



1 Decay Scheme

Pb-203 disintegrates by electron capture to Tl-203 via excited levels.

Le plomb 203 se désintègre par capture électronique vers des niveaux excités du thallium 203.

2 Nuclear Data

$$T_{1/2}({}^{203}\text{Pb}) : 51,929 \quad (10) \quad \text{h}$$

$$Q^+({}^{203}\text{Pb}) : 975 \quad (6) \quad \text{keV}$$

2.1 Electron Capture Transitions

| | Energy keV | Probability × 100 | Nature | lg <i>ft</i> | P_K | P_L | P_{M+} |
|------------------|---------------|----------------------|----------------------|--------------|-------------|-------------|------------|
| $\epsilon_{0,2}$ | 294 (6) | 4,80 (8) | Unique 1st Forbidden | 6,812 | 0,7076 (32) | 0,2168 (22) | 0,0756 (9) |
| $\epsilon_{0,1}$ | 696 (6) | 95,20 (12) | 1st Forbidden | 6,404 | 0,7786 (4) | 0,1661 (3) | 0,0552 (1) |

2.2 Gamma Transitions and Internal Conversion Coefficients

| | Energy keV | $P_{\gamma+ce}$ × 100 | Multipolarity | α_K | α_L | α_M | α_T |
|---------------------------|---------------|--------------------------|----------------|--------------|--------------|--------------|--------------|
| $\gamma_{1,0}(\text{Tl})$ | 279,1952 (10) | 99,24 (9) | M1 + E2 | 0,164 (1) | 0,04837 (48) | | 0,2261 (8) |
| $\gamma_{2,1}(\text{Tl})$ | 401,320 (3) | 4,04 (8) | M1 + 0,09 % E2 | 0,1464 (21) | 0,0245 (4) | 0,00572 (8) | 0,1784 (25) |
| $\gamma_{2,0}(\text{Tl})$ | 680,515 (3) | 0,765 (18) | E2 | 0,01065 (15) | 0,00250 (4) | 0,000605 (9) | 0,01393 (20) |

3 Atomic Data

3.1 Tl

| | | | |
|------------------|---|-------|------|
| ω_K | : | 0,963 | (4) |
| $\bar{\omega}_L$ | : | 0,367 | (15) |
| n_{KL} | : | 0,812 | (5) |

3.1.1 X Radiations

| | Energy keV | Relative probability |
|--------------|-------------------|-------------------------|
| X_K | | |
| $K\alpha_2$ | 70,8327 | 59,24 |
| $K\alpha_1$ | 72,8738 | 100 |
| $K\beta_3$ | 82,116 | } |
| $K\beta_1$ | 82,5756 | } |
| $K\beta_5''$ | 83,0456 | } |
| $K\beta_5'$ | 83,1417 | } |
| $K\beta_2$ | 84,867 | } |
| $K\beta_4$ | 85,1357 | } |
| $KO_{2,3}$ | 85,444 | } |
| X_L | | |
| $L\ell$ | 8,9531 | |
| $L\alpha$ | 10,1718 – 10,2679 | |
| $L\eta$ | 10,9942 | |
| $L\beta$ | 11,8117 – 12,9566 | |
| $L\gamma$ | 13,8528 – 14,7362 | |

3.1.2 Auger Electrons

| | Energy keV | Relative probability |
|---------|-----------------|-------------------------|
| Auger K | | |
| KLL | 54,587 – 59,954 | 100 |
| KLX | 66,37 – 72,86 | 55,4 |
| KXY | 78,12 – 85,50 | 7,67 |
| Auger L | 5,43 – 10,93 | |

4 Electron Emissions

| | | Energy keV | Electrons per 100 disint. |
|---------------------|------|---------------------|------------------------------|
| e _{AL} | (Tl) | 5,43 - 10,93 | 57,9 (6) |
| e _{AK} | (Tl) | | 3,4 (4) |
| | KLL | 54,587 - 59,954 | } |
| | KLX | 66,37 - 72,86 | } |
| | KXY | 78,12 - 85,50 | } |
| ec _{1,0} K | (Tl) | 193,665 (1) | 13,27 (12) |
| ec _{1,0} L | (Tl) | 263,8485 - 266,5377 | 3,912 (46) |
| ec _{1,0} M | (Tl) | 275,4911 - 276,8059 | 1,254 (18) |
| ec _{2,1} K | (Tl) | 315,790 (3) | 0,502 (13) |

5 Photon Emissions

5.1 X-Ray Emissions

| | | Energy keV | Photons per 100 disint. | |
|--------------------|------|------------------|----------------------------|--------------|
| XL | (Tl) | 8,9531 — 14,7362 | 33,2 (6) | |
| XK α_2 | (Tl) | 70,8327 | 25,61 (19) | } K α |
| XK α_1 | (Tl) | 72,8738 | 43,24 (25) | } |
| XK β_3 | (Tl) | 82,116 | } | |
| XK β_1 | (Tl) | 82,5756 | } | K' β_1 |
| XK β_5'' | (Tl) | 83,0456 | } | |
| XK β_5' | (Tl) | 83,1417 | } | |
| XK β_2 | (Tl) | 84,867 | } | |
| XK β_4 | (Tl) | 85,1357 | } | K' β_2 |
| XKO _{2,3} | (Tl) | 85,444 | } | |

5.2 Gamma Emissions

| | Energy keV | Photons per 100 disint. |
|---------------------|---------------|----------------------------|
| $\gamma_{1,0}$ (Tl) | 279,1952 (10) | 80,94 (5) |
| $\gamma_{2,1}$ (Tl) | 401,320 (3) | 3,43 (6) |
| $\gamma_{2,0}$ (Tl) | 680,515 (3) | 0,754 (18) |

6 Main Production Modes

Tl – 203(d,2n)Pb – 203
 Tl – 203(p,n)Pb – 203
 Tl – 203(He – 3,3n)Bi – 203
 Bi – 203(E.C.)Pb – 203
 Hg – 202(α ,3n γ)Pb – 203
 Pb – 205(p,t)Pb – 203
 Hg – 204(α ,5n)Pb – 203
 Hg – 202(α ,3n)Pb – 203
 Pb – 204(γ ,n)Pb – 203
 Pt – 198(Be – 9,4n)Pb – 203

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