

# Recommended Nuclear Decay Data

## Cd-109

Decay Mode: EC		Half-Life: (462.1 ± 1.4) d					[2]
Radiation Type		Energy (keV)			Intensity (%)		Ref.
Auger-L		1.8	-	3.8	1.670	10	[1]
Auger-K		17.8	-	25.5	20.6	5	[1]
ce-K-1		65.52			40.8	5	[1]
ce-L-1		84.2			44.8	5	[1]
ce-MNOP-1		87.32			9.8	2	[1]
X-ray L	Σ	3.1			10.34	26	[2]
X-ray K $\alpha$	Σ	22.1			83.6	6	[2]
X-ray K $\beta$	Σ	25.0			17.77	19	[2]
$\gamma$	Ag-109m	88.03			3.626	20	[2]

Cd-109 with Ag-109m (half-life: 39.6 s) in equilibrium

# Recommended Nuclear Decay Data

## Ce-139

Decay Mode: ECL		Half-Life: (137.66 ± 0.06) d			[2]	
Radiation Type		Energy (keV)		Intensity (%)		Ref.
Auger-L		2.7	- 6.2	90.2	10	[1]
Auger-K		26.2	- 38.8	8.3	4	[1]
ce-K-1		126.93		17.15	8	[1]
ce-L-1		159.59		2.32	10	[1]
ce-MNO-1		164.49		0.639	16	[1]
X-ray L	Σ	5.0		12.0	6	[2]
X-ray K $\alpha$	Σ	33.30		63.7	6	[2]
X-ray K $\beta$	Σ	38.0		15.40	21	[2]
$\gamma$		165.86		79.90	4	[2]

# Recommended Nuclear Decay Data

## Co-57

Decay Mode: EC		Half-Life: (271.83 ± 0.08) d					[2]
Radiation Type		Energy (keV)			Intensity (%)		Ref.
Auger-L		0.6	-	0.7	255	16	[3]
Auger-K		5.37	-	7.10	106	3	[3]
ce-K-1		7.31			70.2	4	[3]
ce-LMN-1		13.56			7.57	24	[3]
ce-K-2		114.95			1.63	10	[3]
ce-LMN-2		129.36			0.18	1	[3]
ce-K-3		129.36			1.43	4	[3]
ce-LMN-3		135.62			0.172	15	[3]
X-ray L		0.71			1.27	21	[2]
X-ray K	Σ	6.48			57.9	8	[2]
γ		14.41			9.16	15	[2]
γ		122.06			85.60	17	[2]
γ		136.47			10.68	8	[2]
γ		230.40			0.00040	12	[2]
γ		339.69			0.0037	11	[2]
γ		352.33			0.0030	9	[2]
γ		366.80			0.0012	4	[2]
γ		570.09			0.016	5	[2]
γ		692.41			0.149	10	[2]
γ		706.54			0.0050	15	[2]

# Recommended Nuclear Decay Data

## Co-60

Decay Mode: $\beta^-$		Half-Life: (1925.3 $\pm$ 0.4 ) d			[2]		
Radiation Type		Energy (keV)		Intensity (%)		Ref.	
Auger-L		0.7	-	0.9	0.0392	12	[1]
Auger-K		6.26	-	8.32	0.0154	5	[1]
$\beta^-$ max		157.8			$\ll$ 0.001	--	[1]
$\beta^-$ max		318.22			99.88	3	[1]
$\beta^-$ av		95.77					[1]
$\beta^-$ max		665.3			$\ll$ 0.001	--	[1]
$\beta^-$ max		1491.4			0.12	3	[1]
$\beta^-$ av		625.87					[1]
$\beta^-$ max		2823.9			$\ll$ 0.001	--	[1]
X-ray L	$\Sigma$	0.74	-	0.94	$<$ 0.001	--	[1]
X-ray K $\alpha$	$\Sigma$	7.46	-	7.48	0.0098	4	[1]
X-ray K $\beta$	$\Sigma$	8.26	-	8.27	0.00136	5	[1]
$\gamma$		347.14			0.0075	4	[2]
$\gamma$		826.10			0.0076	8	[2]
$\gamma$		1173.2			99.85	3	[2]
$\gamma$		1332.5			99.9826	6	[2]
$\gamma$		2158.8			0.0012	2	[2]
$\gamma$		2505.7			$\ll$ 0.001	--	[2]

# Recommended Nuclear Decay Data

## Cs-137

Decay Mode: $\beta^-$		Half-Life: (11000 $\pm$ 90) d			[2]		
Radiation Type		Energy (keV)			Intensity (%)		Ref.
Auger-L		2.6	-	5.9	7.28	12	[1]
Auger-K		25.31	-	37.41	0.76	4	[1]
ce-K-1		624.22			7.62	19	[1]
ce-L-1		656.0			1.42	19	[1]
ce-MN-1		661.0			0.33	1	[3]
$\beta^-$ max		513.97			94.36	28	[1]
$\beta^-$ av		174.3					[1]
$\beta^-$ max		1175.6			5.64	28	[1]
$\beta^-$ av		416.3					[1]
X-ray L	$\Sigma$	4.7			0.90	5	[2]
X-ray K $\alpha$	$\Sigma$	32.06			5.53	10	[2]
X-ray K $\beta$	$\Sigma$	36.6			1.321	27	[2]
$\gamma$	Ba-137m	661.66			85.00	20	[2]

Cs-137 with Ba-137m (half-life: 2.552 m) in equilibrium

# Recommended Nuclear Decay Data

## Hg-203

Decay Mode: $\beta^-$		Half-Life: (46.604 $\pm$ 0.017) d		[2]	
Radiation Type		Energy (keV)	Intensity (%)		Ref.
Auger-L		7.78	8.8	7	[4]
Auger-K		55.2	0.44	20	[4]
$\beta^-$ max		213.0	100	--	[4]
$\beta^-$ av		57.9			[4]
X-ray L	$\Sigma$	11.1	6.0	12	[2]
X-ray K $\alpha$	$\Sigma$	70.11	61.0	14	[2]
X-ray K $\beta$	$\Sigma$	83.0	2.83	11	[2]
$\gamma$		279.20	81.46	13	[2]

# Recommended Nuclear Decay Data

## Sn-113

Decay Mode: EC		Half-Life: (115.09 ± 0.04) d		[2]	
Radiation Type		Energy (keV)	Intensity (%)	Ref.	
Auger-L		2.84	115	7	[4]
Auger-K		20.0	17	4	[4]
ce-K-2		363.76	28.2	6	[4]
ce-L-2		387.46	5.48	16	[4]
ce-MNOP-2		391.0	1.245	13	[4]
X-ray L	Σ	3.42	7.6	8	[2]
X-ray K $\alpha$	Σ	24.14	79.6	6	[2]
X-ray K $\beta$	Σ	27.4	17.2	3	[2]
$\gamma$		255.12	2.13	2	[2]
$\gamma$		382.9	« 0.001	--	[3]
$\gamma$	In-113m	391.69	64.89	13	[2]
$\gamma$		638.0	0.00095	29	[2]
$\gamma$		646.8	« 0.001	--	[3]

Sn-113 with In-113m (half-life: 1.6582 h) in equilibrium

# Recommended Nuclear Decay Data

Sr-85

Decay Mode: EC		Half-Life: (64.849 ± 0.004) d		[2]	
Radiation Type		Energy (keV)	Intensity (%)	Ref.	
Auger-L		1.68	108.2	23	[3]
Auger-K		11.4	28.7	7	[3]
X-ray L	Σ	1.7	0.16	6	[2]
X-ray Kα	Σ	13.37	50.1	2	[2]
X-ray Kβ	Σ	15.0	8.7	2	[2]
γ		514.01	98.4	4	[2]
γ		868.06	0.012	2	[2]



# Recommended Nuclear Decay Data

Y-88

Decay Mode: EC, $\beta^+$		Half-Life: (106.630 $\pm$ 0.025) d			[2]
Radiation Type		Energy (keV)	Intensity (%)		Ref.
Auger-L		1.79	105	6	[3]
Auger-K		12.5	26.2	8	[3]
$\beta^+$ max		754.7	0.20	2	[3]
X-ray L	$\Sigma$	1.82	2.5	4	[2]
X-ray K $\alpha$	$\Sigma$	14.14	52.2	6	[2]
X-ray K $\beta$	$\Sigma$	15.8	9.4	2	[2]
$\gamma$	Annih.	511.0	0.42	4	[2]
$\gamma$		850.6	0.065	13	[2]
$\gamma$		898.04	94.0	3	[2]
$\gamma$		1382.2	0.021	6	[2]
$\gamma$		1836.1	99.33	3	[2]
$\gamma$		2734.0	0.61	2	[2]
$\gamma$		3219.7	0.0071	20	[2]

# Recommended Nuclear Decay Data

## ■ Decay Mode

$\alpha$	Alpha
$\beta^-$ , $\beta^+$	Beta
EC	Electron capture
IT	Isomeric transition

## ■ Half-Life

s	Seconds
m	Minutes
h	Hours
d	Days
y	Years

## ■ Energy

All energies are given in keV.  
Normally there are energies listed with an intensity  $\geq 1\%$ .

## ■ Radiation Type

Auger-L/K	L or K-shell auger electron
ce-K-1	K-shell conversion electron transition 1
ce-L-2	L-shell conversion electron transition 2
$\alpha$	Alpha particle
$\beta^-$ max, $\beta^+$ max	Beta particle (maximal energy)
$\beta^-$ av, $\beta^+$ av	Beta particle (average energy)
X-ray L	L X-ray
X-ray $K\alpha$ , $K\beta$	K X-rays
$\gamma$	Gamma ray
$\gamma$ Annih.	Annihilation radiation
$\Sigma$	Signifies weighted mean energies and intensities

## ■ Intensity

Values are given in percent. The format used for the uncertainties in the listed values can be illustrated by the following examples:

$$1.2 \quad 56 \quad = \quad 1.2 \pm 5.6$$
$$1.23 \quad 56 \quad = \quad 1.23 \pm 0.56$$

## ■ References

- [1] PTB-6.11-97-1, Braunschweig, Oktober 1997
- [2] PTB-Ra-16/5, Braunschweig, Mai 2000
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- [5] Table de Radionuclides, BNM-CEA/DTA/LPRI Commissariat à l'Énergie Atomique – France 1999
- [6] National Nuclear Data Center USA, Brookhaven National Laboratory Upton N.Y.
- [7] Table of Isotopes, 8th Edition, 1996
- [8] BNM-CEA/DTA/DAMRI Nuclear and Atomic Decay Data ; 19/12/98

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