# $^{134}_{55}Cs_{79}$

## 1 Decay Scheme

Le césium 134 se désintègre essentiellement par émission bêta moins vers des niveaux excités du baryum 134.
*Cs-134 desintegrates mainly by beta minus emissions to excited levels in Ba-134.*

## 2 Nuclear Data

| | | | | |
|---|---|---|---|---|
| $T_{1/2}(^{134}Cs)$ | : | 2,0644 | (14) | a |
| $Q^{+}(^{134}Cs)$ | : | 1233,3 | (8) | keV |
| $Q^{-}(^{134}Cs)$ | : | 2058,98 | (33) | keV |

### 2.1 Electron Capture Transitions

| | Energy keV | Probability × 100 | Nature | lg $ft$ | $P_K$ | $P_L$ | $P_M$ |
|---|---|---|---|---|---|---|---|
| $\epsilon_{0,1}$ | 386,3 (8) | 0,0003 (1) | 2nd Forbidden | 13 | 0,8361 (16) | 0,1289 (11) | 0,0283 (6) |

### 2.2 $\beta^-$ Transitions

| | Energy keV | Probability × 100 | Nature | lg $ft$ |
|---|---|---|---|---|
| $\beta^-_{0,5}$ | 89,06 (33) | 27,27 (3) | Allowed | 6,49 |
| $\beta^-_{0,4}$ | 415,64 (33) | 2,498 (8) | Allowed | 9,65 |
| $\beta^-_{0,3}$ | 658,39 (33) | 70,19 (8) | Allowed | 8,89 |
| $\beta^-_{0,2}$ | 891,01 (33) | $\sim 0$ | 2nd Forbidden | 13 |
| $\beta^-_{0,1}$ | 1454,26 (33) | 0,06 (6) | 2nd Forbidden | 13,1 |

## 2.3 Gamma Transitions and Internal Conversion Coefficients

| | Energy keV | $P_{\gamma+ce}$ × 100 | Multipolarity | $\alpha_K$ | $\alpha_L$ | $\alpha_M$ | $\alpha_T$ |
|---|---|---|---|---|---|---|---|
| $\gamma_{4,3}$(Ba) | 242,746 (6) | 0,0262 (34) | (M1+E2) | 0,0722 (12) | 0,0120 (25) | 0,0025 (6) | 0,087 (3) |
| $\gamma_{5,4}$(Ba) | 326,585 (6) | 0,0177 (11) | (M1+E2) | 0,031 (3) | 0,0047 (3) | 0,00097 (8) | 0,0367 (22) |
| $\gamma_{4,2}$(Ba) | 475,368 (5) | 1,496 (7) | M1+97(92)%E2 | 0,0096 (4) | 0,00146 (3) | 0,000304 (6) | 0,0114 (5) |
| $\gamma_{2,1}$(Ba) | 563,2457 (36) | 8,402 (15) | E2 | 0,00603 (9) | 0,000881 (13) | 0,000183 (3) | 0,00714 (10) |
| $\gamma_{5,3}$(Ba) | 569,331 (6) | 15,512 (21) | M1+7,27(4)%E2 | 0,00805 (12) | 0,001039 (15) | 0,000214 (3) | 0,00936 (14) |
| $\gamma_{1,0}$(Ba) | 604,7223 (19) | 98,21 (8) | E2 | 0,00503 (7) | 0,000721 (10) | 0,0001495 (21) | 0,00593 (9) |
| $\gamma_{3,1}$(Ba) | 795,8677 (44) | 85,73 (9) | E2 | 0,00258 (4) | 0,000351 (5) | 0,0000724 (11) | 0,00302 (5) |
| $\gamma_{5,2}$(Ba) | 801,953 (5) | 8,720 (16) | E2 | 0,00254 (4) | 0,000344 (5) | 0,000071 (1) | 0,00297 (5) |
| $\gamma_{1,0}$(Xe) | 847,041 (23) | 0,0003 (1) | E2 | | | | |
| $\gamma_{4,1}$(Ba) | 1038,6137 (44) | 0,9930 (33) | M1+33,5(19)%E2 | 0,00179 (6) | 0,000228 (7) | 0,0000467 (13) | 0,00208 (7) |
| $\gamma_{2,0}$(Ba) | 1167,968 (3) | 1,793 (5) | E2 | 0,001122 (16) | 0,0001444 (21) | 0,0000297 (5) | 0,001307 (19) |
| $\gamma_{5,1}$(Ba) | 1365,1987 (44) | 3,022 (8) | E2 | 0,000820 (12) | 0,0001039 (15) | 0,0000213 (3) | 0,000987 (14) |

# 3 Atomic Data

## 3.1 Ba

$\omega_K$ : 0,900 (4)
$\bar{\omega}_L$ : 0,110 (5)
$n_{KL}$ : 0,888 (4)

### 3.1.1 X Radiations

| | | Energy keV | | Relative probability |
|---|---|---|---|---|
| $X_K$ | | | | |
| | $K\alpha_2$ | 31,8174 | | 54,28 |
| | $K\alpha_1$ | 32,1939 | | 100 |
| | $K\beta_3$ | 36,3045 | } | |
| | $K\beta_1$ | 36,3786 | } | |
| | $K\beta_5''$ | 36,654 | } | 29,41 |
| | $K\beta_2$ | 37,258 | } | |
| | $K\beta_4$ | 37,312 | } | 7,41 |
| | $KO_{2,3}$ | 37,425 | } | |
| $X_L$ | | | | |
| | $L\ell$ | 3,9544 | | |
| | $L\alpha$ | 4,4515 – 4,4666 | | |
| | $L\eta$ | 4,3307 | | |
| | $L\beta$ | 4,8278 – 5,207 | | |
| | $L\gamma$ | 5,3715 – 5,8104 | | |

### 3.1.2 Auger Electrons

| | | Energy keV | Relative probability |
|---|---|---|---|
| Auger K | | | |
| | KLL | 25,314 – 26,786 | 100 |
| | KLX | 30,095 – 32,179 | 47,7 |
| | KXY | 34,86 – 37,41 | 5,7 |
| Auger L | | 2,66 – 5,81 | |

# 4 Electron Emissions

| | | Energy keV | | Electrons per 100 disint. |
|---|---|---|---|---|
| $e_{AL}$ | (Ba) | 2,66 - 5,81 | | 0,850 (5) |
| $e_{AK}$ | (Ba) | | | 0,093 (4) |
| | KLL | 25,314 - 26,786 | } | |
| | KLX | 30,095 - 32,179 | } | |
| | KXY | 34,86 - 37,41 | } | |
| $ec_{2,1\ K}$ | (Ba) | 525,805 | (4) | 0,0503 (8) |
| $ec_{5,3\ K}$ | (Ba) | 531,890 | (6) | 0,1237 (19) |
| $ec_{5,3\ L}$ | (Ba) | 563,342 - 564,084 | | 0,01597 (23) |
| $ec_{1,0\ K}$ | (Ba) | 567,282 | (2) | 0,491 (7) |
| $ec_{1,0\ L}$ | (Ba) | 598,734 - 599,475 | | 0,0704 (10) |
| $ec_{1,0\ M}$ | (Ba) | 603,430 - 603,942 | | 0,01460 (21) |
| $ec_{3,1\ K}$ | (Ba) | 758,427 | (4) | 0,2205 (34) |
| $ec_{5,2\ K}$ | (Ba) | 764,512 | (5) | 0,02208 (35) |
| $ec_{3,1\ L}$ | (Ba) | 789,879 - 790,621 | | 0,0300 (4) |
| $\beta^-_{0,5}$ | max: | 89,06 | (33) | 27,27 (3) |
| $\beta^-_{0,5}$ | avg: | 23,2 | (4) | |
| $\beta^-_{0,4}$ | max: | 415,64 | (33) | 2,498 (8) |
| $\beta^-_{0,4}$ | avg: | 123,6 | (4) | |
| $\beta^-_{0,3}$ | max: | 658,39 | (33) | 70,19 (8) |
| $\beta^-_{0,3}$ | avg: | 210,3 | (4) | |
| $\beta^-_{0,2}$ | max: | 891,01 | (33) | $\sim 0$ |
| $\beta^-_{0,2}$ | avg: | 300 | (1) | |
| $\beta^-_{0,1}$ | max: | 1454,26 | (33) | 0,06 (6) |
| $\beta^-_{0,1}$ | avg: | 535 | (1) | |

# 5 Photon Emissions

## 5.1 X-Ray Emissions

| | | Energy keV | | Photons per 100 disint. | |
|---|---|---|---|---|---|
| XL | (Ba) | 3,9544 — 5,8104 | | 0,1058 (17) | |
| XK$\alpha_2$ | (Ba) | 31,8174 | | 0,2378 (26) | } K$\alpha$ |
| XK$\alpha_1$ | (Ba) | 32,1939 | | 0,438 (5) | } |
| XK$\beta_3$ | (Ba) | 36,3045 | } | | |
| XK$\beta_1$ | (Ba) | 36,3786 | } | 0,1289 (19) | K$'\beta_1$ |
| XK$\beta_5''$ | (Ba) | 36,654 | } | | |
| XK$\beta_2$ | (Ba) | 37,258 | } | | |
| XK$\beta_4$ | (Ba) | 37,312 | } | 0,0325 (8) | K$'\beta_2$ |
| XKO$_{2,3}$ | (Ba) | 37,425 | } | | |

## 5.2 Gamma Emissions

| | Energy keV | Photons per 100 disint. |
|---|---|---|
| $\gamma_{4,3}$(Ba) | 242,76 (5) | 0,0241 (31) |
| $\gamma_{5,4}$(Ba) | 326,585 (14) | 0,0171 (11) |
| $\gamma_{4,2}$(Ba) | 475,365 (2) | 1,479 (7) |
| $\gamma_{2,1}$(Ba) | 563,246 (3) | 8,342 (15) |
| $\gamma_{5,3}$(Ba) | 569,330 (2) | 15,368 (21) |
| $\gamma_{1,0}$(Ba) | 604,720 (3) | 97,63 (8) |
| $\gamma_{3,1}$(Ba) | 795,86 (1) | 85,47 (9) |
| $\gamma_{5,2}$(Ba) | 801,950 (6) | 8,694 (16) |
| $\gamma_{4,1}$(Ba) | 1038,605 (8) | 0,9909 (33) |
| $\gamma_{2,0}$(Ba) | 1167,967 (4) | 1,791 (5) |
| $\gamma_{5,1}$(Ba) | 1365,194 (4) | 3,019 (8) |

# 6 Main Production Modes

{ Cs – 133(n,$\gamma$)Cs – 134 $\sigma$ : 29,0 (15) barns
Possible impurities : Cs – 134m

Cs – 133(n,$\gamma$)Cs – 134m
{ Cs – 134m(I.T.,)Cs – 134
Possible impurities : T1/2 = 2,913 h

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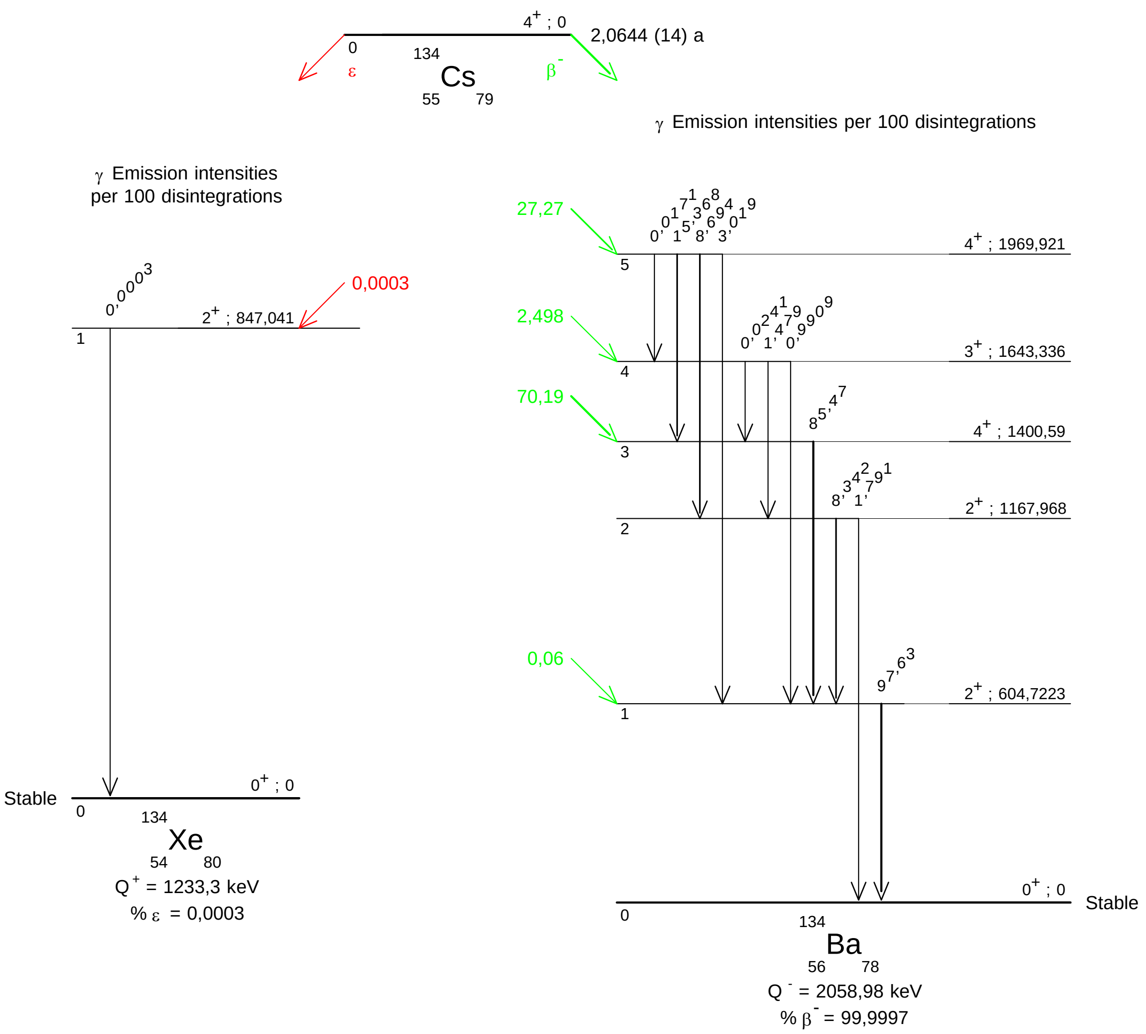
4+ ; 0
0
2,0644 (14) a
ε
β-
134
Cs
55 79
γ Emission intensities per 100 disintegrations
γ Emission intensities
per 100 disintegrations
0,0003
0,0003
2+ ; 847,041
1
Stable
0+ ; 0
0
134
Xe
54 80
Q+ = 1233,3 keV
% ε = 0,0003
27,27
2,498
70,19
0,06
0,0171
15,368
8,694
3,019
4+ ; 1969,921
5
0,0241
1,479
0,9909
3+ ; 1643,336
4
85,47
4+ ; 1400,59
3
8,342
1,791
2+ ; 1167,968
2
97,63
2+ ; 604,7223
1
0+ ; 0
Stable
0
134
Ba
56 78
Q- = 2058,98 keV
% β- = 99,9997