd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
154-Tb	21.5 ± *0.4*	h	0(+#)	21.5	0.0 +	21.5 ± *0.4*	0.0 +	21.5 ± *0.4*	**0.0 -**	21.5 ±*0.4*	**0**

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
154-Dy	3.0 ± *1.5*	My	0+	3	0.0 +	3.0 ± *1.5*	0.0 +	3.0 ± *1.5*	0.0 +	3.0 ± *1.5*	0+
154-Ho	11.76 ± *0.19*	m	2-	11.76	2	11.76 ± *0.19*	2.0 -	11.76 ± *0.19*	2.0 -	11.76 ±*0.19*	2-
154-Er	3.73 ± *0.09*	m	0+	3.73	0.0 +	3.73 ± *0.09*	0.0 +	3.73 ± *0.09*	0.0 +	3.73 ±*0.09*	0+
154-Tm	8.1 ± *0.3*	s	(2-)	8.1	2	8.1 ± *0.3*	2.0 -	8.1 ± *0.3*	2.0 -	8.1 ± *0.3*	(2-)
154-Yb	409 ± *2.0*	ms	0+	409	0.0 +	409 ± *2.0*	0.0 +	409 ± *2.0*	0.0 +	409 ± *2.0*	0+
154-Lu	1#	s	(2-)	1	2	1 ± *0.0*	2.0 -	**2 ± *0.2***	2.0 -		(2-)
154-Hf	2 ± *1.0*	s	0+	2	0.0 +	2 ± *1.0*	0.0 +	2 ± *1.0*	0.0 +	2 ± *1.0*	0+
155-La	60#	ms	5/2+#	60	2.5 +	60 ± *0.0*	2.5 +	**1.8E+2 ± *0.0***	**? -**		
155-Ce	200# ± *1E-4*	ms	5/2-#	200	2.5	200 ± *0.0*	2.5 -	**471 ± *0.0***	**? -**	**0.000300 ± *0.0***	
155-Pr	1# ± *3E-7*	s	5/2-#	1	2.5	1 ± *0.0*	2.5 -	**0.9 ± *0.0***	**? -**	**3E-7 ±*0.0***	
155-Nd	8.9 ± *0.2*	s	3/2-#	8.9	1.5	8.9 ± *0.2*	1.5 -	8.9 ± *0.2*	**? -**	8.9 ± *0.2*	
155-Pm	41.5 ± *0.2*	s	(5/2-)	41.5	2.5	41.5 ± *0.2*	2.5 -	41.5 ± *0.2*	**2.5 -**	41.5 ±*0.2*	5/2-
155-Sm	22.3 ± *0.2*	m	3/2-	22.3	1.5	22.3 ± *0.2*	1.5 -	22.3 ± *0.2*	1.5 -	22.3 ±*0.2*	3/2-
155-Eu	4.753 ± *0.014*	y	5/2+	4.753	2.5 +	4.753 ± *0.014*	2.5 +	4.753 ± *0.014*	2.5 +	4.753 ±*0.014*	5/2+
155-Gd	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
155-Tb	5.32 ± *0.06*	d	3/2+	5.32	1.5 +	5.32 ± *0.06*	1.5 +	5.32 ± *0.06*	1.5 +	5.32 ±*0.06*	3/2+
155-Dy	9.9 ± *0.2*	h	3/2-	9.9	1.5	9.9 ± *0.2*	1.5 -	9.9 ± *0.2*	1.5 -	9.9 ± *0.2*	3/2-
155-Ho	48 ± *1.0*	m	5/2+	48	2.5 +	48 ± *2.0*	2.5 +	48 ± *1.0*	2.5 +	48 ± *1.0*	5/2+
155-Er	5.3 ± *0.3*	m	(7/2-)	5.3	3.5	5.3 ± *0.3*	3.5 -	5.3 ± *0.3*	3.5 -	5.3 ± *0.3*	7/2-
155-Tm	21.6 ± *0.2*	s	(11/2-)	21.6	5.5	21.6 ± *0.2*	5.5 -	21.6 ± *0.2*	5.5 -	21.6 ±*0.2*	11/2-
155-Yb	1.793 ± *0.019*	s	(7/2-)	1.793	3.5	1.793 ± *0.019*	3.5 -	1.793 ± *0.019*	3.5 -	1.793 ±*0.019*	(7/2-)
155-Lu	68.6 ± *1.6*	ms	(11/2-)	68.6	5.5	68.6 ± *1.6*	5.5 -	68 ± *1.0*	5.5 -	68 ± *1.0*	11/2-
155-Hf	840 ± *30.0*	ms	7/2-#	840	3.5	**890 ± *120.0***	3.5 -	**890 ± *120.0***	**? -**	**890 ±*120.0***	
155-Ta	3.2 ± *1.3*	ms	(11/2-)	3.2	5.5	**0.013 ±*0.0040***	5.5 -	**3.1 ± *1.3***	5.5 -	**2.9 ±*0.0***	11/2-
156-Ce	150#	ms	0+	150	0.0 +	150 ± *0.0*	0.0 +	**369 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
156-Pr	500# ± *3E-4*	ms		500	?	500 ± *100.0*	**2.0 -**	**733 ± *0.0***	? -		
156-Nd	5.06 ± *0.13*	s	0+	5.06	0.0 +	**5.49 ± *0.07***	0.0 +	**5.49 ± *0.07***	0.0 +	**5.26 ±*0.2***	0+
156-Pm	26.70 ± *0.1*	s	4(+)	26.7	4.0 +	26.70 ± *0.1*	**4.0 -**	26.70 ± *0.1*	**4.0 -**	26.70 ±*0.1*	4(+)
156-Sm	9.4 ± *0.2*	h	0+	9.4	0.0 +	9.4 ± *0.2*	0.0 +	9.4 ± *0.2*	0.0 +	9.4 ± *0.2*	0+
156-Eu	15.19 ± *0.08*	d	0+	15.19	0.0 +	15.19 ± *0.08*	0.0 +	15.19 ± *0.08*	0.0 +	15.19 ±*0.08*	0+
156-Gd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
156-Tb	5.35 ± *0.1*	d	3-	5.35	3	**5.17 ± *0.12***	3.0 -	5.35 ± *0.1*	3.0 -	5.35 ±*0.1*	3-
156-Dy	stable ± *3E25*		0+	stable	0.0 +	**3E+25 ± *0.0***	0.0 +	stable	0.0 +		0+
156-Ho	56 ± *1.0*	m	4-	56	4	56 ± *1.0*	4.0 -	56 ± *1.0*	4.0 -	56 ± *1.0*	4-
156-Er	19.5 ± *1.0*	m	0+	19.5	0.0 +	19.5 ± *1.0*	0.0 +	19.5 ± *1.0*	0.0 +	19.5 ±*1.0*	0+
156-Tm	83.8 ± *1.8*	s	2-	83.8	2	83.8 ± *1.8*	2.0 -	83.8 ± *1.8*	2.0 -	83.8 ±*1.8*	2-
156-Yb	26.1 ± *0.7*	s	0+	26.1	0.0 +	26.1 ± *0.7*	0.0 +	26.1 ± *0.7*	0.0 +	26.1 ±*0.7*	0+
156-Lu	494 ± *12.0*	ms	(2)-	494	2	494 ± *12.0*	2.0 -	494 ± *12.0*	2.0 -	494 ±*12.0*	(2)-
156-Hf	23 ± *1.0*	ms	0+	23	0.0 +	23 ± *1.0*	0.0 +	23 ± *1.0*	0.0 +	23 ± *1.0*	0+
156-Ta	106 ± *4.0*	ms	(2-)	106	2	**144 ± *24.0***	2.0 -	**144 ± *24.0***	2.0 -	106 ± *4.0*	(2-)
157-Ce	50#	ms	7/2+#	50	3.5 +	50 ± *0.0*	3.5 +	**2.4E+2 ± *0.0***	**? -**		
157-Pr	300#	ms	5/2-#	300	2.5	300 ± *60.0*	2.5 -	**598 ± *0.0***	**? -**		
157-Nd	2# ± *3E-7*	s	5/2-#	2	2.5	**3 ± *0.5***	2.5 -	2 ± *0.0*	**? -**	**0.1 ±*0.0***	
157-Pm	10.56 ± *0.1*	s	(5/2-)	10.56	2.5	10.56 ± *0.1*	2.5 -	10.56 ± *0.1*	**2.5 -**	10.56 ±*0.1*	(5/2-)
157-Sm	8.03 ± *0.07*	m	3/2-#	8.03	1.5	8.03 ± *0.07*	1.5 -	8.03 ± *0.0667*	1.5 -	8.03 ±*0.07*	(3/2-)
157-Eu	15.18 ± *0.03*	h	5/2+	15.18	2.5 +	15.18 ± *0.03*	2.5 +	15.18 ± *0.03*	2.5 +	15.18 ±*0.03*	5/2+
157-Gd	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
157-Tb	71 ± *7.0*	y	3/2+	71	1.5 +	**99 ± *10.0***	1.5 +	71 ± *7.0*	1.5 +	71 ± *7.0*	3/2+
157-Dy	8.14 ± *0.04*	h	3/2-	8.14	1.5	8.14 ± *0.05*	1.5 -	8.14 ± *0.04*	1.5 -	8.14 ±*0.04*	3/2-
157-Ho	12.6 ± *0.2*	m	7/2-	12.6	3.5	12.6 ± *0.2*	3.5 -	12.6 ± *0.2*	3.5 -	12.6 ±*0.2*	7/2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
157-Er	18.65 ± *0.1*	m	3/2-	18.65	1.5	18.65 ± *0.1*	1.5 -	18.65 ± *0.1*	1.5 -	18.65 ±*0.1*	3/2-
157-Tm	3.63 ± *0.09*	m	1/2+	3.63	0.5 +	3.63 ± *0.09*	0.5 +	3.63 ± *0.09*	0.5 +	3.63 ±*0.09*	1/2+
157-Yb	38.6 ± *1.0*	s	7/2-	38.6	3.5	38.6 ± *1.0*	3.5 -	38.6 ± *1.0*	3.5 -	38.6 ±*1.0*	7/2-
157-Lu	6.8 ± *1.8*	s	(1/2+;3/2+)	6.8	**?**	6.8 ± *1.8*	**? -**	6.8 ± *1.8*	**? -**	6.8 ± *1.8*	(1/2+,3/2+)
157-Hf	115 ± *1.0*	ms	7/2-	115	3.5	115 ± *1.0*	3.5 -	**110 ± *6.0***	3.5 -	**110 ±*6.0***	7/2-
157-Ta	10.1 ± *0.4*	ms	1/2+	10.1	0.5 +	10.1 ± *0.4*	0.5 +	10.1 ± *0.4*	0.5 +	10.1 ±*0.4*	1/2+
157-W	275 ± *40.0*	ms	(7/2-)	275	3.5						
158-Pr	200#	ms		200	?	200 ± *0.0*	? -	**134 ± *0.0***	? -		
158-Nd	700# ± *3E-4*	ms	0+	700	0.0 +	700 ± *200.0*	0.0 +	**1.33E+3 ±*0.0***	0.0 +	**0.000160 ± *0.0***	0+
158-Pm	4.8 ± *0.5*	s		4.8	?	4.8 ± *0.5*	? -	4.8 ± *0.5*	? -	4.8 ± *0.5*	
158-Sm	5.30 ± *0.03*	m	0+	5.3	0.0 +	5.30 ± *0.03*	0.0 +	5.30 ± *0.03*	0.0 +	5.30 ±*0.03*	0+
158-Eu	45.9 ± *0.2*	m	(1-)	45.9	1	45.9 ± *0.2*	1.0 -	45.9 ± *0.2*	1.0 -	45.9 ±*0.2*	(1-)
158-Gd	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
158-Tb	180 ± *11.0*	y	3-	180	3	180 ± *11.0*	3.0 -	180 ± *11.0*	3.0 -	180 ±*11.0*	3-
158-Dy	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
158-Ho	11.3 ± *0.4*	m	5+	11.3	5.0 +	11.3 ± *0.4*	5.0 +	11.3 ± *0.4*	5.0 +	11.3 ±*0.4*	5+
158-Er	2.29 ± *0.06*	h	0+	2.29	0.0 +	2.29 ± *0.06*	0.0 +	2.29 ± *0.06*	0.0 +	2.29 ±*0.06*	0+
158-Tm	3.98 ± *0.06*	m	2-	3.98	2	3.98 ± *0.06*	2.0 -	3.98 ± *0.06*	2.0 -	3.98 ±*0.06*	2-
158-Yb	1.49 ± *0.13*	m	0+	1.49	0.0 +	1.49 ± *0.13*	0.0 +	1.49 ± *0.13*	0.0 +	1.49 ±*0.13*	0+
158-Lu	10.6 ± *0.3*	s	2-	10.6	2	10.6 ± *0.3*	2.0 -	10.6 ± *0.3*	**? -**	10.6 ±*0.3*	
158-Hf	2.85 ± *0.07*	s	0+	2.85	0.0 +	2.85 ± *0.07*	0.0 +	2.85 ± *0.07*	0.0 +	2.85 ±*0.07*	0+
158-Ta	49 ± *8.0*	ms	(2-)	49	2	49 ± *8.0*	2.0 -	**55 ± *15.0***	2.0 -	**55 ±*15.0***	(2-)
158-W	1.25 ± *0.21*	ms	0+	1.25	0.0 +	**1.37 ± *0.17***	0.0 +	1.25 ± *0.21*	0.0 +	1.25 ±*0.21*	0+
159-Pr	100#	ms	5/2-#	100	2.5	100 ± *0.0*	2.5 -	**106 ± *0.0***	**? -**		
159-Nd	500# ± *3E-4*	ms	7/2+#	500	3.5 +	500 ± *100.0*	3.5 +	**773 ± *0.0***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
159-Pm	1.5 ± *0.2*	s	5/2-#	1.5	2.5	**3 ± *0.6***	2.5 -	1.5 ± *0.15*	**? -**	1.5 ± *0.2*	
159-Sm	11.37 ± *0.15*	s	5/2-	11.37	2.5	11.37 ± *0.15*	2.5 -	11.37 ± *0.15*	2.5 -	11.37 ±*0.15*	5/2-
159-Eu	18.1 ± *0.1*	m	5/2+	18.1	2.5 +	18.1 ± *0.1*	2.5 +	18.1 ± *0.1*	2.5 +	18.1 ±*0.1*	5/2+
159-Gd	18.479 ± *0.0040*	h	3/2-	18.478	1.5	18.479 ±*0.0040*	1.5 -	18.479 ±*0.0040*	1.5 -	18.479 ±*0.0040*	3/2-
159-Tb	stable		3/2+	stable	1.5 +	stable	**1.5 -**	stable	**1.5 -**		3/2+
159-Dy	144.4 ± *0.2*	d	3/2-	144.4	1.5	144.4 ± *0.2*	1.5 -	144.4 ± *0.2*	1.5 -	144.4 ±*0.2*	3/2-
159-Ho	33.05 ± *0.11*	m	7/2-	33.05	3.5	33.05 ± *0.11*	3.5 -	33.05 ± *0.11*	3.5 -	33.05 ±*0.11*	7/2-
159-Er	36 ± *1.0*	m	3/2-	36	1.5	36 ± *1.0*	1.5 -	36 ± *1.0*	1.5 -	36 ± *1.0*	3/2-
159-Tm	9.13 ± *0.16*	m	5/2+	9.13	2.5 +	9.13 ± *0.16*	2.5 +	9.13 ± *0.16*	2.5 +	9.13 ±*0.16*	5/2+
159-Yb	1.67 ± *0.09*	m	5/2(-)	1.67	2.5	**1.72 ± *0.1***	2.5 -	1.67 ± *0.09*	2.5 -	1.67 ±*0.09*	5/2(-)
159-Lu	12.1 ± *1.0*	s	1/2+	12.1	0.5 +	12.1 ± *1.0*	0.5 +	12.1 ± *1.0*	**? -**	12.1 ±*1.0*	
159-Hf	5.20 ± *0.1*	s	7/2-	5.2	3.5	5.20 ± *0.1*	3.5 -	**5.60 ± *0.4***	3.5 -	**5.60 ±*0.4***	7/2-
159-Ta	1.04 ± *0.09*	s	1/2+	1.04	0.5 +	1.04 ± *0.09*	0.5 +	**0.830 ± *0.18***	**0.5 -**	**0.830 ±*0.18***	1/2+
159-W	8.2 ± *0.7*	ms	7/2-#	8.2	3.5	8.2 ± *0.7*	3.5 -	**7.3 ± *2.7***	**? -**	**7.3 ±*2.7***	
159-Re	40#	us	1/2+#	40	0.5 +						(1/2+)
160-Nd	300# ± *3E-4*	ms	0+	300	0.0 +	300 ± *60.0*	0.0 +	**588 ± *0.0***	**? -**		
160-Pm	2# ± *3E-7*	s		2	?	2 ± *0.4*	**1.0 -**	2 ± *0.0*	? -		
160-Sm	9.6 ± *0.3*	s	0+	9.6	0.0 +	9.6 ± *0.3*	0.0 +	9.6 ± *0.3*	0.0 +	9.6 ± *0.3*	0+
160-Eu	38 ± *4.0*	s	(1)(-#)	38	1	38 ± *4.0*	1.0 -	38 ± *4.0*	**1.0 -**	38 ± *4.0*	**1**
160-Gd	stable ± *9E26*		0+	stable	0.0 +	**4E+24 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +		0+
160-Tb	72.3 ± *0.2*	d	3-	72.3	3	72.3 ± *0.2*	3.0 -	72.3 ± *0.2*	3.0 -	72.3 ±*0.2*	3-
160-Dy	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
160-Ho	25.6 ± *0.3*	m	5+	25.6	5.0 +	25.3 ± *0.7*	5.0 +	25.6 ± *0.3*	5.0 +	25.6 ±*0.3*	5+
160-Er	28.58 ± *0.09*	h	0+	28.58	0.0 +	28.58 ± *0.09*	0.0 +	28.58 ± *0.09*	0.0 +	28.58 ±*0.09*	0+
160-Tm	9.4 ± *0.3*	m	1-	9.4	1	9.4 ± *0.3*	1.0 -	9.4 ± *0.3*	1.0 -	9.4 ± *0.3*	1-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
160-Yb	4.8 ± *0.2*	m	0+	4.8	0.0 +	4.8 ± *0.2*	0.0 +	4.8 ± *0.2*	0.0 +	4.8 ± *0.2*	0+
160-Lu	36.1 ± *0.3*	s	2-#	36.1	2	36.1 ± *0.3*	2.0 -	36.1 ± *0.3*	**? -**	36.1 ±*0.3*	
160-Hf	13.6 ± *0.2*	s	0+	13.6	0.0 +	13.6 ± *0.2*	0.0 +	13.6 ± *0.2*	0.0 +	13.6 ±*0.2*	0+
160-Ta	1.70 ± *0.2*	s	(2-)	1.7	2	1.70 ± *0.2*	2.0 -	**1.55 ± *0.04***	**? -**	**1.55 ±*0.04***	
160-W	90 ± *5.0*	ms	0+	90	0.0 +	90 ± *5.0*	0.0 +	91 ± *5.0*	0.0 +	91 ± *5.0*	0+
160-Re	611 ± *7.0*	us	(4-)	611	4	**860 ± *120.0***	**2.0 -**	**850 ± *120.0***	**2.0 -**	**820 ±*0.0***	(2-)
161-Nd	200#	ms	1/2-#	200	0.5	200 ± *0.0*	0.5 -	**488 ± *0.0***	**? -**		
161-Pm	700# ± *3E-4*	ms	5/2-#	700	2.5	700 ± *0.0*	2.5 -	**1.07E+3 ±*0.0***	**? -**		
161-Sm	4.8 ± *0.4*	s	7/2+#	4.8	3.5 +	4.8 ± *0.8*	3.5 +	4.8 ± *0.8*	**? -**	4.8 ± *0.4*	
161-Eu	26 ± *3.0*	s	5/2+#	26	2.5 +	26 ± *3.0*	2.5 +	26 ± *3.0*	**? -**	26 ± *3.0*	
161-Gd	3.646 ± *0.0030*	m	5/2-	3.647	2.5	3.660 ± *0.05*	2.5 -	3.660 ± *0.05*	2.5 -	3.660 ±*0.05*	5/2-
161-Tb	6.89 ± *0.02*	d	3/2+	6.89	1.5 +	6.89 ± *0.03*	1.5 +	6.91 ± *0.019*	1.5 +	6.89 ±*0.02*	3/2+
161-Dy	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+
161-Ho	2.48 ± *0.05*	h	7/2-	2.48	3.5	2.48 ± *0.12*	3.5 -	2.48 ± *0.05*	3.5 -	2.48 ±*0.05*	7/2-
161-Er	3.21 ± *0.03*	h	3/2-	3.21	1.5	3.21 ± *0.03*	1.5 -	3.21 ± *0.03*	1.5 -	3.21 ±*0.03*	3/2-
161-Tm	30.2 ± *0.8*	m	7/2+	30.2	3.5 +	30.2 ± *0.8*	3.5 +	30.2 ± *0.8*	3.5 +	30.2 ±*0.8*	7/2+
161-Yb	4.2 ± *0.2*	m	3/2-	4.2	1.5	4.2 ± *0.2*	1.5 -	4.2 ± *0.2*	1.5 -	4.2 ± *0.2*	3/2-
161-Lu	77 ± *2.0*	s	1/2+	77	0.5 +	77 ± *2.0*	0.5 +	77 ± *2.0*	0.5 +	77 ± *2.0*	1/2+
161-Hf	18.2 ± *0.5*	s	3/2-#	18.2	1.5	18.2 ± *0.5*	1.5 -	18.2 ± *0.5*	**? -**	18.2 ±*0.5*	
161-Ta	3#	s	(1/2+)	3	0.5 +	3 ± *0.0*	0.5 +	3 ± *0.1*	**? -**		(1/2+)
161-W	409 ± *16.0*	ms	7/2-#	409	3.5	409 ± *16.0*	3.5 -	409 ± *18.0*	**? -**	409 ±*18.0*	
161-Re	440 ± *1.0*	us	1/2+	440	0.5 +	**1.50E+4 ±*4000.0***	0.5 +	**370 ± *40.0***	0.5 +	440 ±*10.0*	1/2+
161-Os	640 ± *60.0*	us	(7/2-)	640	3.5					640 ±*60.0*	(7/2-)
162-Pm	500# ± *3E-4*	ms		500	?	500 ± *0.0*	? -	**268 ± *0.0***	? -		
162-Sm	2.4 ± *0.5*	s	0+	2.4	0.0 +	2.4 ± *0.5*	0.0 +	2.4 ± *0.5*	0.0 +	2.4 ± *0.5*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
162-Eu	10.6 ± *1.0*	s		10.6	?	10.6 ± *1.0*	? -	10.6 ± *1.0*	? -	10.6 ±*1.0*	
162-Gd	8.4 ± *0.2*	m	0+	8.4	0.0 +	8.4 ± *0.2*	0.0 +	8.4 ± *0.2*	0.0 +	8.4 ± *0.2*	0+
162-Tb	7.60 ± *0.15*	m	(1-)	7.6	1	7.60 ± *0.15*	1.0 -	7.60 ± *0.15*	1.0 -	7.60 ±*0.15*	1-
162-Dy	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
162-Ho	15.0 ± *1.0*	m	1+	15	1.0 +	15 ± *1.0*	1.0 +	15 ± *1.0*	1.0 +	15 ± *1.0*	1+
162-Er	stable ± *4E21*		0+	stable	0.0 +	**4E+21 ± *0.0***	0.0 +	stable	0.0 +		0+
162-Tm	21.70 ± *0.19*	m	1-	21.7	1	21.70 ± *0.19*	1.0 -	21.70 ± *0.19*	1.0 -	21.70 ±*0.19*	1-
162-Yb	18.87 ± *0.19*	m	0+	18.87	0.0 +	18.87 ± *0.19*	0.0 +	18.87 ± *0.19*	0.0 +	18.87 ±*0.19*	0+
162-Lu	1.37 ± *0.02*	m	1(-)	1.37	1	1.37 ± *0.02*	1.0 -	1.37 ± *0.02*	1.0 -	1.37 ±*0.02*	1-
162-Hf	39.4 ± *0.9*	s	0+	39.4	0.0 +	39.4 ± *0.9*	0.0 +	39.4 ± *0.9*	0.0 +	39.4 ±*0.9*	0+
162-Ta	3.57 ± *0.12*	s	7+#	3.57	7.0 +	3.57 ± *0.12*	**3.0 +**	3.57 ± *0.12*	**? -**	3.57 ±*0.12*	
162-W	1.36 ± *0.07*	s	0+	1.36	0.0 +	1.36 ± *0.07*	0.0 +	1.36 ± *0.07*	0.0 +	1.36 ±*0.07*	0+
162-Re	107 ± *13.0*	ms	(2-)	107	2	107 ± *13.0*	2.0 -	107 ± *13.0*	2.0 -	107 ±*13.0*	(2-)
162-Os	2.1 ± *0.1*	ms	0+	2.1	0.0 +	**1.9 ± *0.7***	0.0 +	2.1 ± *0.1*	0.0 +	2.1 ± *0.1*	0+
163-Pm	200# ± *3E-4*	ms	5/2-#	200	2.5	200 ± *0.0*	2.5 -	200 ± *0.0*	**? -**		
163-Sm	1# ± *3E-7*	s	1/2-#	1	0.5	1 ± *0.0*	0.5 -	**2 ± *0.0***	**? -**		
163-Eu	7.7 ± *0.4*	s	5/2+#	7.7	2.5 +	**6 ± *0.0***	2.5 +	7.7 ± *0.4*	**? -**	7.7 ± *0.4*	
163-Gd	68 ± *3.0*	s	7/2+#	68	3.5 +	68 ± *3.0*	**2.5 -**	68 ± *3.0*	**? -**	68 ± *3.0*	**(5/2-,7/2+)**
163-Tb	19.5 ± *0.3*	m	3/2+	19.5	1.5 +	19.5 ± *0.3*	1.5 +	19.5 ± *0.3*	1.5 +	19.5 ±*0.3*	3/2+
163-Dy	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
163-Ho	4.570 ± *0.025*	ky	7/2-	4.57	3.5	4.570 ± *0.021*	3.5 -	4.570 ± *0.025*	3.5 -	4.570 ±*0.025*	7/2-
163-Er	75.0 ± *0.4*	m	5/2-	75	2.5	75 ± *0.4*	2.5 -	75 ± *0.4*	2.5 -	75 ± *0.4*	5/2-
163-Tm	1.810 ± *0.0050*	h	1/2+	1.81	0.5 +	1.810 ±*0.0050*	0.5 +	1.810 ±*0.0050*	0.5 +	1.810 ±*0.0050*	1/2+
163-Yb	11.05 ± *0.35*	m	3/2-	11.05	1.5	11.05 ± *0.25*	1.5 -	11.05 ± *0.35*	1.5 -	11.05 ±*0.35*	3/2-
163-Lu	3.97 ± *0.13*	m	1/2(+)	3.97	0.5 +	3.97 ± *0.13*	0.5 +	3.97 ± *0.13*	0.5 +	3.97 ±*0.13*	1/2(+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
163-Hf	40.0 ± *0.6*	s	3/2-#	40	1.5	40 ± *0.6*	1.5 -	40 ± *0.6*	**? -**	40 ± *0.6*	
163-Ta	10.6 ± *1.8*	s	1/2+	10.6	0.5 +	10.6 ± *1.8*	0.5 +	10.6 ± *1.8*	**? -**	10.6 ±*1.8*	
163-W	2.63 ± *0.09*	s	7/2-	2.63	3.5	**2.80 ± *0.2***	**1.5 -**	**2.80 ± *0.2***	**? -**	2.67 ±*0.1*	7/2-
163-Re	390 ± *70.0*	ms	1/2+	390	0.5 +	390 ± *70.0*	0.5 +	390 ± *72.0*	0.5 +	390 ±*72.0*	1/2+
163-Os	5.5 ± *0.6*	ms	7/2-#	5.5	3.5	5.5 ± *0.6*	3.5 -	5.5 ± *0.6*	**? -**	5.5 ± *0.6*	(7/2-)
164-Sm	500# ± *3E-4*	ms	0+	500	0.0 +	500 ± *0.0*	0.0 +	**1.23E+3 ±*0.0***	**? -**		
164-Eu	4.2 ± *0.2*	s		4.2	?	**2 ± *0.0***	? -	**2.8 ± *0.0***	? -	4.2 ± *0.2*	
164-Gd	45 ± *3.0*	s	0+	45	0.0 +	45 ± *3.0*	0.0 +	45 ± *3.0*	0.0 +	45 ± *3.0*	0+
164-Tb	3.0 ± *0.1*	m	(5+)	3	5.0 +	3 ± *0.1*	5.0 +	3 ± *0.1*	5.0 +	3 ± *0.1*	(5+)
164-Dy	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
164-Ho	29 ± *1.0*	m	1+	29	1.0 +	29 ± *0.6*	1.0 +	29 ± *1.0*	1.0 +	29 ± *1.0*	1+
164-Er	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
164-Tm	2.0 ± *0.1*	m	1+	2	1.0 +	2 ± *0.1*	1.0 +	2 ± *0.1*	1.0 +	2 ± *0.1*	1+
164-Yb	75.8 ± *1.7*	m	0+	75.8	0.0 +	75.8 ± *1.7*	0.0 +	75.8 ± *1.7*	0.0 +	75.8 ±*1.7*	0+
164-Lu	3.14 ± *0.03*	m	1(-)	3.14	1	3.14 ± *0.03*	1.0 -	3.14 ± *0.03*	1.0 -	3.14 ±*0.03*	1(-)
164-Hf	111 ± *8.0*	s	0+	111	0.0 +	111 ± *8.0*	0.0 +	111 ± *8.0*	0.0 +	111 ± *8.0*	0+
164-Ta	14.2 ± *0.3*	s	(3+)	14.2	3.0 +	14.2 ± *0.3*	3.0 +	14.2 ± *0.3*	3.0 +	14.2 ±*0.3*	(3+)
164-W	6.3 ± *0.2*	s	0+	6.3	0.0 +	6.3 ± *0.2*	0.0 +	6.3 ± *0.2*	0.0 +	6.3 ± *0.2*	0+
164-Re	719 ± *161.0*	ms	(2-)	719	2	**0.00000100 ± *1.0E-6***	**? -**	**530 ± *230.0***	**? -**	**530 ±*230.0***	
164-Os	21 ± *1.0*	ms	0+	21	0.0 +	21 ± *1.0*	0.0 +	21 ± *1.0*	0.0 +	21 ± *1.0*	0+
164-Ir	1#	ms	2-#	1	2	1 ± *0.0*	2.0 -	**1E+2 ± *0.0***	**? -**		
165-Sm	200# ± *3E-4*	ms	5/2-#	200	2.5	200 ± *0.0*	2.5 -	**764 ± *0.0***	**? -**		
165-Eu	2.7 ± *0.3*	s	5/2+#	2.7	2.5 +	**1 ± *0.0***	2.5 +	**2.3 ± *0.2***	**? -**	**2.3 ±*0.2***	
165-Gd	10.3 ± *1.6*	s	1/2-#	10.3	0.5	10.3 ± *1.6*	0.5 -	10.3 ± *1.6*	**? -**	10.3 ±*1.6*	
165-Tb	2.11 ± *0.1*	m	3/2+#	2.11	1.5 +	2.11 ± *0.1*	1.5 +	2.11 ± *0.1*	1.5 +	2.11 ±*0.1*	(3/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	**Units**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**	**Half-life**	**Jp**
165-Dy	2.334 ± *0.0010*	h	7/2+	2.334	3.5 +	2.334 ±*0.0060*	3.5 +	2.334 ±*0.0010*	3.5 +	2.334 ±*0.0010*	7/2+
165-Ho	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
165-Er	10.36 ± *0.04*	h	5/2-	10.36	2.5	10.36 ± *0.04*	2.5 -	10.36 ± *0.04*	2.5 -	10.36 ±*0.04*	5/2-
165-Tm	30.06 ± *0.03*	h	1/2+	30.06	0.5 +	30.06 ± *0.03*	0.5 +	30.06 ± *0.03*	0.5 +	30.06 ±*0.03*	1/2+
165-Yb	9.9 ± *0.3*	m	5/2-	9.9	2.5	9.9 ± *0.3*	2.5 -	9.9 ± *0.3*	2.5 -	9.9 ± *0.3*	5/2-
165-Lu	10.74 ± *0.1*	m	1/2+	10.74	0.5 +	10.74 ± *0.1*	0.5 +	10.74 ± *0.1*	0.5 +	10.74 ±*0.1*	1/2+
165-Hf	76 ± *4.0*	s	(5/2-)	76	2.5	76 ± *4.0*	2.5 -	76 ± *4.0*	2.5 -	76 ± *4.0*	(5/2-)
165-Ta	31.0 ± *1.5*	s	(1/2+;3/2+)	31	1.5 +	31 ± *1.5*	**2.5 -**	31 ± *1.5*	**? -**	31 ± *1.5*	**(9/2-)**
165-W	5.1 ± *0.5*	s	(5/2-)	5.1	2.5	5.1 ± *0.5*	**1.5 -**	5.1 ± *0.5*	2.5 -	5.1 ± *0.5*	(5/2-)
165-Re	2.62 ± *0.14*	s	(1/2+)	2.62	0.5 +	**1 ± *0.0***	0.5 +	**1 ± *0.1***	0.5 +	2.61 ±*0.0*	(1/2+)
165-Os	71 ± *3.0*	ms	(7/2-)	71	3.5	71 ± *3.0*	3.5 -	71 ± *3.0*	3.5 -	71 ± *3.0*	(7/2-)
165-Ir	50# ± *100*	ns	1/2+#	50	0.5 +	**1.0E+3 ± *0.0***	0.5 +	**1.0E+3 ± *0.0***	0.5 +	**1.0E+3 ± *0.0***	(1/2+)
166-Eu	1.7 ± *0.3*	s		1.7	?	**0.40 ± *0.0***	? -	**0.40 ± *0.04***	? -		
166-Gd	4.8 ± *1.0*	s	0+	4.8	0.0 +	4.8 ± *1.0*	0.0 +	4.8 ± *1.0*	0.0 +	4.8 ± *1.0*	0+
166-Tb	25.1 ± *2.1*	s	(2-)	25.1	2	25.6 ± *2.2*	**? -**	25.1 ± *2.1*	2.0 -	25.1 ±*2.1*	(2-)
166-Dy	81.6 ± *0.1*	h	0+	81.6	0.0 +	81.6 ± *0.17*	0.0 +	81.6 ± *0.1*	0.0 +	81.6 ±*0.1*	0+
166-Ho	26.824 ± *0.012*	h	0-	26.825	0	26.800 ± *0.02*	0.0 -	26.800 ± *0.02*	0.0 -	26.824 ±*0.012*	0-
166-Er	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
166-Tm	7.70 ± *0.03*	h	2+	7.7	2.0 +	7.70 ± *0.03*	2.0 +	7.70 ± *0.03*	2.0 +	7.70 ±*0.03*	2+
166-Yb	56.7 ± *0.1*	h	0+	56.7	0.0 +	56.7 ± *0.1*	0.0 +	56.7 ± *0.1*	0.0 +	56.7 ±*0.1*	0+
166-Lu	2.65 ± *0.1*	m	6-	2.65	6	2.65 ± *0.1*	6.0 -	2.65 ± *0.1*	6.0 -	2.65 ±*0.1*	6-
166-Hf	6.77 ± *0.3*	m	0+	6.77	0.0 +	6.77 ± *0.3*	0.0 +	6.77 ± *0.3*	0.0 +	6.77 ±*0.3*	0+
166-Ta	34.4 ± *0.5*	s	(2)+	34.4	2.0 +	34.4 ± *0.5*	2.0 +	34.4 ± *0.5*	2.0 +	34.4 ±*0.5*	(2)+
166-W	19.2 ± *0.6*	s	0+	19.2	0.0 +	19.2 ± *0.6*	0.0 +	19.2 ± *0.6*	0.0 +	19.2 ±*0.6*	0+
166-Re	2.25 ± *0.21*	s	(7+)	2.25	7.0 +	**2 ± *0.0***	**2.0 -**	2.25 ± *0.21*	**? -**	2.25 ±*0.21*	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
166-Os	216 ± *9.0*	ms	0+	216	0.0 +	216 ± *9.0*	0.0 +	**199 ± *3.0***	0.0 +	**199 ±*3.0***	0+
166-Ir	10.5 ± *2.2*	ms	(2-)	10.5	2	10.5 ± *2.2*	2.0 -	10.5 ± *2.2*	2.0 -	10.5 ±*2.2*	(2-)
166-Pt	300 ± *100.0*	us	0+	300	0.0 +	300 ± *100.0*	0.0 +	300 ± *100.0*	0.0 +	300 ±*100.0*	0+
167-Eu	200# ± *3E-4*	ms	5/2+#	200	2.5 +	200 ± *0.0*	2.5 +	200 ± *20.0*	**? -**		
167-Gd	3# ± *3E-7*	s	5/2-#	3	2.5	3 ± *0.0*	2.5 -	3 ± *0.0*	**? -**		
167-Tb	19 ± *3.0*	s	3/2+#	19	1.5 +	19 ± *3.0*	1.5 +	19 ± *2.7*	1.5 +	19 ± *2.7*	(3/2+)
167-Dy	6.20 ± *0.08*	m	(1/2-)	6.2	0.5	6.20 ± *0.08*	0.5 -	6.20 ± *0.08*	0.5 -	6.20 ±*0.08*	(1/2-)
167-Ho	3.1 ± *0.1*	h	7/2-	3.1	3.5	3.1 ± *0.1*	3.5 -	3.1 ± *0.1*	3.5 -	3.1 ± *0.1*	7/2-
167-Er	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
167-Tm	9.25 ± *0.02*	d	1/2+	9.25	0.5 +	9.25 ± *0.014*	0.5 +	9.25 ± *0.02*	0.5 +	9.25 ±*0.02*	1/2+
167-Yb	17.5 ± *0.2*	m	5/2-	17.5	2.5	17.5 ± *0.2*	2.5 -	17.5 ± *0.2*	2.5 -	17.5 ±*0.2*	5/2-
167-Lu	51.5 ± *1.0*	m	7/2+	51.5	3.5 +	51.5 ± *1.0*	3.5 +	51.5 ± *1.0*	3.5 +	51.5 ±*1.0*	7/2+
167-Hf	2.05 ± *0.05*	m	(5/2)-	2.05	2.5	2.05 ± *0.05*	2.5 -	2.05 ± *0.05*	2.5 -	2.05 ±*0.05*	(5/2)-
167-Ta	1.33 ± *0.07*	m	(3/2+)	1.33	1.5 +	1.33 ± *0.07*	1.5 +	1.33 ± *0.0667*	1.5 +	1.33 ±*0.0667*	(3/2+)
167-W	19.9 ± *0.5*	s	3/2-#	19.9	1.5	19.9 ± *0.5*	1.5 -	19.9 ± *0.5*	**? +**	19.9 ±*0.5*	**(+)**
167-Re	3.4 ± *0.4*	s	(9/2-)	3.4	4.5	3.4 ± *0.4*	4.5 -	**5.9 ± *0.3***	4.5 -	**5.9 ±*0.3***	(9/2-)
167-Os	839 ± *5.0*	ms	7/2-	839	3.5	**810 ± *60.0***	**1.5 -**	**810 ± *60.0***	**? -**	**810 ±*60.0***	(7/2-)
167-Ir	29.3 ± *0.6*	ms	1/2+	29.3	0.5 +	**35.2 ± *2.0***	0.5 +	**35.2 ± *2.0***	0.5 +	**35.2 ±*2.0***	1/2+
167-Pt	800 ± *160.0*	us	7/2-#	800	3.5	**700 ± *200.0***	3.5 -	**780 ± *160.0***	**? -**	**700 ±*200.0***	
168-Eu	>300ns	ns									
168-Gd	300# ± *3E-4*	ms	0+	300	0.0 +	300 ± *0.0*	0.0 +	300 ± *0.0*	0.0 +		
168-Tb	8.2 ± *1.3*	s	4-#	8.2	4	8.2 ± *1.3*	4.0 -	8.2 ± *1.3*	4.0 -	8.2 ± *1.3*	(4-)
168-Dy	8.7 ± *0.3*	m	0+	8.7	0.0 +	8.7 ± *0.3*	0.0 +	8.7 ± *0.3*	0.0 +	8.7 ± *0.3*	0+
168-Ho	2.99 ± *0.07*	m	3+	2.99	3.0 +	2.99 ± *0.07*	3.0 +	2.99 ± *0.07*	3.0 +	2.99 ±*0.07*	3+
168-Er	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
168-Tm	93.1 ± *0.2*	d	3+	93.1	3.0 +	**90 ± *4.0***	3.0 +	93.1 ± *0.2*	3.0 +	93.1 ±*0.2*	3+
168-Yb	stable ± *4E21*		0+	stable	0.0 +	**4E+21 ± *0.0***	0.0 +	stable	0.0 +		0+
168-Lu	5.5 ± *0.1*	m	6(-)	5.5	6	5.5 ± *0.1*	6.0 -	5.5 ± *0.1*	6.0 -	5.5 ± *0.1*	6(-)
168-Hf	25.95 ± *0.2*	m	0+	25.95	0.0 +	25.95 ± *0.2*	0.0 +	25.95 ± *0.2*	0.0 +	25.95 ±*0.2*	0+
168-Ta	2.0 ± *0.1*	m	(2-;3+)	2	**?**	2 ± *0.1*	**? -**	2 ± *0.1*	**? -**	2 ± *0.1*	**(2-,3+)**
168-W	50.9 ± *1.9*	s	0+	50.9	0.0 +	51 ± *2.0*	0.0 +	**53 ± *2.0***	0.0 +	50.9 ±*1.9*	0+
168-Re	4.4 ± *0.1*	s	(7+)	4.4	7.0 +	4.4 ± *0.1*	**? -**	4.4 ± *0.1*	**? -**	4.4 ± *0.1*	(7+)
168-Os	2.1 ± *0.1*	s	0+	2.1	0.0 +	2.1 ± *0.07*	0.0 +	2.1 ± *0.1*	0.0 +	2.1 ± *0.1*	0+
168-Ir	230 ± *50.0*	ms	(2-)	230	2	**161 ± *21.0***	**? -**	232 ± *50.0*	**? -**	**222 ±*0.0***	
168-Pt	2.02 ± *0.1*	ms	0+	2.02	0.0 +	2 ± *0.4*	0.0 +	2 ± *0.4*	0.0 +	2.02 ±*0.1*	0+
169-Gd	1# ± *3E-7*	s	7/2-#	1	3.5	1 ± *0.0*	3.5 -	1 ± *0.0*	**? -**		
169-Tb	2# ± *3E-7*	s	3/2+#	2	1.5 +	2 ± *0.0*	1.5 +	2 ± *0.2*	**? -**		
169-Dy	39 ± *8.0*	s	(5/2)-	39	2.5	39 ± *8.0*	2.5 -	39 ± *8.0*	2.5 -	39 ± *8.0*	(5/2)-
169-Ho	4.72 ± *0.1*	m	7/2-	4.72	3.5	4.70 ± *0.1*	3.5 -	4.72 ± *0.1*	3.5 -	4.72 ±*0.1*	7/2-
169-Er	9.392 ± *0.018*	d	1/2-	9.392	0.5	9.400 ± *0.02*	0.5 -	9.392 ± *0.018*	0.5 -	9.392 ±*0.018*	1/2-
169-Tm	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
169-Yb	32.018 ± *0.0050*	d	7/2+	32.014	3.5 +	32.018 ±*0.0050*	3.5 +	32.018 ±*0.0050*	3.5 +	32.018 ±*0.0050*	7/2+
169-Lu	34.06 ± *0.05*	h	7/2+	34.06	3.5 +	34.06 ± *0.05*	3.5 +	34.06 ± *0.05*	3.5 +	34.06 ±*0.05*	7/2+
169-Hf	3.24 ± *0.04*	m	(5/2-)	3.24	2.5	3.24 ± *0.04*	2.5 -	3.24 ± *0.04*	2.5 -	3.24 ±*0.04*	5/2-
169-Ta	4.9 ± *0.4*	m	(5/2+)	4.9	2.5 +	4.9 ± *0.4*	2.5 +	4.9 ± *0.4*	2.5 +	4.9 ± *0.4*	(5/2+)
169-W	74 ± *6.0*	s	5/2-#	74	2.5	**76 ± *6.0***	2.5 -	74 ± *6.0*	2.5 -	74 ± *6.0*	(5/2-)
169-Re	8.1 ± *0.5*	s	(9/2-)	8.1	4.5	8.1 ± *0.5*	4.5 -	8.1 ± *0.5*	4.5 -	8.1 ± *0.5*	(9/2-)
169-Os	3.46 ± *0.11*	s	(5/2-)	3.46	2.5	3.46 ± *0.11*	**1.5 -**	3.43 ± *0.14*	2.5 -	3.43 ±*0.14*	(5/2-)
169-Ir	353 ± *4.0*	ms	(1/2+)	353	0.5 +	**400 ± *100.0***	0.5 +	**640 ± *350.0***	0.5 +	353 ± *4.0*	(1/2+)
169-Pt	6.99 ± *0.09*	ms	(7/2-)	6.99	3.5	**3.70 ± *1.5***	**1.5 -**	7 ± *0.2*	3.5 -	7 ± *0.2*	(7/2-)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
169-Au	150#	us	1/2+#	150	0.5 +	150 ± *0.0*	0.5 +	150 ± *0.0*	**? -**		
170-Gd	>300ns	ns	0+								
170-Tb	3# ± *3E-7*	s		3	?	3 ± *0.0*	? -	3 ± *0.3*	? -		
170-Dy	30#	s	0+	30	0.0 +	30 ± *0.0*	0.0 +	30 ± *0.0*	0.0 +		0+
170-Ho	2.76 ± *0.05*	m	6+#	2.76	6.0 +	2.78 ± *0.14*	6.0 +	2.76 ± *0.05*	6.0 +	2.76 ±*0.05*	(6+)
170-Er	stable ± *1E25*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
170-Tm	128.6 ± *0.3*	d	1-	128.6	1	128.6 ± *0.3*	1.0 -	128.6 ± *0.3*	1.0 -	128.6 ±*0.3*	1-
170-Yb	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
170-Lu	2.012 ± *0.02*	d	0+	2.012	0.0 +	2.012 ± *0.02*	0.0 +	2.012 ± *0.021*	0.0 +	2.012 ±*0.02*	0+
170-Hf	16.01 ± *0.13*	h	0+	16.01	0.0 +	16.01 ± *0.13*	0.0 +	16.01 ± *0.13*	0.0 +	16.01 ±*0.13*	0+
170-Ta	6.76 ± *0.06*	m	(3)(+#)	6.76	3.0 +	6.76 ± *0.06*	3.0 +	6.76 ± *0.06*	3.0 +	6.76 ±*0.06*	(3+)
170-W	2.42 ± *0.04*	m	0+	2.42	0.0 +	2.42 ± *0.04*	0.0 +	2.42 ± *0.04*	0.0 +	2.42 ±*0.04*	0+
170-Re	9.2 ± *0.2*	s	(5+)	9.2	5.0 +	9.2 ± *0.2*	5.0 +	9.2 ± *0.2*	5.0 +	9.2 ± *0.2*	(5+)
170-Os	7.37 ± *0.18*	s	0+	7.37	0.0 +	7.46 ± *0.23*	0.0 +	7.37 ± *0.18*	0.0 +	7.37 ±*0.18*	0+
170-Ir	910 ± *150.0*	ms	(3-)	910	3	910 ± *150.0*	**? -**	900 ± *150.0*	3.0 -	**870 ±*0.0***	(3-)
170-Pt	13.93 ± *0.16*	ms	0+	13.93	0.0 +	13.80 ± *0.5*	0.0 +	14 ± *0.2*	0.0 +	13.80 ±*0.5*	0+
170-Au	290 ± *50.0*	us	(2-)	290	2	**310 ± *50.0***	2.0 -	291 ± *45.0*	2.0 -	**300 ±*0.0***	(2-)
171-Tb	500# ± *3E-4*	ms	3/2+#	500	1.5 +	500 ± *0.0*	1.5 +	500 ± *50.0*	**? -**		
171-Dy	6# ± *3E-7*	s	7/2-#	6	3.5	6 ± *0.0*	3.5 -	6 ± *0.0*	**? -**		
171-Ho	53 ± *2.0*	s	7/2-#	53	3.5	53 ± *2.0*	3.5 -	53 ± *2.0*	3.5 -	53 ± *2.0*	(7/2-)
171-Er	7.516 ± *0.0020*	h	5/2-	7.517	2.5	7.516 ±*0.0020*	2.5 -	7.516 ±*0.0020*	2.5 -	7.516 ±*0.0020*	5/2-
171-Tm	1.92 ± *0.01*	y	1/2+	1.92	0.5 +	1.92 ± *0.0137*	0.5 +	1.92 ± *0.01*	0.5 +	1.92 ±*0.01*	1/2+
171-Yb	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
171-Lu	8.24 ± *0.03*	d	7/2+	8.24	3.5 +	8.25 ± *0.03*	3.5 +	8.24 ± *0.03*	3.5 +	8.24 ±*0.03*	7/2+
171-Hf	12.1 ± *0.4*	h	7/2+	12.1	3.5 +	12.1 ± *0.4*	3.5 +	12.1 ± *0.4*	3.5 +	12.1 ±*0.4*	7/2(+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
171-Ta	23.3 ± *0.3*	m	(5/2-)	23.3	2.5	23.3 ± *0.3*	2.5 -	23.3 ± *0.3*	2.5 -	23.3 ±*0.3*	(5/2-)
171-W	2.38 ± *0.04*	m	(5/2-)	2.38	2.5	2.38 ± *0.04*	2.5 -	2.38 ± *0.04*	2.5 -	2.38 ±*0.04*	(5/2-)
171-Re	15.2 ± *0.4*	s	(9/2-)	15.2	4.5	15.2 ± *0.4*	4.5 -	15.2 ± *0.4*	4.5 -	15.2 ±*0.4*	(9/2-)
171-Os	8.3 ± *0.2*	s	(5/2-)	8.3	2.5	8.3 ± *0.2*	2.5 -	8.3 ± *0.2*	2.5 -	8.3 ± *0.2*	(5/2-)
171-Ir	3.1 ± *0.3*	s	1/2+	3.1	0.5 +	**3.6 ± *1.0***	0.5 +	**3.5 ± *1.0***	0.5 +	**3.2 ±*0.0***	(1/2+)
171-Pt	45.5 ± *2.5*	ms	7/2-	45.5	3.5	**44 ± *7.0***	**1.5 -**	**51.0 ± *2.0***	**? -**	45.5 ±*2.5*	(7/2-)
171-Au	22.3 ± *2.4*	us	(1/2+)	22.3	0.5 +	**17 ± *9.0***	0.5 +	**19.0 ± *7.0***	0.5 +	**17 ± *0.0***	(1/2+)
171-Hg	70 ± *30.0*	us	3/2-#	70	1.5	**80 ± *30.0***	1.5 -	69 ± *26.0*	**? -**	**59 ± *0.0***	
172-Tb	>300ns	ns									
172-Dy	3# ± *3E-7*	s	0+	3	0.0 +	3 ± *0.0*	0.0 +	3 ± *0.0*	0.0 +		
172-Ho	25 ± *3.0*	s		25	?	25 ± *3.0*	? -	25 ± *3.0*	? -	25 ± *3.0*	
172-Er	49.3 ± *0.3*	h	0+	49.3	0.0 +	49.3 ± *0.3*	0.0 +	49.3 ± *0.5*	0.0 +	49.3 ±*0.3*	0+
172-Tm	63.6 ± *0.2*	h	2-	63.6	2	63.6 ± *0.2*	2.0 -	63.6 ± *0.3*	2.0 -	63.6 ±*0.2*	2-
172-Yb	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
172-Lu	6.70 ± *0.03*	d	4-	6.7	4	6.70 ± *0.01*	4.0 -	6.70 ± *0.04*	4.0 -	6.70 ±*0.03*	4-
172-Hf	1.87 ± *0.03*	y	0+	1.87	0.0 +	1.87 ± *0.03*	0.0 +	1.87 ± *0.03*	0.0 +	1.87 ±*0.03*	0+
172-Ta	36.8 ± *0.3*	m	(3+)	36.8	3.0 +	36.8 ± *0.3*	3.0 +	36.8 ± *0.3*	3.0 +	36.8 ±*0.3*	(3+)
172-W	6.6 ± *0.9*	m	0+	6.6	0.0 +	6.6 ± *0.9*	0.0 +	6.6 ± *0.9*	0.0 +	6.6 ± *0.9*	0+
172-Re	15 ± *3.0*	s	-5	15	5.0 ?	15 ± *3.0*	**? -**	**55 ± *5.0***	**2.0 -**	15 ± *3.0*	**-5**
172-Os	19.2 ± *0.9*	s	0+	19.2	0.0 +	19.2 ± *0.9*	0.0 +	19.2 ± *0.9*	0.0 +	19.2 ±*0.9*	0+
172-Ir	4.4 ± *0.3*	s	(3+)	4.4	3.0 +	4.4 ± *0.3*	3.0 +	4.4 ± *0.3*	3.0 +	4.4 ± *0.3*	(3+)
172-Pt	97.6 ± *1.3*	ms	0+	97.6	0.0 +	98.4 ± *2.4*	0.0 +	96 ± *3.0*	0.0 +	97.6 ±*1.3*	0+
172-Au	28 ± *4.0*	ms	(2-)	28	2	**4.7 ± *1.1***	**? -**	**4.7 ± *1.1***	**? -**	**22 ± *0.0***	
172-Hg	231 ± *9.0*	us	0+	231	0.0 +	**420 ± *240.0***	0.0 +	**365 ± *155.0***	0.0 +	231 ± *9.0*	0+
173-Dy	2# ± *3E-7*	s	9/2+#	2	4.5 +	2 ± *0.0*	4.5 +	2 ± *0.0*	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
173-Ho	10# ± *3E-7*	s	7/2-#	10	3.5	10 ± *0.0*	3.5 -	10 ± *0.0*	**? -**		
173-Er	1.434 ± *0.017*	m	(7/2-)	1.434	3.5	**1.400 ± *0.1***	3.5 -	**1.400 ± *0.1***	3.5 -	**1.400 ±*0.1***	(7/2-)
173-Tm	8.24 ± *0.08*	h	(1/2+)	8.24	0.5 +	8.24 ± *0.08*	0.5 +	8.24 ± *0.08*	0.5 +	8.24 ±*0.08*	(1/2+)
173-Yb	stable		5/2-	stable	2.5	stable	2.5 -	stable	2.5 -		5/2-
173-Lu	1.37 ± *0.01*	y	7/2+	1.37	3.5 +	**1.34 ±*0.0356***	3.5 +	1.37 ± *0.01*	3.5 +	1.37 ±*0.01*	7/2+
173-Hf	23.6 ± *0.1*	h	1/2-	23.6	0.5	23.9 ± *0.3*	0.5 -	23.6 ± *0.1*	0.5 -	23.6 ±*0.1*	1/2-
173-Ta	3.14 ± *0.13*	h	5/2-	3.14	2.5	3.14 ± *0.13*	2.5 -	3.14 ± *0.13*	2.5 -	3.14 ±*0.13*	5/2-
173-W	7.6 ± *0.2*	m	5/2-	7.6	2.5	7.6 ± *0.2*	2.5 -	7.6 ± *0.2*	2.5 -	7.6 ± *0.2*	5/2-
173-Re	2.0 ± *0.3*	m	(5/2-)	2	2.5	2 ± *0.3*	2.5 -	2.0 ± *0.26*	2.5 -	2.0 ±*0.26*	(5/2-)
173-Os	22.4 ± *0.9*	s	(5/2-)	22.4	2.5	22.4 ± *0.9*	2.5 -	22.4 ± *0.9*	2.5 -	**16 ± *5.0***	(5/2-)
173-Ir	9.0 ± *0.8*	s	(1/2+;3/2+)	9	0.5 +	9 ± *0.8*	**? -**	9 ± *0.8*	**? -**	9 ± *0.8*	(3/2+,5/2+)
173-Pt	382 ± *2.0*	ms	(5/2-)	382	2.5	**365 ± *7.0***	2.5 -	382 ± *2.0*	2.5 -	382 ± *2.0*	(5/2-)
173-Au	25 ± *1.0*	ms	(1/2+)	25	0.5 +	**59 ± *45.0***	0.5 +	25 ± *1.0*	0.5 +	25 ± *1.0*	(1/2+)
173-Hg	910 ± *260.0*	us	3/2-#	910	1.5	**1.10E+3 ±*400.0***	1.5 -	**700 ± *300.0***	**3.5 -**	900 ± *0.0*	
174-Dy	>300ns	ns	0+								
174-Ho	8# ± *3E-7*	s		8	?	8 ± *0.0*	? -	8 ± *0.0*	? -		
174-Er	3.2 ± *0.2*	m	0+	3.2	0.0 +	3.2 ± *0.2*	0.0 +	3.2 ± *0.2*	0.0 +	3.2 ± *0.2*	0+
174-Tm	5.4 ± *0.1*	m	(4)-	5.4	4	5.4 ± *0.1*	4.0 -	5.4 ± *0.1*	4.0 -	5.4 ± *0.1*	(4)-
174-Yb	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
174-Lu	3.31 ± *0.05*	y	1-	3.31	1	**3.56 ± *0.411***	1.0 -	3.31 ± *0.05*	1.0 -	3.31 ±*0.05*	(1)-
174-Hf	2.0 ± *0.4*	Py	0+	2	0.0 +	2.0 ± *0.4*	0.0 +	2.0 ± *0.4*	0.0 +	2.0 ± *0.4*	0+
174-Ta	1.14 ± *0.08*	h	3+	1.14	3.0 +	1.14 ± *0.08*	3.0 +	1.14 ± *0.08*	3.0 +	1.14 ±*0.08*	3+
174-W	33.2 ± *2.1*	m	0+	33.2	0.0 +	33.2 ± *2.1*	0.0 +	33.2 ± *2.1*	0.0 +	33.2 ±*2.1*	0+
174-Re	2.40 ± *0.04*	m	3+#	2.4	3.0 +	2.40 ± *0.04*	**? -**	2.40 ± *0.04*	**? -**	2.40 ±*0.04*	
174-Os	44 ± *4.0*	s	0+	44	0.0 +	44 ± *4.0*	0.0 +	44 ± *4.0*	0.0 +	44 ± *4.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
174-Ir	7.9 ± *0.6*	s	(3+)	7.9	3.0 +	7.9 ± *0.6*	3.0 +	7.9 ± *0.6*	3.0 +	7.9 ± *0.6*	(3+)
174-Pt	889 ± *17.0*	ms	0+	889	0.0 +	889 ± *17.0*	0.0 +	889 ± *17.0*	0.0 +	889 ±*17.0*	0+
174-Au	139 ± *3.0*	ms	low	139	?	139 ± *3.0*	? -	139 ± *3.0*	? -	**120 ±*20.0***	
174-Hg	2.0 ± *0.4*	ms	0+	2	0.0 +	**1.9 ± *0.4***	0.0 +	**1.9 ± *0.35***	0.0 +	**2.1 ±*0.0***	
175-Ho	5# ± *3E-7*	s	7/2-#	5	3.5	5 ± *0.0*	3.5 -	5 ± *0.0*	**? -**		
175-Er	1.2 ± *0.3*	m	9/2+#	1.2	4.5 +	1.2 ± *0.3*	4.5 +	1.2 ± *0.3*	4.5 +	1.2 ± *0.3*	(9/2+)
175-Tm	15.2 ± *0.5*	m	1/2+#	15.2	0.5 +	15.2 ± *0.5*	0.5 +	15.2 ± *0.5*	0.5 +	15.2 ±*0.5*	(1/2+)
175-Yb	4.185 ± *0.0010*	d	(7/2-)	4.185	3.5	4.185 ±*0.0010*	3.5 -	4.185 ±*0.0010*	3.5 -	4.185 ±*0.0010*	(7/2-)
175-Lu	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
175-Hf	70 ± *2.0*	d	5/2(-)	70	2.5	70 ± *1.0*	2.5 -	70 ± *2.0*	2.5 -	70 ± *2.0*	5/2(-)
175-Ta	10.5 ± *0.2*	h	7/2+	10.5	3.5 +	10.5 ± *0.2*	3.5 +	10.5 ± *0.2*	3.5 +	10.5 ±*0.2*	7/2+
175-W	35.2 ± *0.6*	m	(1/2-)	35.2	0.5	35.2 ± *0.6*	0.5 -	35.2 ± *0.6*	0.5 -	35.2 ±*0.6*	(1/2-)
175-Re	5.89 ± *0.05*	m	5/2-#	5.89	2.5	5.89 ± *0.05*	2.5 -	5.89 ± *0.05*	2.5 -	5.89 ±*0.05*	(5/2-)
175-Os	1.4 ± *0.1*	m	(5/2-)	1.4	2.5	1.4 ± *0.1*	2.5 -	1.4 ± *0.1*	2.5 -	1.4 ± *0.1*	(5/2-)
175-Ir	9 ± *2.0*	s	5/2-#	9	2.5	9 ± *2.0*	2.5 -	9 ± *2.0*	2.5 -	9 ± *2.0*	(5/2-)
175-Pt	2.53 ± *0.06*	s	(7/2-)	2.53	3.5	2.53 ± *0.06*	**2.5 -**	2.53 ± *0.06*	3.5 -	2.53 ±*0.06*	7/2-
175-Au	188 ± *12.0*	ms	1/2+	188	0.5 +	**100 ± *0.0***	0.5 +	**100 ± *20.0***	0.5 +		(1/2+)
175-Hg	10.6 ± *0.4*	ms	(7/2-)	10.6	3.5	10.8 ± *0.4*	**2.5 -**	10.7 ± *0.4*	3.5 -	10.6 ±*0.4*	(7/2-)
176-Ho	>300ns	ns									
176-Er	20# ± *3E-7*	s	0+	20	0.0 +	20 ± *0.0*	0.0 +	20 ± *0.0*	0.0 +		
176-Tm	1.85 ± *0.03*	m	(4+)	1.85	4.0 +	1.85 ± *0.03*	4.0 +	**1.90 ± *0.1***	4.0 +	**1.90 ±*0.1***	(4+)
176-Yb	stable ± *5E24*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
176-Lu	37.6 ± *0.7*	Gy	7-	37.6	7	**40.0 ± *2.2***	7.0 -	37.6 ± *0.7*	7.0 -	37.6 ±*0.7*	7-
176-Hf	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
176-Ta	8.09 ± *0.05*	h	(1)-	8.09	1	8.09 ± *0.05*	1.0 -	8.09 ± *0.05*	1.0 -	8.09 ±*0.05*	(1)-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
176-W	2.5 ± *0.1*	h	0+	2.5	0.0 +	2.5 ± *0.1*	0.0 +	2.5 ± *0.1*	0.0 +	2.5 ± *0.1*	0+
176-Re	5.3 ± *0.3*	m	(3+)	5.3	3.0 +	5.3 ± *0.3*	3.0 +	5.3 ± *0.3*	3.0 +	5.3 ± *0.3*	(3+)
176-Os	3.6 ± *0.5*	m	0+	3.6	0.0 +	3.6 ± *0.5*	0.0 +	3.6 ± *0.5*	0.0 +	3.6 ± *0.5*	0+
176-Ir	8.7 ± *0.5*	s		8.7	?	**8.3 ± *0.6***	? -	8.7 ± *0.5*	? -	8.7 ± *0.5*	
176-Pt	6.33 ± *0.15*	s	0+	6.33	0.0 +	6.33 ± *0.15*	0.0 +	6.33 ± *0.15*	0.0 +	6.33 ±*0.15*	0+
176-Au	1.05 ± *0.01*	s	(5-)	1.05	5	**1.08 ± *0.17***	5.0 -	1.05 ± *0.01*	**3.0 -**		
176-Hg	20.3 ± *1.4*	ms	0+	20.3	0.0 +	20.4 ± *1.5*	0.0 +	20.3 ± *1.4*	0.0 +	20.3 ±*1.4*	0+
176-Tl	6.2 ± *2.3*	ms	(3-;4-;5-)	6.2	**?**	**10 ± *0.0***	**? -**	**6 ± *2.2***	**? -**	**5.2 ±*0.0***	(3-,4-,5-)
177-Er	3# ± *3E-7*	s	1/2-#	3	0.5	3 ± *0.0*	0.5 -	3 ± *0.0*	**? -**		
177-Tm	90 ± *6.0*	s	(7/2-)	90	3.5	90 ± *6.0*	3.5 -	90 ± *6.0*	3.5 -	90 ± *6.0*	(7/2-)
177-Yb	1.911 ± *0.0030*	h	(9/2+)	1.911	4.5 +	1.911 ±*0.0030*	4.5 +	1.911 ±*0.0030*	4.5 +	1.911 ±*0.0030*	(9/2+)
177-Lu	6.647 ± *0.0040*	d	7/2+	6.647	3.5 +	6.647 ± *0.04*	3.5 +	6.647 ±*0.0040*	3.5 +	6.647 ±*0.0040*	7/2+
177-Hf	stable		7/2-	stable	3.5	stable	3.5 -	stable	3.5 -		7/2-
177-Ta	56.56 ± *0.06*	h	7/2+	56.56	3.5 +	56.40 ± *0.5*	3.5 +	56.56 ± *0.06*	3.5 +	56.56 ±*0.06*	7/2+
177-W	132 ± *2.0*	m	1/2-	132	0.5	132 ± *2.0*	0.5 -	132 ± *2.0*	0.5 -	132 ± *2.0*	1/2-
177-Re	14 ± *1.0*	m	5/2-	14	2.5	14 ± *1.0*	2.5 -	14 ± *1.0*	2.5 -	14 ± *1.0*	5/2-
177-Os	3.0 ± *0.2*	m	1/2-	3	0.5	3 ± *0.2*	0.5 -	3 ± *0.2*	0.5 -	3 ± *0.2*	1/2-
177-Ir	30 ± *2.0*	s	5/2-	30	2.5	30 ± *2.0*	2.5 -	30 ± *2.0*	2.5 -	30 ± *2.0*	5/2-
177-Pt	10.6 ± *0.4*	s	5/2-	10.6	2.5	10.6 ± *0.4*	2.5 -	10.6 ± *0.4*	2.5 -	10.6 ±*0.4*	5/2-
177-Au	1.46 ± *0.03*	s	(1/2+;3/2+)	1.46	1.5 +	1.46 ± *0.03*	**? -**	1.46 ± *0.032*	**? -**	1.46 ±*0.032*	(1/2+,3/2+)
177-Hg	127.3 ± *1.8*	ms	(7/2-)	127.3	3.5	127.3 ± *1.8*	**6.5 +**	127.3 ± *1.8*	**6.5 +**	127.3 ±*1.8*	**(13/2+)**
177-Tl	18 ± *5.0*	ms	(1/2+)	18	0.5 +	18 ± *5.0*	0.5 +	18 ± *5.0*	0.5 +	18 ± *5.0*	(1/2+)
178-Er	>300ns	ns	0+								
178-Tm	30# ± *3E-7*	s		30	?	30 ± *0.0*	? -	30 ± *0.0*	? -	**3.0E-7 ±*0.0***	
178-Yb	74 ± *3.0*	m	0+	74	0.0 +	74 ± *3.0*	0.0 +	74 ± *3.0*	0.0 +	74 ± *3.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
178-Lu	28.4 ± *0.2*	m	1(+)	28.4	1.0 +	28.4 ± *0.2*	1.0 +	28.4 ± *0.2*	1.0 +	28.4 ±*0.2*	1(+)
178-Hf	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
178-Ta	2.36 ± *0.08*	h	7-#	2.36	7	**0.155 ±*6.67E-4***	**1.0 +**	**0.155 ±*5.0E-4***	**1.0 +**	2.36 ±*0.08*	7-
178-W	21.6 ± *0.3*	d	0+	21.6	0.0 +	21.6 ± *0.3*	0.0 +	21.6 ± *0.3*	0.0 +	21.6 ±*0.3*	0+
178-Re	13.2 ± *0.2*	m	(3+)	13.2	3.0 +	13.2 ± *0.2*	3.0 +	13.2 ± *0.2*	3.0 +	13.2 ±*0.2*	(3+)
178-Os	5.0 ± *0.4*	m	0+	5	0.0 +	5 ± *0.4*	0.0 +	5 ± *0.4*	0.0 +	5 ± *0.4*	0+
178-Ir	12 ± *2.0*	s		12	?	12 ± *2.0*	? -	12 ± *2.0*	? -	12 ± *2.0*	
178-Pt	20.7 ± *0.7*	s	0+	20.7	0.0 +	21.1 ± *0.6*	0.0 +	21.1 ± *0.6*	0.0 +	20.7 ±*0.7*	0+
178-Au	2.6 ± *0.5*	s		2.6	?	2.6 ± *0.5*	? -	2.6 ± *0.5*	? -	2.6 ± *0.5*	
178-Hg	266.5 ± *2.4*	ms	0+	266.5	0.0 +	269 ± *3.0*	0.0 +	269 ± *3.0*	0.0 +	266.5 ±*2.4*	0+
178-Tl	255 ± *10.0*	ms		255	?	255 ± *10.0*	? -	**60 ± *6.0***	? -	254 ± *0.0*	
178-Pb	230 ± *150.0*	us	0+	230	0.0 +	230 ± *150.0*	0.0 +	230 ± *150.0*	0.0 +	**120 ±*0.0***	0+
179-Tm	20# ± *3E-7*	s	1/2+#	20	0.5 +	20 ± *0.0*	0.5 +	20 ± *0.0*	**? -**		
179-Yb	8.0 ± *0.4*	m	(1/2-)	8	0.5	8 ± *0.4*	0.5 -	8 ± *0.4*	0.5 -	8 ± *0.4*	(1/2-)
179-Lu	4.59 ± *0.06*	h	7/2+	4.59	3.5 +	4.59 ± *0.06*	3.5 +	4.59 ± *0.06*	3.5 +	4.59 ±*0.06*	7/2+
179-Hf	stable		9/2+	stable	4.5 +	stable	4.5 +	stable	4.5 +		9/2+
179-Ta	1.82 ± *0.03*	y	7/2+	1.82	3.5 +	**1.61 ±*0.0274***	3.5 +	1.82 ± *0.03*	3.5 +	1.82 ±*0.03*	7/2+
179-W	37.05 ± *0.16*	m	7/2-	37.05	3.5	37.05 ± *0.16*	3.5 -	37.05 ± *0.16*	3.5 -	37.05 ±*0.16*	7/2-
179-Re	19.5 ± *0.1*	m	5/2+	19.5	2.5 +	19.5 ± *0.1*	2.5 +	19.5 ± *0.1*	2.5 +	19.5 ±*0.1*	5/2+
179-Os	6.5 ± *0.3*	m	1/2-	6.5	0.5	6.5 ± *0.3*	0.5 -	6.5 ± *0.3*	0.5 -	6.5 ± *0.3*	1/2-
179-Ir	79 ± *1.0*	s	(5/2)-	79	2.5	79 ± *1.0*	2.5 -	79 ± *1.0*	2.5 -	79 ± *1.0*	(5/2)-
179-Pt	21.2 ± *0.4*	s	1/2-	21.2	0.5	21.2 ± *0.4*	0.5 -	21.2 ± *0.4*	0.5 -	21.2 ±*0.4*	1/2-
179-Au	7.1 ± *0.3*	s	(1/2+;3/2+)	7.1	**?**	7.1 ± *0.3*	**2.5 -**	**3.3 ± *1.3***	**? -**	7.1 ± *0.3*	(1/2+,3/2+)
179-Hg	1.05 ± *0.03*	s	7/2-	1.05	3.5	**1.09 ± *0.04***	**2.5 -**	**1.08 ± *0.09***	**? -**	1.05 ±*0.03*	(7/2-)
179-Tl	480 ± *20.0*	ms	1/2+	480	0.5 +	**270 ± *30.0***	0.5 +	**230 ± *40.0***	0.5 +	**230 ±*40.0***	(1/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
179-Pb	3.9 ± *1.1*	ms	(9/2-)	3.9	4.5	**3 ± *0.0***	**2.5 -**	**3 ± *0.0***	**? -**	**3.5 ±*0.0***	(9/2-)
180-Tm	>300ns	ns									
180-Yb	2.4 ± *0.5*	m	0+	2.4	0.0 +	2.4 ± *0.5*	0.0 +	2.4 ± *0.5*	0.0 +	2.4 ± *0.5*	0+
180-Lu	5.7 ± *0.1*	m	5+	5.7	5.0 +	5.7 ± *0.1*	**3.0 +**	5.7 ± *0.1*	5.0 +	5.7 ± *0.1*	5+
180-Hf	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
180-Ta	8.154 ± *0.0060*	h	1+	8.153	1.0 +	8.080 ± *0.05*	1.0 +	8.154 ±*0.0060*	1.0 +	8.154 ±*0.0060*	1+
180-W	1.8 ± *0.2*	Ey	0+	1.8	0.0 +	stable	0.0 +	1.8 ± *0.2*	0.0 +	**0.11 ±*0.0***	0+
180-Re	2.44 ± *0.06*	m	(1)-	2.44	1	2.44 ± *0.06*	1.0 -	2.44 ± *0.06*	1.0 -	2.44 ±*0.06*	(1)-
180-Os	21.5 ± *0.4*	m	0+	21.5	0.0 +	21.5 ± *0.4*	0.0 +	21.5 ± *0.4*	0.0 +	21.5 ±*0.4*	0+
180-Ir	1.5 ± *0.1*	m	(4;5)(+#)	1.5	**?**	1.5 ± *0.1*	**? -**	1.5 ± *0.1*	**? -**	1.5 ± *0.1*	**(4,5)**
180-Pt	56 ± *2.0*	s	0+	56	0.0 +	56 ± *2.0*	0.0 +	56 ± *2.0*	0.0 +	56 ± *2.0*	0+
180-Au	8.1 ± *0.3*	s		8.1	?	8.1 ± *0.3*	? -	8.1 ± *0.3*	? -	8.1 ± *0.3*	
180-Hg	2.575 ± *0.014*	s	0+	2.575	0.0 +	2.580 ± *0.01*	0.0 +	2.580 ± *0.01*	0.0 +	2.580 ±*0.01*	0+
180-Tl	1.09 ± *0.01*	s	4(-)	1.09	4	**1.5 ± *0.2***	**? -**	1.09 ± *0.01*	**? -**	**1.5 ±*0.2***	
180-Pb	4.2 ± *0.5*	ms	0+	4.2	0.0 +	**5 ± *3.0***	0.0 +	**4.5 ± *1.1***	0.0 +	4.2 ± *0.5*	0+
181-Tm	>300ns	ns									
181-Yb	1# ± *5E-9*	m	3/2-#	1	1.5	1 ± *0.0*	1.5 -	1 ± *0.0*	**? -**	**3E-9 ±*0.0***	
181-Lu	3.5 ± *0.3*	m	7/2+#	3.5	3.5 +	3.5 ± *0.3*	3.5 +	3.5 ± *0.3*	3.5 +	3.5 ± *0.3*	(7/2+)
181-Hf	42.39 ± *0.06*	d	1/2-	42.38	0.5	42.38 ± *0.06*	0.5 -	42.39 ± *0.06*	0.5 -	42.39 ±*0.06*	1/2-
181-Ta	stable		7/2+	stable	3.5 +	stable	3.5 +	stable	3.5 +		7/2+
181-W	121.2 ± *0.2*	d	9/2+	121.2	4.5 +	121.0 ± *0.12*	4.5 +	121.2 ± *0.2*	4.5 +	121.2 ±*0.2*	9/2+
181-Re	19.9 ± *0.7*	h	5/2+	19.9	2.5 +	19.9 ± *0.7*	2.5 +	19.9 ± *0.7*	2.5 +	19.9 ±*0.7*	5/2+
181-Os	105 ± *3.0*	m	1/2-	105	0.5	105 ± *3.0*	0.5 -	105 ± *3.0*	0.5 -	105 ± *3.0*	1/2-
181-Ir	4.90 ± *0.15*	m	5/2-	4.9	2.5	4.90 ± *0.15*	2.5 -	4.90 ± *0.15*	2.5 -	4.90 ±*0.15*	5/2-
181-Pt	52.0 ± *2.2*	s	1/2-	52	0.5	52 ± *2.2*	0.5 -	52 ± *2.2*	0.5 -	52 ± *2.2*	1/2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
181-Au	13.7 ± *1.4*	s	(3/2-)	13.7	1.5	13.7 ± *1.4*	1.5 -	13.7 ± *1.4*	1.5 -	13.7 ±*1.4*	(3/2-)
181-Hg	3.6 ± *0.1*	s	1/2(-#)	3.6	0.5	3.6 ± *0.1*	0.5 -	3.6 ± *0.1*	0.5 -	3.6 ± *0.1*	1/2-
181-Tl	3.2 ± *0.3*	s	1/2+	3.2	0.5 +	3.2 ± *0.3*	0.5 +	3.2 ± *0.3*	0.5 +	3.2 ± *0.3*	(1/2+)
181-Pb	39.0 ± *0.8*	ms	(9/2-)	39	4.5	**45 ± *20.0***	**2.5 -**	**36 ± *2.0***	4.5 -	**45 ±*20.0***	**(13/2+)**
182-Yb	>300ns	ns	0+								
182-Lu	2.0 ± *0.2*	m	1-#	2	1	2 ± *0.2*	**? -**	2 ± *0.2*	**? -**	2 ± *0.2*	
182-Hf	8.9 ± *0.9*	My	0+	8.9	0.0 +	9.0 ± *2.0*	0.0 +	8.9 ± *0.09*	0.0 +	8.9 ±*0.09*	0+
182-Ta	114.74 ± *0.12*	d	3-	114.75	3	114.70 ± *0.4*	3.0 -	114.74 ± *0.12*	3.0 -	114.74 ±*0.12*	3-
182-W	stable ± *2E29*		0+	stable	0.0 +	stable	0.0 +	**0 ± *0.0***	0.0 +		0+
182-Re	64.0 ± *0.5*	h	7+	64	7.0 +	64 ± *0.5*	7.0 +	64 ± *0.5*	7.0 +	64 ± *0.5*	7+
182-Os	21.84 ± *0.2*	h	0+	21.84	0.0 +	22.10 ± *0.25*	0.0 +	21.84 ± *0.2*	0.0 +	21.84 ±*0.2*	0+
182-Ir	15 ± *1.0*	m	3+	15	3.0 +	15 ± *1.0*	3.0 +	15 ± *1.0*	**5.0 +**	15 ± *1.0*	3+
182-Pt	2.67 ± *0.12*	m	0+	2.67	0.0 +	**2.20 ± *0.1***	0.0 +	**3 ± *0.2***	0.0 +	2.67 ±*0.12*	0+
182-Au	15.5 ± *0.4*	s	(2+)	15.5	2.0 +	15.5 ± *0.4*	2.0 +	15.6 ± *0.4*	**? -**	15.5 ±*0.4*	(2+)
182-Hg	10.83 ± *0.06*	s	0+	10.83	0.0 +	10.83 ± *0.06*	0.0 +	10.83 ± *0.06*	0.0 +	10.83 ±*0.06*	0+
182-Tl	2.2 ± *0.3*	s	(7+)	2.2	7.0 +	**2 ± *0.3***	**2.0 -**	**3.1 ± *1.0***	7.0 +	**3.1 ±*1.0***	(7+)
182-Pb	55 ± *5.0*	ms	0+	55	0.0 +	**60 ± *40.0***	0.0 +	**58 ± *38.0***	0.0 +	55 ± *5.0*	0+
183-Yb	>300ns	ns									
183-Lu	58 ± *4.0*	s	(7/2+)	58	3.5 +	58 ± *4.0*	3.5 +	58 ± *4.0*	3.5 +	58 ± *4.0*	(7/2+)
183-Hf	1.018 ± *0.0020*	h	(3/2-)	1.018	1.5	**1.067 ±*0.017***	1.5 -	**1.067 ±*0.017***	1.5 -	**1.067 ±*0.017***	(3/2-)
183-Ta	5.1 ± *0.1*	d	7/2+	5.1	3.5 +	5.1 ± *0.07*	3.5 +	5.1 ± *0.1*	3.5 +	5.1 ± *0.1*	7/2+
183-W	stable ± *1E29*		1/2-	0	0.5	**3E+24 ± *0.0***	0.5 -	**0 ± *0.0***	0.5 -	**3E+24 ±*0.0***	1/2-
183-Re	70.0 ± *1.4*	d	5/2+	70	2.5 +	70 ± *1.4*	2.5 +	70 ± *1.4*	2.5 +	70 ± *1.4*	5/2+
183-Os	13.0 ± *0.5*	h	9/2+	13	4.5 +	13 ± *0.5*	4.5 +	13 ± *0.5*	4.5 +	13 ± *0.5*	9/2+
183-Ir	58 ± *5.0*	m	5/2-	58	2.5	58 ± *5.0*	2.5 -	58 ± *6.0*	2.5 -	58 ± *6.0*	5/2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
183-Pt	6.5 ± *1.0*	m	1/2-	6.5	0.5	6.5 ± *1.0*	0.5 -	6.5 ± *1.0*	0.5 -	6.5 ± *1.0*	1/2-
183-Au	42.8 ± *1.0*	s	5/2-	42.8	2.5	42 ± *1.2*	2.5 -	42.8 ± *1.0*	2.5 -	42.8 ± *1.0*	(5/2)-
183-Hg	9.4 ± *0.7*	s	1/2-	9.4	0.5	9.4 ± *0.7*	0.5 -	9.4 ± *0.7*	0.5 -	9.4 ± *0.7*	1/2-
183-Tl	6.9 ± *0.7*	s	1/2(+)	6.9	0.5 +	6.9 ± *0.7*	0.5 +	6.9 ± *0.7*	0.5 +	6.9 ± *0.7*	(1/2+)
183-Pb	535 ± *30.0*	ms	3/2-	535	1.5	535 ± *30.0*	1.5 -	535 ± *30.0*	1.5 -	535 ± *30.0*	(3/2-)
184-Yb	>300ns	ns	0+								
184-Lu	20 ± *3.0*	s	(3+)	20	3.0 +	20 ± *3.0*	3.0 +	20 ± *3.0*	3.0 +	**19 ± *2.0***	(3+)
184-Hf	4.12 ± *0.05*	h	0+	4.12	0.0 +	4.12 ± *0.05*	0.0 +	4.12 ± *0.05*	0.0 +	4.12 ± *0.05*	0+
184-Ta	8.7 ± *0.1*	h	(5-)	8.7	5	8.7 ± *0.1*	5.0 -	8.7 ± *0.1*	5.0 -	8.7 ± *0.1*	(5-)
184-W	stable ± *2E29*		0+	stable	0.0 +	**1E+25 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +		0+
184-Re	35.4 ± *0.7*	d	3(-)	35.4	3	**37.9 ± *0.5***	3.0 -	35.4 ± *0.7*	3.0 -	35.4 ± *0.7*	3(-)
184-Os	stable ± *1E21*		0+		0.0 +	**2E+21 ± *0.0***	0.0 +	**0 ± *0.0***	0.0 +	**2E+21 ± *0.0***	0+
184-Ir	3.09 ± *0.03*	h	5-	3.09	5	3.09 ± *0.03*	5.0 -	3.09 ± *0.03*	5.0 -	3.09 ± *0.03*	5-
184-Pt	17.3 ± *0.2*	m	0+	17.3	0.0 +	17.3 ± *0.2*	0.0 +	17.3 ± *0.2*	0.0 +	17.3 ± *0.2*	0+
184-Au	20.6 ± *0.9*	s	5+	20.6	5.0 +	20.6 ± *0.9*	5.0 +	20.6 ± *0.9*	5.0 +	20.6 ± *0.9*	5+
184-Hg	30.87 ± *0.26*	s	0+	30.87	0.0 +	30.60 ± *0.3*	0.0 +	30.90 ± *0.3*	0.0 +	30.87 ± *0.26*	0+
184-Tl	10.1 ± *0.5*	s	2-#	10.1	2	**9.70 ± *0.6***	2.0 -	**11 ± *1.0***	**2.0 +**	10.1 ± *0.5*	
184-Pb	490 ± *25.0*	ms	0+	490	0.0 +	490 ± *25.0*	0.0 +	490 ± *25.0*	0.0 +	490 ± *25.0*	0+
184-Bi	6.6 ± *1.5*	ms	3+#	6.6	3.0 +	6.6 ± *1.5*	3.0 +	**13 ± *2.0***	**? -**	**13 ± *2.0***	
185-Yb	>300ns	ns									
185-Lu	*6# ± 3E-7*	s	7/2+#	6	3.5 +						
185-Hf	3.5 ± *0.6*	m	3/2-#	3.5	1.5	3.5 ± *0.6*	1.5 -	3.5 ± *0.6*	**? -**	3.5 ± *0.6*	
185-Ta	49.4 ± *1.5*	m	7/2+#	49.4	3.5 +	49 ± *2.0*	3.5 +	49.4 ± *1.5*	3.5 +	49.4 ± *1.5*	(7/2+)
185-W	75.1 ± *0.3*	d	3/2-	75.1	1.5	75.1 ± *0.3*	1.5 -	75.1 ± *0.3*	1.5 -	75.1 ± *0.3*	3/2-
185-Re	stable		5/2+	stable	2.5 +	stable	2.5 +	stable	2.5 +		5/2+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
185-Os	92.95 ± *0.09*	d	1/2-	92.95	0.5	93.80 ± *0.9*	0.5 -	93.60 ± *0.5*	0.5 -	93.60 ±*0.5*	1/2-
185-Ir	14.4 ± *0.1*	h	5/2-	14.4	2.5	14.4 ± *0.1*	2.5 -	14.4 ± *0.1*	2.5 -	14.4 ±*0.1*	5/2-
185-Pt	70.9 ± *2.4*	m	(9/2+)	70.9	4.5 +	70.9 ± *2.4*	4.5 +	70.9 ± *2.4*	4.5 +	70.9 ±*2.4*	9/2+
185-Au	4.25 ± *0.06*	m	5/2-	4.25	2.5	4.25 ± *0.06*	2.5 -	4.25 ± *0.06*	2.5 -	4.25 ±*0.06*	5/2-
185-Hg	49.1 ± *1.0*	s	1/2-	49.1	0.5	49.1 ± *1.0*	0.5 -	49.1 ± *1.0*	0.5 -	49.1 ±*1.0*	1/2-
185-Tl	19.5 ± *0.5*	s	1/2+#	19.5	0.5 +	19.5 ± *0.5*	0.5 +	19.5 ± *0.5*	0.5 +	19.5 ±*0.5*	(1/2+)
185-Pb	6.3 ± *0.4*	s	3/2-	6.3	1.5	6.3 ± *0.4*	1.5 -	6.3 ± *0.4*	1.5 -	6.3 ± *0.4*	3/2-
185-Bi	2#	ms	9/2-#	2	4.5	2 ± *0.0*	4.5 -	**0.06 ±*0.0040***	**0.5 +**	**0.06 ±*0.0040***	**1/2+**
186-Lu	>300ns	ns									
186-Hf	2.6 ± *1.2*	m	0+	2.6	0.0 +	2.6 ± *1.2*	0.0 +	2.6 ± *1.2*	0.0 +	2.6 ± *1.2*	0+
186-Ta	10.5 ± *0.3*	m	(2-;3-)	10.5	**?**	10.5 ± *0.3*	**? -**	10.5 ± *0.3*	**? -**	10.5 ±*0.3*	(2-,3-)
186-W	stable ± *1E26*		0+	stable	0.0 +	**2E+25 ± *0.0***	0.0 +	**5E+27 ±*5.0E26***	0.0 +		0+
186-Re	3.7183 ± *0.0011*	d	1-	3.7188	1	3.75 ± *0.03*	1.0 -	3.7183 ±*0.0011*	1.0 -	3.7183 ±*0.0011*	1-
186-Os	2.0 ± *1.1*	Py	0+	2	0.0 +	2.0 ± *1.1*	0.0 +	2.0 ± *1.1*	0.0 +	2.0 ± *1.1*	0+
186-Ir	16.64 ± *0.03*	h	5+	16.64	5.0 +	16.64 ± *0.03*	5.0 +	16.64 ± *0.03*	5.0 +	16.64 ±*0.03*	5+
186-Pt	2.08 ± *0.05*	h	0+	2.08	0.0 +	2.08 ± *0.05*	0.0 +	2.08 ± *0.05*	0.0 +	2.08 ±*0.05*	0+
186-Au	10.7 ± *0.5*	m	3-	10.7	3	10.7 ± *0.5*	3.0 -	10.7 ± *0.5*	3.0 -	10.7 ±*0.5*	3-
186-Hg	1.38 ± *0.06*	m	0+	1.38	0.0 +	1.38 ± *0.06*	0.0 +	1.38 ± *0.06*	0.0 +	1.38 ±*0.06*	0+
186-Tl	40#	s	(2-)	40	2	40 ± *0.0*	2.0 -	**28 ± *1.0***	**7.0 +**	**28 ± *1.0***	**(7+)**
186-Pb	4.82 ± *0.03*	s	0+	4.82	0.0 +	4.82 ± *0.03*	0.0 +	4.82 ± *0.03*	0.0 +	4.82 ±*0.03*	0+
186-Bi	14.8 ± *0.7*	ms	(3+)	14.8	3.0 +	14.8 ± *0.7*	3.0 +	15 ± *1.7*	3.0 +	15 ± *1.7*	(3+)
186-Po	40#	us	0+	40	0.0 +						
187-Lu	>300ns	ns									
187-Hf	30# ± *3E-7*	s	3/2-#	30	1.5	30 ± *0.0*	1.5 -	30 ± *0.0*	**? -**		
187-Ta	2.3 ± *6.0*	m	7/2+#	2.3	3.5 +	**2 ± *0.0***	3.5 +	**2 ± *0.2***	**? -**		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
187-W	24.000 ± *0.0040*	h	3/2-	24	1.5	23.850 ± *0.08*	1.5 -	24 ± *0.0040*	1.5 -	24 ±*0.0040*	3/2-
187-Re	43.3 ± *0.07*	Gy	5/2+	43.3	2.5 +	43.5 ± *1.3*	2.5 +	43.3 ± *0.7*	2.5 +	43.3 ±*0.7*	5/2+
187-Os	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
187-Ir	10.5 ± *0.3*	h	3/2+	10.5	1.5 +	10.5 ± *0.3*	1.5 +	10.5 ± *0.3*	1.5 +	10.5 ±*0.3*	3/2+
187-Pt	2.35 ± *0.03*	h	3/2-	2.35	1.5	2.35 ± *0.03*	1.5 -	2.35 ± *0.03*	1.5 -	2.35 ±*0.03*	3/2-
187-Au	8.3 ± *0.2*	m	1/2(+)	8.3	0.5 +	8.4 ± *0.3*	0.5 +	8.4 ± *0.3*	0.5 +	8.3 ± *0.2*	1/2(+)
187-Hg	1.9 ± *0.3*	m	3/2(-)	1.9	1.5	1.9 ± *0.3*	1.5 -	**2.4 ± *0.3***	**0.5 -**	**2.4 ±*0.3***	3/2(-)
187-Tl	~51	s	(1/2+)	51	0.5 +	51 ± *0.0*	0.5 +	51 ± *5.1*	0.5 +	51 ± *0.0*	(1/2+)
187-Pb	15.2 ± *0.3*	s	3/2-	15.2	1.5	15.2 ± *0.3*	1.5 -	15.2 ± *0.3*	1.5 -	**18.3 ±*0.3***	**(13/2+)**
187-Bi	37 ± *2.0*	ms	9/2-#	37	4.5	**32 ± *3.0***	4.5 -	**32 ± *3.0***	4.5 -	37 ± *2.0*	(9/2-)
187-Po	1.40 ± *0.25*	ms	(1/2-;5/2-)	1.4	**?**					1.40 ±*0.25*	(1/2-,5/2-)
188-Lu	>300ns	ns									
188-Hf	20# ± *3E-7*	s	0+	20	0.0 +	20 ± *0.0*	0.0 +	20 ± *2.0*	0.0 +		0+
188-Ta	19.6 ± *2.0*	s		19.6	?	**20 ± *0.0***	? -	**20 ± *2.0***	? -		
188-W	69.78 ± *0.05*	d	0+	69.78	0.0 +	69.78 ± *0.05*	0.0 +	69.78 ± *0.05*	0.0 +	69.78 ±*0.05*	0+
188-Re	17.0040 ± *0.0022*	h	1-	17.0028	1	16.9800 ±*0.02*	1.0 -	17.0040 ±*0.0022*	1.0 -	17.0040 ± *0.0022*	1-
188-Os	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
188-Ir	41.5 ± *0.5*	h	1-	41.5	1	41.5 ± *0.5*	1.0 -	41.5 ± *0.5*	1.0 -	41.5 ±*0.5*	1-
188-Pt	10.2 ± *0.3*	d	0+	10.2	0.0 +	10.2 ± *0.3*	0.0 +	10.2 ± *0.3*	0.0 +	10.2 ±*0.3*	0+
188-Au	8.84 ± *0.06*	m	1(-)	8.84	1	8.84 ± *0.06*	1.0 -	8.84 ± *0.06*	1.0 -	8.84 ±*0.06*	1(-)
188-Hg	3.25 ± *0.15*	m	0+	3.25	0.0 +	3.25 ± *0.15*	0.0 +	3.25 ± *0.15*	0.0 +	3.25 ±*0.15*	0+
188-Tl	71 ± *2.0*	s	(2-)	71	2	71 ± *1.0*	**7.0 +**	71 ± *1.0*	**7.0 +**	71 ± *2.0*	(2-)
188-Pb	25.1 ± *0.1*	s	0+	25.1	0.0 +	25.5 ± *0.1*	0.0 +	25.1 ± *0.1*	0.0 +	25.1 ±*0.1*	0+
188-Bi	61.2 ± *2.7*	ms	3+#	61.2	3.0 +	**44 ± *3.0***	3.0 +	60 ± *3.0*	3.0 +	**210 ±*90.0***	
188-Po	275 ± *30.0*	us	0+	275	0.0 +	**430 ± *180.0***	0.0 +	**425 ± *175.0***	0.0 +	**400 ±*0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
189-Hf	2# ± *3E-7*	s	3/2-#	2	1.5					**3E-7 ±*0.0***	
189-Ta	3# ± *3E-7*	s	7/2+#	3	3.5 +	3 ± *0.0*	3.5 +	3 ± *0.3*	3.5 +		(7/2+)
189-W	10.7 ± *0.5*	m	3/2-#	10.7	1.5	10.7 ± *0.5*	1.5 -	10.7 ± *0.5*	1.5 -	10.7 ±*0.5*	(3/2-)
189-Re	24.3 ± *0.4*	h	5/2+	24.3	2.5 +	24.3 ± *0.4*	2.5 +	24.3 ± *0.4*	2.5 +	24.3 ±*0.4*	5/2+
189-Os	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
189-Ir	13.2 ± *0.1*	d	3/2+	13.2	1.5 +	13.2 ± *0.1*	1.5 +	13.2 ± *0.1*	1.5 +	13.2 ±*0.1*	3/2+
189-Pt	10.87 ± *0.12*	h	3/2-	10.87	1.5	10.87 ± *0.12*	1.5 -	10.87 ± *0.12*	1.5 -	10.87 ±*0.12*	3/2-
189-Au	28.7 ± *0.3*	m	1/2+	28.7	0.5 +	28.7 ± *0.3*	0.5 +	28.7 ± *0.3*	0.5 +	28.7 ±*0.3*	1/2+
189-Hg	7.6 ± *0.1*	m	3/2-	7.6	1.5	7.6 ± *0.1*	1.5 -	7.6 ± *0.1*	1.5 -	7.6 ± *0.1*	3/2-
189-Tl	2.3 ± *0.2*	m	(1/2+)	2.3	0.5 +	2.3 ± *0.2*	0.5 +	2.3 ± *0.2*	0.5 +	2.3 ± *0.2*	(1/2+)
189-Pb	50.5 ± *2.1*	s	3/2-	50.5	1.5	51 ± *3.0*	1.5 -	**39 ± *8.0***	1.5 -	**39 ± *8.0***	(3/2-)
189-Bi	658 ± *47.0*	ms	(9/2-)	658	4.5	**674 ± *11.0***	4.5 -	**674 ± *11.0***	4.5 -	658 ±*47.0*	(9/2-)
189-Po	3.8 ± *0.4*	ms	(5/2-)	3.8	2.5	**5 ± *1.0***	**1.5 -**	**3.5 ± *0.5***	**? -**	**3.5 ±*0.5***	(7/2-)
190-Hf	>300ns	ns	0+								
190-Ta	5.3 ± *0.7*	s	-3	5.3	3.0 ?	**0.30 ± *0.0***	**? -**	**0.30 ± *0.0***	**? -**	5.3 ± *0.7*	
190-W	30.0 ± *1.5*	m	0+	30	0.0 +	30 ± *1.5*	0.0 +	30 ± *1.5*	0.0 +	30 ± *1.5*	0+
190-Re	3.1 ± *0.3*	m	(2)-	3.1	2	3.1 ± *0.3*	2.0 -	3.1 ± *0.3*	2.0 -	3.1 ± *0.3*	(2)-
190-Os	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
190-Ir	11.78 ± *0.1*	d	4-	11.78	4	12 ± *0.2*	4.0 -	11.78 ± *0.1*	4.0 -	11.78 ±*0.1*	4-
190-Pt	650 ± *30.0*	Gy	0+	650	0.0 +	650 ± *30.0*	0.0 +	650 ± *30.0*	0.0 +	650 ±*30.0*	0+
190-Au	42.8 ± *1.0*	m	1-	42.8	1	42.8 ± *1.0*	1.0 -	42.8 ± *1.0*	1.0 -	42.8 ±*1.0*	1-
190-Hg	20.0 ± *0.5*	m	0+	20	0.0 +	20 ± *0.4*	0.0 +	20 ± *0.5*	0.0 +	20 ± *0.5*	0+
190-Tl	2.6 ± *0.3*	m	2(-)	2.6	2	2.6 ± *0.3*	2.0 -	**3.7 ± *0.3***	**7.0 +**	2.6 ± *0.3*	2(-)
190-Pb	71 ± *1.0*	s	0+	71	0.0 +	71 ± *1.0*	0.0 +	71 ± *1.0*	0.0 +	71 ± *1.0*	0+
190-Bi	6.3 ± *0.1*	s	(3+)	6.3	3.0 +	6.3 ± *0.1*	3.0 +	6.3 ± *0.1*	3.0 +	6.3 ± *0.1*	(3+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
190-Po	2.46 ± *0.05*	ms	0+	2.46	0.0 +	2.45 ± *0.05*	0.0 +	2.45 ± *0.05*	0.0 +	2.46 ±*0.05*	0+
191-Ta	3# ± *3E-7*	s		3	?					**3E-7 ±*0.0***	
191-W	20# ± *3E-7*	s	3/2-#	20	1.5	20 ± *0.0*	1.5 -	20 ± *0.0*	**? -**		
191-Re	9.8 ± *0.5*	m	(3/2+;1/2+)	9.8	**?**	9.7 ± *0.4*	1.5 +	9.8 ± *0.5*	**? -**	9.8 ± *0.5*	(3/2+,1/2+)
191-Os	14.99 ± *0.02*	d	9/2-	14.99	4.5	**15.30 ± *0.3***	4.5 -	**15.40 ± *0.1***	4.5 -	**15.40 ±*0.1***	9/2-
191-Ir	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
191-Pt	2.83 ± *0.02*	d	3/2-	2.83	1.5	2.80 ± *0.025*	1.5 -	2.80 ± *0.025*	1.5 -	2.83 ±*0.02*	3/2-
191-Au	3.18 ± *0.08*	h	3/2+	3.18	1.5 +	3.18 ± *0.08*	1.5 +	3.18 ± *0.08*	1.5 +	3.18 ±*0.08*	3/2+
191-Hg	49 ± *10.0*	m	3/2(-)	49	1.5	49 ± *10.0*	1.5 -	49 ± *10.0*	1.5 -	49 ± *10.0*	3/2(-)
191-Tl	20#	m	(1/2+)	20	0.5 +	20 ± *0.0*	0.5 +	20 ± *0.0*	0.5 +		(1/2+)
191-Pb	1.33 ± *0.08*	m	(3/2-)	1.33	1.5	1.33 ± *0.08*	1.5 -	1.33 ± *0.08*	1.5 -	1.33 ±*0.08*	(3/2-)
191-Bi	12.4 ± *0.3*	s	(9/2-)	12.4	4.5	12.3 ± *0.5*	4.5 -	12.4 ± *0.3*	4.5 -	12.4 ±*0.3*	(9/2-)
191-Po	22 ± *1.0*	ms	(3/2-)	22	1.5	22 ± *1.0*	1.5 -	22 ± *1.0*	1.5 -	22 ± *1.0*	(3/2-)
191-At	2.1 ± *0.8*	ms	(1/2+)	2.1	0.5 +					**1.7 ±*0.0***	(1/2+)
192-Ta	2.2 ± *0.7*	s	-2	2.2	2.0 ?					2.2 ± *0.7*	**(1,2)**
192-W	30# ± *3E-7*	s	0+	30	0.0 +	**10 ± *0.0***	0.0 +	**10 ± *0.0***	**? -**		0+
192-Re	16.0 ± *0.9*	s		16	?	**6.20 ± *0.8***	**1.0 -**	16 ± *1.0*	? -	16 ± *1.0*	
192-Os	stable ± *3E20*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
192-Ir	73.827 ± *0.013*	d	4+	73.831	4.0 +	73.822 ±*0.0090*	4.0 +	73.827 ±*0.013*	4.0 +	73.829 ±*0.011*	4+
192-Pt	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
192-Au	4.94 ± *0.09*	h	1-	4.94	1	4.94 ± *0.09*	1.0 -	4.94 ± *0.09*	1.0 -	4.94 ±*0.09*	1-
192-Hg	4.85 ± *0.2*	h	0+	4.85	0.0 +	4.85 ± *0.2*	0.0 +	4.85 ± *0.2*	0.0 +	4.85 ±*0.2*	0+
192-Tl	9.6 ± *0.4*	m	(2-)	9.6	2	9.6 ± *0.4*	2.0 -	9.6 ± *0.4*	2.0 -	9.6 ± *0.4*	(2-)
192-Pb	3.5 ± *0.1*	m	0+	3.5	0.0 +	3.5 ± *0.1*	0.0 +	3.5 ± *0.1*	0.0 +	3.5 ± *0.1*	0+
192-Bi	34.6 ± *0.9*	s	(3+)	34.6	3.0 +	34.6 ± *0.9*	3.0 +	34.6 ± *0.9*	3.0 +	34.6 ±*0.9*	(3+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
192-Po	32.2 ± *0.3*	ms	0+	32.2	0.0 +	**33.2 ± *1.4***	0.0 +	**33.2 ± *1.4***	0.0 +	32.2 ±*0.3*	0+
192-At	11.5 ± *0.6*	ms	3+#	11.5	3.0 +					**88 ± *6.0***	**(9-,10-)**
193-Ta	>300ns	ns									
193-W	1# ± *3E-7*	s		1	?					**3E-7 ±*0.0***	
193-Re	20# ± *3E-7*	s	5/2+#	20	2.5 +	**30 ± *0.0***	2.5 +	**52 ± *1.0***	**? -**		
193-Os	29.830 ± *0.018*	h	3/2-	29.833	1.5	30.110 ± *0.01*	1.5 -	30.110 ± *0.01*	1.5 -	30.110 ±*0.01*	3/2-
193-Ir	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
193-Pt	50 ± *6.0*	y	1/2-	50	0.5	50 ± *9.0*	0.5 -	50 ± *6.0*	0.5 -	50 ± *6.0*	1/2-
193-Au	17.65 ± *0.15*	h	3/2+	17.65	1.5 +	17.65 ± *0.15*	1.5 +	17.65 ± *0.15*	1.5 +	17.65 ±*0.15*	3/2+
193-Hg	3.80 ± *0.15*	h	3/2(-)	3.8	1.5	3.80 ± *0.15*	1.5 -	3.80 ± *0.15*	1.5 -	3.80 ±*0.15*	3/2(-)
193-Tl	21.6 ± *0.8*	m	1/2(+#)	21.6	0.5 +	21.8 ± *0.7*	0.5 +	21.6 ± *0.8*	0.5 +	21.6 ±*0.8*	1/2(+)
193-Pb	5#	m	(3/2-)	5	1.5	5 ± *0.0*	1.5 -	**2 ± *1.0***	1.5 -		(3/2-)
193-Bi	63.6 ± *3.0*	s	(9/2-)	63.6	4.5	**67 ± *3.0***	4.5 -	63.6 ± *3.0*	4.5 -	63.6 ±*3.0*	(9/2-)
193-Po	370 ± *40.0*	ms	(3/2-)	370	1.5	**420 ± *40.0***	1.5 -	370 ± *43.0*	1.5 -	370 ± *0.0*	(3/2-)
193-At	29 ± *5.0*	ms	1/2+#	29	0.5 +	**40 ± *0.0***	**4.5 -**	29 ± *4.5*	0.5 +	**28 ± *0.0***	(1/2+)
193-Rn	1.15 ± *0.27*	ms	3/2-#	1.15	1.5					1.15 ±*0.27*	(3/2-)
194-Ta	>300ns	ns									
194-W	1# ± *3E-7*	s		1	?					**3E-7 ±*0.0***	**0+**
194-Re	1.0 ± *0.5*	s		1	?	**2 ± *0.0***	? -	1 ± *0.5*	? -	1 ± *0.5*	
194-Os	6.0 ± *0.2*	y	0+	6	0.0 +	6.0 ± *0.2*	0.0 +	6.0 ± *0.2*	0.0 +	6.0 ± *0.2*	0+
194-Ir	19.28 ± *0.13*	h	1-	19.28	1	19.30 ± *0.1*	1.0 -	19.28 ± *0.13*	1.0 -	19.28 ±*0.13*	1-
194-Pt	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
194-Au	38.02 ± *0.1*	h	1-	38.03	1	38.02 ± *0.1*	1.0 -	38.02 ± *0.1*	1.0 -	38.02 ±*0.1*	1-
194-Hg	440 ± *80.0*	y	0+	440	0.0 +	444 ± *80.0*	0.0 +	444 ± *77.0*	0.0 +	444 ±*77.0*	0+
194-Tl	33.0 ± *0.5*	m	2-	33	2	33 ± *0.5*	2.0 -	33 ± *0.5*	2.0 -	33 ± *0.5*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
194-Pb	10.7 ± *0.6*	m	0+	10.7	0.0 +	**12 ± *0.5***	0.0 +	**12 ± *0.5***	0.0 +	10.7 ±*0.6*	0+
194-Bi	95 ± *3.0*	s	(3+)	95	3.0 +	95 ± *3.0*	3.0 +	95 ± *3.0*	3.0 +	95 ± *3.0*	(3+)
194-Po	392 ± *4.0*	ms	0+	392	0.0 +	392 ± *4.0*	0.0 +	392 ± *4.0*	0.0 +	392 ± *4.0*	0+
194-At	253 ± *10.0*	ms	(4-;5-)	253	**?**	**40 ± *0.0***	**3.0 +**	**40 ± *4.0***	**? -**	**40 ± *0.0***	
194-Rn	780 ± *160.0*	us	0+	780	0.0 +					780 ±*160.0*	(0+)
195-W	>300ns	ns									
195-Re	6 ± *1.0*	s	5/2+#	6	2.5 +					6 ± *1.0*	
195-Os	9# ± *5E-9*	m	3/2-#	9	1.5	**7 ± *0.6***	**0.5 -**	9 ± *0.0*	**? -**	9 ± *0.0*	
195-Ir	2.5 ± *0.2*	h	(3/2+)	2.5	1.5 +	2.5 ± *0.2*	1.5 +	2.5 ± *0.2*	1.5 +	2.5 ± *0.2*	3/2+
195-Pt	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
195-Au	186.10 ± *0.05*	d	3/2+	186.11	1.5 +	186.09 ±*0.031*	1.5 +	186.10 ±*0.047*	1.5 +	186.10 ±*0.047*	3/2+
195-Hg	10.53 ± *0.03*	h	1/2-	10.53	0.5	**9.900 ± *0.5***	0.5 -	10.53 ± *0.03*	0.5 -	10.53 ±*0.03*	1/2-
195-Tl	1.16 ± *0.05*	h	1/2+	1.16	0.5 +	1.16 ± *0.05*	0.5 +	1.16 ± *0.05*	0.5 +	1.16 ±*0.05*	1/2+
195-Pb	~15	m	3/2-#	15	1.5	15 ± *0.0*	1.5 -	15 ± *1.5*	1.5 -	15 ± *0.0*	3/2-
195-Bi	183 ± *4.0*	s	(9/2-)	183	4.5	183 ± *4.0*	4.5 -	183 ± *4.0*	4.5 -	183 ± *4.0*	(9/2-)
195-Po	4.64 ± *0.09*	s	(3/2-)	4.64	1.5	4.64 ± *0.09*	1.5 -	4.64 ± *0.09*	1.5 -	4.64 ±*0.09*	(3/2-)
195-At	328 ± *20.0*	ms	1/2+	328	0.5 +	328 ± *20.0*	**4.5 -**	328 ± *20.0*	0.5 +	328 ±*20.0*	1/2+
195-Rn	7 ± *3.0*	ms	(3/2-)	7	1.5	**6 ± *3.0***	1.5 -	7 ± *3.0*	1.5 -	**6 ± *0.0***	3/2-
196-W	>300ns	ns	0+								
196-Re	2.4 ± *15.0*	s		2.4	?						
196-Os	34.9 ± *0.2*	m	0+	34.9	0.0 +	34.9 ± *0.2*	0.0 +	34.9 ± *0.2*	0.0 +	34.9 ±*0.2*	0+
196-Ir	52 ± *1.0*	s	(0-)	52	0	52 ± *2.0*	0.0 -	52 ± *2.0*	0.0 -	52 ± *1.0*	(0-)
196-Pt	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
196-Au	6.1669 ± *6E-4*	d	2-	6.1667	2	6.1830 ± *0.01*	2.0 -	6.1669 ±*6.0E-4*	2.0 -	6.1669 ±*6.0E-4*	2-
196-Hg	stable ± *7E25*		0+	stable	0.0 +	**8E+25 ± *0.0***	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
196-Tl	1.84 ± *0.03*	h	2-	1.84	2	1.84 ± *0.03*	2.0 -	1.84 ± *0.03*	2.0 -	1.84 ±*0.03*	2-
196-Pb	37 ± *3.0*	m	0+	37	0.0 +	37 ± *3.0*	0.0 +	37 ± *3.0*	0.0 +	37 ± *3.0*	0+
196-Bi	5.1 ± *0.2*	m	(3+)	5.1	3.0 +	5.1 ± *0.2*	3.0 +	5.1 ± *0.2*	3.0 +	5.1 ± *0.2*	(3+)
196-Po	5.56 ± *0.09*	s	0+	5.56	0.0 +	5.56 ± *0.12*	0.0 +	**5.80 ± *0.2***	0.0 +	**5.80 ±*0.2***	0+
196-At	388 ± *7.0*	ms	(3+)	388	3.0 +	**253 ± *9.0***	3.0 +	388 ± *7.0*	3.0 +	388 ± *7.0*	(3+)
196-Rn	4.7 ± *1.1*	ms	0+	4.7	0.0 +	**3 ± *7.0***	0.0 +	**4.6 ± *1.1***	0.0 +	**4.4 ±*0.0***	0+
197-W	>300ns	ns									
197-Re	300# ± *3E-4*	ms	5/2+#	300	2.5 +						
197-Os	2.8 ± *0.6*	m	5/2-#	2.8	2.5					2.8 ± *0.6*	
197-Ir	5.8 ± *0.5*	m	(3/2+)	5.8	1.5 +	5.8 ± *0.5*	1.5 +	5.8 ± *0.5*	1.5 +	5.8 ± *0.5*	3/2+
197-Pt	19.8915 ± *0.0019*	h	1/2-	19.8917	0.5	19.8915 ±*0.0019*	0.5 -	19.8915 ±*0.0019*	0.5 -	19.8915 ± *0.0019*	1/2-
197-Au	stable		3/2+	stable	1.5 +	stable	1.5 +	stable	1.5 +		3/2+
197-Hg	64.94 ± *0.07*	h	1/2-	64.94	0.5	64.60 ± *0.6*	0.5 -	64.14 ± *0.05*	0.5 -	64.14 ±*0.05*	1/2-
197-Tl	2.84 ± *0.04*	h	1/2+	2.84	0.5 +	2.84 ± *0.04*	0.5 +	2.84 ± *0.04*	0.5 +	2.84 ±*0.04*	1/2+
197-Pb	8.1 ± *1.7*	m	3/2-	8.1	1.5	8 ± *2.0*	1.5 -	8 ± *2.0*	1.5 -	8.1 ± *1.7*	3/2-
197-Bi	9.33 ± *0.5*	m	(9/2-)	9.33	4.5	9.30 ± *0.5*	4.5 -	9.33 ± *0.5*	4.5 -	9.33 ±*0.5*	(9/2-)
197-Po	53.6 ± *0.9*	s	(3/2-)	53.6	1.5	53.6 ± *1.0*	1.5 -	**84 ± *16.0***	1.5 -	**84 ±*16.0***	(3/2-)
197-At	388.2 ± *5.6*	ms	(9/2-)	388.2	4.5	**350.0 ± *40.0***	4.5 -	388 ± *6.0*	4.5 -	388 ± *6.0*	(9/2-)
197-Rn	54 ± *6.0*	ms	(3/2-)	54	1.5	**65 ± *25.0***	1.5 -	**66 ± *16.0***	1.5 -	**65 ± *0.0***	(3/2-)
198-Re	300# ± *3E-4*	ms		300	?						
198-Os	1# ± *5E-9*	m	0+	1	0.0 +						0+
198-Ir	8 ± *1.0*	s		8	?	8 ± *1.0*	? -	8 ± *1.0*	? -	8 ± *1.0*	
198-Pt	stable ± *1E22*		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
198-Au	2.6948 ± *0.0012*	d	2-	2.6944	2	2.6943 ±*8.0E-4*	2.0 -	2.6947 ±*3.0E-4*	2.0 -	2.6947 ±*3.0E-4*	2-
198-Hg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
198-Tl	5.3 ± *0.5*	h	2-	5.3	2	5.3 ± *0.5*	2.0 -	5.3 ± *0.5*	2.0 -	5.3 ± *0.5*	2-
198-Pb	2.4 ± *0.1*	h	0+	2.4	0.0 +	2.4 ± *0.1*	0.0 +	2.4 ± *0.1*	0.0 +	2.4 ± *0.1*	0+
198-Bi	10.3 ± *0.3*	m	(2+;3+)	10.3	**? +**	10.3 ± *0.3*	**? -**	10.3 ± *0.3*	**? -**	10.3 ±*0.3*	(2+,3+)
198-Po	1.77 ± *0.03*	m	0+	1.77	0.0 +	1.77 ± *0.03*	0.0 +	1.77 ± *0.03*	0.0 +	1.77 ±*0.03*	0+
198-At	4.21 ± *0.22*	s	(3+)	4.21	3.0 +	4.20 ± *0.3*	3.0 +	4.20 ± *0.3*	3.0 +	**3.80 ±*0.4***	(3+)
198-Rn	65 ± *3.0*	ms	0+	65	0.0 +	**57 ± *9.0***	0.0 +	65 ± *3.0*	0.0 +	65 ± *3.0*	0+
199-Re	>300ns	ns									
199-Os	6 ± *3.0*	s	5/2-#	6	2.5					**5 ± *0.0***	
199-Ir	7 ± *5.0*	s	3/2+#	7	1.5 +	**2E+1 ± *0.0***	1.5 +	7 ± *5.0*	**? -**	**6 ± *0.0***	
199-Pt	30.80 ± *0.21*	m	5/2-	30.8	2.5	30.80 ± *0.4*	2.5 -	30.80 ± *0.4*	2.5 -	30.80 ±*0.21*	5/2-
199-Au	3.139 ± *0.0070*	d	3/2+	3.139	1.5 +	3.139 ±*0.0070*	1.5 +	3.139 ±*0.0070*	1.5 +	3.139 ±*0.0070*	3/2+
199-Hg	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
199-Tl	7.42 ± *0.08*	h	1/2+	7.42	0.5 +	7.42 ± *0.08*	0.5 +	7.42 ± *0.08*	0.5 +	7.42 ±*0.08*	1/2+
199-Pb	90 ± *10.0*	m	3/2-	90	1.5	90 ± *10.0*	1.5 -	90 ± *10.0*	1.5 -	90 ± *10.0*	3/2-
199-Bi	27 ± *1.0*	m	9/2-	27	4.5	27 ± *1.0*	4.5 -	27 ± *1.0*	4.5 -	27 ± *1.0*	9/2-
199-Po	5.47 ± *0.15*	m	3/2-#	5.47	1.5	5.48 ± *0.16*	1.5 -	5.47 ± *0.15*	1.5 -	5.47 ±*0.15*	(3/2-)
199-At	7.02 ± *0.12*	s	(9/2-)	7.02	4.5	**7.20 ± *0.5***	4.5 -	7.03 ± *0.15*	4.5 -	7.03 ±*0.15*	(9/2-)
199-Rn	590 ± *30.0*	ms	(3/2-)	590	1.5	**620 ± *30.0***	1.5 -	590 ± *30.0*	1.5 -	590 ±*30.0*	(3/2-)
199-Fr	16 ± *7.0*	ms	1/2+#	16	0.5 +	16 ± *7.0*	**1.5 -**	**15 ± *7.0***	**? -**	**12 ± *0.0***	
200-Os	7 ± *4.0*	s	0+	7	0.0 +					**6 ± *0.0***	0+
200-Ir	44 ± *6.0*	s		44	?					**3.0E-7 ±*0.0***	
200-Pt	12.6 ± *0.3*	h	0+	12.6	0.0 +	12.5 ± *0.3*	0.0 +	12.6 ± *0.3*	0.0 +	12.6 ±*0.3*	0+
200-Au	48.4 ± *0.3*	m	1(-)	48.4	1	48.4 ± *0.3*	1.0 -	48.4 ± *0.3*	1.0 -	48.4 ±*0.3*	(1-)
200-Hg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
200-Tl	26.1 ± *0.1*	h	2-	26.1	2	26.1 ± *0.1*	2.0 -	26.1 ± *0.1*	2.0 -	26.1 ±*0.1*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
200-Pb	21.5 ± *0.4*	h	0+	21.5	0.0 +	21.5 ± *0.4*	0.0 +	21.5 ± *0.4*	0.0 +	21.5 ±*0.4*	0+
200-Bi	36.4 ± *0.5*	m	7+	36.4	7.0 +	36.4 ± *0.5*	7.0 +	36.4 ± *0.5*	7.0 +	36.4 ±*0.5*	7+
200-Po	11.51 ± *0.08*	m	0+	11.51	0.0 +	11.5 ± *0.1*	0.0 +	11.51 ± *0.08*	0.0 +	11.51 ±*0.08*	0+
200-At	43.2 ± *0.9*	s	(3+)	43.2	3.0 +	43.2 ± *0.9*	3.0 +	43 ± *1.0*	3.0 +	43 ± *1.0*	(3+)
200-Rn	1.09 ± *0.16*	s	0+	1.09	0.0 +	**1.03 ± *0.05***	0.0 +	1.07 ± *0.155*	0.0 +	**1.03 ±*0.0***	0+
200-Fr	49 ± *4.0*	ms	(3+)	49	3.0 +	**24 ± *10.0***	3.0 +	49 ± *4.0*	3.0 +	49 ± *4.0*	(3+)
201-Os	1# ± *3E-7*	s	1/2-#	1	0.5						
201-Ir	21 ± *5.0*	s	3/2+#	21	1.5 +					**3.0E-7 ±*0.0***	
201-Pt	2.5 ± *0.1*	m	(5/2-)	2.5	2.5	2.5 ± *0.1*	2.5 -	2.5 ± *0.1*	2.5 -	2.5 ± *0.1*	(5/2-)
201-Au	26.0 ± *0.8*	m	3/2+	26	1.5 +	26 ± *1.0*	1.5 +	26 ± *0.8*	1.5 +	26 ± *0.8*	3/2+
201-Hg	stable		3/2-	stable	1.5	stable	1.5 -	stable	1.5 -		3/2-
201-Tl	3.0421 ± *0.0017*	d	1/2+	3.0417	0.5 +	3.0409 ±*0.0029*	0.5 +	3.0421 ±*0.0017*	0.5 +	3.0421 ±*0.0017*	1/2+
201-Pb	9.33 ± *0.03*	h	5/2-	9.33	2.5	9.40 ± *0.1*	2.5 -	9.33 ± *0.03*	2.5 -	9.33 ±*0.03*	5/2-
201-Bi	103 ± *3.0*	m	9/2-	103	4.5	**108 ± *3.0***	4.5 -	103 ± *3.0*	4.5 -	103 ± *3.0*	9/2-
201-Po	15.6 ± *0.1*	m	3/2-	15.6	1.5	15.3 ± *0.2*	1.5 -	15.6 ± *0.1*	1.5 -	15.6 ±*0.1*	3/2-
201-At	85.2 ± *1.6*	s	(9/2-)	85.2	4.5	85 ± *3.0*	4.5 -	85.2 ± *1.6*	4.5 -	85.2 ±*1.6*	(9/2-)
201-Rn	7.0 ± *0.4*	s	(3/2-)	7	1.5	7 ± *0.4*	1.5 -	7 ± *0.4*	1.5 -	7 ± *0.4*	(3/2-)
201-Fr	62 ± *5.0*	ms	(9/2-)	62	4.5	**48 ± *15.0***	4.5 -	**69 ± *14.0***	4.5 -	62 ± *5.0*	(9/2-)
201-Ra	1#	ms	3/2-#	1	1.5					**2 ± *0.0***	**(13/2+)**
202-Os	200# ± *3E-4*	ms	0+	200	0.0 +						
202-Ir	13 ± *2.0*	s	1-#	13	1					**11 ± *3.0***	(1-,2-)
202-Pt	44 ± *15.0*	h	0+	44	0.0 +	44 ± *15.0*	0.0 +	44 ± *15.0*	0.0 +	44 ± *15.0*	0+
202-Au	28.4 ± *1.2*	s	(1-)	28.4	1	28.8 ± *1.9*	1.0 -	28.4 ± *1.2*	1.0 -	28.4 ±*1.2*	(1-)
202-Hg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
202-Tl	12.31 ± *0.08*	d	2-	12.31	2	12.24 ± *0.03*	2.0 -	12.31 ± *0.08*	2.0 -	12.31 ±*0.08*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
202-Pb	52.5 ± *2.8*	ky	0+	52.5	0.0 +	53.0 ± *2.0*	0.0 +	52.5 ± *2.8*	0.0 +	52.5 ±*2.8*	0+
202-Bi	1.72 ± *0.05*	h	5(+#)	1.72	5.0 +	1.72 ± *0.05*	5.0 +	1.71 ± *0.04*	5.0 +	1.71 ±*0.04*	5+
202-Po	44.6 ± *0.4*	m	0+	44.6	0.0 +	44.7 ± *0.5*	0.0 +	44.6 ± *0.4*	0.0 +	44.6 ±*0.4*	0+
202-At	184 ± *1.0*	s	(2+;3+)	184	**?**	184 ± *1.0*	**? -**	184 ± *1.0*	**? -**	184 ± *1.0*	(2+,3+)
202-Rn	9.7 ± *0.1*	s	0+	9.7	0.0 +	**9.9 ± *0.18***	0.0 +	9.7 ± *0.1*	0.0 +	9.7 ± *0.1*	0+
202-Fr	300 ± *50.0*	ms	(3+)	300	3.0 +	**290 ± *30.0***	3.0 +	300 ± *50.0*	3.0 +	300 ±*50.0*	(3+)
202-Ra	31 ± *20.0*	ms	0+	31	0.0 +	**2.6 ± *2.1***	0.0 +	**28 ± *19.0***	0.0 +	**16 ± *0.0***	0+
203-Os	>300ns	ns									
203-Ir	1# ± *3E-7*	s	3/2+#	1	1.5 +						
203-Pt	22 ± *4.0*	s	1/2-#	22	0.5					**10 ± *3.0***	(1/2-)
203-Au	60 ± *6.0*	s	3/2+	60	1.5 +	**53 ± *2.0***	1.5 +	60 ± *6.0*	1.5 +	60 ± *6.0*	3/2+
203-Hg	46.594 ± *0.012*	d	5/2-	46.597	2.5	46.603 ±*0.021*	2.5 -	46.594 ±*0.012*	2.5 -	46.594 ±*0.012*	5/2-
203-Tl	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
203-Pb	51.92 ± *0.03*	h	5/2-	51.92	2.5	51.89 ±*0.0192*	2.5 -	51.92 ± *0.03*	2.5 -	51.92 ±*0.03*	5/2-
203-Bi	11.76 ± *0.05*	h	9/2-	11.76	4.5	11.76 ± *0.05*	4.5 -	11.76 ± *0.05*	4.5 -	11.76 ±*0.05*	9/2-
203-Po	36.7 ± *0.5*	m	5/2-	36.7	2.5	36.7 ± *0.5*	2.5 -	36.7 ± *0.5*	2.5 -	36.7 ±*0.5*	5/2-
203-At	7.4 ± *0.2*	m	9/2-	7.4	4.5	7.4 ± *0.2*	4.5 -	7.4 ± *0.2*	4.5 -	7.4 ± *0.2*	9/2-
203-Rn	44 ± *2.0*	s	3/2-#	44	1.5	44 ± *2.1*	**? -**	44 ± *2.0*	1.5 -	44 ± *2.0*	(3/2-)
203-Fr	550 ± *10.0*	ms	9/2-#	550	4.5	550 ± *20.0*	4.5 -	550 ± *10.0*	4.5 -	550 ±*10.0*	(9/2-)
203-Ra	36 ± *13.0*	ms	(3/2-)	36	1.5	**1 ± *5.0***	1.5 -	**31 ± *13.0***	1.5 -	**31 ± *0.0***	(3/2-)
204-Ir	200#	ms		200	?						
204-Pt	10.3 ± *1.4*	s	0+	10.3	0.0 +					10.3 ±*1.4*	0+
204-Au	38.2 ± *1.4*	s	(2-)	38.2	2	**39.8 ± *0.9***	2.0 -	**39.8 ± *0.9***	2.0 -	**39.8 ±*0.9***	(2-)
204-Hg	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
204-Tl	3.783 ± *0.012*	y	2-	3.784	2	3.788 ± *0.015*	2.0 -	3.783 ± *0.012*	2.0 -	3.783 ±*0.012*	2-

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
204-Pb	stable ± *4E24*		0+	0	0.0 +	**4E+24 ±*2.0E24***	0.0 +	**4E+24 ±*2.0E24***	0.0 +	**4E+24 ±*0.0***	0+
204-Bi	11.22 ± *0.1*	h	6+	11.22	6.0 +	11.22 ± *0.1*	6.0 +	11.22 ± *0.1*	6.0 +	11.22 ±*0.1*	6+
204-Po	3.519 ± *0.012*	h	0+	3.519	0.0 +	3.530 ± *0.02*	0.0 +	3.530 ± *0.02*	0.0 +	3.519 ±*0.012*	0+
204-At	9.12 ± *0.11*	m	7+	9.12	7.0 +	9.20 ± *0.2*	7.0 +	9.22 ± *0.13*	7.0 +	9.12 ±*0.11*	7+
204-Rn	1.242 ± *0.023*	m	0+	1.242	0.0 +	1.240 ± *0.03*	0.0 +	**1.170 ± *0.18***	0.0 +	1.242 ±*0.02333*	0+
204-Fr	1.75 ± *0.26*	s	(3+)	1.75	3.0 +	**1.70 ± *0.3***	3.0 +	**1.70 ± *0.3***	3.0 +	**1.80 ±*0.3***	(3+)
204-Ra	60 ± *9.0*	ms	0+	60	0.0 +	60 ± *11.0*	0.0 +	61 ± *11.0*	0.0 +	**57 ± *0.0***	0+
205-Ir	>300ns	ns									
205-Pt	1# ± *3E-7*	s	9/2+#	1	4.5 +					**3E-7 ±*0.0***	
205-Au	32.5 ± *1.4*	s	3/2+#	32.5	1.5 +	**31 ± *2.0***	1.5 +	**31 ± *2.0***	1.5 +	**31 ± *2.0***	(3/2+)
205-Hg	5.14 ± *0.09*	m	1/2-	5.14	0.5	5.20 ± *0.1*	0.5 -	5.14 ± *0.09*	0.5 -	5.14 ±*0.09*	1/2-
205-Tl	stable		1/2+	stable	0.5 +	stable	0.5 +	stable	0.5 +		1/2+
205-Pb	17.3 ± *0.7*	My	5/2-	17.3	2.5	**15.3 ± *0.7***	2.5 -	17.3 ± *0.7*	2.5 -	17.3 ±*0.7*	5/2-
205-Bi	15.31 ± *0.04*	d	9/2-	15.31	4.5	15.31 ± *0.04*	4.5 -	15.31 ± *0.04*	4.5 -	15.31 ±*0.04*	9/2-
205-Po	1.74 ± *0.08*	h	5/2-	1.74	2.5	**1.66 ± *0.02***	2.5 -	1.74 ± *0.08*	2.5 -	1.74 ±*0.08*	5/2-
205-At	33.8 ± *0.2*	m	9/2-	33.8	4.5	**26.9 ± *0.08***	4.5 -	**26.9 ± *0.8***	4.5 -	**26.9 ±*0.8***	9/2-
205-Rn	2.83 ± *0.07*	m	5/2-	2.83	2.5	2.80 ± *0.1*	2.5 -	2.83 ± *0.0667*	2.5 -	2.83 ±*0.0667*	5/2-
205-Fr	3.82 ± *0.06*	s	(9/2-)	3.82	4.5	**3.92 ± *0.04***	4.5 -	3.80 ± *0.03*	4.5 -	**3.92 ±*0.04***	(9/2-)
205-Ra	220 ± *50.0*	ms	(3/2-)	220	1.5	220 ± *50.0*	1.5 -	220 ± *50.0*	1.5 -	**210 ±*0.0***	(3/2-)
206-Pt	1# ± *3E-7*	s	0+	1	0.0 +						
206-Au	30# ± *3E-7*	s		30	?					**3.0E-7 ±*0.0***	
206-Hg	8.32 ± *0.07*	m	0+	8.32	0.0 +	**8.15 ± *0.1***	0.0 +	8.32 ± *0.07*	0.0 +	8.32 ±*0.07*	0+
206-Tl	4.202 ± *0.011*	m	0-	4.202	0	4.202 ± *0.017*	0.0 -	4.202 ± *0.011*	0.0 -	4.202 ±*0.011*	0-
206-Pb	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
206-Bi	6.243 ± *0.0030*	d	6(+)	6.243	6.0 +	6.243 ±*0.0030*	6.0 +	6.243 ±*0.0030*	6.0 +	6.243 ±*0.0030*	6+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
206-Po	8.8 ± *0.1*	d	0+	8.8	0.0 +	8.8 ± *0.1*	0.0 +	8.8 ± *0.1*	0.0 +	8.8 ± *0.1*	0+
206-At	30.6 ± *0.8*	m	(5)+	30.6	5.0 +	30 ± *0.6*	5.0 +	30.6 ± *0.8*	5.0 +	30.6 ±*0.8*	(5)+
206-Rn	5.67 ± *0.17*	m	0+	5.67	0.0 +	5.67 ± *0.17*	0.0 +	5.67 ± *0.17*	0.0 +	5.67 ±*0.17*	0+
206-Fr	~16	s	(2+;3+)	16	**?**	16 ± *0.0*	**? -**	16 ± *1.6*	**? -**	16 ± *0.0*	(2+,3+)
206-Ra	240 ± *20.0*	ms	0+	240	0.0 +	240 ± *20.0*	0.0 +	240 ± *20.0*	0.0 +	240 ±*20.0*	0+
206-Ac	25 ± *7.0*	ms	(3+)	25	3.0 +	25 ± *7.0*	3.0 +	**24 ± *7.0***	3.0 +	**22 ± *0.0***	(3+)
207-Pt	>300ns	ns									
207-Au	10# ± *3E-7*	s	3/2+#	10	1.5 +					**3.0E-7 ±*0.0***	
207-Hg	2.9 ± *0.2*	m	9/2+#	2.9	4.5 +	2.9 ± *0.2*	4.5 +	2.9 ± *0.2*	4.5 +	2.9 ± *0.2*	(9/2+)
207-Tl	4.77 ± *0.02*	m	1/2+	4.77	0.5 +	4.77 ± *0.03*	0.5 +	4.77 ± *0.03*	0.5 +	4.77 ±*0.03*	1/2+
207-Pb	stable		1/2-	stable	0.5	stable	0.5 -	stable	0.5 -		1/2-
207-Bi	31.55 ± *0.04*	y	9/2-	31.55	4.5	31.76 ± *1.917*	4.5 -	31.55 ± *0.04*	4.5 -	31.55 ±*0.04*	9/2-
207-Po	5.80 ± *0.02*	h	5/2-	5.8	2.5	5.80 ± *0.02*	2.5 -	5.80 ± *0.02*	2.5 -	5.80 ±*0.02*	5/2-
207-At	1.81 ± *0.03*	h	9/2-	1.81	4.5	1.80 ± *0.04*	4.5 -	1.80 ± *0.04*	4.5 -	1.81 ±*0.03*	9/2-
207-Rn	9.25 ± *0.17*	m	5/2-	9.25	2.5	9.25 ± *0.17*	2.5 -	9.25 ± *0.17*	2.5 -	9.25 ±*0.17*	5/2-
207-Fr	14.8 ± *0.1*	s	9/2-	14.8	4.5	14.8 ± *0.1*	4.5 -	14.8 ± *0.1*	4.5 -	14.8 ±*0.1*	9/2-
207-Ra	1.38 ± *0.18*	s	5/2-#	1.38	2.5	**1.30 ± *0.2***	**? -**	**1.30 ± *0.2***	**? -**	**1.35 ±*0.0***	(3/2-,5/2-)
207-Ac	31 ± *8.0*	ms	9/2-#	31	4.5	**22 ± *40.0***	4.5 -	**27 ± *8.5***	4.5 -	**27 ± *0.0***	(9/2-)
208-Pt	>300ns	ns	0+								
208-Au	10# ± *3E-7*	s		10	?					**3.0E-7 ±*0.0***	
208-Hg	42 ± *5.0*	m	0+	42	0.0 +	42 ± *5.0*	0.0 +	42 ± *4.5*	0.0 +	**41 ± *0.0***	0+
208-Tl	3.053 ± *0.0040*	m	5+	3.053	5.0 +	3.053 ±*0.0040*	5.0 +	3.053 ±*0.0040*	5.0 +	3.053 ±*0.0040*	5+
208-Pb	stable		0+	stable	0.0 +	stable	0.0 +	stable	0.0 +		0+
208-Bi	368 ± *4.0*	ky	5+	368	5.0 +	368 ± *4.0*	5.0 +	368 ± *4.0*	5.0 +	368 ± *4.0*	5+
208-Po	2.898 ± *0.0020*	y	0+	2.898	0.0 +	2.930 ± *0.04*	0.0 +	2.898 ±*0.0020*	0.0 +	2.898 ±*0.0020*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
208-At	1.63 ± *0.03*	h	6+	1.63	6.0 +	1.63 ± *0.03*	6.0 +	1.63 ± *0.03*	6.0 +	1.63 ±*0.03*	6+
208-Rn	24.35 ± *0.14*	m	0+	24.35	0.0 +	24.35 ± *0.14*	0.0 +	24.35 ± *0.14*	0.0 +	24.35 ±*0.14*	0+
208-Fr	59.1 ± *0.3*	s	7+	59.1	7.0 +	59.1 ± *0.3*	7.0 +	59.1 ± *0.3*	7.0 +	59.1 ±*0.3*	7+
208-Ra	1.110 ± *0.045*	s	0+	1.11	0.0 +	**1.300 ± *0.2***	0.0 +	**1.300 ± *0.2***	0.0 +	**1.300 ±*0.2***	0+
208-Ac	97 ± *16.0*	ms	(3+)	97	3.0 +	**95 ± *24.0***	3.0 +	**95 ± *20.0***	3.0 +	**95 ± *0.0***	(3+)
208-Th	2.4 ± *1.2*	ms		2.4	?					**1.7 ±*0.0***	**0+**
209-Au	1# ± *3E-7*	s	3/2+#	1	1.5 +					**3E-7 ±*0.0***	
209-Hg	37 ± *8.0*	s	9/2+#	37	4.5 +	37 ± *8.0*	4.5 +	37 ± *7.5*	**? -**	**35 ± *0.0***	
209-Tl	2.161 ± *0.0070*	m	(1/2+)	2.162	0.5 +	2.200 ± *0.07*	0.5 +	2.200 ± *0.07*	0.5 +	2.200 ±*0.07*	(1/2+)
209-Pb	3.253 ± *0.014*	h	9/2+	3.253	4.5 +	3.253 ± *0.014*	4.5 +	3.253 ± *0.014*	4.5 +	3.253 ±*0.014*	9/2+
209-Bi	19.9 ± *0.7*	Ey	9/2-	stable	4.5	**19.0 ± *2.0***	4.5 -	**19.0 ± *2.0***	4.5 -		9/2-
209-Po	102 ± *5.0*	y	1/2-	102	0.5	102 ± *5.0*	0.5 -	102 ± *5.0*	0.5 -	102 ± *5.0*	1/2-
209-At	5.41 ± *0.05*	h	9/2-	5.41	4.5	5.41 ± *0.05*	4.5 -	5.41 ± *0.05*	4.5 -	5.41 ±*0.05*	9/2-
209-Rn	28.5 ± *1.0*	m	5/2-	28.5	2.5	28.5 ± *1.0*	2.5 -	28.8 ± *0.9*	2.5 -	28.5 ±*1.0*	5/2-
209-Fr	50.0 ± *0.3*	s	9/2-	50	4.5	50 ± *0.3*	4.5 -	50 ± *0.3*	4.5 -	50 ± *0.3*	9/2-
209-Ra	4.71 ± *0.08*	s	5/2-	4.71	2.5	**4.60 ± *0.2***	2.5 -	**4.60 ± *0.2***	2.5 -	**4.60 ±*0.2***	5/2-
209-Ac	92 ± *11.0*	ms	(9/2-)	92	4.5	**1.0E+2 ±*50.0***	4.5 -	**98 ± *43.0***	4.5 -	**1.0E+2 ± *50.0***	(9/2-)
209-Th	3.1 ± *1.2*	ms	5/2-#	3.1	2.5	**7 ± *5.0***	2.5 -	**6.5 ± *4.2***	2.5 -	**3.8 ±*0.0***	(5/2-)
210-Au	1# ± *3E-7*	s		1	?					**3E-7 ±*0.0***	
210-Hg	10# ± *5E-9*	m	0+	10	0.0 +	10 ± *0.0*	0.0 +	**2.4 ± *0.0***	0.0 +	**5.0E-9 ±*0.0***	0+
210-Tl	1.30 ± *0.03*	m	5+#	1.3	5.0 +	1.30 ± *0.03*	5.0 +	1.30 ± *0.03*	5.0 +	1.30 ±*0.03*	(5+)
210-Pb	22.20 ± *0.22*	y	0+	22.2	0.0 +	22.16 ± *0.12*	0.0 +	22.20 ± *0.22*	0.0 +	22.20 ±*0.22*	0+
210-Bi	5.012 ± *0.0050*	d	1-	5.012	1	5.012 ±*0.0050*	1.0 -	5.012 ±*0.0050*	1.0 -	5.012 ±*0.0050*	1-
210-Po	138.376 ± *0.0020*	d	0+	138.426	0.0 +	138.388 ±*0.0040*	0.0 +	138.376 ±*0.0020*	0.0 +	138.376 ± *0.0020*	0+
210-At	8.1 ± *0.4*	h	(5)+	8.1	5.0 +	8.1 ± *0.4*	5.0 +	8.1 ± *0.4*	5.0 +	8.1 ± *0.4*	(5)+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
210-Rn	2.4 ± *0.1*	h	0+	2.4	0.0 +	2.4 ± *0.1*	0.0 +	2.4 ± *0.1*	0.0 +	2.4 ± *0.1*	0+
210-Fr	3.18 ± *0.06*	m	6+	3.18	6.0 +	3.18 ± *0.06*	6.0 +	3.18 ± *0.06*	6.0 +	3.18 ±*0.06*	6+
210-Ra	4.0 ± *0.1*	s	0+	4	0.0 +	**3.7 ± *0.2***	0.0 +	**3.7 ± *0.2***	0.0 +	**3.7 ±*0.2***	0+
210-Ac	350 ± *40.0*	ms	7+#	350	7.0 +	350 ± *50.0*	7.0 +	350 ± *50.0*	**? -**	350 ±*50.0*	
210-Th	16.0 ± *3.6*	ms	0+	16	0.0 +	**9 ± *17.0***	0.0 +	16 ± *4.0*	0.0 +	**9 ± *0.0***	0+
211-Hg	10# ± *3E-7*	s	9/2+#	10	4.5 +					**3.0E-7 ±*0.0***	
211-Tl	100 ± *40.0*	s	1/2+#	100	0.5 +	**60 ± *0.0***	0.5 +	**60 ± *0.0***	**? -**	**88 ± *0.0***	
211-Pb	36.1 ± *0.2*	m	9/2+	36.1	4.5 +	36.1 ± *0.2*	4.5 +	36.1 ± *0.2*	4.5 +	36.1 ±*0.2*	9/2+
211-Bi	2.14 ± *0.02*	m	9/2-	2.14	4.5	2.17 ± *0.04*	4.5 -	2.14 ± *0.02*	4.5 -	2.14 ±*0.02*	9/2-
211-Po	516 ± *3.0*	ms	9/2+	516	4.5 +	516 ± *3.0*	4.5 +	516 ± *3.0*	4.5 +	516 ± *3.0*	9/2+
211-At	7.214 ± *0.0070*	h	9/2-	7.214	4.5	7.214 ±*0.0070*	4.5 -	7.214 ±*0.0070*	4.5 -	7.214 ±*0.0070*	9/2-
211-Rn	14.6 ± *0.2*	h	1/2-	14.6	0.5	14.6 ± *0.2*	0.5 -	14.6 ± *0.2*	0.5 -	14.6 ±*0.2*	1/2-
211-Fr	3.10 ± *0.02*	m	9/2-	3.1	4.5	3.10 ± *0.02*	4.5 -	3.10 ± *0.02*	4.5 -	3.10 ±*0.02*	9/2-
211-Ra	13.2 ± *1.4*	s	5/2(-)	13.2	2.5	13 ± *2.0*	2.5 -	13 ± *2.0*	2.5 -	13 ± *2.0*	5/2(-)
211-Ac	213 ± *25.0*	ms	9/2-#	213	4.5	**250 ± *50.0***	4.5 -	210 ± *30.0*	4.5 -	210 ±*30.0*	9/2-
211-Th	48 ± *20.0*	ms	5/2-#	48	2.5	48 ± *20.0*	2.5 -	**50 ± *20.0***	**? -**	**37 ± *0.0***	
212-Hg	1# ± *5E-9*	m	0+	1	0.0 +					**5E-9 ±*0.0***	0+
212-Tl	100 ± *40.0*	s	5+#	100	5.0 +	**30 ± *0.0***	5.0 +	**67 ± *0.0***	**? -**	**96 ± *0.0***	
212-Pb	10.64 ± *0.01*	h	0+	10.64	0.0 +	10.64 ± *0.01*	0.0 +	10.64 ± *0.01*	0.0 +	10.64 ±*0.01*	0+
212-Bi	60.55 ± *0.06*	m	1(-)	60.55	1	60.54 ± *0.06*	1.0 -	60.55 ± *0.06*	1.0 -	60.55 ±*0.06*	1(-)
212-Po	299 ± *2.0*	ns	0+	299	0.0 +	298 ± *3.0*	0.0 +	299 ± *2.0*	0.0 +	299 ± *2.0*	0+
212-At	314 ± *2.0*	ms	(1-)	314	1	314 ± *2.0*	1.0 -	314 ± *2.0*	1.0 -	314 ± *2.0*	(1-)
212-Rn	23.9 ± *1.2*	m	0+	23.9	0.0 +	23.9 ± *1.2*	0.0 +	23.9 ± *1.2*	0.0 +	23.9 ±*1.2*	0+
212-Fr	20.0 ± *0.6*	m	5+	20	5.0 +	20 ± *0.6*	5.0 +	20 ± *0.6*	5.0 +	20 ± *0.6*	5+
212-Ra	13.0 ± *0.2*	s	0+	13	0.0 +	13 ± *0.2*	0.0 +	13 ± *0.2*	0.0 +	13 ± *0.2*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
212-Ac	920 ± *50.0*	ms	6+#	920	6.0 +	920 ± *50.0*	6.0 +	930 ± *50.0*	**? -**	930 ±*50.0*	
212-Th	31.7 ± *1.3*	ms	0+	31.7	0.0 +	**36 ± *15.0***	0.0 +	**35 ± *15.0***	0.0 +	**30 ± *0.0***	0+
212-Pa	8 ± *5.0*	ms	7+#	8	7.0 +	8 ± *5.0*	7.0 +	**5 ± *0.0***	**? -**	**5 ± *0.0***	
213-Hg	1# ± *3E-7*	s	5/2+#	1	2.5 +					**3E-7 ±*0.0***	
213-Tl	60 ± *40.0*	s	1/2+	60	0.5 +					**46 ± *0.0***	
213-Pb	10.2 ± *0.3*	m	(9/2+)	10.2	4.5 +	10.2 ± *0.3*	4.5 +	10.2 ± *0.3*	4.5 +	10.2 ±*0.3*	(9/2+)
213-Bi	45.59 ± *0.06*	m	9/2-	45.58	4.5	45.59 ± *0.06*	4.5 -	45.59 ± *0.06*	4.5 -	45.59 ±*0.06*	9/2-
213-Po	3.72 ± *0.02*	us	9/2+	3.72	4.5 +	**4.20 ± *0.8***	4.5 +	**4.20 ± *0.8***	4.5 +	3.72 ±*0.02*	9/2+
213-At	125 ± *6.0*	ns	9/2-	125	4.5	125 ± *6.0*	4.5 -	125 ± *6.0*	4.5 -	125 ± *6.0*	9/2-
213-Rn	19.5 ± *0.1*	ms	9/2+#	19.5	4.5 +	**25 ± *0.2***	4.5 +	**25 ± *0.2***	4.5 +	19.5 ±*0.1*	(9/2+)
213-Fr	34.82 ± *0.14*	s	9/2-	34.82	4.5	34.60 ± *0.3*	4.5 -	34.82 ± *0.14*	4.5 -	34.82 ±*0.14*	9/2-
213-Ra	2.73 ± *0.05*	m	1/2-	2.73	0.5	2.74 ± *0.06*	0.5 -	2.73 ± *0.05*	0.5 -	2.73 ±*0.05*	1/2-
213-Ac	738 ± *16.0*	ms	9/2-#	738	4.5	**800 ± *50.0***	4.5 -	**800 ± *50.0***	**? -**	738 ±*16.0*	
213-Th	144 ± *21.0*	ms	5/2-#	144	2.5	**140 ± *25.0***	2.5 -	**140 ± *25.0***	**? -**	144 ±*21.0*	
213-Pa	7 ± *3.0*	ms	9/2-#	7	4.5	7 ± *3.0*	4.5 -	**5 ± *0.0***	**? -**	**5 ± *0.0***	
214-Hg	1# ± *3E-7*	s	0+	1	0.0 +					**3E-7 ±*0.0***	0+
214-Tl	10# ± *3E-7*	s	5+#	10	5.0 +					**3.0E-7 ±*0.0***	
214-Pb	26.8 ± *0.9*	m	0+	26.8	0.0 +	26.8 ± *0.9*	0.0 +	26.8 ± *0.9*	0.0 +	26.8 ±*0.9*	0+
214-Bi	19.9 ± *0.4*	m	1-	19.9	1	19.9 ± *0.4*	1.0 -	19.9 ± *0.4*	1.0 -	19.9 ±*0.4*	1-
214-Po	164.3 ± *2.0*	us	0+	164.3	0.0 +	163.7 ± *0.2*	0.0 +	164.3 ± *2.0*	0.0 +	164.3 ±*2.0*	0+
214-At	558 ± *10.0*	ns	1-	558	1	558 ± *10.0*	1.0 -	558 ± *10.0*	1.0 -	558 ±*10.0*	1-
214-Rn	270 ± *20.0*	ns	0+	270	0.0 +	270 ± *20.0*	0.0 +	270 ± *20.0*	0.0 +	270 ±*20.0*	0+
214-Fr	5.0 ± *0.2*	ms	(1-)	5	1	5 ± *0.2*	1.0 -	5 ± *0.2*	1.0 -	5 ± *0.2*	(1-)
214-Ra	2.46 ± *0.03*	s	0+	2.46	0.0 +	2.46 ± *0.03*	0.0 +	2.46 ± *0.03*	0.0 +	2.46 ±*0.03*	0+
214-Ac	8.2 ± *0.2*	s	5+#	8.2	5.0 +	8.2 ± *0.2*	5.0 +	8.2 ± *0.2*	**? -**	8.2 ± *0.2*	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
214-Th	87 ± *10.0*	ms	0+	87	0.0 +	**1.0E+2 ±*25.0***	0.0 +	**1.0E+2 ±*25.0***	0.0 +	87 ± *10.0*	0+
214-Pa	17 ± *3.0*	ms		17	?	17 ± *3.0*	? -	17 ± *3.0*	? -	17 ± *3.0*	
215-Hg	1# ± *3E-7*	s	3/2+#	1	1.5 +					**3E-7 ±*0.0***	
215-Tl	5# ± *3E-7*	s	1/2+#	5	0.5 +					**3E-7 ±*0.0***	
215-Pb	2.45 ± *0.2*	m	9/2+#	2.45	4.5 +	**0.600 ±*0.0167***	**2.5 +**	**0.600 ±*0.0167***	**? -**	2.45 ±*0.2*	
215-Bi	7.6 ± *0.2*	m	(9/2-)	7.6	4.5	**7.4 ± *0.6***	4.5 -	7.7 ± *0.2*	4.5 -	7.6 ± *0.2*	(9/2-)
215-Po	1.781 ± *0.0040*	ms	9/2+	1.781	4.5 +	1.780 ± *0.01*	4.5 +	1.781 ±*0.0040*	4.5 +	1.781 ±*0.0040*	9/2+
215-At	100 ± *20.0*	us	9/2-	100	4.5	100 ± *20.0*	4.5 -	100 ± *20.0*	4.5 -	100 ±*20.0*	9/2-
215-Rn	2.30 ± *0.1*	us	9/2+	2.3	4.5 +	2.30 ± *0.1*	4.5 +	2.30 ± *0.1*	4.5 +	2.30 ±*0.1*	9/2+
215-Fr	86 ± *5.0*	ns	9/2-	86	4.5	86 ± *5.0*	4.5 -	86 ± *5.0*	4.5 -	86 ± *5.0*	9/2-
215-Ra	1.67 ± *0.01*	ms	9/2+#	1.67	4.5 +	**1.59 ± *0.09***	4.5 +	**1.55 ± *0.07***	4.5 +	**1.55 ±*0.07***	(9/2+)
215-Ac	170 ± *10.0*	ms	9/2-	170	4.5	170 ± *10.0*	4.5 -	170 ± *10.0*	4.5 -	170 ±*10.0*	9/2-
215-Th	1.2 ± *0.2*	s	(1/2-)	1.2	0.5	1.2 ± *0.2*	0.5 -	1.2 ± *0.2*	0.5 -	1.2 ± *0.2*	(1/2-)
215-Pa	14 ± *2.0*	ms	9/2-#	14	4.5	14 ± *2.0*	4.5 -	14 ± *2.0*	**? -**	14 ± *2.0*	
216-Hg	100# ± *3E-4*	ms	0+	100	0.0 +					**0.000300 ± *0.0***	0+
216-Tl	2# ± *3E-7*	s	5+#	2	5.0 +					**3E-7 ±*0.0***	
216-Pb	7# ± *5E-9*	m	0+	7	0.0 +					**5E-9 ±*0.0***	0+
216-Bi	2.25 ± *0.05*	m	(6-;7-)	2.25	**?**	**2.17 ± *0.05***	**1.0 -**	2.25 ± *0.05*	**? -**	2.25 ±*0.05*	(6-,7-)
216-Po	145 ± *2.0*	ms	0+	145	0.0 +	**150 ± *5.0***	0.0 +	145 ± *2.0*	0.0 +	145 ± *2.0*	0+
216-At	300 ± *30.0*	us	1(-)	300	1	300 ± *30.0*	1.0 -	300 ± *30.0*	1.0 -	300 ±*30.0*	1-
216-Rn	45 ± *5.0*	us	0+	45	0.0 +	45 ± *5.0*	0.0 +	45 ± *5.0*	0.0 +	45 ± *5.0*	0+
216-Fr	700 ± *20.0*	ns	(1-)	700	1	700 ± *20.0*	1.0 -	700 ± *20.0*	1.0 -	700 ±*20.0*	(1-)
216-Ra	182 ± *10.0*	ns	0+	182	0.0 +	182 ± *10.0*	0.0 +	182 ± *10.0*	0.0 +	182 ±*10.0*	0+
216-Ac	440 ± *16.0*	us	(1-)	440	1	**330 ± *0.0***	1.0 -	440 ± *16.0*	1.0 -	440 ±*16.0*	(1-)
216-Th	26.0 ± *0.2*	ms	0+	26	0.0 +	**26.8 ± *0.3***	0.0 +	26 ± *1.5*	0.0 +	26 ± *0.2*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
216-Pa	105 ± *12.0*	ms		105	?	105 ± *12.0*	? -	**160 ± *50.0***	? -	**150 ±*0.0***	
217-Tl	1# ± *3E-7*	s	1/2+#	1	0.5 +					**3E-7 ±*0.0***	
217-Pb	30# ± *3E-7*	s	9/2+#	30	4.5 +					**3.0E-7 ±*0.0***	
217-Bi	98.5 ± *0.8*	s	9/2-#	98.5	4.5	98.5 ± *0.8*	4.5 -	98.5 ± *0.8*	**? -**	**93 ± *3.0***	
217-Po	1.514 ± *0.026*	s	(9/2+)	1.514	4.5 +	**1.470 ± *0.05***	**2.5 +**	1.530 ± *0.05*	4.5 +	**1.460 ±*0.05***	(11/2+)
217-At	32.3 ± *0.4*	ms	9/2-	32.3	4.5	32.3 ± *0.4*	4.5 -	32.3 ± *0.4*	4.5 -	32.3 ±*0.4*	9/2-
217-Rn	540 ± *50.0*	us	9/2+	540	4.5 +	540 ± *50.0*	4.5 +	540 ± *50.0*	4.5 +	540 ±*50.0*	9/2+
217-Fr	16.8 ± *1.9*	us	9/2-	16.8	4.5	**22 ± *5.0***	4.5 -	**19.0 ± *3.0***	4.5 -	**19 ± *3.0***	9/2-
217-Ra	1.63 ± *0.17*	us	(9/2+)	1.63	4.5 +	1.60 ± *0.2*	4.5 +	1.60 ± *0.2*	4.5 +	1.60 ±*0.2*	(9/2+)
217-Ac	69 ± *4.0*	ns	9/2-	69	4.5	69 ± *4.0*	4.5 -	69 ± *4.0*	4.5 -	69 ± *4.0*	9/2-
217-Th	247 ± *4.0*	us	9/2+#	247	4.5 +	**252 ± *7.0***	4.5 +	251 ± *5.0*	4.5 +	**241 ±*5.0***	(9/2+)
217-Pa	3.48 ± *0.09*	ms	9/2-#	3.48	4.5	**4.90 ± *0.6***	4.5 -	**3.60 ± *0.8***	**? -**	**3.60 ±*0.8***	
217-U	800 ± *700.0*	us	1/2-#	800	0.5	**2.60E+4 ±*14000.0***	0.5 -	**2.35E+4 ±*13500.0***	**? -**	**1.60E+4 ± *0.0***	
218-Tl	200#	ms	5+#	200	5.0 +						
218-Pb	2# ± *5E-9*	m	0+	2	0.0 +					**5E-9 ±*0.0***	0+
218-Bi	33 ± *1.0*	s	(6-;7-;8-)	33	**?**	33 ± *1.0*	**1.0 -**	33 ± *1.0*	**? -**	33 ± *1.0*	
218-Po	3.098 ± *0.012*	m	0+	3.098	0.0 +	3.098 ±*0.0080*	0.0 +	3.098 ± *0.012*	0.0 +	3.098 ±*0.012*	0+
218-At	1.5 ± *0.3*	s	1-#	1.5	1	1.5 ± *0.3*	1.0 -	1.5 ± *0.3*	**? -**	1.5 ± *0.3*	
218-Rn	35 ± *5.0*	ms	0+	35	0.0 +	35 ± *9.0*	0.0 +	35 ± *5.0*	0.0 +	35 ± *5.0*	0+
218-Fr	1.0 ± *0.6*	ms	1-	1	1	1 ± *0.6*	1.0 -	1 ± *0.6*	1.0 -	1 ± *0.6*	1-
218-Ra	25.2 ± *0.3*	us	0+	25.2	0.0 +	25.6 ± *1.1*	0.0 +	25.2 ± *0.3*	0.0 +	25.2 ±*0.3*	0+
218-Ac	1.08 ± *0.09*	us	1-#	1.08	1	1.08 ± *0.09*	1.0 -	1.08 ± *0.09*	1.0 -	1.08 ±*0.09*	(1-)
218-Th	117 ± *9.0*	ns	0+	117	0.0 +	**109 ± *13.0***	0.0 +	117 ± *9.0*	0.0 +	117 ± *9.0*	0+
218-Pa	113 ± *10.0*	us		113	?	**120 ± *40.0***	? -	113 ± *10.0*	? -	113 ±*10.0*	
218-U	550 ± *140.0*	us	0+	550	0.0 +	**6.00E+3 ±*5000.0***	0.0 +	545 ± *135.0*	0.0 +	**510 ±*0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
219-Pb	10# ± *3E-7*	s	9/2+#	10	4.5 +					**3.0E-7 ±*0.0***	
219-Bi	22 ± *7.0*	s	9/2-#	22	4.5					22 ± *7.0*	
219-Po	2# ± *5E-9*	m	9/2+#	2	4.5 +	2 ± *0.0*	**3.5 +**	**5E-9 ± *0.0***	**? -**	**5E-9 ±*0.0***	
219-At	56 ± *3.0*	s	5/2-#	56	2.5	**54 ± *6.0***	2.5 -	56 ± *3.0*	**4.5 -**	56 ± *3.0*	
219-Rn	3.96 ± *0.01*	s	5/2+	3.96	2.5 +	3.96 ± *0.05*	2.5 +	3.96 ± *0.01*	2.5 +	3.96 ±*0.01*	5/2+
219-Fr	20 ± *2.0*	ms	9/2-	20	4.5	20 ± *2.0*	4.5 -	20 ± *2.0*	4.5 -	20 ± *2.0*	9/2-
219-Ra	10 ± *3.0*	ms	(7/2)+	10	3.5 +	10 ± *3.0*	3.5 +	10 ± *3.0*	3.5 +	10 ± *3.0*	(7/2)+
219-Ac	11.8 ± *1.5*	us	9/2-	11.8	4.5	11.8 ± *1.5*	4.5 -	11.8 ± *1.5*	4.5 -	11.8 ±*1.5*	9/2-
219-Th	1.05 ± *0.03*	us	9/2+#	1.05	4.5 +	1.05 ± *0.03*	4.5 +	1.05 ± *0.03*	**? -**	1.05 ±*0.03*	(9/2+)
219-Pa	53 ± *10.0*	ns	9/2-	53	4.5	53 ± *10.0*	4.5 -	53 ± *10.0*	4.5 -	53 ± *10.0*	9/2-
219-U	55 ± *25.0*	us	9/2+#	55	4.5 +	**42 ± *34.0***	4.5 +	**42 ± *24.0***	**? -**	**42 ± *0.0***	
219-Np	55#	us	9/2-#	55	4.5						
220-Pb	30# ± *3E-7*	s	0+	30	0.0 +					**3.0E-7 ±*0.0***	0+
220-Bi	7# ± *3E-7*	s	1-#	7	1					**3E-7 ±*0.0***	
220-Po	40# ± *3E-7*	s	0+	40	0.0 +	40 ± *0.0*	0.0 +	**3.0E-7 ± *0.0***	0.0 +	**3.0E-7 ±*0.0***	0+
220-At	3.71 ± *0.04*	m	3(-#)	3.71	3	3.71 ± *0.04*	**3.0 -**	3.71 ± *0.04*	**3.0 -**	3.71 ±*0.04*	**3**
220-Rn	55.6 ± *0.1*	s	0+	55.6	0.0 +	55.8 ± *0.3*	0.0 +	55.6 ± *0.1*	0.0 +	55.6 ±*0.1*	0+
220-Fr	27.4 ± *0.3*	s	1+	27.4	1.0 +	27.4 ± *0.3*	1.0 +	27.4 ± *0.3*	1.0 +	27.4 ±*0.3*	1+
220-Ra	17.9 ± *1.4*	ms	0+	17.9	0.0 +	18 ± *2.0*	0.0 +	18 ± *2.0*	0.0 +	18 ± *2.0*	0+
220-Ac	26.36 ± *0.19*	ms	(3-)	26.36	3	26.40 ± *0.2*	3.0 -	26.40 ± *0.2*	**? -**	26.40 ±*0.2*	(3-)
220-Th	9.7 ± *0.6*	us	0+	9.7	0.0 +	9.7 ± *0.6*	0.0 +	9.7 ± *0.6*	0.0 +	9.7 ± *0.6*	0+
220-Pa	780 ± *160.0*	ns	1-#	780	1	780 ± *160.0*	1.0 -	780 ± *160.0*	**? -**	780 ±*160.0*	
220-U	60#	ns	0+	60	0.0 +	60 ± *0.0*	0.0 +	60 ± *6.0*	0.0 +		
220-Np	100#	ns	1-#	100	1						
221-Bi	5# ± *3E-7*	s	9/2-#	5	4.5					**3E-7 ±*0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
221-Po	2.2 ± *0.7*	m	9/2+#	2.2	4.5 +						
221-At	2.3 ± *0.2*	m	3/2-#	2.3	1.5	2.3 ± *0.2*	1.5 -	2.3 ± *0.2*	**? -**	2.3 ± *0.2*	
221-Rn	25.7 ± *0.5*	m	7/2+	25.7	3.5 +	**25 ± *2.0***	3.5 +	25.7 ± *0.5*	3.5 +	**25 ± *2.0***	7/2+
221-Fr	4.777 ± *0.013*	m	5/2-	4.777	2.5	**4.900 ± *0.2***	2.5 -	**4.900 ± *0.2***	2.5 -	**4.900 ±*0.2***	5/2-
221-Ra	28 ± *2.0*	s	5/2+	28	2.5 +	28 ± *2.0*	2.5 +	28 ± *2.0*	2.5 +	28 ± *2.0*	5/2+
221-Ac	52 ± *2.0*	ms	9/2-#	52	4.5	52 ± *2.0*	4.5 -	52 ± *2.0*	**? -**	52 ± *2.0*	(3/2-)
221-Th	1.68 ± *0.06*	ms	(7/2+)	1.68	3.5 +	1.68 ± *0.06*	3.5 +	**1.73 ± *0.03***	3.5 +	**1.74 ±*0.03***	(7/2+)
221-Pa	5.9 ± *1.7*	us	9/2-	5.9	4.5	5.9 ± *1.7*	4.5 -	5.9 ± *1.7*	4.5 -	5.9 ± *1.7*	9/2-
221-U	700#	ns	9/2+#	700	4.5 +	700 ± *0.0*	4.5 +			700 ± *0.0*	(9/2+)
221-Np	100#	ns	9/2-#	100	4.5						
222-Bi	2# ± *3E-7*	s	1-#	2	1						
222-Po	9.1 ± *7.2*	m	0+	9.1	0.0 +					9.2 ± *7.2*	0+
222-At	54 ± *10.0*	s		54	?	54 ± *10.0*	? -	54 ± *10.0*	? -	54 ± *10.0*	
222-Rn	3.8235 ± *3E-4*	d	0+	3.8241	0.0 +	3.8231 ±*3.0E-4*	0.0 +	3.8235 ±*3.0E-4*	0.0 +	3.8235 ±*3.0E-4*	0+
222-Fr	14.2 ± *0.3*	m	2-	14.2	2	14.2 ± *0.3*	2.0 -	14.2 ± *0.3*	2.0 -	14.2 ±*0.3*	2-
222-Ra	33.6 ± *0.4*	s	0+	33.6	0.0 +	**38 ± *0.5***	0.0 +	**36.2 ± *0.1***	0.0 +	**38 ± *0.5***	0+
222-Ac	5.0 ± *0.5*	s	1-	5	1	5 ± *0.5*	1.0 -	5 ± *0.5*	1.0 -	5 ± *0.5*	1-
222-Th	2.05 ± *0.07*	ms	0+	2.05	0.0 +	**2.80 ± *0.3***	0.0 +	**2.24 ± *0.013***	0.0 +	**2.24 ±*0.03***	0+
222-Pa	3.2 ± *0.3*	ms		3.2	?	3.2 ± *0.3*	? -	**3.3 ± *0.3***	? -	**2.9 ±*0.0***	
222-U	1.5 ± *0.8*	us	0+	1.5	0.0 +	**1.4 ± *0.7***	0.0 +	**1.3 ± *0.7***	0.0 +	**1 ± *0.0***	0+
222-Np	3#	us	1-#	3	1						
223-Bi	1# ± *3E-7*	s	9/2-#	1	4.5					**3E-7 ±*0.0***	
223-Po	1# ± *5E-9*	m	9/2+#	1	4.5 +					**5E-9 ±*0.0***	
223-At	50 ± *7.0*	s	3/2-#	50	1.5	50 ± *7.0*	1.5 -	50 ± *7.0*	**? -**	50 ± *7.0*	
223-Rn	24.3 ± *0.4*	m	7/2(-#)	24.3	3.5	24.2 ± *0.7*	3.5 -	24.3 ± *0.4*	3.5 -	24.3 ±*0.4*	**02-Jul**

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
223-Fr	22.00 ± *0.07*	m	3/2(-)	22	1.5	21.80 ± *0.4*	1.5 -	22 ± *0.07*	1.5 -	22 ± *0.07*	3/2(-)
223-Ra	11.43 ± *0.05*	d	3/2+	11.43	1.5 +	11.43 ± *0.02*	**0.5 +**	11.43 ± *0.05*	1.5 +	11.43 ±*0.05*	3/2+
223-Ac	2.10 ± *0.05*	m	(5/2-)	2.1	2.5	2.10 ± *0.05*	2.5 -	2.10 ± *0.05*	2.5 -	2.10 ±*0.05*	(5/2-)
223-Th	600 ± *20.0*	ms	(5/2)+	600	2.5 +	600 ± *20.0*	2.5 +	600 ± *20.0*	2.5 +	600 ±*20.0*	(5/2)+
223-Pa	5.1 ± *0.3*	ms	9/2-#	5.1	4.5	5.1 ± *0.6*	4.5 -	5.1 ± *0.6*	**? -**	5.1 ± *0.6*	
223-U	21 ± *8.0*	us	7/2+#	21	3.5 +	**18 ± *10.0***	3.5 +	**18 ± *7.5***	**? -**	**18 ± *0.0***	
223-Np	1#	us	9/2-#	1	4.5						
224-Bi	300# ± *3E-4*	ms	1-#	300	1					**0.000300 ± *0.0***	
224-Po	1# ± *5E-9*	m	0+	1	0.0 +					**5E-9 ±*0.0***	0+
224-At	2.5 ± *1.5*	m		2.5	?					2.5 ± *1.5*	
224-Rn	107 ± *3.0*	m	0+	107	0.0 +	107 ± *3.0*	0.0 +	107 ± *3.0*	0.0 +	107 ± *3.0*	0+
224-Fr	3.33 ± *0.1*	m	1-	3.33	1	3.33 ± *0.1*	1.0 -	3.33 ± *0.1*	1.0 -	3.33 ±*0.1*	1-
224-Ra	3.66 ± *0.04*	d	0+	3.66	0.0 +	3.64 ± *0.03*	0.0 +	3.66 ± *0.04*	0.0 +	3.66 ±*0.04*	0+
224-Ac	2.78 ± *0.17*	h	0-	2.78	0	2.78 ± *0.17*	0.0 -	2.78 ± *0.17*	0.0 -	2.78 ±*0.17*	0-
224-Th	1.05 ± *0.02*	s	0+	1.05	0.0 +	1.05 ± *0.02*	0.0 +	1.05 ± *0.02*	0.0 +	1.05 ±*0.02*	0+
224-Pa	844 ± *19.0*	ms	5-#	844	5	844 ± *19.0*	5.0 -	**790 ± *60.0***	5.0 -	**790 ±*60.0***	
224-U	940 ± *270.0*	us	0+	940	0.0 +	940 ± *270.0*	0.0 +	**900 ± *300.0***	0.0 +	**900 ±*300.0***	0+
224-Np	100#	us	1-#	100	1						
225-Po	20# ± *3E-7*	s	9/2+#	20	4.5 +					**3.0E-7 ±*0.0***	
225-At	2# ± *5E-9*	m	1/2+#	2	0.5 +					**5E-9 ±*0.0***	
225-Rn	4.66 ± *0.04*	m	7/2-	4.66	3.5	4.66 ± *0.04*	3.5 -	4.66 ± *0.04*	3.5 -	4.66 ±*0.04*	7/2-
225-Fr	3.95 ± *0.14*	m	3/2-	3.95	1.5	4 ± *0.2*	1.5 -	3.95 ± *0.14*	1.5 -	3.95 ±*0.14*	3/2-
225-Ra	14.9 ± *0.2*	d	1/2+	14.9	0.5 +	14.8 ± *0.2*	**1.5 +**	14.9 ± *0.2*	0.5 +	14.9 ±*0.2*	1/2+
225-Ac	9.920 ± *0.0030*	d	3/2-#	9.92	1.5	10 ± *0.1*	1.5 -	10 ± *0.1*	1.5 -	10 ± *0.1*	(3/2-)
225-Th	8.75 ± *0.04*	m	(3/2+)	8.75	1.5 +	8.72 ± *0.04*	1.5 +	8.72 ± *0.04*	1.5 +	8.75 ±*0.04*	(3/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
225-Pa	1.7 ± *0.2*	s	5/2-#	1.7	2.5	1.7 ± *0.1*	2.5 -	1.7 ± *0.1*	**? -**	1.7 ± *0.2*	
225-U	61 ± *4.0*	ms	5/2+#	61	2.5 +	61 ± *4.0*	2.5 +	**84 ± *4.0***	**? -**	**69 ±*15.0***	
225-Np	3# ± *0.0020*	ms	9/2-#	3	4.5	3 ± *0.0*	4.5 -	**0.002 ± *0.0***	4.5 -		(9/2-)
226-Po	20# ± *3E-7*	s	0+	20	0.0 +					**3.0E-7 ±*0.0***	0+
226-At	20# ± *3E-7*	s		20	?					**3.0E-7 ±*0.0***	
226-Rn	7.4 ± *0.1*	m	0+	7.4	0.0 +	7.4 ± *0.1*	0.0 +	7.4 ± *0.1*	0.0 +	7.4 ± *0.1*	0+
226-Fr	49 ± *1.0*	s	1-	49	1	49 ± *1.0*	1.0 -	49 ± *1.0*	1.0 -	49 ± *1.0*	1-
226-Ra	1.600 ± *0.0070*	ky	0+	1.6	0.0 +	1.600 ±*0.0070*	0.0 +	1.600 ±*0.0070*	0.0 +	1.600 ±*0.0070*	0+
226-Ac	29.37 ± *0.12*	h	(1)(-#)	29.36	1	29.37 ± *0.12*	1.0 -	29.37 ± *0.12*	**1.0 -**	29.37 ±*0.12*	**-1**
226-Th	30.70 ± *0.03*	m	0+	30.7	0.0 +	30.57 ± *0.1*	0.0 +	30.57 ± *0.1*	0.0 +	30.57 ±*0.1*	0+
226-Pa	1.8 ± *0.2*	m		1.8	?	1.8 ± *0.2*	? -	1.8 ± *0.2*	? -	1.8 ± *0.2*	
226-U	269 ± *6.0*	ms	0+	269	0.0 +	**350 ± *150.0***	0.0 +	**350 ± *150.0***	0.0 +	**350 ±*150.0***	0+
226-Np	35 ± *10.0*	ms		35	?	35 ± *10.0*	? -	35 ± *10.0*	? -	35 ± *10.0*	
227-Po	5# ± *3E-7*	s	9/2+#	5	4.5 +					**3E-7 ±*0.0***	
227-At	20# ± *3E-7*	s	1/2+#	20	0.5 +					**3.0E-7 ±*0.0***	
227-Rn	20.8 ± *0.7*	s	5/2(+#)	20.8	2.5 +	20.8 ± *0.7*	2.5 +	20.8 ± *0.7*	**? -**	20.8 ±*0.7*	
227-Fr	2.47 ± *0.03*	m	1/2+	2.47	0.5 +	2.47 ± *0.03*	0.5 +	2.47 ± *0.03*	0.5 +	2.47 ±*0.03*	1/2+
227-Ra	42.2 ± *0.5*	m	3/2+	42.2	1.5 +	42.2 ± *0.5*	1.5 +	42.2 ± *0.5*	1.5 +	42.2 ±*0.5*	3/2+
227-Ac	21.772 ± *0.0030*	y	3/2-	21.773	1.5	21.773 ±*0.0030001*	1.5 -	21.772 ±*0.0030001*	1.5 -	21.772 ±*0.0030*	3/2-
227-Th	18.68 ± *0.09*	d	1/2+	18.68	0.5 +	18.72 ±*0.0050*	0.5 +	18.68 ± *0.09*	0.5 +	18.68 ±*0.09*	1/2+
227-Pa	38.3 ± *0.3*	m	(5/2-)	38.3	2.5	38.3 ± *0.3*	2.5 -	38.3 ± *0.3*	2.5 -	38.3 ±*0.3*	(5/2-)
227-U	1.1 ± *0.1*	m	(3/2+)	1.1	1.5 +	1.1 ± *0.1*	1.5 +	1.1 ± *0.1*	1.5 +	1.1 ± *0.1*	(3/2+)
227-Np	510 ± *60.0*	ms	5/2-#	510	2.5	510 ± *60.0*	2.5 -	510 ± *60.0*	**? -**	510 ±*60.0*	
228-At	5# ± *3E-7*	s		5	?					**3E-7 ±*0.0***	
228-Rn	65 ± *2.0*	s	0+	65	0.0 +	65 ± *2.0*	0.0 +	65 ± *2.0*	0.0 +	65 ± *2.0*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
228-Fr	38 ± *1.0*	s	2-	38	2	38 ± *1.0*	2.0 -	38 ± *1.0*	2.0 -	38 ± *1.0*	2-
228-Ra	5.75 ± *0.03*	y	0+	5.75	0.0 +	5.75 ± *0.03*	0.0 +	5.75 ± *0.03*	0.0 +	5.75 ±*0.03*	0+
228-Ac	6.15 ± *0.02*	h	3+	6.15	3.0 +	6.15 ± *0.02*	3.0 +	6.15 ± *0.03*	3.0 +	6.15 ±*0.02*	3+
228-Th	1.9116 ± *0.0016*	y	0+	1.9115	0.0 +	1.9127 ±*5.4758E-4*	0.0 +	1.9120 ±*0.0020*	0.0 +	1.9116 ±*0.0016*	0+
228-Pa	22 ± *1.0*	h	3+	22	3.0 +	22 ± *1.0*	3.0 +	22 ± *1.0*	3.0 +	22 ± *1.0*	3+
228-U	9.1 ± *0.2*	m	0+	9.1	0.0 +	9.1 ± *0.2*	0.0 +	9.1 ± *0.2*	0.0 +	9.1 ± *0.2*	0+
228-Np	61.4 ± *1.4*	s		61.4	?	61.4 ± *1.4*	? -	61.4 ± *1.4*	? -	61.4 ±*1.4*	
228-Pu	2.1 ± *1.3*	s	0+	2.1	0.0 +	**0.010 ± *0.0***	0.0 +	**1.9 ± *1.3***	0.0 +		0+
229-At	5# ± *3E-7*	s	1/2+#	5	0.5 +					**3E-7 ±*0.0***	
229-Rn	11.9 ± *1.3*	s	5/2+#	11.9	2.5 +					12 ± *0.0*	
229-Fr	50.2 ± *0.4*	s	1/2+#	50.2	0.5 +	50.2 ± *0.4*	0.5 +	50.2 ± *0.4*	0.5 +	50.2 ±*2.0*	
229-Ra	4.0 ± *0.2*	m	5/2+	4	2.5 +	4 ± *0.2*	2.5 +	4 ± *0.2*	2.5 +	4 ± *0.2*	5/2+
229-Ac	62.7 ± *0.5*	m	(3/2+)	62.7	1.5 +	62.7 ± *0.5*	1.5 +	62.7 ± *0.5*	1.5 +	62.7 ±*0.5*	(3/2+)
229-Th	7.932 ± *0.055*	ky	5/2+	7.932	2.5 +	**7.340 ± *0.16***	2.5 +	**7.340 ± *0.16***	2.5 +	7.880 ±*0.12*	5/2+
229-Pa	1.50 ± *0.05*	d	(5/2+)	1.5	2.5 +	1.5 ± *0.05*	2.5 +	1.5 ± *0.05*	2.5 +	1.5 ±*0.05*	(5/2+)
229-U	58 ± *3.0*	m	(3/2+)	58	1.5 +	58 ± *3.0*	1.5 +	58 ± *3.0*	1.5 +	58 ± *3.0*	(3/2+)
229-Np	4.00 ± *0.18*	m	5/2+#	4	2.5 +	4 ± *0.2*	2.5 +	4 ± *0.2*	**? -**	4 ± *0.2*	
229-Pu	91 ± *26.0*	s	3/2+#	91	1.5 +	**1.2E+2 ±*50.0***	1.5 +	**1.1E+2 ±*49.0***	1.5 +	90 ± *0.0*	(3/2+)
230-Rn	10# ± *3E-7*	s	0+	10	0.0 +						
230-Fr	19.1 ± *0.5*	s		19.1	?	19.1 ± *0.5*	? -	19.1 ± *0.5*	? -	19.1 ±*0.5*	
230-Ra	93 ± *2.0*	m	0+	93	0.0 +	93 ± *2.0*	0.0 +	93 ± *2.0*	0.0 +	93 ± *2.0*	0+
230-Ac	122 ± *3.0*	s	(1+)	122	1.0 +	122 ± *3.0*	1.0 +	122 ± *3.0*	1.0 +	122 ± *3.0*	(1+)
230-Th	75.4 ± *0.3*	ky	0+	75.4	0.0 +	75.4 ± *0.3*	0.0 +	75.4 ± *0.3*	0.0 +	75.4 ±*0.3*	0+
230-Pa	17.4 ± *0.5*	d	(2-)	17.4	2	17.4 ± *0.5*	2.0 -	17.4 ± *0.5*	2.0 -	17.4 ±*0.5*	(2-)
230-U	20.23 ± *0.02*	d	0+	20.23	0.0 +	**20.80 ± *2.1***	0.0 +	**20.80 ± *2.1***	0.0 +	**20.80 ±*0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
230-Np	4.6 ± *0.3*	m		4.6	?	4.6 ± *0.3*	? -	4.6 ± *0.3*	? -	4.6 ± *0.3*	
230-Pu	1.70 ± *0.17*	m	0+	1.7	0.0 +	1.70 ± *0.17*	0.0 +	1.70 ± *0.167*	0.0 +	1.70 ±*0.167*	
230-Am	1.4 ± *1.3*	m		1.4	?					**0.52 ±*0.0***	
231-Rn	300# ± *3E-4*	ms	1/2+#	300	0.5 +						
231-Fr	17.6 ± *0.6*	s	1/2+#	17.6	0.5 +	17.6 ± *0.6*	0.5 +	17.6 ± *0.6*	0.5 +	17.6 ±*0.6*	(1/2+)
231-Ra	104.0 ± *0.8*	s	(5/2+)	104	2.5 +	103 ± *3.0*	2.5 +	103 ± *3.0*	2.5 +	104 ± *1.0*	(5/2+)
231-Ac	7.5 ± *0.1*	m	(1/2+)	7.5	0.5 +	7.5 ± *0.1*	0.5 +	7.5 ± *0.1*	0.5 +	7.5 ± *0.1*	1/2+
231-Th	25.52 ± *0.01*	h	5/2+	25.52	2.5 +	25.52 ± *0.01*	2.5 +	25.52 ± *0.01*	2.5 +	25.52 ±*0.01*	5/2+
231-Pa	32.76 ± *0.11*	ky	3/2-	32.77	1.5	32.76 ± *0.11*	1.5 -	32.76 ± *0.11*	1.5 -	32.76 ±*0.11*	3/2-
231-U	4.2 ± *0.1*	d	(5/2)(+#)	4.2	2.5 +	4.2 ± *0.1*	2.5 +	4.2 ± *0.1*	**2.5 -**	4.2 ± *0.1*	**(5/2-)**
231-Np	48.8 ± *0.2*	m	(5/2)(+#)	48.8	2.5 +	48.8 ± *0.2*	2.5 +	48.8 ± *0.2*	**2.5 -**	48.8 ±*0.2*	**(5/2-)**
231-Pu	8.6 ± *0.5*	m	3/2+#	8.6	1.5 +	8.6 ± *0.5*	1.5 +	8.6 ± *0.5*	1.5 +	8.6 ± *0.5*	(3/2+)
231-Am	1#	m		1	?	**0.5 ± *0.0***	? -	**0.2 ± *0.0***	? -		
232-Fr	5.5 ± *0.6*	s	-5	5.5	5.0 ?	**5 ± *1.0***	**? -**	5.5 ± *0.6*	**5.0 -**	5.5 ± *0.6*	**-5**
232-Ra	4.0 ± *0.3*	m	0+	4	0.0 +	**4.2 ± *0.83***	0.0 +	**4.2 ± *0.8***	0.0 +	**4.2 ±*0.8***	0+
232-Ac	1.98 ± *0.08*	m	(1+)	1.98	1.0 +	1.98 ± *0.0833*	1.0 +	1.98 ± *0.0833*	1.0 +	1.98 ±*0.0833*	(1+)
232-Th	14.0 ± *0.1*	Gy	0+	14	0.0 +	14.1 ± *0.06*	0.0 +	14.1 ± *0.06*	0.0 +	14.0 ±*0.1*	0+
232-Pa	1.32 ± *0.02*	d	(2-)	1.32	2	1.31 ± *0.02*	2.0 -	1.32 ± *0.02*	2.0 -	1.32 ±*0.02*	(2-)
232-U	68.9 ± *0.4*	y	0+	68.9	0.0 +	69.8 ± *0.5*	0.0 +	68.9 ± *0.4*	0.0 +	68.9 ±*0.4*	0+
232-Np	14.7 ± *0.3*	m	(4+)	14.7	4.0 +	14.7 ± *0.3*	4.0 +	14.7 ± *0.3*	4.0 +	14.7 ±*0.3*	(4+)
232-Pu	33.7 ± *0.5*	m	0+	33.7	0.0 +	33.7 ± *0.5*	0.0 +	33.8 ± *0.7*	0.0 +	33.8 ±*0.7*	0+
232-Am	1.31 ± *0.04*	m	1-#	1.31	1	1.31 ± *0.04*	**? -**	1.32 ± *0.0333*	**? -**	1.32 ±*0.0333*	
232-Cm	30#	s	0+	30	0.0 +						
233-Fr	5# ± *3E-7*	s	1/2+#	5	0.5 +					**3E-7 ±*0.0***	
233-Ra	30 ± *5.0*	s	1/2+#	30	0.5 +	30 ± *5.0*	0.5 +	30 ± *5.0*	**? -**	30 ± *5.0*	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
233-Ac	145 ± *10.0*	s	(1/2+)	145	0.5 +	145 ± *10.0*	0.5 +	145 ± *10.0*	0.5 +	145 ±*10.0*	(1/2+)
233-Th	21.83 ± *0.04*	m	(1/2)+	21.83	0.5 +	**22.30 ± *0.1***	**1.5 +**	**22.30 ± *0.1***	0.5 +	21.83 ±*0.04*	1/2+
233-Pa	26.975 ± *0.013*	d	3/2-	26.979	1.5	27 ± *0.1*	1.5 -	26.975 ±*0.013*	1.5 -	26.975 ±*0.013*	3/2-
233-U	159.2 ± *0.2*	ky	5/2+	159.2	2.5 +	159.3 ± *0.2*	2.5 +	159.2 ± *0.2*	2.5 +	159.2 ±*0.2*	5/2+
233-Np	36.2 ± *0.1*	m	5/2+#	36.2	2.5 +	36.2 ± *0.1*	2.5 +	36.2 ± *0.1*	2.5 +	36.2 ±*0.1*	(5/2+)
233-Pu	20.9 ± *0.4*	m	5/2+#	20.9	2.5 +	20.9 ± *0.4*	2.5 +	20.9 ± *0.4*	**? -**	20.9 ±*0.4*	
233-Am	3.2 ± *0.8*	m	5/2-#	3.2	2.5	3.2 ± *0.8*	**? -**	3.2 ± *0.8*	**? -**	3.2 ± *0.8*	
233-Cm	27 ± *10.0*	s	3/2+#	27	1.5 +	**60 ± *0.0***	1.5 +	**18 ± *0.0***	**? -**		
234-Ra	30 ± *10.0*	s	0+	30	0.0 +	30 ± *10.0*	0.0 +	30 ± *10.0*	0.0 +	30 ± *10.0*	0+
234-Ac	45 ± *2.0*	s	1+#	45	1.0 +	**44 ± *7.0***	**? -**	**44 ± *7.0***	**? -**	**44 ± *7.0***	
234-Th	24.10 ± *0.03*	d	0+	24.1	0.0 +	24.09 ± *0.03*	0.0 +	24.10 ± *0.03*	0.0 +	24.10 ±*0.03*	0+
234-Pa	6.70 ± *0.05*	h	4+	6.7	4.0 +	6.78 ± *0.03*	4.0 +	6.70 ± *0.05*	4.0 +	6.70 ±*0.05*	4+
234-U	245.5 ± *0.6*	ky	0+	245.5	0.0 +	245.7 ± *0.3*	0.0 +	245.5 ± *0.6*	0.0 +	245.5 ±*0.6*	0+
234-Np	4.4 ± *0.1*	d	(0+)	4.4	0.0 +	4.4 ± *0.1*	0.0 +	4.4 ± *0.1*	0.0 +	4.4 ± *0.1*	(0+)
234-Pu	8.8 ± *0.1*	h	0+	8.8	0.0 +	8.8 ± *0.1*	0.0 +	8.8 ± *0.1*	0.0 +	8.8 ± *0.1*	0+
234-Am	2.32 ± *0.08*	m		2.32	?	2.32 ± *0.08*	? -	2.32 ± *0.08*	? -	2.32 ±*0.08*	
234-Cm	51 ± *12.0*	s	0+	51	0.0 +	51 ± *12.0*	0.0 +	51 ± *12.0*	0.0 +	51 ± *12.0*	0+
234-Bk	2.43 ± *0.17*	m		2.43	?					**2.33 ±*0.0***	
235-Ra	3#	s	5/2+#	3	2.5 +						
235-Ac	62 ± *4.0*	s	1/2+#	62	0.5 +	**40 ± *0.0***	0.5 +	**60 ± *4.0***	**? -**	**60 ± *4.0***	
235-Th	7.2 ± *0.1*	m	1/2+#	7.2	0.5 +	**6.9 ± *0.2***	**2.5 +**	7.1 ± *0.2*	0.5 +	7.2 ± *0.1*	(1/2+)
235-Pa	24.44 ± *0.11*	m	(3/2-)	24.43	1.5	24.20 ± *0.3*	1.5 -	24.44 ± *0.11*	1.5 -	24.44 ±*0.11*	(3/2-)
235-U	704 ± *1.0*	My	7/2-	704	3.5	704 ± *0.5*	3.5 -	704 ± *0.5*	3.5 -	704 ± *1.0*	7/2-
235-Np	396.1 ± *1.2*	d	5/2+	396.1	2.5 +	395.9 ± *1.096*	2.5 +	396.2 ± *1.2*	2.5 +	396.1 ±*1.2*	5/2+
235-Pu	25.3 ± *0.5*	m	(5/2+)	25.3	2.5 +	25.3 ± *0.5*	2.5 +	25.3 ± *0.5*	2.5 +	25.3 ±*0.5*	(5/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
235-Am	10.3 ± *0.6*	m	5/2-#	10.3	2.5	**9.90 ± *0.5***	2.5 -	10.3 ± *0.6*	**? -**	**9.90 ±*0.5***	
235-Cm	5#	m	5/2+#	5	2.5 +	5 ± *0.0*	2.5 +	5 ± *0.5*	**? -**		
235-Bk	1#	m		1	?	**0.3 ± *0.0***	? -	**0.3 ± *0.0***	? -		
236-Ac	4.5 ± *3.6*	m		4.5	?	**2 ± *0.0***	? -	**2 ± *0.0***	? -		
236-Th	37.3 ± *1.5*	m	0+	37.3	0.0 +	37.5 ± *0.2*	0.0 +	37.3 ± *1.5*	0.0 +	37.3 ±*1.5*	0+
236-Pa	9.1 ± *0.1*	m	1(-)	9.1	1	9.1 ± *0.1*	1.0 -	9.1 ± *0.1*	1.0 -	9.1 ± *0.1*	1(-)
236-U	23.42 ± *0.03*	My	0+	23.42	0.0 +	23.70 ± *0.2*	0.0 +	23.42 ± *0.04*	0.0 +	23.42 ±*0.04*	0+
236-Np	153 ± *5.0*	ky	(6-)	153	6	152 ± *3.0*	6.0 -	153 ± *5.0*	6.0 -	153 ± *5.0*	(6-)
236-Pu	2.858 ± *0.0080*	y	0+	2.858	0.0 +	2.858 ±*0.0060*	0.0 +	2.858 ±*0.0080*	0.0 +	2.858 ±*0.0080*	0+
236-Am	3.6 ± *0.1*	m	(5-)	3.6	5	**30 ± *0.0***	**? -**	3.6 ± *0.2*	5.0 -	3.6 ± *0.2*	5-
236-Cm	6.8 ± *0.8*	m	0+	6.8	0.0 +	**10 ± *0.0***	0.0 +	**32 ± *0.0***	0.0 +		0+
236-Bk	2#	m		2	?	**1 ± *0.0***	? -				
237-Ac	4#	m	1/2+#	4	0.5 +						
237-Th	4.8 ± *0.5*	m	5/2+#	4.8	2.5 +	4.8 ± *0.5*	2.5 +	**4.7 ± *0.6***	2.5 +	4.8 ± *0.5*	(5/2+)
237-Pa	8.7 ± *0.2*	m	(1/2+)	8.7	0.5 +	8.7 ± *0.2*	0.5 +	8.7 ± *0.2*	0.5 +	8.7 ± *0.2*	(1/2+)
237-U	6.752 ± *0.0020*	d	1/2+	6.752	0.5 +	6.75 ± *0.01*	0.5 +	6.75 ± *0.01*	0.5 +	6.752 ±*0.0020*	1/2+
237-Np	2.144 ± *0.0070*	My	5/2+	2.144	2.5 +	2.140 ± *0.01*	2.5 +	2.144 ±*0.0070*	2.5 +	2.144 ±*0.0070*	5/2+
237-Pu	45.64 ± *0.04*	d	7/2-	45.64	3.5	45.30 ± *0.2*	3.5 -	45.64 ± *0.04*	3.5 -	45.64 ±*0.04*	7/2-
237-Am	73.6 ± *0.8*	m	5/2(-)	73.6	2.5	73 ± *1.0*	2.5 -	73.6 ± *0.8*	2.5 -	73.6 ±*0.8*	5/2(-)
237-Cm	20#	m	5/2+#	20	2.5 +	20 ± *0.0*	2.5 +	20 ± *2.0*	**? -**		
237-Bk	2#	m	(3/2-)	2	1.5	**1 ± *0.0***	**3.5 +**	**1 ± *0.1***	**? -**		
237-Cf	0.8 ± *0.2*	s	5/2+#	0.8	2.5 +	**2.1 ± *0.3***	2.5 +	**2.1 ± *0.3***	**? -**	**2.1 ±*0.3***	
238-Th	9.4 ± *2.0*	m	0+	9.4	0.0 +	9.4 ± *2.0*	0.0 +	9.4 ± *2.0*	0.0 +	9.4 ± *2.0*	0+
238-Pa	2.27 ± *0.09*	m	3-#	2.27	3	2.27 ± *0.09*	3.0 -	2.27 ± *0.09*	3.0 -	2.27 ±*0.09*	(3-)
238-U	4.468 ± *0.0030*	Gy	0+	4.468	0.0 +	4.468 ±*0.0030*	0.0 +	4.468 ±*0.0030*	0.0 +	4.468 ±*0.0030*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
238-Np	2.117 ± *0.0020*	d	2+	2.117	2.0 +	2.117 ±*0.0020*	2.0 +	2.117 ±*0.0020*	2.0 +	2.117 ±*0.0020*	2+
238-Pu	87.7 ± *0.1*	y	0+	87.7	0.0 +	87.7 ± *0.3*	0.0 +	87.7 ± *0.1*	0.0 +	87.7 ±*0.1*	0+
238-Am	98 ± *2.0*	m	1+	98	1.0 +	98 ± *2.0*	1.0 +	98 ± *2.0*	1.0 +	98 ± *2.0*	1+
238-Cm	2.2 ± *0.4*	h	0+	2.2	0.0 +	**2.4 ± *0.1***	0.0 +	**2.4 ± *0.1***	0.0 +	**2.4 ±*0.1***	0+
238-Bk	2.40 ± *0.08*	m		2.4	?	2.40 ± *0.1*	? -	2.40 ± *0.0833*	? -	2.40 ±*0.0833*	
238-Cf	21.2 ± *1.3*	ms	0+	21.2	0.0 +	21.1 ± *1.3*	0.0 +	21 ± *2.0*	0.0 +	21 ± *2.0*	0+
239-Th	2#	m	7/2+#	2	3.5 +						
239-Pa	1.8 ± *0.5*	h	(3/2)(-#)	1.8	1.5	1.8 ± *0.5*	**? -**	1.8 ± *0.5*	**1.5 -**	1.8 ± *0.5*	**(3/2)**
239-U	23.45 ± *0.02*	m	5/2+	23.45	2.5 +	23.47 ± *0.05*	2.5 +	23.45 ± *0.02*	2.5 +	23.45 ±*0.02*	5/2+
239-Np	2.356 ± *0.0030*	d	5/2+	2.356	2.5 +	2.355 ±*0.0040*	2.5 +	2.356 ±*0.0030*	2.5 +	2.356 ±*0.0030*	5/2+
239-Pu	24.11 ± *0.03*	ky	1/2+	24.11	0.5 +	24.11 ± *0.011*	0.5 +	24.11 ± *0.03*	0.5 +	24.11 ±*0.03*	1/2+
239-Am	11.9 ± *0.1*	h	(5/2)-	11.9	2.5	11.9 ± *0.1*	2.5 -	11.9 ± *0.1*	2.5 -	11.9 ±*0.1*	(5/2)-
239-Cm	2.5 ± *0.4*	h	(7/2-)	2.5	3.5	**2.9 ± *0.0***	3.5 -	**2.9 ± *0.29***	3.5 -	**2.9 ±*0.0***	(7/2-)
239-Bk	4#	m	(7/2+)	4	3.5 +	**3 ± *0.0***	3.5 +				
239-Cf	60 ± *30.0*	s	5/2+#	60	2.5 +	60 ± *30.0*	2.5 +	**52 ± *25.0***	**? -**	**39 ± *0.0***	
239-Es	1#	s	5/2+#	1	2.5 +						
240-Pa	2#	m		2	?	2 ± *0.0*	? -	2 ± *0.0*	? -		
240-U	14.1 ± *0.1*	h	0+	14.1	0.0 +	14.1 ± *0.2*	0.0 +	14.1 ± *0.1*	0.0 +	14.1 ±*0.1*	0+
240-Np	61.9 ± *0.2*	m	(5+)	61.9	5.0 +	**65 ± *3.0***	5.0 +	61.9 ± *0.2*	5.0 +	61.9 ±*0.2*	(5+)
240-Pu	6.561 ± *0.0070*	ky	0+	6.56	0.0 +	6.563 ±*0.0050*	0.0 +	6.561 ±*0.0070*	0.0 +	6.561 ±*0.0070*	0+
240-Am	50.8 ± *0.3*	h	(3-)	50.8	3	50.8 ± *0.3*	3.0 -	50.8 ± *0.3*	3.0 -	50.8 ±*0.3*	(3-)
240-Cm	27 ± *1.0*	d	0+	27	0.0 +	27 ± *1.0*	0.0 +	27 ± *1.0*	0.0 +	27 ± *1.0*	0+
240-Bk	4.8 ± *0.8*	m		4.8	?	4.8 ± *0.8*	? -	4.8 ± *0.8*	? -	4.8 ± *0.8*	
240-Cf	40.3 ± *0.9*	s	0+	40.3	0.0 +	**57.6 ± *9.0***	0.0 +	**57.6 ± *9.0***	0.0 +	**57.6 ±*9.0***	0+
240-Es	1#	s		1	?	1 ± *0.0*	? -	1 ± *0.0*	? -		

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
241-Pa	2#	m	3/2-#	2	1.5						
241-U	5#	m	7/2+#	5	3.5 +	5 ± *0.0*	3.5 +	5 ± *0.0*	**? -**		
241-Np	13.9 ± *0.2*	m	(5/2+)	13.9	2.5 +	13.9 ± *0.2*	2.5 +	13.9 ± *0.2*	2.5 +	13.9 ±*0.2*	5/2+
241-Pu	14.290 ± *0.0060*	y	5/2+	14.288	2.5 +	14.330 ±*0.040001*	2.5 +	14.290 ±*0.0060001*	2.5 +	14.290 ±*0.0060*	5/2+
241-Am	432.6 ± *0.6*	y	5/2-	432.6	2.5	432.8 ± *0.7*	2.5 -	432.6 ± *0.6*	2.5 -	432.6 ±*0.6*	5/2-
241-Cm	32.8 ± *0.2*	d	1/2+	32.8	0.5 +	32.8 ± *0.2*	0.5 +	32.8 ± *0.2*	0.5 +	32.8 ±*0.2*	1/2+
241-Bk	4.6 ± *0.4*	m	(7/2+)	4.6	3.5 +	4.6 ± *0.4*	3.5 +	4.6 ± *0.4*	3.5 +	4.6 ± *0.4*	(7/2+)
241-Cf	2.35 ± *0.18*	m	7/2-#	2.35	3.5	**3.80 ± *0.7***	3.5 -	**3.78 ± *0.7***	3.5 -	**3.78 ±*0.7***	(7/2-)
241-Es	10 ± *5.0*	s	(3/2-)	10	1.5	10 ± *5.0*	1.5 -	**8.5 ± *5.5***	**? -**	**8 ± *0.0***	
241-Fm	730 ± *60.0*	us	5/2+#	730	2.5 +					730 ±*60.0*	
242-U	16.8 ± *0.5*	m	0+	16.8	0.0 +	16.8 ± *0.5*	0.0 +	16.8 ± *0.5*	0.0 +	16.8 ±*0.5*	0+
242-Np	2.2 ± *0.2*	m	(1+)	2.2	1.0 +	2.2 ± *0.2*	1.0 +	2.2 ± *0.2*	1.0 +	2.2 ± *0.2*	(1+)
242-Pu	375 ± *2.0*	ky	0+	375	0.0 +	374 ± *1.1*	0.0 +	374 ± *1.1*	0.0 +	375 ± *2.0*	0+
242-Am	16.02 ± *0.02*	h	1-	16.02	1	16.04 ± *0.03*	1.0 -	16.02 ± *0.02*	1.0 -	16.02 ±*0.02*	1-
242-Cm	162.8 ± *0.2*	d	0+	162.8	0.0 +	162.9 ± *0.07*	0.0 +	162.9 ± *0.06*	0.0 +	162.8 ±*0.2*	0+
242-Bk	7.0 ± *1.3*	m	2-#	7	2	7 ± *1.3*	2.0 -	7 ± *1.3*	**? -**	7 ± *1.3*	
242-Cf	3.49 ± *0.15*	m	0+	3.49	0.0 +	3.49 ± *0.12*	0.0 +	**3.70 ± *0.5***	0.0 +	**3.70 ±*0.5***	0+
242-Es	17.8 ± *1.6*	s		17.8	?	**13.5 ± *2.5***	? -	**13.5 ± *2.5***	? -	**13.5 ±*2.5***	
242-Fm	800 ± *200.0*	us	0+	800	0.0 +	800 ± *200.0*	0.0 +	800 ± *200.0*	0.0 +	800 ±*200.0*	0+
243-U	10#	m	9/2-#	10	4.5						
243-Np	1.85 ± *0.15*	m	(5/2-)	1.85	2.5	1.85 ± *0.15*	2.5 -	1.85 ± *0.15*	2.5 -	1.85 ±*0.15*	(5/2-)
243-Pu	4.956 ± *0.0030*	h	7/2+	4.956	3.5 +	4.956 ±*0.0030*	3.5 +	4.956 ±*0.0030*	3.5 +	4.956 ±*0.0030*	7/2+
243-Am	7.37 ± *0.04*	ky	5/2-	7.37	2.5	7.36 ± *0.0219*	2.5 -	7.37 ± *0.015*	2.5 -	7.37 ±*0.04*	5/2-
243-Cm	29.1 ± *0.1*	y	5/2+	29.1	2.5 +	**30.0 ± *2.0***	2.5 +	29.1 ± *0.1*	2.5 +	29.1 ±*0.1*	5/2+
243-Bk	4.5 ± *0.2*	h	3/2-#	4.5	1.5	4.5 ± *0.2*	1.5 -	4.5 ± *0.2*	1.5 -	4.5 ± *0.2*	(3/2-)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
243-Cf	10.7 ± *0.5*	m	1/2+#	10.7	0.5 +	10.7 ± *0.5*	0.5 +	10.7 ± *0.5*	0.5 +	10.7 ±*0.5*	(1/2+)
243-Es	21.6 ± *1.6*	s	(7/2+)	21.6	3.5 +	**21 ± *2.0***	**1.5 -**	**21 ± *2.0***	**? -**	**21 ± *2.0***	
243-Fm	231 ± *9.0*	ms	7/2-#	231	3.5	**210 ± *60.0***	3.5 -	**200 ± *60.0***	**3.5 +**	**180 ±*0.0***	**(7/2+)**
244-Np	2.29 ± *0.16*	m	(7-)	2.29	7	2.29 ± *0.16*	7.0 -	2.29 ± *0.16*	7.0 -	2.29 ±*0.16*	(7-)
244-Pu	80.0 ± *0.9*	My	0+	80	0.0 +	80.0 ± *0.9*	0.0 +	81.1 ± *0.3*	0.0 +	80.0 ±*0.9*	0+
244-Am	10.1 ± *0.1*	h	6-#	10.1	6	10.1 ± *0.1*	6.0 -	10.1 ± *0.1*	6.0 -	10.1 ±*0.1*	(6-)
244-Cm	18.10 ± *0.02*	y	0+	18.1	0.0 +	18.00 ± *0.1*	0.0 +	18.11 ± *0.03*	0.0 +	18.10 ±*0.1*	0+
244-Bk	4.35 ± *0.15*	h	4-#	4.35	4	4.35 ± *0.15*	4.0 -	4.35 ± *0.15*	4.0 -	4.35 ±*0.15*	(4-)
244-Cf	19.4 ± *0.6*	m	0+	19.4	0.0 +	19.4 ± *0.6*	0.0 +	19.4 ± *0.6*	0.0 +	19.4 ±*0.6*	0+
244-Es	37 ± *4.0*	s		37	?	37 ± *4.0*	? -	37 ± *4.0*	? -	37 ± *4.0*	
244-Fm	3.12 ± *0.08*	ms	0+	3.12	0.0 +	**3.30 ± *0.5***	0.0 +	**3.30 ± *0.5***	0.0 +	**3.30 ±*0.5***	0+
245-Np	2#	m	5/2#	2	2.5 ?						
245-Pu	10.5 ± *0.1*	h	(9/2-)	10.5	4.5	10.5 ± *0.1*	4.5 -	10.5 ± *0.1*	4.5 -	10.5 ±*0.1*	(9/2-)
245-Am	2.05 ± *0.01*	h	(5/2)+	2.05	2.5 +	2.05 ± *0.01*	2.5 +	2.05 ± *0.01*	2.5 +	2.05 ±*0.01*	(5/2)+
245-Cm	8.423 ± *0.074*	ky	7/2+	8.423	3.5 +	8.500 ± *0.2*	3.5 +	8.500 ± *0.1*	3.5 +	8.423 ±*0.074*	7/2+
245-Bk	4.95 ± *0.03*	d	3/2-	4.95	1.5	4.94 ± *0.03*	1.5 -	4.94 ± *0.03*	1.5 -	4.95 ±*0.03*	3/2-
245-Cf	45.0 ± *1.5*	m	1/2+	45	0.5 +	45 ± *1.5*	**2.5 +**	45 ± *1.5*	**? -**	45 ± *1.5*	1/2+
245-Es	1.1 ± *0.1*	m	(3/2-)	1.1	1.5	1.1 ± *0.1*	1.5 -	1.1 ± *0.1*	1.5 -	1.1 ± *0.1*	(3/2-)
245-Fm	4.2 ± *1.3*	s	1/2+#	4.2	0.5 +	4.2 ± *1.3*	0.5 +	4.2 ± *1.3*	**? -**	4.2 ± *1.3*	
245-Md	400 ± *200.0*	ms	(7/2-)	400	3.5	**0.900 ± *0.25***	**0.5 -**	**0.900 ± *0.25***	**0.5 -**	**0.900 ±*0.25***	(1/2-)
246-Pu	10.84 ± *0.02*	d	0+	10.84	0.0 +	10.85 ± *0.02*	0.0 +	10.84 ± *0.02*	0.0 +	10.84 ±*0.02*	0+
246-Am	39 ± *3.0*	m	(7-)	39	7	39 ± *3.0*	**7.0 +**	39 ± *3.0*	7.0 -	39 ± *3.0*	(7-)
246-Cm	4.706 ± *0.04*	ky	0+	4.706	0.0 +	4.730 ± *0.15*	0.0 +	4.760 ± *0.04*	0.0 +	4.706 ±*0.04*	0+
246-Bk	1.80 ± *0.02*	d	2(-)	1.8	2	1.80 ± *0.02*	2.0 -	1.80 ± *0.02*	2.0 -	1.80 ±*0.02*	2(-)
246-Cf	35.7 ± *0.5*	h	0+	35.7	0.0 +	35.7 ± *0.5*	0.0 +	35.7 ± *0.5*	0.0 +	35.7 ±*0.5*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
246-Es	7.5 ± *0.5*	m	4-#	7.5	4	**7.7 ± *0.5***	4.0 -	**7.7 ± *0.5***	**? -**	7.5 ± *0.5*	
246-Fm	1.54 ± *0.04*	s	0+	1.54	0.0 +	**1.10 ± *0.2***	0.0 +	**1.10 ± *0.2***	0.0 +	1.54 ±*0.04*	0+
246-Md	0.92 ± *0.18*	s		0.92	?	**1 ± *0.4***	? -	**0.900 ± *0.2***	? -	**0.900 ±*0.2***	
247-Pu	2.27 ± *0.23*	d	1/2+#	2.27	0.5 +	2.27 ± *0.23*	0.5 +	2.27 ± *0.23*	**? -**	2.27 ±*0.23*	
247-Am	23.0 ± *1.3*	m	5/2#	23	2.5 ?	23 ± *1.3*	2.5 -	23 ± *1.3*	2.5 -	23 ± *1.3*	**(5/2)**
247-Cm	15.6 ± *0.5*	My	9/2-	15.6	4.5	**16.0 ± *0.5***	4.5 -	15.6 ± *0.5*	4.5 -	15.6 ±*0.5*	9/2-
247-Bk	1.38 ± *0.25*	ky	(3/2-)	1.38	1.5	1.38 ± *0.25*	1.5 -	1.38 ± *0.25*	1.5 -	1.38 ±*0.25*	(3/2-)
247-Cf	3.11 ± *0.03*	h	7/2+#	3.11	3.5 +	3.11 ± *0.03*	3.5 +	3.11 ± *0.03*	3.5 +	3.11 ±*0.03*	(7/2+)
247-Es	4.55 ± *0.26*	m	(7/2+)	4.55	3.5 +	4.60 ± *0.3*	3.5 +	4.55 ± *0.26*	3.5 +	4.55 ±*0.26*	(7/2+)
247-Fm	31 ± *1.0*	s	(7/2+)	31	3.5 +	**35 ± *4.0***	**2.5 +**	**29 ± *1.0***	3.5 +	**35 ± *4.0***	
247-Md	1.19 ± *0.09*	s	(7/2-)	1.19	3.5	**0.270 ± *0.16***	**0.5 -**	**1.12 ± *0.22***	**? -**	**1.12 ±*0.22***	
248-Am	3#	m		3	?	3 ± *0.0*	? -	**1E+1 ± *1.0***	? -		
248-Cm	348 ± *6.0*	ky	0+	348	0.0 +	**340 ± *4.0***	0.0 +	348 ± *6.0*	0.0 +	348 ± *6.0*	0+
248-Bk	>9	y	6+#	9	6.0 +	9 ± *0.0*	6.0 +	9 ± *0.0*	**? -**	9 ± *0.0*	
248-Cf	334 ± *3.0*	d	0+	334	0.0 +	334 ± *2.8*	0.0 +	334 ± *2.8*	0.0 +	334 ± *2.8*	0+
248-Es	27 ± *5.0*	m	2-#;0+#	27	**?**	27 ± *5.0*	**? -**	27 ± *5.0*	**? -**	27 ± *5.0*	**(2-,0+)**
248-Fm	35.1 ± *0.8*	s	0+	35.1	0.0 +	**36 ± *3.0***	0.0 +	**36 ± *2.0***	0.0 +	**36 ± *3.0***	0+
248-Md	7 ± *3.0*	s		7	?	7 ± *3.0*	? -	7 ± *3.0*	? -	7 ± *3.0*	
248-No	<2us	us	0+	2	0.0 +						
249-Am	1#	m		1	?	1 ± *0.0*	? -	**2 ± *0.0***	? -		
249-Cm	64.15 ± *0.03*	m	(1/2+)	64.15	0.5 +	64.15 ± *0.03*	0.5 +	64.15 ± *0.03*	0.5 +	64.15 ±*0.03*	1/2+
249-Bk	330 ± *4.0*	d	7/2+	330	3.5 +	**320 ± *6.0***	3.5 +	**320 ± *6.0***	3.5 +	330 ± *4.0*	7/2+
249-Cf	351 ± *2.0*	y	9/2-	351	4.5	351 ± *2.0*	4.5 -	351 ± *2.0*	4.5 -	351 ± *2.0*	9/2-
249-Es	102.2 ± *0.6*	m	7/2+	102.2	3.5 +	102.2 ± *0.6*	3.5 +	102.2 ± *0.6*	3.5 +	102.2 ±*0.6*	7/2+
249-Fm	1.6 ± *0.1*	m	(7/2+)	1.6	3.5 +	**2.6 ± *0.7***	3.5 +	**2.6 ± *0.7***	3.5 +	**2.6 ±*0.7***	(7/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
249-Md	23.4 ± *2.4*	s	(7/2-)	23.4	3.5	**24 ± *4.0***	3.5 -	**24 ± *4.0***	**? -**	**21.7 ±*2.0***	(7/2-)
249-No	57 ± *12.0*	us	5/2+#	57	2.5 +	57 ± *12.0*	2.5 +				
250-Cm	8300#	y	0+	8299	0.0 +	**8000 ±*4000.0***	0.0 +	8300 ± *830.0*	0.0 +	8300 ±*0.0*	0+
250-Bk	3.212 ± *0.0050*	h	2-	3.211	2	3.217 ±*0.0050*	2.0 -	3.212 ±*0.0050*	2.0 -	3.212 ±*0.0050*	2-
250-Cf	13.08 ± *0.09*	y	0+	13.08	0.0 +	13.08 ± *0.09*	0.0 +	13.08 ± *0.09*	0.0 +	13.08 ±*0.09*	0+
250-Es	8.6 ± *0.1*	h	(6+)	8.6	6.0 +	8.6 ± *0.1*	6.0 +	8.6 ± *0.1*	6.0 +	8.6 ± *0.1*	(6+)
250-Fm	30.4 ± *1.5*	m	0+	30.4	0.0 +	30 ± *3.0*	0.0 +	30 ± *3.0*	0.0 +	30 ± *3.0*	0+
250-Md	52 ± *5.0*	s		52	?	52 ± *6.0*	? -	**28 ± *7.5***	? -	52 ± *6.0*	
250-No	5.0 ± *0.6*	us	0+	5	0.0 +	**5.7 ± *0.8***	0.0 +	**4.3 ± *1.1***	0.0 +	**4.2 ±*0.0***	0+
251-Cm	16.8 ± *0.2*	m	(1/2+)	16.8	0.5 +	16.8 ± *0.2*	0.5 +	16.8 ± *0.2*	0.5 +	16.8 ±*0.2*	(1/2+)
251-Bk	55.6 ± *1.1*	m	(3/2-)	55.6	1.5	55.6 ± *1.1*	1.5 -	55.6 ± *1.1*	1.5 -	55.6 ±*1.1*	(3/2-)
251-Cf	900 ± *40.0*	y	1/2+	900	0.5 +	898 ± *44.0*	0.5 +	898 ± *44.0*	0.5 +	898 ±*44.0*	1/2+
251-Es	33 ± *1.0*	h	(3/2-)	33	1.5	33 ± *1.0*	1.5 -	33 ± *1.0*	1.5 -	33 ± *1.0*	3/2-
251-Fm	5.30 ± *0.08*	h	(9/2-)	5.3	4.5	5.30 ± *0.08*	4.5 -	5.30 ± *0.08*	4.5 -	5.30 ±*0.08*	(9/2-)
251-Md	4.21 ± *0.23*	m	(7/2-)	4.21	3.5	**4 ± *0.5***	3.5 -	**4 ± *0.5***	**? -**	**4 ± *0.5***	(7/2-)
251-No	800 ± *10.0*	ms	(7/2+)	800	3.5 +	800 ± *300.0*	3.5 +	800 ± *10.0*	3.5 +	800 ±*10.0*	(7/2+)
251-Lr	150#	us		150	?	150 ± *0.0*	? -	**1.34E+6 ±*0.0***	? -		
252-Cm	1# ± *2880.0*	m	0+	1	0.0 +	**1E+3 ± *0.0***	0.0 +			**3E+3 ±*0.0***	0+
252-Bk	1.8 ± *0.5*	m		1.8	?	1.8 ± *0.5*	? -				
252-Cf	2.645 ± *0.0080*	y	0+	2.645	0.0 +	2.645 ±*0.0080*	0.0 +	2.645 ±*0.0080*	0.0 +	2.645 ±*0.0080*	0+
252-Es	471.7 ± *1.9*	d	(4+)	471.6	4.0 +	471.7 ± *1.9*	**5.0 -**	471.7 ± *1.9*	**5.0 -**	471.7 ±*1.9*	**(5-)**
252-Fm	25.39 ± *0.04*	h	0+	25.39	0.0 +	25.39 ± *0.05*	0.0 +	25.39 ± *0.05*	0.0 +	25.39 ±*0.04*	0+
252-Md	2.3 ± *0.8*	m		2.3	?	2.3 ± *0.8*	? -	2.3 ± *0.8*	? -	2.3 ± *0.8*	
252-No	2.45 ± *0.02*	s	0+	2.45	0.0 +	2.44 ± *0.04*	0.0 +	2.44 ± *0.04*	0.0 +	2.44 ±*0.04*	0+
252-Lr	369 ± *75.0*	ms		369	?	**390 ± *90.0***	? -	**380 ± *90.0***	? -	**360 ±*0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
253-Bk	10#	m		10	?	10 ± *0.0*	? -	10 ± *1.0*	? -		
253-Cf	17.81 ± *0.08*	d	(7/2+)	17.81	3.5 +	17.81 ± *0.08*	3.5 +	17.81 ± *0.08*	3.5 +	17.81 ±*0.08*	(7/2+)
253-Es	20.47 ± *0.03*	d	7/2+	20.47	3.5 +	20.47 ± *0.03*	3.5 +	20.47 ± *0.03*	3.5 +	20.47 ±*0.03*	7/2+
253-Fm	3.00 ± *0.12*	d	(1/2)+	3	0.5 +	3 ± *0.12*	0.5 +	3 ± *0.12*	0.5 +	3 ± *0.12*	1/2+
253-Md	12 ± *8.0*	m	(7/2-)	12	3.5	12 ± *8.0*	3.5 -	**11 ± *7.5***	3.5 -	**6 ± *0.0***	(7/2-)
253-No	1.56 ± *0.02*	m	(9/2-)	1.56	4.5	**1.62 ± *0.15***	4.5 -	**1.62 ± *0.15***	4.5 -	**1.62 ±*0.15***	(9/2-)
253-Lr	632 ± *46.0*	ms	(7/2-)	632	3.5	**580 ± *70.0***	3.5 -	**575 ± *65.0***	3.5 -	**570 ±*0.0***	(7/2-)
253-Rf	13 ± *5.0*	ms	(7/2)(+#)	13	3.5 +	13 ± *5.0*	3.5 +	**0.051 ±*0.013***	**? -**		
254-Bk	1#	m		1	?	1 ± *0.0*	? -	**2 ± *0.0***	? -		
254-Cf	60.5 ± *0.2*	d	0+	60.5	0.0 +	60.5 ± *0.2*	0.0 +	60.5 ± *0.2*	0.0 +	60.5 ±*0.2*	0+
254-Es	275.7 ± *0.5*	d	(7+)	275.7	7.0 +	275.7 ± *0.5*	7.0 +	275.7 ± *0.5*	7.0 +	275.7 ±*0.5*	(7+)
254-Fm	3.240 ± *0.0020*	h	0+	3.239	0.0 +	3.240 ±*0.0020*	0.0 +	3.240 ±*0.0020*	0.0 +	3.240 ±*0.0020*	0+
254-Md	10 ± *3.0*	m	0-#	10	0	10 ± *3.0*	0.0 -	**28 ± *8.0***	**? -**	10 ± *3.0*	
254-No	51.2 ± *0.4*	s	0+	51.2	0.0 +	51 ± *10.0*	0.0 +	51 ± *10.0*	0.0 +	51 ± *10.0*	0+
254-Lr	17.1 ± *1.8*	s		17.1	?	**13 ± *3.0***	? -	**13 ± *3.0***	? -	**13 ± *3.0***	
254-Rf	23 ± *3.0*	us	0+	23	0.0 +	23 ± *3.0*	0.0 +	23 ± *3.0*	0.0 +	23 ± *3.0*	0+
255-Cf	85 ± *18.0*	m	(7/2+)	85	3.5 +	85 ± *18.0*	3.5 +	85 ± *18.0*	3.5 +	85 ± *18.0*	(7/2+)
255-Es	39.8 ± *1.2*	d	(7/2+)	39.8	3.5 +	39.8 ± *1.2*	3.5 +	39.8 ± *1.2*	3.5 +	39.8 ±*1.2*	(7/2+)
255-Fm	20.07 ± *0.07*	h	7/2+	20.07	3.5 +	20.07 ± *0.07*	3.5 +	20.07 ± *0.07*	3.5 +	20.07 ±*0.07*	7/2+
255-Md	27 ± *2.0*	m	(7/2-)	27	3.5	27 ± *2.0*	3.5 -	27 ± *2.0*	3.5 -	27 ± *2.0*	(7/2-)
255-No	3.52 ± *0.18*	m	(1/2+)	3.52	0.5 +	**3.10 ± *0.2***	0.5 +	**3.10 ± *0.2***	0.5 +	3.52 ±*0.21*	(1/2+)
255-Lr	31.1 ± *1.1*	s	(1/2-)	31.1	0.5	**22 ± *4.0***	**3.5 -**	**22 ± *4.0***	**1.5 -**	31.1 ±*1.1*	[1/2-]
255-Rf	1.66 ± *0.07*	s	(9/2-)	1.66	4.5	1.64 ± *0.11*	4.5 -	1.68 ± *0.19*	4.5 -	1.68 ±*0.09*	(9/2-)
255-Db	1.7 ± *0.5*	s		1.7	?	1.7 ± *0.5*	? -	1.7 ± *0.5*	? -	**1.6 ±*0.0***	
256-Cf	12.3 ± *1.2*	m	0+	12.3	0.0 +	12.3 ± *1.2*	0.0 +	12.3 ± *1.2*	0.0 +	12.3 ±*1.2*	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
256-Es	25.4 ± *2.4*	m	(1+;0-)	25.4	**?**	25.4 ± *2.4*	**? -**	25.4 ± *2.4*	**? -**	25.4 ±*2.4*	**(1+,0-)**
256-Fm	157.6 ± *1.3*	m	0+	157.6	0.0 +	157.6 ± *1.3*	0.0 +	157.6 ± *1.3*	0.0 +	157.6 ±*1.3*	0+
256-Md	30#	m	7-#	30	7	**77 ± *2.0***	**1.0 -**	**77 ± *2.0***	**1.0 -**	**77 ± *2.0***	(1-)
256-No	2.91 ± *0.05*	s	0+	2.91	0.0 +	2.91 ± *0.05*	0.0 +	2.91 ± *0.05*	**? -**	2.91 ±*0.05*	0+
256-Lr	27 ± *3.0*	s		27	?	27 ± *3.0*	? -	27 ± *3.0*	? -	27 ± *3.0*	
256-Rf	6.64 ± *0.07*	ms	0+	6.64	0.0 +	**6.45 ± *0.25***	0.0 +	**6.40 ± *0.2***	0.0 +	**6.40 ±*0.2***	0+
256-Db	1.9 ± *0.4*	s		1.9	?	1.9 ± *0.4*	? -	**1.7 ± *0.4***	? -	**2.6 ±*0.0***	
257-Es	7.7 ± *0.2*	d	7/2+#	7.7	3.5 +	7.7 ± *0.2*	3.5 +	7.7 ± *0.2*	**? -**	7.7 ± *0.2*	
257-Fm	100.5 ± *0.2*	d	(9/2+)	100.5	4.5 +	100.5 ± *0.2*	4.5 +	100.5 ± *0.2*	4.5 +	100.5 ±*0.2*	(9/2+)
257-Md	5.52 ± *0.05*	h	(7/2-)	5.52	3.5	5.52 ± *0.05*	3.5 -	5.52 ± *0.05*	3.5 -	5.52 ±*0.05*	(7/2-)
257-No	24.5 ± *0.5*	s	(7/2+)	24.5	3.5 +	**25 ± *2.0***	3.5 +	**25 ± *2.0***	3.5 +	24.5 ±*0.5*	(3/2+)
257-Lr	6.0 ± *0.4*	s	(1/2-)	6	0.5	**0.65 ± *0.025***	**4.5 +**	**0.65 ± *0.025***	**? -**	**4 ± *0.0***	
257-Rf	4.82 ± *0.13*	s	(1/2+)	4.82	0.5 +	**4.70 ± *0.3***	0.5 +	**4.70 ± *0.3***	0.5 +	**4.40 ±*0.0***	(1/2+)
257-Db	2.3 ± *0.2*	s	(9/2+)	2.3	4.5 +	**1.5 ± *0.17***	4.5 +	**1.5 ± *0.17***	**? -**	2.3 ± *0.2*	(9/2+)
258-Es	3#	m		3	?	3 ± *0.0*	? -	3 ± *0.0*	? -		
258-Fm	370 ± *14.0*	us	0+	370	0.0 +	370 ± *14.0*	0.0 +	370 ± *43.0*	0.0 +	370 ±*43.0*	0+
258-Md	51.5 ± *0.3*	d	8-#	51.5	8	51.5 ± *0.3*	8.0 -	51.5 ± *0.3*	**? -**	51.5 ±*0.3*	
258-No	1.2 ± *0.2*	ms	0+	1.2	0.0 +	1.2 ± *0.2*	0.0 +	1.2 ± *0.2*	0.0 +	1.2 ± *0.2*	0+
258-Lr	4.1 ± *0.3*	s		4.1	?	4.1 ± *0.3*	? -	4.1 ± *0.3*	? -	4.1 ± *0.3*	
258-Rf	13.8 ± *0.9*	ms	0+	13.8	0.0 +	**12 ± *2.0***	0.0 +	**12 ± *2.0***	0.0 +	**12 ± *2.0***	0+
258-Db	4.5 ± *0.4*	s		4.5	?	4.5 ± *0.6*	? -	**4 ± *1.0***	? -	**4 ± *1.0***	
258-Sg	2.7 ± *0.5*	ms	0+	2.7	0.0 +	**3.3 ± *1.0***	0.0 +	**3.2 ± *1.0***	0.0 +	**2.9 ±*0.0***	0+
259-Fm	1.5 ± *0.3*	s	3/2+#	1.5	1.5 +	1.5 ± *0.3*	1.5 +	1.5 ± *0.3*	**? -**	1.5 ± *0.2*	
259-Md	1.60 ± *0.06*	h	7/2-#	1.6	3.5	1.60 ± *0.05*	3.5 -	1.60 ± *0.05*	**? -**	1.60 ±*0.06*	
259-No	58 ± *5.0*	m	9/2+#	58	4.5 +	58 ± *5.0*	4.5 +	58 ± *5.0*	**? -**	58 ± *5.0*	(9/2+)

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
259-Lr	6.2 ± *0.3*	s	1/2-#	6.2	0.5	6.2 ± *0.3*	**4.5 +**	6.2 ± *0.3*	**? -**	6.2 ± *0.3*	
259-Rf	2.63 ± *0.26*	s	7/2+#	2.63	3.5 +	**2.80 ± *0.4***	3.5 +	**3.20 ± *0.6***	**? -**	**2.40 ±*0.4***	
259-Db	510 ± *160.0*	ms		510	?	510 ± *160.0*	? -	510 ± *160.0*	? -	510 ±*160.0*	**[9/2+]**
259-Sg	280 ± *50.0*	ms	1/2+#	280	0.5 +	**580 ± *210.0***	0.5 +	**555 ± *205.0***	0.5 +	**290 ±*50.0***	
260-Fm	1#	m	0+	1	0.0 +			**0.00007 ±*0.0***	0.0 +		
260-Md	27.8 ± *0.8*	d		27.8	?	27.8 ± *0.8*	? -	**31.8 ± *0.5***	? -	**31.8 ±*0.5***	
260-No	106 ± *8.0*	ms	0+	106	0.0 +	106 ± *8.0*	0.0 +	106 ± *8.0*	0.0 +	106 ± *8.0*	0+
260-Lr	3.0 ± *0.5*	m		3	?	3 ± *0.5*	? -	3 ± *0.5*	? -	3 ± *0.5*	
260-Rf	21 ± *1.0*	ms	0+	21	0.0 +	21 ± *1.0*	0.0 +	21 ± *1.0*	0.0 +	21 ± *1.0*	0+
260-Db	1.52 ± *0.13*	s		1.52	?	1.52 ± *0.13*	? -	1.52 ± *0.13*	? -	1.52 ±*0.13*	
260-Sg	4.95 ± *0.33*	ms	0+	4.95	0.0 +	**3.80 ± *0.8***	0.0 +	**3.60 ± *0.9***	0.0 +	**3.60 ±*0.9***	0+
260-Bh	41 ± *14.0*	ms		41	?	**0.30 ± *0.0***	? -	**0.30 ± *0.03***	? -		
261-Md	40#	m	7/2-#	40	3.5	40 ± *0.0*	3.5 -	40 ± *0.0*	**? -**		
261-No	3#	h	3/2+#	3	1.5 +	3 ± *0.0*	1.5 +	**4E+1 ± *0.0***	**? -**		
261-Lr	39 ± *12.0*	m		39	?	39 ± *12.0*	? -	39 ± *12.0*	? -	39 ± *12.0*	
261-Rf	2.2 ± *0.3*	s	3/2+#	2.2	1.5 +	**5.5 ± *2.5***	1.5 +	**65 ± *10.0***	**? -**	**78 ± *0.0***	
261-Db	4.5 ± *1.1*	s		4.5	?	**1.8 ± *0.4***	? -	**1.8 ± *0.4***	? -	**1.8 ±*0.4***	
261-Sg	183 ± *5.0*	ms	(3/2+)	183	1.5 +	**230 ± *60.0***	**3.5 +**	**230 ± *60.0***	**? -**	**230 ±*60.0***	
261-Bh	12.8 ± *3.2*	ms	(5/2-)	12.8	2.5	13 ± *4.0*	**? -**	13 ± *4.0*	**? -**	**12 ± *0.0***	
262-Md	3#	m		3	?						
262-No	~5	ms	0+	5	0.0 +	5 ± *0.0*	0.0 +	5 ± *0.5*	0.0 +	5 ± *0.0*	0+
262-Lr	~4	h		4	?	4 ± *0.0*	? -	4 ± *0.4*	? -	4 ± *0.0*	
262-Rf	250 ± *100.0*	ms	0+	250	0.0 +	**2.30E+3 ±*400.0***	0.0 +	**2.30E+3 ±*400.0***	0.0 +	**2.30E+3 ± *400.0***	0+
262-Db	35 ± *5.0*	s		35	?	35 ± *5.0*	? -	35 ± *5.0*	? -	35 ± *5.0*	
262-Sg	10.9 ± *2.3*	ms	0+	10.9	0.0 +	**8 ± *3.0***	0.0 +	**7.90 ± *2.8***	0.0 +	**6.90 ±*0.0***	0+

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
262-Bh	84 ± *11.0*	ms		84	?	**2.9E+2 ±*160.0***	? -	**1.0E+2 ±*26.0***	? -	**1.0E+2 ± *26.0***	
263-No	20#	m		20	?						
263-Lr	5#	h		5	?	5 ± *0.0*	? -	5 ± *0.5*	? -		
263-Rf	11 ± *3.0*	m	3/2+#	11	1.5 +	11 ± *3.0*	1.5 +	**10 ± *2.0***	**? -**	**10 ± *2.0***	
263-Db	29 ± *9.0*	s		29	?	29 ± *9.0*	? -	29 ± *8.5*	? -	**27 ± *0.0***	
263-Sg	940 ± *140.0*	ms	7/2+#	940	3.5 +	**1.00E+3 ±*200.0***	**4.5 +**	**1.00E+3 ±*200.0***	**? -**	**1.00E+3 ± *200.0***	
263-Bh	200#	ms		200	?	200 ± *0.0*	? -	**0.200 ± *0.02***	? -		
263-Hs	760 ± *40.0*	us	7/2+#	760	3.5 +	**1.00E+3 ±*0.0***	3.5 +	**3.55E+3 ±*0.0***	**? -**		
264-No	1#	m	0+	1	0.0 +						
264-Lr	10#	h		10	?						
264-Rf	1#	h	0+	1	0.0 +	1 ± *0.0*	0.0 +	1 ± *0.1*	0.0 +		
264-Db	3#	m		3	?	3 ± *0.0*	? -	3 ± *0.3*	? -		
264-Sg	47 ± *20.0*	ms	0+	47	0.0 +	**4.0E+2 ± *0.0***	0.0 +	**45 ± *19.0***	0.0 +	**37 ± *0.0***	0+
264-Bh	1.07 ± *0.21*	s		1.07	?	**1.30 ± *0.5***	? -	**0.660 ± *0.38***	? -	**0.440 ±*0.0***	
264-Hs	540 ± *300.0*	us	0+	540	0.0 +	540 ± *300.0*	0.0 +	**800 ± *80.0***	0.0 +	**800 ±*0.0***	0+
265-Lr	10#	h		10	?						
265-Rf	6.6 ± *5.3*	m	3/2+#	6.6	1.5 +	**7.8E+2 ± *0.0***	1.5 +	**0.017 ± *0.0***	**? -**		
265-Db	15#	m		15	?	15 ± *0.0*	? -	15 ± *1.5*	? -		
265-Sg	9.2 ± *1.6*	s	9/2+#	9.2	4.5 +	**8 ± *3.0***	**1.5 +**	**8 ± *3.0***	4.5 +	**16 ± *0.0***	
265-Bh	1.19 ± *0.52*	s		1.19	?	**0.5 ± *0.0***	? -	**1.10 ± *0.5***	? -		
265-Hs	1.96 ± *0.16*	ms	3/2+#	1.96	1.5 +	**2.10 ± *0.3***	**4.5 +**	**2.05 ± *0.25***	**? -**	**2 ± *0.0***	
265-Mt	2#	ms		2	?	2 ± *0.0*	? -	**1E+5 ± *0.0***	? -		
266-Lr	1#	h		1	?						
266-Rf	4#	h	0+	4	0.0 +						
266-Db	80 ± *70.0*	m		80	?					**22 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
266-Sg	460 ± *180.0*	ms	0+	460	0.0 +	**2.10E+4 ±*6000.0***	0.0 +	**2.50E+4 ±*16000.0***	0.0 +	**2.10E+4 ± *0.0***	0+
266-Bh	2.5 ± *1.6*	s		2.5	?	**5 ± *3.0***	? -	**5.4 ± *4.5***	? -	**1.7 ±*0.0***	
266-Hs	3.02 ± *0.54*	ms	0+	3.02	0.0 +	**2.70 ± *1.0***	0.0 +	**2.65 ± *0.95***	0.0 +	**2.30 ±*0.0***	0+
266-Mt	1.2 ± *0.4*	ms		1.2	?	1.2 ± *0.4*	? -	**1.8 ± *1.7***	? -	**1.7 ±*0.0***	
267-Rf	2.5 ± *1.5*	h		2.5	?					**2.3 ±*0.0***	
267-Db	4.6 ± *3.7*	h		4.6	?					**1.2 ±*0.0***	
267-Sg	1.8 ± *0.7*	m		1.8	?						
267-Bh	22 ± *10.0*	s		22	?	22 ± *10.0*	? -	**21 ± *10.0***	? -	**17 ± *0.0***	
267-Hs	55 ± *11.0*	ms	5/2+#	55	2.5 +	**32 ± *15.0***	**1.5 +**	55 ± *11.0*	**? -**	**52 ± *0.0***	
267-Mt	10#	ms		10	?	10 ± *0.0*	? -	10 ± *1.0*	? -		
267-Ds	10 ± *8.0*	us	9/2+#	10	4.5 +	10 ± *8.0*	4.5 +	**2.8 ± *1.3***	**? -**	**2.8 ±*0.0***	
268-Rf	1#	h	0+	1	0.0 +						
268-Db	30.8 ± *5.0*	h		30.8	?					**32 ± *0.0***	
268-Sg	2#	m	0+	2	0.0 +						
268-Bh	25#	s		25	?						
268-Hs	1.42 ± *1.13*	s	0+	1.42	0.0 +	**2 ± *0.0***	0.0 +	**1.20 ± *0.6***	0.0 +		
268-Mt	27 ± *6.0*	ms	5+#;6+#	27	**?**	**53 ± *21.0***	**? -**	**23 ± *6.5***	**? -**	**21 ± *0.0***	
268-Ds	100#	us	0+	100	0.0 +	100 ± *0.0*	0.0 +	100 ± *0.0*	0.0 +		
269-Db	3#	h		3	?						
269-Sg	8.0 ± *6.3*	m		8	?	**0.58 ± *0.38***	? -	**0.83 ± *0.0***	? -		
269-Bh	1#	m		1	?	**0.4 ± *0.0***	? -	**0.8 ± *0.0***	? -		
269-Hs	27 ± *17.0*	s	9/2+#	27	4.5 +	27 ± *17.0*	**? -**	**13 ± *6.5***	**? -**	**9.7 ±*0.0***	
269-Mt	100#	ms		100	?	**200 ± *0.0***	? -	**50 ± *50.0***	? -		
269-Ds	230 ± *110.0*	us	9/2+#	230	4.5 +	230 ± *110.0*	**1.5 +**	**268 ± *156.0***	**? -**	**179 ±*0.0***	
270-Db	90 ± *70.0*	h		90	?					**23 ± *0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
270-Sg	3#	m	0+	3	0.0 +						
270-Bh	3.8 ± *3.0*	m		3.8	?					**1.0 ±*0.0***	
270-Hs	30#	s	0+	30	0.0 +					**3.6 ±*0.0***	
270-Mt	6.3 ± *1.5*	ms		6.3	?	**2.0E+3 ± *0.0***	? -	**6.0 ± *1.4***	? -	**5 ± *0.0***	
270-Ds	205 ± *48.0*	us	0+	205	0.0 +	**160 ± *100.0***	0.0 +	**150 ± *90.0***	0.0 +	**100 ±*0.0***	0+
271-Sg	3.1 ± *1.6*	m		3.1	?					**2.4 ±*0.0***	
271-Bh	1#	m		1	?						
271-Hs	10#	s		10	?						
271-Mt	400#	ms		400	?	**5.00E+3 ±*0.0***	? -	**5.00E+3 ±*0.0***	? -		
271-Ds	90 ± *40.0*	ms	13/2-#	90	6.5	**2.1E+2 ±*170.0***	**5.5 -**	**1.7 ± *0.36***	**? -**	**1.6 ±*0.0***	
272-Sg	4#	m	0+	4	0.0 +						
272-Bh	8.8 ± *2.1*	s		8.8	?					**10 ± *0.0***	
272-Hs	10#	s	0+	10	0.0 +						
272-Mt	400#	ms		400	?						
272-Ds	200#	ms	0+	200	0.0 +	**1.00E+3 ±*0.0***	0.0 +	**1.00E+3 ±*100.0***	0.0 +		
272-Eb						**2 ± *0.8***	**? -**				
272-Rg	4.5 ± *1.0*	ms	5+#;6+#	4.5	**?**			**4.1 ± *1.1***	**? -**	**3.8 ±*0.0***	
273-Sg	5#	m		5	?						
273-Bh	1#	m		1	?						
273-Hs	910 ± *720.0*	ms	3/2+#	910	1.5 +	**5.00E+4 ±*0.0***	1.5 +	**5.00E+4 ±*0.0***	**? -**		
273-Mt	800#	ms		800	?	**2.00E+4 ±*0.0***	? -	**2.00E+4 ±*0.0***	? -		
273-Ds	240 ± *120.0*	us	13/2-#	240	6.5	**360 ± *280.0***	6.5 -	**225 ± *115.0***	**? -**	**170 ±*0.0***	
273-Rg	2#	ms		2	?						
274-Bh	3.4 ± *2.7*	m		3.4	?					**0.90 ±*0.0***	
274-Hs	500#	ms	0+	500	0.0 +						

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
274-Mt	850 ± *540.0*	ms		850	?					**450 ±*0.0***	
274-Ds	10#	ms	0+	10	0.0 +						
274-Rg	29 ± *18.0*	ms		29	?					**6.4 ±*0.0***	
275-Bh	5#	m		5	?						
275-Hs	290 ± *150.0*	ms		290	?					**150 ±*0.0***	
275-Mt	40 ± *30.0*	ms		40	?					**9.7 ±*0.0***	
275-Ds	10#	ms		10	?						
275-Rg	5#	ms		5	?						
276-Hs	100#	ms	0+	100	0.0 +						
276-Mt	730 ± *160.0*	ms		730	?					720 ± *0.0*	
276-Ds	100#	ms	0+	100	0.0 +						
276-Rg	10#	ms		10	?						
276-Cn	100#	us	0+	100	0.0 +						
277-Hs	11 ± *9.0*	ms	3/2+#	11	1.5 +						
277-Mt	10#	s		10	?						
277-Ds	22 ± *17.0*	ms	11/2+#	22	5.5 +						
277-Rg	10#	ms		10	?						
277-Cn	990 ± *490.0*	us	3/2+#	990	1.5 +					**690 ±*0.0***	
278-Mt	29 ± *23.0*	s		29	?					**7.6 ±*0.0***	
278-Ds	270#	ms	0+	270	0.0 +						
278-Rg	8 ± *5.0*	ms		8	?					**4 ± *0.0***	
278-Cn	2#	ms	0+	2	0.0 +						
278-113	2.3 ± *1.3*	ms		2.3	?					**0.24 ±*0.0***	
279-Mt	30#	s		30	?						
279-Ds	210 ± *50.0*	ms		210	?					**180 ±*0.0***	

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
279-Rg	640 ± *510.0*	ms		640	?					**170 ±*0.0***	
279-Cn	5#	ms		5	?						
279-113	1#	ms		1	?						
280-Ds	11 ± *6.0*	s	0+	11	0.0 +						
280-Rg	3.8 ± *0.8*	s		3.8	?					**3.6 ±*0.0***	
280-Cn	5#	ms	0+	5	0.0 +						
280-113	10#	ms		10	?						
281-Ds	14 ± *4.0*	s	3/2+#	14	1.5 +					**9.6 ±*0.0***	
281-Rg	37 ± *17.0*	s		37	?					**26 ± *0.0***	
281-Cn	370 ± *290.0*	ms	3/2+#	370	1.5 +						
281-113	100#	ms		100	?						
282-Rg	1.9 ± *1.5*	s		1.9	?					**0.5 ±*0.0***	
282-Cn	900 ± *240.0*	us	0+	900	0.0 +					**500 ±*0.0***	
282-113	140 ± *90.0*	ms		140	?					**73 ± *0.0***	
283-Rg	30#	s		30	?						
283-Cn	4.1 ± *1.0*	s		4.1	?					**4 ± *0.0***	
283-113	380 ± *310.0*	ms		380	?					**100 ±*0.0***	
284-Cn	104 ± *20.0*	ms	0+	104	0.0 +					**101 ±*0.0***	
284-113	1.01 ± *0.24*	s		1.01	?					**0.480 ±*0.0***	
285-Cn	32 ± *9.0*	s	5/2+#	32	2.5 +					**34 ± *0.0***	
285-113	8 ± *4.0*	s		8	?					**6 ± *0.0***	
285-Fl	470 ± *380.0*	ms		470	?						
286-113	70 ± *60.0*	s		70	?					**20 ± *0.0***	
286-Fl	140 ± *30.0*	ms	0+	140	0.0 +						
287-113	2#	m		2	?						

Nuclide	Nubase2012			RIPL (updated)		JEFF 3.1.1		ENDF/B-VII		ENSDF April 2014	
	Half-life	Units	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp	Half-life	Jp
287-Fl	520 ± *130.0*	ms		520	?						
287-115	120 ± *100.0*	ms		120	?					**32 ± *0.0***	
288-Fl	750 ± *140.0*	ms	0+	750	0.0 +						
288-115	190 ± *40.0*	ms		190	?					**87 ± *0.0***	
289-Fl	2.4 ± *0.6*	s	5/2+#	2.4	2.5 +						
289-115	340 ± *180.0*	ms		340	?					**220 ±*0.0***	
289-Lv	2#	ms	5/2+#	2	2.5 +						
290-115	60 ± *50.0*	ms		60	?					**16 ± *0.0***	
290-Lv	8 ± *3.0*	ms	0+	8	0.0 +						
291-115	1#	s		1	?						
291-Lv	28 ± *15.0*	ms		28	?						
291-117	2#	ms		2	?						
292-Lv	24 ± *12.0*	ms	0+	24	0.0 +						
292-117	10#	ms		10	?						
293-Lv	80 ± *40.0*	ms		80	?						
293-117	18 ± *8.0*	ms		18	?					**14 ± *0.0***	
293-118	1#	ms	1/2+#	1	0.5 +						
294-117	290 ± *230.0*	ms		290	?						
294-118	1.4 ± *0.7*	ms	0+	1.4	0.0 +					**1.8 ±*0.0***	0+
295-118	10#	ms		10	?						

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