1 Decay Scheme

Xe-133m disintegrates by a strong converted gamma transition to the ground state of Xe-133.

Le Xénon 133 métastable se déexcite selon une transition gamma fortement convertie.

2 Nuclear Data

\[ T_{1/2}(^{133m}\text{Xe}) : 2,198 \pm 13 \text{ d} \]
\[ T_{1/2}(^{133}\text{Xe}) : 5,2474 \pm 5 \text{ d} \]
\[ Q^{IT}(^{133m}\text{Xe}) : 233,219 \pm 15 \text{ keV} \]

2.1 Gamma Transitions and Internal Conversion Coefficients

<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>( P_{\gamma+ce} \times 100 )</th>
<th>Multipolarity</th>
<th>( \alpha_K )</th>
<th>( \alpha_L )</th>
<th>( \alpha_M )</th>
<th>( \alpha_T )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \gamma_{1,0}(\text{Xe}) )</td>
<td>233,219 (15)</td>
<td>100</td>
<td>M4</td>
<td>6,25 (9)</td>
<td>2,04 (3)</td>
<td>0,453 (7)</td>
</tr>
</tbody>
</table>

3 Atomic Data

3.1 Xe

\( \omega_K : 0,888 \pm 5 \) \\
\( \overline{\omega}_{L} : 0,097 \pm 5 \) \\
\( n_{KL} : 0,902 \pm 4 \)
### 3.1.1 X Radiations

<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>Relative probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>X_K</td>
<td></td>
</tr>
<tr>
<td>Kα₂</td>
<td>29,459</td>
</tr>
<tr>
<td>Kα₁</td>
<td>29,779</td>
</tr>
<tr>
<td>Kβ₃</td>
<td>33,562</td>
</tr>
<tr>
<td>Kβ₁</td>
<td>33,625</td>
</tr>
<tr>
<td>Kβ₅''</td>
<td>33,881</td>
</tr>
<tr>
<td>Kβ₂</td>
<td>34,415</td>
</tr>
<tr>
<td>Kβ₄</td>
<td>34,496</td>
</tr>
<tr>
<td>KO₂,3</td>
<td>34,552</td>
</tr>
<tr>
<td>X_L</td>
<td></td>
</tr>
<tr>
<td>Lℓ</td>
<td>3,638</td>
</tr>
<tr>
<td>Lα</td>
<td>4,098 – 4,11</td>
</tr>
<tr>
<td>Lη</td>
<td>3,958</td>
</tr>
<tr>
<td>Lβ</td>
<td>4,418 – 4,776</td>
</tr>
<tr>
<td>Lγ</td>
<td>4,895 – 5,296</td>
</tr>
</tbody>
</table>

### 3.1.2 Auger Electrons

<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>Relative probability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Auger K</td>
<td></td>
</tr>
<tr>
<td>KLL</td>
<td>23,512 – 24,842</td>
</tr>
<tr>
<td>KLX</td>
<td>27,897 – 29,770</td>
</tr>
<tr>
<td>KXY</td>
<td>32,27 – 34,54</td>
</tr>
<tr>
<td>Auger L</td>
<td>2.4 – 5.2</td>
</tr>
</tbody>
</table>
4 Electron Emissions

<table>
<thead>
<tr>
<th></th>
<th>Energy</th>
<th>Electrons per 100 disint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>e&lt;sub&gt;AL&lt;/sub&gt; (Xe)</td>
<td>2.4 - 5.2 keV</td>
<td>70.4 (10)</td>
</tr>
<tr>
<td>e&lt;sub&gt;AK&lt;/sub&gt; (Xe)</td>
<td></td>
<td>7.1 (4)</td>
</tr>
<tr>
<td>KLL</td>
<td>23.512 - 24.842 keV</td>
<td></td>
</tr>
<tr>
<td>KLX</td>
<td>27.897 - 29.770 keV</td>
<td></td>
</tr>
<tr>
<td>KXY</td>
<td>32.27 - 34.54 keV</td>
<td></td>
</tr>
<tr>
<td>e&lt;sub&gt;c&lt;/sub&gt;&lt;sup&gt;1,0&lt;/sup&gt; K (Xe)</td>
<td>198.655 (15)</td>
<td>63.5 (12)</td>
</tr>
<tr>
<td>e&lt;sub&gt;c&lt;/sub&gt;&lt;sup&gt;1,0&lt;/sup&gt; L (Xe)</td>
<td>227.766 - 228.437 keV</td>
<td>20.73 (40)</td>
</tr>
<tr>
<td>e&lt;sub&gt;c&lt;/sub&gt;&lt;sup&gt;1,0&lt;/sup&gt; M (Xe)</td>
<td>232.070 - 232.542 keV</td>
<td>4.60 (8)</td>
</tr>
<tr>
<td>e&lt;sub&gt;c&lt;/sub&gt;&lt;sup&gt;1,0&lt;/sup&gt; N (Xe)</td>
<td>233.006 - 233.152 keV</td>
<td>0.943 (18)</td>
</tr>
</tbody>
</table>

5 Photon Emissions

5.1 X-Ray Emissions

<table>
<thead>
<tr>
<th></th>
<th>Energy</th>
<th>Photons per 100 disint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>XL</td>
<td>(Xe) 3.638 — 5.296 keV</td>
<td>7.6 (4)</td>
</tr>
<tr>
<td>X&lt;sub&gt;Kα2&lt;/sub&gt; (Xe)</td>
<td>29.459</td>
<td>16.0 (4)</td>
</tr>
<tr>
<td>X&lt;sub&gt;Kα1&lt;/sub&gt; (Xe)</td>
<td>29.779</td>
<td>29.7 (6)</td>
</tr>
<tr>
<td>X&lt;sub&gt;Kβ3&lt;/sub&gt; (Xe)</td>
<td>33.562</td>
<td></td>
</tr>
<tr>
<td>X&lt;sub&gt;Kβ1&lt;/sub&gt; (Xe)</td>
<td>33.625</td>
<td>8.61 (20)</td>
</tr>
<tr>
<td>X&lt;sub&gt;Kβ4&lt;/sub&gt; (Xe)</td>
<td>33.881</td>
<td></td>
</tr>
<tr>
<td>X&lt;sub&gt;Kβ2&lt;/sub&gt; (Xe)</td>
<td>34.415</td>
<td></td>
</tr>
<tr>
<td>X&lt;sub&gt;Kβ4&lt;/sub&gt; (Xe)</td>
<td>34.496</td>
<td>2.03 (7)</td>
</tr>
<tr>
<td>X&lt;sub&gt;KO2,3&lt;/sub&gt; (Xe)</td>
<td>34.552</td>
<td></td>
</tr>
</tbody>
</table>

5.2 Gamma Emissions

<table>
<thead>
<tr>
<th></th>
<th>Energy</th>
<th>Photons per 100 disint.</th>
</tr>
</thead>
<tbody>
<tr>
<td>γ&lt;sub&gt;1,0&lt;/sub&gt;(Xe)</td>
<td>233.219 (15)</td>
<td>10.16 (13)</td>
</tr>
</tbody>
</table>
6 Main Production Modes

\[
\begin{align*}
&\text{Fission product(})\text{)} \\
&\text{Possible impurities : Xe} - 127, \text{Xe} - 131 m, \text{Xe} - 131, \text{Xe} - 133, \text{Xe} - 135 \\
&\begin{align*}
&\text{Xe} - 132(n,\gamma)\text{Xe} - 133 m \quad \sigma : 0.05 \text{ (1) barns} \\
&\text{Possible impurities : Xe} - 125, \text{Xe} - 129 m, \text{Xe} - 133, \text{Xe} - 135, \text{Xe} - 135 m, \text{Xe} - 137
\end{align*}
\end{align*}
\]

7 References

- I.Bergström. Phys. Rev. 81 (1951) 638 (Half-life, Gamma ray energies, K/L ratio)
- I.Bergström. Ark. Fysik 7 (1954) 255 (K ICC, K/L ratio)
- P.Raghavan. At. Data Nucl. Data Tables 42 (1989) 189 (Nuclear moments)
- S.Rab. Nucl. Data Sheets 75 (1995) 491 (Decay scheme)
\[ \gamma \text{ Emission intensities per 100 disintegrations} \]

\[ \begin{align*}
\gamma^0_{1.6} & : 233,219 \\
3^+ & : 233,219 \\
5^+ & : 233,219 \\
10,16 & \text{d}
\end{align*} \]

\[ \begin{align*}
0 & \quad \text{Xe}^{133}_{54} \\
3^+ & : 0 \\
5,2474 (5) & \text{d}
\end{align*} \]

\[ Q^\gamma = 233,219 \text{ keV} \]

\[ \% IT = 100 \]