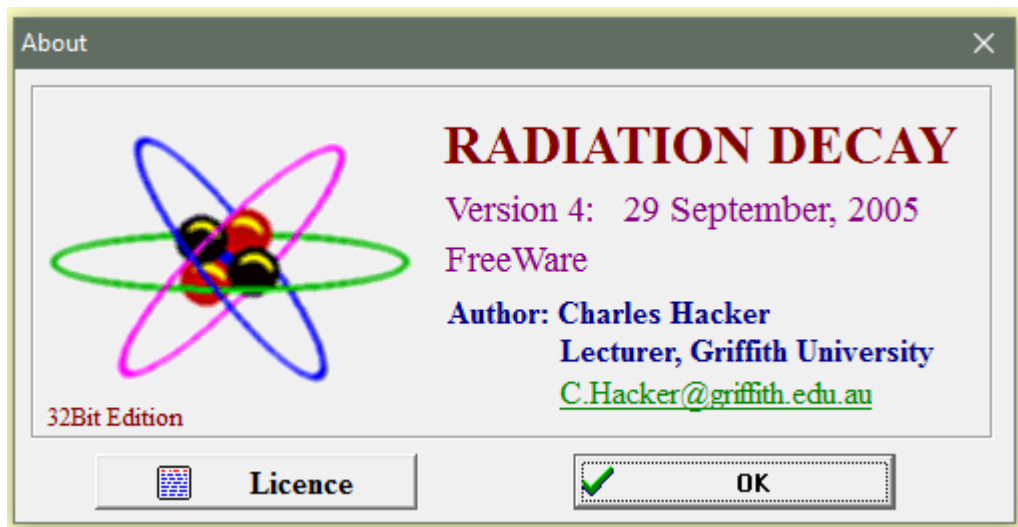


# Decay data of $^{133}\text{Ba}$ , $^{207}\text{Bi}$ , $^{137}\text{Cs}$ and $^{22}\text{Na}$

Source:



<http://rad-decay.software.informer.com/4.0/>

Rad Decay is a software developed by Charles Hacker, Lecturer in Electronics, Computing and Physics and provides radioactive decay information for over 3000 radionuclides.

The data is extrapolated from the US Brookhaven National Laboratory National Nuclear Data Center (NNDC) ENSDF database.

Data provided include the half life, radioactive daughter nuclides, decay chain series, probabilities per decay, and decay product energies for alphas, betas, positrons, electrons, X-rays, and photons.

More information on radioactive decay

[https://www-nds.iaea.org/relnsd/vcharthtml/guide.html#gs\\_jp](https://www-nds.iaea.org/relnsd/vcharthtml/guide.html#gs_jp)

## Ba-133

Atomic Number : 56  
Half-Life : 10.51 y

Jp : 1/2+  
Sn : 7189,90 keV  
Sp : 7687,10 keV

### Possible Parents

Parent	Fraction (%)	Decay Mode
Ba-133m	99.9904 %	IT

### Decay Products

Daughter	Fraction (%)	Decay Mode
Cs-133	100 %	e

### Emission Products

Number of Alphas : 0  
Number of Betas : 2  
Number of Gammas : 9  
Number of X-Rays : 20

## Ba-133

### Beta Emissions:

Endpoint Energy (keV)	Intensity (%)	Decay Mode
133,55	14,0000	e
80,39	86,0000	e

## Ba-133

### Gamma Emissions:

Energy (keV)	Intensity (%)	Decay Mode
383,85	8,9400	e
356,02	62,0500	e
302,85	18,3300	e
276,40	7,1640	e
223,23	0,4500	e
160,61	0,6450	e
81,00	34,0600	e
79,61	2,6200	e
53,16	2,1990	e

## Ba-133

### X-Ray Emissions:

Energy (keV)	Intensity (%)	Assignment
35,907	0,7400	Cs Kb4
35,818	3,5800	Cs Kb2
35,252	0,1230	Cs Kb5
34,987	11,6000	Cs Kb1
34,920	5,9900	Cs Kb3
30,973	64,5000	Cs Ka1
30,625	34,9000	Cs Ka2
30,270	0,0040	Cs Ka3
5,553	0,2200	Cs Lg3
5,542	0,1500	Cs Lg2
5,281	0,5400	Cs Lg1
4,934	1,1900	Cs Lb2
4,781	0,0480	Cs Lb6
4,717	0,9300	Cs Lb3
4,649	0,5600	Cs Lb4
4,620	3,8000	Cs Lb1
4,286	6,0000	Cs La1
4,272	0,6600	Cs La2
4,142	0,1100	Cs Lh
3,795	0,2400	Cs Ll

Jp: spin

Sn: neutron separation energy

Sp: proton separation energy

# Bi-207

Atomic Number : 83  
Half-Life : 31.55 y

Jp : 9/2-  
Sn : 8097,00 keV  
Sp : 3557,20 keV

## Possible Parents

Parent	Fraction (%)	Decay Mode
Po-207	99.979 %	e+b+

## Decay Products

Daughter	Fraction (%)	Decay Mode
Pb-207	100 %	e+b+

## Emission Products

Number of Alphas	:	0
Number of Betas	:	2
Number of Gammas	:	6
Number of X-Rays	:	22

## Beta Emissions:

Endpoint Energy (keV)	Intensity (%)	Decay Mode
764,83	92,2600	e
58,25	7,7000	e

## Gamma Emissions:

Energy (keV)	Intensity (%)	Decay Mode
1770,24	6,8700	e+b+
1442,20	0,1300	e+b+
1063,66	74,5000	e+b+
897,80	0,1210	e+b+
569,70	97,7400	e+b+
328,12	0,0007	e+b+

## X-Ray Emissions:

Energy (keV)	Intensity (%)	Assignment
87,580	0,6700	Pb Kb4
87,300	2,9800	Pb Kb2
85,470	0,2380	Pb Kb5
84,938	8,1900	Pb Kb1
84,450	4,2600	Pb Kb3
74,969	35,8000	Pb Ka1
72,805	21,3000	Pb Ka2
72,144	0,0326	Pb Ka3
15,216	0,3900	Pb Lg3
15,178	0,2900	Pb Lg6
15,097	0,3100	Pb Lg2
14,765	1,6600	Pb Lg1
13,015	0,4280	Pb Lb5
12,794	1,0900	Pb Lb3
12,614	7,9000	Pb Lb1
12,611	3,3100	Pb Lb2
12,307	0,9100	Pb Lb4
12,142	0,2080	Pb Lb6
11,349	0,1820	Pb Lh
10,551	13,3000	Pb La1
10,450	1,5000	Pb La2
9,184	0,7500	Pb Ll

Jp: spin

Sn: neutron separation energy

Sp: proton separation energy

# Cs-137

Atomic Number : 55  
Half-Life : 30.07 y

Jp : 7/2+  
Sn : 8278,30 keV  
Sp : 7416,00 keV

## Possible Parents

Parent	Fraction (%)	Decay Mode
Xe-137	100 %	b-

## Decay Products

Daughter	Fraction (%)	Decay Mode
Ba-137m	100 %	b-

## Emission Products

Number of Alphas	:	0
Number of Betas	:	3
Number of Gammas	:	0
Number of X-Rays	:	20

## Beta Emissions:

Endpoint Energy (keV)	Intensity (%)	Decay Mode
1175,63	5,6000	b-
892,22	0,0006	b-
513,97	94,4000	b-

## X-Ray Emissions:

Energy (keV)	Intensity (%)	Assignment
37,349	0,0481	Ba Kb4
37,255	0,2150	Ba Kb2
36,652	0,0079	Ba Kb5
36,378	0,6800	Ba Kb1
36,304	0,3520	Ba Kb3
32,194	3,7600	Ba Ka1
31,817	2,0400	Ba Ka2
31,452	0,0003	Ba Ka3
5,809	0,0093	Ba Lg3
5,797	0,0065	Ba Lg2
5,531	0,0330	Ba Lg1
5,156	0,0740	Ba Lb2
4,994	0,0030	Ba Lb6
4,927	0,0390	Ba Lb3
4,852	0,0230	Ba Lb4
4,827	0,2260	Ba Lb1
4,466	0,3600	Ba La1
4,451	0,0400	Ba La2
4,331	0,0064	Ba Lh
3,954	0,0143	Ba Li

## Gammas from <sup>137</sup>Cs (30.07 y 3)

Eg (keV)	Ig (%)	Decay mode
283.53 4	0.00058 8	b-
661.657 3	85.1 2	b-

Jp: spin

Sn: neutron separation energy

Sp: proton separation energy

# Na-22

Atomic Number : 11  
Half-Life : 2.6019 y

Jp : 3+  
Sn : 11069,20 keV  
Sp : 6739,40 keV

## Possible Parents

Parent	Fraction (%)	Decay Mode
Mg-22	100 %	e+b+

## Decay Products

Daughter	Fraction (%)	Decay Mode
Ne-22	100 %	e+b+

## Emission Products

Number of Alphas : 0  
Number of Betas : 0  
Number of Gammas : 1  
Number of X-Rays : 2

## Gamma Emissions:

Energy (keV)	Intensity (%)	Decay Mode
1274,53	99,9440	e+b+

## X-Ray Emissions:

Energy (keV)	Intensity (%)	Assignment
0,849	0,0028	Ne Ka1
0,848	0,0014	Ne Ka2

Jp: spin

Sn: neutron separation energy

Sp: proton separation energy

## Attenuation coefficients for lead

