



## 1 Decay Scheme

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

*Fe-59 decays to the 1099 and 1291 keV excited levels of Co-59 mainly.*

## 2 Nuclear Data

$$T_{1/2}({}^{59}\text{Fe}) : 44,495 \quad (8) \quad \text{d}$$

$$Q^{-}({}^{59}\text{Fe}) : 1565,2 \quad (6) \quad \text{keV}$$

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

	Energy keV	Probability × 100	Nature	lg <i>ft</i>
$\beta_{0,4}^{-}$	83,6 (6)	0,082 (4)	Allowed	6,9
$\beta_{0,3}^{-}$	130,9 (6)	1,25 (2)	Allowed	6,5
$\beta_{0,2}^{-}$	273,6 (6)	45,21 (25)	Allowed	5,9
$\beta_{0,1}^{-}$	465,9 (6)	53,33 (23)	Allowed	6,7
$\beta_{0,0}^{-}$	1565,2 (6)	0,25 (15)	2nd Forbidden	11

### 2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	$\alpha_K$	$\alpha_L$	$\alpha_M$	$\alpha_T$
$\gamma_{3,2}(\text{Co})$	142,652 (2)	0,988 (15)	M1+0,0064%E2	0,01433 (43)	0,001428 (43)	0,000199 (6)	0,0160 (1)
$\gamma_{2,1}(\text{Co})$	192,349 (5)	2,944 (29)	M1+4,22%E2	0,00807 (24)	0,000804 (24)	0,0001119 (34)	0,00899 (15)
$\gamma_{3,1}(\text{Co})$	335,00 (1)	0,265 (7)	M1+1,42%E2	0,00179 (5)	0,000175 (5)	0,0000244 (7)	0,00199 (6)
$\gamma_{4,1}(\text{Co})$	382,32 (20)	0,0215 (16)	M1+E2				
$\gamma_{1,0}(\text{Co})$	1099,262 (5)	56,60 (21)	E2	0,0001572 (47)	0,00001516 (45)	0,00000211 (6)	0,000175 (5)
$\gamma_{2,0}(\text{Co})$	1291,611 (6)	43,22 (25)	E2	0,00011 (3)	0,0000106 (30)	0,0000015 (5)	0,000122 (4)
$\gamma_{4,0}(\text{Co})$	1481,58 (20)	0,0603 (37)	M1+E2				

### 3 Atomic Data

#### 3.1 Co

$$\omega_K : 0,388 \quad (4)$$

$$\bar{\omega}_L : 0,0072 \quad (5)$$

$$n_{KL} : 1,418 \quad (4)$$

##### 3.1.1 X Radiations

	Energy keV	Relative probability	
X <sub>K</sub>	K $\alpha_2$	6,9154	51,16
	K $\alpha_1$	6,9304	100
	K $\beta_1$	7,6495	}
	K $\beta_5''$		
			21,11

### 4 Electron Emissions

	Energy keV	Electrons per 100 disint.
$\beta_{0,4}^-$	max: 83,6 (6)	0,082 (4)
$\beta_{0,4}^-$	avg: 22,0 (6)	
$\beta_{0,3}^-$	max: 130,9 (6)	1,25 (2)
$\beta_{0,3}^-$	avg: 35,8 (8)	
$\beta_{0,2}^-$	max: 273,6 (6)	45,21 (25)
$\beta_{0,2}^-$	avg: 81 (1)	
$\beta_{0,1}^-$	max: 465,9 (6)	53,33 (23)
$\beta_{0,1}^-$	avg: 149,5 (10)	
$\beta_{0,0}^-$	max: 1565,2 (6)	0,25 (15)
$\beta_{0,0}^-$	avg: 522 (2)	

## 5 Photon Emissions

### 5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XK $\alpha_2$	(Co)	6,9154	0,00596 (13)	} K $\alpha$
XK $\alpha_1$	(Co)	6,9304	0,01170 (28)	
XK $\beta_1$	(Co)	7,6495	} 0,00243 (7)	K' $\beta_1$

### 5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$ (Co)	142,651 (2)	0,972 (15)
$\gamma_{2,1}$ (Co)	192,349 (5)	2,918 (29)
$\gamma_{3,1}$ (Co)	334,8 (2)	0,264 (7)
$\gamma_{4,1}$ (Co)	382,0 (4)	0,0215 (16)
$\gamma_{1,0}$ (Co)	1099,245 (3)	56,59 (21)
$\gamma_{2,0}$ (Co)	1291,590 (6)	43,21 (25)
$\gamma_{4,0}$ (Co)	1481,7 (2)	0,0603 (37)

## 6 Main Production Modes

$$\left\{ \begin{array}{l} \text{Fe} - 58(n,\gamma)\text{Fe} - 59 \quad \sigma : 1,15 (2) \text{ barns} \\ \text{Possible impurities : Fe} - 55, \text{Cr} - 51 \end{array} \right.$$

$$\left\{ \begin{array}{l} \text{Co} - 59(n,p)\text{Fe} - 59 \\ \text{Possible impurities : Fe} - 55, \text{Co} - 60 \end{array} \right.$$

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