

Dissemination and visualisation of reference decay data



Link to LNHB posters

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Introduction

LNHB, through its participation to the DDEP, is deeply involved in decay data evaluation and publication. Our laboratory is in charge of the dissemination of the recommended decay data to the users, once the evaluation process is completed. Multiple media may be used for this purpose: tabulated data files on our website, regular or special paper publications, and online access thanks to a specially developed web application, LARAWEB. We present you hereafter some of these media.

LNHB website

This is the entry point to find all necessary information on recommended decay data.

- New recommended radionuclide decay data are regularly uploaded
- Links to the already published dataset collection (e.g. Monographie BIPM-5 volumes, Mini Table)
- Links to other useful publications (table of half-lives, table of α , X and γ emissions, etc.)

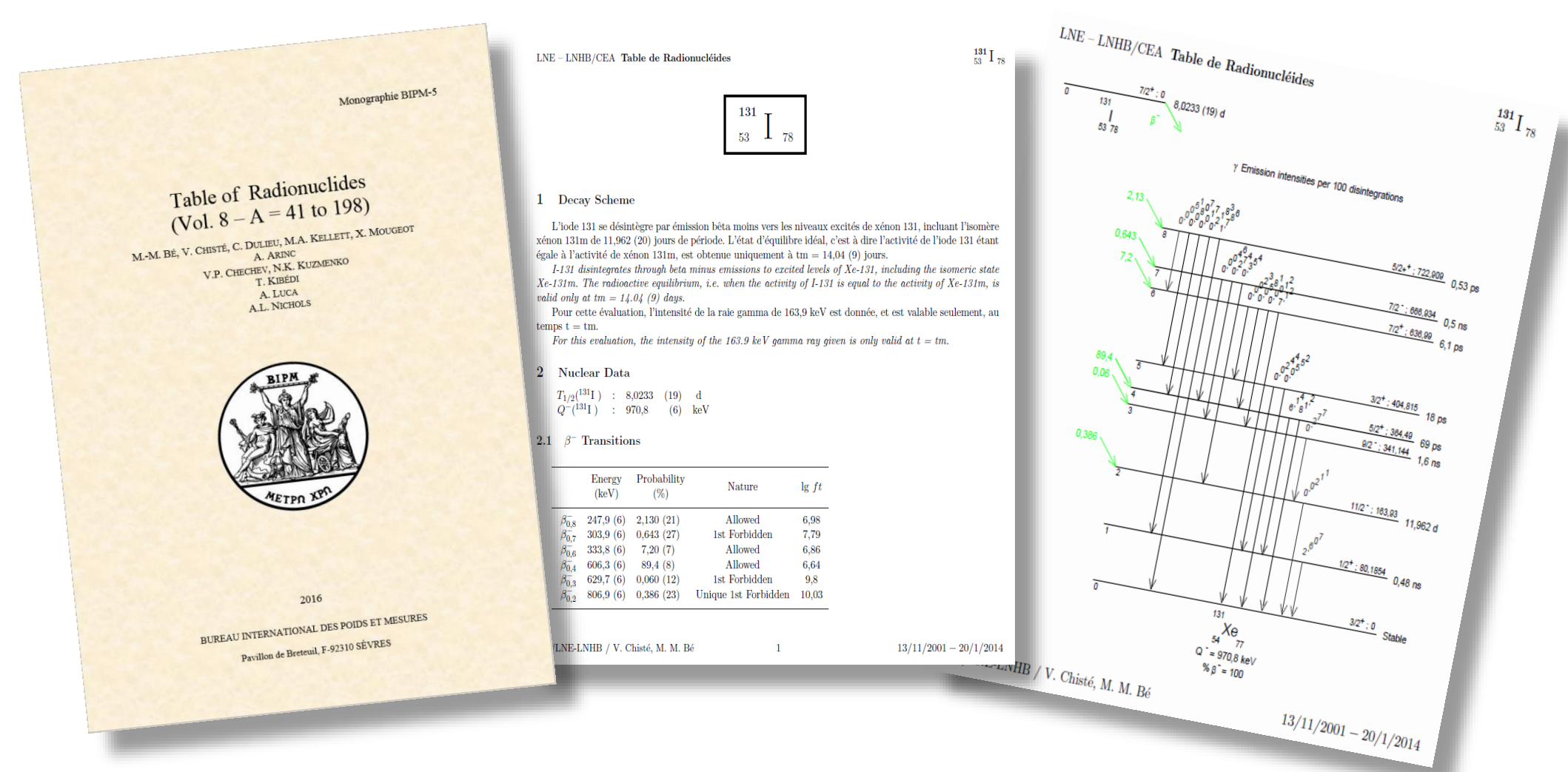
<http://www.nucleide.org/NucData.htm>

Recommended decay data files:

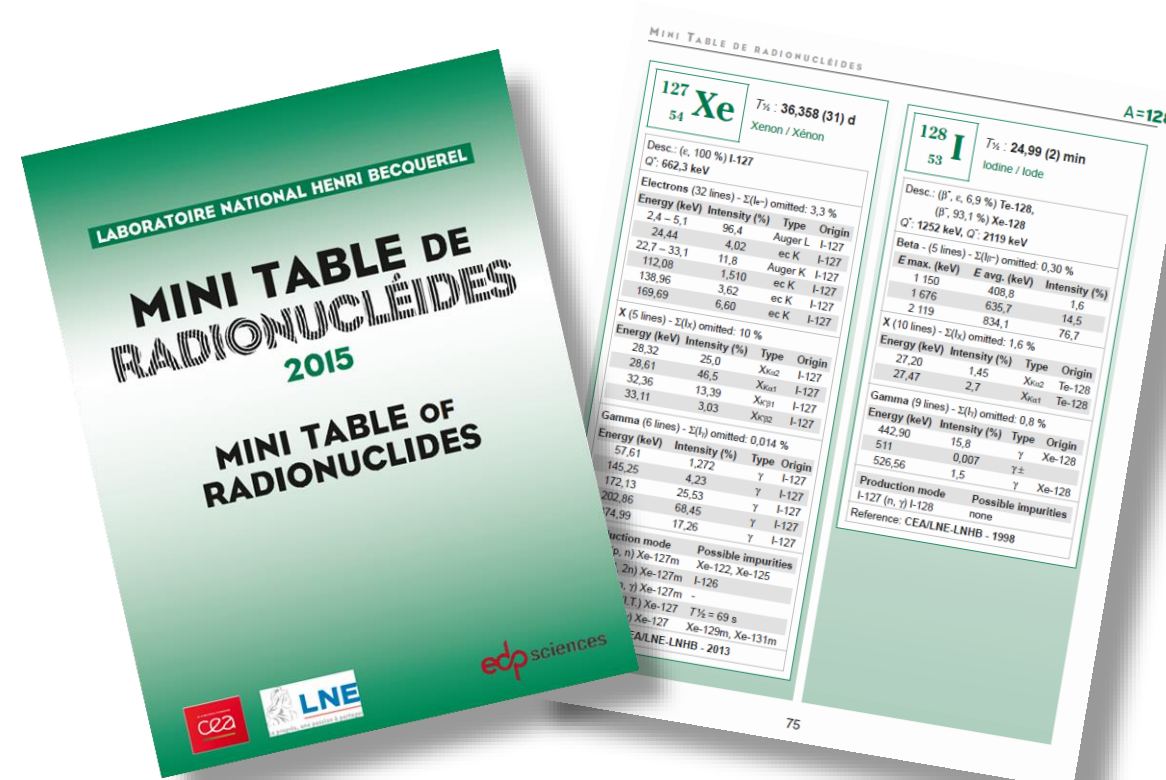
- data tables and decay scheme (PDF)
- comments on the evaluation process (PDF)
- various export formats (ENSDF, PenNuc, text file)



Paper publications



Monographie BIPM-5

Already 7 volumes published \approx 220 radionuclide evaluations
(Volume 8 in press)

Mini Table of Radionuclides

New edition published in 2015
 \approx 300 radionuclides

NUCLÉIDE-LARA

Library for alpha, gamma and X emissions
 \approx 400 radionuclides
(New edition in 2017)

LARAWEB: online application for alpha, X & gamma spectrometry

Main features of LARAWEB are:

- Direct consultation of decay data, emissions and decay scheme for a selected nuclide (intensity and energy thresholds may be set)
- Advanced search engine with multiple criteria: decay mode (β^+ / ε , β^- , IT, α), emission type (α , X or γ), intensity, energy, atomic mass, half-life. Relevant results are highlighted.
- Simple calculation tools: mass to activity conversion, decay calculation

Simple consultation of decay data and scheme

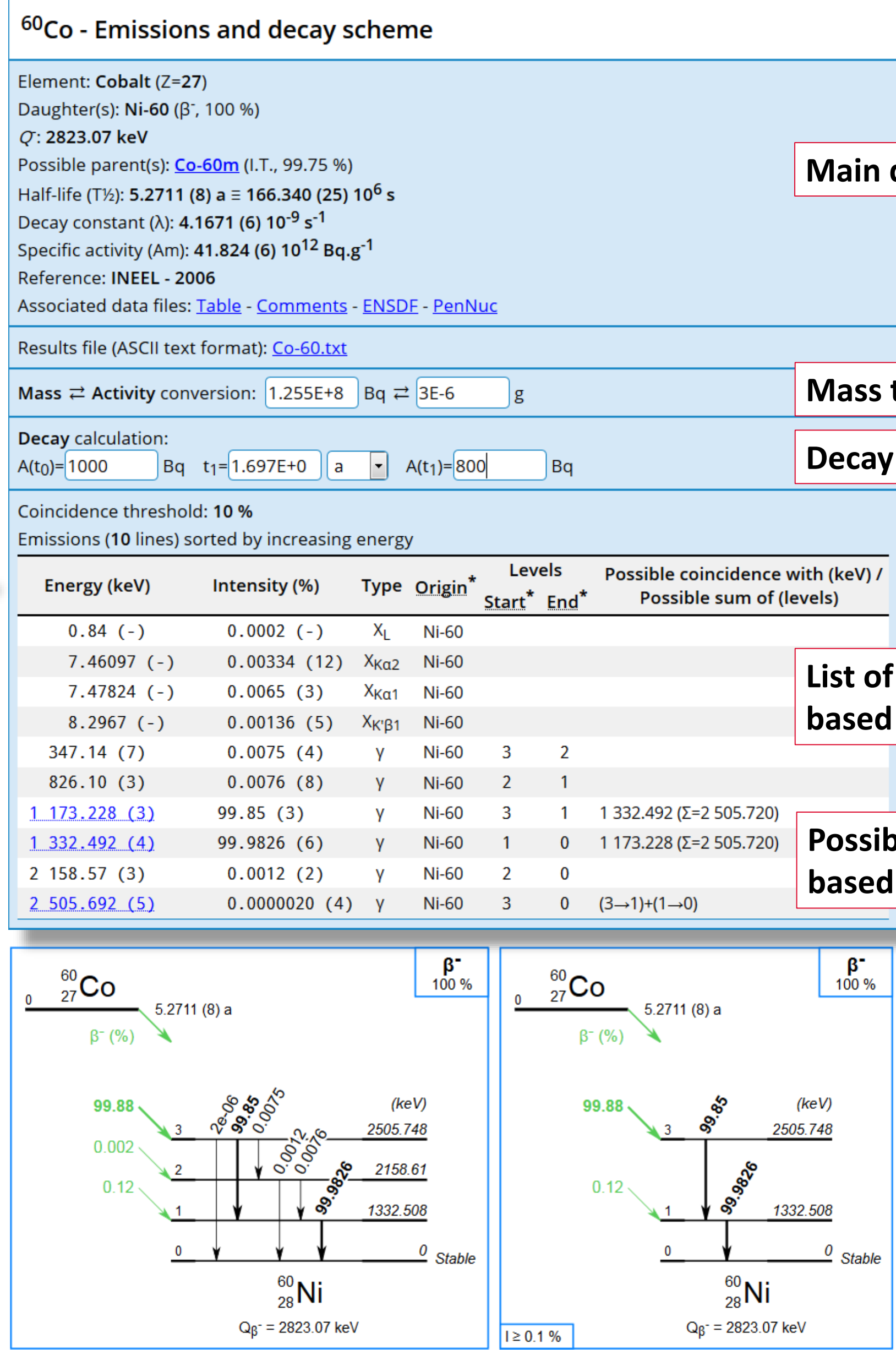
Nucléide - Lara
Library for gamma and alpha emissions

Nuclide list:
59Fe
59Ni
60Co
60Co-M
61Cu
63Ni
63Zn
64Cu

Nuclide search:
(e.g.: 99Xx or Xx-99)

Energy threshold (keV):
Intensity threshold (%):
Coincidence threshold (%):
Show γ - γ coincidences:
Sort by decreasing intensity:
Show simple decay tools:
Display: ☒ Data ☒ Emissions ☒ Scheme
Emission type: ☒ X ☒ gamma ☒ alpha
Language: ☒ EN ☐ EO ☐ FR

Show data

Nuclide(s) selection,
display parameters and
threshold settings

Main data

Mass to activity conversion

Decay calculation tool

List of X, γ and α emissions,
based on selected thresholdsPossible γ - γ coincidences
based on selected threshold<http://www.nucleide.org/Laraweb>

Advanced search engine with multiple criteria

Nuclide search criteria

Decay mode: ☒ β^+ / ε ☒ β^- ☒ IT ☐ α
(☐ And ☐ Or ☐ XOR)
Emission type: ☐ X ☒ gamma ☐ alpha
Energy 1 (or range):
511 \pm 1 keV
And energy 2 (or range):
850 \pm 50 keV
And energy 3 (or range):
Intensity range:
5 - %
Mass range:
Half-life range:
1 d - a

Find nuclides

Nuclide search window,
e.g. looking for nuclides
emitting γ -rays at 511 \pm 1
and 850 \pm 50 keV,
with $I_\gamma > 5\%$ and $T_{1/2} > 1$ d

Selection results

3 nuclides disintegrating by β^+ , ε or β^- or I.T. giving 6 gamma emissions where
Energy 1: E = 511 \pm 1 keV
Energy 2: E = 850 \pm 50 keV
Intensity: $I \geq 5\%$
Half-life: $T_{1/2} \geq 1$ d

Energy / Intensity (nuclide):
511 5.14E+1 (84Rb)
511 3.92E+1 (56Co)
511 2.99E+1 (58Co)
810.7602 9.94E+1 (58Co)
846.7638 9.99E+1 (56Co)
881.61 6.90E+1 (84Rb)

Show emissions

Nuclide (half-life):
56Co (77.236 d)
58Co (70.85 d)
84Rb (32.82 d)

Energy threshold (keV):
Intensity threshold (%): 5

Show emissions

Nuclides meeting
search criteria,
ordered by
emission energy &
also by half-lifeRelated data and emissions:
highlighted in yellow those
meeting the search criteria, in blue
other intense lines.
Thresholds and emission type
filters are also applied.

⁵⁶Co - Emissions

Element: Cobalt (Z=27)
Daughter(s): Fe-56 (β^+ , ε , 100 %)
 Q° : 4566 keV
Possible parent(s): **Ni-56** (β^+ , ε , 100 %)
Half-life ($T_{1/2}$): 77.236 (26) d \approx 6.6732 (22) 10^6 s
Decay constant (λ): 103.870 (35) 10^{-9} s $^{-1}$
Specific activity (Am): 1.11700 (38) 10^{15} Bq.g $^{-1}$
Reference: LBNL, NPL - 2005
Associated data files: [Table](#) - [Comments](#) - [ENSDF](#) - [PenNuc](#)

Results file (ASCII text format): [Co-56.txt](#)

Intensity threshold: 5 %
Gamma emissions (8 lines out of 47) sorted by increasing energy
Emissions meeting search criteria Other significantly intense emissions

Energy (keV)	Intensity (%)	Type	Origin*	Levels Start* End*
511 (-)	39.21 (22)	γ±	Fe-56	-1 -1
846.7638 (19)	99.9399 (23)	γ	Fe-56	1 0
1 037.8333 (24)	14.03 (5)	γ	Fe-56	5 2
1 238.2736 (22)	66.41 (16)	γ	Fe-56	2 1
1 771.327 (3)	15.45 (4)	γ	Fe-56	8 2
2 034.752 (5)	7.741 (13)	γ	Fe-56	11 2
2 598.438 (4)	16.96 (4)	γ	Fe-56	7 1
3 253.402 (5)	7.87 (3)	γ	Fe-56	10 1

⁵⁸Co - Emissions

Element: Cobalt (Z=27)
Daughter(s): Fe-58 (β^+ , ε , 100 %)
 Q° : 2307.9 keV
Possible parent(s): **Co-58m** (I.T., 100 %)
Half-life ($T_{1/2}$): 70.85 (3) d \approx 6.1214 (26) 10^6 s
Decay constant (λ): 113.233 (48) 10^{-9} s $^{-1}$
Specific activity (Am): 1.17570 (50) 10^{15} Bq.g $^{-1}$
Reference: CEA/LNE-LNHB - 2013
Associated data files: [Table](#) - [Comments](#) - [ENSDF](#) - [PenNuc](#)

Results file (ASCII text format): [Co-58.txt](#)

Intensity threshold: 5 %
Gamma emissions (2 lines out of 4) sorted by increasing energy
Emissions meeting search criteria Other significantly intense emissions

Energy (keV)	Intensity (%)	Type	Origin*	Levels Start* End*
511 (-)	29.88 (32)	γ±	Fe-58	-1 -1
810.7602 (20)	99.44 (2)	γ	Fe-58	1 0

Conclusion

Many new developments have been implemented in the online tool LARAWEB, including information on γ - γ coincidences and the ability to plot decay schemes. In particular, the use of intensity thresholds allows the main decay radiations to be displayed and a simplified decay scheme to be plotted, which is unique to LARAWEB.

We would like to express our sincere thanks to all members of the Decay Data Evaluation Project, past and present.