$^{58}_{27}Co_{31}$

1 Decay Scheme

Co-58 disintegrates to Fe-58 excited levels by electron capture or by beta plus emission.
Le Co-58 se désintègre par capture électronique et émission bêta plus vers des niveaux excités de Fe-58.

2 Nuclear Data

$T_{1/2}(^{58}Co)$	:	70,83	(10)	d
$Q^{+}(^{58}Co)$	:	2307,4	(11)	keV

2.1 β^{+} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{+}_{0,1}$	474,6 (11)	15,0 (2)	Allowed	6,6
$\beta^{+}_{0,0}$	1285,4 (11)	0,00082 (23)	2nd Forbidden	12,7

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,2}$	632,6 (11)	1,21 (2)	Allowed	7,4	0,8873 (16)	0,0965 (13)	0,0162 (7)
$\epsilon_{0,1}$	1496,6 (11)	83,80 (8)	Allowed	6,6	0,8885 (16)	0,0955 (13)	0,0160 (7)

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K (10^{-4})	α_T (10^{-4})
$\gamma_{1,0}$(Fe)	810,765 (2)	99,48 (1)	E2	3,0 (1)	3,4 (1)
$\gamma_{2,1}$(Fe)	863,958 (6)	0,69 (1)	M1+E2	2,3 (4)	2,6 (4)
$\gamma_{2,0}$(Fe)	1674,751 (7)	0,52 (1)	E2	0,76	0,83

3 Atomic Data

3.1 Fe

ω_K	:	0,352	(4)
$\bar{\omega}_L$	:	0,0061	(5)
n_{KL}	:	1,456	(12)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	6,39091		50,7
	$K\alpha_1$	6,40391		100
	$K\beta_3$	7,05804	}	
	$K\beta_5''$	7,1083	}	20,3
X_L				
	$L\ell$	0,615		
	$L\beta$	– 0,79		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	5,37 – 5,65	100
KLX	6,16 – 6,40	27,4
KXY	6,93 – 7,11	1,87
Auger L	0,03 – 0,84	

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Fe)	0,03 - 0,84	1,60 (2)
e_{AK}	(Fe)		0,715 (13)
	KLL	5,37 - 5,65	}
	KLX	6,16 - 6,40	}
	KXY	6,93 - 7,11	}
$ec_{1,0\ K}$	(Fe)	803,66 (1)	0,00034 (4)
$ec_{1,0\ L}$	(Fe)	809,32 - 810,77	
$ec_{2,1\ K}$	(Fe)	856,85 (1)	0,0000017 (9)
$ec_{2,1\ L}$	(Fe)	863,11 - 863,95	
$ec_{2,0\ K}$	(Fe)	1667,62 (1)	0,00000004 (1)
$ec_{2,0\ L}$	(Fe)	1673,88 - 1674,72	
$\beta^+_{0,0}$	max:	1285,4 (11)	0,00082 (23)
$\beta^+_{0,0}$	avg:	553,4 (5)	
$\beta^+_{0,1}$	max:	474,6 (11)	15,0 (2)
$\beta^+_{0,1}$	avg:	201,3 (6)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Fe)	0,615 — 0,792		0,73 (7)	
$XK\alpha_2$	(Fe)	6,39091		7,9 (2)	} $K\alpha$
$XK\alpha_1$	(Fe)	6,40391		15,6 (2)	}
$XK\beta_3$	(Fe)	7,05804	}		
$XK\beta_1$	(Fe)		}	3,2 (1)	$K'\beta_1$
$XK\beta_5''$	(Fe)	7,1083	}		
$XK\beta_4$	(Fe)		}		$K'\beta_2$

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma^{\pm}$	511	30,0 (4)
$\gamma_{1,0}$(Fe)	810,759 (2)	99,45 (1)
$\gamma_{2,1}$(Fe)	863,951 (6)	0,69 (1)
$\gamma_{2,0}$(Fe)	1674,725 (7)	0,52 (1)

6 Main Production Modes

{ Ni – 58(n,p)Co – 58m
Possible impurities : Ni – 63, Co – 57, Co – 60

{ Ni – 58(n,p)Co – 58
Possible impurities : Ni – 63, Co – 57, Co – 60

{ Mn – 55(α,n)Co – 58m
Possible impurities : none

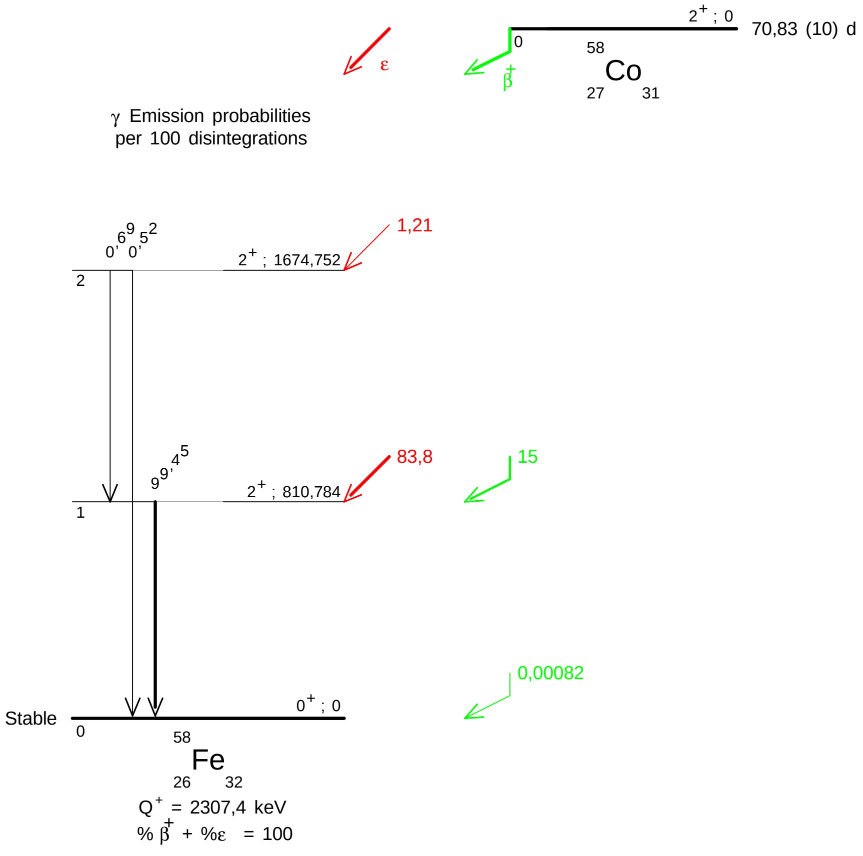
{ Mn – 55(α,n)Co – 58
Possible impurities : none

{ Co – 59(n,2n)Co – 58m
Possible impurities : Fe – 59, Co – 60

{ Co – 59(n,2n)Co – 58
Possible impurities : Fe – 59, Co – 60

7 References

- L. S. Cheng, L. S. Dick, J. D. Kurbatov. Phys. Rev. 88 (1952) 887
  (K ICC, K/L)
- H. Daniel. Z. Phys. 150 (1958) 144
  (Beta emission probabilities)
- W. F. Frey, J. H. Hamilton, S. Hultberg. Ark. Fysik 21 (1962) 383
  (K/L, K ICC)
- D. Mac Arthur, R. Goodman, A. Artna, M. W. Johns. Nucl. Phys. 38 (1962) 106
  (K ICC, K/L)
- R. B. Moler, R. W. Fink. Phys. Rev. 131 (1963) 821
  (PK)
- W. Bambynek, E. De Roost, E. Funck. Proceeding of the Conference on Electron Capture and Higher Order Processes in Nuclear Dec. (Budapest) (1968) 253
  (Gamma-ray emission probabilities, Beta+ emission probabilities, Elec. Capture probabilities)
- N. C. Dyer, J. H. Hamilton. Bull. Amer. Phys. Soc. 14 (1969) 551
  (Gamma-ray energies and emission probabilities)
- R. Vaninbrouck. Atomic Energy Rev. 91 (1973) 524
  (Half-life)
- J. Legrand, F. Lagoutine, J. Morel. Atomic Energy Rev. 11 (1973) 524
  (Gamma-ray energies and emission probabilities)
- F. Lagoutine, F. Legrand, C. Bac. Int. J. Appl. Radiat. Isotop. 26 (1975) 131
  (Half-life)
- R. L. Heath. Aerojet Nucl. Co. Report ANCR-1000-2 (1977)
  (Gamma-ray energies and emission probabilities)
- R. C. Greenwood, R. G. Helmer, R. J. Gehrke. Nucl. Instrum. Methods 159 (1979) 465
  (Gamma-ray energies)
- A. Grutter. Int. J. Appl. Radiat. Isotop. 33 (1982) 533
  (Gamma-ray energies and emission probabilities)
- V.A.Sole. Nucl. Instrum. Methods A312 (1992) 303
  (K fluorescence yield)
- G. Audi, A. H. Wapstra. Nucl. Phys. A595 (1995) 409
  (Q)
- E. Schönfeld, H. Janssen. Nucl. Instrum. Methods A369 (1996) 527
  (Atomic Data)
- R. G. Helmer, C. van der Leun. Nucl. Instrum. Methods A450 (2000) 35
  (Gamma-ray energies)


2+ ; 0
70,83 (10) d
0
58
Co
27 31
ε
β+
γ Emission probabilities
per 100 disintegrations
1,21
2+ ; 1674,752
2
83,8
15
2+ ; 810,784
1
0,00082
Stable
0+ ; 0
0
58
Fe
26 32
Q+ = 2307,4 keV
% β+ + %ε = 100