



1 Decay Scheme

Fe-59 decays by 100% beta minus emission to four excited levels in Co-59; mainly to the 1099 and 1291 keV excited levels.

Le fer 59 se désintègre par émission bêta moins principalement vers les niveaux excités de 1099 et 1291 keV du cobalt 59.

2 Nuclear Data

$$T_{1/2}({}^{59}\text{Fe}) : 44,494 \quad (12) \quad \text{d}$$

$$Q^{-}({}^{59}\text{Fe}) : 1565,0 \quad (4) \quad \text{keV}$$

2.1 β^{-} Transitions

	Energy (keV)	Probability (%)	Nature	lg ft
$\beta_{0,4}^{-}$	83,3 (4)	0,080 (6)	Allowed	7,08
$\beta_{0,3}^{-}$	130,7 (4)	1,25 (3)	Allowed	6,49
$\beta_{0,2}^{-}$	273,4 (4)	45,19 (34)	Allowed	5,98
$\beta_{0,1}^{-}$	465,7 (4)	53,30 (31)	Allowed	6,69
$\beta_{0,0}^{-}$	1565,0 (4)	0,18 (4)	2nd Forbidden	11,15

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy (keV)	$P_{\gamma+ce}$ (%)	Multipolarity	α_K (10^{-2})	α_L (10^{-3})	α_M (10^{-4})	α_T (10^{-2})
$\gamma_{3,2}(\text{Co})$	142,651 (2)	0,994 (28)	M1+E2	1,432 (21)	1,428 (20)	1,99 (3)	1,596 (23)
$\gamma_{2,1}(\text{Co})$	192,349 (5)	2,94 (5)		0,808 (17)	0,805 (17)	1,120 (23)	0,900 (18)
$\gamma_{3,1}(\text{Co})$	335,000 (6)	0,261 (11)	M1+E2	0,178 (7)	0,174 (7)	0,243 (9)	0,198 (8)
$\gamma_{4,1}(\text{Co})$	382,46 (12)	0,0215 (23)	M1+E2	0,129 (6)	0,126 (6)	0,176 (9)	0,144 (7)
$\gamma_{1,0}(\text{Co})$	1099,256 (3)	56,52 (31)	E2	0,01571 (22)	0,01515 (22)	0,0211 (3)	0,01744 (25)
$\gamma_{2,0}(\text{Co})$	1291,605 (5)	43,24 (33)	E2	0,01096 (16)	0,01055 (15)	0,01470 (21)	0,01483 (21)
$\gamma_{4,0}(\text{Co})$	1481,72 (12)	0,059 (6)	M1+E2	0,00751 (11)	0,00720 (11)	0,01003 (15)	0,01448 (21)

3 Atomic Data

3.1 Co

ω_K	:	0,388	(4)
$\bar{\omega}_L$:	0,0072	(5)
n_{KL}	:	1,418	(4)

3.1.1 X Radiations

	Energy (keV)	Relative probability
X _K		
K α_2	6,91538	51,16
K α_1	6,9304	100
K β_1	7,6495	} 21,11
K β_5''	7,706	

4 Electron Emissions

	Energy (keV)	Electrons (per 100 disint.)
$\beta_{0,4}^-$	max: 83,3 (4) avg: 22,0 (1)	} 0,080 (6)
$\beta_{0,3}^-$	max: 130,7 (4) avg: 35,7 (1)	
$\beta_{0,2}^-$	max: 273,4 (4) avg: 80,9 (2)	} 45,19 (34)
$\beta_{0,1}^-$	max: 465,7 (4) avg: 149,2 (2)	
$\beta_{0,0}^-$	max: 1565,0 (4) avg: 584	} 0,18 (4)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy (keV)	Photons (per 100 disint.)	
XK α_2	(Co)	6,91538	0,00596 (11)	} K α
XK α_1	(Co)	6,9304	0,01166 (21)	
XK β_1	(Co)	7,6495	} 0,00242 (5)	K' β_1
XK β_5''	(Co)	7,706		

5.2 Gamma Emissions

	Energy (keV)	Photons (per 100 disint.)
$\gamma_{3,2}$ (Co)	142,651 (2)	0,978 (28)
$\gamma_{2,1}$ (Co)	192,349 (5)	2,91 (5)
$\gamma_{3,1}$ (Co)	335,000 (6)	0,260 (11)
$\gamma_{4,1}$ (Co)	382,46 (12)	0,0215 (23)
γ^\pm	511	0,00115 (5)
$\gamma_{1,0}$ (Co)	1099,245 (3)	56,51 (31)
$\gamma_{2,0}$ (Co)	1291,590 (6)	43,23 (33)
$\gamma_{4,0}$ (Co)	1481,70 (12)	0,059 (6)

6 Main Production Modes

- { Fe – 58(n, γ)Fe – 59 σ : 1,15 (2) barns
- { Possible impurities: Fe – 55, Cr – 51
- { Co – 59(n,p)Fe – 59
- { Possible impurities: Fe – 55, Co – 60

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