$^{54}_{25}\mathrm{Mn}_{29}$

1 Decay Scheme

Mn-54 decays by electron capture (99.9997(3) %) directly to the 834.855-keV excited level (2+) of Cr-54 and by very weak electron capture and beta plus transitions to the ground state (0+) of Cr-54.

Le manganèse 54 décroît par capture électronique (99,9997 (3) %) vers le niveau excité à 834,855 keV du chrome 54 et par capture électronique et transition bêta plus vers le niveau fondamental du chrome 54.

2 Nuclear Data

$T_{1/2}(^{54}\mathrm{Mn}\ )$: 312,19 (3) d
$Q^{+}(^{54}\mathrm{Mn}\ )$: 1377,2 (10) keV

2.1 Electron Capture Transitions

	Energy (keV)	Probability (%)	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,1}$	542,3 (10)	99,9997 (3)	Allowed	6,17	0,8896 (17)	0,0948 (14)	0,0150 (6)
$\epsilon_{0,0}$	1377,2 (10)	0,0003 (3)	Unique 2nd Forbidden	>13,9	0,8908 (16)	0,0938 (13)	0,0148 (6)

2.2 β^{+} Transitions

	Energy (keV)	Probability (%)	Nature	lg ft
$\beta^{+}_{0,0}$	355,2 (10)	<0,00000057	Unique 2nd Forbidden	>13,9

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy (keV)	$P_{\gamma+ce}$ (%)	Multipolarity	α_K (10^{-4})	α_L (10^{-4})	α_M (10^{-4})	α_T (10^{-4})
$\gamma_{1,0}$(Cr)	834,855 (3)	99,9997 (3)	E2	2,22 (4)	0,206 (3)	0,0271 (4)	2,45 (4)

3 Atomic Data

3.1 Cr

ω_K : 0,289 (5)
$\bar{\omega}_L$: 0,0045 (9)
n_{KL} : 1,508 (5)

3.1.1 X Radiations

		Energy (keV)	Relative probability
X_K			
	$K\alpha_2$	5,40557	50,91
	$K\alpha_1$	5,41479	100
	$K\beta_1$	5,94677	20,31
	$K\beta''_5$	5,987	
X_L			
	$L\ell$	0,5003	
	$L\alpha$	0,5729 - 0,57695	
	$L\eta$	0,5102	
	$L\beta$	0,57515 - 0,69748	
	$L\gamma$	0,58496 - 0,58496	

3.1.2 Auger Electrons

	Energy (keV)	Relative probability
Auger K		
KLL	4,554 - 4,794	100
KLX	5,206 - 5,412	26,92
KXY	5,841 - 5,985	1,913
Auger L	0,4 - 0,7	2,91

4 Electron and Positron Emissions

		Energy (keV)	Electrons (per 100 disint.)
e_{AL}	(Cr)	0,4 - 0,7	143,0 (6)
e_{AK}	(Cr)		
	KLL	4,554 - 4,794	63,3 (5)
	KLX	5,206 - 5,412	
	KXY	5,841 - 5,985	
$ec_{1,0\ K}$	(Cr)	828,866 (3)	0,0222 (4)
$ec_{1,0\ L}$	(Cr)	834,16 - 834,281	0,00206 (3)
$\beta^+_{0,0}$	max:	355,2 (10)	<0,00000057
	avg:	182	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy (keV)	Photons (per 100 disint.)	
XL	(Cr)	0,5003 - 0,69748	0,65 (13)	
XKα_2	(Cr)	5,40557	7,65 (14)	Kα
XKα_1	(Cr)	5,41479	15,02 (27)	
XKβ_1	(Cr)	5,94677	3,05 (7)	K$'\beta_1$
XKβ''_5	(Cr)	5,987		

5.2 Gamma Emissions

	Energy (keV)	Photons (per 100 disint.)
$\gamma^{\pm}$	511	<0,00000114
$\gamma_{1,0}$(Cr)	834,848 (3)	99,9752 (5)

6 Main Production Modes

- Fe − 54(n,p)Mn − 54
- Possible impurities: Cr − 51, Fe − 55, Fe − 57

$\left\{ \begin{array}{l} \mathrm{Cr-53(d,n)Mn-54} \\ \text{Possible impurities: V} - 48, \mathrm{Mn-52} \end{array} \right.$

$\mathrm{V-51}(\alpha,\mathrm{n})\mathrm{Mn-54}$

$\mathrm{Cr-52}(\alpha,\mathrm{d})\mathrm{Mn-54}$

$\mathrm{Cr-54(p,n)Mn-54}$

$\mathrm{Cr-52(t,n)Mn-54}$

$\mathrm{Fe-54(t,He-3)Mn-54}$

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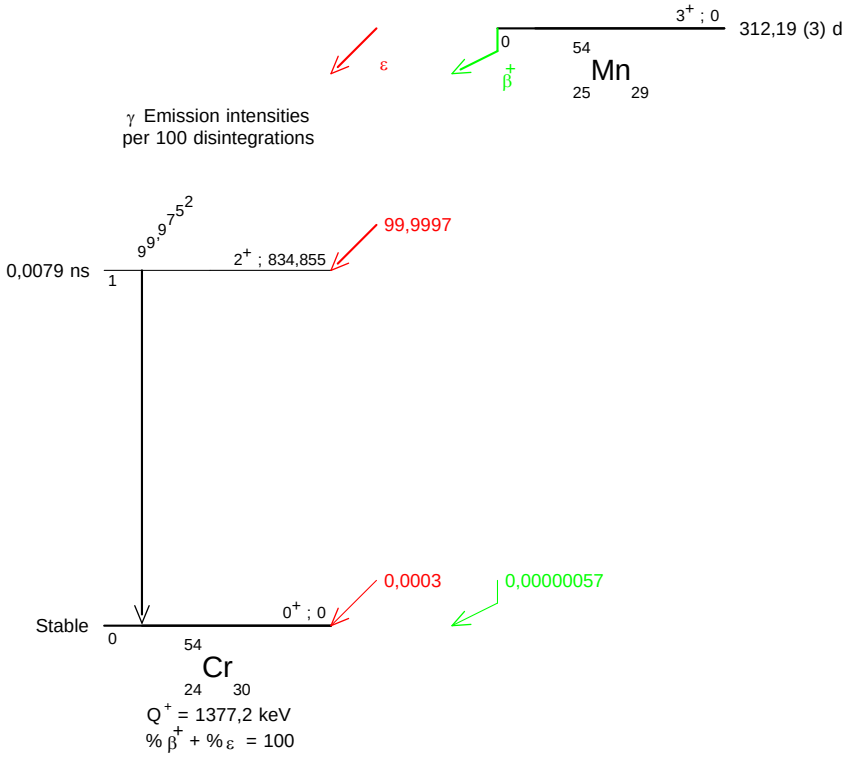
3+ ; 0
312,19 (3) d
0
54
Mn
25
29
ε
β+
γ Emission intensities
per 100 disintegrations
99,9997
2+ ; 834,855
0,0079 ns
1
0,0003
0,00000057
0+ ; 0
Stable
0
54
Cr
24
30
Q+ = 1377,2 keV
% β+ + % ε = 100