$^{99m}_{43}\mathrm{Tc}_{56}$

1 Decay Scheme

Tc-99m mainly disintegrates to Tc-99. Weak beta minus transitions have been observed to Ru-99 nuclear levels. Depending on the chemical environment, some changes can modify the value of the half-life.
Le technétium 99m se désexcite vers le niveau fondamental du technétium 99. Des changements dans la valeur de la période peuvent être obtenus par une modification de l'environnement extérieur, composition chimique par exemple qui influence la conversion interne de la transition de 2,17 keV dans les couches externes. Des transitions bêta moins de très faible intensité vers le niveau fondamental et les deux niveaux excités de ruthénium 99 ont été mises en évidence.

2 Nuclear Data

$T_{1/2}(^{99m}\mathrm{Tc})$	:	6,0067	(10)	h
$T_{1/2}(^{99}\mathrm{Tc})$	:	211,5	(11)	10^3 a
$Q^-(^{99m}\mathrm{Tc})$	:	436,2	(2)	keV
$Q^{IT}(^{99m}\mathrm{Tc})$	:	142,683	(1)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,2}$	113,9 (2)	0,000106 (6)	1st Forbidden	8,5
$\beta^-_{0,1}$	346,7 (2)	0,0026 (5)	1st Forbidden	8,7
$\beta^-_{0,0}$	436,3 (2)	0,0010 (3)	Unique 1st Forbidden	9,4

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce} \times 100$	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{2,1}$(Tc)	2,1726 (4)	99,0 (4)	E3			119 (3) 10^8	135 (4) 10^8
$\gamma_{1,0}$(Ru)	89,6 (3)	0,00259 (20)	29%M1+E2	1,17 (4)	0,27 (1)		1,49 (5)
$\gamma_{1,0}$(Tc)	140,511 (1)	99,0 (4)	M1+3,3%E2	0,104 (3)	0,01290 (39)	0,00236 (7)	0,119 (3)
$\gamma_{2,0}$(Tc)	142,675 (25)	1,0 (1)	M4	29,3 (6)	9,35 (20)	1,86 (6)	40,9 (8)
$\gamma_{2,1}$(Ru)	232,7 (2)	0,0000088 (15)		0,0412 (15)			0,048 (2)
$\gamma_{2,0}$(Ru)	322,4 (1)	0,000098 (6)		0,0152 (5)			0,0175 (5)

3 Atomic Data

3.1 Tc

ω_K	:	0,782	(4)
$\bar{\omega}_L$	:	0,0415	(10)
$\bar{\omega}_M$	:	0,0010	(1)
n_{KL}	:	1,014	(4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	18,251		52,59
	$K\alpha_1$	18,3672		100
	$K\beta_3$	20,599	}	
	$K\beta_1$	20,619	}	
	$K\beta''_5$	20,789	}	26,58
	$K\beta_2$	21,005	}	
	$K\beta_4$	21,042	}	4,2
X_L				
	$L\ell$	2,134		
	$L\alpha$	2,42 – 2,425		
	$L\eta$	2,25		
	$L\beta$	2,456 – 2,788		
	$L\gamma$	2,726 – 3,002		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	14,86 – 15,58	100
KLX	17,43 – 18,33	40,3
KXY	19,93 – 21,00	4,1
Auger L	1,6 – 2,9	736

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Tc)	1,6 - 2,9	10,89 (9)
e_{AK}	(Tc)		2,15 (8)
	KLL	14,86 - 15,58 }	
	KLX	17,43 - 18,33 }	
	KXY	19,93 - 21,00 }	
$ec_{2,1\ T}$	(Tc)	1,628 - 2,170	99,9 (27)
$ec_{2,1\ M}$	(Tc)	1,628 - 1,919	88,0 (24)
$ec_{2,1\ N}$	(Tc)	2,104 - 2,170	11,7 (3)
$ec_{1,0\ T}$	(Tc)	119,467 - 140,510	10,53 (27)
$ec_{1,0\ K}$	(Tc)	119,467 (1)	9,20 (27)
$ec_{2,0\ K}$	(Tc)	121,631 (25)	0,67 (6)
$ec_{1,0\ L}$	(Tc)	137,468 - 137,834	1,142 (35)
$ec_{2,0\ L}$	(Tc)	139,632 - 139,998	0,215 (20)
$ec_{1,0\ M}$	(Tc)	139,967 - 140,258	0,209 (6)
$\beta^-_{0,2}$	max:	113,9 (2)	0,000106 (6)
$\beta^-_{0,2}$	avg:	37,8 (6)	
$\beta^-_{0,1}$	max:	346,7 (2)	0,0026 (5)
$\beta^-_{0,1}$	avg:	102,1 (5)	
$\beta^-_{0,0}$	max:	436,3 (2)	0,0010 (3)
$\beta^-_{0,0}$	avg:	152,3 (5)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Tc)	2,134 — 3,002		0,482 (12)	
XKα_2	(Tc)	18,251		2,22 (7)	} Kα
XKα_1	(Tc)	18,3672		4,21 (12)	}
XKβ_3	(Tc)	20,599	}		
XKβ_1	(Tc)	20,619	}	1,12 (4)	K$'\beta_1$
XKβ''_5	(Tc)	20,789	}		
XKβ_2	(Tc)	21,005	}		
XKβ_4	(Tc)	21,042	}	0,177 (8)	K$'\beta_2$

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Tc)	2,1726 (4)	0,0000000074 (2)
$\gamma_{1,0}$(Ru)	89,6 (3)	0,00104 (20)
$\gamma_{1,0}$(Tc)	140,511 (1)	88,5 (2)
$\gamma_{2,0}$(Tc)	142,683 (1)	0,023 (2)
$\gamma_{2,1}$(Ru)	232,7 (2)	0,0000084 (15)
$\gamma_{2,0}$(Ru)	322,4 (1)	0,000096 (6)

6 Main Production Modes

Separation from Mo − 99 + Tc − 99m
Possible impurities : Mo − 99

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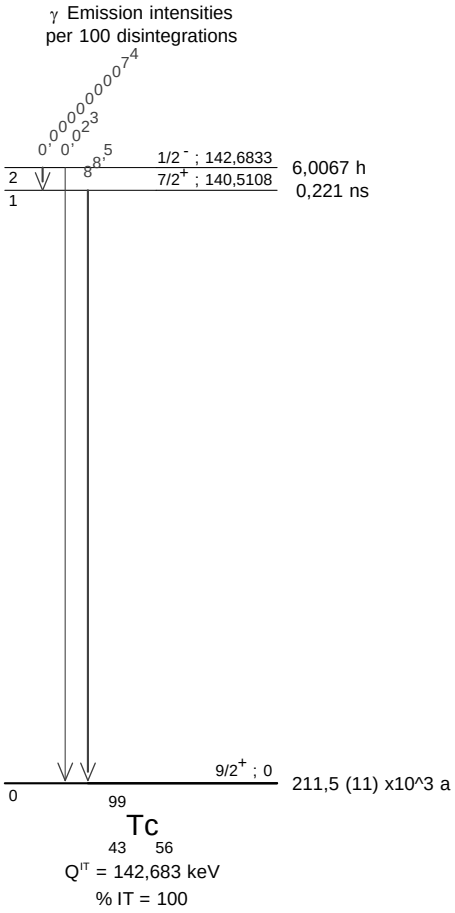
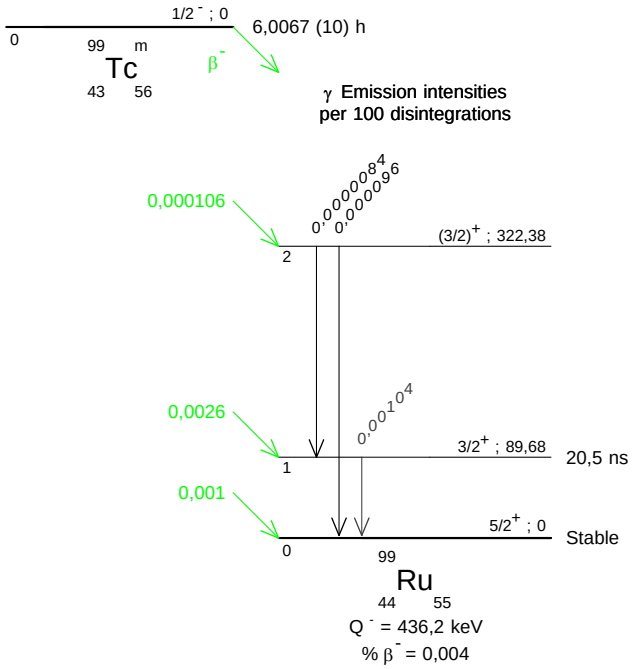

γ Emission intensities
per 100 disintegrations
0,0,0,0,0,0,0,7,4
0,0,0,0,0,2,3
0,0,0,5
8,8,5
1/2 - ; 142,6833
7/2+ ; 140,5108
6,0067 h
0,221 ns
2
1
9/2+ ; 0
211,5 (11) x10^3 a
0
99
Tc
43 56
Q^IT = 142,683 keV
% IT = 100


1/2- ; 0
6,0067 (10) h
0
99 m
Tc
43 56
β-
γ Emission intensities
per 100 disintegrations
0,000106
0,0884
0,0896
0,0004
0,0008
(3/2)+ ; 322,38
2
0,0026
0,0104
3/2+ ; 89,68
20,5 ns
1
0,001
5/2+ ; 0
Stable
0
99
Ru
44 55
Q- = 436,2 keV
% β- = 0,004