ENDF/B-VII Decay Data

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CSEWG - USNDP 2004

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Data stored in ENDF decay data libraries

- Level energy, half-life, spin and parity, decay branching ratio and Q-value.

- Discrete energy and intensity for:
  - Gammas (also ICCs: α, α_k, α_l)
  - X-rays
  - Conversion Electrons
  - Auger Electrons
  - Neutrons
  - Protons
  - Alphas

- Average energies for:
  - $\beta+$
  - $\beta-$

- Sum energies for all radiation types

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Sources of data

The Evaluated Nuclear Structure Data File (ENSDF) database is the only comprehensive source of evaluated decay data.

ENSDF is updated continuously.

ENSDF contains 3682 decay datasets (full information), covering 2224 different parent nuclei. For instance, there are 2 datasets with ^{236}U as parent nucleus:

^{236}U α decay

^{236}U IT decay

Sources of complementary information

Atomic Mass Evaluation:
Last published in 2003.

Nuclear Wallet Cards:
Mass excess, half-life, spin-parity, decay modes. Last published in 2000, new one in 2005.

NuBase:
Similar to Nuclear Wallet Cards, last published in 2003.

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Comparison of Decay Data Libraries

	ENDF/B-VI	JEFF-3.0 (05/27/2004) (preliminary)
# of 457 Sections	979	3,625
# Distinctive Nuclei	830	2,945
# Sum Energies	3,426	3,631
# Gammas	24,202	23,661
# X-rays	2,753	3,866
# β- transitions	5,921	6,625
# ε/β+ transitions	399	1,002
# CE+Auger	6,044	24,663
# Alphas	754	830
# Neutrons	0	135
# Protons	0	0
# Discrete radiations	40,073	61,020

NuDat (decay)
80,664
11,080
10,451
11,780
63,615
2,248

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How to update the ENDF decay data libraries

1) Q-values from 2003 Atomic Mass Evaluations

2) Level energies, half-lives, $J\pi$ and decay branching ratios from 2005 Nuclear Wallet Cards

3) Internal Conversion Coefficients from BRICC (Band-Raman ICCs), recently setup by T. Kibedi:

- 2% precision in calculated values

- Extensive grid for interpolation

4) Radiation energy and intensity from ENSDF, updated with items 1, 2 and 3, and processed with program RadList.

5) Online collaboration, automatic retrieval, processing and storing of data. *Several months of work?*

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