



## 1 Decay Scheme

L'I-131 se désintègre par émission beta moins vers les niveaux excités de Xe-131, incluant l'isomère Xe-131M de 11,930(16) jours de période. L'état d'équilibre idéal, c'est à dire l'activité de I-131 étant égale à l'activité de Xe-131m, est obtenu après 13,994(1) jours.

*I-131 disintegrates through beta minus emission to the excited levels of Xe-131, the isomeric state Xe-131m (half-life = 11.930(16) d) included. The radioactive equilibrium, i.e. the activity of I-131 is equal to the activity of Xe-131m, is obtained after 13.994(1) days.*

Pour cette évaluation, l'intensité de la raie gamma de 163,9 keV est donnée pour I-131 et Xe-131m étant à l'équilibre.

*For this evaluation, the intensity of the 163.9 keV gamma ray is given for I-131 and Xe-131 to be in radioactive equilibrium.*

## 2 Nuclear Data

$$T_{1/2}({}^{131}\text{I}) : 8,0233 \quad (19) \quad \text{d}$$

$$Q^{-}({}^{131}\text{I}) : 970,8 \quad (6) \quad \text{keV}$$

### 2.1 $\beta^{-}$ Transitions

	Energy keV	Probability × 100	Nature	lg <i>ft</i>
$\beta_{0,8}^{-}$	247,9 (6)	2,114 (20)	Allowed	6,98
$\beta_{0,7}^{-}$	303,9 (6)	0,643 (27)	1st Forbidden	7,79
$\beta_{0,6}^{-}$	333,8 (6)	7,36 (8)	Allowed	6,86
$\beta_{0,4}^{-}$	606,3 (6)	89,4 (8)	Allowed	6,64
$\beta_{0,3}^{-}$	629,7 (6)	0,053 (29)	1st Forbidden	9,8
$\beta_{0,2}^{-}$	806,9 (6)	0,396 (14)	1st Forbidden Unique	10,03

## 2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ $\times 100$	Multipolarity	$\alpha_K$	$\alpha_L$	$\alpha_M$	$\alpha_T$
$\gamma_{1,0}(\text{Xe})$	80,1853 (19)	6,72 (14)	M1[+E2]	1,353 (41)	0,180 (5)	0,0367 (11)	1,579 (47)
$\gamma_{8,6}(\text{Xe})$	85,918 (8)	0,00029 (16)	[M1, E2]	1,508 (31)	0,558 (15)		2,21 (5)
$\gamma_{2,0}(\text{Xe})$	163,930 (8)	1,086 (7)	M4	30,8 (9)	14,66 (44)	3,38 (10)	49,6 (15)
$\gamma_{3,2}(\text{Xe})$	177,214 (17)	0,3294 (44)	M1+94,87%E2	0,187 (6)	0,0427 (13)	0,00901 (27)	0,241 (7)
$\gamma_{6,5}(\text{Xe})$	232,175 (8)	0,00282 (42)	[E2]	0,0782 (23)	0,01534 (46)		0,0976 (29)
$\gamma_{6,4}(\text{Xe})$	272,501 (8)	0,0603 (10)	M1+12,62%E2	0,04613 (36)	0,0063 (13)		0,054 (2)
$\gamma_{4,1}(\text{Xe})$	284,305 (5)	6,36 (6)	E2	0,0409 (12)	0,00725 (22)		0,0500 (15)
$\gamma_{6,3}(\text{Xe})$	295,848 (13)	0,00084 (27)	[E1]	0,00937 (28)	0,001185 (36)		0,01086 (33)
$\gamma_{7,4}(\text{Xe})$	302,444 (13)	0,0046 (5)	[E1]	0,00885 (27)	0,001118 (34)		0,01025 (31)
$\gamma_{8,5}(\text{Xe})$	318,093 (8)	0,0824 (16)	M1+1,19%E2	0,0307 (9)	0,00397 (12)	0,000808 (24)	0,0357 (11)
$\gamma_{5,1}(\text{Xe})$	324,651 (6)	0,0225 (27)	M1+39,02%E2	0,0283 (8)	0,00406 (12)	0,000832 (25)	0,0334 (10)
$\gamma_{7,3}(\text{Xe})$	325,791 (18)	0,276 (27)	M1+5,02%E2	0,0288 (9)	0,00376 (11)	0,000765 (23)	0,0335 (10)
$\gamma_{8,4}(\text{Xe})$	358,419 (8)	0,0100 (23)	[M1, E2]	0,02130 (45)	0,00307 (7)		0,0252 (5)
$\gamma_{4,0}(\text{Xe})$	364,490 (4)	83,1 (8)	M1+95,35%E2	0,0191 (6)	0,00304 (9)	0,000628 (19)	0,0229 (7)
$\gamma_{5,0}(\text{Xe})$	404,816 (4)	0,0561 (13)	M1+50%E2	0,0153 (14)	0,002140 (18)		0,0179 (13)
$\gamma_{7,2}(\text{Xe})$	503,005 (17)	0,3621 (43)	E2	0,00751 (23)	0,001096 (33)	0,000225 (7)	0,00889 (27)
$\gamma_{6,0}(\text{Xe})$	636,991 (4)	7,29 (8)	E2	0,00404 (12)	0,000558 (17)	0,0001141 (34)	0,00474 (14)
$\gamma_{8,1}(\text{Xe})$	642,724 (6)	0,2203 (28)	[E2]	0,00395 (12)	0,000545 (16)		0,00463 (14)
$\gamma_{8,0}(\text{Xe})$	722,909 (4)	1,804 (20)	M1+4,11%E2	0,00399 (12)	0,000500 (15)	0,0001014 (30)	0,00461 (14)

## 3 Atomic Data

### 3.1 Xe

$\omega_K$	:	0,888	(5)
$\bar{\omega}_L$	:	0,097	(5)
$n_{KL}$	:	0,902	(4)

#### 3.1.1 X Radiations

	Energy keV	Relative probability		
$X_K$	$K\alpha_2$	29,459	53,98	
	$K\alpha_1$	29,779	100	
	$K\beta_3$	33,562	}	
	$K\beta_1$	33,625	}	
	$K\beta_5''$	33,881	}	28,99
	$K\beta_2$	34,415	}	
	$K\beta_4$	34,496	}	6,84
	$KO_{2,3}$	34,552	}	
$X_L$	$L\ell$	3,64		
	$L\gamma$	- 5,30		

## 3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	23,512 – 24,842	100
KLX	27,897 – 29,770	46,5
KXY	32,27 – 34,54	5,41
Auger L	0,140 – 5,316	

## 4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e <sub>AL</sub>	(Xe)	0,140 - 5,316	5,91 (4)
e <sub>AK</sub>	(Xe)		0,68 (4)
	KLL	23,512 - 24,842	}
	KLX	27,897 - 29,770	}
	KXY	32,27 - 34,54	}
ec <sub>1,0</sub> K	(Xe)	45,621 (2)	3,53 (11)
ec <sub>1,0</sub> L	(Xe)	74,732 - 75,403	0,469 (14)
ec <sub>1,0</sub> M	(Xe)	79,036 - 79,508	0,0957 (30)
ec <sub>1,0</sub> N	(Xe)	79,972 - 80,118	0,0210 (7)
ec <sub>2,0</sub> K	(Xe)	129,366 (8)	0,662 (29)
ec <sub>2,0</sub> L	(Xe)	158,477 - 159,148	0,315 (14)
ec <sub>2,0</sub> M	(Xe)	162,781 - 163,253	0,0727 (32)
ec <sub>4,0</sub> K	(Xe)	329,926 (4)	1,55 (5)
ec <sub>4,0</sub> L	(Xe)	359,037 - 359,708	0,247 (8)
ec <sub>4,0</sub> M	(Xe)	363,341 - 363,813	0,0510 (16)
$\beta_{0,8}^-$	max:	247,9 (6)	2,114 (20)
$\beta_{0,8}^-$	avg:	69,35 (19)	
$\beta_{0,7}^-$	max:	303,9 (6)	0,643 (27)
$\beta_{0,7}^-$	avg:	86,94 (19)	
$\beta_{0,6}^-$	max:	333,8 (6)	7,36 (8)
$\beta_{0,6}^-$	avg:	96,61 (19)	
$\beta_{0,4}^-$	max:	606,3 (6)	89,4 (8)
$\beta_{0,4}^-$	avg:	191,59 (22)	
$\beta_{0,3}^-$	max:	629,7 (6)	0,053 (29)
$\beta_{0,3}^-$	avg:	200,23 (22)	
$\beta_{0,2}^-$	max:	806,9 (6)	0,396 (14)
$\beta_{0,2}^-$	avg:	267,91 (23)	

## 5 Photon Emissions

### 5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Xe)	3,64 — 5,30	0,635 (13)	
XK $\alpha_2$	(Xe)	29,459	1,54 (4)	} K $\alpha$
XK $\alpha_1$	(Xe)	29,779	2,85 (7)	
XK $\beta_3$	(Xe)	33,562	} 0,826 (21)	} K' $\beta_1$
XK $\beta_1$	(Xe)	33,625		
XK $\beta_5''$	(Xe)	33,881		
XK $\beta_2$	(Xe)	34,415		
XK $\beta_4$	(Xe)	34,496		
XKO $_{2,3}$	(Xe)	34,552	0,195 (7)	} K' $\beta_2$

### 5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$ (Xe)	80,1850 (19)	2,607 (27)
$\gamma_{8,6}$ (Xe)	85,9 (2)	0,000089 (49)
$\gamma_{2,0}$ (Xe)	163,930 (8)	0,0215 (7)
$\gamma_{3,2}$ (Xe)	177,214 (2)	0,2654 (32)
$\gamma_{6,5}$ (Xe)	232,18 (15)	0,00257 (38)
$\gamma_{6,4}$ (Xe)	272,498 (17)	0,0572 (9)
$\gamma_{4,1}$ (Xe)	284,305 (5)	6,06 (6)
$\gamma_{6,3}$ (Xe)	295,8 (2)	0,00083 (27)
$\gamma_{7,4}$ (Xe)	302,4 (2)	0,00455 (49)
$\gamma_{8,5}$ (Xe)	318,088 (16)	0,0796 (15)
$\gamma_{5,1}$ (Xe)	324,651 (25)	0,0218 (26)
$\gamma_{7,3}$ (Xe)	325,789 (4)	0,267 (26)
$\gamma_{8,4}$ (Xe)	358,4 (2)	0,0098 (22)
$\gamma_{4,0}$ (Xe)	364,489 (5)	81,2 (8)
$\gamma_{5,0}$ (Xe)	404,814 (4)	0,0551 (13)
$\gamma_{7,2}$ (Xe)	503,004 (4)	0,3589 (43)
$\gamma_{6,0}$ (Xe)	636,989 (4)	7,26 (8)
$\gamma_{8,1}$ (Xe)	642,719 (5)	0,2193 (28)
$\gamma_{8,0}$ (Xe)	722,911 (5)	1,796 (20)

## 6 Main Production Modes

- { Fission product()  
Possible impurities : None
- { Te – 130(n,γ)Te – 131m  
Possible impurities :  $T_{1/2}(\text{Te} - 131\text{m}) = 30 \text{ h}$
- { Te – 131m( $\beta^-$ )I – 131  $\sigma : 0,02 \text{ (1) barns}$   
Possible impurities : Te – 121m, Te – 121, Te – 123m, Te – 125m, Te – 127, Te – 129m
- { Te – 130(n,γ)Te – 131  
Possible impurities :  $T_{1/2}(\text{Te} - 131) = 25\text{min}$
- { Te – 131( $\beta^-$ )I – 131  $\sigma : 0,27 \text{ (6) barns}$   
Possible impurities : Te – 121m, Te – 121, Te – 123m, Te – 125m, Te – 127, Te – 129m

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