Monographie BIPM-5

Table of Radionuclides
(Vol. 7 – A = 14 to 245)

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Preface

This monograph is one of several published in a series by the Bureau International des Poids et Mesures (BIPM) on behalf of the Consultative Committee for Ionizing Radiation (*Comité Consultatif des Rayonnements Ionisants,* CCRI[1]). The aim of this series of publications is to review topics that are of importance for the measurement of ionizing radiation and especially of radioactivity, in particular those techniques normally used by participants in international comparisons. It is expected that these publications will prove to be useful reference volumes both for those who are already engaged in this field and for those who are approaching such measurements for the first time.

The purpose of this monograph, number 5 in the series, is to present the recommended values of nuclear and decay data for a wide range of radionuclides. Activity measurements for more than sixty-three of these radionuclides have already been the subject of comparisons under the auspices of Section II (dedicated to the Measurement of radionuclides) of the CCRI. The material for this monograph is now covered in seven volumes. The first two volumes contain the primary recommended data relating to half-lives, decay modes, x-rays, gamma-rays, electron emissions; alpha- and beta-particle transitions and emissions, and their uncertainties for a set of sixty-eight radionuclides, Volume 1 for those radionuclides with mass number up to and including 150 and Volume 2 for those radionuclides with mass number over 150. Volume 3 contains the equivalent data for twenty-six additional radionuclides as listed and re-evaluations for ^{125}Sb and ^{153}Sm.Volume 4 contains the data for a further thirty-one radionuclides with a re-evaluation for ^{226}Ra and Volume 5 includes seventeen new radionuclide evaluations and eight re-evaluations of previous data as identified in the contents page. Volume 6 contains twenty-one new radionuclide evaluations and four re-evaluations, for ^{64}Cu, ^{236}Np, ^{237}Np and ^{239}U. The present Volume 7 contains twenty-four new radionuclide evaluations and five re-evaluations, for ^{67}Ga, ^{208}Tl, ^{228}Th, ^{242}Cm and ^{244}Cm. The data have been collated and evaluated by an international working group (Decay Data Evaluation Project, DDEP) led by the Laboratoire National de Métrologie et d'Essais – Laboratoire National Henri Becquerel (LNE-LNHB). The evaluators have agreed on the methodologies to be used and the CD-ROM included with this monograph contains the evaluators' comments for each radionuclide in addition to the data tables included in the monograph itself.

The work involved in evaluating nuclear data is ongoing and the recommended values are kept up to date on the LNE-LNHB website at http://www.nucleide.org/DDEP_WG/DDEPdata.htm.

The BIPM and the DDEP are most grateful to the International Atomic Energy Agency (IAEA) for their assistance and financial support to some evaluators in the production of data for Volumes 1 to 3 through their Coordinated Research Project "Update of X Ray and Gamma Ray Decay Data Standards for Detector Calibration and Other Applications" and for Volumes 4 to 7 through their Coordinated Research Project "Updated Decay Data Library for Actinides". The BIPM and the DDEP are indebted also to some other evaluators who participate in the United States Nuclear Data Program (USNDP) for their support to these publications.

The publication of further volumes of Monographie 5 is envisaged when necessary to add new radionuclide data or re-evaluations in this more permanent format that can be referenced easily.

Although other data sets may still be used when evaluating radionuclide activity, use of this common, recommended data set should help to reduce the uncertainties in activity evaluations and lead to more coherent results for comparisons.

K. Carneiro
President of the CCRI

M.J.T. Milton
Director of the BIPM

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[1] previously known as the *Comité Consultatif pour les Etalons de Mesure des Rayonnements Ionisants* (CCEMRI)

Monographie BIPM-5 – Table of Radionuclides, Volume 7

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“TABLE DE RADIONUCLÉIDES”

Sommaire - Ce volume regroupe l’évaluation des radionucléides suivants :

^{14}C, ^{35}S, ^{36}Cl, ^{37}Ar, ^{45}Ca, ^{67}Ga, ^{68}Ga, ^{68}Ge,^{127}Sb, ^{127}Te, ^{127m}Te, ^{134}Cs, ^{141}Ce, ^{147}Nd, ^{147}Pm, ^{195}Au, ^{206}Hg, ^{207}Tl, ^{208}Tl, ^{209}Tl, ^{211}Pb, ^{211}At, ^{213}Bi, ^{215}Bi, ^{228}Th, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm.

Les valeurs recommandées et les incertitudes associées comprennent : la période radioactive, les modes de décroissance, les émissions α, β, γ, X et électroniques ainsi que les caractéristiques des transitions correspondantes.

“TABLE OF RADIONUCLIDES”

Summary - This volume includes the evaluation of the following radionuclides:

^{14}C, ^{35}S, ^{36}Cl, ^{37}Ar, ^{45}Ca, ^{67}Ga, ^{68}Ga, ^{68}Ge,^{127}Sb, ^{127}Te, ^{127m}Te, ^{134}Cs, ^{141}Ce, ^{147}Nd, ^{147}Pm, ^{195}Au, ^{206}Hg, ^{207}Tl, ^{208}Tl, ^{209}Tl, ^{211}Pb, ^{211}At, ^{213}Bi, ^{215}Bi, ^{228}Th, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm.

Primary recommended data comprise half-lives, decay modes, X-rays, gamma-rays, electron emissions, alpha- and beta-particle transitions and emissions, and their uncertainties.

“TABELLE DER RADIONUKLIDE”

Zusammenfassung – Dieser Band umfaßt die Evaluation der folgenden Radionuklide:

^{14}C, ^{35}S, ^{36}Cl, ^{37}Ar, ^{45}Ca, ^{67}Ga, ^{68}Ga, ^{68}Ge,^{127}Sb, ^{127}Te, ^{127m}Te, ^{134}Cs, ^{141}Ce, ^{147}Nd, ^{147}Pm, ^{195}Au, ^{206}Hg, ^{207}Tl, ^{208}Tl, ^{209}Tl, ^{211}Pb, ^{211}At, ^{213}Bi, ^{215}Bi, ^{228}Th, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm.

In diesem Bericht sind evaluierte Werte der Halbwertszeiten, Übergangswahrscheinlichkeiten und Übergangsenergien von α, β^--, β^+-, EC- und Gammaübergängen, Konversionskoeffizienten von Gammaübergängen sowie der Emissionswahrscheinlichkeiten von Röntgen- und Gammaquanten, Auger- und Konversionselektronen und deren Unsicherheiten zusammengefaßt.

“ТАБЛИЦА РАДИОНУКЛИДОВ”

Резюме. Этот том включает оценки характеристик распада для следующих нуклидов:

^{14}C, ^{35}S, ^{36}Cl, ^{37}Ar, ^{45}Ca, ^{67}Ga, ^{68}Ga, ^{68}Ge,^{127}Sb, ^{127}Te, ^{127m}Te, ^{134}Cs, ^{141}Ce, ^{147}Nd, ^{147}Pm, ^{195}Au, ^{206}Hg, ^{207}Tl, ^{208}Tl, ^{209}Tl, ^{211}Pb, ^{211}At, ^{213}Bi, ^{215}Bi, ^{228}Th, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm.

Основные рекомендуемые данные включают периоды полураспада, виды распада, X-излучение, гамма-излучение, электронное излучение, альфа- и бета- переходы и излучения, а также погрешности рассмотренных величин.

“TABLA DE RADIONUCLEIDOS”

Contenido – Este volúmen agrupa la evaluación de los radionucleidos siguientes:

^{14}C, ^{35}S, ^{36}Cl, ^{37}Ar, ^{45}Ca, ^{67}Ga, ^{68}Ga, ^{68}Ge,^{127}Sb, ^{127}Te, ^{127m}Te, ^{134}Cs, ^{141}Ce, ^{147}Nd, ^{147}Pm, ^{195}Au, ^{206}Hg, ^{207}Tl, ^{208}Tl, ^{209}Tl, ^{211}Pb, ^{211}At, ^{213}Bi, ^{215}Bi, ^{228}Th, ^{242}Cm, ^{243}Cm, ^{244}Cm, ^{245}Cm.

Los valores recomendados y las incertidumbres asociadas comprenden: el período de semidesintegración radiactiva, los modos de desintegración, las emisiones α, β, γ, X y electrónicas incluyendo las características de las transiciones correspondientes.

TABLE DE RADIONUCLÉIDES

TABLE OF RADIONUCLIDES

TABELLE DER RADIONUKLIDE

ТАБЛИЦА РАДИОНУКЛИДОВ

TABLA DE RADIONUCLEIDOS

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TABLE DE RADIONUCLÉIDES

INTRODUCTION

Le Laboratoire National Henri Becquerel (LNHB) a commencé l'étude des données nucléaires et atomiques qui caractérisent la décroissance des radionucléides en 1974. Ces évaluations ont fait l'objet de la publication des quatre volumes de la Table de Radionucléides [87Ta, 99Be] et de six volumes de la *Monographie* BIPM-5 [04Be, 06Be, 08Be, 10Be, 11Be]. Ce nouveau volume s'inscrit dans la continuation du travail précédent.

D'autre part, pour des raisons évidentes, telles la facilité de mise à jour des données ou la commodité de consultation pour les utilisateurs, le LNHB a créé une base de données informatisée. Le logiciel NUCLEIDE est la forme informatisée de cette table, il permet un accès aisé aux différentes informations à l'aide de menus déroulants atteints par un simple « clic » sur un « bouton ».

Le propos de la Table est d'étudier un nombre limité de radionucléides utiles dans le domaine de la métrologie ou dans des domaines variés d'applications (médecine nucléaire, environnement, cycle du combustible, etc.) et d'en présenter une étude complète.

Les données recommandées comprennent : la période radioactive, les modes de décroissance, les émissions α, β, γ, X et électroniques ainsi que les caractéristiques des transitions associées.

Dans le but de mettre à jour et d'ajouter de nouvelles évaluations plus rapidement Le Laboratoire National Henri Becquerel (LNHB, France) et le Physikalisch - Technische Bundesanstalt (PTB, Germany) ont établi un accord de coopération. Ils ont ensuite été rejoints par Idaho National Engineering & Environmental Laboratory (INEEL, USA), Lawrence Berkeley National Laboratory (LBNL, USA) et Khlopin Radium Institute (KRI, Russia). Le premier travail de cette collaboration internationale a été d'établir une méthode et des règles communes d'évaluation. Les évaluations proposent des valeurs recommandées et leurs incertitudes. Ces valeurs ont été évaluées à partir des données expérimentales disponibles. A défaut, elles sont issues de calculs théoriques. Toutes les références utilisées pour l'évaluation d'un radionucléide sont listées à la fin de chaque chapitre.

Ce volume est le septième de la *Monographie* 5 publiée sous l'égide du BIPM.

VALEURS RECOMMANDÉES ET INCERTITUDES

Les principales étapes pour l'évaluation des données et leurs incertitudes sont :
- une analyse critique de toutes les publications disponibles afin de retenir ou non une valeur et son incertitude, ramenée à l'incertitude-type composée ;
- la détermination d'une valeur recommandée qui est, selon les cas, une moyenne simple ou pondérée des valeurs issues des publications, ceci est décidé après examen du chi carré réduit. Dans le cas d'une moyenne pondérée, le poids relatif de chaque valeur est limité à 50 %. L'incertitude, notée u_c, est la plus grande des valeurs des incertitudes interne ou externe ; dans le cas de valeurs incompatibles elle peut être étendue pour recouvrir la valeur la plus précise.

Pour certaines applications il est nécessaire de définir une incertitude élargie, notée *U*, telle que :
$U(y) = k \times u_c(y)$ où *k* est le facteur d'élargissement.
La valeur de k retenue pour cette publication est : $k = 1$.

Les valeurs d'incertitude indiquées portent sur les derniers chiffres significatifs, ainsi :
9,230 (11) signifie 9,230 ± 0,011 et
9,2 (11) 9,2 ± 1,1

Si une valeur est donnée sans incertitude, cela signifie qu'elle est considérée comme douteuse. Elle est indiquée à titre indicatif et souvent a été estimée en fonction du schéma de désintégration comme étant « de l'ordre de ».

Des précisions concernant les techniques d'évaluation peuvent être obtenues dans les références [85Zi], [96He], [99In] (voir rubrique Références) ou directement auprès des auteurs.
La description physique des données évaluées est disponible dans la référence [99In].

NUMÉROTAGE

Les niveaux d'un noyau sont numérotés, arbitrairement, de 0 pour le niveau fondamental à *n* pour le énième niveau excité. Les diverses transitions sont ainsi repérées par leur niveau de départ et leur niveau d'arrivée.
Dans le cas de transition de faible probabilité qu'il n'est pas possible de situer sur le schéma de désintégration, les niveaux de départ et d'arrivée sont notés (-1, *n*).
Dans le cas de l'émission gamma de 511 keV qui suit une désintégration bêta plus, la notation adoptée est : (-1, -1).

UNITÉS

Les valeurs recommandées sont exprimées :
- pour les périodes :

	Symbole
. en secondes pour $T_{1/2}$ <= 60 secondes	s
. en minutes pour $T_{1/2}$ > 60 secondes	min
. en heures pour $T_{1/2}$ > 60 minutes	h
. en jours pour $T_{1/2}$ > 24 heures	d
. en années pour $T_{1/2}$ > 365 jours	a

1 année = 365,242 198 jours = 31 556 926 secondes ;

- pour les probabilités de transition et nombre de particules émises, les valeurs sont données pour 100 désintégrations ;

- les énergies sont exprimées en keV.

Remarque : Si une valeur plus précise de la période est nécessaire, par exemple en jours plutôt qu'en années, le lecteur se référera aux commentaires de l'évaluation inclus sur le CD-Rom ou sur les sites web du LNE-LNHB ou du BIPM. Ceci évitera l'introduction d'erreurs d'arrondi supplémentaires en cas de conversion d'unités.

AVERTISSEMENT

Ce document a été imprimé en 2013, pour toutes les nouvelles évaluations et mises à jour ultérieures, le lecteur se référera aux documents accessibles sur :
http://www.nucleide.org/NucData.htm
http://www.bipm.org/fr/publications/monographie-ri-5.html

TABLE OF RADIONUCLIDES

INTRODUCTION

The evaluation of decay data for the “Table de Radionucléides” by the Bureau National de Métrologie – Laboratoire National Henri Becquerel/Commissariat à L’Énergie Atomique (BNM – LNHB/CEA) began in 1974, continued to 1987 and four volumes were published [87Ta, 99Be]. This work has been pursued and six volumes of evaluations have already been published as *Monographie* BIPM-5 [04Be, 06Be, 08Be, 10Be, 11Be].

Moreover, LNHB developed a database and related software (NUCLÉIDE) with the objectives of making it easier to update and add data and, obviously, to offer easy access to the nuclear and atomic decay data to the user by “click on the button” facilities.

The aim of this Table is to provide recommended data for nuclides of special interest for metrology or practical applications like nuclear medicine, monitoring and reactor shielding, etc.

Primary recommended data comprise half-lives, decay modes, X-rays, gamma-rays, electron emissions, alpha- and beta-particle transitions and emissions, and their uncertainties. All the references used for the evaluations are given.

In order to update the data of the nuclides already present and to add new evaluations, the Laboratoire National Henri Becquerel (LNHB, France) and the Physikalisch-Technische Bundesanstalt (PTB, Germany) established a cooperative agreement; they were then joined by the Idaho National Engineering & Environmental Laboratory (INEEL, USA), the Lawrence Berkeley National Laboratory (LBNL, USA) and the Khlopin Radium Institute (KRI, Russia). This international collaboration is based on an informal agreement; the initial work of this group was to discuss and to agree on a methodology to be used in these evaluations. The data and associated uncertainties were evaluated from all available experiments and taking into account theoretical considerations.

This volume is the seventh in the series of the *Monographie* 5 published under the auspices of the BIPM.

RECOMMENDED VALUES AND UNCERTAINTIES

The main steps for the evaluation of the data and their uncertainties are:

- a critical analysis of all available original publications in order to accept or not each value and its uncertainty reduced to the combined standard uncertainty;
- the determination of the best value which is either the weighted or the unweighted average of the retained values, this is decided after examination of the reduced χ^2 value. For a weighted average of discrepant data, each weight is limited to 50 %, and the uncertainty, designated u_c, is the larger of the internal or external uncertainty values, which may be expanded to cover the most precise input value.

For some applications it may be necessary to define an expanded uncertainty, designated U, as:
$U(y) = k \times u_c(y)$ where k is the coverage factor.
In this publication, standard uncertainties are quoted (i.e. $k = 1$).

The value of the uncertainty, in parentheses, applies to the least significant digits, i.e.:
9.230 (11) means 9.230 ± 0.011 and
9.2 (11) 9.2 ± 1.1

A value given without an uncertainty is considered questionable. It is provided for information and often its order of magnitude is estimated from the decay scheme.

Information on evaluation methods may be obtained from references [85Zi, 96He, 99In] or directly from the authors.

Information on the meaning of physical data may be obtained from reference [99In].

NUMBERING

Nuclear levels are arbitrarily numbered from 0 (for the ground state level) to *n* (for the *n*th excited level).
All transitions are designated by their initial and final levels.
For transitions with weak emission probabilities that are not shown by an arrow in the decay scheme, the initial and final levels are noted (-1, *n*).
For a 511 keV gamma emission, which follows a beta plus disintegration, the adopted numbering is (-1, -1).

UNITS

The recommended values are given:
- for half-lives:

	Symbol
. in seconds for $T_{1/2}$ <= 60 seconds	s
. in minutes for $T_{1/2}$ > 60 seconds	min
. in hours for $T_{1/2}$ > 60 minutes	h
. in days for $T_{1/2}$ > 24 hours	d
. in years for $T_{1/2}$ > 365 days	a

1 year = 1 a = 365.242 198 d = 31 556 926 s

- for transition probabilities and number of emitted particles, the values are given for 100 disintegrations of the parent nuclide.

- for energies, the values are expressed in keV.

Remark: When a more precise evaluation of a half life is required, for example in days instead of years, the reader is referred to the commented evaluation included on the CD ROM or on the websites of the LNE-LNHB or the BIPM. This will avoid the introduction of rounding errors.

NOTICE

This report was printed in 2013. New evaluations and updated issues will be available on:
http://www.nucleide.org/NucData.htm
http://www.bipm.org/en/publications/monographie-ri-5.html

TABELLE DER RADIONUKLIDE

EINLEITUNG

Die Evaluation der Zerfallsdaten für die „Table de Radionucléides“ durch das Laboratoire National Henri Becquerel (BNM-LNHB/CEA) begann im Jahre 1974, diese Arbeit wurde bis 1987 fortgesetzt, und es wurden vier Bände veröffentlicht [87Ta, 99Be]. Seitdem sind des weiteren sechs Bände der *Monographie* BIPM-5 [04Be, 06Be, 08Be, 10Be, 11Be] erschienen. Der vorliegende neue Band stellt die Fortsetzung der vorhergehenden Arbeit dar.

Darüber hinaus wurde im LNHB eine computerbasierte Datenbank entwickelt. Die Software NUCLEIDE erleichtert die Aktualisierung und die Einbeziehung weiterer Daten und ermöglicht den Zugang zu den Kern- und Atomdaten für den Anwender „auf Tastendruck“.

Der Zweck dieser Tabelle ist es, empfohlene Daten einer begrenzten Anzahl von Radionukliden für metrologische und praktische Anwendungen wie etwa in der Nuklearmedizin, der Umweltüberwachung, dem Brennstoffkreislauf, der Reaktorabschirmung usw. zur Verfügung zu stellen.

Die empfohlenen Daten betreffen die Halbwertszeit, die Art des Zerfalls und die Charakteristika der α-, β-, γ-, Röntgen- und Elektronenemissionen und der entsprechenden Übergänge.

Um die bereits vorliegenden Daten zu aktualisieren und neue Evaluationen schneller einbeziehen zu können, vereinbarten das Laboratoire National Henri Becquerel (LNHB, Frankreich) und die Physikalisch-Technische Bundesanstalt (PTB, Deutschland) eine Übereinkunft zur Zusammenarbeit. Es schlossen sich das Idaho National Engineering and Environmental Laboratory (INEEL, USA), das Lawrence Berkeley National Laboratory (LBNL, USA) und das Khlopin Radium Institute (KRI, Rußland) an. Eine der ersten Arbeiten dieser Gruppe war es, die in diesen Evaluationen benutzte Methodologie zu diskutieren und festzulegen. Die Datenbank umfaßt empfohlene Daten und ihre Unsicherheiten, die aus den verfügbaren experimentellen Daten oder theoretischen Berechnungen gewonnen wurden. Alle für die Evaluation benutzten Referenzen werden angegeben.

Dieser Band ist die siebte Ausgabe der *Monographie* BIPM-5.

EMPFOHLENE WERTE UND UNSICHERHEITEN

Die Hauptschritte für die Evaluation der Daten und Unsicherheiten sind:

- Eine kritische Analyse aller verfügbaren Veröffentlichungen, um einen jeweils veröffentlichten Wert und seine Unsicherheit - auf die kombinierte Standardunsicherheit zurückgeführt - zu berücksichtigen oder auszuschließen.
- Die Bestimmung eines empfohlenen Wertes, der entweder das gewichtete oder das ungewichtete Mittel der veröffentlichten Werte ist. Die Entscheidung wird nach der Prüfung des reduzierten Chi-Quadrat-Werts getroffen. Im Falle des gewichteten Mittels wird das Gewicht jedes Einzelwerts auf 50 % begrenzt.

Die Unsicherheit, als u_c bezeichnet, ist der größere Wert der inneren oder äußeren Unsicherheit. Für einen diskrepanten Datensatz kann sie so vergrößert werden, daß der genaueste Einzelwert in der Unsicherheit mit eingeschlossen ist.

Für einige Anwendungen ist es notwendig, eine vergrößerte Unsicherheit, als U bezeichnet, wie folgt zu definieren:

$U(y) = k \times u_c(y)$ wo k der Erweiterungsfaktor ist.

Für die vorliegende Veröffentlichung ist die erweitere Unsicherheit mit $k = 1$ berechnet.

Die Werte der Unsicherheit beziehen sich auf die letzten Stellen, d. h.:

9,230(11) bedeutet 9,230 ± 0,011 und
9,2(11) bedeutet 9,2 ± 1,1

Wenn ein Wert ohne Unsicherheit angegeben ist, bedeutet das, daß dieser Wert als fragwürdig zu betrachten ist. Er wird zur Information mitgeteilt und ist oft abgeschätzt aus dem Zerfallsschema im Sinne „in der Größenordnung von“.

Informationen über die Evaluationsprozedur können aus den Referenzen [85Zi, 96He, 99In] oder direkt von den Autoren bezogen werden.

Die Bedeutung der evaluierten Daten kann aus Ref. [99In] entnommen werden.

NUMERIERUNG

Die Kernniveaus werden willkürlich numeriert von 0 für den Grundzustand bis zu *n* für das n-te angeregte Niveau. Alle Übergänge werden durch ihr Ausgangs- und Endniveau gekennzeichnet. Für Übergänge mit geringen Wahrscheinlichkeiten, die nicht im Zerfallsschema gezeigt werden können, werden als Ausgangs- und Endniveau (-1, *n*) angegeben.

Für die 511 keV-Gamma-Emission, die dem Beta Plus-Zerfall folgt, ist die angenommene Numerierung (-1, -1).

EINHEITEN

Die empfohlenen Werte sind ausgedrückt:
- für Halbwertszeiten:

. in Sekunden für $T_{1/2} \leq 60$ Sekunden	s
. in Minuten für $T_{1/2} > 60$ Sekunden	min
. in Stunden für $T_{1/2} > 60$ Minuten	h
. in Tagen für $T_{1/2} > 24$ Stunden	d
. in Jahren für $T_{1/2} > 365$ Tage	a

1 a = 365,242 198 d = 31 556 926 s

- für Übergangswahrscheinlichkeiten und die Anzahl der emittierten Teilchen werden Werte angegeben, die sich auf 100 Zerfälle beziehen.

- die Werte der Energien sind in keV ausgedrückt.

HINWEIS

Dieses Dokument wurde im Jahre 2013 erstellt. Alle späteren Fassungen oder neueren Evaluationen können vom Leser unter
http://www.nucleide.org/NucData.htm
http://www.bipm.org/en/publications/monographie-ri-5.html
abgerufen werden.

ТАБЛИЦА РАДИОНУКЛИДОВ

ВВЕДЕНИЕ

Оценка данных распада для Table de Radionucléides, BNM – LNHB/CEA, была начата в 1974 г. и продолжалась до 1987 г. К тому времени были опубликованы четыре тома [87Ta] и затем, в 1999 г., был опубликован пятый том, содержащий ревизованные оценки для 30 выбранных радионуклидов [99Be]. Эта работа была продолжена, и три тома были опубликованы как *Monographie* BIPM-5 [04Be, 06Be, 08Be, 10Be, 11Be].

В дополнение в LNHB была развита компьютерная форма Table de Radionucléides (программа NUCLEIDE) с тем, чтобы обеспечить более простое обновление и дополнение данных и, очевидно, также с целью предложить пользователю более легкий доступ к ядерным и атомным данным распада путем "нажатия кнопки".

Цель настоящего издания - дать рекомендованные данные для нуклидов, представляющих специфический интерес для метрологии или практических приложений, таких как ядерная медицина, мониторинг, реакторная защита и др.

Первичные рекомендованные данные включают периоды полураспада, виды распада, характеристики X- и гамма-излучений, электронных излучений, альфа- и бета-переходов и излучений и погрешности величин этих характеристик. В книге дан полный список литературы, использованной для оценок.

Для того чтобы обновить данные по нуклидам, уже имеющимся в Table de Radionucléides, и добавить новые оценки, Национальная лаборатория им. Анри Беккереля (LNHB, Франция) и Физико-Технический Институт (PTB, Германия) заключили кооперативное соглашение. К ним затем присоединились Национальная лаборатория прикладных и экологических исследований Айдахо (INEEL, США), Лоуренсовская Национальная Лаборатория Беркли (LBNL, США) и Радиевый институт им. В.Г. Хлопина (KRI, Россия). Это международное сотрудничество основано на неформальном соглашении. Первоначальная работа состояла в обсуждении и принятии согласованной методологии, которая должна быть использована в этих оценках. Данные и связанные с ними погрешности были оценены с использованием всех имеющихся в распоряжении результатов экспериментов и с учетом теоретических рассмотрений.

Настоящий том представляет собой шестой выпуск *Monographie* BIPM-5.

РЕКОМЕНДОВАННЫЕ ЗНАЧЕНИЯ И ПОГРЕШНОСТИ

Основные шаги для оценки данных и их погрешностей следующие:

- критический анализ всех имеющихся оригинальных публикаций, чтобы принять или отвергнуть данное значение и его погрешность, приведенную к комбинированному стандартному отклонению;

- определение лучшего значения, которое является взвешенным или невзвешенным средним сохраненных величин; выбор взвешенного или невзвешенного среднего определяется анализом величины χ^2. В случае среднего взвешенного вес каждого оригинального результата ограничивается 50 %. В качестве итоговой погрешности (u_c) принимается большая из двух погрешностей среднего взвешенного: внутренней и внешней. Для расходящегося набора данных она может быть расширена, чтобы перекрыть самое точное входное значение.

Для некоторых применений может оказаться необходимым расширенная погрешность (U), выраженная как: $U(y) = k \times u_c(y)$, где k - коэффициент перекрытия. Для этой публикации принято $k = 1$.

Значение погрешности, в скобках, приводится в единицах последней значащей цифры, т.е.:
9,230 (11) означает 9,230 ± 0,011 и
9,2 (11) 9,2 ± 1,1

Если значение величины дается без погрешности, она считается сомнительной и приводится для информации. Такие величины часто оценивались из схемы распада под рубрикой "порядка".

Информацию о процедурах оценки можно получить из публикаций [85Zi, 96He, 99In] или непосредственно от авторов.
Информация о смысле физических величин может быть получена из [99In].

НУМЕРАЦИЯ

Ядерные уровни произвольно пронумерованы от 0 для основного состояния до *n* для n-ого возбужденного уровня. Все переходы обозначаются по их начальному и конечному уровням.
Для слабых переходов, не показанных стрелкой в схеме распада, начальный и конечный уровни обозначаются как (-1, *n*).
Для гамма-излучения с энергией 511 кэВ, которое следует за бета-плюс распадом, принято обозначение (-1, -1).

ЕДИНИЦЫ

Рекомендованные значения выражены:

- для периодов полураспада:

. в секундах для $T_{1/2} \leq 60$ секунд	s
. в минутах для $T_{1/2} > 60$ секунд	min
. в часах для $T_{1/2} > 60$ минут	h
. в сутках для $T_{1/2} > 24$ часов	d
. в годах для $T_{1/2} > 365$ суток	a

1 год = 365,242198 суток = 31 556 926 секунд

- для вероятностей переходов и числа испускаемых частиц значения даны на 100 распадов;

- для энергий значения выражены в килоэлектронвольтах (keV).

ПРИМЕЧАНИЕ

Этот выпуск подготовлен в 2013 г. Новые оценки и обновленные результаты можно найти на сайте:
http://www.nucleide.org/NucData.htm
http://www.bipm.org/en/publications/monographie-ri-5.html

TABLA DE RADIONUCLEIDOS

INTRODUCCION

El Laboratorio Nacional Henri Becquerel (LNHB) inició en 1974 el estudio de datos nucleares y atómicos que caracterizan la desintegración de radionucleidos. Esas evaluaciones han permitido la publicación de cuatro volúmenes de la Tabla de Radionucleidos [87Ta, 99Be]. Este nuevo volumen es el siguiente en la continuación del estudio precedente *Monographie* BIPM-5 [04Be, 06Be, 08Be, 10Be, 11Be].

Para facilitar la corrección de nueva información y mejorar la comodidad de consulta a los lectores, el LNHB a creado una base de datos informatizada. El programa NUCLEIDE permite el acceso a la Tabla de Radionucleidos con la ayuda de menues en cascada disponibles con un simple « clic ».

El objetivo de la Tabla de Radionucleidos es el de proporcionar información sobre un número limitado de radionucleidos utilizados en el campo de la metrología o en otras disciplinas (medicina nuclear, medio ambiente, ciclo del combustible,etc.)

Los datos recomendados incluyen : el período de semidesintegración, los modos de desintegración, las emisiones α, β, γ, X y de electrones atómicos asociados a las mismas.

Con el propósito de actualizar y agregar nuevas evaluaciones rapidamente el *Laboratoire National Henri Becquerel* (LNHB, Francia) y el *Physikalisch-Technische Bundesanstalt* (PTB , Alemania) establecieron un acuerdo de colaboración. Posteriormente se unieron el *Idaho National Engineering & Environmental Laboratory* (INEEL, USA), *Lawrence Berkeley National Laboratory* LBNL, USA) y *Khlopin Radium Institute* (KRI, Rusia). El primer trabajo de esta colaboración internacional fue el de establecer el método y las reglas comunes de evaluación. Las evaluaciones proponen valores recomendados e incertidumbres asociadas. Éstos valores han sido evaluados a partir de datos experimentales. En su ausencia, los valores se obtienen por cálculos teóricos. Todas las referencias utilizadas para la evaluación de un radionucleido se citan al final de cada capítulo.

VALORES RECOMENDADOS E INCERTIDUMBRES

Las principales etapas para evaluar datos con sus incertidumbres son:

- Un análisis crítico de todas las publicaciones disponibles con el fin de obtener un valor con su incertidumbre, considerada como incertidumbre típica combinada.
- La determinación de un valor recomendado que es, según el caso, una media simple o ponderada de valores obtenidos de publicaciones. Ésto se decide tras el chi-cuadrado reducido. En el caso de una media ponderada para conjuntos de valores discrepantes, el peso estadístico relativo de cada valor es limitado al 50 %. La incertidumbre, $\boldsymbol{u_c}$, es el mayor de los valores de las incertidumbres interna o externa. En el caso de conjuntos de valores discrepantes, este valor puede ser extendido con el fin de incluir el valor experimental más preciso.

Para ciertas aplicaciones, es necesario definir una incertidumbre expandida, llamada $\boldsymbol{U}$:
$\boldsymbol{U}(y) = k \times \boldsymbol{u_c}(y)$ donde k es el factor de cobertura.
El valor de k utilizado en esta publicación es: $k = 1$.

Los valores de incertidumbres indicados entre paréntesis corresponden a las últimas cifras significativas, por ejemplo:
9,230 (11) significa 9,230 ± 0,011 y
9,2 (11) significa 9,2 ± 1,1

Valores dados sin incertidumbres se consideran dudosos (usualmente se presentan como valores aproximados, y a menudo estimados a partir de los esquemas de desintegración).
Para más información sobre las técnicas de evaluación consultar [85Zi], [96He], [99In] o directamente con el autor.

NUMERACION

Los niveles de un núcleo están arbitrariamente numerados desde “0” (para el nivel fundamental), hasta “*n*” para el enésimo nivel excitado. Las transiciones se representan por sus niveles inicial y final.
En el caso de una transición débil e imposible de situar en el esquema de desintegración, el nivel inicial y el final están designados con la siguiente notación: (-1, *n*).
En el caso de una emisión γ de 511 keV que sigue a una desintegración β^+, la notación adoptada es: (-1, -1).

UNIDADES

Los valores recomendados se dan:
- para los períodos de semidesintegración:

	Símbolo
. en segundos para $T_{1/2} \leq 60$ segundos	s
. en minutos para $T_{1/2} > 60$ segundos	min
. en horas para $T_{1/2} > 60$ minutos	h
. en días para $T_{1/2} > 24$ horas	d
. en años para $T_{1/2} > 365$ días	a

1 año = 365,242 198 días = 31 556 926 segundos;

- para las probabilidades de transición y número de partículas emitidas, los valores se dan por 100 desintegraciones;
- para las energías, los valores se expresan en keV.

ADVERTENCIA

Este documento ha sido imprimido en el 2013. Para obtener todas las nuevas evaluaciones actualizadas ulteriormente, el lector deberá referirse a los documentos disponibles en:
http://www.nucleide.org/NucData.htm
http://www.bipm.org/en/publications/monographie-ri-5.html

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[11Be] **Marie-Martine BÉ, Vanessa CHISTÉ, Christophe DULIEU, Xavier MOUGEOT, Valery CHECHEV, Nikolay KUZMENKO, Filip G. KONDEV, Aurelian LUCA, Mónica GALÁN, Arzu ARINC, Xiaolong HUANG, B. WANG, Alan NICHOLS.** Table of Radionuclides, Monographie BIPM-5, vol.6, ISBN 13 978-92-822-2242-3 (Vol. 6) et 13 978-92-822-2243-0 (CD-Rom), CEA/LNE-LNHB, 91191 Gif-sur-Yvette, France and BIPM, Pavillon de Breteuil, 92312 Sèvres, France.
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Toutes demandes de renseignements concernant les données recommandées et la façon dont elles ont été établies doivent être adressées directement aux auteurs des évaluations.

Information on the data and the evaluation methods is available from the authors listed below.

Informationen über die Daten und Evaluationsprozeduren können bei den im folgenden zusammengestellten Autoren angefordert werden:

Todos los pedidos de información relativos a datos recomendados y la manera de establecerlos deben dirigirse directamente a los autores de las evaluaciones.

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List of radionuclides included in:

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* : updated evaluations

Volume 6 - A = 41 to 242

* : updated evaluations

Volume 5 - A = 22 to 244

* : updated evaluations

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Volume 4 - A = 133 to 252

* : updated evaluations

Volume 3 - A = 3 to 244

* : updated evaluations

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* : updated evaluations

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(Volumes 1 to 7 – All nuclides sorted by alphabetical order)

* : updated evaluations

$$\boxed{^{14}_{6}\mathrm{C}_{8}}$$

1 Decay Scheme

C-14 disintegrates 100 % by beta-minus transition to the ground state of the stable nuclide N-14.
Le carbone 14 se désintègre exclusivement par émission bêta moins vers le niveau fondamental d'azote 14.

2 Nuclear Data

$T_{1/2}(^{14}\mathrm{C})$: 5700 (30) a
$Q^{-}(^{14}\mathrm{C})$: 156,476 (4) keV

2.1 β^{-} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{-}_{0,0}$	156,476 (4)	100	Allowed	9,04

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
$\beta^{-}_{0,0}$	max:	156,476 (4)	100
$\beta^{-}_{0,0}$	avg:	49,16 (1)	

4 Main Production Modes

N – 14(n,p)C – 14
Possible impurities : none

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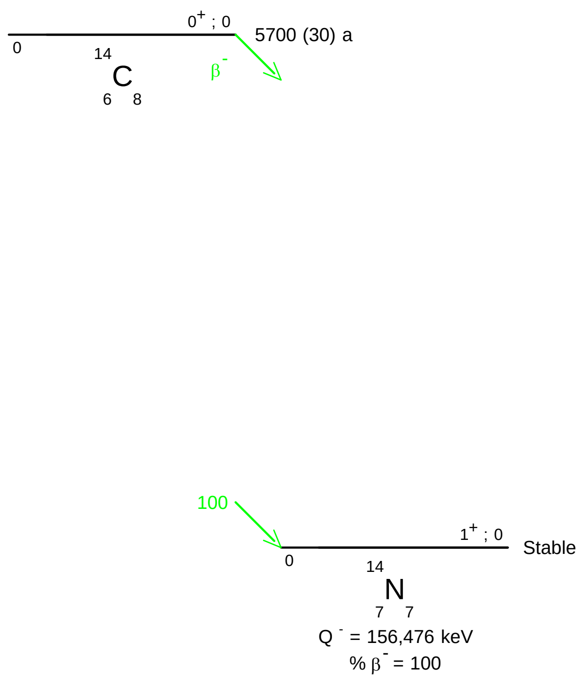
0+ ; 0
5700 (30) a
0
14 C 6 8
β-
100
1+ ; 0
Stable
0
14 N 7 7
Q - = 156,476 keV
% β- = 100

$$^{\mathbf{35}}_{16}\mathrm{S}_{19}$$

1 Decay Scheme

S-35 disintegrates 100% by beta-minus decay to the ground state of the stable nuclide Cl-35.
Le soufre 35 se désintègre à 100% par émission bêta moins vers le niveau fondamental de clore 35.

2 Nuclear Data

$T_{1/2}$(^{35}S) : 87,25 (15) d
Q^{-}(^{35}S) : 167,33 (3) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,0}$	167,33 (3)	100	Allowed	5,01

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
$\beta^-_{0,0}$	max:	167,33 (3)	100
$\beta^-_{0,0}$	avg:	48,79 (1)	

4 Main Production Modes

S – 34(n,γ)S – 35
Possible impurities : none

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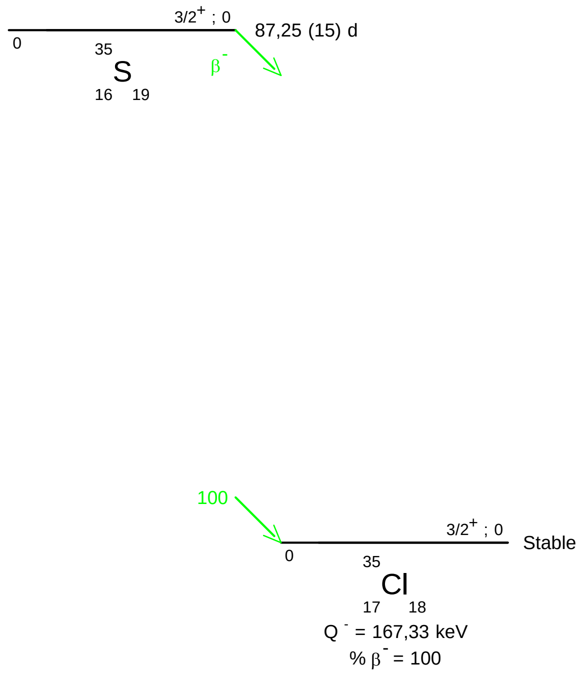
3/2+ ; 0
87,25 (15) d
0
35
S
16 19
β-
100
3/2+ ; 0
Stable
0
35
Cl
17 18
Q - = 167,33 keV
% β- = 100

$^{\mathbf{36}}_{17}\mathrm{Cl}_{19}$

1 Decay Scheme

Cl-36 disintegrates by 98.1 % beta-minus decay to the ground state of Ar-36 ; 1.9 % electron capture and 0.0015 % beta-plus decay to the ground state of S-36.
Le clore 36 se désintègre pour 98,1 % par emission bêta moins vers le niveau fondamental d'argon 36 et par capture électronique (1,9 %) et émission bêta plus (0,0015 %) vers le niveau fondamental de soufre 36.

2 Nuclear Data

$T_{1/2}(^{36}\mathrm{Cl})$	:	302	(4)	10^3 a
$Q^-(^{36}\mathrm{Cl})$	:	709,55	(5)	keV
$Q^+(^{36}\mathrm{Cl})$	:	1142,14	(19)	keV

2.1 β^+ Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^+_{0,0}$	120,14 (19)	0,00157 (30)	2nd Forbidden	14,5

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,0}$	1142,14 (19)	1,9 (1)	2nd Forbidden	13,5	0,904 (5)	0,086 (4)	0,010 (1)

2.3 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,0}$	709,53 (5)	98,1 (1)	2nd Forbidden	13,3

3 Atomic Data

3.1 S

ω_K : 0,0804 (19)
n_{KL} : 1,807 (7)

3.1.1 X Radiations

		Energy keV		Relative probability
$\mathrm{X_K}$				
	$\mathrm{K}\alpha_2$	2,3066		50,5
	$\mathrm{K}\alpha_1$	2,3078		100
	$\mathrm{K}\beta_3$	2,457	}	
	$\mathrm{K}\beta_5''$		}	9,3

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	1,98 – 2,12	100
KLX	2,22 – 2,30	12,4
KXY	2,44 – 2,46	0,38

3.2 Ar

ω_K : 0,120 (3)
n_{KL} : 1,697 (6)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	2,9553		50,5
	$K\alpha_1$	2,9577		100
	$K\beta_3$	3,1905	}	
	$K\beta_5''$		}	16,2

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	2,511 – 2,669	100
KLX	2,831 – 2,942	21,6
KXY	3,149 – 3,174	1,16

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(S)	-		0,163 (12)
e_{AK}	(S)			1,58 (9)
	KLL	1,98 - 2,12	}	
	KLX	2,22 - 2,30	}	
	KXY	2,44 - 2,46	}	
e_{AK}	(Ar)			0,13 (2)
	KLL	2,511 - 2,669	}	
	KLX	2,831 - 2,942	}	
	KXY	3,149 - 3,174	}	
$\beta^+_{0,0}$	max:	120,14 (19)		0,00157 (30)
$\beta^+_{0,0}$	avg:	54 (4)		
$\beta^-_{0,0}$	max:	709,53 (5)		98,1 (1)
$\beta^-_{0,0}$	avg:	316 (16)		

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XKα_2	(S)	2,3066		0,044 (3)	} Kα
XKα_1	(S)	2,3078		0,086 (5)	}
XKβ_3	(S)	2,457	}		
XKβ_1	(S)		}	0,008 (1)	$\mathrm{K}'\beta_1$
XKα_2	(Ar)	2,9553		0,0062 (10)	} Kα
XKα_1	(Ar)	2,9577		0,0123 (19)	}
XKβ_3	(Ar)	3,1905	}		
XKβ_1	(Ar)		}	0,0020 (3)	$\mathrm{K}'\beta_1$

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma^{\pm}$	511	0,0031 (6)

6 Main Production Modes

Cl – 35(n,γ)Cl – 36

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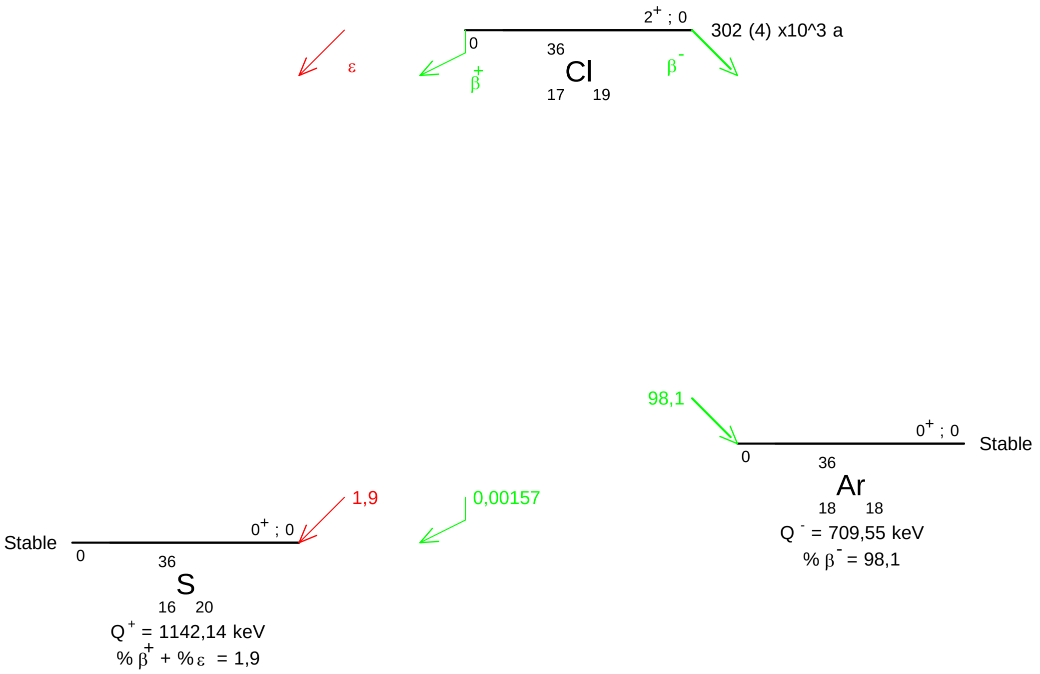
2+ ; 0
302 (4) x10^3 a
0
36
Cl
17 19
ε
β+
β-
98,1
0+ ; 0
Stable
0
36
Ar
18 18
Q - = 709,55 keV
% β- = 98,1
1,9
0,00157
Stable
0+ ; 0
0
36
S
16 20
Q+ = 1142,14 keV
% β+ + % ε = 1,9

$$^{\mathbf{37}}_{18}\mathrm{Ar}_{19}$$

1 Decay Scheme

Ar-37 decays 100% by electron capture to the ground state of Cl-37.
L'argon se désintègre par capture électronique vers le niveau fondamental de clore 37.

2 Nuclear Data

$T_{1/2}(^{37}\mathrm{Ar})$: 35,01 (2) d
$Q^{+}(^{37}\mathrm{Ar})$: 813,87 (20) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,0}$	813,87 (20)	100	Allowed	5,1	0,9021 (24)	0,0872 (20)	0,0106 (7)

3 Atomic Data

3.1 Cl

ω_K : 0,0989 (24)
$\bar{\omega}_L$: 0,00118 (24)
n_{KL} : 1,751 (6)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	2,6208		50,56
	$K\alpha_1$	2,62241		100
	$K\beta_1$	2,8156	}	
	$K\beta_5''$		}	12,95
X_L				
	$L\ell$	0,1833		
	$L\beta$	– 0,2681		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	2,241 – 2,384	100
KLX	2,535 – 2,616	17,2
KXY	2,787 – 2,809	0,74
Auger L	0,165 – 0,257	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Cl)	0,165 - 0,257		166,5 (8)
e_{AK}	(Cl)			81,3 (3)
	KLL	2,241 - 2,384	}	
	KLX	2,535 - 2,616	}	
	KXY	2,787 - 2,809	}	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Cl)	0,1833 — 0,2681		0,20 (4)	
XKα_2	(Cl)	2,6208		2,76 (7)	} Kα
XKα_1	(Cl)	2,62241		5,46 (14)	}
XKβ_1	(Cl)	2,8156	}	0,71 (4)	K$'\beta_1$

6 Main Production Modes

Cl – 37(p,n)Ar – 37

Cl – 37(d,2n)Ar – 37

S – 34(α,3n)Ar – 37

K – 39(d,α)Ar – 37

Ca – 40(n,α)Ar – 37

Ar – 36(n,γ)Ar – 37 σ : 0,430 (6) barns

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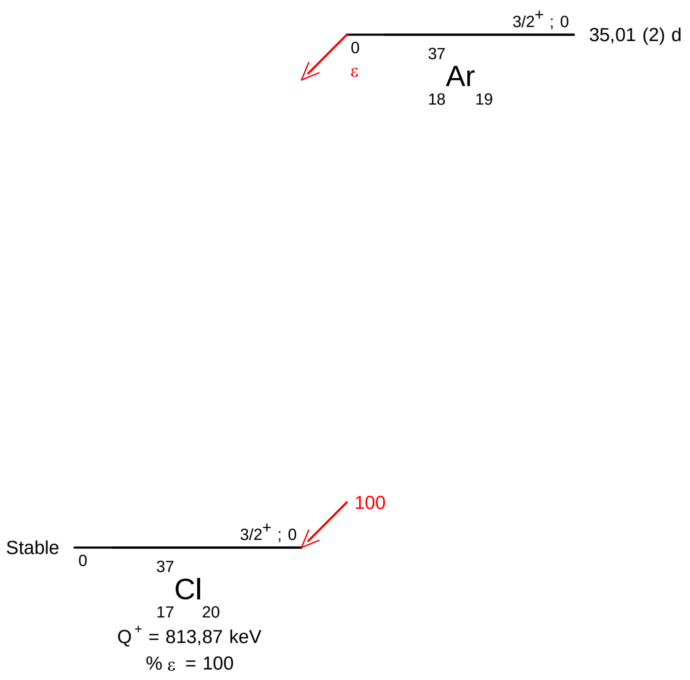
3/2+ ; 0
35,01 (2) d
0
ε
37 Ar 18 19
100
Stable
3/2+ ; 0
0
37 Cl 17 20
Q+ = 813,87 keV
% ε = 100

$^{45}_{20}\mathrm{Ca}_{25}$

1 Decay Scheme

Le calcium 45 se désintègre par émission bêta moins principalement vers le niveau fondamental de scandium 45.
Ca-45 disintegrates by beta minus emission to the Sc-45 ground state mainly.

2 Nuclear Data

$T_{1/2}$(^{45}Ca) : 162,64 (11) d
Q^-(^{45}Ca) : 258,0 (7) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,1}$	245,6 (7)	0,0020 (7)	Unique 1st Forbidden	10,3
$\beta^-_{0,0}$	258,0 (7)	99,9980 (7)	Allowed	6

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Sc)	12,40 (5)	0,0020 (7)	M2	362 (8)	53,4 (12)	6,63 (15)	423 (9)

3 Electron Emissions

		Energy keV	Electrons per 100 disint.
$ec_{1,0\ K}$	(Sc)	7,90 (5)	0,0017 (6)
$\beta^-_{0,1}$	max:	245,6 (7)	0,0020 (7)
$\beta^-_{0,1}$	avg:	91,7 (7)	
$\beta^-_{0,0}$	max:	258,0 (7)	99,9980 (7)
$\beta^-_{0,0}$	avg:	76,8 (7)	

4 Main Production Modes

Ca – 44(n,γ)Ca – 45 σ : 0,88 (5) barns
Possible impurities : Ca – 47

Sc – 45(n,p)Ca – 45
Possible impurities : Sc – 44, Sc – 44m, Sc – 46, K – 42

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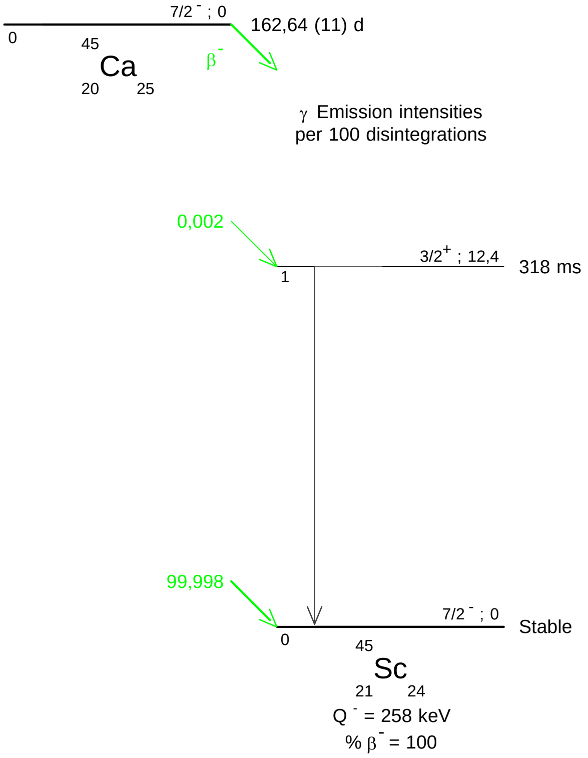
7/2 - ; 0
0
45
Ca
20 25
β -
162,64 (11) d
γ Emission intensities
per 100 disintegrations
0,002
3/2+ ; 12,4
1
318 ms
99,998
7/2 - ; 0
0
Stable
45
Sc
21 24
Q - = 258 keV
% β - = 100

$^{67}_{31}\mathrm{Ga}_{36}$

1 Decay Scheme

Ga-67 disintegrates by 100 % electron capture to the excited levels of 887,7 keV, 393,5 keV, 184,6 keV, 93,3 keV and the ground state level of the stable Zn-67.

Le gallium 67 se désintègre à 100% par capture électronique vers les niveaux excités de 887,7 keV, 393,5 keV, 184,6 keV et 93,3 keV, ainsi que vers le niveau fondamental du zinc 67.

2 Nuclear Data

$T_{1/2}(^{67}\mathrm{Ga})$: 3,2613 (5) d
$Q^{+}(^{67}\mathrm{Ga})$: 1000,8 (12) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,4}$	113,1 (12)	0,280 (8)	Allowed	5,648	0,8680 (17)	0,1119 (14)	0,0188 (5)
$\epsilon_{0,3}$	607,3 (12)	23,60 (47)	Allowed	5,239	0,8824 (15)	0,0999 (12)	0,0165 (4)
$\epsilon_{0,2}$	816,2 (12)	22,3 (27)	Allowed	5,523	0,8832 (15)	0,0993 (12)	0,0164 (4)
$\epsilon_{0,1}$	907,5 (12)	50,5 (17)	Allowed	5,261	0,8834 (15)	0,0991 (12)	0,0164 (4)
$\epsilon_{0,0}$	1000,8 (12)	3,3 (32)	Allowed	6,532	0,8836 (15)	0,0989 (12)	0,0164 (4)

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K (10^{-4})	α_L (10^{-4})	α_M (10^{-4})	α_T (10^{-4})
$\gamma_{2,1}$(Zn)	91,263 (15)	3,37 (24)	M1+1,5(6)%E2	810 (50)	87 (7)	12,5 (9)	910 (60)
$\gamma_{1,0}$(Zn)	93,307 (12)	70,6 (16)	E2	7480 (110)	922 (13)	130,0 (19)	8540 (120)
$\gamma_{2,0}$(Zn)	184,577 (17)	21,30 (27)	M1+8,8(36)%E2	151 (19)	15,8 (20)	2,3 (3)	169 (21)
$\gamma_{3,2}$(Zn)	208,939 (15)	2,40 (6)	M1+0,18(14)%E2	80,6 (13)	8,27 (13)	1,186 (19)	90,1 (14)
$\gamma_{3,1}$(Zn)	300,233 (21)	16,67 (45)	M1+3,07(33)%E2	34,8 (6)	3,54 (6)	0,508 (8)	38,8 (6)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K (10^{-4})	α_L (10^{-4})	α_M (10^{-4})	α_T (10^{-4})
$\gamma_{3,0}$(Zn)	393,529 (20)	4,60 (12)	M1+0,26(16)%E2	17,28 (25)	1,748 (25)	0,251 (4)	19,3 (3)
$\gamma_{4,3}$(Zn)	494,145 (28)	0,0667 (31)	M1+1,2(7)%E2	10,30 (16)	1,038 (17)	0,1488 (24)	11,49 (18)
$\gamma_{4,2}$(Zn)	703,11 (8)	0,0113 (9)	M1+0,8(5)%E2	4,70 (7)	0,470 (7)	0,0674 (10)	5,24 (8)
$\gamma_{4,1}$(Zn)	794,405 (41)	0,053 (6)	E2+0,8(19)%M3	4,8 (5)	0,49 (6)	0,070 (8)	5,4 (6)
$\gamma_{4,0}$(Zn)	887,682 (33)	0,1493 (48)	M1+47,4(47)%E2	3,18 (6)	0,318 (6)	0,0456 (8)	3,54 (7)

2.3 Zn

ω_K : 0,486 (4)
$\bar{\omega}_L$: 0,0108 (4)
n_{KL} : 1,326 (4)

2.3.1 X Radiations

		Energy keV		Relative probability
X_K				
	Kα_2	8,61587		51,42
	Kα_1	8,63896		100
	Kβ_1	9,5721	}	
	Kβ_5''	9,6499	}	21,46
	Kβ_2	9,6581	}	
X_L				
	Lℓ	0,8836		
	Lα	1,0119 – 1,0122		
	Lη	0,9065		
	Lβ	1,02044 – 1,1861		
	Lγ	1,04333 – 1,04333		

2.3.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	7,21 – 7,55	100
KLX	8,31 – 8,63	28,3
KXY	9,39 – 9,65	2,01
Auger L	0,732 – 0,997	361,7

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Zn)	0,732 - 0,997		167,5 (21)
e_{AK}	(Zn)			60,4 (21)
	KLL	7,21 - 7,55	}	
	KLX	8,31 - 8,63	}	
	KXY	9,39 - 9,65	}	
$ec_{2,1\ K}$	(Zn)	81,604 (15)		0,250 (16)
$ec_{1,0\ K}$	(Zn)	83,651 (5)		28,4 (7)
$ec_{1,0\ L}$	(Zn)	92,116 - 93,290		3,55 (9)
$ec_{1,0\ M}$	(Zn)	93,174 - 93,302		0,522 (13)
$ec_{2,0\ K}$	(Zn)	174,918 (17)		0,316 (40)
$ec_{3,1\ K}$	(Zn)	290,558 (10)		0,060 (3)

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Zn)	0,8836 — 1,1861		1,75 (5)	
XKα_2	(Zn)	8,61587		17,0 (6)	} Kα
XKα_1	(Zn)	8,63896		33,0 (12)	}
XKβ_1	(Zn)	9,5721	}	7,08 (26)	Kβ_1'
XKβ_5''	(Zn)	9,6499	}		
XKβ_2	(Zn)	9,6581	}		
XKβ_4	(Zn)		}		Kβ_2'

4.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Zn)	91,263 (15)	3,09 (7)
$\gamma_{1,0}$(Zn)	93,307 (12)	38,1 (7)
$\gamma_{2,0}$(Zn)	184,577 (17)	20,96 (44)
$\gamma_{3,2}$(Zn)	208,939 (15)	2,37 (5)

	Energy keV	Photons per 100 disint.
$\gamma_{3,1}$(Zn)	300,232 (21)	16,60 (37)
$\gamma_{3,0}$(Zn)	393,528 (20)	4,59 (10)
$\gamma_{4,3}$(Zn)	494,143 (28)	0,0666 (29)
$\gamma_{4,2}$(Zn)	703,11 (8)	0,0113 (9)
$\gamma_{4,1}$(Zn)	794,400 (41)	0,0528 (17)
$\gamma_{4,0}$(Zn)	887,676 (33)	0,1492 (38)

5 Main Production Modes

$$\left\{\begin{array}{l}\mathrm{Zn-67(p,n)Ga-67} \qquad \sigma : 640 \ \ \mathrm{barns}\\ \text{Possible impurities : } \ \mathrm{Ga-66}\end{array}\right.$$

$$\left\{\begin{array}{l}\mathrm{Zn-67(d,2n)Ga-67}\\ \text{Possible impurities : } \ \mathrm{Ga-66}\end{array}\right.$$

Zn – 68(p,2n)Ga – 67

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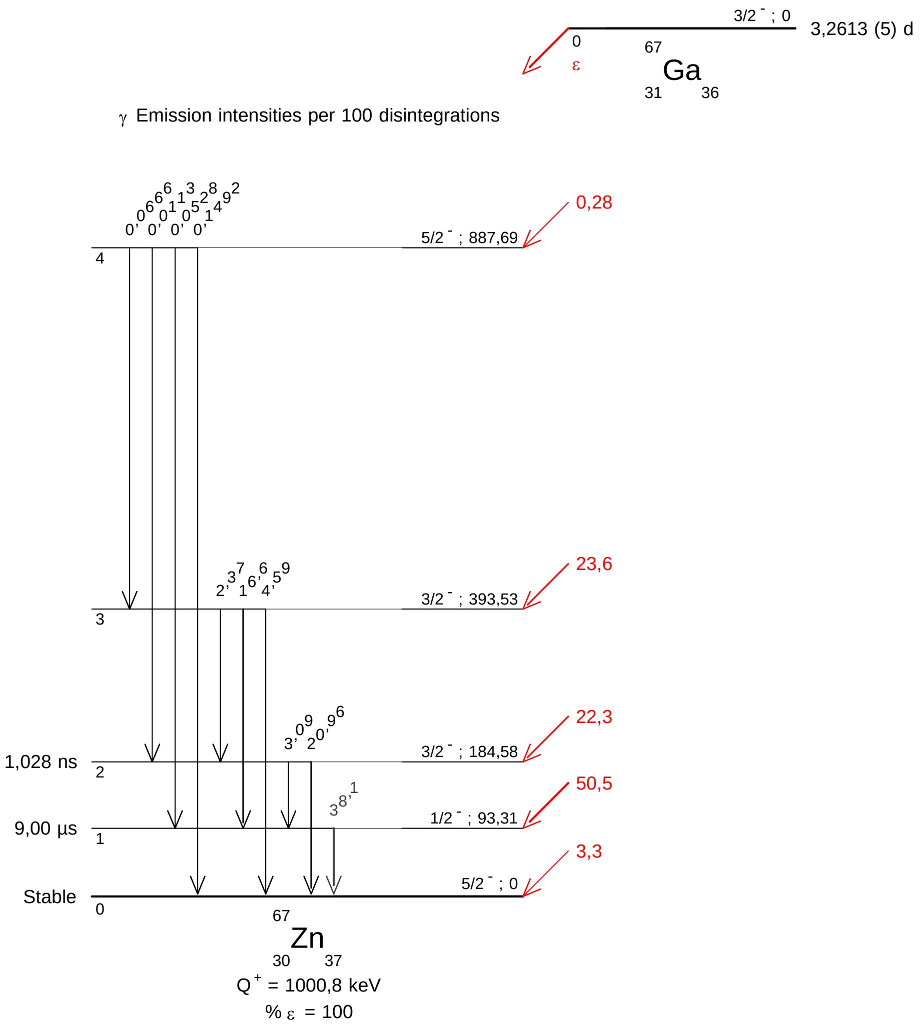
3/2 - ; 0
3,2613 (5) d
0
ε
67 Ga 31 36
γ Emission intensities per 100 disintegrations
0,0666
0,0113
0,0528
0,1492
0,28
5/2 - ; 887,69
4
2,37
16,6
4,59
23,6
3/2 - ; 393,53
3
3,09
20,96
22,3
1,028 ns
2
3/2 - ; 184,58
38,1
50,5
9,00 µs
1
1/2 - ; 93,31
3,3
Stable
0
5/2 - ; 0
67 Zn 30 37
Q+ = 1000,8 keV
% ε = 100

$^{68}_{31}\mathrm{Ga}_{37}$

1 Decay Scheme

Ga-68 disintegrates by positron emission (88.88 (41) %) and electron capture (11.11 (41) %) into Zn-68. Besides the main g(1,0) transition, there are 13 weak gamma transitions from 5 excited levels in Zn-68.
Le gallium 68 se désintègre par émission bêta plus (88,88 (41) %) et par capture électronique (11,11 (41) %) vers le zinc 68.

2 Nuclear Data

$T_{1/2}(^{68}\mathrm{Ga})$: 67,83 (20) min
$Q^{+}(^{68}\mathrm{Ga})$: 2921,1 (12) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,5}$	99,3 (12)	0,0104 (5)	Allowed	5,1	0,8653 (18)	0,1141 (17)	0,0192 (5)
$\epsilon_{0,4}$	582,7 (12)	0,096 (3)	Allowed	5,7	0,8823 (16)	0,1000 (15)	0,0166 (5)
$\epsilon_{0,3}$	1037,9 (12)	0,234 (5)	Allowed	5,9	0,8836 (15)	0,0989 (14)	0,0164 (5)
$\epsilon_{0,2}$	1265,2 (12)	0,0335 (23)	Allowed	6,9	0,8839 (15)	0,0986 (14)	0,0163 (5)
$\epsilon_{0,1}$	1843,7 (12)	1,80 (5)	Allowed	5,5	0,8844 (15)	0,0983 (14)	0,0162 (5)
$\epsilon_{0,0}$	2921,1 (12)	8,94 (41)	Allowed	5,2	0,8847 (15)	0,0980 (12)	0,0162 (4)

2.2 β^{+} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{+}_{0,2}$	243,2 (12)	0,00026 (2)	Allowed	
$\beta^{+}_{0,1}$	821,7 (12)	1,20 (4)	Allowed	
$\beta^{+}_{0,0}$	1899,1 (12)	87,68 (41)	Allowed	

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Zn)	227,31 (15)	0,00012 (5)	E2	0,0268 (4)	0,00286 (4)	0,000406 (6)	0,0300 (5)
$\gamma_{5,4}$(Zn)	483,35 (16)	0,000265 (29)	M1+50(25)%E2	0,0015 (3)	0,00016 (3)	0,000022 (4)	0,0017 (3)
$\gamma_{2,1}$(Zn)	578,52 (13)	0,0343 (23)	E2	0,001139 (16)	0,0001160 (17)	0,0000166 (3)	0,001272 (18)
$\gamma_{4,2}$(Zn)	682,57 (16)	0,000314 (20)	E2	0,000707 (10)	0,0000716 (10)	0,0000103 (2)	0,000789 (11)
$\gamma_{3,1}$(Zn)	805,84 (8)	0,0928 (27)	M1+70(1)%E2	0,000421 (6)	0,0000424 (7)	0,00000607 (9)	0,000470 (7)
$\gamma_{5,3}$(Zn)	938,62 (20)	0,000178 (16)	M1+33(8)%E2	0,000272 (11)	0,0000272 (11)	0,0000039 (2)	0,000304 (12)
$\gamma_{1,0}$(Zn)	1077,35 (5)	3,236 (30)	E2	0,000221 (4)	0,0000222 (4)	0,00000318 (5)	0,000247 (4)
$\gamma_{5,2}$(Zn)	1165,93 (15)	0,000016 (10)	E2	0,000185 (3)	0,0000185 (3)	0,00000265 (4)	0,000211 (3)
$\gamma_{4,1}$(Zn)	1261,09 (9)	0,0954 (21)	M1+2,2(1)%E2	0,0001418 (20)	0,00001409 (20)	0,00000202 (3)	0,0001725 (25)
$\gamma_{2,0}$(Zn)	1655,87 (14)		E0				
$\gamma_{5,1}$(Zn)	1744,44 (13)	0,0096 (5)	M1+6,9(1)%E2	0,0000770 (11)	0,00000763 (11)	0,00000109 (2)	0,000241 (4)
$\gamma_{3,0}$(Zn)	1883,19 (6)	0,1420 (35)	E2	0,0000697 (10)	0,00000691 (10)	0,00000099 (2)	0,000333 (5)
$\gamma_{4,0}$(Zn)	2338,48 (8)	0,00113 (16)	E2	0,0000471 (7)	0,00000467 (7)	0,00000067 (1)	0,000529 (8)
$\gamma_{5,0}$(Zn)	2821,79 (14)	0,000466 (36)	E2	0,0000343 (5)	0,00000339 (5)	0,000000486 (7)	0,000740 (11)

3 Atomic Data

3.1 Zn

ω_K	:	0,486	(4)
$\bar{\omega}_L$	:	0,0108	(4)
n_{KL}	:	1,326	(4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	8,61587		51,42
	$K\alpha_1$	8,63896		100
	$K\beta_1$	9,5721	}	
	$K\beta_5''$	9,6499	}	21,46
X_L				
	$L\ell$	0,884		
	$L\alpha$	1,012 – 1,012		
	$L\eta$	0,906		
	$L\beta$	1,02 – 1,186		
	$L\gamma$	1,043 – 1,043		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	7,21 – 7,55	100
KLX	8,31 – 8,63	28,3
KXY	9,39 – 9,65	2,01
Auger L	0,732 – 0,997	360

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Zn)	0,732 - 0,997		13,98 (19)
e_{AK}	(Zn)			5,05 (20)
	KLL	7,21 - 7,55	}	
	KLX	8,31 - 8,63	}	
	KXY	9,39 - 9,65	}	
$\beta^+_{0,0}$	max:	1899,1	(12)	87,68 (41)
$\beta^+_{0,0}$	avg:	836,0	(6)	
$\beta^+_{0,1}$	max:	821,7	(12)	1,20 (4)
$\beta^+_{0,1}$	avg:	352,6	(6)	
$\beta^+_{0,2}$	max:	243,2	(12)	0,00026 (2)
$\beta^+_{0,2}$	avg:	107,6	(6)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Zn)	0,884 — 1,186		0,146 (4)	
XKα_2	(Zn)	8,61587		1,42 (6)	} Kα
XKα_1	(Zn)	8,63896		2,76 (11)	}
XKβ_1	(Zn)	9,5721	}	0,593 (24)	K$'\beta_1$
XKβ_5''	(Zn)	9,6499	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Zn)	227,31 (15)	0,000120 (49)
$\gamma_{5,4}$(Zn)	483,35 (16)	0,000265 (29)
$\gamma^{\pm}$	511	177,8 (8)
$\gamma_{2,1}$(Zn)	578,52 (13)	0,0343 (23)
$\gamma_{4,2}$(Zn)	682,57 (16)	0,000314 (20)
$\gamma_{3,1}$(Zn)	805,83 (8)	0,0928 (27)
$\gamma_{5,3}$(Zn)	938,61 (20)	0,000178 (16)
$\gamma_{1,0}$(Zn)	1077,34 (5)	3,235 (30)
$\gamma_{5,2}$(Zn)	1165,92 (15)	0,000016 (10)
$\gamma_{4,1}$(Zn)	1261,08 (9)	0,0954 (21)
$\gamma_{5,1}$(Zn)	1744,42 (13)	0,0096 (5)
$\gamma_{3,0}$(Zn)	1883,16 (6)	0,1420 (35)
$\gamma_{4,0}$(Zn)	2338,44 (8)	0,00113 (16)
$\gamma_{5,0}$(Zn)	2821,73 (14)	0,000466 (36)

6 Main Production Modes

Cu – 65(α,n)Ga – 68
Zn – 67(p,γ)Ga – 68
Zn – 68(p,n)Ga – 68
Ga – 69(d,t)Ga – 68
Ge – 70(d,α)Ga – 68
{ Ge – 68(E.C.)Ga – 68
Chemical separation after EC decay

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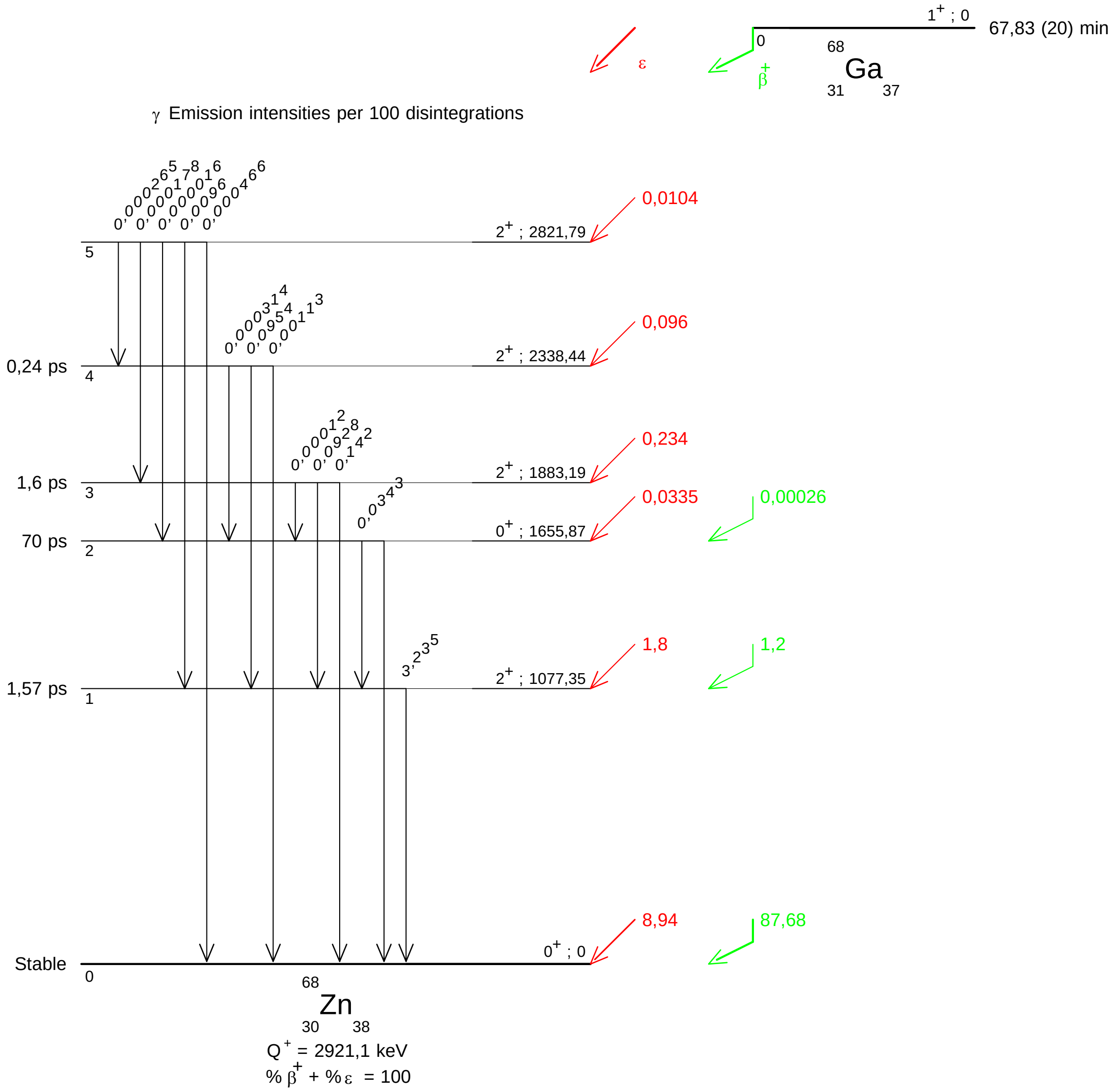
1^+ ; 0
67,83 (20) min
0
68
Ga
31 37
ε
β^+
γ Emission intensities per 100 disintegrations
0,000265
0,000178
0,000016
0,00096
0,000466
0,000314
0,0954
0,00113
0,00012
0,0928
0,142
0,0343
3,235
5
4
3
2
1
0
0,24 ps
1,6 ps
70 ps
1,57 ps
Stable
2^+ ; 2821,79
2^+ ; 2338,44
2^+ ; 1883,19
0^+ ; 1655,87
2^+ ; 1077,35
0^+ ; 0
0,0104
0,096
0,234
0,0335
1,8
8,94
0,00026
1,2
87,68
68
Zn
30 38
Q^+ = 2921,1 keV
% β^+ + % ε = 100

$^{\mathbf{68}}_{32}$Ge $_{36}$

1 Decay Scheme

Ge-68 disintegrates100 % by electron capture to the Ga-68 ground state which has a half-life of 67,8 min.
Le Ge-68 se désintègre à 100 % par capture électronique vers le niveau fondamental de Ga-68 qui a une période de 67,8 min.

2 Nuclear Data

$T_{1/2}(^{68}\text{Ge})$: 270,95 (26) d
$T_{1/2}(^{68}\text{Ga})$: 67,83 (20) min
$Q^{+}(^{68}\text{Ge})$: 106,9 (24) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_M
$\epsilon_{0,0}$	106,9 (24)	100	Allowed	5,006	0,8639 (24)	0,1150 (23)	0,0196 (5)

3 Atomic Data

3.1 Ga

ω_K : 0,517 (4)
$\bar{\omega}_L$: 0,0123 (4)
n_{KL} : 1,294 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	9,22495		51,46
	$K\alpha_1$	9,25184		100
	$K\beta_3$	10,2605	}	
	$K\beta_1$	10,2644	}	
	$K\beta_5''$	10,348	}	22,07
	$K\beta_2$	10,3664	}	
	$K\beta_4$		}	0,0013
X_L				
	$L\ell$	0,959		
	$L\alpha$	1,098 – 1,099		
	$L\eta$	0,985		
	$L\beta$	1,114 – 1,283		
	$L\gamma$	1,141 – 1,303		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	7,708 – 8,069	100
KLX	8,889 – 9,251	29,1
KXY	10,051 – 10,366	2,12
Auger L	0,8 – 1,3	384

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e$_{\mathrm{AL}}$	(Ga)	0,8 - 1,3		121,8 (7)
e$_{\mathrm{AK}}$	(Ga)			41,7 (5)
	KLL	7,708 - 8,069	}	
	KLX	8,889 - 9,251	}	
	KXY	10,051 - 10,366	}	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ga)	0,959 — 1,303		1,490 (24)	
XKα_2	(Ga)	9,22495		13,25 (15)	} Kα
XKα_1	(Ga)	9,25184		25,74 (26)	}
XKβ_3	(Ga)	10,2605	}		
XKβ_1	(Ga)	10,2644	}	5,65 (8)	K$'\beta_1$
XKβ_5''	(Ga)	10,348	}		
XKβ_2	(Ga)	10,3664	}		
XKβ_4	(Ga)		}	0,034 (9)	K$'\beta_2$

6 Main Production Modes

Zn – 66(α,2n)Ge – 68
Ga – 69(p,2n)Ge – 68
Nat.Ga(p,x)Ge – 68

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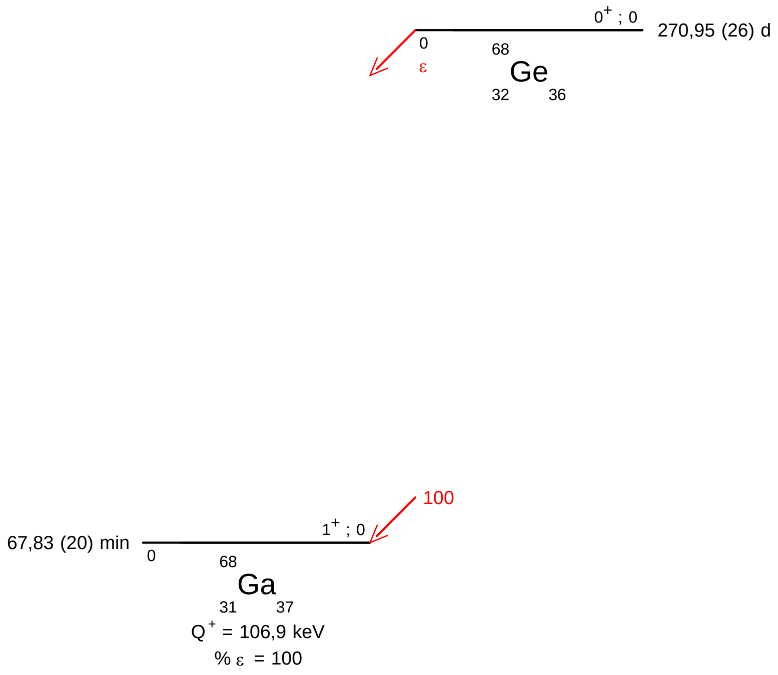
0+ ; 0
270,95 (26) d
0
ε
68
Ge
32
36
100
67,83 (20) min
1+ ; 0
0
68
Ga
31
37
Q+ = 106,9 keV
% ε = 100

$^{127}_{51}$Sb $_{76}$

1 Decay Scheme

Sb-127 undergoes beta(minus) decay to excited levels in Te-127 (half-life of 9.35(10) h) with a beta branch of 83.2(6)%, and to Te-127m (half-life of 106.1(7) d) with a beta branch of 16.8(6)%.
L'antimoine 127 se désintègre par émissions bêta moins vers le niveau métastable du tellure 127 de 106 jours de période et des niveaux d'énergie supérieure.

2 Nuclear Data

$T_{1/2}(^{127}\mathrm{Sb})$	:	3,85	(7)	d
$T_{1/2}(^{127\mathrm{m}}\mathrm{Te})$	:	106,1	(7)	d
$T_{1/2}(^{127}\mathrm{Te})$	:	9,35	(10)	h
$Q^{-}(^{127}\mathrm{Sb})$	:	1582	(5)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,19}$	203 (5)	0,18 (4)	allowed	7,42
$\beta^-_{0,18}$	259 (5)	0,12 (2)	[allowed]	7,93
$\beta^-_{0,17}$	273 (5)	0,06 (2)	(allowed)	8,3
$\beta^-_{0,16}$	292 (5)	0,61 (4)	allowed	7,39
$\beta^-_{0,15}$	376 (5)	0,10 (4)	(allowed)	8,53
$\beta^-_{0,14}$	427 (5)	0,85 (25)	allowed	7,79
$\beta^-_{0,13}$	442 (5)	1,35 (21)	allowed	7,64
$\beta^-_{0,12}$	505 (5)	5,17 (14)	(allowed)	7,251
$\beta^-_{0,11}$	658 (5)	1,27 (25)	allowed	8,26
$\beta^-_{0,10}$	796 (5)	7,72 (21)	1st forbidden non-unique	7,766
$\beta^-_{0,9}$	799 (5)	17,2 (3)	allowed	7,425
$\beta^-_{0,7}$	897 (5)	34,4 (4)	allowed	7,304
$\beta^-_{0,6}$	951 (5)	4,00 (21)	1st forbidden non-unique	8,33
$\beta^-_{0,4}$	1109 (5)	22,6 (8)	allowed	7,826

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,3}$	1241 (5)	2,4 (3)	(1st forbidden non-unique)	8,98
$\beta^-_{0,2}$	1494 (5)	2,0 (5)	1st forbidden unique	10,21

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Te)	61,16 (2)	5,93 (24)	M1+19,4%E2	2,93 (12)	0,99 (14)	0,21 (3)	4,2 (3)
$\gamma_{10,6}$(Te)	154,7 (1)	0,15 (4)	M1+8%E2	0,182 (14)	0,026 (5)	0,0052 (11)	0,214 (20)
$\gamma_{3,2}$(Te)	252,64 (9)	8,82 (15)	M1+82%E2	0,0541 (12)	0,0090 (4)	0,00182 (8)	0,0652 (17)
$\gamma_{9,5}$(Te)	280,7 (1)	0,55 (4)	M1+0,8%E2	0,0351 (5)	0,00445 (7)	0,000888 (13)	0,0407 (6)
$\gamma_{6,3}$(Te)	290,5 (1)	1,91 (7)	M1+14%E2	0,0326 (5)	0,00430 (7)	0,000859 (14)	0,0379 (6)
$\gamma_{11,6}$(Te)	292,6 (2)	0,28 (14)	E1+1,5%M2	0,0103 (60)	0,00136 (16)	0,00027 (18)	0,012 (7)
$\gamma_{9,4}$(Te)	309,4 (1)	0,078 (13)	M1+1%E2	0,0273 (4)	0,00345 (5)	0,000687 (10)	0,0316 (5)
$\gamma_{12,7}$(Te)	392,0 (2)	0,94 (7)	M1+2,2%E2	0,01490 (21)	0,00187 (3)	0,000372 (6)	0,01722 (25)
$\gamma_{4,1}$(Te)	412,10 (5)	3,48 (18)	E2	0,01210 (17)	0,001775 (25)	0,000357 (5)	0,01431 (20)
$\gamma_{15,9}$(Te)	423,7 (7)	0,10 (4)	M1+50%E2	0,0117 (4)	0,00158 (4)	0,000316 (9)	0,0137 (4)
$\gamma_{5,1}$(Te)	440,77 (2)	0,7 (3)	M1+20%E2	0,0109 (3)	0,001395 (22)	0,000278 (5)	0,0126 (3)
$\gamma_{10,3}$(Te)	445,3 (1)	4,23 (11)	M1+50%E2	0,0102 (4)	0,001369 (23)	0,000274 (5)	0,0120 (4)
$\gamma_{11,4}$(Te)	450,8 (2)	0,21 (7)	M1+33%E2	0,0101 (4)	0,001318 (20)	0,000263 (5)	0,0118 (4)
$\gamma_{13,7}$(Te)	455,1 (1)	0,11 (7)	M1+50%E2	0,0097 (4)	0,001287 (19)	0,000258 (4)	0,0113 (4)
$\gamma_{4,0}$(Te)	473,26 (4)	25,1 (7)	M1+4%E2	0,00928 (14)	0,001159 (17)	0,000231 (4)	0,01072 (16)
$\gamma_{5,0}$(Te)	501,93 (1)	0,65 (11)	M1+10,4%E2	0,00795 (13)	0,000997 (14)	0,000199 (3)	0,00919 (14)
$\gamma_{6,2}$(Te)	543,2 (1)	2,64 (11)	E2	0,00553 (8)	0,000761 (11)	0,0001525 (22)	0,00648 (9)
$\gamma_{11,3}$(Te)	583,2 (2)	0,32 (18)	E1	0,001622 (23)	0,000196 (3)	0,0000389 (6)	0,00187 (3)
$\gamma_{12,4}$(Te)	603,9 (2)	4,23 (11)	M1+2%E2	0,00513 (8)	0,000634 (10)	0,0001261 (18)	0,00592 (9)
$\gamma_{17,7}$(Te)	624,2 (1)	0,064 (21)	M1+50%E2	0,0043 (3)	0,000550 (24)	0,000110 (5)	0,0050 (4)
$\gamma_{13,5}$(Te)	638,3 (1)	0,35 (4)	M1+15%E2	0,00438 (7)	0,000544 (8)	0,0001083 (16)	0,00506 (8)
$\gamma_{14,5}$(Te)	652,8 (1)	0,28 (4)	M1+5,4%E2	0,00423 (7)	0,000522 (8)	0,0001038 (16)	0,00488 (8)
$\gamma_{13,4}$(Te)	666,9 (1)	0,53 (18)	M1+50%E2	0,0037 (3)	0,000464 (23)	0,000093 (5)	0,0042 (3)
$\gamma_{14,4}$(Te)	681,4 (1)	0,53 (25)	M1+50%E2	0,00347 (25)	0,000440 (22)	0,000088 (5)	0,0040 (3)
$\gamma_{7,0}$(Te)	685,09 (7)	35,5 (4)	E2	0,00303 (5)	0,000399 (6)	0,0000797 (12)	0,00352 (5)
$\gamma_{10,2}$(Te)	697,9 (1)	3,37 (18)	E2	0,00289 (4)	0,000380 (6)	0,0000759 (11)	0,00336 (5)
$\gamma_{9,1}$(Te)	721,5 (1)	1,78 (7)	E2	0,00266 (4)	0,000348 (5)	0,0000695 (10)	0,00309 (5)
$\gamma_{19,6}$(Te)	747,2 (1)	0,11 (4)	E1	0,000951 (14)	0,0001142 (16)	0,0000226 (4)	0,001093 (16)
$\gamma_{8,0}$(Te)	762,7 (1)	0,07 (4)	M1+50%E2	0,00265 (20)	0,000332 (19)	0,000066 (4)	0,00306 (22)
$\gamma_{9,0}$(Te)	782,6 (1)	14,7 (3)	M1+4,2%E2	0,00277 (4)	0,000339 (5)	0,0000673 (10)	0,00319 (5)
$\gamma_{16,4}$(Te)	816,5 (1)	0,27 (3)	M1+50%E2	0,00225 (17)	0,000282 (17)	0,000056 (4)	0,00260 (19)
$\gamma_{18,5}$(Te)	821,5 (8)	0,117 (22)					
$\gamma_{11,0}$(Te)	924,0 (2)	0,461 (25)	E2	0,001491 (21)	0,000189 (3)	0,0000376 (6)	0,001725 (25)
$\gamma_{13,0}$(Te)	1140,2 (1)	0,35 (7)	M1+2%E2	0,001179 (20)	0,0001427 (23)	0,0000283 (5)	0,001358 (23)
$\gamma_{14,0}$(Te)	1154,7 (1)	0,039 (21)	M1+E2				
$\gamma_{16,0}$(Te)	1289,8 (1)	0,34 (3)	M1+0,04%E2	0,000901 (13)	0,0001087 (16)	0,0000216 (3)	0,001055 (15)
$\gamma_{19,0}$(Te)	1378,6 (1)	0,07 (4)	M1+E2				

3 Atomic Data

3.1

ω_K : 0,875 (4)
$\bar{\omega}_L$: 0,0862 (35)
n_{KL} : 0,917 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	27,202		53,9
	$K\alpha_1$	27,4726		100
	$K\beta_3$	30,9446	}	28,7
	$K\beta_1$	30,996	}	
	$K\beta_5''$	31,232	}	
	$K\beta_5'$	31,242	}	
	$K\beta_2$	31,7008	}	6,21
	$K\beta_4$	31,774	}	
	$KO_{2,3}$	31,182	}	
X_L				
	$L\ell$	3,335		
	$L\alpha$	3,759 – 3,77		
	$L\eta$	3,605		
	$L\beta$	4,03 – 4,302		
	$L\gamma$	4,572 – 4,829		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	21,804 – 22,989	100
KLX	25,814 – 27,470	45,3
KXY	29,80 – 31,81	5,15
Auger L	2,29 – 3,72	1330

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Te)	2,29 - 3,72	4,90 (14)
e_{AK}	(Te)		0,556 (26)
	KLL	21,804 - 22,989	}
	KLX	25,814 - 27,470	}
	KXY	29,80 - 31,81	}
$ec_{1,0\ T}$	(Te)	29,35 - 61,16	4,79 (24)
$ec_{1,0\ K}$	(Te)	29,35 (2)	3,36 (22)
$ec_{1,0\ L}$	(Te)	56,22 - 56,82	1,14 (9)
$ec_{1,0\ M}$	(Te)	60,15 - 60,59	0,24 (2)
$ec_{1,0\ N}$	(Te)	60,99 - 61,12	0,045 (4)
$\beta^-_{0,19}$	max:	203 (5)	0,18 (4)
$\beta^-_{0,19}$	avg:	55,9 (15)	
$\beta^-_{0,18}$	max:	259 (5)	0,12 (2)
$\beta^-_{0,18}$	avg:	72,8 (16)	
$\beta^-_{0,17}$	max:	273 (5)	0,06 (2)
$\beta^-_{0,17}$	avg:	77,2 (16)	
$\beta^-_{0,16}$	max:	292 (5)	0,61 (4)
$\beta^-_{0,16}$	avg:	83,4 (16)	
$\beta^-_{0,15}$	max:	376 (5)	0,10 (4)
$\beta^-_{0,15}$	avg:	110,7 (17)	
$\beta^-_{0,14}$	max:	427 (5)	0,85 (25)
$\beta^-_{0,14}$	avg:	128,2 (18)	
$\beta^-_{0,13}$	max:	442 (5)	1,35 (21)
$\beta^-_{0,13}$	avg:	133,2 (18)	
$\beta^-_{0,12}$	max:	505 (5)	5,17 (14)
$\beta^-_{0,12}$	avg:	155,3 (18)	
$\beta^-_{0,11}$	max:	658 (5)	1,27 (25)
$\beta^-_{0,11}$	avg:	211,5 (19)	
$\beta^-_{0,10}$	max:	796 (5)	7,72 (21)
$\beta^-_{0,10}$	avg:	264,4 (20)	
$\beta^-_{0,9}$	max:	799 (5)	17,2 (3)
$\beta^-_{0,9}$	avg:	265,8 (20)	
$\beta^-_{0,7}$	max:	897 (5)	34,4 (4)
$\beta^-_{0,7}$	avg:	304,5 (20)	
$\beta^-_{0,6}$	max:	951 (5)	4,00 (21)
$\beta^-_{0,6}$	avg:	326,2 (21)	
$\beta^-_{0,4}$	max:	1109 (5)	22,6 (8)
$\beta^-_{0,4}$	avg:	391,2 (21)	
$\beta^-_{0,3}$	max:	1241 (5)	2,4 (3)

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,3}$	avg:	446,9	(22)	
$\beta^-_{0,2}$	max:	1494	(5)	2,0 (5)
$\beta^-_{0,2}$	avg:	562,4	(21)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Te)	3,335 — 4,829		0,462 (23)	
XKα_2	(Te)	27,202		1,11 (4)	} Kα
XKα_1	(Te)	27,4726		2,06 (7)	}
XKβ_3	(Te)	30,9446	}		
XKβ_1	(Te)	30,996	}	0,591 (21)	K$'\beta_1$
XKβ_5''	(Te)	31,232	}		
XKβ_5'	(Te)	31,242	}		
XKβ_2	(Te)	31,7008	}		
XKβ_4	(Te)	31,774	}	0,128 (6)	K$'\beta_2$
XKO$_{2,3}$	(Te)	31,182	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Te)	61,16 (2)	1,140 (14)
$\gamma_{10,6}$(Te)	154,7 (1)	0,12 (3)
$\gamma_{3,2}$(Te)	252,64 (9)	8,28 (14)
$\gamma_{9,5}$(Te)	280,7 (1)	0,53 (4)
$\gamma_{6,3}$(Te)	290,5 (1)	1,84 (7)
$\gamma_{11,6}$(Te)	292,6 (2)	0,28 (14)
$\gamma_{9,4}$(Te)	309,4 (1)	0,076 (13)
$\gamma_{12,7}$(Te)	392,0 (2)	0,92 (7)
$\gamma_{4,1}$(Te)	412,10 (5)	3,43 (18)
$\gamma_{15,9}$(Te)	423,7 (7)	0,10 (4)
$\gamma_{5,1}$(Te)	440,77 (2)	0,7 (3)
$\gamma_{10,3}$(Te)	445,3 (1)	4,18 (11)
$\gamma_{11,4}$(Te)	450,8 (2)	0,21 (7)

	Energy keV	Photons per 100 disint.
$\gamma_{13,7}$(Te)	455,1 (1)	0,11 (7)
$\gamma_{4,0}$(Te)	473,26 (4)	24,8 (7)
$\gamma_{5,0}$(Te)	501,93 (1)	0,64 (11)
$\gamma_{6,2}$(Te)	543,2 (1)	2,62 (11)
$\gamma_{11,3}$(Te)	583,2 (2)	0,32 (18)
$\gamma_{12,4}$(Te)	603,9 (2)	4,21 (11)
$\gamma_{17,7}$(Te)	624,2 (1)	0,064 (21)
$\gamma_{13,5}$(Te)	638,3 (1)	0,35 (4)
$\gamma_{14,5}$(Te)	652,8 (1)	0,28 (4)
$\gamma_{13,4}$(Te)	666,9 (1)	0,53 (18)
$\gamma_{14,4}$(Te)	681,4 (1)	0,53 (25)
$\gamma_{7,0}$(Te)	685,09 (7)	35,4 (4)
$\gamma_{10,2}$(Te)	697,9 (1)	3,36 (18)
$\gamma_{9,1}$(Te)	721,5 (1)	1,77 (7)
$\gamma_{19,6}$(Te)	747,2 (1)	0,11 (4)
$\gamma_{8,0}$(Te)	762,7 (1)	0,07 (4)
$\gamma_{9,0}$(Te)	782,6 (1)	14,7 (3)
$\gamma_{16,4}$(Te)	816,5 (1)	0,27 (3)
$\gamma_{18,5}$(Te)	821,5 (8)	0,117 (22)
$\gamma_{11,0}$(Te)	924,0 (2)	0,460 (25)
$\gamma_{13,0}$(Te)	1140,2 (1)	0,35 (7)
$\gamma_{14,0}$(Te)	1153,99 (9)	0,039 (21)
$\gamma_{16,0}$(Te)	1288,90 (8)	0,34 (3)
$\gamma_{19,0}$(Te)	1378,6 (1)	0,07 (4)

6 Main Production Modes

Te – 128(γ,p)Sb – 127

Te – 130(d,αn)Sb – 127

U – 235(n,f)Sb – 127

U – 235(d,f)Sb – 127

U – 235(α,f)Sb – 127

U – 238(n,f)Sb – 127

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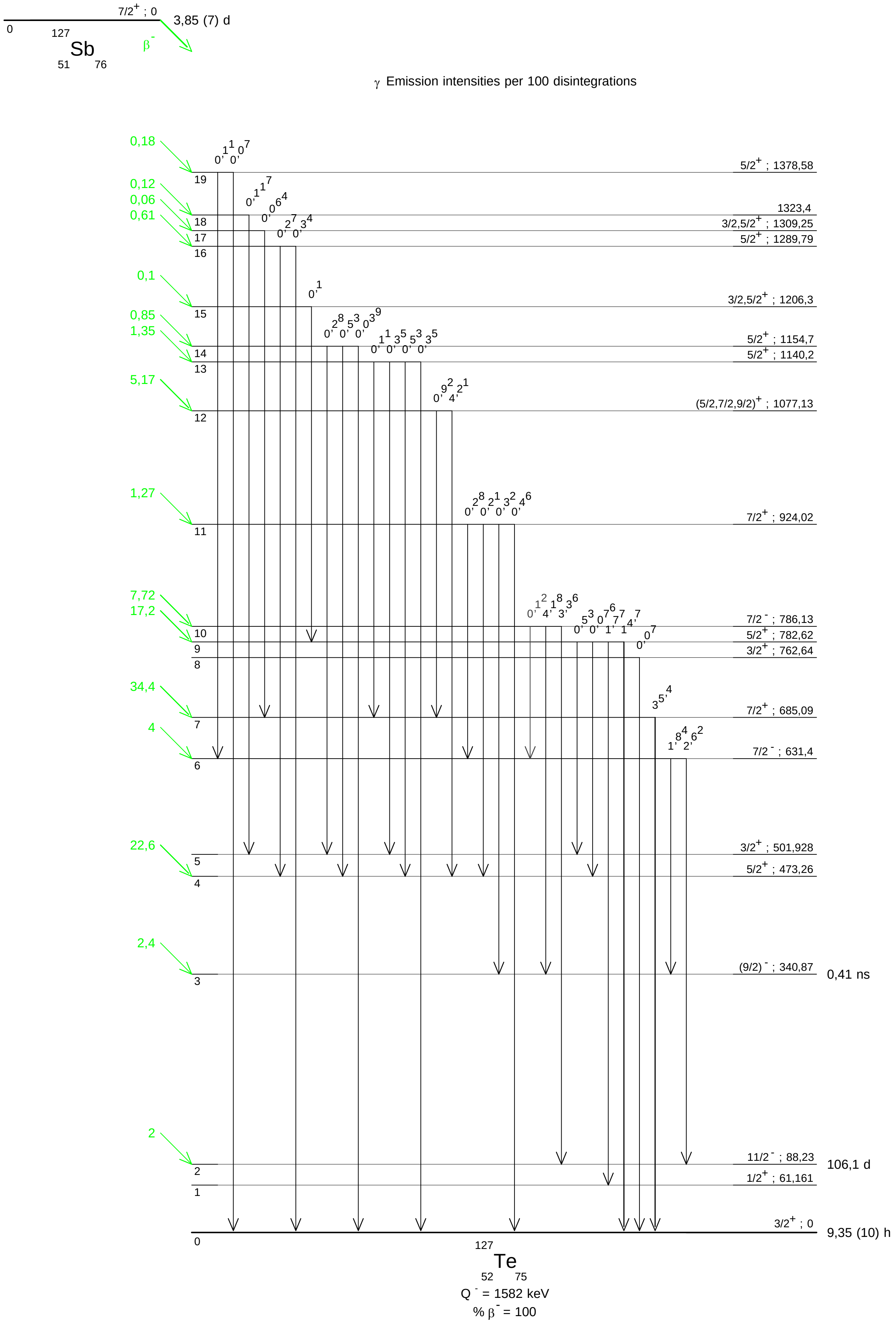
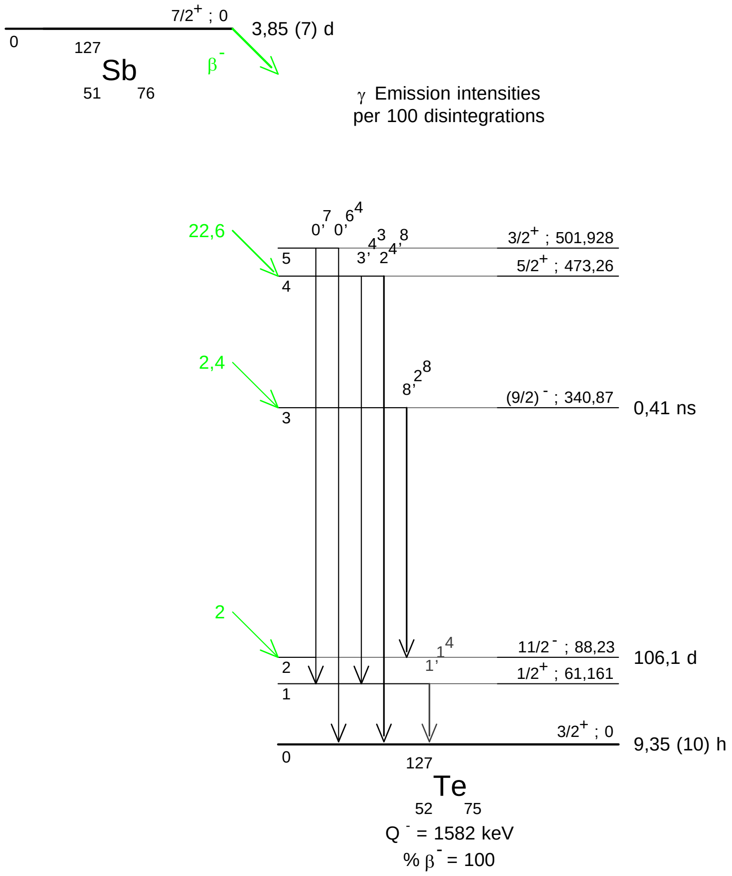

7/2+ ; 0
0
127 Sb 51 76
3,85 (7) d
β-
γ Emission intensities per 100 disintegrations
0,18
0,12
0,06
0,61
0,1
0,85
1,35
5,17
1,27
7,72
17,2
34,4
4
22,6
2,4
2
19 5/2+ ; 1378,58
18 1323,4
17 3/2,5/2+ ; 1309,25
16 5/2+ ; 1289,79
15 3/2,5/2+ ; 1206,3
14 5/2+ ; 1154,7
13 5/2+ ; 1140,2
12 (5/2,7/2,9/2)+ ; 1077,13
11 7/2+ ; 924,02
10 7/2- ; 786,13
9 5/2+ ; 782,62
8 3/2+ ; 762,64
7 7/2+ ; 685,09
6 7/2- ; 631,4
5 3/2+ ; 501,928
4 5/2+ ; 473,26
3 (9/2)- ; 340,87
0,41 ns
2 11/2- ; 88,23
106,1 d
1 1/2+ ; 61,161
0 3/2+ ; 0
9,35 (10) h
127 Te 52 75
Q- = 1582 keV
% β- = 100


7/2+ ; 0
3,85 (7) d
0
127
Sb
51 76
β-
γ Emission intensities
per 100 disintegrations
22,6
2,4
2
0'7
0'64
3'43
2'4
8
8'28
1'4
5
4
3
2
1
0
3/2+ ; 501,928
5/2+ ; 473,26
(9/2) - ; 340,87
0,41 ns
11/2 - ; 88,23
106,1 d
1/2+ ; 61,161
3/2+ ; 0
9,35 (10) h
127
Te
52 75
Q - = 1582 keV
% β- = 100

$^{127}_{52}\mathrm{Te}_{75}$

1 Decay Scheme

Te-127 undergoes beta decay to various nuclear levels of I-127 through five β^- and nine subsequent γ emissions.
Le tellure 127 se désintègre par émissions bêta moins vers des niveaux excités et, principalement, vers le niveau fondamental de l'iode 127.

2 Nuclear Data

$T_{1/2}$(^{127}Te) : 9,35 (10) h
Q^-(^{127}Te) : 702 (4) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,5}$	84 (4)	0,00013 (2)	allowed	8,38
$\beta^-_{0,4}$	284 (4)	1,19 (2)	allowed	6,086
$\beta^-_{0,3}$	327 (4)	0,0006 (3)	allowed	9,58
$\beta^-_{0,2}$	499 (4)	0,025 (3)	allowed	8,57
$\beta^-_{0,0}$	702 (4)	98,780 (14)	allowed	5,49

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(I)	57,608 (11)	0,144 (3)	M1+0.7%E2	3,16 (5)	0,449 (8)	0,0910 (16)	3,72 (6)
$\gamma_{2,1}$(I)	145,252 (14)	0,0059 (9)	E2	0,357 (5)	0,0907 (13)	0,0189 (3)	0,471 (7)
$\gamma_{3,2}$(I)	172,132 (12)	0,00035 (23)	M1+0,7%E2	0,1419 (20)	0,0185 (3)	0,00373 (6)	0,1650 (24)
$\gamma_{2,0}$(I)	202,860 (8)	0,062 (2)	M1+21%E2	0,0965 (17)	0,0142 (5)	0,00289 (10)	0,1143 (22)
$\gamma_{4,2}$(I)	215,13 (6)	0,043 (2)	M1+4,0%E2	0,0782 (11)	0,01031 (16)	0,00208 (4)	0,0910 (13)

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{4,1}$(I)	360,38 (6)	0,139 (2)	M1+3,6%E2	0,0201 (3)	0,00256 (4)	0,000514 (8)	0,0232 (4)
$\gamma_{3,0}$(I)	374,992 (9)	0,0003 (2)	E2	0,01671 (24)	0,00257 (4)	0,000524 (8)	0,0199 (3)
$\gamma_{4,0}$(I)	417,99 (6)	1,013 (11)	M1+0,6%E2	0,01381 (20)	0,001741 (25)	0,000350 (5)	0,01598 (23)
$\gamma_{5,0}$(I)	618,31 (13)	0,00013 (2)	M1+50%E2	0,0047 (4)	0,00061 (3)	0,000123 (6)	0,0055 (4)

3 Atomic Data

3.1 I

ω_K : 0,882 (4)
$\bar{\omega}_L$: 0,092 (4)
n_{KL} : 0,909 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	28,3175		53,8
	$K\alpha_1$	28,6123		100
	$K\beta_3$	32,2397	}	
	$K\beta_1$	32,2951	}	
	$K\beta_5^{''}$	32,539	}	28,7
	$K\beta_5^{'}$	32,55	}	
	$K\beta_2$	33,042	}	
	$K\beta_4$	33,12	}	6,52
	$KO_{2,3}$	33,166	}	
X_L				
	$L\ell$	3,485		
	$L\alpha$	3,927 – 3,938		
	$L\eta$	3,779		
	$L\beta$	4,221 – 4,508		
	$L\gamma$	4,801 – 5,060		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	22,659 – 23,909	100
KLX	26,853 – 28,609	45,9
KXY	31,02 – 33,16	5,28
Auger L	2,38 – 3,88	1223

4 Electron Emissions

		Energy keV			Electrons per 100 disint.
e_{AL}	(I)	2,38 - 3,88			0,1174 (18)
e_{AK}	(I)				0,0145 (6)
	KLL	22,659 - 23,909		}	
	KLX	26,853 - 28,609		}	
	KXY	31,02 - 33,16		}	
$\beta^-_{0,5}$	max:	84	(4)		0,00013 (2)
$\beta^-_{0,5}$	avg:	21,8	(11)		
$\beta^-_{0,4}$	max:	284	(4)		1,19 (2)
$\beta^-_{0,4}$	avg:	80,7	(13)		
$\beta^-_{0,3}$	max:	327	(4)		0,0006 (3)
$\beta^-_{0,3}$	avg:	94,5	(13)		
$\beta^-_{0,2}$	max:	499	(4)		0,025 (3)
$\beta^-_{0,2}$	avg:	153,0	(15)		
$\beta^-_{0,0}$	max:	702	(4)		98,780 (14)
$\beta^-_{0,0}$	avg:	227,8	(16)		

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(I)	3,485 — 5,060		0,0119 (6)	
XKα_2	(I)	28,3175		0,0309 (7)	} Kα
XKα_1	(I)	28,6123		0,0574 (12)	}
XKβ_3	(I)	32,2397	}		
XKβ_1	(I)	32,2951	}	0,0165 (4)	K$'\beta_1$
XKβ_5''	(I)	32,539	}		
XKβ_5'	(I)	32,55	}		
XKβ_2	(I)	33,042	}		
XKβ_4	(I)	33,12	}	0,00374 (12)	K$'\beta_2$
XKO$_{2,3}$	(I)	33,166	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(I)	57,608 (11)	0,0306 (6)
$\gamma_{2,1}$(I)	145,252 (14)	0,0040 (6)
$\gamma_{3,2}$(I)	172,132 (12)	0,0003 (2)
$\gamma_{2,0}$(I)	202,860 (8)	0,056 (2)
$\gamma_{4,2}$(I)	215,13 (6)	0,039 (2)
$\gamma_{4,1}$(I)	360,38 (6)	0,136 (2)
$\gamma_{3,0}$(I)	374,991 (9)	0,0003 (2)
$\gamma_{4,0}$(I)	417,99 (6)	0,997 (11)
$\gamma_{5,0}$(I)	618,31 (13)	0,00013 (2)

6 Main Production Modes

Te – 126(n,γ)Te – 127

Te – 128(n,2n)Te – 127

U – 235(n,f)Sb – 127

Sb – 127(β^-)Te – 127

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  (Q)
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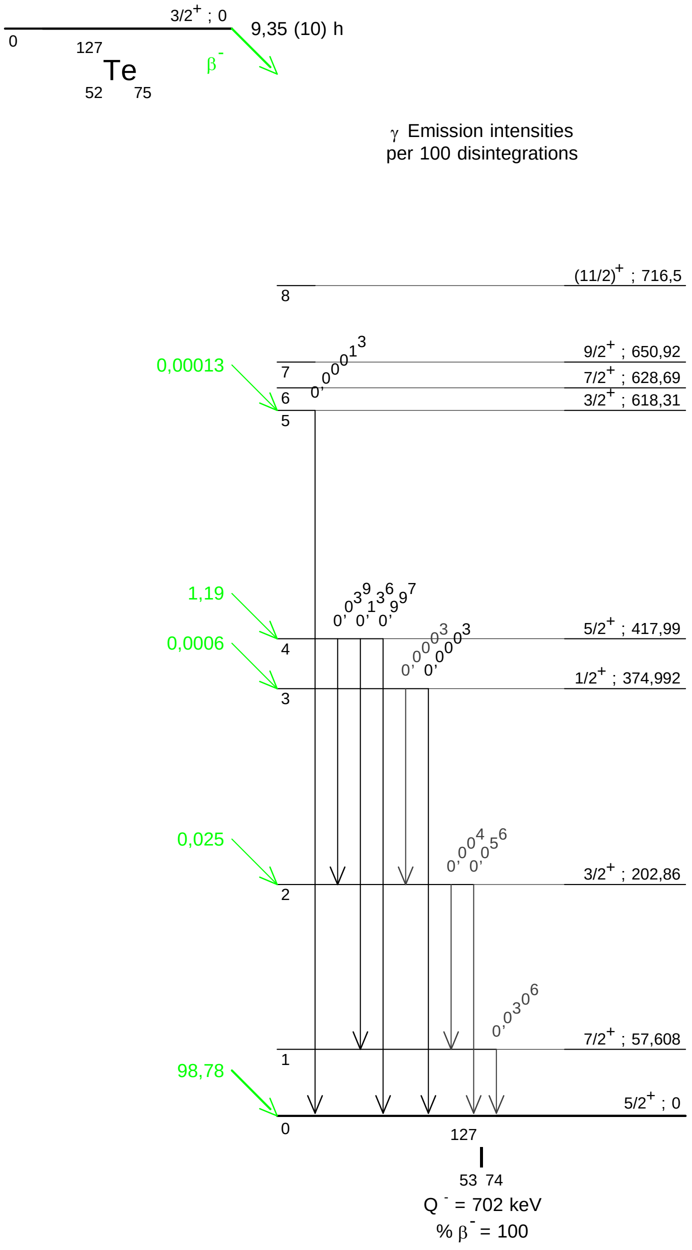
  (Q)


3/2+ ; 0
0
127
Te
52 75
β-
9,35 (10) h
γ Emission intensities
per 100 disintegrations
(11/2)+ ; 716,5
8
9/2+ ; 650,92
7
7/2+ ; 628,69
6
3/2+ ; 618,31
5
0,00013
0,00013
1,19
0,039
0,136
0,997
5/2+ ; 417,99
4
0,0006
0,0003
0,0003
1/2+ ; 374,992
3
0,025
0,004
0,056
3/2+ ; 202,86
2
0,0306
7/2+ ; 57,608
1
98,78
5/2+ ; 0
0
127
I
53 74
Q - = 702 keV
% β- = 100

$^{\mathbf{127m}}_{52}\mathrm{Te}_{75}$

1 Decay Scheme

Te-127m decays predominantly by isomeric transition with a total IT branch of 97.27(7)% directly to the ground state, and by a β^- branch of 2.73(7)% to nuclear levels of I-127 (primarily the first excited state of I-127).
Le tellure 127 metastable se déexcite vers le niveau fondamental du tellure 127 principalement et, pour une faible part, se désintègre par émissions β^- vers des niveaux excités de l'iode 127.

2 Nuclear Data

$T_{1/2}(^{127m}\mathrm{Te})$: 106,1 (7) d
$T_{1/2}(^{127}\mathrm{Te})$: 9,35 (10) h
$Q^{IT}(^{127m}\mathrm{Te})$: 88,23 (7) keV
$Q^{-}(^{127m}\mathrm{Te})$: 790 (4) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,8}$	74 (4)	0,0141 (6)	1st Forbidden	8,61
$\beta^-_{0,7}$	139 (4)	0,0027 (2)	1st Forbidden	10,18
$\beta^-_{0,6}$	161 (4)	0,00009 (2)	Unique 1st Forbidden	11,3
$\beta^-_{0,1}$	732 (4)	2,71 (7)	Unique 1st Forbidden	9,873

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(I)	57,608 (11)	2,73 (5)	M1+0,7%E2	3,16 (5)	0,449 (8)	0,0910 (16)	3,72 (6)
$\gamma_{2,0}$(Te)	88,23 (7)	97,3 (18)	M4	486 (7)	506 (8)	120,4 (18)	1138 (17)
$\gamma_{7,1}$(I)	593,31 (8)	0,0024 (2)	M1+5%E2	0,00578 (9)	0,000722 (11)	0,0001448 (21)	0,00668 (10)

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{6,0}$(I)	628,69 (16)	0,00009 (2)	M1+50%E2	0,0045 (4)	0,00058 (3)	0,000117 (6)	0,0052 (4)
$\gamma_{7,0}$(I)	650,92 (8)	0,0003 (2)	E2	0,00362 (5)	0,000488 (7)	0,0000985 (14)	0,00423 (6)
$\gamma_{8,1}$(I)	658,89 (6)	0,0141 (6)	E2	0,00351 (5)	0,000472 (7)	0,0000953 (14)	0,00410 (6)

3 Atomic Data

3.1 I

ω_K : 0,882 (4)
$\bar{\omega}_L$: 0,092 (4)
n_{KL} : 0,909 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	Kα_2	28,3175		53,9
	Kα_1	28,6123		100
	Kβ_3	32,2397	}	
	Kβ_1	32,2951	}	
	Kβ_5''	32,539	}	28,8
	Kβ_5'	32,55	}	
	Kβ_2	33,042	}	
	Kβ_4	33,12	}	6,51
	KO$_{2,3}$	33,166	}	
X_L				
	Lℓ	3,485		
	Lα	3,927 – 3,938		
	Lη	3,779		
	Lβ	4,221 – 4,508		
	Lγ	4,801 – 5,060		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	22,659 – 23,909	100
KLX	26,853 – 28,609	45,7
KXY	31,02 – 33,16	5,24
Auger L	2,37 – 3,88	1220

3.2 Te

ω_K : 0,875 (4)
$\bar{\omega}_L$: 0,0862 (35)
n_{KL} : 0,917 (4)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	27,202		53,4
	$K\alpha_1$	27,4726		100
	$K\beta_3$	30,9446	}	
	$K\beta_1$	30,996	}	
	$K\beta_5''$	31,232	}	28,5
	$K\beta_5'$	31,242	}	
	$K\beta_2$	31,7008	}	
	$K\beta_4$	31,774	}	6,22
	$KO_{2,3}$	31,182	}	
X_L				
	$L\ell$	3,335		
	$L\alpha$	3,759 – 3,77		
	$L\eta$	3,605		
	$L\beta$	4,03 – 4,302		
	$L\gamma$	4,572 – 4,829		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	21,804 – 22,989	100
KLX	25,814 – 27,470	45,2
KXY	29,80 – 31,81	5,13
Auger L	2,29 – 3,72	2154

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(I)	2,37 - 3,88	1,74 (3)
e_{AK}	(I)		0,216 (9)
	KLL	22,659 - 23,909 }	
	KLX	26,853 - 28,609 }	
	KXY	31,02 - 33,16 }	
e_{AL}	(Te)	2,29 - 3,72	74,3 (10)
e_{AK}	(Te)		5,19 (21)
	KLL	21,804 - 22,989 }	
	KLX	25,814 - 27,470 }	
	KXY	29,80 - 31,81 }	
$ec_{1,0\ T}$	(I)	24,44 - 57,61	2,15 (5)
$ec_{1,0\ K}$	(I)	24,44 (1)	1,83 (3)
$ec_{1,0\ L}$	(I)	52,42 - 53,05	0,26 (1)
$ec_{1,0\ M}$	(I)	56,54 - 56,99	0,0526 (13)
$ec_{2,0\ T}$	(Te)	56,42 - 88,23	97,2 (23)
$ec_{2,0\ K}$	(Te)	56,42 (7)	41,5 (10)
$ec_{2,0\ L}$	(Te)	83,29 - 83,89	43,2 (11)
$ec_{2,0\ M}$	(Te)	87,22 - 87,66	10,28 (25)
$ec_{2,0\ N}$	(Te)	88,06 - 88,19	1,98 (5)
$\beta^-_{0,8}$	max:	74 (4)	0,0141 (6)
$\beta^-_{0,8}$	avg:	19,1 (11)	
$\beta^-_{0,7}$	max:	139 (4)	0,0027 (2)
$\beta^-_{0,7}$	avg:	37,2 (12)	

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,6}$	max:	161	(4)	0,00009 (2)
$\beta^-_{0,6}$	avg:	52,9	(14)	
$\beta^-_{0,1}$	max:	732	(4)	2,71 (7)
$\beta^-_{0,1}$	avg:	255,9	(15)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(I)	3,485 — 5,060		0,177 (9)	
XKα_2	(I)	28,3175		0,459 (12)	} Kα
XKα_1	(I)	28,6123		0,852 (21)	}
XKβ_3	(I)	32,2397	}	0,245 (7)	K$'\beta_1$
XKβ_1	(I)	32,2951	}		
XKβ_5''	(I)	32,539	}		
XKβ_5'	(I)	32,55	}		
XKβ_2	(I)	33,042	}	0,0555 (19)	K$'\beta_2$
XKβ_4	(I)	33,12	}		
XKO$_{2,3}$	(I)	33,166	}		
XL	(Te)	3,335 — 4,829		7,0 (3)	
XKα_2	(Te)	27,202		10,3 (3)	} Kα
XKα_1	(Te)	27,4726		19,3 (5)	}
XKβ_3	(Te)	30,9446	}	5,51 (15)	K$'\beta_1$
XKβ_1	(Te)	30,996	}		
XKβ_5''	(Te)	31,232	}		
XKβ_5'	(Te)	31,242	}		
XKβ_2	(Te)	31,7008	}	1,20 (5)	K$'\beta_2$
XKβ_4	(Te)	31,774	}		
XKO$_{2,3}$	(Te)	31,182	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(I)	57,608 (11)	0,578 (10)
$\gamma_{2,0}$(Te)	88,23 (7)	0,0854 (16)
$\gamma_{7,1}$(I)	593,31 (8)	0,0024 (2)
$\gamma_{6,0}$(I)	628,69 (16)	0,00009 (2)
$\gamma_{7,0}$(I)	650,92 (8)	0,0003 (2)
$\gamma_{8,1}$(I)	658,89 (6)	0,0140 (6)

6 Main Production Modes

Te – 126(n,γ)Te – 127m

Te – 128(n,2n)Te – 127m

U – 235(n,f)Sb – 127

Sb – 127(β^-)Te – 127m

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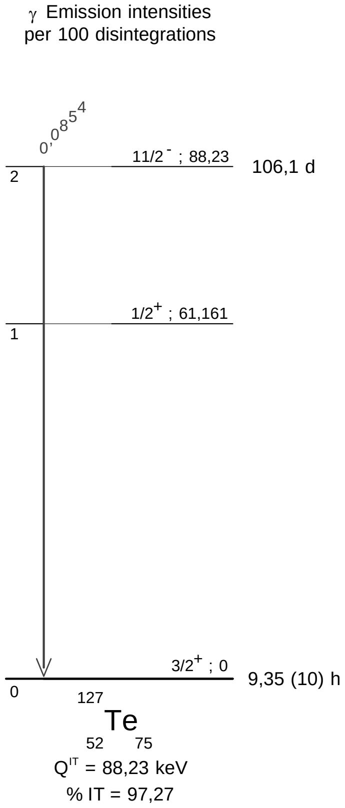
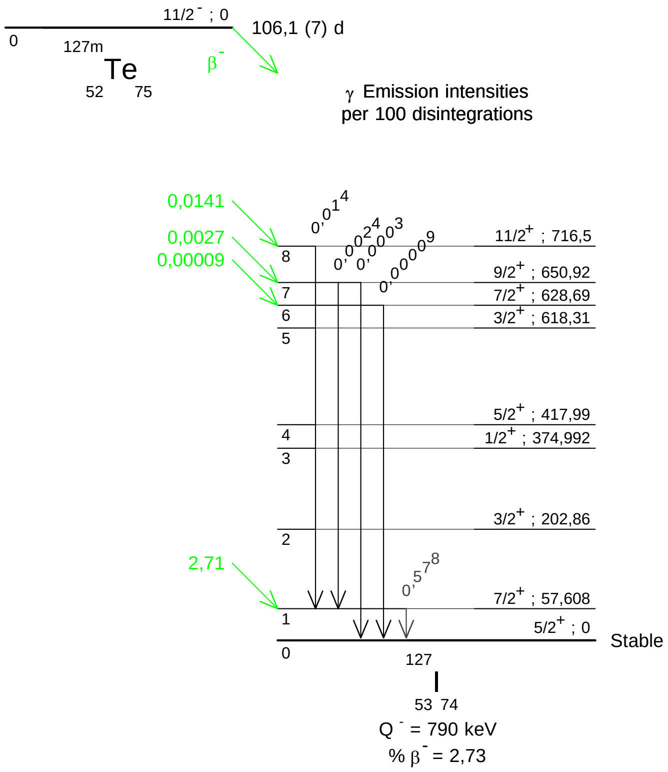

γ Emission intensities
per 100 disintegrations
0,0854
11/2⁻ ; 88,23
106,1 d
2
1/2⁺ ; 61,161
1
3/2⁺ ; 0
9,35 (10) h
0
127
Te
52
75
Q^IT = 88,23 keV
% IT = 97,27


11/2$^-$; 0
0
127m
Te
52 75
β$^-$
106,1 (7) d
γ Emission intensities
per 100 disintegrations
0,0141
0,0027
0,00009
2,71
0,014
0,0024
0,0003
0,00009
0,578
8
7
6
5
4
3
2
1
0
11/2$^+$; 716,5
9/2$^+$; 650,92
7/2$^+$; 628,69
3/2$^+$; 618,31
5/2$^+$; 417,99
1/2$^+$; 374,992
3/2$^+$; 202,86
7/2$^+$; 57,608
5/2$^+$; 0
Stable
127
I
53 74
Q$^-$ = 790 keV
% β$^-$ = 2,73

$^{134}_{55}$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 β^{-} 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)	~ 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	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_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

ω_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)		~ 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)	
XKα_2	(Ba)	31,8174		0,2378 (26)	} Kα
XKα_1	(Ba)	32,1939		0,438 (5)	}
XKβ_3	(Ba)	36,3045	}		
XKβ_1	(Ba)	36,3786	}	0,1289 (19)	K$'\beta_1$
XKβ_5''	(Ba)	36,654	}		
XKβ_2	(Ba)	37,258	}		
XKβ_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,γ)Cs – 134 σ : 29,0 (15) barns
Possible impurities : Cs – 134m

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

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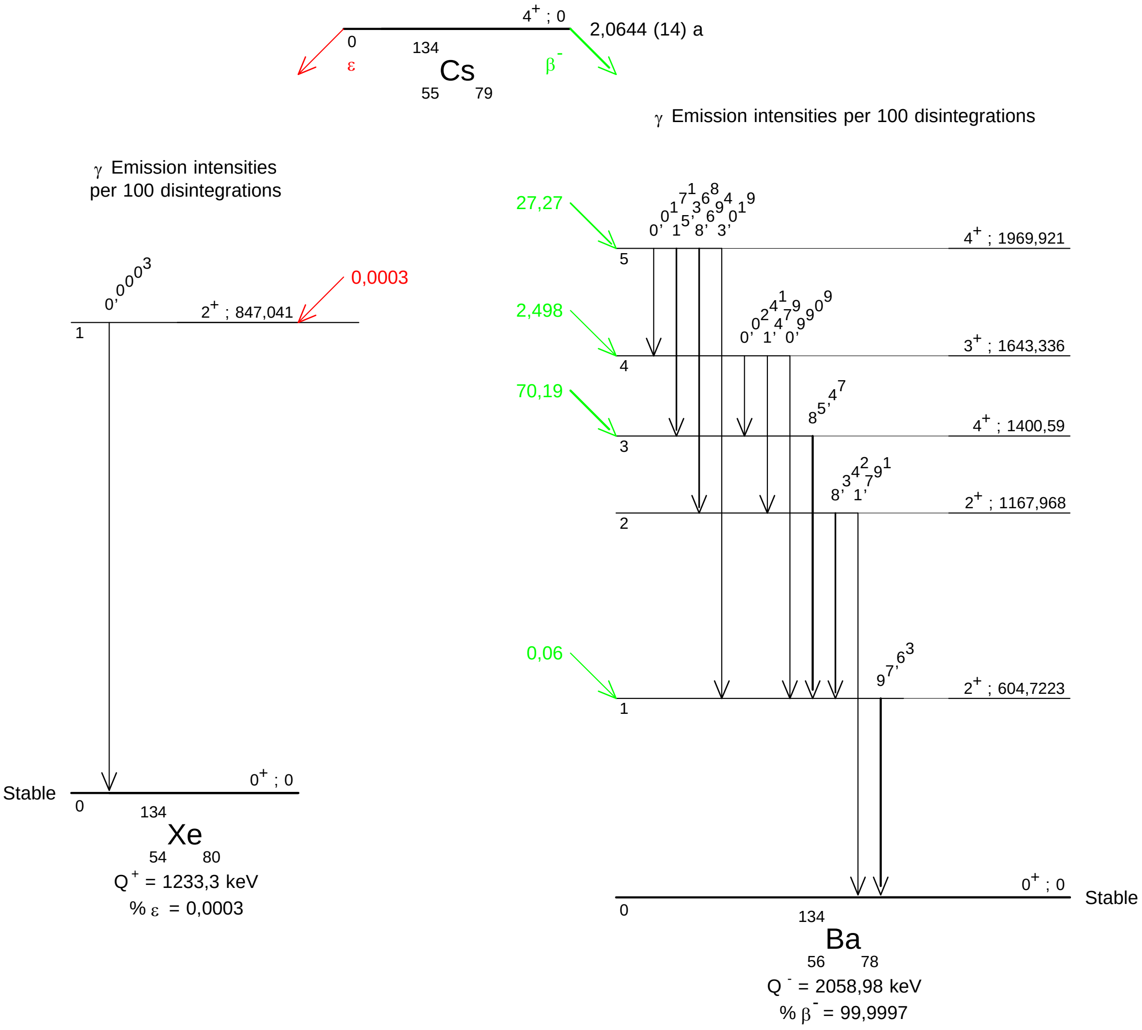
  (Q)


4^+ ; 0
0
ε
134
Cs
55 79
β^-
2,0644 (14) a
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
0,0241
1,479
0,9909
85,47
8,342
1,791
97,63
5
4
3
2
1
0
4^+ ; 1969,921
3^+ ; 1643,336
4^+ ; 1400,59
2^+ ; 1167,968
2^+ ; 604,7223
0^+ ; 0
Stable
134
Ba
56 78
Q^- = 2058,98 keV
% β^- = 99,9997

$$\boxed{{}^{\mathbf{141}}_{58}\mathrm{Ce}_{83}}$$

1 Decay Scheme

Ce-141 decays by beta minus emission. The main beta transition (70%) leads to the 145 keV level of Pr-141, the weaker beta transition (30%) feeds directly the ground state of Pr-141.
Le cérium 141 se désintègre par émission bêta principalement (70 %) vers le niveau excité de 145 keV du praséodyme 141 et pour 30 % vers le niveau fondamental.

2 Nuclear Data

$T_{1/2}(^{141}\mathrm{Ce})$	:	32,503	(11)	d
$Q^-(^{141}\mathrm{Ce})$	:	580,4	(11)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,1}$	435,0 (11)	69,97 (44)	1st forbidden	6,97
$\beta^-_{0,0}$	580,4 (11)	30,03 (44)	1st forbidden	7,76

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pr)	145,4433 (14)	69,97 (44)	M1+0,46%E2	0,383 (6)	0,0529 (8)	0,01116 (16)	0,449 (7)

3 Atomic Data

3.1 Pr

ω_K : 0,914 (4)
$\bar{\omega}_L$: 0,132 (5)
n_{KL} : 0,871 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	35,5506		54,76
	$K\alpha_1$	36,0267		100
	$K\beta_3$	40,6533	}	
	$K\beta_1$	40,7487	}	
	$K\beta_5''$	41,05	}	30,42
	$K\beta_2$	41,774	}	
	$K\beta_4$	41,877	}	7,79
	$KO_{2,3}$	41,968	}	
X_L				
	$L\ell$	4,458		
	$L\alpha$	5,0129 – 5,0343		
	$L\eta$	4,9337		
	$L\beta$	5,4887 – 5,9032		
	$L\gamma$	6,1375 – 6,617		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	28,162 – 29,890	100
KLX	33,576 – 36,004	49,4
KXY	38,97 – 41,95	6,1
Auger L	2,94 – 6,79	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pr)	2,94 - 6,79		16,15 (11)
e_{AK}	(Pr)			1,59 (8)
	KLL	28,162 - 29,890	}	
	KLX	33,576 - 36,004	}	
	KXY	38,97 - 41,95	}	
$ec_{1,0\ T}$	(Pr)	103,4527 - 145,4210		21,68 (35)
$ec_{1,0\ K}$	(Pr)	103,4527 (14)		18,5 (3)
$ec_{1,0\ L}$	(Pr)	138,6085 - 139,4790		2,555 (40)
$ec_{1,0\ M}$	(Pr)	143,932 - 144,512		0,539 (8)
$ec_{1,0\ N}$	(Pr)	145,1388 - 145,4410		0,1202 (20)
$\beta^-_{0,1}$	max:	435,0 (11)		69,97 (44)
$\beta^-_{0,1}$	avg:	129,7 (5)		
$\beta^-_{0,0}$	max:	580,4 (11)		30,03 (44)
$\beta^-_{0,0}$	avg:	180,8 (6)		

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pr)	4,458 — 6,617		2,52 (5)	
XKα_2	(Pr)	35,5506		4,80 (9)	} Kα
XKα_1	(Pr)	36,0267		8,76 (15)	}
XKβ_3	(Pr)	40,6533	}		
XKβ_1	(Pr)	40,7487	}	2,67 (6)	K$'\beta_1$
XKβ_5''	(Pr)	41,05	}		
XKβ_2	(Pr)	41,774	}		
XKβ_4	(Pr)	41,877	}	0,682 (20)	K$'\beta_2$
XKO$_{2,3}$	(Pr)	41,968	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pr)	145,4433 (14)	48,29 (19)

6 Main Production Modes

Ce – 140(n,γ)Ce – 141 σ : 0,58 (2) barns
Possible impurities : Ce – 139, Ce – 143, Ce – 144

Pr – 141(n,p)Ce – 141

La – 139(n,γ)La – 140 σ : 8,93 (4) barns

La – 140(n,γ)La – 141
Possible impurities : Ce – 139

La – 141(β^-)Ce – 141

Fission product
Possible impurities : Ce – 139, Ce – 143, Ce – 144

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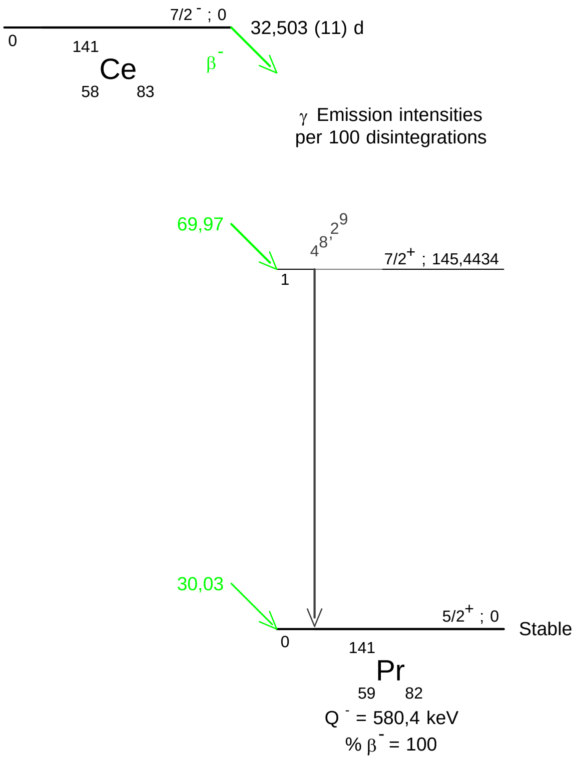
7/2 - ; 0
0
141
Ce
58
83
32,503 (11) d
β-
γ Emission intensities
per 100 disintegrations
69,97
48,29
7/2+ ; 145,4434
1
30,03
5/2+ ; 0
Stable
0
141
Pr
59
82
Q - = 580,4 keV
% β- = 100

$^{147}_{60}\mathrm{Nd}_{87}$

1 Decay Scheme

Nd-147 disintegrates by beta minus emission to excited levels of Pm-147. If a transition to the ground state level exists, it is less than 0.15 %.
Le néodyme 147 se désintègre par émission bêta moins vers des niveaux excités du prométhéum 147. La désintégration par émission bêta moins vers le niveau fondamental, si elle existe, est inférieure à 0,15 %.

2 Nuclear Data

$T_{1/2}(^{147}\mathrm{Nd})$	:	10,987	(11)	d
$T_{1/2}(^{147}\mathrm{Pm})$	:	2,6234	(4)	a
$Q^-(^{147}\mathrm{Nd})$	:	895,7	(9)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,10}$	209,8 (9)	2,184 (16)	1st Forbidden	7
$\beta^-_{0,9}$	215,3 (9)	0,0897 (28)	1st Forbidden	8,4
$\beta^-_{0,8}$	246,7 (9)	0,296 (19)	Unique 2nd Forbidden	7,5
$\beta^-_{0,6}$	262,8 (9)	0,0190 (27)	Unique 1st Forbidden	9,1
$\beta^-_{0,5}$	364,7 (9)	14,6 (9)	1st Forbidden	7
$\beta^-_{0,4}$	406,4 (9)	0,781 (15)	1st Forbidden	8,4
$\beta^-_{0,3}$	485,2 (9)	0,715 (34)	1st Forbidden	8,7
$\beta^-_{0,1}$	804,6 (9)	81 (5)	1st Forbidden	7,4
$\beta^-_{0,0}$	895,7 (9)	0 (5)	1st Forbidden	7,5

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{9,8}$(Pm)	31,3 (2)		[M2]		422 (14)	100 (4)	548 (18)
$\gamma_{10,8}$(Pm)	36,75 (10)		[E3]		7600 (170)	1960 (50)	10040 (220)
$\gamma_{10,6}$(Pm)	53,1 (2)		[E2]	4,40 (7)	16,1 (4)	3,73 (9)	25,1 (6)
$\gamma_{4,2}$(Pm)	80,82 (27)	0,0042 (11)	[M1,E2]	2,26 (17)	1,3 (10)	0,29 (22)	3,9 (11)
$\gamma_{1,0}$(Pm)	91,105 (2)	86 (5)	M1 + 0,80 % E2	1,714 (24)	0,250 (4)	0,0535 (8)	2,03 (3)
$\gamma_{8,5}$(Pm)	117,98 (8)	0,230 (19)	E3	3,15 (5)	8,41 (12)	2,02 (3)	14,07 (20)
$\gamma_{5,3}$(Pm)	120,48 (5)	0,690 (27)	M1 + 1,33 % E2	0,772 (11)	0,112 (4)	0,0239 (8)	0,914 (14)
$\gamma_{9,5}$(Pm)	149,3 (2)	0,0056 (6)	[M1,E2]	0,39 (3)	0,10 (5)	0,022 (10)	0,52 (3)
$\gamma_{10,5}$(Pm)	154,7 (2)	0,0058 (6)	[M1,E2]	0,36 (3)	0,09 (4)	0,020 (9)	0,468 (19)
$\gamma_{8,4}$(Pm)	159,7 (2)	0,0190 (14)	M2	2,18 (4)	0,439 (7)	0,0977 (15)	2,74 (4)
$\gamma_{9,4}$(Pm)	191,0 (3)	0,00442 (48)	[M1,E2]	0,192 (22)	0,040 (11)	0,009 (3)	0,244 (9)
$\gamma_{10,4}$(Pm)	196,64 (4)	0,2214 (23)	M1 + 3,85 % E2	0,196 (3)	0,0281 (8)	0,00601 (18)	0,231 (4)
$\gamma_{7,3}$(Pm)	230,77 (8)						
$\gamma_{8,2}$(Pm)	240,5 (2)	0,0417 (26)	E1	0,0213 (3)	0,00290 (5)	0,000615 (9)	0,0250 (4)
$\gamma_{9,2}$(Pm)	271,87 (6)	0,0138 (10)	M1 + 0,99 % E2	0,0820 (12)	0,01133 (16)	0,00242 (4)	0,0964 (14)
$\gamma_{10,3}$(Pm)	275,374 (15)	0,847 (13)	M1 + 1,23 % E2	0,0792 (11)	0,01095 (16)	0,00234 (4)	0,0931 (13)
$\gamma_{3,1}$(Pm)	319,411 (18)	2,112 (20)	M1 + 12,5 % E2	0,0514 (8)	0,00734 (11)	0,001572 (22)	0,0607 (9)
$\gamma_{4,1}$(Pm)	398,155 (20)	0,884 (8)	M1 + 8,1 % E2	0,0293 (5)	0,00406 (6)	0,000866 (13)	0,0345 (5)
$\gamma_{2,0}$(Pm)	408,52 (6)	0,0183 (13)	M1 + 24,5 % E2	0,0257 (5)	0,00368 (6)	0,000789 (12)	0,0304 (5)
$\gamma_{3,0}$(Pm)	410,48 (3)	0,140 (6)	E2	0,01724 (25)	0,00313 (5)	0,000683 (10)	0,0212 (3)
$\gamma_{5,1}$(Pm)	439,895 (22)	1,233 (12)	M1 + 27 % E2	0,0210 (4)	0,00300 (5)	0,000641 (10)	0,0248 (4)
$\gamma_{4,0}$(Pm)	489,24 (3)	0,138 (12)	M1 +38,4 % E2	0,0152 (16)	0,00218 (14)	0,00047 (3)	0,0179 (18)
$\gamma_{5,0}$(Pm)	531,016 (22)	12,9 (9)	M1 + 14,2 % E2	0,01374 (23)	0,00188 (3)	0,000402 (6)	0,0161 (3)
$\gamma_{6,1}$(Pm)	541,83 (7)	0,0190 (27)	[E2]	0,00824 (12)	0,001338 (19)	0,000290 (4)	0,00994 (14)
$\gamma_{9,1}$(Pm)	589,35 (4)	0,0374 (21)	[M1,E2]	0,0090 (23)	0,00128 (23)	0,00027 (4)	0,011 (3)
$\gamma_{10,1}$(Pm)	594,80 (3)	0,2684 (36)	M1 + 23,2 % E2	0,00995 (23)	0,00137 (3)	0,000292 (6)	0,0117 (3)
$\gamma_{8,0}$(Pm)	649,04 (8)	0,00510 (39)	M2	0,0251 (4)	0,00371 (6)	0,000799 (12)	0,0299 (5)
$\gamma_{9,0}$(Pm)	680,52 (15)	0,0285 (14)	[M1,E2]	0,0063 (18)	0,00088 (17)	0,00019 (4)	0,0074 (18)
$\gamma_{10,0}$(Pm)	685,90 (4)	0,841 (9)	M1 + 45,8 % E2	0,0063 (4)	0,00088 (4)	0,000188 (9)	0,0074 (5)

3 Atomic Data

3.1 Pm

ω_K : 0,922 (4)
$\bar{\omega}_L$: 0,148 (6)
n_{KL} : 0,861 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	38,1716		55,1
	$K\alpha_1$	38,7251		100
	$K\beta_3$	43,713	}	30,1
	$K\beta_1$	43,826	}	
	$K\beta_5''$	44,145	}	
	$K\beta_2$	44,937	}	8,4
	$K\beta_4$	45,064	}	
	$KO_{2,3}$	45,162	}	
X_L				
	$L\ell$	4,81		
	$L\alpha$	5,4061 – 5,4325		
	$L\eta$	5,363		
	$L\beta$	5,9552 – 6,3985		
	$L\gamma$	6,6814 – 7,1893		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	30,16 – 32,08	100
KLX	36,03 – 37,63	49,6
KXY	41,84 – 44,16	7,1
Auger L	3,10 – 6,27	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pm)	3,10 - 6,27		43,4 (18)
e_{AK}	(Pm)			3,9 (4)
	KLL	30,16 - 32,08		}
	KLX	36,03 - 37,63		}
	KXY	41,84 - 44,16		}
$\mathrm{ec}_{1,0\ \mathrm{K}}$	(Pm)	45,921	(2)	48,7 (32)
$\mathrm{ec}_{5,3\ \mathrm{K}}$	(Pm)	75,30	(5)	0,279 (12)
$\mathrm{ec}_{1,0\ \mathrm{L}}$	(Pm)	83,677 - 84,646		7,10 (46)
$\mathrm{ec}_{1,0\ \mathrm{M}}$	(Pm)	89,460 - 90,078		1,52 (10)
$\mathrm{ec}_{1,0\ \mathrm{N}}$	(Pm)	90,774 - 91,101		0,342 (22)
$\mathrm{ec}_{8,5\ \mathrm{L}}$	(Pm)	110,52 - 111,49		0,128 (11)
$\mathrm{ec}_{10,3\ \mathrm{K}}$	(Pm)	230,190	(15)	0,0614 (12)
$\mathrm{ec}_{3,1\ \mathrm{K}}$	(Pm)	274,227	(18)	0,1023 (19)
$\mathrm{ec}_{5,0\ \mathrm{K}}$	(Pm)	485,832	(22)	0,163 (18)
$\beta^-_{0,10}$	max:	209,8	(9)	2,184 (16)
$\beta^-_{0,10}$	avg:	57,54	(27)	
$\beta^-_{0,9}$	max:	215,3	(9)	0,0897 (28)
$\beta^-_{0,9}$	avg:	59,16	(27)	
$\beta^-_{0,8}$	max:	246,7	(9)	0,296 (19)
$\beta^-_{0,8}$	avg:	91,35	(33)	
$\beta^-_{0,6}$	max:	262,8	(9)	0,0190 (27)
$\beta^-_{0,6}$	avg:	85,89	(33)	
$\beta^-_{0,5}$	max:	364,7	(9)	14,6 (9)
$\beta^-_{0,5}$	avg:	106,02	(30)	
$\beta^-_{0,4}$	max:	406,4	(9)	0,781 (15)
$\beta^-_{0,4}$	avg:	119,83	(30)	
$\beta^-_{0,3}$	max:	485,2	(9)	0,715 (34)
$\beta^-_{0,3}$	avg:	146,67	(30)	
$\beta^-_{0,1}$	max:	804,6	(9)	81 (5)
$\beta^-_{0,1}$	avg:	263,99	(35)	
$\beta^-_{0,0}$	max:	895,7	(9)	0 (5)
$\beta^-_{0,0}$	avg:	299,45	(35)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pm)	4,81 — 7,1893		7,6 (3)	
XKα_2	(Pm)	38,1716		12,9 (9)	} Kα
XKα_1	(Pm)	38,7251		23,5 (15)	}
XKβ_3	(Pm)	43,713	}		
XKβ_1	(Pm)	43,826	}	7,3 (5)	K$'\beta_1$
XKβ_5''	(Pm)	44,145	}		
XKβ_2	(Pm)	44,937	}		
XKβ_4	(Pm)	45,064	}	1,87 (13)	K$'\beta_2$
XKO$_{2,3}$	(Pm)	45,162	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{4,2}$(Pm)	80,82 (27)	0,00086 (11)
$\gamma_{1,0}$(Pm)	91,105 (2)	28,4 (18)
$\gamma_{8,5}$(Pm)	117,98 (8)	0,0152 (13)
$\gamma_{5,3}$(Pm)	120,48 (5)	0,361 (14)
$\gamma_{9,5}$(Pm)	149,3 (2)	0,00368 (38)
$\gamma_{10,5}$(Pm)	154,7 (2)	0,00394 (38)
$\gamma_{8,4}$(Pm)	159,7 (2)	0,00508 (38)
$\gamma_{9,4}$(Pm)	191,0 (3)	0,00356 (38)
$\gamma_{10,4}$(Pm)	196,64 (4)	0,1798 (18)
$\gamma_{8,2}$(Pm)	240,5 (2)	0,0406 (25)
$\gamma_{9,2}$(Pm)	271,87 (6)	0,0126 (9)
$\gamma_{10,3}$(Pm)	275,374 (15)	0,775 (11)
$\gamma_{3,1}$(Pm)	319,411 (18)	1,991 (19)
$\gamma_{4,1}$(Pm)	398,155 (20)	0,855 (8)
$\gamma_{2,0}$(Pm)	408,52 (6)	0,0178 (13)
$\gamma_{3,0}$(Pm)	410,48 (3)	0,137 (6)
$\gamma_{5,1}$(Pm)	439,895 (22)	1,203 (11)
$\gamma_{4,0}$(Pm)	489,24 (3)	0,136 (11)
$\gamma_{5,0}$(Pm)	531,016 (22)	12,7 (9)
$\gamma_{6,1}$(Pm)	541,83 (7)	0,0188 (27)
$\gamma_{9,1}$(Pm)	589,35 (4)	0,037 (2)
$\gamma_{10,1}$(Pm)	594,80 (3)	0,2653 (36)
$\gamma_{8,0}$(Pm)	649,04 (8)	0,00495 (38)
$\gamma_{9,0}$(Pm)	680,52 (15)	0,0283 (14)
$\gamma_{10,0}$(Pm)	685,90 (4)	0,834 (9)

6 Main Production Modes

$\left\{\begin{array}{ll}\mathrm{Nd}-146(\mathrm{n},\gamma)\mathrm{Nd}-147 & \sigma : 1{,}4\ (1)\ \text{barns} \\ \text{Possible impurities : none} & \end{array}\right.$

Fission product.

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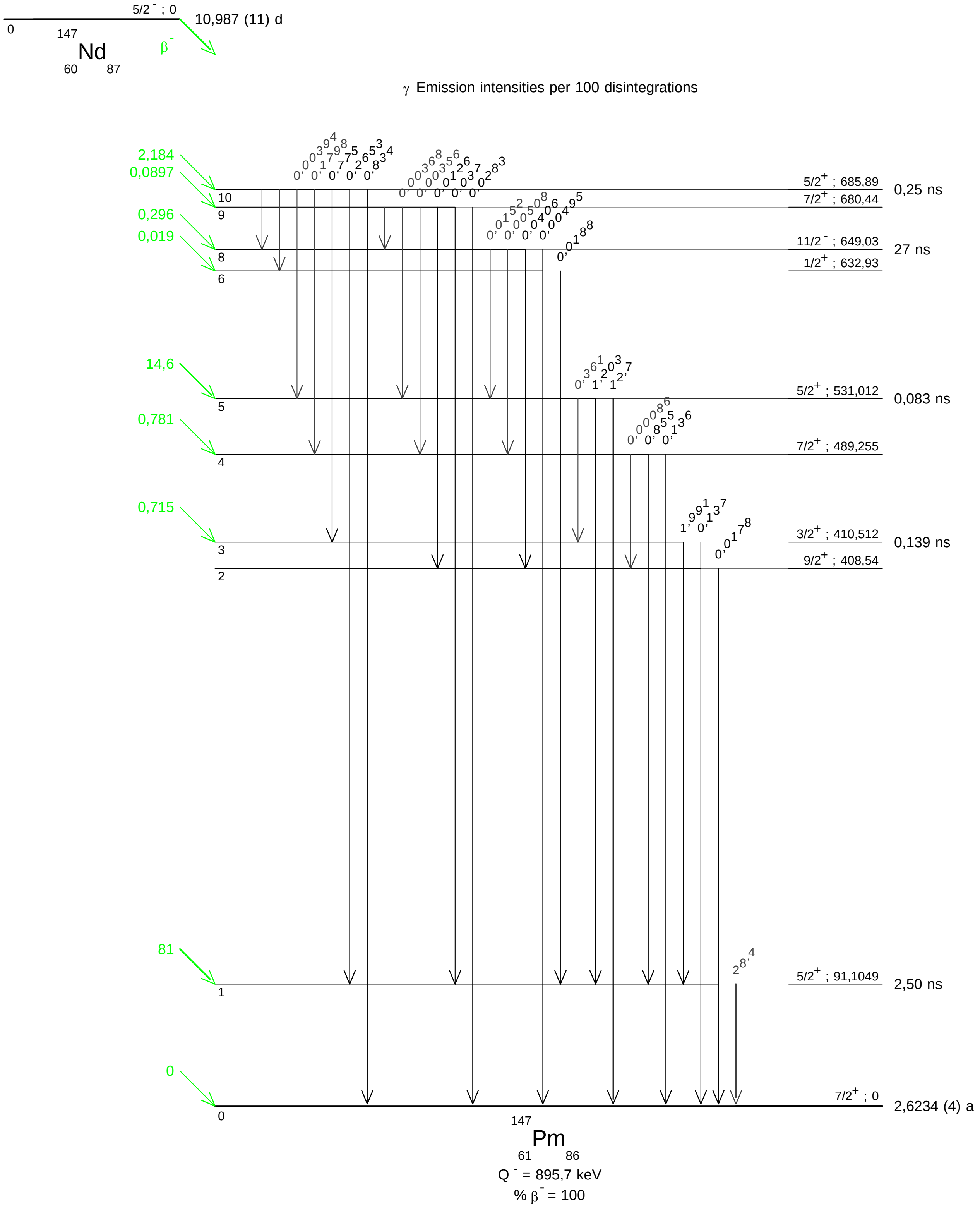
5/2⁻ ; 0
0
147 Nd 60 87
10,987 (11) d
β⁻
γ Emission intensities per 100 disintegrations
2,184
0,0897
0,296
0,019
14,6
0,781
0,715
81
0
0,00394
0,1798
0,775
0,2653
0,834
0,00368
0,00356
0,0126
0,037
0,0283
0,0152
0,00508
0,0406
0,00495
0,0188
0,361
1,203
12,7
0,00086
0,855
0,136
1,991
0,137
0,0178
28,4
10
9
8
6
5
4
3
2
1
0
5/2⁺ ; 685,89
7/2⁺ ; 680,44
11/2⁻ ; 649,03
1/2⁺ ; 632,93
5/2⁺ ; 531,012
7/2⁺ ; 489,255
3/2⁺ ; 410,512
9/2⁺ ; 408,54
5/2⁺ ; 91,1049
7/2⁺ ; 0
0,25 ns
27 ns
0,083 ns
0,139 ns
2,50 ns
2,6234 (4) a
147 Pm 61 86
Q⁻ = 895,7 keV
% β⁻ = 100

$^{147}_{61}\mathrm{Pm}_{86}$

1 Decay Scheme

Pm-147 disintegrates by beta minus emission to the Sm-147 ground state mainly.
Le prométhéum 147 se désintègre par émission bêta moins principalement vers le niveau fondamental du samarium 147.

2 Nuclear Data

$T_{1/2}(^{147}\mathrm{Pm})$	:	2,6234	(4)	a
$T_{1/2}(^{147}\mathrm{Sm})$	:	107,9	(12)	10^9 a
$Q^-(^{147}\mathrm{Pm})$	:	224,1	(3)	keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,2}$	26,8 (3)	0,00000040 (7)	Unique 1st Forbidden	12,1
$\beta^-_{0,1}$	102,9 (3)	0,00542 (13)	1st Forbidden	10,6
$\beta^-_{0,0}$	224,1 (3)	99,99456 (13)	1st Forbidden	7,4

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{2,1}$(Sm)	[76,073 (10)]	0,000000061 (11)	M1 + 30,0% E2	2,91 (5)	1,26 (7)	0,288 (15)	4,53 (9)
$\gamma_{1,0}$(Sm)	121,223 (12)	0,00542 (13)	M1+9,13% E2	0,815 (12)	0,141 (4)	0,0308 (8)	0,994 (14)
$\gamma_{2,0}$(Sm)	197,298 (11)	0,00000040 (7)	E2	0,1565 (22)	0,0482 (7)	0,01092 (16)	0,218 (3)

3 Atomic Data

3.1 Sm

ω_K : 0,926 (4)
$\bar{\omega}_L$: 0,158 (6)
n_{KL} : 0,857 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	39,5229		55,25
	$K\alpha_1$	40,1186		100
	$K\beta_3$	45,289	}	
	$K\beta_1$	45,413	}	
	$K\beta_5''$	45,731	}	31,26
	$K\beta_2$	46,575	}	
	$K\beta_4$	46,705	}	8,07
	$KO_{2,3}$	46,813	}	
X_L				
	$L\ell$	4,991		
	$L\alpha$	5,609 – 5,638		
	$L\eta$	5,586		
	$L\beta$	6,193 – 6,656		
	$L\gamma$	6,964 – 7,487		

4 Electron Emissions

		Energy keV	Electrons per 100 disint.
$\beta^-_{0,2}$	max:	26,8 (3)	0,00000040 (7)
$\beta^-_{0,2}$	avg:	6,9 (1)	
$\beta^-_{0,1}$	max:	102,9 (3)	0,00542 (13)
$\beta^-_{0,1}$	avg:	26,9 (1)	
$\beta^-_{0,0}$	max:	224,1 (3)	99,99456 (13)
$\beta^-_{0,0}$	avg:	61,8 (1)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Sm)	4,991 — 7,487		0,000369 (8)	
XKα_2	(Sm)	39,5229		0,000583 (16)	} Kα
XKα_1	(Sm)	40,1186		0,001055 (29)	}
XKβ_3	(Sm)	45,289	}		
XKβ_1	(Sm)	45,413	}	0,00033 (1)	K$'\beta_1$
XKβ_5''	(Sm)	45,731	}		
XKβ_2	(Sm)	46,575	}		
XKβ_4	(Sm)	46,705	}	0,0000851 (30)	K$'\beta_2$
XKO$_{2,3}$	(Sm)	46,813	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Sm)	[76,073 (10)]	0,000000011 (2)
$\gamma_{1,0}$(Sm)	121,223 (12)	0,00272 (6)
$\gamma_{2,0}$(Sm)	197,298 (11)	0,00000033 (5)

6 Main Production Modes

$\left\{\begin{array}{l}\text{Fission product}\\ \text{Possible impurities : Pm – 149, Pm – 151, Pm – 152}\end{array}\right.$

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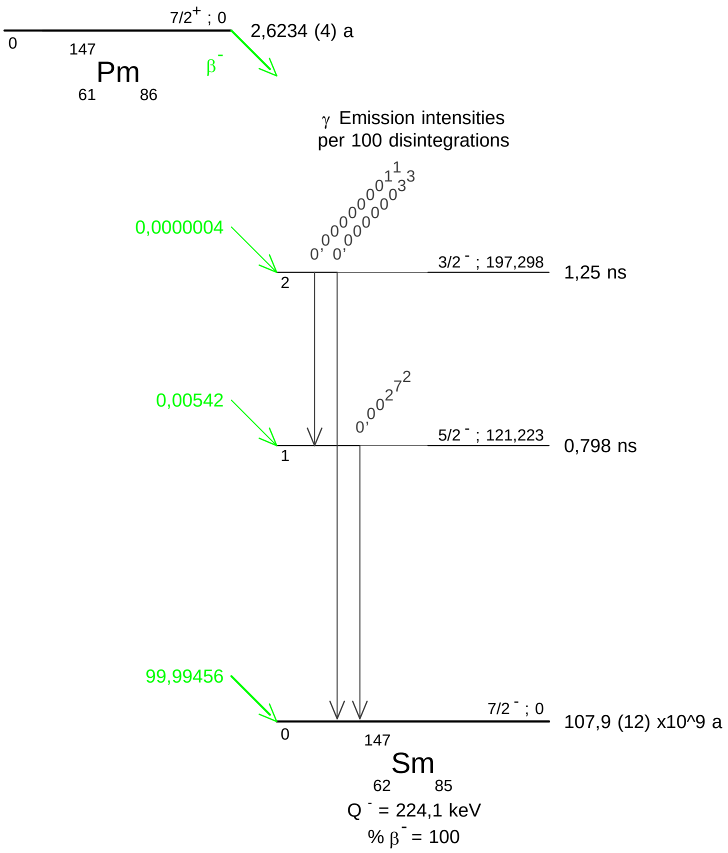
7/2+ ; 0
0
2,6234 (4) a
147
Pm
61
86
β-
γ Emission intensities
per 100 disintegrations
0,000000011
0,00000033
0,0000004
3/2 - ; 197,298
2
1,25 ns
0,00272
0,00542
5/2 - ; 121,223
1
0,798 ns
99,99456
7/2 - ; 0
0
107,9 (12) x10^9 a
147
Sm
62
85
Q - = 224,1 keV
% β- = 100

$^{195}_{79}\text{Au}_{116}$

1 Decay Scheme

Au-195 disintegrates by electron capture transition to the ground state level and excited levels in Pt-195.
L'or 195 se désintègre par capture électronique vers l'état fondamental et des niveaux excités du platine 195.

2 Nuclear Data

$T_{1/2}(^{195}\text{Au})$: 184,7 (14) d
$Q^{+}(^{195}\text{Au})$: 226,8 (10) keV

2.1 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,4}$	15,4 (10)	0,0210 (18)	Unique 1st Forbidden	7,1		0,05 (5)	0,95 (5)
$\epsilon_{0,3}$	27,3 (10)	0,0149 (14)	Unique 1st Forbidden	8,1		0,50 (2)	0,50 (2)
$\epsilon_{0,2}$	97 (1)	32,8 (30)	1st Forbidden	6,3	0,178 (12)	0,587 (9)	0,235 (4)
$\epsilon_{0,1}$	127,9 (10)	57,6 (35)	Unique 1st Forbidden	6,5	0,452 (6)	0,398 (4)	0,1499 (18)
$\epsilon_{0,0}$	226,8 (10)	9,5 (4)	1st Forbidden	8,1	0,6851 (10)	0,2336 (7)	0,0813 (3)

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\text{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{2,1}$(Pt)	30,895 (6)	30,5 (30)	M1+0,02%E2		28,7 (5)	6,65 (11)	37,3 (6)
$\gamma_{1,0}$(Pt)	98,882 (4)	88,1 (16)	M1+1,5%E2	5,59 (8)	0,977 (16)	0,227 (4)	6,86 (10)
$\gamma_{2,0}$(Pt)	129,777 (5)	2,33 (8)	E2	0,467 (7)	0,948 (14)	0,245 (4)	1,729 (25)
$\gamma_{3,0}$(Pt)	199,526 (12)	0,0149 (14)	M1+59%E2	0,42 (6)	0,1374 (25)	0,0338 (9)	0,60 (6)
$\gamma_{4,0}$(Pt)	211,398 (6)	0,0210 (18)	M1+12,6%E2	0,595 (13)	0,1090 (16)	0,0255 (4)	0,737 (14)

3 Atomic Data

3.1 Pt

ω_K : 0,959 (4)
$\bar{\omega}_L$: 0,331 (13)
n_{KL} : 0,818 (4)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	65,123		58,5
	$K\alpha_1$	66,833		100
	$K\beta_3$	75,369	}	
	$K\beta_1$	75,749	}	
	$K\beta_5''$	76,234	}	33,6
	$K\beta_2$	77,786	}	
	$K\beta_4$	78,07	}	9,6
	$KO_{2,3}$	78,337	}	
X_L				
	$L\ell$	8,2683		
	$L\alpha$	9,362 – 9,4423		
	$L\eta$	9,9768		
	$L\beta$	10,8411 – 11,2344		
	$L\gamma$	12,5496 – 13,3617		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	50,399 – 55,021	100
KLX	61,116 – 66,829	54,6
KXY	71,80 – 78,39	7,45
Auger L	5,07 – 14,25	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pt)	5,07 - 14,25		129 (8)
e_{AK}	(Pt)			4,0 (5)
	KLL	50,399 - 55,021	}	
	KLX	61,116 - 66,829	}	
	KXY	71,80 - 78,39	}	
$ec_{2,1\ L}$	(Pt)	17,014 - 19,331		23,0 (23)
$ec_{1,0\ K}$	(Pt)	20,487 (4)		62,7 (12)
$ec_{2,1\ M}$	(Pt)	27,597 - 28,774		5,3 (5)
$ec_{2,1\ N}$	(Pt)	30,171 - 30,824		1,32 (13)
$ec_{2,0\ K}$	(Pt)	51,382 (5)		0,399 (15)
$ec_{1,0\ L}$	(Pt)	85,002 - 87,318		10,95 (23)
$ec_{1,0\ M}$	(Pt)	95,584 - 96,761		2,54 (6)
$ec_{1,0\ N}$	(Pt)	98,158 - 98,811		0,630 (14)
$ec_{2,0\ L}$	(Pt)	115,896 - 118,213		0,81 (3)
$ec_{2,0\ M}$	(Pt)	126,479 - 127,656		0,209 (8)
$ec_{2,0\ N}$	(Pt)	129,053 - 129,706		0,0510 (19)

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pt)	8,2683 — 13,3617		53,1 (24)	
XKα_2	(Pt)	65,123		27,4 (17)	} Kα
XKα_1	(Pt)	66,833		46,9 (29)	}
XKβ_3	(Pt)	75,369	}	15,8 (10)	K$'\beta_1$
XKβ_1	(Pt)	75,749	}		
XKβ_5''	(Pt)	76,234	}		
XKβ_2	(Pt)	77,786	}	4,51 (30)	K$'\beta_2$
XKβ_4	(Pt)	78,07	}		
XKO$_{2,3}$	(Pt)	78,337	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Pt)	30,895 (7)	0,80 (8)
$\gamma_{1,0}$(Pt)	98,882 (4)	11,21 (15)
$\gamma_{2,0}$(Pt)	129,777 (5)	0,854 (29)
$\gamma_{3,0}$(Pt)	199,526 (12)	0,0093 (8)
$\gamma_{4,0}$(Pt)	211,398 (6)	0,0121 (10)

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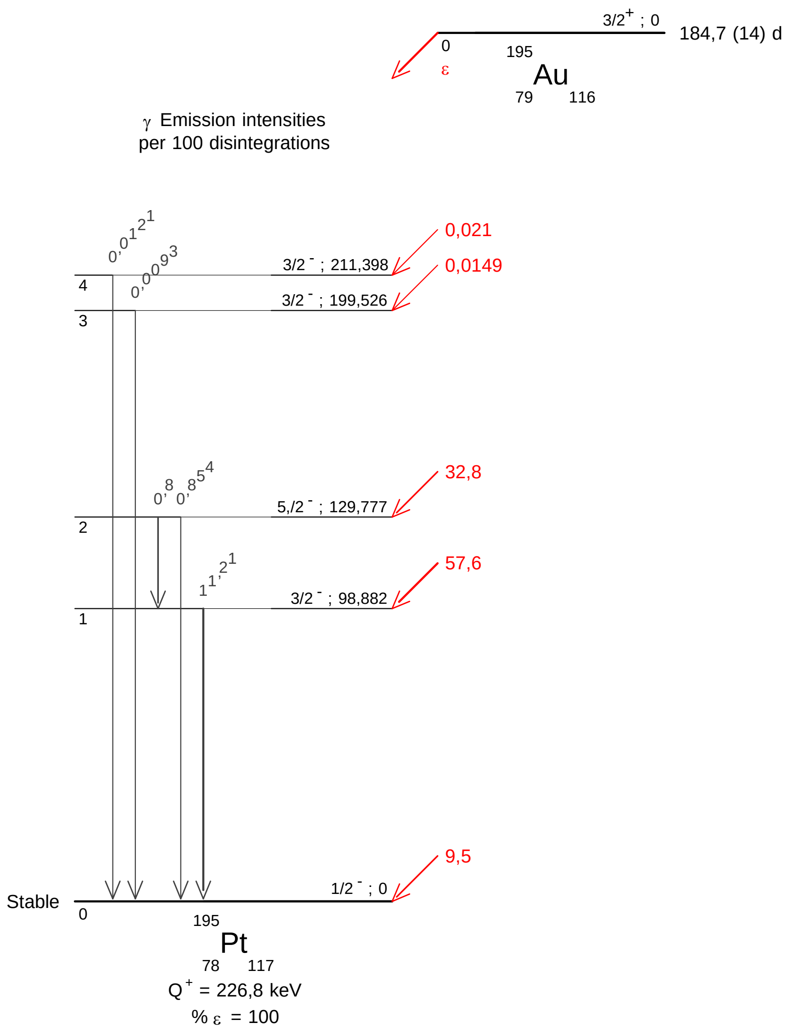
  (Q.)


3/2+ ; 0
184,7 (14) d
0
ε
195
Au
79
116
γ Emission intensities
per 100 disintegrations
0,0121
0,0093
0,8
0,854
11,21
4
3
2
1
0
3/2 - ; 211,398
3/2 - ; 199,526
5/2 - ; 129,777
3/2 - ; 98,882
1/2 - ; 0
0,021
0,0149
32,8
57,6
9,5
Stable
195
Pt
78
117
Q+ = 226,8 keV
% ε = 100

$^{206}_{80}\mathrm{Hg}_{126}$

1 Decay Scheme

Hg-206 disintegrates by 100% beta minus decay to Tl-206, 62(7) % to the ground state, and by 35(7) % and 3.0(4) % to the 304.9 keV and 649.4 keV levels, respectively.
Le mercure 206 se désintègre par émission bêta moins vers les niveaux excités de 304,9 keV et 649,4 keV et le niveau fondamental du thallium 206.

2 Nuclear Data

$T_{1/2}(^{206}\mathrm{Hg})$: 8,32 (7) min
$Q^{-}(^{206}\mathrm{Hg})$: 1308 (20) keV

2.1 β^{-} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{-}_{0,3}$	659 (20)	3,0 (4)	1st forbidden non-unique	5,41
$\beta^{-}_{0,2}$	1003 (20)	35 (7)	1st forbidden non-unique	5,24
$\beta^{-}_{0,0}$	1308 (20)	62 (7)	1st forbidden non-unique	5,67

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Tl)	265,832 (5)	0,014 (7)	E2	0,0855 (12)	0,0561 (8)	0,01440 (21)	0,1603 (23)
$\gamma_{2,0}$(Tl)	304,896 (6)	36 (7)	M1	0,308 (5)	0,0519 (8)	0,01211 (17)	0,375 (6)
$\gamma_{3,2}$(Tl)	344,52 (17)	0,70 (14)	M1	0,221 (4)	0,0371 (6)	0,00866 (13)	0,269 (4)
$\gamma_{3,1}$(Tl)	383,59 (6)	0,014 (7)	M1 (+ E2)	0,10 (7)	0,021 (7)	0,0050 (15)	0,13 (8)
$\gamma_{3,0}$(Tl)	649,42 (5)	2,3 (3)	M1	0,0412 (6)	0,00681 (10)	0,001585 (23)	0,0501 (7)

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				
	$K\alpha_2$	70,8325		59,24
	$K\alpha_1$	72,8725		100
	$K\beta_3$	82,118	}	
	$K\beta_1$	82,577	}	
	$K\beta_5''$	83,115	}	34
	$K\beta_2$	84,838	}	
	$K\beta_4$	85,134	}	10,1
	$KO_{2,3}$	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	5,25 – 15,32	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Tl)	5,25 - 15,32		5,1 (4)
e_{AK}	(Tl)			0,30 (7)
	KLL	54,587 - 59,954	}	
	KLX	66,37 - 72,86	}	
	KXY	78,12 - 85,50	}	
$ec_{2,0\ K}$	(Tl)	219,366	(6)	8,0 (15)
$ec_{3,2\ K}$	(Tl)	258,99	(17)	0,122 (24)
$ec_{2,0\ L}$	(Tl)	289,549 - 292,238		1,35 (26)
$ec_{2,0\ M}$	(Tl)	301,192 - 302,507		0,31 (6)
$ec_{2,0\ N}$	(Tl)	304,050 - 304,777		0,080 (15)
$ec_{3,0\ K}$	(Tl)	563,89	(5)	0,0906 (18)
$\beta^-_{0,3}$	max:	659	(20)	3,0 (4)
$\beta^-_{0,3}$	avg:	203	(7)	
$\beta^-_{0,2}$	max:	1003	(20)	35 (7)
$\beta^-_{0,2}$	avg:	330	(8)	
$\beta^-_{0,0}$	max:	1308	(20)	62 (7)
$\beta^-_{0,0}$	avg:	450	(8)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Tl)	8,9531 — 14,7362	2,9 (4)	
$XK\alpha_2$	(Tl)	70,8325	2,3 (5)	Kα
$XK\alpha_1$	(Tl)	72,8725	3,9 (8)	
$XK\beta_3$	(Tl)	82,118	1,32 (25)	$K'\beta_1$
$XK\beta_1$	(Tl)	82,577		
$XK\beta_5''$	(Tl)	83,115		
$XK\beta_2$	(Tl)	84,838	0,39 (8)	$K'\beta_2$
$XK\beta_4$	(Tl)	85,134		
$XKO_{2,3}$	(Tl)	85,444		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Tl)	265,832 (5)	0,012 (6)
$\gamma_{2,0}$(Tl)	304,896 (6)	26 (5)
$\gamma_{3,2}$(Tl)	344,52 (17)	0,55 (11)
$\gamma_{3,1}$(Tl)	383,59 (6)	0,012 (6)
$\gamma_{3,0}$(Tl)	649,42 (5)	2,2 (3)

6 Main Production Modes

Pb – 210(α)Hg – 206
Hg – 204(t,p)Hg – 206
Pb – 208(p,3p)Hg – 206

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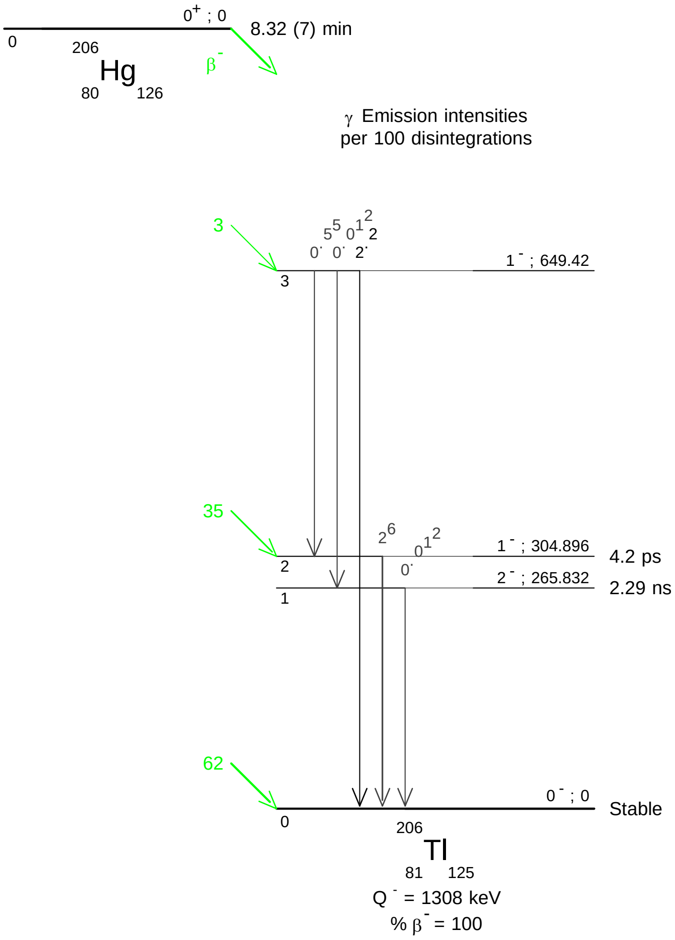
0+ ; 0
8.32 (7) min
0
206 Hg 80 126
β-
γ Emission intensities
per 100 disintegrations
3
35
62
1- ; 649.42
1- ; 304.896
4.2 ps
2- ; 265.832
2.29 ns
0- ; 0
Stable
3
2
1
0
206 Tl 81 125
Q- = 1308 keV
% β- = 100

$$^{207}_{81}\mathrm{Tl}_{126}$$

1 Decay Scheme

Tl-207 decays 100% by beta minus emission to the ground state and two excited levels in Pb-207.
Le thallium 207 se désintègre par émission bêta moins vers deux niveaux excités et le niveau fondamental du plomb 207.

2 Nuclear Data

$T_{1/2}(^{207}\mathrm{Tl})$: 4,774 (12) min
$Q^-(^{207}\mathrm{Tl})$: 1418 (5) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,2}$	520 (5)	0,271 (10)	1st forbidden non-unique	6,15
$\beta^-_{0,1}$	848 (5)	< 0,00008	1st forbidden unique	> 10,8
$\beta^-_{0,0}$	1418 (5)	99,729 (10)	1st forbidden non-unique	5,11

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{2,1}$(Pb)	328,10 (12)	0,00189 (19)	[M1]	0,273 (4)	0,0466 (7)	0,01090 (16)	0,334 (5)
$\gamma_{1,0}$(Pb)	569,698 (2)	0,00189 (19)	E2	0,01584 (23)	0,00439 (7)	0,001081 (16)	0,0216 (3)
$\gamma_{2,0}$(Pb)	897,77 (12)	0,269 (9)	M1 + 0,8% E2	0,0192 (3)	0,00318 (5)	0,000741 (11)	0,0233 (4)

3 Atomic Data

3.1 Pb

ω_K : 0,963 (4)
$\bar{\omega}_L$: 0,379 (15)
n_{KL} : 0,811 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	72,8049		59,5
	$K\alpha_1$	74,97		100
	$K\beta_3$	84,451	}	
	$K\beta_1$	84,937	}	
	$K\beta_5''$	85,47	}	34,2
	$K\beta_2$	87,238	}	
	$K\beta_4$	87,58	}	10,3
	$KO_{2,3}$	87,911	}	
X_L				
	$L\ell$	9,186		
	$L\alpha$	10,4495 – 10,5512		
	$L\eta$	11,3495		
	$L\beta$	12,1443 – 13,3763		
	$L\gamma$	14,3078 – 15,2169		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	56,028 – 61,669	100
KLX	68,181 – 74,969	55,8
KXY	80,3 – 88,0	7,78
Auger L	5,33 – 15,82	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5,33 - 15,82		0,00333 (6)
e_{AK}	(Pb)			0,000202 (23)
	KLL	56,028 - 61,669	}	
	KLX	68,181 - 74,969	}	
	KXY	80,3 - 88,0	}	
$\beta^-_{0,2}$	max:	520 (5)		0,271 (10)
$\beta^-_{0,2}$	avg:	155,0 (17)		
$\beta^-_{0,1}$	max:	848 (5)		< 0,00008
$\beta^-_{0,1}$	avg:	273,2 (18)		
$\beta^-_{0,0}$	max:	1418 (5)		99,729 (10)
$\beta^-_{0,0}$	avg:	492,5 (21)		

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9,186 — 15,217		0,00201 (6)	
XKα_2	(Pb)	72,805		0,00154 (6)	} Kα
XKα_1	(Pb)	74,97		0,00258 (10)	}
XKβ_3	(Pb)	84,451	}		
XKβ_1	(Pb)	84,937	}	0,00088 (4)	K$'\beta_1$
XKβ_5''	(Pb)	85,47	}		
XKβ_2	(Pb)	87,238	}		
XKβ_4	(Pb)	87,58	}	0,000266 (12)	K$'\beta_2$
XKO$_{2,3}$	(Pb)	87,911	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Pb)	328,10 (12)	0,00142 (14)
$\gamma_{1,0}$(Pb)	569,698 (2)	0,00185 (19)
$\gamma_{2,0}$(Pb)	897,77 (12)	0,263 (9)

6 Main Production Modes

Bi – 211(α)Tl – 207

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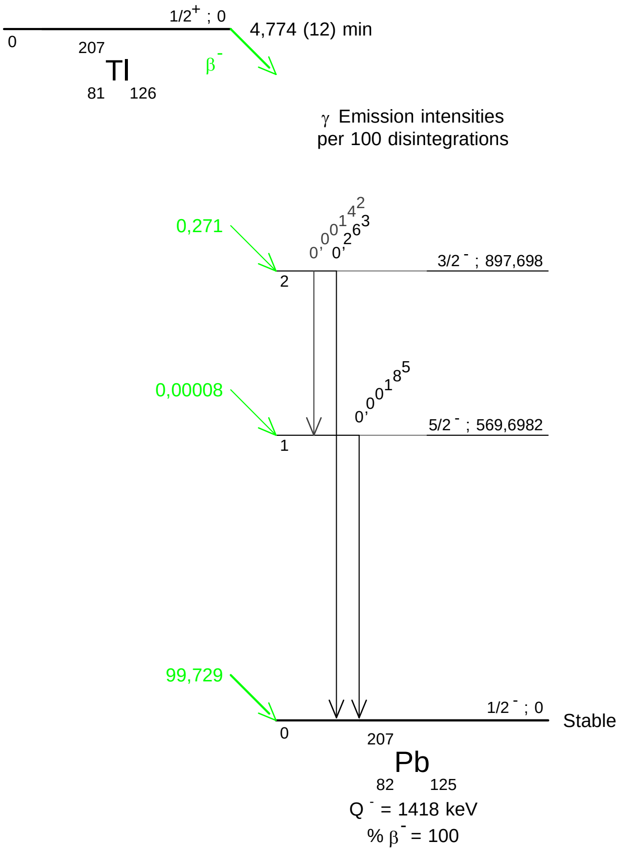
1/2+ ; 0
4,774 (12) min
0
207
Tl
81 126
β-
γ Emission intensities
per 100 disintegrations
0,271
0,00142
0,263
3/2 - ; 897,698
2
0,00008
0,00185
5/2 - ; 569,6982
1
99,729
1/2 - ; 0
Stable
0
207
Pb
82 125
Q - = 1418 keV
% β- = 100

$^{208}_{81}\mathrm{Tl}_{127}$

1 Decay Scheme

Tl-208 ground state ($J^{\pi} = 5^{+}$) decays by beta minus emission to various excited levels of Pb-208.
Le thallium 208 se désintègre par émission bêta moins vers les niveaux excités du plomb 208.

2 Nuclear Data

$T_{1/2}(^{208}\mathrm{Tl})$: 3,058 (6) min
$Q^{-}(^{208}\mathrm{Tl})$: 4999,0 (17) keV

2.1 β^{-} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{-}_{0,23}$	518,3 (17)	0,052 (5)	1st forbidden non-unique	6,67
$\beta^{-}_{0,21}$	615,7 (17)	0,017 (5)	1st forbidden non-unique	7,41
$\beta^{-}_{0,20}$	640,3 (17)	0,045 (4)	1st forbidden non-unique	7,04
$\beta^{-}_{0,19}$	675,1 (17)	0,005 (2)	allowed	8,1
$\beta^{-}_{0,18}$	702,4 (17)	0,102 (11)	1st forbidden non-unique	6,82
$\beta^{-}_{0,17}$	737,1 (17)	0,002 (1)	1st forbidden non-unique	8,6
$\beta^{-}_{0,13}$	818,6 (17)	0,231 (9)	1st forbidden non-unique	6,7
$\beta^{-}_{0,12}$	873,7 (17)	0,174 (9)	1st forbidden non-unique	6,92
$\beta^{-}_{0,8}$	1003,6 (17)	0,007 (3)	1st forbidden non-unique	8,5
$\beta^{-}_{0,7}$	1037,8 (17)	3,17 (4)	1st forbidden non-unique	5,92
$\beta^{-}_{0,6}$	1052,4 (17)	0,048 (3)	1st forbidden non-unique	7,76
$\beta^{-}_{0,5}$	1079,0 (17)	0,63 (4)	1st forbidden non-unique	6,68
$\beta^{-}_{0,4}$	1290,5 (17)	24,1 (2)	1st forbidden non-unique	5,38
$\beta^{-}_{0,3}$	1523,9 (17)	22,1 (5)	1st forbidden non-unique	5,69
$\beta^{-}_{0,2}$	1801,3 (17)	49,2 (6)	1st forbidden non-unique	5,61

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T	α_π (10^{-4})
$\gamma_{5,4}$(Pb)	211,52 (2)	0,38 (2)	M1+3%E2	0,890 (14)	0,1570 (22)	0,0369 (6)	1,096 (17)	
$\gamma_{4,3}$(Pb)	233,37 (2)	0,51 (2)	[M1+33%E2]	0,51 (3)	0,1136 (18)	0,0275 (4)	0,66 (3)	
$\gamma_{7,4}$(Pb)	252,71 (2)	1,26 (3)	[M1+14%E2]	0,495 (14)	0,0926 (14)	0,0220 (4)	0,616 (15)	
$\gamma_{3,2}$(Pb)	277,37 (2)	10,1 (5)	[M1+0,04%E2]	0,432 (6)	0,0739 (11)	0,01730 (25)	0,529 (8)	
$\gamma_{7,3}$(Pb)	486,08 (2)	0,055 (4)	[M1]	0,0954 (14)	0,01608 (23)	0,00376 (6)	0,1164 (17)	
$\gamma_{4,2}$(Pb)	510,74 (2)	24,8 (2)	[M1+0,25%E2]	0,0835 (13)	0,01406 (21)	0,00329 (5)	0,1019 (16)	
$\gamma_{2,1}$(Pb)	583,187 (2)	86,7 (3)	E2	0,01509 (22)	0,00410 (6)	0,001009 (15)	0,0205 (3)	
$\gamma_{18,4}$(Pb)	588,109 (18)	0,06 (1)	[M1]	0,0577 (8)	0,00968 (14)	0,00226 (4)	0,0704 (10)	
$\gamma_{12,3}$(Pb)	650,27 (2)	0,043 (5)	[M1]	0,0444 (7)	0,00742 (11)	0,001733 (25)	0,0541 (8)	
$\gamma_{13,3}$(Pb)	705,34 (2)	0,023 (4)	[M1]	0,0360 (5)	0,00599 (9)	0,001399 (20)	0,0438 (7)	
$\gamma_{5,2}$(Pb)	722,26 (2)	0,25 (4)	M1+8,8%E2	0,0317 (6)	0,00534 (10)	0,001248 (22)	0,0387 (7)	
$\gamma_{6,2}$(Pb)	748,87 (2)	0,048 (3)	[M1]	0,0308 (5)	0,00512 (8)	0,001196 (17)	0,0375 (6)	
$\gamma_{7,2}$(Pb)	763,45 (2)	1,86 (2)	[M1+1,0%E2]	0,0291 (4)	0,00484 (7)	0,001130 (16)	0,0354 (5)	
$\gamma_{(-1,1)}$(Pb)	808,32 (13)	0,030 (7)						
$\gamma_{18,3}$(Pb)	821,48 (2)	0,042 (4)	M1	0,0242 (4)	0,00402 (6)	0,000939 (14)	0,0295 (5)	
$\gamma_{(-1,2)}$(Pb)	835,90 (11)	0,076 (11)						
$\gamma_{3,1}$(Pb)	860,53 (2)	12,7 (1)	[M1+0,02%E2]	0,0215 (3)	0,00356 (5)	0,000831 (12)	0,0262 (4)	
$\gamma_{20,3}$(Pb)	883,59 (2)	0,032 (3)	[M1]	0,0201 (3)	0,00333 (5)	0,000776 (11)	0,0244 (4)	
$\gamma_{12,2}$(Pb)	927,64 (2)	0,131 (7)	[M1]	0,01774 (25)	0,00293 (5)	0,000684 (10)	0,0216 (3)	
$\gamma_{13,2}$(Pb)	982,70 (2)	0,208 (8)	[M1]	0,01530 (22)	0,00253 (4)	0,000589 (9)	0,0186 (3)	
$\gamma_{4,1}$(Pb)	1093,90 (2)	0,44 (1)	E2	0,00449 (7)	0,000844 (12)	0,000200 (3)	0,00560 (8)	
$\gamma_{19,2}$(Pb)	1126,24 (2)	0,005 (2)	E1	0,001691 (24)	0,000256 (4)	0,0000590 (9)	0,00203 (3)	0,0206 (3)
$\gamma_{20,2}$(Pb)	1160,96 (2)	0,011 (3)	[M1]	0,01000 (14)	0,001641 (23)	0,000382 (6)	0,01214 (17)	0,0259 (4)
$\gamma_{21,2}$(Pb)	1185,57 (2)	0,017 (5)	[M1]	0,00947 (14)	0,001555 (22)	0,000362 (5)	0,01151 (17)	0,0501 (7)
$\gamma_{23,2}$(Pb)	1283,04 (2)	0,052 (5)	[M1]	0,00775 (11)	0,001269 (18)	0,000295 (5)	0,00943 (14)	0,232 (4)
$\gamma_{8,1}$(Pb)	1380,89 (2)	0,007 (3)	[M1]	0,00643 (9)	0,001050 (15)	0,000245 (4)	0,00785 (11)	0,546 (8)
$\gamma_{17,1}$(Pb)	1647,32 (2)	0,002 (1)	[M1]	0,00411 (6)	0,000669 (10)	0,0001556 (22)	0,00518 (8)	1,94 (3)
$\gamma_{20,12}$(Pb)	1744,12 (2)	0,002 (1)	[M1]	0,00356 (5)	0,000578 (8)	0,0001344 (19)	0,00457 (7)	2,55 (4)
$\gamma_{1,0}$(Pb)	2614,511 (10)	100	E3	0,001708 (24)	0,000292 (4)	0,0000685 (10)	0,00246 (4)	3,71 (6)

2.3 Pb

ω_K : 0,963 (4)
$\bar{\omega}_L$: 0,379 (15)
n_{KL} : 0,811 (5)

2.3.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	72,8049		59,4
	$K\alpha_1$	74,97		100
	$K\beta_3$	84,451	}	
	$K\beta_1$	84,937	}	
	$K\beta_5''$	85,47	}	34,2

		Energy keV		Relative probability
	$K\beta_2$	87,238	}	
	$K\beta_4$	87,58	}	10,3
	$KO_{2,3}$	87,911	}	
X_L				
	$L\ell$	9,184		
	$L\alpha$	10,45 – 10,551		
	$L\eta$	11,349		
	$L\beta$	12,142 – 13,015		
	$L\gamma$	14,765 – 15,216		

2.3.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	56,028 – 61,669	100
KLX	68,181 – 74,969	55,5
KXY	80,3 – 88,0	7,7
Auger L	5,262 – 10,398	2745

3 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5,262 - 10,398		4,50 (13)
e_{AK}	(Pb)			0,27 (3)
	KLL	56,028 - 61,669	}	
	KLX	68,181 - 74,969	}	
	KXY	80,3 - 88,0	}	
$ec_{3,2}$ T	(Pb)	189,36 - 277,37		3,50 (16)
$ec_{3,2}$ K	(Pb)	189,36 (2)		2,86 (13)
$ec_{3,2}$ L	(Pb)	261,51 - 264,33		0,49 (2)
$ec_{3,2}$ M+	(Pb)	273,52 - 277,37		0,15 (1)
$ec_{4,2}$ T	(Pb)	422,73 - 510,74		2,30 (2)
$ec_{4,2}$ K	(Pb)	422,73 (2)		1,88 (2)
$ec_{4,2}$ L	(Pb)	494,88 - 497,70		0,32
$ec_{2,1}$ T	(Pb)	495,18 - 583,19		1,70 (1)
$ec_{2,1}$ K	(Pb)	495,18 (2)		1,25 (1)
$ec_{4,2}$ M+	(Pb)	506,89 - 510,74		0,098

		Energy keV		Electrons per 100 disint.
$\mathrm{ec}_{2,1\ \mathrm{L}}$	(Pb)	567,33 - 570,15		0,34
$\mathrm{ec}_{2,1\ \mathrm{M+}}$	(Pb)	579,33 - 583,19		0,109
$\mathrm{ec}_{1,0\ \alpha}$	(Pb)	1592,51	(1)	0,0369 (6)
$\mathrm{ec}_{1,0\ \mathrm{K}}$	(Pb)	2526,51	(1)	0,170 (3)
$\mathrm{ec}_{1,0\ \mathrm{L}}$	(Pb)	2598,65 - 2601,48		0,0291 (4)
$\beta^-_{0,23}$	max:	518,3	(17)	0,052 (5)
$\beta^-_{0,23}$	avg:	154,3	(6)	
$\beta^-_{0,21}$	max:	615,7	(17)	0,017 (5)
$\beta^-_{0,21}$	avg:	187,7	(6)	
$\beta^-_{0,20}$	max:	640,3	(17)	0,045 (4)
$\beta^-_{0,20}$	avg:	196,4	(6)	
$\beta^-_{0,19}$	max:	675,1	(17)	0,005 (2)
$\beta^-_{0,19}$	avg:	208,6	(6)	
$\beta^-_{0,18}$	max:	702,4	(17)	0,102 (11)
$\beta^-_{0,18}$	avg:	218,3	(6)	
$\beta^-_{0,17}$	max:	737,1	(17)	0,002 (1)
$\beta^-_{0,17}$	avg:	230,8	(6)	
$\beta^-_{0,13}$	max:	818,6	(17)	0,231 (9)
$\beta^-_{0,13}$	avg:	260,4	(6)	
$\beta^-_{0,12}$	max:	873,7	(17)	0,174 (9)
$\beta^-_{0,12}$	avg:	280,8	(6)	
$\beta^-_{0,8}$	max:	1003,6	(17)	0,007 (3)
$\beta^-_{0,8}$	avg:	329,7	(7)	
$\beta^-_{0,7}$	max:	1037,8	(17)	3,17 (4)
$\beta^-_{0,7}$	avg:	342,8	(7)	
$\beta^-_{0,6}$	max:	1052,4	(17)	0,048 (3)
$\beta^-_{0,6}$	avg:	348,4	(7)	
$\beta^-_{0,5}$	max:	1079,0	(17)	0,63 (4)
$\beta^-_{0,5}$	avg:	358,6	(7)	
$\beta^-_{0,4}$	max:	1290,5	(17)	24,1 (2)
$\beta^-_{0,4}$	avg:	441,5	(7)	
$\beta^-_{0,3}$	max:	1523,9	(17)	22,1 (5)
$\beta^-_{0,3}$	avg:	535,4	(7)	
$\beta^-_{0,2}$	max:	1801,3	(17)	49,2 (6)
$\beta^-_{0,2}$	avg:	649,5	(7)	

4 Photon Emissions

4.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9,184 — 15,216		2,75 (12)	
XKα_2	(Pb)	72,8049		2,03 (5)	} Kα
XKα_1	(Pb)	74,97		3,42 (7)	}
XKβ_3	(Pb)	84,451	}		
XKβ_1	(Pb)	84,937	}	1,17 (3)	K$'\beta_1$
XKβ_5''	(Pb)	85,47	}		
XKβ_2	(Pb)	87,238	}		
XKβ_4	(Pb)	87,58	}	0,353 (11)	K$'\beta_2$
XKO$_{2,3}$	(Pb)	87,911	}		

4.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{5,4}$(Pb)	211,52 (2)	0,18 (1)
$\gamma_{4,3}$(Pb)	233,37 (2)	0,31 (1)
$\gamma_{7,4}$(Pb)	252,71 (2)	0,78 (2)
$\gamma_{3,2}$(Pb)	277,37 (2)	6,6 (3)
$\gamma_{7,3}$(Pb)	486,08 (2)	0,049 (4)
$\gamma_{4,2}$(Pb)	510,74 (2)	22,5 (2)
$\gamma_{2,1}$(Pb)	583,187 (2)	85,0 (3)
$\gamma_{18,4}$(Pb)	588,108 (18)	0,06 (1)
$\gamma_{12,3}$(Pb)	650,27 (2)	0,041 (5)
$\gamma_{13,3}$(Pb)	705,34 (2)	0,022 (4)
$\gamma_{5,2}$(Pb)	722,26 (2)	0,24 (4)
$\gamma_{6,2}$(Pb)	748,87 (2)	0,046 (3)
$\gamma_{7,2}$(Pb)	763,45 (2)	1,80 (2)
$\gamma_{(-1,1)}$(Pb)	808,32 (13)	0,030 (7)
$\gamma_{18,3}$(Pb)	821,48 (2)	0,041 (4)
$\gamma_{(-1,2)}$(Pb)	835,90 (11)	0,076 (11)
$\gamma_{3,1}$(Pb)	860,53 (2)	12,4 (1)
$\gamma_{20,3}$(Pb)	883,59 (2)	0,031 (3)
$\gamma_{12,2}$(Pb)	927,64 (2)	0,128 (7)
$\gamma_{13,2}$(Pb)	982,70 (2)	0,204 (8)
$\gamma_{4,1}$(Pb)	1093,90 (2)	0,44 (1)
$\gamma_{19,2}$(Pb)	1126,24 (2)	0,005 (2)
$\gamma_{20,2}$(Pb)	1160,96 (2)	0,011 (3)
$\gamma_{21,2}$(Pb)	1185,57 (2)	0,017 (5)
$\gamma_{23,2}$(Pb)	1283,04 (2)	0,052 (5)

	Energy keV	Photons per 100 disint.
$\gamma_{8,1}$(Pb)	1380,89 (2)	0,007 (3)
$\gamma_{17,1}$(Pb)	1647,32 (2)	0,002 (1)
$\gamma_{20,12}$(Pb)	1744,12 (2)	0,002 (1)
$\gamma_{1,0}$(Pb)	2614,511 (10)	99,755 (4)

5 Main Production Modes

Bi – 212(α)Tl – 208

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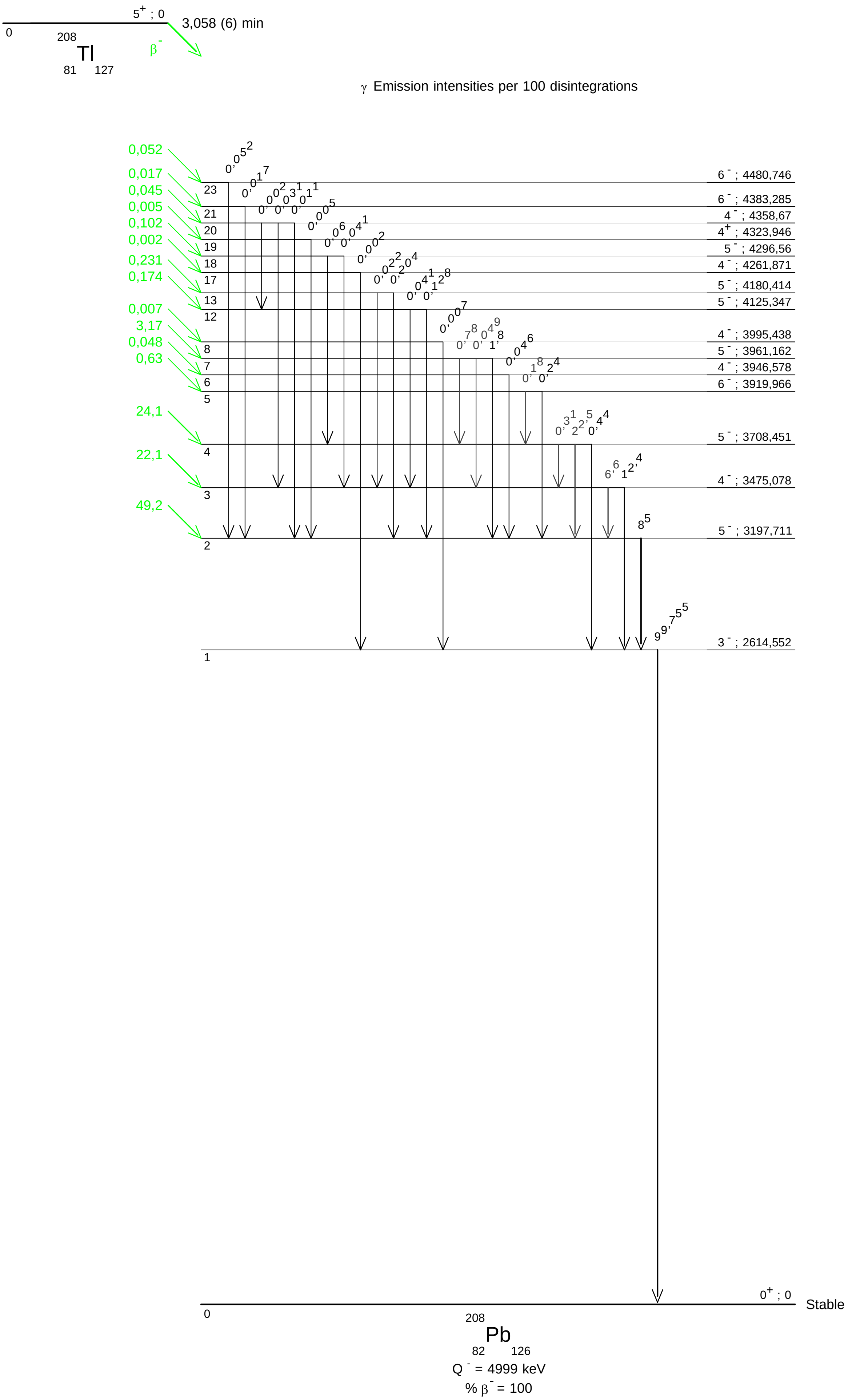
5+ ; 0
0
208 Tl 81 127
β-
3,058 (6) min
γ Emission intensities per 100 disintegrations
0,052
0,017
0,045
0,005
0,102
0,002
0,231
0,174
0,007
3,17
0,048
0,63
24,1
22,1
49,2
23
21
20
19
18
17
13
12
8
7
6
5
4
3
2
1
0
6- ; 4480,746
6- ; 4383,285
4- ; 4358,67
4+ ; 4323,946
5- ; 4296,56
4- ; 4261,871
5- ; 4180,414
5- ; 4125,347
4- ; 3995,438
5- ; 3961,162
4- ; 3946,578
6- ; 3919,966
5- ; 3708,451
4- ; 3475,078
5- ; 3197,711
3- ; 2614,552
0+ ; 0
Stable
208 Pb 82 126
Q- = 4999 keV
% β- = 100

$^{209}_{81}\mathrm{Tl}_{128}$

1 Decay Scheme

Tl-209 decays by 100 % beta minus to Pb-209. The strongest branch of 97.70 (15) % populates the $1/2^-$ excited state at 2149.29 keV.

Le thallium 209 se désintègre par émissions bêta. Le branchement de plus forte intensité peuple le niveau d'énergie 2149 keV du plomb 209.

2 Nuclear Data

$T_{1/2}(^{209}\mathrm{Tl})$: 2,161 (7) min
$T_{1/2}(^{209}\mathrm{Pb})$: 3,277 (15) h
$Q^-(^{209}\mathrm{Tl})$: 3976 (8) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,10}$	587 (8)	0,420 (22)		
$\beta^-_{0,9}$	615 (8)	0,10 (3)		
$\beta^-_{0,8}$	906 (8)	0,645 (16)	1st forbidden	6,3
$\beta^-_{0,7}$	1071 (8)	0,70 (9)	1st forbidden	6,5
$\beta^-_{0,6}$	1451 (8)	0,070 (15)	Allowed	8
$\beta^-_{0,5}$	1515 (8)	0,031 (16)	1st forbidden unique	9,2
$\beta^-_{0,4}$	1660 (8)	0,32 (11)	1st forbidden	7,5
$\beta^-_{0,3}$	1827 (8)	97,70 (15)	1st forbidden	5,2
$\beta^-_{0,2}$	1944 (8)	< 0,1	Allowed	> 8,3

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Pb)	117,22 (8)	100	E1	0,235 (4)	0,0455 (7)	0,01072 (15)	0,295 (5)
$\gamma_{4,2}$(Pb)	283,61 (14)	0,21 (10)	[M1]	0,405 (6)	0,0692 (10)	0,01620 (23)	0,495 (7)
$\gamma_{5,3}$(Pb)	311,51 (31)	0,031 (15)	[E2]	0,0596 (9)	0,0329 (5)	0,00842 (13)	0,1034 (15)
$\gamma_{6,3}$(Pb)	375,50 (22)	0,070 (15)					
$\gamma_{2,1}$(Pb)	465,13 (8)	100	E2	0,0242 (4)	0,00815 (12)	0,00204 (3)	0,0350 (5)
$\gamma_{(-1,1)}$(Pb)	469,7 (3)	0,12 (3)					
$\gamma_{3,1}$(Pb)	582,35 (8)	0,374 (29)	[M2]	0,1574 (22)	0,0322 (5)	0,00774 (11)	0,200 (3)
$\gamma_{4,1}$(Pb)	748,74 (14)	0,080 (21)	[E1]	0,00356 (5)	0,000553 (8)	0,0001280 (18)	0,00428 (6)
$\gamma_{7,3}$(Pb)	755,85 (26)	0,114 (21)	[M1]	0,0301 (5)	0,00500 (7)	0,001168 (17)	0,0366 (6)
$\gamma_{(-1,2)}$(Pb)	860,5 (3)	0,26 (4)					
$\gamma_{7,2}$(Pb)	873,07 (26)	0,59 (8)	[E1]	0,00267 (4)	0,000410 (6)	0,0000947 (14)	0,00320 (5)
$\gamma_{(-1,3)}$(Pb)	890,0 (4)	0,12 (3)					
$\gamma_{(-1,4)}$(Pb)	902,8 (4)	0,10 (2)					
$\gamma_{8,3}$(Pb)	920,43 (14)	0,645 (15)	[M1]	0,0181 (3)	0,00299 (5)	0,000698 (10)	0,0220 (3)
$\gamma_{(-1,5)}$(Pb)	970,3	0,054 (15)					
$\gamma_{10,3}$(Pb)	1239,67 (14)	0,420 (22)					
$\gamma_{9,2}$(Pb)	1329,29 (18)	0,10 (3)					
$\gamma_{1,0}$(Pb)	1566,94 (5)	100	E2	0,00234 (4)	0,000396 (6)	0,0000926 (13)	0,00294 (5)
$\gamma_{(-1,6)}$(Pb)	1661,1 (5)	0,10 (2)					
$\gamma_{(-1,7)}$(Pb)	1673,2 (4)	0,48 (4)					
$\gamma_{(-1,8)}$(Pb)	1781,7 (5)	0,04 (2)					
$\gamma_{(-1,9)}$(Pb)	2005,3 (2)	0,020 (5)					
$\gamma_{(-1,10)}$(Pb)	2032,1 (5)	0,001					
$\gamma_{3,0}$(Pb)	2149,29 (6)	0,015 (5)	[M4]	0,01218 (18)	0,00237 (4)	0,000565 (8)	0,01529 (22)
$\gamma_{4,0}$(Pb)	2315,68 (13)	0,0289 (21)	[E3]	0,00216 (3)	0,000380 (6)	0,0000893 (13)	0,00292 (4)
$\gamma_{(-1,11)}$(Pb)	2548,2	0,015 (6)					

3 Atomic Data

3.1 Pb

ω_K : 0,963 (4)
$\bar{\omega}_L$: 0,379 (15)
n_{KL} : 0,811 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	72,8049		59,5
	$K\alpha_1$	74,97		100
	$K\beta_3$	84,451	}	
	$K\beta_1$	84,937	}	
	$K\beta_5''$	85,47	}	34,2

		Energy keV		Relative probability
	$K\beta_2$	87,238	}	
	$K\beta_4$	87,58	}	10,3
	$KO_{2,3}$	87,911	}	
X_L				
	$L\ell$	9,186		
	$L\alpha$	10,4495 – 10,5512		
	$L\eta$	11,3495		
	$L\beta$	12,1443 – 13,3763		
	$L\gamma$	14,3078 – 15,2169		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	56,028 – 61,669	100
KLX	68,181 – 74,969	55,8
KXY	80,3 – 88,0	7,78
Auger L	5,34 – 15,82	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pb)	5,34 - 15,82		13,23 (15)
e_{AK}	(Pb)			0,77 (9)
	KLL	56,028 - 61,669	}	
	KLX	68,181 - 74,969	}	
	KXY	80,3 - 88,0	}	
$ec_{3,2\ K}$	(Pb)	29,22 (8)		17,51 (48)
$ec_{3,2\ L}$	(Pb)	101,36 - 104,18		3,39 (9)
$ec_{3,2\ M}$	(Pb)	113,37 - 114,74		0,799 (20)
$ec_{3,2\ N}$	(Pb)	116,33 - 117,08		0,200 (5)
$ec_{2,1\ K}$	(Pb)	377,13 (8)		2,34 (7)
$ec_{2,1\ L}$	(Pb)	449,27 - 452,09		0,786 (23)

		Energy keV		Electrons per 100 disint.
$ec_{2,1\ M}$	(Pb)	461,28 - 462,65		0,197 (6)
$ec_{1,0\ K}$	(Pb)	1478,94	(5)	0,2340 (42)
$\beta^-_{0,10}$	max:	587	(8)	0,420 (22)
$\beta^-_{0,10}$	avg:	177,8	(28)	
$\beta^-_{0,9}$	max:	615	(8)	0,10 (3)
$\beta^-_{0,9}$	avg:	187,4	(28)	
$\beta^-_{0,8}$	max:	906	(8)	0,645 (16)
$\beta^-_{0,8}$	avg:	292,9	(30)	
$\beta^-_{0,7}$	max:	1071	(8)	0,70 (9)
$\beta^-_{0,7}$	avg:	355,5	(31)	
$\beta^-_{0,6}$	max:	1451	(8)	0,070 (15)
$\beta^-_{0,6}$	avg:	505,9	(33)	
$\beta^-_{0,5}$	max:	1515	(8)	0,031 (16)
$\beta^-_{0,5}$	avg:	518,1	(31)	
$\beta^-_{0,4}$	max:	1660	(8)	0,32 (11)
$\beta^-_{0,4}$	avg:	591,2	(33)	
$\beta^-_{0,3}$	max:	1827	(8)	97,70 (15)
$\beta^-_{0,3}$	avg:	660,0	(34)	
$\beta^-_{0,2}$	max:	1944	(8)	< 0,1
$\beta^-_{0,2}$	avg:	709,0	(34)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pb)	9,186 — 15,2169		8,04 (14)	
XKα_2	(Pb)	72,8049		5,85 (10)	} Kα
XKα_1	(Pb)	74,97		9,84 (16)	}
XKβ_3	(Pb)	84,451	}		
XKβ_1	(Pb)	84,937	}	3,36 (8)	K$'\beta_1$
XKβ_5''	(Pb)	85,47	}		
XKβ_2	(Pb)	87,238	}		
XKβ_4	(Pb)	87,58	}	1,016 (28)	K$'\beta_2$
XKO$_{2,3}$	(Pb)	87,911	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Pb)	117,224 (7)	77,22 (27)
$\gamma_{4,2}$(Pb)	284,04 (23)	0,14 (7)
$\gamma_{5,3}$(Pb)	311,5 (3)	0,028 (14)
$\gamma_{6,3}$(Pb)	375,5 (2)	0,070 (15)
$\gamma_{2,1}$(Pb)	465,128 (24)	96,62 (5)
$\gamma_{(-1,1)}$(Pb)	469,7 (3)	0,12 (3)
$\gamma_{3,1}$(Pb)	582,4 (2)	0,312 (24)
$\gamma_{4,1}$(Pb)	748,3 (2)	0,080 (21)
$\gamma_{7,3}$(Pb)	755,6 (3)	0,11 (2)
$\gamma_{(-1,2)}$(Pb)	860,5 (3)	0,26 (4)
$\gamma_{7,2}$(Pb)	873,5 (4)	0,59 (8)
$\gamma_{(-1,3)}$(Pb)	890,0 (4)	0,12 (3)
$\gamma_{(-1,4)}$(Pb)	902,8 (4)	0,10 (2)
$\gamma_{8,3}$(Pb)	920,43 (11)	0,631 (15)
$\gamma_{(-1,5)}$(Pb)	970,3	0,054 (15)
$\gamma_{10,3}$(Pb)	1239,66 (11)	0,420 (22)
$\gamma_{9,2}$(Pb)	1329,29 (16)	0,10 (3)
$\gamma_{1,0}$(Pb)	1566,93 (5)	99,707 (5)
$\gamma_{(-1,6)}$(Pb)	1661,1 (5)	0,10 (2)
$\gamma_{(-1,7)}$(Pb)	1673,2 (4)	0,48 (4)
$\gamma_{(-1,8)}$(Pb)	1781,7 (5)	0,04 (2)
$\gamma_{(-1,9)}$(Pb)	2005,3 (2)	0,020 (5)
$\gamma_{(-1,10)}$(Pb)	2032,1 (5)	0,001
$\gamma_{3,0}$(Pb)	2149 (1)	0,015 (5)
$\gamma_{4,0}$(Pb)	2315,80 (21)	0,0288 (21)
$\gamma_{(-1,11)}$(Pb)	2548,2	0,015 (6)

6 Main Production Modes

$\mathrm{Bi-213}(\alpha)\mathrm{Tl-209}$

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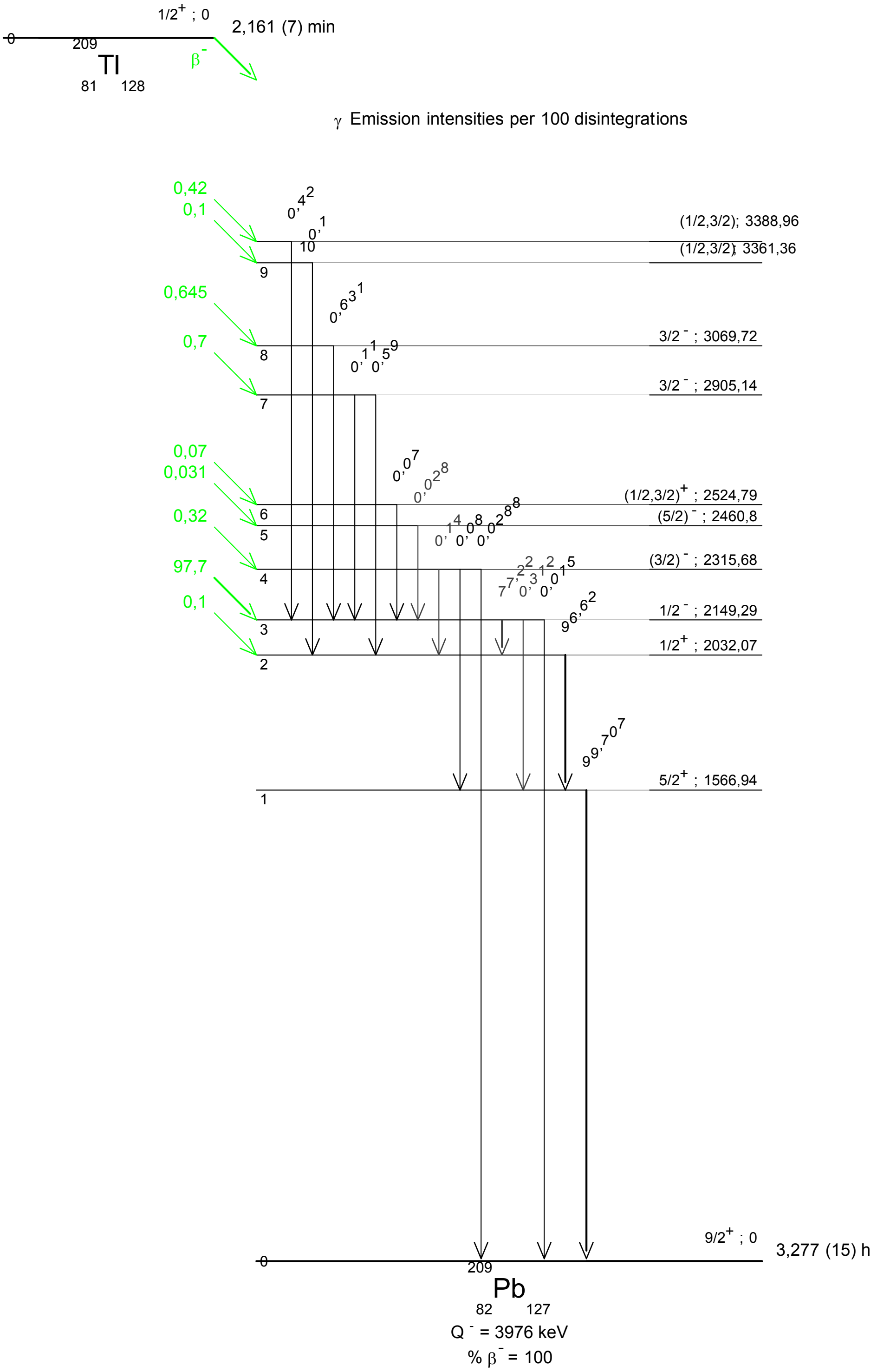
1/2+ ; 0
2,161 (7) min
0
209
Tl
81 128
β-
γ Emission intensities per 100 disintegrations
0,42
0,1
0,645
0,7
0,07
0,031
0,32
97,7
0,1
0,42
0,1
0,631
0,11
0,59
0,07
0,028
0,14
0,08
0,0288
77,22
0,312
0,015
96,62
99,707
10
9
8
7
6
5
4
3
2
1
0
(1/2,3/2); 3388,96
(1/2,3/2); 3361,36
3/2- ; 3069,72
3/2- ; 2905,14
(1/2,3/2)+ ; 2524,79
(5/2)- ; 2460,8
(3/2)- ; 2315,68
1/2- ; 2149,29
1/2+ ; 2032,07
5/2+ ; 1566,94
9/2+ ; 0
3,277 (15) h
209
Pb
82 127
Q- = 3976 keV
% β- = 100

$^{211}_{82}\mathrm{Pb}_{129}$

1 Decay Scheme

Pb-211 ground state ($J^{\pi} = 9/2^{+}$) decays by 100 % beta minus to Bi-211. The strongest branch (91.28 (12) %) decays directly to the ground state ($J^{\pi} = 9/2^{-}$).

Le plomb 211 se désintègre par émissions bêta principalement vers le niveau fondamental du bismuth 211.

2 Nuclear Data

$T_{1/2}(^{211}\mathrm{Pb})$: 36,1 (2) min
$Q^{-}(^{211}\mathrm{Pb})$: 1367 (6) keV

2.1 β^{-} Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^{-}_{0,10}$	96 (6)	0,0172 (15)	1st forbidden non-unique	5,93
$\beta^{-}_{0,9}$	133 (6)	0,0009 (3)		
$\beta^{-}_{0,8}$	171 (6)	0,019 (4)		
$\beta^{-}_{0,7}$	257 (6)	1,06 (4)	1st forbidden non-unique	5,58
$\beta^{-}_{0,6}$	263 (6)	0,0047 (7)		
$\beta^{-}_{0,5}$	286 (6)	0,0570 (24)		
$\beta^{-}_{0,3}$	535 (6)	6,32 (9)	1st forbidden non-unique	5,73
$\beta^{-}_{0,2}$	600 (6)	$< 0{,}09$	1st forbidden non-unique	$> 7{,}7$
$\beta^{-}_{0,1}$	962 (6)	1,57 (9)	1st forbidden non-unique	7,21
$\beta^{-}_{0,0}$	1367 (6)	91,28 (12)	1st forbidden non-unique	5,99

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Bi)	65,304 (18)	0,59 (3)	M1		5,05 (7)	1,188 (17)	6,61 (10)
$\gamma_{7,4}$(Bi)	95,13 (5)	0,19 (3)	M1 + 74,3% E2	2,8 (9)	4,8 (5)	1,27 (12)	9,3 (4)
$\gamma_{5,2}$(Bi)	313,96 (4)	0,0268 (21)					
$\gamma_{7,2}$(Bi)	342,83 (3)	0,035 (6)	[M1,E2]	0,16 (11)	0,035 (11)	0,0085 (22)	0,20 (12)
$\gamma_{2,1}$(Bi)	361,846 (16)	0,049 (6)	[M1,E2]	0,14 (10)	0,03 (1)	0,0072 (20)	0,17 (11)
$\gamma_{1,0}$(Bi)	404,834 (9)	4,30 (7)	M1 + 54,8% E2	0,095 (7)	0,0206 (8)	0,00499 (17)	0,122 (8)
$\gamma_{3,1}$(Bi)	427,150 (15)	2,13 (5)	M1 + 0,05% E2	0,1457 (21)	0,0249 (4)	0,00585 (9)	0,1783 (25)
$\gamma_{8,2}$(Bi)	429,65 (6)	0,008 (3)					
$\gamma_{10,2}$(Bi)	504,07 (6)	0,0059 (8)					
$\gamma_{4,1}$(Bi)	609,55 (4)	0,033 (9)					
$\gamma_{5,1}$(Bi)	675,81 (4)	0,0181 (9)					
$\gamma_{7,1}$(Bi)	704,675 (25)	0,492 (10)	M1 + 0,05% E2	0,0390 (6)	0,00657 (10)	0,001540 (22)	0,0476 (7)
$\gamma_{2,0}$(Bi)	766,680 (13)	0,64 (4)	M1	0,0313 (5)	0,00527 (8)	0,001234 (18)	0,0382 (6)
$\gamma_{3,0}$(Bi)	831,984 (12)	3,60 (5)	M1 + 13,8% E2	0,0229 (23)	0,0039 (4)	0,00092 (8)	0,028 (3)
$\gamma_{10,1}$(Bi)	865,92 (6)	0,0046 (2)					
$\gamma_{4,0}$(Bi)	1014,38 (4)	0,0173 (5)					
$\gamma_{5,0}$(Bi)	1080,64 (4)	0,0121 (5)					
$\gamma_{6,0}$(Bi)	1103,52 (20)	0,0047 (7)					
$\gamma_{7,0}$(Bi)	1109,509 (23)	0,118 (3)	[M1]	0,01209 (17)	0,00201 (3)	0,000470 (7)	0,01472 (21)
$\gamma_{8,0}$(Bi)	1196,33 (5)	0,0103 (4)					
$\gamma_{9,0}$(Bi)	1234,3 (4)	0,0009 (3)					
$\gamma_{10,0}$(Bi)	1270,75 (6)	0,0068 (12)					

3 Atomic Data

3.1 Bi

ω_K : 0,964 (4)
$\bar{\omega}_L$: 0,391 (16)
n_{KL} : 0,809 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	74,8157		59,77
	$K\alpha_1$	77,1088		100
	$K\beta_3$	86,835	}	
	$K\beta_1$	87,344	}	
	$K\beta_5''$	87,862	}	34,3
	$K\beta_2$	89,732	}	
	$K\beta_4$	90,074	}	10,5
	$KO_{2,3}$	90,421	}	

		Energy keV	Relative probability
X_L			
	Lℓ	9,4207	
	Lα	10,7308 – 10,8387	
	Lη	11,7127	
	Lβ	12,4814 – 13,8066	
	Lγ	14,7735 – 15,7084	

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	57,491 – 63,419	100
KLX	70,025 – 77,105	56
KXY	82,53 – 90,52	7,84
Auger L	5,42 – 16,34	

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Bi)	5,42 - 16,34		0,782 (18)
e_{AK}	(Bi)			0,029 (4)
	KLL	57,491 - 63,419	}	
	KLX	70,025 - 77,105	}	
	KXY	82,53 - 90,52	}	
$ec_{3,2\ L}$	(Bi)	48,916 - 51,885		0,389 (21)
$ec_{1,0\ K}$	(Bi)	314,308	(9)	0,36 (3)
$ec_{3,1\ K}$	(Bi)	336,624	(15)	0,264 (7)
$\beta^-_{0,10}$	max:	96	(6)	0,0172 (15)
$\beta^-_{0,10}$	avg:	25,0	(17)	
$\beta^-_{0,9}$	max:	133	(6)	0,0009 (3)
$\beta^-_{0,9}$	avg:	35,0	(17)	
$\beta^-_{0,8}$	max:	171	(6)	0,019 (4)

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,8}$	avg:	45,6	(18)	
$\beta^-_{0,7}$	max:	257	(6)	1,06 (4)
$\beta^-_{0,7}$	avg:	71,0	(18)	
$\beta^-_{0,6}$	max:	263	(6)	0,0047 (7)
$\beta^-_{0,6}$	avg:	72,8	(18)	
$\beta^-_{0,5}$	max:	286	(6)	0,0570 (24)
$\beta^-_{0,5}$	avg:	79,7	(19)	
$\beta^-_{0,3}$	max:	535	(6)	6,32 (9)
$\beta^-_{0,3}$	avg:	159,8	(21)	
$\beta^-_{0,2}$	max:	600	(6)	$< 0{,}09$
$\beta^-_{0,2}$	avg:	182,2	(21)	
$\beta^-_{0,1}$	max:	962	(6)	1,57 (9)
$\beta^-_{0,1}$	avg:	313,3	(23)	
$\beta^-_{0,0}$	max:	1367	(6)	91,28 (12)
$\beta^-_{0,0}$	avg:	470,9	(24)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Bi)	9,4207 — 15,7084		0,494 (13)	
XKα_2	(Bi)	74,8157		0,228 (10)	} Kα
XKα_1	(Bi)	77,1088		0,381 (17)	}
XKβ_3	(Bi)	86,835	}		
XKβ_1	(Bi)	87,344	}	0,130 (6)	K$'\beta_1$
XKβ_5''	(Bi)	87,862	}		
XKβ_2	(Bi)	89,732	}		
XKβ_4	(Bi)	90,074	}	0,0399 (20)	K$'\beta_2$
XKO$_{2,3}$	(Bi)	90,421	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Bi)	65,304 (18)	0,077 (4)
$\gamma_{7,4}$(Bi)	95,13 (5)	0,018 (3)
$\gamma_{5,2}$(Bi)	313,96 (4)	0,0268 (21)
$\gamma_{7,2}$(Bi)	342,83 (3)	0,029 (4)
$\gamma_{2,1}$(Bi)	361,846 (16)	0,042 (3)
$\gamma_{1,0}$(Bi)	404,834 (9)	3,83 (6)
$\gamma_{3,1}$(Bi)	427,150 (15)	1,81 (4)
$\gamma_{8,2}$(Bi)	429,65 (6)	0,008 (3)
$\gamma_{10,2}$(Bi)	504,07 (6)	0,0059 (8)
$\gamma_{4,1}$(Bi)	609,55 (4)	0,033 (9)
$\gamma_{5,1}$(Bi)	675,81 (4)	0,0181 (9)
$\gamma_{7,1}$(Bi)	704,675 (25)	0,47 (1)
$\gamma_{2,0}$(Bi)	766,680 (13)	0,62 (4)
$\gamma_{3,0}$(Bi)	831,984 (12)	3,50 (5)
$\gamma_{10,1}$(Bi)	865,92 (6)	0,0046 (2)
$\gamma_{4,0}$(Bi)	1014,38 (4)	0,0173 (5)
$\gamma_{5,0}$(Bi)	1080,64 (4)	0,0121 (5)
$\gamma_{6,0}$(Bi)	1103,52 (20)	0,0047 (7)
$\gamma_{7,0}$(Bi)	1109,509 (23)	0,116 (3)
$\gamma_{8,0}$(Bi)	1196,33 (5)	0,0103 (4)
$\gamma_{9,0}$(Bi)	1234,3 (4)	0,0009 (3)
$\gamma_{10,0}$(Bi)	1270,75 (6)	0,0068 (12)

6 Main Production Modes

$\mathrm{Po}-215(\alpha)\mathrm{Pb}-211$

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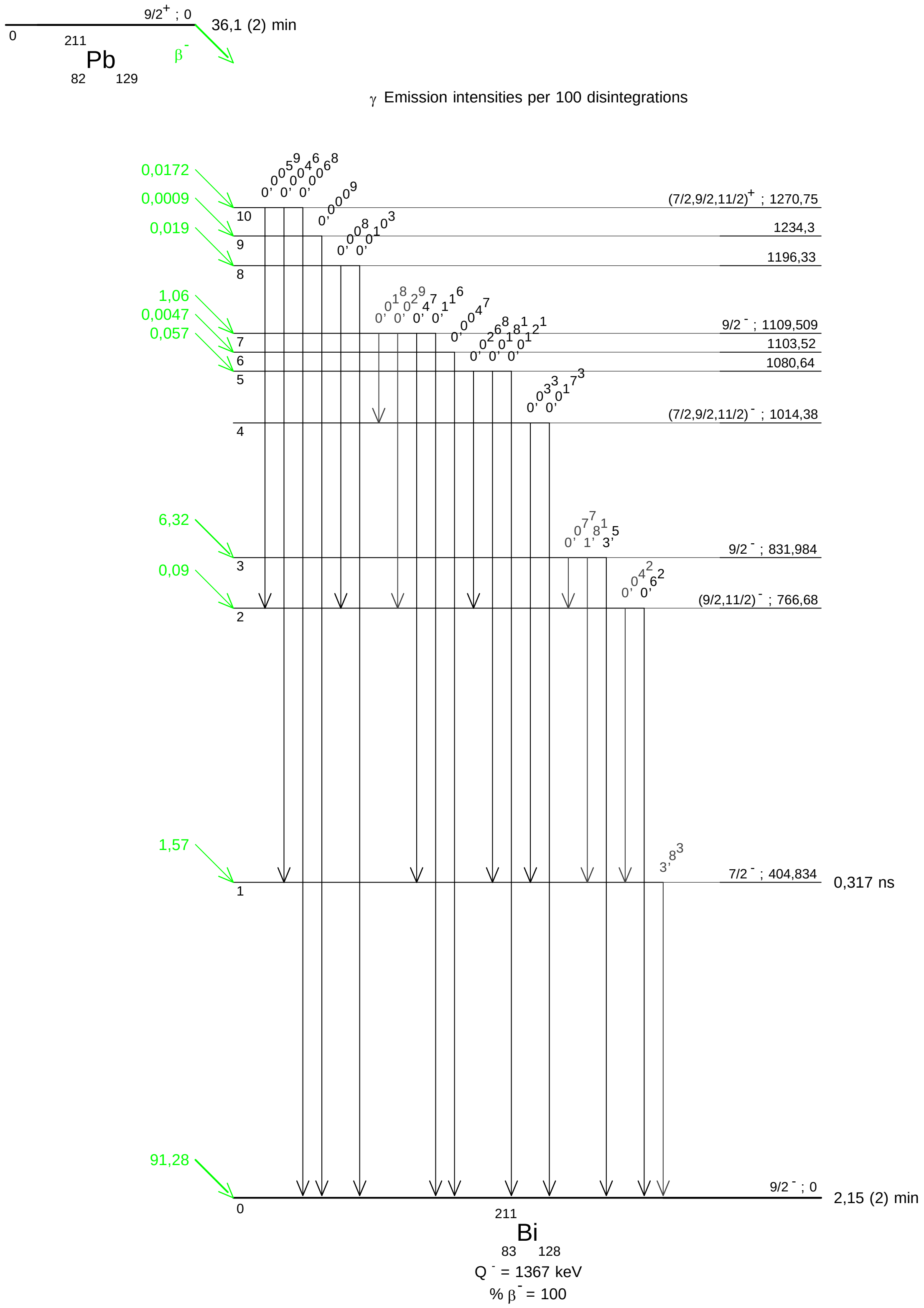
9/2+ ; 0
36,1 (2) min
0
211 Pb 82 129
β-
γ Emission intensities per 100 disintegrations
0,0172
0,0009
0,019
1,06
0,0047
0,057
6,32
0,09
1,57
91,28
10
9
8
7
6
5
4
3
2
1
0
(7/2,9/2,11/2)+ ; 1270,75
1234,3
1196,33
9/2 - ; 1109,509
1103,52
1080,64
(7/2,9/2,11/2) - ; 1014,38
9/2 - ; 831,984
(9/2,11/2) - ; 766,68
7/2 - ; 404,834
0,317 ns
9/2 - ; 0
2,15 (2) min
211 Bi 83 128
Q - = 1367 keV
% β- = 100

$^{211}_{85}\mathrm{At}_{126}$

1 Decay Scheme

At-211 undergoes alpha decay to Bi-207 (41.78(8)%) and EC decay to Po-211 (58.22(8)%).
L'astate 211 se désintègre par capture électronique essentiellement vers le niveau fondamental du polonium 211 et par émissions alpha principalement vers le niveau fondamental du bismuth 207.

2 Nuclear Data

$T_{1/2}(^{211}\mathrm{At})$	:	7,216	(7)	h
$T_{1/2}(^{211}\mathrm{Po})$	:	0,516	(3)	s
$T_{1/2}(^{207}\mathrm{Bi})$	:	32,9	(14)	a
$Q^{\alpha}(^{211}\mathrm{At})$	:	5982,4	(13)	keV
$Q^{+}(^{211}\mathrm{At})$	:	785,4	(25)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,5}$	4990,0 (13)	< 0,00004	> 9,6
$\alpha_{0,3}$	5089,9 (13)	~ 0,0004	~ 3,8
$\alpha_{0,2}$	5239,7 (13)	0,0011 (2)	10,1
$\alpha_{0,1}$	5312,6 (13)	0,0039 (3)	7,3
$\alpha_{0,0}$	5982,4 (13)	41,78 (8)	1,59

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	Nature	lg ft	P_K	P_L	P_{M+}
$\epsilon_{0,1}$	98,2 (26)	0,258 (13)	1st Forbidden non-unique	5,77	0,015 (17)	0,684 (10)	0,301 (7)
$\epsilon_{0,0}$	785,4 (25)	57,96 (8)	1st forbidden non-unique	5,97	0,7731 (2)	0,1693 (1)	0,05758 (4)

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,2}$(Bi)	149,72 (10)	~ 0,0002	M1+13,8%E2	2,3 (3)	0,50 (4)	0,120 (12)	3,0 (3)
$\gamma_{3,1}$(Bi)	222,69 (10)	~ 0,00008	M1+13,8%E2	0,76 (5)	0,1473 (23)	0,0351 (5)	0,95 (5)
$\gamma_{1,0}$(Bi)	669,77 (7)	0,0040 (3)	[M1+5,9%E2]	0,0426 (8)	0,00725 (12)	0,00170 (3)	0,0520 (9)
$\gamma_{1,0}$(Po)	687,2 (7)	0,258 (13)	(M1+3,85%E2]	0,0437 (7)	0,00752 (12)	0,00177 (3)	0,0536 (9)
$\gamma_{2,0}$(Bi)	742,74 (7)	0,0013 (2)	[M1+8,3%E2]	0,0320 (6)	0,00544 (10)	0,001276 (22)	0,0391 (7)
$\gamma_{3,0}$(Bi)	892,46 (7)	~ 0,00014	[M1+66,2%E2]	0,0117 (11)	0,00215 (16)	0,00051 (4)	0,0145 (13)

3 Atomic Data

3.1 Po

ω_K : 0,965 (4)
$\bar{\omega}_L$: 0,403 (16)
n_{KL} : 0,807 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	76,864		60,1
	$K\alpha_1$	79,293		100
	$K\beta_3$	89,256	}	
	$K\beta_1$	89,807	}	
	$K\beta_5''$	90,363	}	34,4
	$K\beta_2$	92,263	}	
	$K\beta_4$	92,618	}	10,7
	$KO_{2,3}$	92,983	}	
X_L				
	$L\ell$	9,658		
	$L\alpha$	11,016 – 11,13		
	$L\eta$	12,085		
	$L\beta$	12,823 – 13,778		
	$L\gamma$	15,742 – 16,213		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	58,978 – 65,205	100
KLX	71,902 – 79,289	54,5
KXY	84,8 – 93,1	8
Auger L	5,434 – 10,934	2905

3.2 Bi

ω_K : 0,964 (4)
$\bar{\omega}_L$: 0,391 (16)
n_{KL} : 0,809 (5)

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	74,8157		59,8
	$K\alpha_1$	77,1088		100
	$K\beta_3$	86,835	}	
	$K\beta_1$	87,344	}	
	$K\beta_5''$	87,862	}	34,1
	$K\beta_2$	89,732	}	
	$K\beta_4$	90,074	}	10,4
	$KO_{2,3}$	90,421	}	
X_L				
	$L\ell$	9,42		
	$L\alpha$	10,731 – 10,839		
	$L\eta$	11,712		
	$L\beta$	12,48 – 13,393		
	$L\gamma$	15,248 – 15,709		

3.2.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	57,491 – 63,419	100
KLX	70,025 – 77,105	55,8
KXY	82,53 – 90,52	7,8
Auger L	5,35 – 10,66	2740

4 α Emissions

	Energy keV	alpha per 100 disint.
$\alpha_{0,5}$	4895,4 (13)	< 0,00004
$\alpha_{0,3}$	4993,4 (13)	∼ 0,0004
$\alpha_{0,2}$	5140,3 (13)	0,0011 (2)
$\alpha_{0,1}$	5211,9 (13)	0,0039 (3)
$\alpha_{0,0}$	5869,0 (13)	41,78 (8)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Po)	5,434 - 10,934		27,6 (8)
e_{AK}	(Po)			1,57 (18)
	KLL	58,978 - 65,205	}	
	KLX	71,902 - 79,289	}	
	KXY	84,8 - 93,1	}	
e_{AL}	(Bi)	5,35 - 10,66		0,000211 (20)
e_{AK}	(Bi)			0,0000126 (24)
	KLL	57,491 - 63,419	}	
	KLX	70,025 - 77,105	}	
	KXY	82,53 - 90,52	}	

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9,658 — 16,213		18,6 (8)	
XKα_2	(Po)	76,864		12,66 (9)	} Kα
XKα_1	(Po)	79,293		21,08 (12)	}
XKβ_3	(Po)	89,256	}	7,26 (12)	K$'\beta_1$
XKβ_1	(Po)	89,807	}		
XKβ_5''	(Po)	90,363	}		
XKβ_2	(Po)	92,263	}	2,26 (5)	K$'\beta_2$
XKβ_4	(Po)	92,618	}		
XKO$_{2,3}$	(Po)	92,983	}		
XL	(Bi)	9,42 — 15,709		0,000136 (14)	
XKα_2	(Bi)	74,8157		0,000098 (15)	} Kα
XKα_1	(Bi)	77,1088		0,000164 (25)	}
XKβ_3	(Bi)	86,835	}	0,000056 (9)	K$'\beta_1$
XKβ_1	(Bi)	87,344	}		
XKβ_5''	(Bi)	87,862	}		
XKβ_2	(Bi)	89,732	}	0,000017 (3)	K$'\beta_2$
XKβ_4	(Bi)	90,074	}		
XKO$_{2,3}$	(Bi)	90,421	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,2}$(Bi)	149,72 (10)	~ 0,00005
$\gamma_{3,1}$(Bi)	222,69 (10)	~ 0,00004
$\gamma_{1,0}$(Bi)	669,77 (7)	0,0038 (3)
$\gamma_{1,0}$(Po)	687,2 (7)	0,245 (12)
$\gamma_{2,0}$(Bi)	742,74 (7)	0,00125 (19)
$\gamma_{3,0}$(Bi)	892,46 (7)	~ 0,00014

7 Main Production Modes

Bi – 209(α, 2n)At – 211

Bi – 209(He – 3, n)At – 211

$$\left\{\begin{array}{l}\text{Bi} - 209(\text{Li} - 7,\ 5\text{n})\text{Rn} - 211\\ \text{Rn} - 211(\text{EC})\text{At} - 211\end{array}\right.$$

$$\left\{\begin{array}{l}\text{Th} - 234(\text{p},\ \text{x})\text{Rn} - 211\\ \text{Rn} - 211(\text{EC})\text{At} - 211\end{array}\right.$$

Natural U(p, x)At – 211

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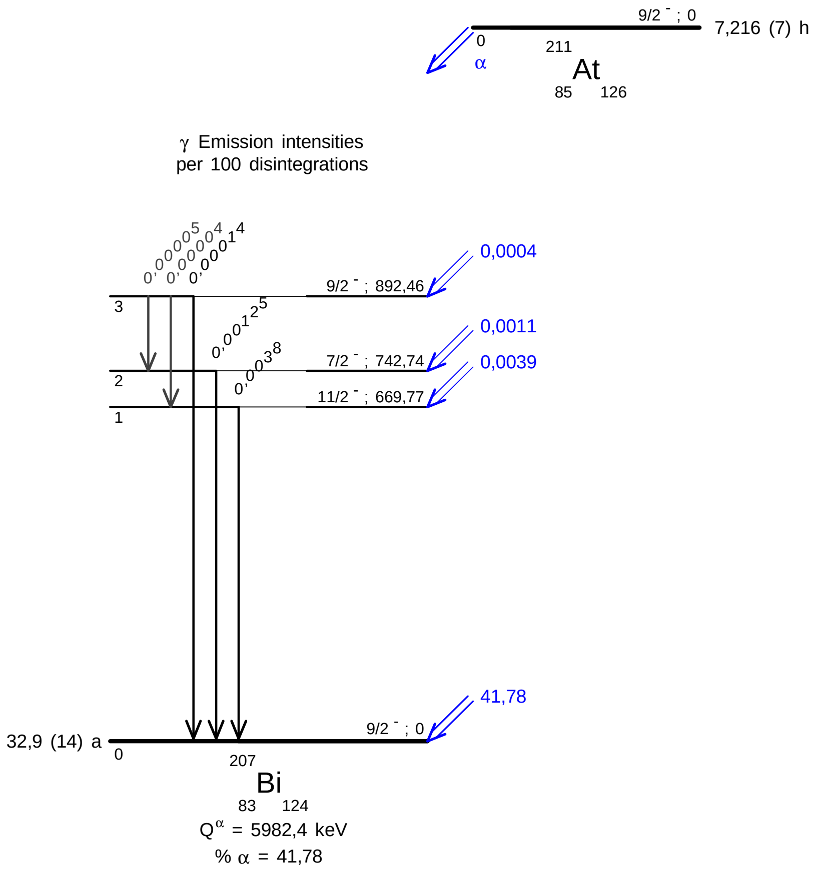
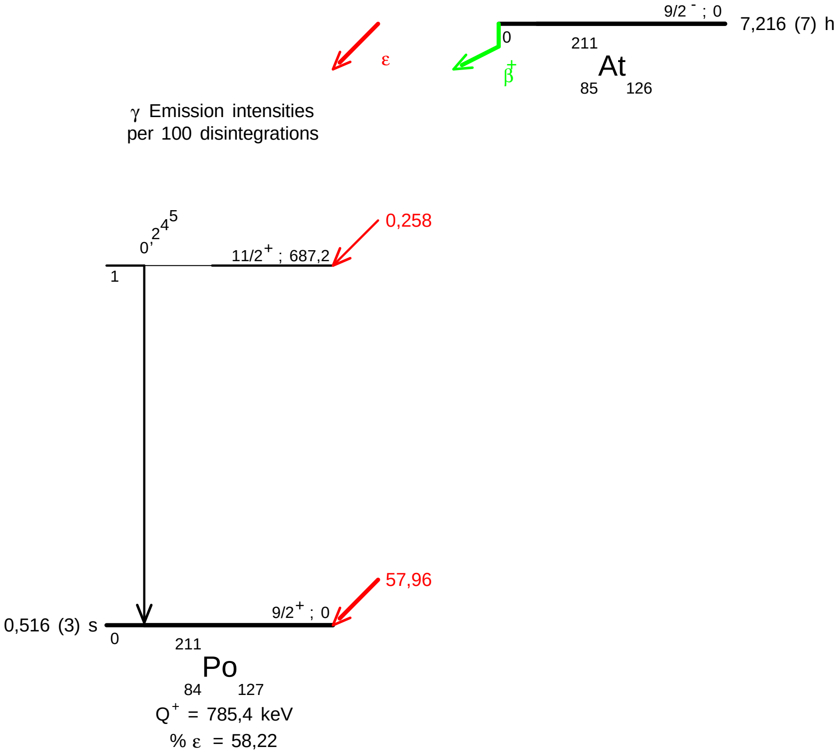

9/2 ⁻ ; 0
7,216 (7) h
0
α
211
At
85
126
γ Emission intensities
per 100 disintegrations
0,00005
0,00004
0,00014
0,00125
0,00038
3
2
1
0
9/2 ⁻ ; 892,46
7/2 ⁻ ; 742,74
11/2 ⁻ ; 669,77
9/2 ⁻ ; 0
0,0004
0,0011
0,0039
41,78
32,9 (14) a
207
Bi
83
124
Qα = 5982,4 keV
% α = 41,78


9/2⁻ ; 0
7,216 (7) h
0
211
At
85 126
ε
β+
γ Emission intensities
per 100 disintegrations
0,245
1
11/2+ ; 687,2
0,258
57,96
9/2+ ; 0
0,516 (3) s
0
211
Po
84 127
Q+ = 785,4 keV
% ε = 58,22

$^{213}_{83}\mathrm{Bi}_{130}$

1 Decay Scheme

Bi-213 disintegrates 97.91(3) % by beta minus emission to the levels in Po-213 and 2.09(3) % through alpha decay to Tl-209.
Le bismuth 213 se désintègre principalement par émissions bêta vers le polonium 213 et par émissions alpha (2,09 %) vers le thallium 209.

2 Nuclear Data

$T_{1/2}(^{213}\mathrm{Bi})$	:	45,59	(6)	min
$T_{1/2}(^{213}\mathrm{Po})$	:	3,70	(5)	10^{-6} s
$T_{1/2}(^{209}\mathrm{Tl})$	:	2,161	(7)	min
$Q^{\alpha}(^{213}\mathrm{Bi})$	:	5983	(6)	keV
$Q^{-}(^{213}\mathrm{Bi})$	:	1423	(5)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,1}$	5655 (10)	0,186 (5)	103
$\alpha_{0,0}$	5981 (10)	1,90 (4)	319

2.2 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,9}$	95 (5)	0,0014 (2)		7,68
$\beta^-_{0,8}$	304 (5)	0,0608 (20)		7,07
$\beta^-_{0,7}$	323 (5)	0,595 (17)		6,16
$\beta^-_{0,6}$	377 (5)	0,020 (4)		7,85
$\beta^-_{0,5}$	419 (5)	0,0648 (23)		7,494
$\beta^-_{0,4}$	555 (5)	0,0129 (6)	1st Forbidden Unique	8,597
$\beta^-_{0,3}$	822 (5)	0,0025 (19)		9,9
$\beta^-_{0,2}$	983 (5)	30,8 (4)	1st Forbidden	6,07
$\beta^-_{0,1}$	1130 (5)	0,21 (9)	1st Forbidden	8,45
$\beta^-_{0,0}$	1423 (5)	66,2 (4)	1st Forbidden	6,316

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M (10^{-3})	α_T
$\gamma_{2,1}$(Po)	147,70 (4)	0,0314 (20)	E2	0,307 (4)	0,85 (1)	0,226 (3)	1,453 (21)
$\gamma_{1,0}$(Po)	292,80 (1)	0,55 (8)	M1+E2	0,22 (17)	0,06 (2)	0,015 (3)	0,30 (18)
$\gamma_{1,0}$(Tl)	323,70 (2)	0,1866 (37)	M1+E2	0,134 (14)	0,0333 (13)	0,0081 (3)	0,178 (15)
$\gamma_{5,3}$(Po)	402,8 (3)	0,00010 (4)					
$\gamma_{2,0}$(Po)	440,44 (1)	30,77 (36)	M1	0,146 (2)	0,0250 (4)	5,94 (8)	0,179 (3)
$\gamma_{4,1}$(Po)	574,9 (3)	0,00068 (16)					
$\gamma_{3,0}$(Po)	600,9 (2)	0,0026 (19)					
$\gamma_{6,2}$(Po)	604,98 (18)	0,0014 (5)					
$\gamma_{7,2}$(Po)	659,759 (20)	0,043 (6)					
$\gamma_{5,1}$(Po)	710,82 (3)	0,0112 (6)					
$\gamma_{7,1}$(Po)	807,372 (11)	0,287 (14)					
$\gamma_{8,1}$(Po)	826,564 (41)	0,0065 (4)					
$\gamma_{4,0}$(Po)	867,961 (20)	0,0122 (6)					
$\gamma_{9,2}$(Po)	887,76 (30)	0,00102 (19)					
$\gamma_{5,0}$(Po)	1003,593 (17)	0,0535 (22)					
$\gamma_{6,0}$(Po)	1045,68 (8)	0,019 (4)					
$\gamma_{7,0}$(Po)	1100,17 (1)	0,265 (6)					
$\gamma_{8,0}$(Po)	1119,422 (8)	0,0543 (20)					
$\gamma_{9,0}$(Po)	1328,2 (3)	0,00039 (13)					

3 Atomic Data

3.1 Po

ω_K : 0,965 (4)
$\bar{\omega}_L$: 0,403 (16)
n_{KL} : 0,807 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	76,864		60,05
	$K\alpha_1$	79,293		100
	$K\beta_3$	89,256	}	
	$K\beta_1$	89,807	}	
	$K\beta_5''$	90,363	}	34,43
	$K\beta_2$	92,263	}	
	$K\beta_4$	92,618	}	10,71
	$KO_{2,3}$	92,983	}	
X_L				
	$L\ell$	9,6576		
	$L\alpha$	11,0161 – 11,1303		
	$L\eta$	12,0847		
	$L\beta$	12,8239 – 14,2476		
	$L\gamma$	15,251 – 16,2129		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	58,978 – 65,205	100
KLX	71,902 – 79,289	56,4
KXY	84,8 – 93,1	7,95
Auger L	5,43 – 16,86	

3.2 Tl

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

3.2.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	70,8325		59,24
	$K\alpha_1$	72,8725		100
	$K\beta_3$	82,118	}	34
	$K\beta_1$	82,577	}	
	$K\beta_5''$	83,115	}	
	$K\beta_2$	84,838	}	10,1
	$K\beta_4$	85,134	}	
	$KO_{2,3}$	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		

3.2.2 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	5,18 – 10,13	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,1}$	5549 (10)	0,186 (5)
$\alpha_{0,0}$	5869 (10)	1,90 (4)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Po)	5,43 - 16,86		1,7 (3)
e_{AK}	(Po)			0,121 (19)
	KLL	58,978 - 65,205	}	
	KLX	71,902 - 79,289	}	
	KXY	84,8 - 93,1	}	
e_{AL}	(Tl)	5,18 - 10,13		0,0107 (13)
e_{AK}	(Tl)			0,00076 (9)
	KLL	54,587 - 59,954	}	
	KLX	66,37 - 72,86	}	
	KXY	78,12 - 85,50	}	
$ec_{2,1\ L}$	(Po)	130,8 - 133,9		0,0109 (7)
$ec_{1,0\ K}$	(Po)	199,70 (1)		0,09 (7)
$ec_{1,0\ K}$	(Tl)	238,17 (2)		0,0212 (22)
$ec_{1,0\ L}$	(Po)	275,9 - 279,0		0,025 (8)
$ec_{2,0\ T}$	(Po)	347,30 - 440,41		4,67 (9)
$ec_{2,0\ K}$	(Po)	347,34 (1)		3,81 (7)
$ec_{2,0\ L}$	(Po)	423,51 - 426,63		0,653 (13)
$ec_{2,0\ M}$	(Po)	436,29 - 437,76		0,1550 (27)
$ec_{2,0\ N}$	(Po)	439,45 - 440,26		0,0392 (7)
$\beta^-_{0,9}$	max:	95 (5)		0,0014 (2)
$\beta^-_{0,9}$	avg:	24,6 (14)		
$\beta^-_{0,8}$	max:	304 (5)		0,0608 (20)
$\beta^-_{0,8}$	avg:	84,9 (16)		
$\beta^-_{0,7}$	max:	323 (5)		0,595 (17)
$\beta^-_{0,7}$	avg:	90,8 (16)		
$\beta^-_{0,6}$	max:	377 (5)		0,020 (4)
$\beta^-_{0,6}$	avg:	107,9 (16)		

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,5}$	max:	419	(5)	0,0648 (23)
$\beta^-_{0,5}$	avg:	121,4	(17)	
$\beta^-_{0,4}$	max:	555	(5)	0,0129 (6)
$\beta^-_{0,4}$	avg:	166,4	(17)	
$\beta^-_{0,3}$	max:	822	(5)	0,0025 (19)
$\beta^-_{0,3}$	avg:	260,8	(19)	
$\beta^-_{0,2}$	max:	983	(5)	30,8 (4)
$\beta^-_{0,2}$	avg:	320,4	(19)	
$\beta^-_{0,1}$	max:	1130	(5)	0,21 (9)
$\beta^-_{0,1}$	avg:	376,8	(20)	
$\beta^-_{0,0}$	max:	1423	(5)	66,2 (4)
$\beta^-_{0,0}$	avg:	492,2	(20)	

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9,6576 — 16,2129		1,14 (18)	
XKα_2	(Po)	76,864		0,99 (15)	} Kα
XKα_1	(Po)	79,293		1,6 (3)	}
XKβ_3	(Po)	89,256	}		
XKβ_1	(Po)	89,807	}	0,56 (9)	K$'\beta_1$
XKβ_5''	(Po)	90,363	}		
XKβ_2	(Po)	92,263	}		
XKβ_4	(Po)	92,618	}	0,18 (3)	K$'\beta_2$
XKO$_{2,3}$	(Po)	92,983	}		
XL	(Tl)	8,9531 — 14,7362		0,0062 (8)	
XKα_2	(Tl)	70,8325		0,0058 (7)	} Kα
XKα_1	(Tl)	72,8725		0,0098 (12)	}
XKβ_3	(Tl)	82,118	}		
XKβ_1	(Tl)	82,577	}	0,0033 (5)	K$'\beta_1$
XKβ_5''	(Tl)	83,115	}		
XKβ_2	(Tl)	84,838	}		
XKβ_4	(Tl)	85,134	}	0,00098 (14)	K$'\beta_2$
XKO$_{2,3}$	(Tl)	85,444	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{2,1}$(Po)	147,70 (4)	0,0128 (8)
$\gamma_{1,0}$(Po)	292,80 (1)	0,421 (7)
$\gamma_{1,0}$(Tl)	323,70 (2)	0,1584 (24)
$\gamma_{5,3}$(Po)	402,8 (3)	0,00010 (4)
$\gamma_{2,0}$(Po)	440,44 (1)	26,1 (3)
$\gamma_{4,1}$(Po)	574,9 (3)	0,00068 (16)
$\gamma_{3,0}$(Po)	600,9 (2)	0,0026 (19)
$\gamma_{6,2}$(Po)	604,93 (17)	0,0014 (5)
$\gamma_{7,2}$(Po)	659,75 (2)	0,043 (6)
$\gamma_{5,1}$(Po)	710,82 (3)	0,0112 (6)
$\gamma_{7,1}$(Po)	807,37 (1)	0,287 (14)
$\gamma_{8,1}$(Po)	826,55 (4)	0,0065 (4)
$\gamma_{4,0}$(Po)	867,96 (2)	0,0122 (6)
$\gamma_{9,2}$(Po)	886,66 (14)	0,00102 (19)
$\gamma_{5,0}$(Po)	1003,58 (2)	0,0535 (22)
$\gamma_{6,0}$(Po)	1045,67 (8)	0,019 (4)
$\gamma_{7,0}$(Po)	1100,16 (1)	0,265 (6)
$\gamma_{8,0}$(Po)	1119,42 (8)	0,0543 (20)
$\gamma_{9,0}$(Po)	1328,2 (3)	0,00039 (13)

7 Main Production Modes

Th – 229 decay chain

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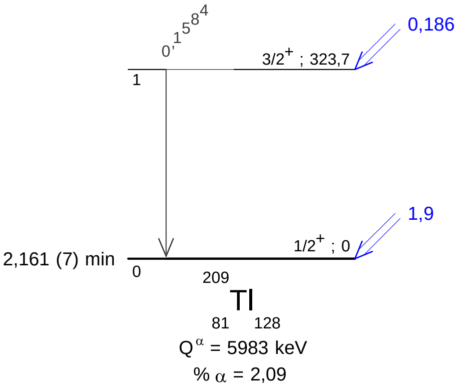
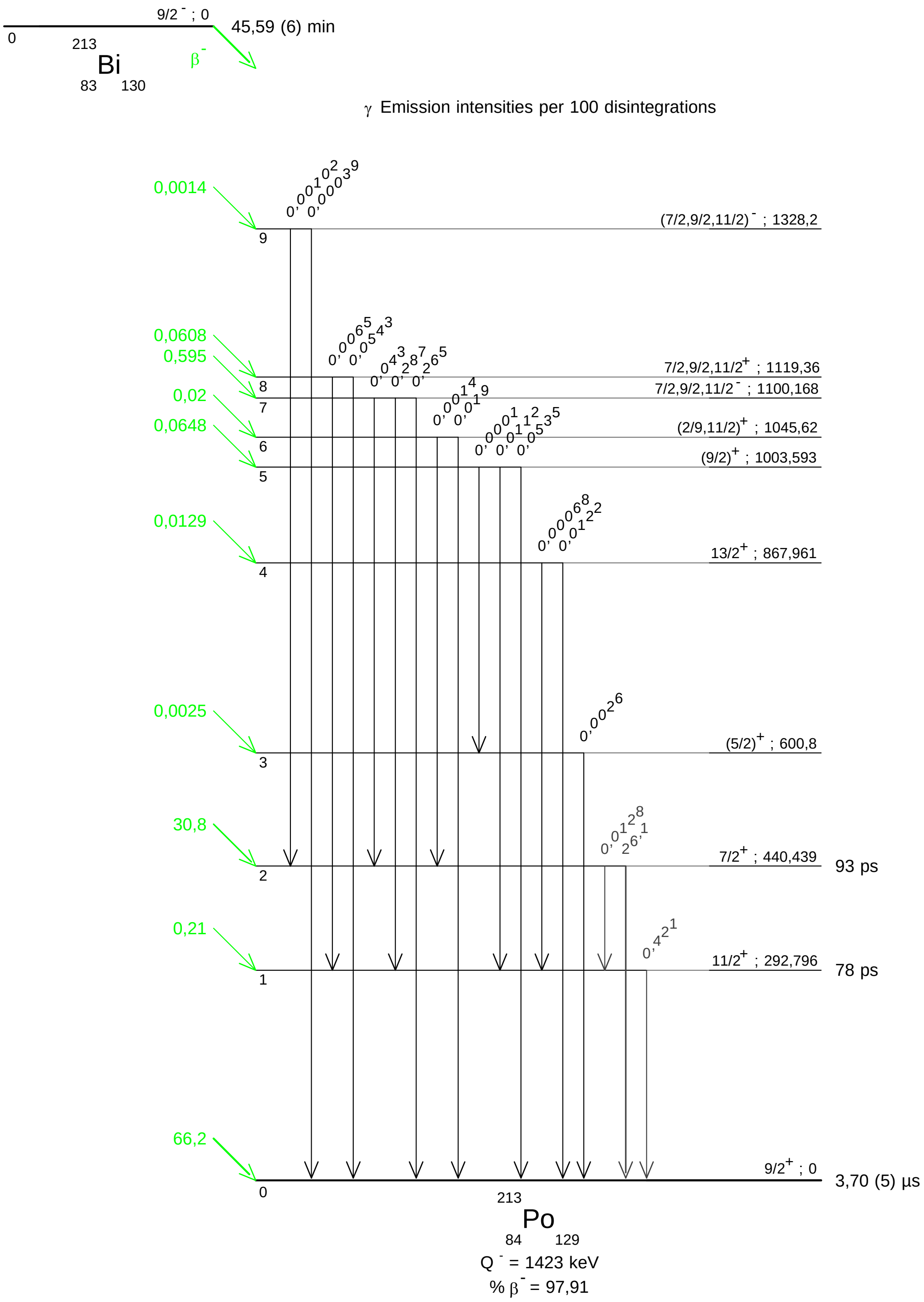

9/2$^-$; 0
45,59 (6) min
0
α
213
Bi
83 130
γ Emission intensities
per 100 disintegrations
0,1584
3/2$^+$; 323,7
0,186
1
1/2$^+$; 0
1,9
2,161 (7) min
0
209
Tl
81 128
Q^{α} = 5983 keV
% α = 2,09


9/2⁻ ; 0
0
213
Bi
83 130
β⁻
45,59 (6) min
γ Emission intensities per 100 disintegrations
0,0014
(7/2,9/2,11/2)⁻ ; 1328,2
9
0,0608
0,595
7/2,9/2,11/2⁺ ; 1119,36
8
7/2,9/2,11/2⁻ ; 1100,168
7
0,02
(2/9,11/2)⁺ ; 1045,62
6
0,0648
(9/2)⁺ ; 1003,593
5
0,0129
13/2⁺ ; 867,961
4
0,0025
(5/2)⁺ ; 600,8
3
30,8
7/2⁺ ; 440,439
93 ps
2
0,21
11/2⁺ ; 292,796
78 ps
1
66,2
9/2⁺ ; 0
3,70 (5) µs
0
213
Po
84 129
Q⁻ = 1423 keV
% β⁻ = 97,91

$^{215}_{83}$Bi $_{132}$

1 Decay Scheme

Bi-215 ground state ($J^\pi = (9/2^-)$) decays 100 % by beta-minus emission to various excited levels and the ground state of Po-215.
Le bismuth 215 se désintègre à 100 % par émissions bêta moins vers des états excités et le niveau fondamental du polonium 215.

2 Nuclear Data

$T_{1/2}(^{215}\mathrm{Bi})$: 7,6 (2) min
$T_{1/2}(^{215}\mathrm{Po})$: 1,781 (4) 10^{-3} s
$Q^-(^{215}\mathrm{Bi})$: 2189 (15) keV

2.1 β^- Transitions

	Energy keV	Probability × 100	Nature	lg ft
$\beta^-_{0,18}$	790 (15)	2,8 (1)	[1st forbidden non-unique]	6
$\beta^-_{0,17}$	895 (15)	2,0 (2)	[1st forbidden non-unique]	6,34
$\beta^-_{0,16}$	1013 (15)	0,2 (1)	[1st forbidden non-unique]	7,5
$\beta^-_{0,14}$	1111 (15)	0,7 (1)	[1st forbidden non-unique]	7,1
$\beta^-_{0,9}$	1354 (15)	1,5 (1)	[1st forbidden non-unique]	7,1
$\beta^-_{0,6}$	1512 (15)	0,5 (1)	[1st forbidden non-unique]	7,8
$\beta^-_{0,5}$	1581 (15)	0,7 (1)	(1st forbidden non-unique)	7,7
$\beta^-_{0,4}$	1671 (15)	0,3 (2)	(1st forbidden non-unique)	8,1
$\beta^-_{0,3}$	1787 (15)	0,5 (1)	(1st forbidden unique)	9
$\beta^-_{0,2}$	1895 (15)	30 (6)	(1st forbidden non-unique)	6,35
$\beta^-_{0,0}$	2189 (15)	61 (6)	(1st forbidden non-unique)	6,28

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{3,1}$(Po)	130,58 (1)	0,0505 (12)	M1+26,5%E2	3,19 (16)	0,94 (4)	0,234 (10)	4,44 (13)
$\gamma_{4,2}$(Po)	224,04 (7)	0,044 (7)	E2	0,1296 (19)	0,1407 (20)	0,0370 (6)	0,319 (5)
$\gamma_{1,0}$(Po)	271,228 (10)	2,34 (10)	M1+94%E2	0,111 (6)	0,0668 (11)	0,0173 (3)	0,201 (7)
$\gamma_{2,0}$(Po)	293,56 (4)	32 (2)	M1+50%E2	0,25 (4)	0,062 (4)	0,0152 (7)	0,34 (5)
$\gamma_{6,2}$(Po)	383,10 (8)	0,14 (7)					
$\gamma_{3,0}$(Po)	401,81 (1)	0,50 (8)	E2	0,0351 (5)	0,01528 (22)	0,00390 (6)	0,0555 (8)
$\gamma_{6,1}$(Po)	405,43 (7)	0,006 (1)					
$\gamma_{4,0}$(Po)	517,60 (6)	1,10 (8)	M1+50%E2	0,058 (9)	0,0115 (11)	0,00277 (24)	0,073 (10)
$\gamma_{9,2}$(Po)	541,76 (22)	0,21 (7)					
$\gamma_{9,1}$(Po)	564,09 (22)	0,67 (7)					
$\gamma_{5,0}$(Po)	608,30 (7)	0,67 (7)	(M1 + E2)				
$\gamma_{6,0}$(Po)	676,66 (7)	0,40 (7)					
$\gamma_{17,4}$(Po)	776,9 (1)	0,81 (14)					
$\gamma_{14,2}$(Po)	784 (2)	0,33 (7)					
$\gamma_{14,1}$(Po)	806,4 (20)	0,40 (7)					
$\gamma_{9,0}$(Po)	835,32 (22)	0,62 (7)					
$\gamma_{16,1}$(Po)	905 (2)	0,21 (7)					
$\gamma_{17,1}$(Po)	1023,3 (1)	0,62 (7)					
$\gamma_{18,2}$(Po)	1105,2 (4)	1,50 (7)					
$\gamma_{18,1}$(Po)	1127,6 (4)	0,48 (7)					
$\gamma_{17,0}$(Po)	1294,5 (1)	0,62 (7)					
$\gamma_{18,0}$(Po)	1398,8 (4)	0,81 (7)					

3 Atomic Data

3.1 Po

ω_K : 0,965 (4)
$\bar{\omega}_L$: 0,403 (16)
n_{KL} : 0,807 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	76,864		60
	$K\alpha_1$	79,293		100
	$K\beta_3$	89,256	}	34
	$K\beta_1$	89,807	}	
	$K\beta_5''$	90,363	}	
	$K\beta_2$	92,263	}	10,7
	$K\beta_4$	92,618	}	
	$KO_{2,3}$	92,983	}	

		Energy keV	Relative probability
X_L			
	$L\ell$	9,658	
	$L\alpha$	11,016 – 11,13	
	$L\eta$	12,085	
	$L\beta$	12,823 – 13,778	
	$L\gamma$	15,742 – 16,213	

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	58,978 – 65,205	100
KLX	71,902 – 79,289	58
KXY	84,8 – 93,1	8,5
Auger L	5,434 – 10,934	3080

4 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Po)	5,434 - 10,934		4,0 (4)
e_{AK}	(Po)			0,22 (5)
	KLL	58,978 - 65,205	}	
	KLX	71,902 - 79,289	}	
	KXY	84,8 - 93,1	}	
$ec_{1,0\ K}$	(Po)	178,13 (1)		0,22 (1)
$ec_{2,0\ K}$	(Po)	200,46 (4)		6,0 (4)
$ec_{1,0\ L}$	(Po)	254,30 - 257,42		0,13 (1)
$ec_{2,0\ L}$	(Po)	276,63 - 279,75		1,5 (1)
$ec_{2,0\ M+}$	(Po)	289,41 - 293,56		0,7 (1)
$\beta^-_{0,18}$	max:	790 (15)		2,8 (1)
$\beta^-_{0,18}$	avg:	249 (6)		

		Energy keV		Electrons per 100 disint.
$\beta^-_{0,17}$	max:	895	(15)	2,0 (2)
$\beta^-_{0,17}$	avg:	287	(6)	
$\beta^-_{0,16}$	max:	1013	(15)	0,2 (1)
$\beta^-_{0,16}$	avg:	332	(6)	
$\beta^-_{0,14}$	max:	1111	(15)	0,7 (1)
$\beta^-_{0,14}$	avg:	370	(6)	
$\beta^-_{0,9}$	max:	1354	(15)	1,5 (1)
$\beta^-_{0,9}$	avg:	465	(6)	
$\beta^-_{0,6}$	max:	1512	(15)	0,5 (1)
$\beta^-_{0,6}$	avg:	528	(6)	
$\beta^-_{0,5}$	max:	1581	(15)	0,7 (1)
$\beta^-_{0,5}$	avg:	556	(6)	
$\beta^-_{0,4}$	max:	1671	(15)	0,3 (2)
$\beta^-_{0,4}$	avg:	593	(6)	
$\beta^-_{0,3}$	max:	1787	(15)	0,5 (1)
$\beta^-_{0,3}$	avg:	619	(6)	
$\beta^-_{0,2}$	max:	1895	(15)	30 (6)
$\beta^-_{0,2}$	avg:	685	(6)	
$\beta^-_{0,0}$	max:	2189	(15)	61 (6)
$\beta^-_{0,0}$	avg:	808	(6)	

5 Photon Emissions

5.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Po)	9,658 — 16,213		2,7 (3)	
XKα_2	(Po)	76,864		1,8 (3)	} Kα
XKα_1	(Po)	79,293		3,0 (5)	}
XKβ_3	(Po)	89,256	}		
XKβ_1	(Po)	89,807	}	1,02 (16)	K$'\beta_1$
XKβ_5''	(Po)	90,363	}		
XKβ_2	(Po)	92,263	}		
XKβ_4	(Po)	92,618	}	0,32 (5)	K$'\beta_2$
XKO$_{2,3}$	(Po)	92,983	}		

5.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{3,1}$(Po)	130,58 (1)	0,0093 (10)
$\gamma_{4,2}$(Po)	224,04 (7)	0,033 (5)
$\gamma_{1,0}$(Po)	271,228 (10)	1,95 (7)
$\gamma_{2,0}$(Po)	293,56 (4)	23,8 (9)
$\gamma_{6,2}$(Po)	383,10 (8)	0,14 (7)
$\gamma_{3,0}$(Po)	401,81 (1)	0,48 (7)
$\gamma_{6,1}$(Po)	405,43 (7)	0,006 (1)
$\gamma_{4,0}$(Po)	517,60 (6)	1,02 (8)
$\gamma_{9,2}$(Po)	541,76 (22)	0,21 (7)
$\gamma_{9,1}$(Po)	564,09 (22)	0,67 (7)
$\gamma_{5,0}$(Po)	608,30 (7)	0,67 (7)
$\gamma_{6,0}$(Po)	676,66 (7)	0,40 (7)
$\gamma_{17,4}$(Po)	776,9 (1)	0,81 (14)
$\gamma_{14,2}$(Po)	784 (2)	0,33 (7)
$\gamma_{14,1}$(Po)	806,4 (20)	0,40 (7)
$\gamma_{9,0}$(Po)	835,32 (22)	0,62 (7)
$\gamma_{16,1}$(Po)	905 (2)	0,21 (7)
$\gamma_{17,1}$(Po)	1023,3 (1)	0,62 (7)
$\gamma_{18,2}$(Po)	1105,2 (4)	1,50 (7)
$\gamma_{18,1}$(Po)	1127,6 (4)	0,48 (7)
$\gamma_{17,0}$(Po)	1294,5 (1)	0,62 (7)
$\gamma_{18,0}$(Po)	1398,8 (4)	0,81 (7)

6 Main Production Modes

U – 235 (4n + 3) decay chain

Th – 232(p,x)Bi – 215

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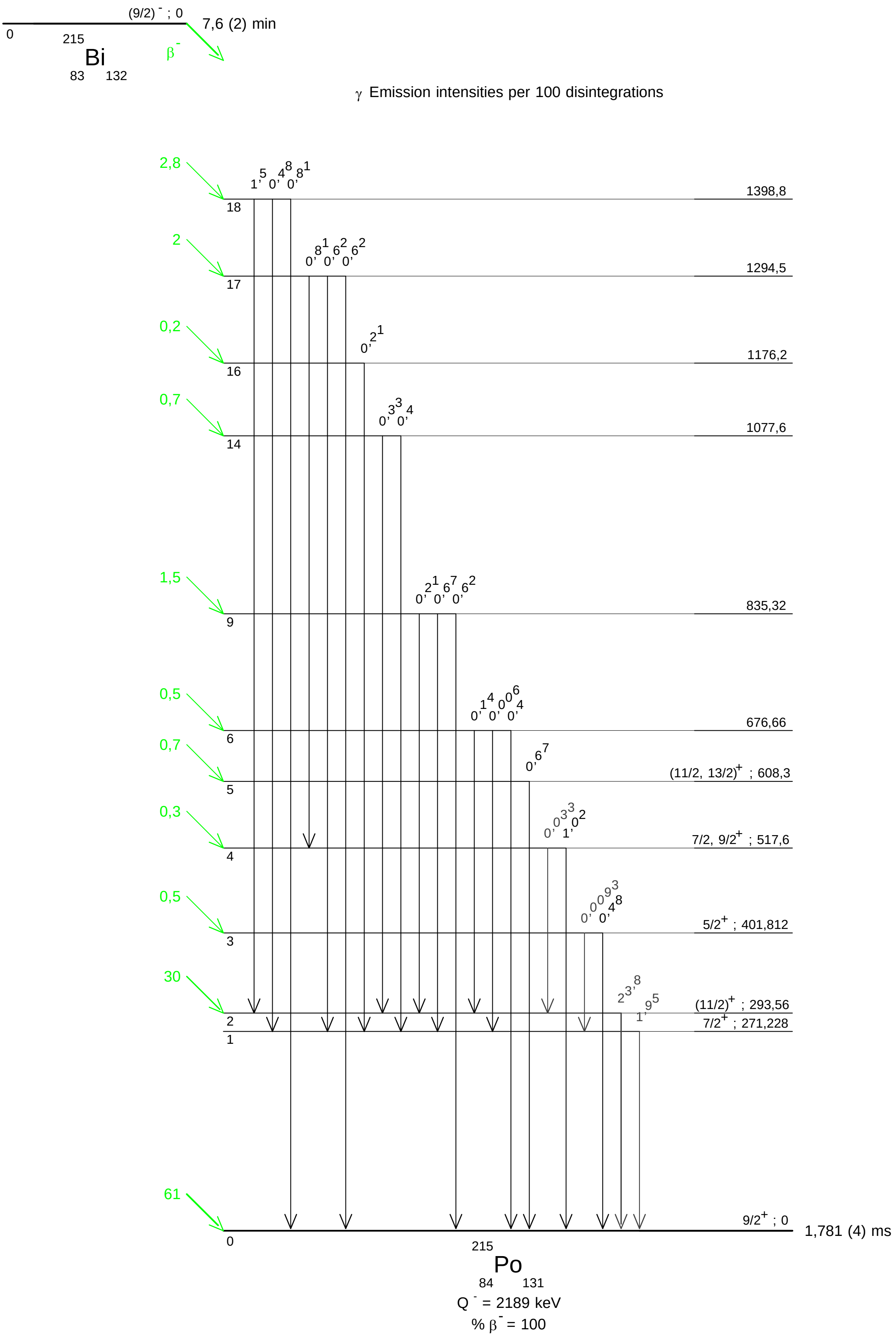
(9/2)$^-$; 0
0
7,6 (2) min
$^{215}_{83}$Bi$_{132}$
β$^-$
γ Emission intensities per 100 disintegrations
2,8
2
0,2
0,7
1,5
0,5
0,7
0,3
0,5
30
61
18 1398,8
17 1294,5
16 1176,2
14 1077,6
9 835,32
6 676,66
5 (11/2, 13/2)$^+$; 608,3
4 7/2, 9/2$^+$; 517,6
3 5/2$^+$; 401,812
2 (11/2)$^+$; 293,56
1 7/2$^+$; 271,228
0 9/2$^+$; 0
1,781 (4) ms
$^{215}_{84}$Po$_{131}$
Q$^-$ = 2189 keV
% β$^-$ = 100

$^{228}_{90}\mathrm{Th}_{138}$

1 Decay Scheme

Th-228 decays 100 % by alpha-particle emission to various excited levels and the ground state of Ra-224, and by a small O-20 cluster-decay branch of 1.13 (22) 10^{-11} %.

Le thorium 228 se désintègre par émission alpha principalement vers le niveau fondamental et le niveau excité de 84,4 keV du radium 224.

2 Nuclear Data

$T_{1/2}(^{228}\mathrm{Th})$: 1,9126 (9) a
$T_{1/2}(^{224}\mathrm{Ra})$: 3,631 (2) d
$Q^{\alpha}(^{228}\mathrm{Th})$: 5520,08 (22) keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,8}$	4527,43 (23)	0,0000045 (7)	7,2
$\alpha_{0,7}$	4603,74 (23)	0,000017 (3)	7
$\alpha_{0,6}$	5040,9 (3)	0,000024 (5)	4600
$\alpha_{0,5}$	5087,01 (24)	0,000010 (2)	21400
$\alpha_{0,4}$	5229,72 (22)	0,036 (6)	44
$\alpha_{0,3}$	5269,30 (22)	0,218 (4)	12,5
$\alpha_{0,2}$	5304,10 (22)	0,408 (7)	10,7
$\alpha_{0,1}$	5435,71 (22)	26,0 (5)	0,958
$\alpha_{0,0}$	5520,08 (22)	73,4 (5)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{4,2}$(Ra)	74,38 (4)	0,015 (5)	[E2]		28,3 (4)	7,71 (11)	38,6 (6)
$\gamma_{1,0}$(Ra)	84,373 (3)	26,4 (7)	E2		15,57 (22)	4,24 (6)	21,2 (3)
$\gamma_{2,1}$(Ra)	131,612 (5)	0,158 (3)	E1	0,194 (3)	0,0406 (6)	0,00977 (14)	0,247 (4)
$\gamma_{5,4}$(Ra)	142,71 (11)	0,0000041 (13)	[E2]	0,279 (4)	1,368 (20)	0,372 (6)	2,14 (3)
$\gamma_{3,1}$(Ra)	166,410 (4)	0,217 (4)	E2	0,225 (4)	0,691 (10)	0,187 (3)	1,164 (17)
$\gamma_{5,3}$(Ra)	182,29 (10)	0,0000057 (20)	[E1]	0,0894 (13)	0,01757 (25)	0,00421 (6)	0,1126 (16)
$\gamma_{4,1}$(Ra)	205,99 (4)	0,0204 (5)	[E1]	0,0671 (10)	0,01292 (18)	0,00309 (5)	0,0841 (12)
$\gamma_{2,0}$(Ra)	215,985 (4)	0,265 (4)	E1	0,0600 (9)	0,01148 (16)	0,00274 (4)	0,0752 (11)
$\gamma_{6,3}$(Ra)	228,42 (18)	0,000025 (6)	[E2]	0,1244 (18)	0,178 (3)	0,0479 (7)	0,366 (6)
$\gamma_{7,2}$(Ra)	700,36 (7)	0,000003 (1)	E1	0,00502 (7)	0,000834 (12)	0,000196 (3)	0,00611 (9)
$\gamma_{8,3}$(Ra)	741,87 (6)	0,0000014 (4)	[E2]	0,01196 (17)	0,00322 (5)	0,000803 (12)	0,01625 (23)
$\gamma_{7,1}$(Ra)	831,97 (10)	0,000014 (2)	E2	0,00970 (14)	0,00240 (4)	0,000594 (9)	0,01289 (18)
$\gamma_{8,1}$(Ra)	908,28 (6)	0,0000017 (5)	[M1+50%E2]	0,0190 (24)	0,0036 (4)	0,00087 (9)	0,024 (3)
$\gamma_{8,0}$(Ra)	992,65 (6)	0,0000014 (4)	[E2]	0,00705 (10)	0,001569 (22)	0,000384 (6)	0,00913 (13)

3 Atomic Data

3.1 Ra

ω_K : 0,968 (4)
$\bar{\omega}_L$: 0,452 (18)
n_{KL} : 0,801 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	85,43		61
	$K\alpha_1$	88,47		100
	$K\beta_3$	99,432	}	
	$K\beta_1$	100,13	}	
	$K\beta_5''$	100,738	}	35,1
	$K\beta_2$	102,89	}	
	$K\beta_4$	103,295	}	11,5
	$KO_{2,3}$	103,74	}	
X_L				
	$L\ell$	10,622		
	$L\alpha$	12,196 – 12,339		
	$L\eta$	13,662		
	$L\beta$	14,236 – 15,447		
	$L\gamma$	17,848 – 18,412		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	65,149 – 72,729	100
KLX	79,721 – 88,466	57
KXY	94,27 – 103,91	8,4
Auger L	5,71 – 12,04	852500

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	4448,00 (23)	0,0000045 (7)
$\alpha_{0,7}$	4522,97 (23)	0,000017 (3)
$\alpha_{0,6}$	4952,5 (3)	0,000024 (5)
$\alpha_{0,5}$	4997,76 (24)	0,000010 (2)
$\alpha_{0,4}$	5137,97 (22)	0,036 (6)
$\alpha_{0,3}$	5176,86 (22)	0,218 (4)
$\alpha_{0,2}$	5211,05 (22)	0,408 (7)
$\alpha_{0,1}$	5340,35 (22)	26,0 (5)
$\alpha_{0,0}$	5423,24 (22)	73,4 (5)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Ra)	5,71 - 12,04		10,4 (4)
e_{AK}	(Ra)			0,0020 (3)
	KLL	65,149 - 72,729	}	
	KLX	79,721 - 88,466	}	
	KXY	94,27 - 103,91	}	
$ec_{3,1\ K}$	(Ra)	62,497 (4)		0,023 (1)
$ec_{1,0\ T}$	(Ra)	65,14 - 84,36		25,2 (7)
$ec_{1,0\ L}$	(Ra)	65,14 - 68,93		18,5 (5)
$ec_{1,0\ M}$	(Ra)	79,55 - 81,27		5,0 (2)
$ec_{1,0\ N+}$	(Ra)	83,17 - 84,36		1,65 (5)

		Energy keV	Electrons per 100 disint.
$ec_{2,0\ K}$	(Ra)	112,072 (4)	0,015 (6)
$ec_{3,1\ L}$	(Ra)	147,17 - 150,97	0,069 (2)
$ec_{3,1\ M}$	(Ra)	161,59 - 166,40	0,025 (1)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Ra)	10,622 — 18,412		8,6 (4)	
XKα_2	(Ra)	85,43		0,0180 (3)	} Kα
XKα_1	(Ra)	88,47		0,0295 (5)	}
XKβ_3	(Ra)	99,432	}		
XKβ_1	(Ra)	100,13	}	0,01034 (21)	K$'\beta_1$
XKβ_5''	(Ra)	100,738	}		
XKβ_2	(Ra)	102,89	}		
XKβ_4	(Ra)	103,295	}	0,00339 (9)	K$'\beta_2$
XKO$_{2,3}$	(Ra)	103,74	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{4,2}$(Ra)	74,38 (4)	0,00039 (14)
$\gamma_{1,0}$(Ra)	84,373 (3)	1,19 (3)
$\gamma_{2,1}$(Ra)	131,612 (5)	0,127 (2)
$\gamma_{5,4}$(Ra)	142,71 (11)	0,0000013 (4)
$\gamma_{3,1}$(Ra)	166,410 (4)	0,1004 (14)
$\gamma_{5,3}$(Ra)	182,29 (10)	0,0000051 (18)
$\gamma_{4,1}$(Ra)	205,99 (4)	0,0188 (5)
$\gamma_{2,0}$(Ra)	215,985 (4)	0,246 (4)
$\gamma_{6,3}$(Ra)	228,42 (18)	0,000018 (4)
$\gamma_{7,2}$(Ra)	700,36 (7)	0,000003 (1)
$\gamma_{8,3}$(Ra)	741,87 (6)	0,0000014 (4)

	Energy keV	Photons per 100 disint.
$\gamma_{7,1}$(Ra)	831,97 (7)	0,000014 (2)
$\gamma_{8,1}$(Ra)	908,28 (6)	0,0000017 (5)
$\gamma_{8,0}$(Ra)	992,65 (6)	0,0000014 (4)

7 Main Production Modes

Th – 230(p,t)Th – 228

Th – 230(α,α2nγ)Th – 228

Ra – 226(α,2nγ)Th – 228

U – 232(α)

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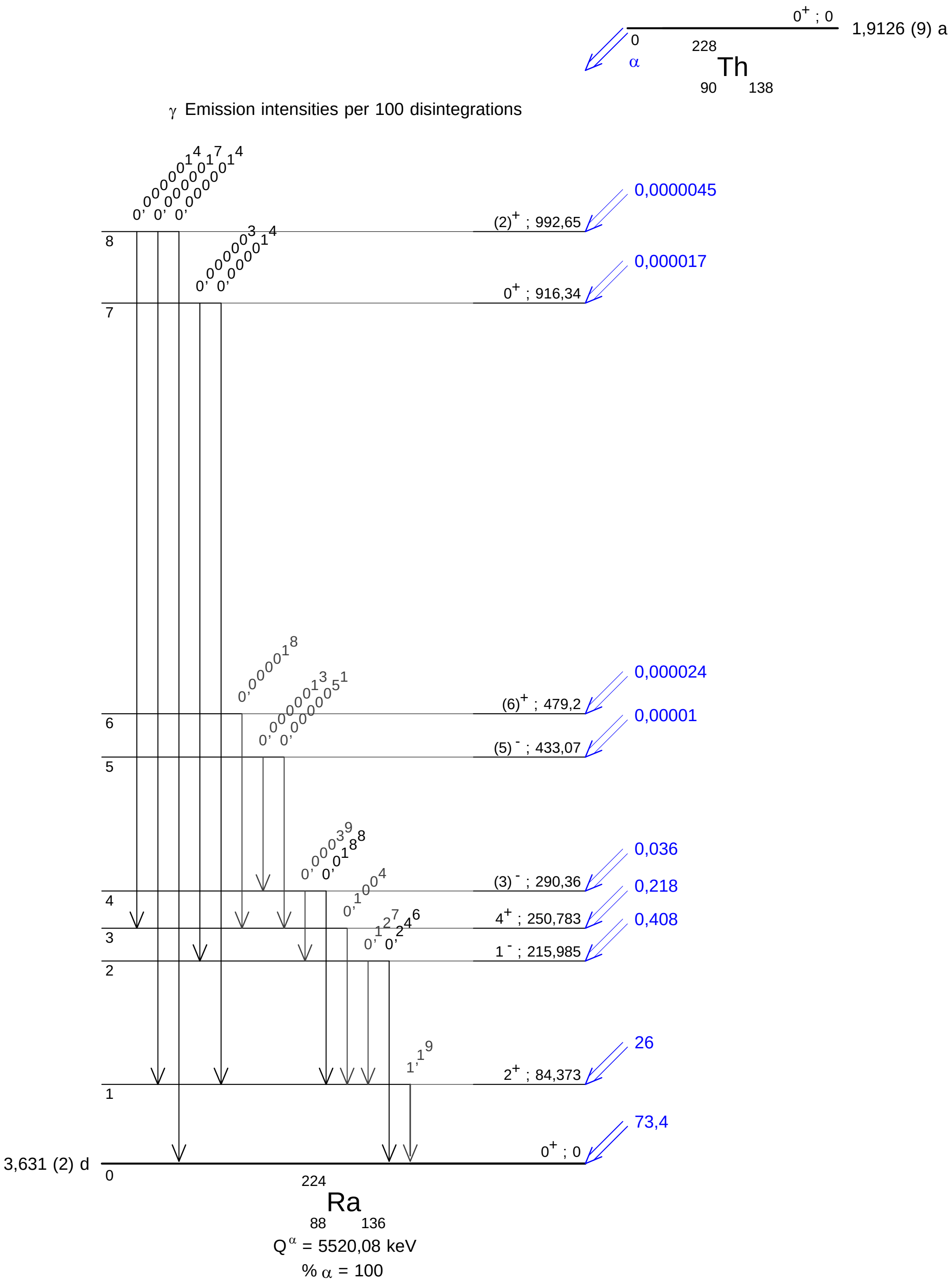
0+ ; 0
1,9126 (9) a
0
α
228
Th
90 138
γ Emission intensities per 100 disintegrations
0,0000014
0,0000017
0,0000014
0,000003
0,000014
8
(2)+ ; 992,65
0,0000045
7
0+ ; 916,34
0,000017
0,000018
0,0000013
0,0000051
6
(6)+ ; 479,2
0,000024
5
(5)- ; 433,07
0,00001
0,00039
0,0188
0,1004
4
(3)- ; 290,36
0,036
0,127
0,246
3
4+ ; 250,783
0,218
2
1- ; 215,985
0,408
1,19
1
2+ ; 84,373
26
3,631 (2) d
0
0+ ; 0
73,4
224
Ra
88 136
Qα = 5520,08 keV
% α = 100

$^{242}_{96}\mathrm{Cm}_{146}$

1 Decay Scheme

Cm-242 decays 100% by alpha transitions to Pu-238 and by spontaneous fission with branching fraction of 6.36 (14) E-6 %.
Le curium 242 se désintègre à 100% par transition alpha vers le plutonium 238 et par fission spontanée pour 6,36 (14) E-06 %.

2 Nuclear Data

$T_{1/2}(^{242}\mathrm{Cm})$: 162,86 (8) d
$T_{1/2}(^{238}\mathrm{Pu})$: 87,74 (3) a
$Q^{\alpha}(^{242}\mathrm{Cm})$: 6215,56 (8) keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,15}$	4951,27 (24)	0,00000052 (14)	6
$\alpha_{0,14}$	4986,87 (24)	0,00000055 (15)	10
$\alpha_{0,13}$	5089,77 (19)	0,00000031 (10)	88
$\alpha_{0,12}$	5186,94 (10)	0,0000037 (10)	32
$\alpha_{0,11}$	5197,0 (3)	≤ 0,0000002	≥ 700
$\alpha_{0,10}$	5232,56 (12)	0,0000017 (5)	137
$\alpha_{0,9}$	5252,84 (11)	0,00000113 (21)	278
$\alpha_{0,8}$	5274,13 (12)	0,000035 (7)	12
$\alpha_{0,7}$	5452,34 (15)	≤ 0,00000022	≥ 24000
$\alpha_{0,6}$	5554,28 (14)	0,000013 (3)	1700
$\alpha_{0,5}$	5610,48 (11)	0,00025 (5)	183
$\alpha_{0,4}$	5701,94 (18)	0,00002	7500
$\alpha_{0,3}$	5912,14 (11)	0,0046 (5)	458
$\alpha_{0,2}$	6069,56 (10)	0,034 (2)	390
$\alpha_{0,1}$	6171,48 (9)	25,94 (7)	1,733
$\alpha_{0,0}$	6215,56 (8)	74,06 (7)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pu)	44,08 (3)	26,0 (8)	E2		572 (12)	159,4 (32)	787 (16)
$\gamma_{2,1}$(Pu)	101,92 (4)	0,0388 (22)	E2		10,48 (21)	2,94 (6)	14,45 (21)
$\gamma_{3,2}$(Pu)	157,42 (9)	0,0046 (5)	[E2]	0,193 (4)	1,450 (29)	0,405 (8)	2,19 (4)
$\gamma_{4,3}$(Pu)	210,20 (14)	0,00002052	E2	0,140 (3)	0,415 (8)	0,115 (2)	0,710 (14)
$\gamma_{8,5}$(Pu)	336,36 (15)	0,00000072 (31)	[E1]	0,0257 (5)	0,00502 (10)	0,00122 (2)	0,0323 (6)
$\gamma_{9,5}$(Pu)	357,64 (7)	0,000000055 (11)	M1+E2	0,133 (12)	0,0599 (17)	0,0158 (4)	0,214 (15)
$\gamma_{7,3}$(Pu)	459,8 (2)	0,00000006 (3)					
$\gamma_{6,2}$(Pu)	515,25 (19)	0,0000046 (12)	E1+M2	0,0175 (21)	0,0037 (6)	0,00092 (14)	0,022 (3)
$\gamma_{5,1}$(Pu)	561,02 (10)	0,000152 (40)	E1	0,00929 (18)	0,00169 (3)	0,000407 (8)	0,01153 (23)
$\gamma_{5,0}$(Pu)	605,04 (10)	0,000106 (30)	E1	0,00806 (16)	0,00146 (3)	0,000350 (7)	0,00999 (20)
$\gamma_{6,1}$(Pu)	617,20 (12)	0,0000079 (21)	E1+M2	0,0095 (9)	0,00185 (22)	0,00045 (6)	0,0120 (12)
$\gamma_{7,2}$(Pu)	617,22 (13)	0,00000016					
$\gamma_{10,2}$(Pu)	837,01 (15)	0,00000019 (6)	[E2]	0,01250 (25)	0,00366 (7)	0,000930 (19)	0,0174 (3)
$\gamma_{12,2}$(Pu)	882,63 (3)	0,000000068 (15)	(E2)	0,01141 (23)	0,00321 (6)	0,000811 (16)	0,0157 (3)
$\gamma_{8,1}$(Pu)	897,33 (10)	0,000022 (6)	(E2)	0,01108 (22)	0,00308 (6)	0,000778 (15)	0,0152 (3)
$\gamma_{9,1}$(Pu)	918,7 (2)	0,00000054 (15)	E1	0,00382 (8)	0,000663 (13)	0,000158 (3)	0,00469 (9)
$\gamma_{10,1}$(Pu)	938,91 (10)	0,00000097 (33)	E0+E2				4,4 (4)
$\gamma_{8,0}$(Pu)	941,5 (2)		E0				
$\gamma_{9,0}$(Pu)	962,8 (2)	0,00000053 (15)	E1	0,00352 (7)	0,000609 (12)	0,0001452 (29)	0,00432 (8)
$\gamma_{11,1}$(Pu)	974,5 (3)	0,0000002					
$\gamma_{13,2}$(Pu)	979,8 (2)	0,00000026 (8)					
$\gamma_{10,0}$(Pu)	983,0 (3)	0,00000051 (18)	[E2]	0,00946 (18)	0,00246 (5)	0,000619 (12)	0,01276 (25)
$\gamma_{12,1}$(Pu)	984,5 (1)	0,0000020 (6)	M1+E2	0,00949 (19)	0,00247 (5)	0,000619 (12)	0,01279 (26)
$\gamma_{12,0}$(Pu)	1028,5 (2)	0,0000016 (5)	E2	0,00875 (17)	0,00221 (4)	0,000554 (11)	0,01171 (23)
$\gamma_{13,1}$(Pu)	1081,7 (3)	0,00000005 (2)					
$\gamma_{15,2}$(Pu)	1118,3 (3)	0,00000017 (9)	[E2]	0,00757 (15)	0,00182 (3)	0,000454 (9)	0,01001 (20)
$\gamma_{14,1}$(Pu)	1184,6 (3)	0,00000050 (15)	E2	0,00685 (14)	0,00160 (3)	0,000397 (8)	0,00899 (18)
$\gamma_{15,1}$(Pu)	1220,2 (3)	0,00000035 (11)	E0+E2+(M1)				0,26 (3)
$\gamma_{14,0}$(Pu)	1228,7 (3)		E0				

3 Atomic Data

3.1

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,521 (20)
n_{KL} : 0,790 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	99,525		63,17
	$K\alpha_1$	103,734		100
	$K\beta_3$	116,244	}	36,36
	$K\beta_1$	117,228	}	
	$K\beta_5''$	117,918	}	
	$K\beta_2$	120,54	}	12,61
	$K\beta_4$	120,969	}	
	$KO_{2,3}$	121,543	}	
X_L				
	$L\ell$	12,12		
	$L\alpha$	14,087 – 14,282		
	$L\eta$	16,333		
	$L\beta$	16,5 – 19,33		
	$L\gamma$	20,71 – 23,07		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	75,2 – 85,3	100
KLX	92,6 – 103,6	60,6
KXY	109,8 – 121,5	9,2
Auger L	6,1 – 22,9	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,15}$	4869,43 (23)	0,00000052 (14)
$\alpha_{0,14}$	4904,44 (23)	0,00000055 (15)
$\alpha_{0,13}$	5005,64 (19)	0,00000031 (10)
$\alpha_{0,12}$	5101,21 (10)	0,0000037 (10)
$\alpha_{0,11}$	5111,1 (3)	$\leq$ 0,0000002
$\alpha_{0,10}$	5146,07 (12)	0,0000017 (5)

	Energy keV	Probability × 100
$\alpha_{0,9}$	5165,95 (16)	0,00000113 (21)
$\alpha_{0,8}$	5186,95 (12)	0,000035 (7)
$\alpha_{0,7}$	5366,22 (15)	≤ 0,00000022
$\alpha_{0,6}$	5462,47 (14)	0,000013 (3)
$\alpha_{0,5}$	5517,75 (11)	0,00025 (5)
$\alpha_{0,4}$	5607,76 (16)	0,00002
$\alpha_{0,3}$	5816,39 (11)	0,0046 (5)
$\alpha_{0,2}$	5969,24 (9)	0,034 (2)
$\alpha_{0,1}$	6069,37 (9)	25,94 (7)
$\alpha_{0,0}$	6112,72 (8)	74,06 (7)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pu)	6,1 - 22,9		8,99 (21)
e_{AK}	(Pu)			0,0000082 (15)
	KLL	75,2 - 85,3	}	
	KLX	92,6 - 103,6	}	
	KXY	109,8 - 121,5	}	
$ec_{1,0\ L}$	(Pu)	20,98 - 26,02		18,8 (6)
$ec_{1,0\ M}$	(Pu)	38,15 - 40,31		5,25 (15)
$ec_{2,1\ L}$	(Pu)	78,82 - 83,86		0,0263 (16)
$ec_{2,1\ M}$	(Pu)	95,99 - 98,15		0,0074 (4)
$ec_{3,2\ K}$	(Pu)	25,63 (5)		0,00027 (3)
$ec_{3,2\ L}$	(Pu)	134,32 - 139,36		0,00210 (24)
$ec_{3,2\ M}$	(Pu)	151,49 - 153,65		0,00059 (7)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV	Photons per 100 disint.	
XL	(Pu)	12,12 — 23,07	9,92 (23)	
XKα_2	(Pu)	99,525	0,000082 (9)	} Kα
XKα_1	(Pu)	103,734	0,000130 (15)	}

		Energy keV		Photons per 100 disint.	
$\mathrm{XK}\beta_3$	(Pu)	116,244	}		
$\mathrm{XK}\beta_1$	(Pu)	117,228	}	0,000048 (6)	$\mathrm{K}'\beta_1$
$\mathrm{XK}\beta_5''$	(Pu)	117,918	}		
$\mathrm{XK}\beta_2$	(Pu)	120,54	}		
$\mathrm{XK}\beta_4$	(Pu)	120,969	}	0,0000165 (19)	$\mathrm{K}'\beta_2$
$\mathrm{XKO}_{2,3}$	(Pu)	121,543	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pu)	44,08 (3)	0,0330 (7)
$\gamma_{2,1}$(Pu)	101,92 (4)	0,00251 (14)
$\gamma_{3,2}$(Pu)	157,42 (9)	0,00145 (16)
$\gamma_{4,3}$(Pu)	210,20 (14)	0,000012
$\gamma_{8,5}$(Pu)	336,36 (15)	0,0000007 (3)
$\gamma_{9,5}$(Pu)	357,64 (7)	0,000000045 (9)
$\gamma_{7,3}$(Pu)	459,8 (2)	0,00000006 (3)
$\gamma_{6,2}$(Pu)	515,25 (19)	0,0000045 (12)
$\gamma_{5,1}$(Pu)	561,02 (10)	0,00015 (4)
$\gamma_{5,0}$(Pu)	605,04 (10)	0,000105 (30)
$\gamma_{6,1}$(Pu)	617,20 (12)	0,0000079 (21)
$\gamma_{7,2}$(Pu)	617,22 (13)	0,00000016
$\gamma_{10,2}$(Pu)	837,01 (15)	0,00000019 (6)
$\gamma_{12,2}$(Pu)	882,63 (3)	0,000000067 (15)
$\gamma_{8,1}$(Pu)	897,33 (10)	0,000022 (6)
$\gamma_{9,1}$(Pu)	918,7 (2)	0,00000054 (15)
$\gamma_{10,1}$(Pu)	938,91 (10)	0,00000018 (6)
$\gamma_{9,0}$(Pu)	962,8 (2)	0,00000053 (15)
$\gamma_{11,1}$(Pu)	974,5 (3)	0,0000002
$\gamma_{13,2}$(Pu)	979,8 (2)	0,00000026 (8)
$\gamma_{10,0}$(Pu)	983,0 (3)	0,00000050 (18)
$\gamma_{12,1}$(Pu)	984,5 (1)	0,0000020 (6)
$\gamma_{12,0}$(Pu)	1028,5 (2)	0,0000016 (5)
$\gamma_{13,1}$(Pu)	1081,7 (3)	0,00000005 (2)
$\gamma_{15,2}$(Pu)	1118,3 (3)	0,00000017 (9)
$\gamma_{14,1}$(Pu)	1184,6 (3)	0,00000050 (15)
$\gamma_{15,1}$(Pu)	1220,2 (3)	0,00000028 (9)

7 Main Production Modes

Am – 241(n,γ)Am – 242

$$\left\{\begin{array}{l}\mathrm{Am}-242(\beta^-)\mathrm{Cm}-242\\ \text{Possible impurities : }\ \mathrm{Am}-241,\mathrm{Cm}-243,\mathrm{Cm}-244\end{array}\right.$$

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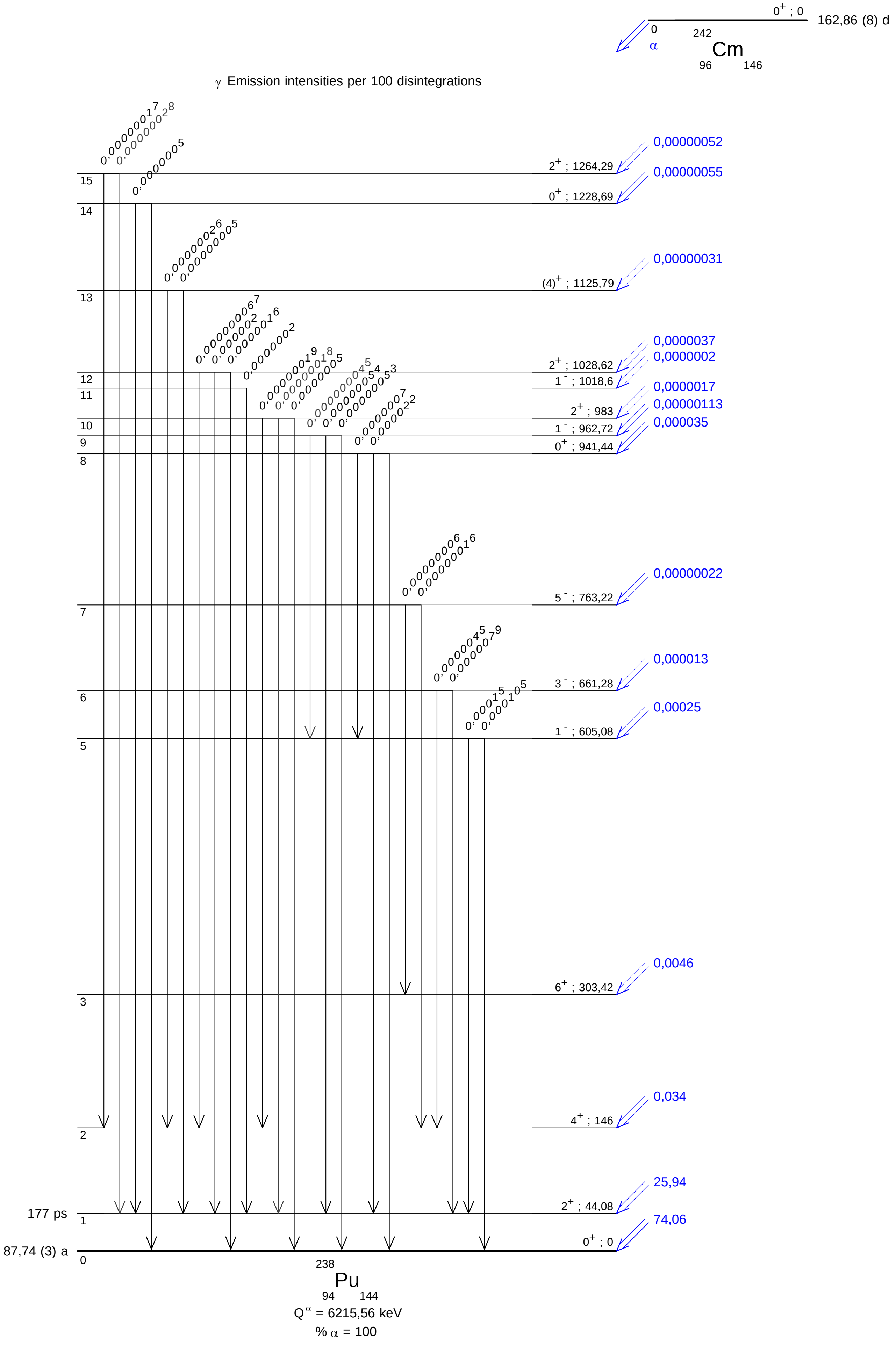
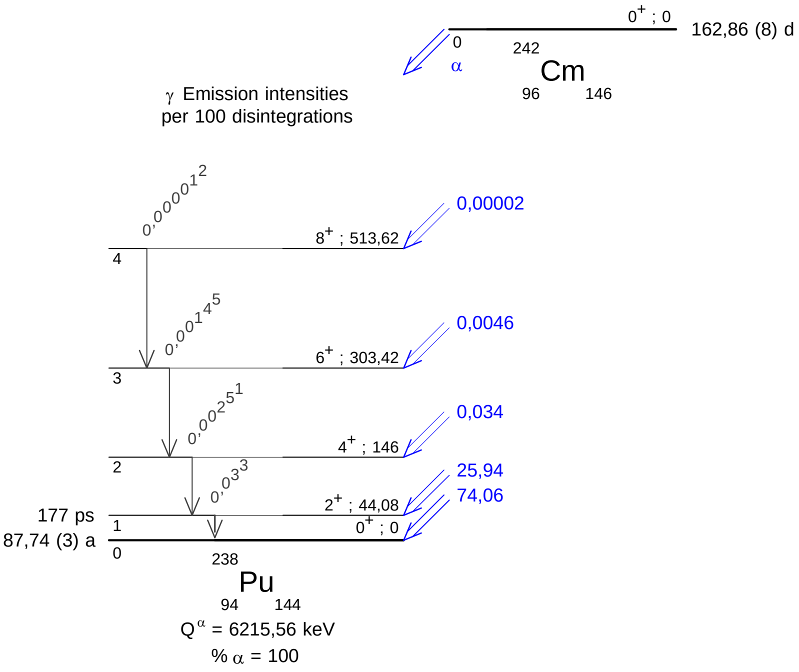

0+ ; 0
162,86 (8) d
0
α
242 Cm 96 146
γ Emission intensities per 100 disintegrations
2+ ; 1264,29
0+ ; 1228,69
(4)+ ; 1125,79
2+ ; 1028,62
1- ; 1018,6
2+ ; 983
1- ; 962,72
0+ ; 941,44
5- ; 763,22
3- ; 661,28
1- ; 605,08
6+ ; 303,42
4+ ; 146
2+ ; 44,08
0+ ; 0
0,00000052
0,00000055
0,00000031
0,0000037
0,0000002
0,0000017
0,00000113
0,000035
0,00000022
0,000013
0,00025
0,0046
0,034
25,94
74,06
15
14
13
12
11
10
9
8
7
6
5
3
2
1
0
177 ps
87,74 (3) a
238 Pu 94 144
Q α = 6215,56 keV
% α = 100


0+ ; 0
162,86 (8) d
0
α
242
Cm
96
146
γ Emission intensities
per 100 disintegrations
0,000012
0,00002
8+ ; 513,62
4
0,00145
0,0046
6+ ; 303,42
3
0,00251
0,034
4+ ; 146
2
0,033
25,94
74,06
2+ ; 44,08
177 ps
1
0+ ; 0
87,74 (3) a
0
238
Pu
94
144
Qα = 6215,56 keV
% α = 100

$^{243}_{96}\mathrm{Cm}_{147}$

1 Decay Scheme

Cm-243 decays by alpha emission mainly (99,71%) to excited levels and to the ground state of Pu-239. It exists a small electron capture branch to the Am-243 ground state level.
Le curium 243 se désintègre par émission alpha vers des niveaux excités et le niveau fondamental de plutonium 239 et par capture électronique, avec une faible intensité, vers le niveau fondamental de l'américium 243.

2 Nuclear Data

$T_{1/2}(^{243}\mathrm{Cm})$	:	28,9	(4)	a
$T_{1/2}(^{243}\mathrm{Am})$	:	7367	(23)	a
$T_{1/2}(^{239}\mathrm{Pu})$	:	24100	(11)	a
$Q^{\alpha}(^{243}\mathrm{Cm})$	:	6168,8	(10)	keV
$Q^{+}(^{243}\mathrm{Cm})$	:	7,5	(17)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,27}$	5319 (15)	0,00039	137
$\alpha_{0,26}$	5356 (3)	0,0015	60,6
$\alpha_{0,25}$	5406 (3)	0,001	184
$\alpha_{0,24}$	5413 (3)	0,003	67,7
$\alpha_{0,23}$	5423 (3)	0,003	77,9
$\alpha_{0,22}$	5612,6 (11)	0,002	1538
$\alpha_{0,21}$	5626 (3)	0,006	610
$\alpha_{0,20}$	5631 (3)	0,002	1955
$\alpha_{0,19}$	5663,2 (10)	0,007	854
$\alpha_{0,18}$	5670 (3)	0,007	930
$\alpha_{0,17}$	5676,7 (10)	0,009	792
$\alpha_{0,16}$	5682 (3)	0,02	381
$\alpha_{0,15}$	5688 (3)	0,01	823

	Energy keV	Probability × 100	F
$\alpha_{0,14}$	5699,0 (11)	≤ 0,01	951
$\alpha_{0,13}$	5707 (3)	0,03	351
$\alpha_{0,12}$	5718 (5)	0,06	202
$\alpha_{0,11}$	5735 (3)	0,14	108
$\alpha_{0,10}$	5742 (3)	0,03	549
$\alpha_{0,9}$	5777,2 (10)	0,2	129
$\alpha_{0,8}$	5781,4 (10)	1,6 (1)	17
$\alpha_{0,7}$	5838,7 (10)	11,3 (2)	4,94
$\alpha_{0,6}$	5883,3 (10)	73,4 (4)	1,32
$\alpha_{0,5}$	5976,0 (14)	0,7	427
$\alpha_{0,4}$	6005 (1)	0,1	4230
$\alpha_{0,3}$	6093,1 (10)	5,7 (2)	209
$\alpha_{0,2}$	6111,5 (10)	1,05 (12)	1410
$\alpha_{0,1}$	6160,9 (10)	4,4 (2)	593
$\alpha_{0,0}$	6168,8 (10)	1,3 (2)	2210

2.2 Electron Capture Transitions

	Energy keV	Probability × 100	lg ft
$\epsilon_{0,0}$	7,5	0,29 (3)	7,3

2.3 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{9,8}$(Pu)	4,16 (2)		E1				
$\gamma_{1,0}$(Pu)	7,860 (3)	85,5	M1+E2			4200 (300)	5700 (400)
$\gamma_{3,2}$(Pu)	18,430 (4)	0,8	(M1+E2)			6000 (6000)	8000 (6200)
$\gamma_{7,6}$(Pu)	44,663 (5)	12,7 (23)	M1+E2		72 (9)	18 (3)	96 (13)
$\gamma_{2,1}$(Pu)	49,412 (4)	25,4	M1+E2		92 (6)	24,8 (17)	126 (8)
$\gamma_{2,0}$(Pu)	57,273 (4)	13,38	E2		161,1 (23)	45,0 (7)	222 (4)
$\gamma_{8,7}$(Pu)	57,30 (2)	2,368	[M1]		21,5 (3)	5,24 (8)	28,6 (4)
$\gamma_{9,7}$(Pu)	61,460 (2)	0,0222 (19)	E1		0,354 (5)	0,0881 (13)	0,473 (7)
$\gamma_{3,1}$(Pu)	67,841 (7)	20 (5)	E2		71,5 (10)	20,0 (3)	98,5 (14)
$\gamma_{4,3}$(Pu)	88,06 (3)	0,024	M1+E2		9,07 (13)	2,36 (4)	12,26 (18)
$\gamma_{8,6}$(Pu)	101,96 (2)	0,123	E2		10,46 (15)	2,93 (5)	14,42 (21)
$\gamma_{9,6}$(Pu)	106,125 (2)	0,373 (34)	E1(+M2)		0,19 (3)	0,050 (8)	0,26 (4)
$\gamma_{4,2}$(Pu)	106,47 (4)	0,192	E2		8,56 (12)	2,40 (4)	11,80 (17)
$\gamma_{5,3}$(Pu)	117,1 (10)	0,7 (0)	[E2]		5,52 (24)	1,54 (7)	7,6 (4)
$\gamma_{7,4}$(Pu)	166,39 (6)	0,12 (5)	M1	4,91 (7)	0,984 (14)	0,239 (4)	6,22 (9)

	Energy keV	P$_{\gamma+\text{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{6,3}$(Pu)	209,753 (2)	13,95 (45)	M1+E2	2,56 (4)	0,511 (8)	0,1241 (18)	3,24 (5)
$\gamma_{6,2}$(Pu)	228,183 (2)	37,7 (11)	M1+E2	2,02 (3)	0,403 (6)	0,0979 (14)	2,56 (4)
$\gamma_{7,3}$(Pu)	254,40 (3)	0,314 (29)	M1+E2	1,457 (21)	0,294 (5)	0,0716 (10)	1,85 (3)
$\gamma_{7,2}$(Pu)	272,87 (9)	0,201 (25)	M1+E2	1,198 (18)	0,241 (4)	0,0588 (9)	1,518 (22)
$\gamma_{6,1}$(Pu)	277,599 (2)	34,3 (10)	M1+E2	1,142 (16)	0,230 (4)	0,0560 (8)	1,448 (21)
$\gamma_{6,0}$(Pu)	285,460 (2)	0,910 (25)	E2	0,0843 (12)	0,1190 (17)	0,0326 (5)	0,247 (4)
$\gamma_{8,3}$(Pu)	311,7 (2)	0,0350 (42)	M1+E2	0,84 (3)	0,168 (4)	0,0408 (8)	1,06 (3)
$\gamma_{9,3}$(Pu)	315,880 (3)	0,0187 (21)	E1(+M2)	0,0294 (6)	0,00583 (16)	0,00141 (4)	0,0372 (9)
$\gamma_{7,1}$(Pu)	322,3 (2)	0,0082 (12)	[E2]	0,0679 (10)	0,0745 (11)	0,0203 (3)	0,1699 (24)
$\gamma_{9,2}$(Pu)	334,310 (3)	0,0248 (21)	E1(+M2)	0,0261 (5)	0,00511 (10)	0,001238 (24)	0,0329 (6)
$\gamma_{22,4}$(Pu)	392,4 (5)		E1+M2				
$\gamma_{19,3}$(Pu)	430,0 (3)		E1+M2				
$\gamma_{17,2}$(Pu)	434,7 (5)		E1+M2				
$\gamma_{19,2}$(Pu)	447,6 (5)						
$\gamma_{14,1}$(Pu)	461,9 (5)		E1+M2				
$\gamma_{14,0}$(Pu)	469,8 (5)		E1				
$\gamma_{17,1}$(Pu)	484,3 (5)						
$\gamma_{17,0}$(Pu)	492,3 (5)		E1+M2				
$\gamma_{19,1}$(Pu)	497,8 (3)		E1+M2				
$\gamma_{22,2}$(Pu)	499		E1+M2				
$\gamma_{(-1,1)}$(Pu)	640						
$\gamma_{(-1,2)}$(Pu)	680						
$\gamma_{(-1,3)}$(Pu)	720						
$\gamma_{(-1,4)}$(Pu)	740						
$\gamma_{(-1,5)}$(Pu)	760						

3 Atomic Data

3.1 Pu

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,521 (20)
n_{KL} : 0,790 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	Kα_2	99,525		63,17
	Kα_1	103,734		100
	Kβ_3	116,244	}	36,7
	Kβ_1	117,228	}	
	Kβ_5''	117,918	}	
	Kβ_2	120,54	}	12,74
	Kβ_4	120,969	}	
	KO$_{2,3}$	121,543	}	
X_L				
	Lℓ	12,1246		
	Lα	14,0834 – 14,2791		
	Lη	16,334		
	Lβ	16,4987 – 18,5427		
	Lγ	20,7081 – 21,9844		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	75,263 – 85,357	100
KLX	92,607 – 103,729	60,6
KXY	109,93 – 121,78	9,18
Auger L	6,19 – 22,99	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,27}$	5231 (15)	0,00039
$\alpha_{0,26}$	5268 (3)	0,0015
$\alpha_{0,25}$	5317 (3)	0,001
$\alpha_{0,24}$	5324 (3)	0,003
$\alpha_{0,23}$	5333 (3)	0,003
$\alpha_{0,22}$	5520,1 (11)	0,002
$\alpha_{0,21}$	5533 (3)	0,006
$\alpha_{0,20}$	5538 (3)	0,002
$\alpha_{0,19}$	5569,9 (10)	0,007
$\alpha_{0,18}$	5576 (3)	0,007
$\alpha_{0,17}$	5583,2 (10)	0,009
$\alpha_{0,16}$	5588 (3)	0,02
$\alpha_{0,15}$	5594 (3)	0,01
$\alpha_{0,14}$	5605,1 (11)	$\leq$ 0,01
$\alpha_{0,13}$	5613 (3)	0,03
$\alpha_{0,12}$	5624 (5)	0,06
$\alpha_{0,11}$	5640 (3)	0,14
$\alpha_{0,10}$	5647 (3)	0,03
$\alpha_{0,9}$	5682 (1)	0,2
$\alpha_{0,8}$	5686,1 (10)	1,6 (1)
$\alpha_{0,7}$	5742,5 (10)	11,3 (2)
$\alpha_{0,6}$	5786,4 (10)	73,4 (4)
$\alpha_{0,5}$	5877,6 (14)	0,7
$\alpha_{0,4}$	5906,1 (10)	0,1
$\alpha_{0,3}$	5992,7 (10)	5,7 (2)
$\alpha_{0,2}$	6010,8 (10)	1,05 (12)
$\alpha_{0,1}$	6059,4 (10)	4,4 (2)
$\alpha_{0,0}$	6067,2 (10)	1,3 (2)

5 Electron Emissions

		Energy keV	Electrons per 100 disint.
e_{AL}	(Pu)	6,19 - 22,99	49,3 (15)
e_{AK}	(Pu)		1,34 (19)
	KLL	75,263 - 85,357	}
	KLX	92,607 - 103,729	}
	KXY	109,93 - 121,78	}
$\mathrm{ec}_{1,0\ \mathrm{M}}$	(Pu)	1,93 - 4,09	63,0 (45)
$\mathrm{ec}_{1,0\ \mathrm{N}}$	(Pu)	6,30 - 7,44	17,4 (12)
$\mathrm{ec}_{3,2\ \mathrm{M}}$	(Pu)	12,50 - 14,66	0,6 (6)
$\mathrm{ec}_{3,2\ \mathrm{N}}$	(Pu)	16,87 - 18,01	0,16 (16)
$\mathrm{ec}_{7,6\ \mathrm{L}}$	(Pu)	21,559 - 26,606	9,4 (16)
$\mathrm{ec}_{2,1\ \mathrm{L}}$	(Pu)	26,308 - 31,355	18,4 (12)
$\mathrm{ec}_{2,0\ \mathrm{L}}$	(Pu)	34,169 - 39,216	9,67 (14)
$\mathrm{ec}_{8,7\ \mathrm{L}}$	(Pu)	34,2 - 39,2	1,720 (24)
$\mathrm{ec}_{7,6\ \mathrm{M}}$	(Pu)	38,730 - 40,888	2,36 (49)
$\mathrm{ec}_{7,6\ \mathrm{N}}$	(Pu)	43,104 - 44,239	0,66 (12)
$\mathrm{ec}_{2,1\ \mathrm{M}}$	(Pu)	43,479 - 45,637	4,96 (34)
$\mathrm{ec}_{3,1\ \mathrm{L}}$	(Pu)	44,737 - 49,784	14,3 (36)
$\mathrm{ec}_{2,1\ \mathrm{N}}$	(Pu)	47,853 - 48,988	1,36 (10)
$\mathrm{ec}_{2,0\ \mathrm{M}}$	(Pu)	51,340 - 53,498	2,700 (42)
$\mathrm{ec}_{8,7\ \mathrm{M}}$	(Pu)	51,4 - 53,5	0,419 (6)
$\mathrm{ec}_{8,7\ \mathrm{N}}$	(Pu)	55,7 - 56,9	0,1142 (16)
$\mathrm{ec}_{2,0\ \mathrm{N}}$	(Pu)	55,714 - 56,849	0,742 (11)
$\mathrm{ec}_{3,1\ \mathrm{M}}$	(Pu)	61,908 - 64,066	4 (1)
$\mathrm{ec}_{3,1\ \mathrm{N}}$	(Pu)	66,282 - 67,417	1,10 (28)
$\mathrm{ec}_{4,2\ \mathrm{L}}$	(Pu)	83,37 - 88,41	0,1284 (18)
$\mathrm{ec}_{6,3\ \mathrm{K}}$	(Pu)	87,962 (2)	8,42 (29)
$\mathrm{ec}_{5,3\ \mathrm{L}}$	(Pu)	94 - 99	0,442 (19)
$\mathrm{ec}_{6,2\ \mathrm{K}}$	(Pu)	106,392 (2)	21,4 (7)
$\mathrm{ec}_{5,3\ \mathrm{M}}$	(Pu)	111,2 - 113,3	0,123 (6)
$\mathrm{ec}_{7,3\ \mathrm{K}}$	(Pu)	132,61 (3)	0,160 (15)
$\mathrm{ec}_{6,1\ \mathrm{K}}$	(Pu)	155,808 (2)	16,0 (5)
$\mathrm{ec}_{6,3\ \mathrm{L}}$	(Pu)	186,649 - 191,696	1,68 (6)
$\mathrm{ec}_{6,3\ \mathrm{M}}$	(Pu)	203,820 - 205,978	0,408 (14)
$\mathrm{ec}_{6,2\ \mathrm{L}}$	(Pu)	205,079 - 210,126	4,27 (14)
$\mathrm{ec}_{6,3\ \mathrm{N}}$	(Pu)	208,194 - 209,329	0,1112 (38)
$\mathrm{ec}_{6,2\ \mathrm{M}}$	(Pu)	222,250 - 224,408	1,038 (33)
$\mathrm{ec}_{6,2\ \mathrm{N}}$	(Pu)	226,624 - 227,759	0,282 (9)
$\mathrm{ec}_{6,1\ \mathrm{L}}$	(Pu)	254,495 - 259,542	3,22 (11)
$\mathrm{ec}_{6,1\ \mathrm{M}}$	(Pu)	271,666 - 273,824	0,784 (25)
$\mathrm{ec}_{6,1\ \mathrm{N}}$	(Pu)	276,040 - 277,175	0,213 (7)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12,1246 — 21,9844		52,1 (16)	
XKα_2	(Pu)	99,525		13,34 (28)	} Kα
XKα_1	(Pu)	103,734		21,1 (5)	}
XKβ_3	(Pu)	116,244	}		
XKβ_1	(Pu)	117,228	}	7,75 (21)	K$'\beta_1$
XKβ_5''	(Pu)	117,918	}		
XKβ_2	(Pu)	120,54	}		
XKβ_4	(Pu)	120,969	}	2,69 (8)	K$'\beta_2$
XKO$_{2,3}$	(Pu)	121,543	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pu)	7,861 (2)	0,015
$\gamma_{3,2}$(Pu)	18,430 (4)	0,0001
$\gamma_{7,6}$(Pu)	44,663 (5)	0,131 (16)
$\gamma_{2,1}$(Pu)	49,414 (2)	0,2
$\gamma_{2,0}$(Pu)	57,273 (4)	0,06
$\gamma_{8,7}$(Pu)	57,30 (2)	0,08
$\gamma_{9,7}$(Pu)	61,460 (2)	0,0151 (13)
$\gamma_{3,1}$(Pu)	67,841 (7)	0,20 (5)
$\gamma_{4,3}$(Pu)	88,06 (3)	0,0018
$\gamma_{8,6}$(Pu)	101,96 (2)	0,008
$\gamma_{9,6}$(Pu)	106,125 (2)	0,296 (25)
$\gamma_{4,2}$(Pu)	106,47 (4)	0,015
$\gamma_{5,3}$(Pu)	117,1 (10)	0,08
$\gamma_{7,4}$(Pu)	166,39 (6)	0,016 (7)
$\gamma_{6,3}$(Pu)	209,753 (2)	3,29 (10)
$\gamma_{6,2}$(Pu)	228,183 (2)	10,6 (3)
$\gamma_{7,3}$(Pu)	254,40 (3)	0,11 (1)
$\gamma_{7,2}$(Pu)	272,87 (9)	0,08 (1)
$\gamma_{6,1}$(Pu)	277,599 (2)	14,0 (4)
$\gamma_{6,0}$(Pu)	285,460 (2)	0,73 (2)
$\gamma_{8,3}$(Pu)	311,7 (2)	0,017 (2)
$\gamma_{9,3}$(Pu)	315,880 (3)	0,018 (2)
$\gamma_{7,1}$(Pu)	322,3 (2)	0,007 (1)
$\gamma_{9,2}$(Pu)	334,310 (3)	0,024 (2)

7 Main Production Modes

Am – 241(n,γ)Am – 242

Am – 242(β^-)Cm – 242

Cm – 242(n,γ)Cm – 243

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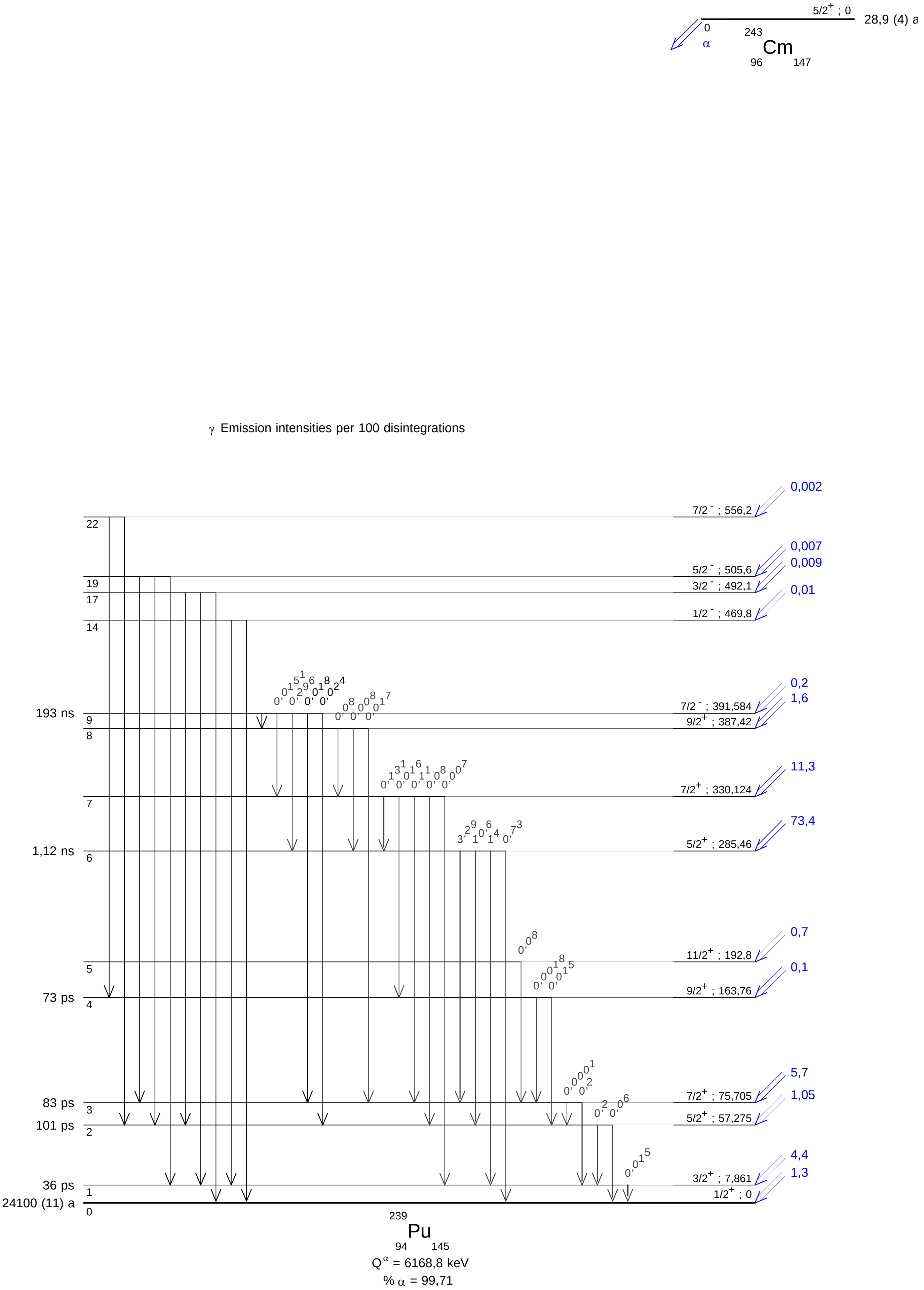
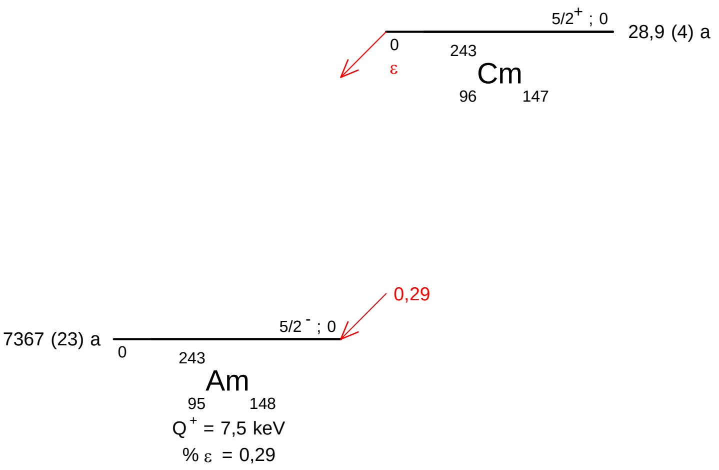

5/2+ ; 0
28,9 (4) a
0
α
243
Cm
96
147
γ Emission intensities per 100 disintegrations
7/2- ; 556,2
0,002
5/2- ; 505,6
0,007
3/2- ; 492,1
0,009
1/2- ; 469,8
0,01
7/2- ; 391,584
0,2
9/2+ ; 387,42
1,6
7/2+ ; 330,124
11,3
5/2+ ; 285,46
73,4
11/2+ ; 192,8
0,7
9/2+ ; 163,76
0,1
7/2+ ; 75,705
5,7
5/2+ ; 57,275
1,05
3/2+ ; 7,861
4,4
1/2+ ; 0
1,3
22
19
17
14
193 ns
9
8
7
1,12 ns
6
5
73 ps
4
83 ps
3
101 ps
2
36 ps
1
24100 (11) a
0
239
Pu
94
145
Qα = 6168,8 keV
% α = 99,71


5/2+ ; 0
28,9 (4) a
0
ε
243
Cm
96
147
0,29
7367 (23) a
5/2 - ; 0
0
243
Am
95
148
Q+ = 7,5 keV
% ε = 0,29

$^{\mathbf{244}}_{96}$Cm $_{148}$

1 Decay Scheme

Cm-244 decays 100% by alpha transitions to Pu-240 and by spontaneous fission with branching fraction of 1.36 (1) E-4 %.
Le curium 244 se désintègre par émission alpha et par fission spontanée dans une dans une proportion de 1,36 (1) E-4 %. Le nombre moyen de neutrons émis par fission spontanée est de 2,731 (20). Le nombre de neutrons émis pour 100 désintégrations de Cm-244 est : 3,71 (5) E-4%.

2 Nuclear Data

$T_{1/2}$(^{244}Cm) : 18,11 (3) a
$T_{1/2}$(^{240}Pu) : 6561 (7) a
Q^{α}(^{244}Cm) : 5901,74 (5) keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,9}$	4963,68 (8)	0,0000047 (11)	33
$\alpha_{0,8}$	5001,42 (7)	0,000050 (5)	5,6
$\alpha_{0,7}$	5041,03 (9)	0,000149 (16)	3,5
$\alpha_{0,6}$	5252,89 (7)	0,0000042 (30)	3100
$\alpha_{0,5}$	5304,40 (7)	0,000055 (9)	500
$\alpha_{0,4}$	5362,2	0,00004	
$\alpha_{0,3}$	5607,42 (6)	0,00352 (18)	512
$\alpha_{0,2}$	5760,05 (5)	0,0204 (15)	636
$\alpha_{0,1}$	5858,92 (5)	23,3 (4)	1,94
$\alpha_{0,0}$	5901,74 (5)	76,7 (4)	1

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+ce}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pu)	42,824 (8)	23,4 (8)	E2		658 (13)	183 (4)	905 (18)
$\gamma_{2,1}$(Pu)	98,860 (13)	0,0239 (16)	E2		12,08 (24)	3,38 (7)	16,6 (3)
$\gamma_{3,2}$(Pu)	152,63 (2)	0,00355 (18)	(E2)	0,196 (4)	1,66 (3)	0,465 (9)	2,48 (5)
$\gamma_{4,3}$(Pu)	202,4	0,00004	(E2)	0,148 (3)	0,487 (10)	0,135 (3)	0,817 (16)
$\gamma_{8,6}$(Pu)	251,47 (6)	0,0000121 (24)	(E1)	0,048 (1)	0,00983 (20)	0,00239 (5)	0,0606 (12)
$\gamma_{7,5}$(Pu)	263,37 (8)	0,000065 (9)	(E1)	0,0433 (9)	0,00881 (18)	0,00214 (4)	0,0547 (11)
$\gamma_{9,6}$(Pu)	289,21 (7)	0,0000048 (48)	E2+M3	3 (4)	2,4 (23)	0,7 (7)	7 (7)
$\gamma_{8,5}$(Pu)	302,98 (6)	0,0000198 (31)	(E1)	0,0320 (7)	0,00637 (13)	0,00154 (3)	0,0405 (8)
$\gamma_{9,5}$(Pu)	340,72 (7)	0,0000018 (9)					
$\gamma_{6,2}$(Pu)	507,16 (5)	0,0000088 (28)	(E1)	0,01126 (23)	0,00208 (4)	0,00050 (1)	0,01401 (29)
$\gamma_{5,1}$(Pu)	554,52 (4)	0,000088 (11)	(E1)	0,00949 (19)	0,00174 (4)	0,000417 (9)	0,01179 (24)
$\gamma_{5,0}$(Pu)	597,34 (4)	0,000054 (7)	(E1)	0,00826 (17)	0,00150 (3)	0,000359 (7)	0,01024 (21)
$\gamma_{6,1}$(Pu)	606,03 (4)	0,0000081 (14)					
$\gamma_{8,2}$(Pu)	758,63 (5)	0,0000141 (19)	(E2)	0,0148 (3)	0,00473 (9)	0,001211 (24)	0,0212 (4)
$\gamma_{7,1}$(Pu)	817,89 (7)	0,000069 (9)	(E2)	0,0130 (3)	0,00389 (8)	0,000989 (20)	0,0182 (4)
$\gamma_{8,1}$(Pu)	857,50 (4)	0,0000057 (8)					
$\gamma_{7,0}$(Pu)	860,71 (7)	0,0000082 (20)	(E0)				
$\gamma_{9,1}$(Pu)	895,24 (6)	0,0000019 (7)	E1+M2	0,06 (6)	0,013 (13)	0,003 (3)	0,07 (7)
$\gamma_{8,0}$(Pu)	900,32 (4)	0,0000013 (6)					
$\gamma_{9,0}$(Pu)	938,06 (6)	0,0000004 (4)					

3 Atomic Data

3.1

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,521 (20)
$\bar{\omega}_M$: 0,0555 (5)
n_{KL} : 0,790 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	99,525		63,17
	$K\alpha_1$	103,734		100
	$K\beta_3$	116,244	}	
	$K\beta_1$	117,228	}	
	$K\beta_5''$	117,918	}	36,36
	$K\beta_2$	120,54	}	
	$K\beta_4$	120,969	}	12,61
	$KO_{2,3}$	121,543	}	

		Energy keV	Relative probability
X_L			
	$L\ell$	12,125	
	$L\alpha$	14,083 – 14,279	
	$L\eta$	16,334	
	$L\beta$	16,499 – 19,331	
	$L\gamma$	20,708 – 21,984	

3.1.2 Auger Electrons

		Energy keV	Relative probability
Auger K			
	KLL	75,263 – 85,357	100
	KLX	92,607 – 103,729	60,6
	KXY	109,93 – 121,78	9,18
Auger L		6,1 – 22,9	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,9}$	4882,12 (8)	0,0000047 (11)
$\alpha_{0,8}$	4919,24 (7)	0,000050 (5)
$\alpha_{0,7}$	4958,20 (9)	0,000149 (16)
$\alpha_{0,6}$	5166,58 (7)	0,0000042 (30)
$\alpha_{0,5}$	5217,24 (7)	0,000055 (9)
$\alpha_{0,4}$	5315,3	0,00004
$\alpha_{0,3}$	5515,29 (6)	0,00352 (18)
$\alpha_{0,2}$	5665,41 (5)	0,0204 (15)
$\alpha_{0,1}$	5762,65 (5)	23,3 (4)
$\alpha_{0,0}$	5804,77 (5)	76,7 (4)

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pu)	6,1 - 22,9		8,09 (20)
e_{AK}	(Pu)			0,0000061 (9)
	KLL	75,263 - 85,357	}	
	KLX	92,607 - 103,729	}	
	KXY	109,93 - 121,78	}	
$ec_{1,0\ L}$	(Pu)	19,720 - 24,767		16,9 (6)
$ec_{1,0\ M}$	(Pu)	36,891 - 39,049		4,72 (16)
$ec_{2,1\ L}$	(Pu)	75,76 - 80,80		0,0164 (11)
$ec_{2,1\ M}$	(Pu)	92,92 - 95,05		0,00468 (32)
$ec_{3,2\ K}$	(Pu)	30,82 (2)		0,00019 (1)
$ec_{3,2\ L}$	(Pu)	129,52 - 134,57		0,00169 (9)
$ec_{3,2\ M}$	(Pu)	146,69 - 148,85		0,000470 (25)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12,125 — 21,984		8,92 (23)	
$XK\alpha_2$	(Pu)	99,525		0,000061 (4)	} $K\alpha$
$XK\alpha_1$	(Pu)	103,734		0,000097 (5)	}
$XK\beta_3$	(Pu)	116,244	}		
$XK\beta_1$	(Pu)	117,228	}	0,0000354 (20)	$K'\beta_1$
$XK\beta_5''$	(Pu)	117,918	}		
$XK\beta_2$	(Pu)	120,54	}		
$XK\beta_4$	(Pu)	120,969	}	0,0000123 (7)	$K'\beta_2$
$XKO_{2,3}$	(Pu)	121,543	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pu)	42,824 (8)	0,0258 (7)
$\gamma_{2,1}$(Pu)	98,860 (13)	0,00136 (9)
$\gamma_{3,2}$(Pu)	152,63 (2)	0,00102 (5)
$\gamma_{4,3}$(Pu)	202,4	0,000022
$\gamma_{8,6}$(Pu)	251,47 (6)	0,0000114 (23)
$\gamma_{7,5}$(Pu)	263,37 (8)	0,000062 (9)
$\gamma_{9,6}$(Pu)	289,21 (7)	0,0000006 (3)
$\gamma_{8,5}$(Pu)	302,98 (6)	0,000019 (3)
$\gamma_{9,5}$(Pu)	340,72 (7)	0,0000018 (9)
$\gamma_{6,2}$(Pu)	507,16 (5)	0,0000087 (28)
$\gamma_{5,1}$(Pu)	554,52 (4)	0,000087 (11)
$\gamma_{5,0}$(Pu)	597,34 (4)	0,000053 (7)
$\gamma_{6,1}$(Pu)	606,03 (4)	0,0000081 (14)
$\gamma_{8,2}$(Pu)	758,63 (5)	0,0000138 (19)
$\gamma_{7,1}$(Pu)	817,89 (7)	0,000068 (9)
$\gamma_{8,1}$(Pu)	857,50 (4)	0,0000057 (8)
$\gamma_{7,0}$(Pu)	860,71 (7)	0,0000082 (20)
$\gamma_{9,1}$(Pu)	895,24 (6)	0,0000018 (6)
$\gamma_{8,0}$(Pu)	900,32 (4)	0,0000013 (6)
$\gamma_{9,0}$(Pu)	938,06 (6)	0,0000004 (4)

7 Main Production Modes

$$\begin{cases} \mathrm{Am}-243(\mathrm{n},\gamma)\mathrm{Am}-244 \\ \mathrm{Am}-244(\beta^-)\mathrm{Cm}-244 \\ \text{Possible impurities : } \mathrm{Am}-243,\mathrm{Cm}-245,\mathrm{Cm}-246 \end{cases}$$

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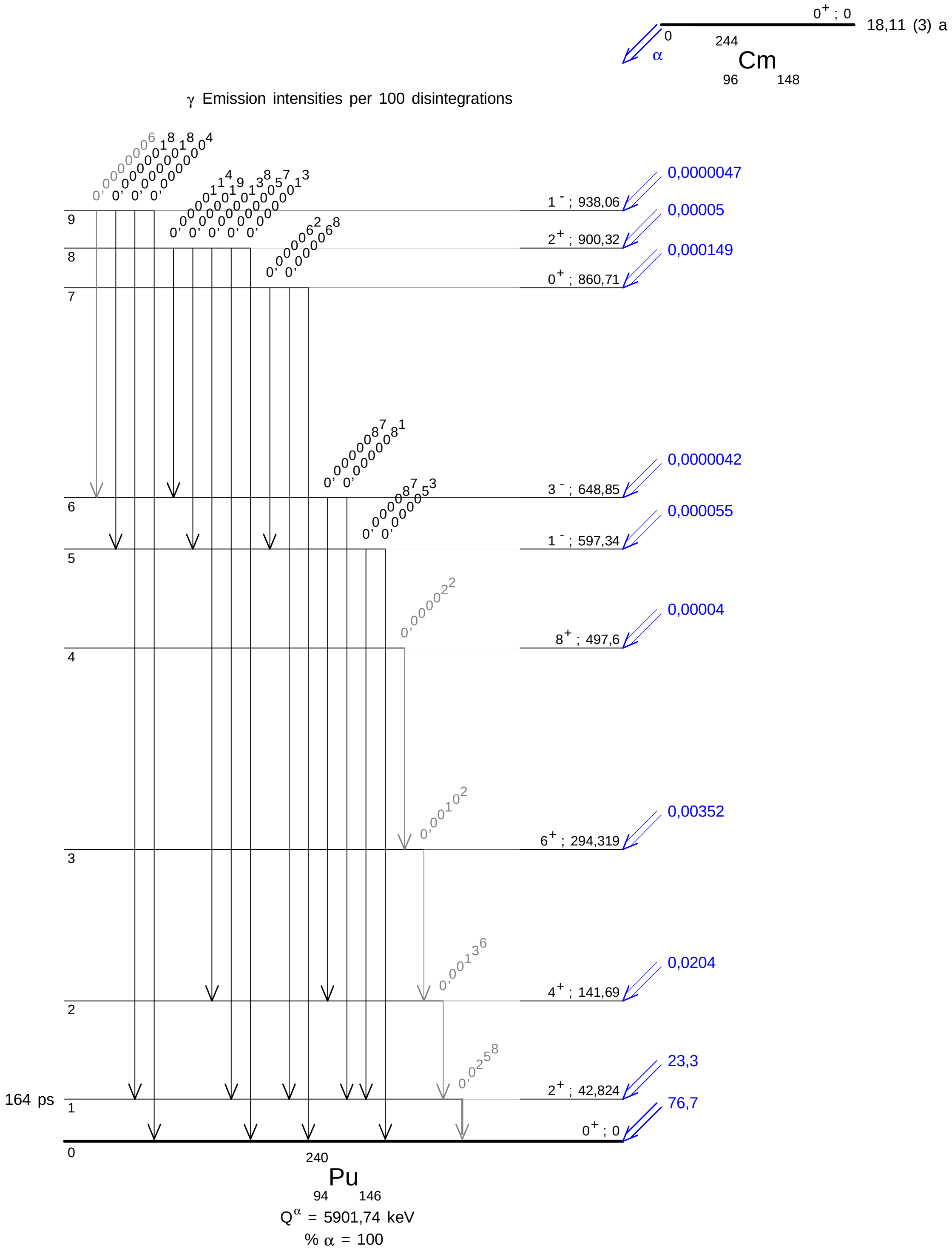
0+ ; 0
18,11 (3) a
0
α
244
Cm
96
148
γ Emission intensities per 100 disintegrations
9
1 - ; 938,06
0,0000047
8
2+ ; 900,32
0,00005
7
0+ ; 860,71
0,000149
6
3 - ; 648,85
0,0000042
5
1 - ; 597,34
0,000055
4
8+ ; 497,6
0,00004
0,000022
3
6+ ; 294,319
0,00352
0,0102
2
4+ ; 141,69
0,0204
0,0136
164 ps
1
2+ ; 42,824
23,3
0,0258
0
0+ ; 0
76,7
240
Pu
94
146
Qα = 5901,74 keV
% α = 100

$^{245}_{96}$Cm $_{149}$

1 Decay Scheme

Cm-245 decays 100% by alpha transitions to Pu-241.

Le curium 245 se désintègre à 100 % par émissions alpha vers le plutonium 241.

2 Nuclear Data

$T_{1/2}$(^{245}Cm)	:	8250	(70)	a
$T_{1/2}$(^{241}Pu)	:	14,33	(4)	a
Q^{α}(^{245}Cm)	:	5622,3	(5)	keV

2.1 α Transitions

	Energy keV	Probability × 100	F
$\alpha_{0,8}$	5237 (3)	≤ 0,005	1000
$\alpha_{0,7}$	5321,4 (12)	0,32	51
$\alpha_{0,6}$	5391,7 (12)	5,0 (1)	8,7
$\alpha_{0,5}$	5450,9 (12)	93,2 (5)	1,03
$\alpha_{0,4}$	5460,6 (5)	0,0210 (9)	5520
$\alpha_{0,3}$	5461,0 (5)	0,39 (22)	300
$\alpha_{0,2}$	5526,4 (5)	0,04	7130
$\alpha_{0,1}$	5579,7 (5)	0,83	768
$\alpha_{0,0}$	5622,3 (5)	0,58	1770

2.2 Gamma Transitions and Internal Conversion Coefficients

	Energy keV	$P_{\gamma+\mathrm{ce}}$ × 100	Multipolarity	α_K	α_L	α_M	α_T
$\gamma_{1,0}$(Pu)	41,972 (1)	38,2 (22)	M1+E2		76,2 (15)	19,4 (4)	102,4 (20)
$\gamma_{2,1}$(Pu)	53,807 (1)	3,34 (20)	M1+E2		33,3 (8)	8,42 (21)	44,7 (11)
$\gamma_{6,5}$(Pu)	56,89 (3)	3,16 (17)	M1+E2		64 (5)	17,3 (14)	87 (7)
$\gamma_{3,2}$(Pu)	65,535 (3)	0,45 (22)	M1+E2		18 (9)	4,5 (24)	24 (12)
$\gamma_{7,6}$(Pu)	69,237 (18)	0,20 (4)	M1(+E2)		21 (10)	5 (3)	28 (14)
$\gamma_{5,2}$(Pu)	79,2728 (18)	2,8 (7)	M1+E2		16 (5)	4,3 (12)	22 (6)
$\gamma_{2,0}$(Pu)	95,7795 (12)	0,221 (47)	E2		14,0 (2)	3,92 (6)	19,3 (3)
$\gamma_{7,5}$(Pu)	126,09 (4)	0,046 (13)	[E2]	0,1705 (24)	3,94 (6)	1,101 (16)	5,59 (8)
$\gamma_{5,1}$(Pu)	133,081 (2)	34,7 (10)	M1+E2	8,80 (13)	1,92 (3)	0,473 (7)	11,36 (17)
$\gamma_{6,2}$(Pu)	136,156 (9)	1,13 (12)	M1+E2	6,2 (12)	2,04 (15)	0,52 (5)	9 (1)
$\gamma_{7,3}$(Pu)	139,858 (16)	0,064 (33)	[M1,E2]	4 (4)	2,0 (5)	0,54 (15)	7 (4)
$\gamma_{4,0}$(Pu)	161,685 (1)	0,210 (9)	E2	0,190 (3)	1,289 (18)	0,360 (5)	1,96 (3)
$\gamma_{5,0}$(Pu)	175,0524 (14)	61,0 (16)	M1+E2	4,07 (7)	0,855 (12)	0,209 (3)	5,21 (8)
$\gamma_{6,1}$(Pu)	189,965 (10)	0,889 (42)	M1+E2	2,46 (15)	0,665 (10)	0,1680 (25)	3,36 (16)
$\gamma_{7,2}$(Pu)	205,393 (16)	0,028 (13)	[M1,E2]	1,4 (13)	0,50 (5)	0,129 (3)	2,1 (14)
$\gamma_{6,0}$(Pu)	231,935 (9)	0,0175 (27)	[E2]	0,1200 (17)	0,275 (4)	0,0760 (11)	0,498 (7)
$\gamma_{(-1,1)}$(Pu)	388,16 (5)	0,019 (1)					

3 Atomic Data

3.1 Pu

ω_K : 0,971 (4)
$\bar{\omega}_L$: 0,521 (20)
n_{KL} : 0,790 (5)

3.1.1 X Radiations

		Energy keV		Relative probability
X_K				
	$K\alpha_2$	99,525		63,17
	$K\alpha_1$	103,734		100
	$K\beta_3$	116,244	}	
	$K\beta_1$	117,228	}	
	$K\beta_5''$	117,918	}	36,70
	$K\beta_2$	120,54	}	
	$K\beta_4$	120,969	}	12,74
	$KO_{2,3}$	121,543	}	
X_L				
	$L\ell$	12,1246		
	$L\alpha$	14,0834 – 14,2791		
	$L\eta$	16,334		
	$L\beta$	16,4987 – 19,331		
	$L\gamma$	20,7081 – 21,9844		

3.1.2 Auger Electrons

	Energy keV	Relative probability
Auger K		
KLL	75,263 – 85,357	100
KLX	92,607 – 103,729	60,6
KXY	109,93 – 121,78	9,18
Auger L	6,19 – 22,99	

4 α Emissions

	Energy keV	Probability × 100
$\alpha_{0,8}$	5152 (3)	≤0,005
$\alpha_{0,7}$	5234,4 (12)	0,32
$\alpha_{0,6}$	5303,6 (12)	5,0 (1)
$\alpha_{0,5}$	5361,8 (12)	93,2 (5)
$\alpha_{0,4}$	5371,4 (5)	0,0210 (9)
$\alpha_{0,3}$	5371,7 (5)	0,39 (22)
$\alpha_{0,2}$	5436,1 (5)	0,04
$\alpha_{0,1}$	5488,5 (5)	0,83
$\alpha_{0,0}$	5530,4 (4)	0,58

5 Electron Emissions

		Energy keV		Electrons per 100 disint.
e_{AL}	(Pu)	6,19 - 22,99		50,1 (13)
e_{AK}	(Pu)			1,91 (27)
	KLL	75,263 - 85,357	}	
	KLX	92,607 - 103,729	}	
	KXY	109,93 - 121,78	}	
$ec_{5,1\ K}$	(Pu)	11,290 (2)		24,7 (7)
$ec_{6,2\ K}$	(Pu)	14,365 (9)		0,70 (14)
$ec_{1,0\ L}$	(Pu)	18,868 - 23,915		28,1 (16)
$ec_{2,1\ L}$	(Pu)	30,703 - 35,750		2,43 (15)
$ec_{6,5\ L}$	(Pu)	33,79 - 38,83		2,30 (22)
$ec_{1,0\ M}$	(Pu)	36,039 - 38,197		7,16 (42)
$ec_{1,0\ N}$	(Pu)	40,413 - 41,548		1,96 (11)
$ec_{3,2\ L}$	(Pu)	42,431 - 47,478		0,32 (17)
$ec_{7,6\ L}$	(Pu)	46,133 - 51,180		0,15 (9)
$ec_{2,1\ M}$	(Pu)	47,874 - 50,032		0,615 (37)
$ec_{6,5\ M}$	(Pu)	50,96 - 53,12		0,62 (6)
$ec_{2,1\ N}$	(Pu)	52,248 - 53,383		0,168 (10)
$ec_{5,0\ K}$	(Pu)	53,2613 (14)		40,0 (11)
$ec_{6,5\ N}$	(Pu)	55,33 - 56,47		0,169 (17)
$ec_{5,2\ L}$	(Pu)	56,169 - 61,216		1,9 (6)
$ec_{6,1\ K}$	(Pu)	68,17 (1)		0,502 (34)
$ec_{2,0\ L}$	(Pu)	72,676 - 77,722		0,153 (32)
$ec_{5,2\ M}$	(Pu)	73,340 - 75,498		0,52 (15)
$ec_{5,2\ N}$	(Pu)	77,714 - 78,849		0,144 (49)

		Energy keV	Electrons per 100 disint.
ec$_{5,1\ L}$	(Pu)	109,977 - 115,024	5,40 (16)
ec$_{6,2\ L}$	(Pu)	113,052 - 118,099	0,231 (19)
ec$_{5,1\ M}$	(Pu)	127,148 - 129,306	1,329 (39)
ec$_{5,1\ N}$	(Pu)	131,522 - 132,657	0,362 (10)
ec$_{5,0\ L}$	(Pu)	151,948 - 156,995	8,40 (22)
ec$_{6,1\ L}$	(Pu)	166,861 - 171,908	0,1357 (45)
ec$_{5,0\ M}$	(Pu)	169,119 - 171,277	2,05 (5)
ec$_{5,0\ N}$	(Pu)	173,493 - 174,628	0,560 (15)

6 Photon Emissions

6.1 X-Ray Emissions

		Energy keV		Photons per 100 disint.	
XL	(Pu)	12,1246 — 21,9844		51,7 (10)	
XKα_2	(Pu)	99,525		19,0 (5)	} Kα
XKα_1	(Pu)	103,734		30,1 (7)	}
XKβ_3	(Pu)	116,244	}		
XKβ_1	(Pu)	117,228	}	11,06 (30)	K$'\beta_1$
XKβ_5''	(Pu)	117,918	}		
XKβ_2	(Pu)	120,54	}		
XKβ_4	(Pu)	120,969	}	3,84 (12)	K$'\beta_2$
XKO$_{2,3}$	(Pu)	121,543	}		

6.2 Gamma Emissions

	Energy keV	Photons per 100 disint.
$\gamma_{1,0}$(Pu)	41,972 (1)	0,369 (20)
$\gamma_{2,1}$(Pu)	53,807 (1)	0,073 (4)
$\gamma_{6,5}$(Pu)	56,89 (3)	0,0359 (21)
$\gamma_{3,2}$(Pu)	65,535 (3)	0,018 (2)
$\gamma_{7,6}$(Pu)	69,237 (18)	0,007 (3)
$\gamma_{5,2}$(Pu)	79,2728 (18)	0,120 (7)
$\gamma_{2,0}$(Pu)	95,7795 (12)	0,0109 (23)
$\gamma_{7,5}$(Pu)	126,09 (4)	0,007 (2)
$\gamma_{5,1}$(Pu)	133,081 (2)	2,81 (7)

	Energy keV	Photons per 100 disint.
$\gamma_{6,2}$(Pu)	136,156 (9)	0,113 (4)
$\gamma_{7,3}$(Pu)	139,858 (16)	0,008 (1)
$\gamma_{4,0}$(Pu)	161,685 (1)	0,071 (3)
$\gamma_{5,0}$(Pu)	175,0523 (14)	9,83 (22)
$\gamma_{6,1}$(Pu)	189,965 (10)	0,204 (6)
$\gamma_{7,2}$(Pu)	205,393 (16)	0,009 (1)
$\gamma_{6,0}$(Pu)	231,935 (9)	0,0117 (18)
$\gamma_{(-1,1)}$(Pu)	388,16 (5)	0,019 (1)

7 Main Production Modes

$$\begin{cases} \mathrm{Cm-244(n,\gamma)Cm-245} \\ \text{Possible impurities : } \mathrm{Cm-242,\ Cm-243,\ Cm-244} \end{cases}$$

Cf – 249(α)Cm – 245

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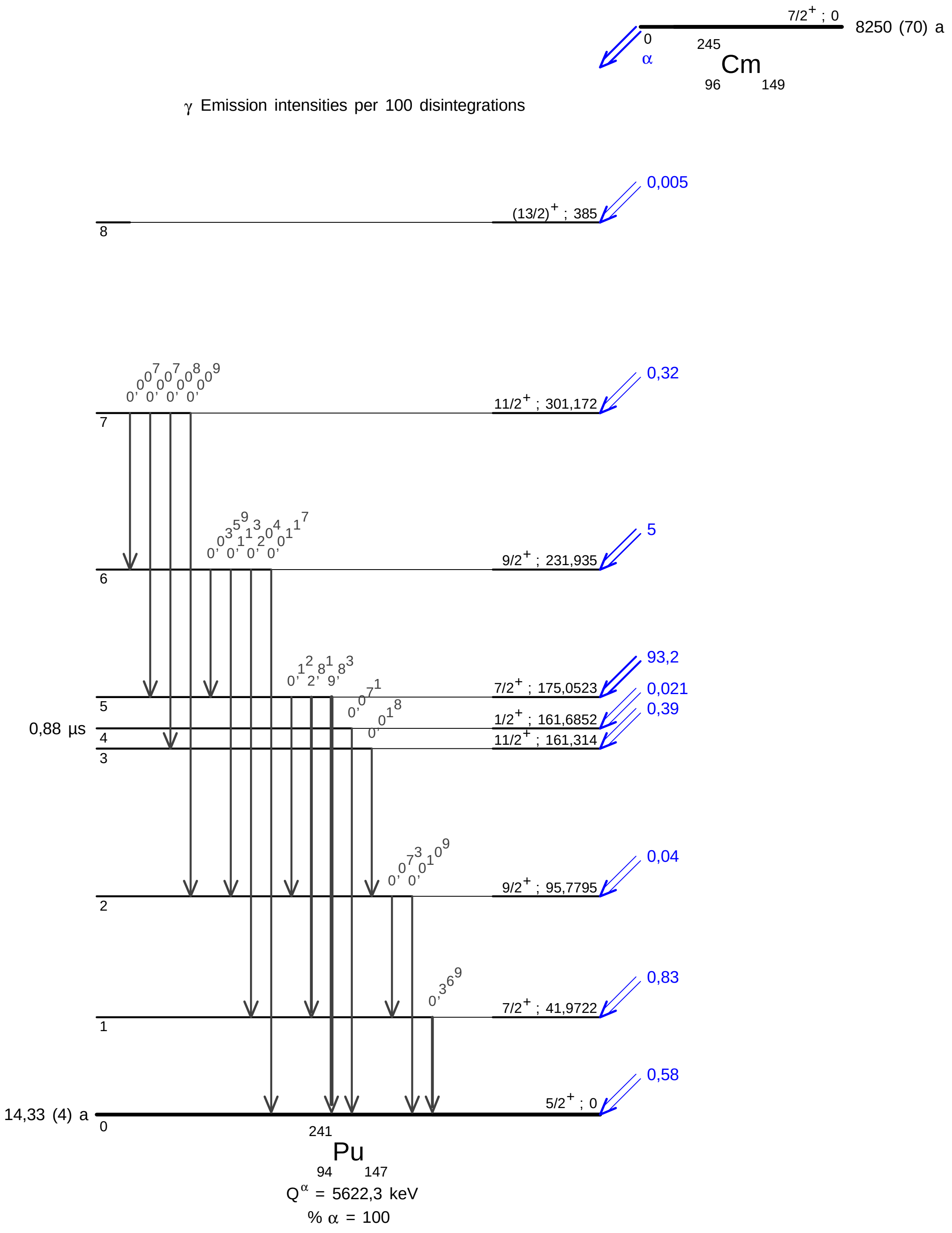
7/2+ ; 0
8250 (70) a
0
α
245
Cm
96
149
γ Emission intensities per 100 disintegrations
0,005
(13/2)+ ; 385
8
0,32
11/2+ ; 301,172
7
5
9/2+ ; 231,935
6
93,2
7/2+ ; 175,0523
5
0,021
1/2+ ; 161,6852
4
0,88 µs
0,39
11/2+ ; 161,314
3
0,04
9/2+ ; 95,7795
2
0,83
7/2+ ; 41,9722
1
0,369
0,58
5/2+ ; 0
14,33 (4) a
0
241
Pu
94
147
Qα = 5622,3 keV
% α = 100

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