IAEA CRP

REFERENCE DATA BASE FOR NEUTRON ACTIVATION ANALYSIS

3rd RCM - NOVEMBER 2008

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~~~ Consultancy on measured k_0's and related nuclear data ~~~

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Past contributions

by FDC

Gamma spectrum peak evaluation test

Menno Blaauw	11 July 2006	Coordinate activity.
	5 Dec 2005	Provide standard spectra for purpose to participants.
All participants	30 Apr 2006	Submit results to coordinator.
Menno Blaauw	Next RCM	Summarize contributions.

FDC: done

Detector efficiency calibration

Zsolt Revay	May 2006	Coordinate activity. Provide standard calibration spectra and calibration data to participants.
All participants	31 Oct 2006	Submit results according to specifications to coordinator. FDC: done
Zsolt Revay	Next RCM	Summarize contributions.

Neutron spectrum characterization

Andrej Trkov	Next RCM	Coordinate activity.
Frans De Corte	Dec 2005 FDC: done	Provide recommendations for other candidate materials that have suitable capture and threshold reactions.
All participants	Dec 2006	Monitoring material from the k0-IAEA package to be used by all participants for spectrum characterization of their irradiation facility, in addition to any other available monitor materials. Determine f and a by conventional methods.
All participants	Dec 2006	If available, also provide neutron spectra in 640 group structure from statistical model calculations or from direct measurements. To be sent to Andrej Trkov for further analysis.
Andrej Trkov	Next RCM	Further analysis of spectrum characterization results.
Andrej Trkov	Next RCM	Summarize contributions.

Neutron spectrum characterization

Andrej Trkov	Next RCM	Coordinate activity.
Frans De Corte	Dec 2005 FDC: done	Provide recommendations for other candidate materials that have suitable capture and threshold reactions.
All participants	Dec 2006	Monitoring material from the k0-IAEA package to
All participants		Andrej Trkov for further analysis.
Andrej Trkov	Next RCM	Further analysis of spectrum characterization results.
Andrej Trkov	Next RCM	Summarize contributions.

FDC: reactor Thetis Ghent decomissioned December 2003

Materials analysis test

Maria Arribere	Next RCM	Coordinate activity.
All participants	Next RCM	To perform a materials analysis test.

FDC: reactor Thetis decommissioned December 2003

Frans De Corte	Dec 2005	To review the availability and appropriateness of using synthetic multi-element standard materials (SMELS) or a suitable substitute. To look into the future possibility of SMELS production.

FDC: done

Nuclear data

Andrej Trkov Sep 2006

Data currently in the k0 database to be intercompared with equivalent data from other sources to identify discrepant data that may require re-evaluation or new measurements.

Richard Firestone Dec 2006

Compare and evaluate Pg and k0 values for the EGAF library.

Data from the k0 database, ENSDF, DDEP, EGAF, and the literature to be considered.

Frans De Corte Oct 2005

FDC: done

Provide half-life data from the k0 database to M. Kellett.

Mark Kellett Jan 2006

Compare half-life data from the k0 database with values from the evaluated databases.

3rd RCM - Agenda
Tuesday 18 November 2008

⇒⇒ **Recommended k_0 (Q_0, σ_0, $T_{1/2}$, ---) values (F. De Corte, Z. Révay, ---)**

Recommended k_0 (Q_0, σ_0, $T_{1/2}$, ---) values

Table 3: Problematic nuclei requiring further investigation/measurement

Nuclide	Value	Method	Capability exists/comments
^{115}Cd	k_0,Q_0	Two channel	Arribére, Jonah, Jaćimović
^{192}Ir	k_0		k_0 value missing† from ADNDT 85 (2003)
^{197}Hg	k_0,Q_0		Arribére, Jonah
^{75}Se	k_0,Q_0		Kennedy, Jaći
^{153}Gd/^{153}Sm‡	k_0		Ke
^{159}Gd	k_0		
^{131}Ba	k_0,Q_0	Two channel/Cd cov	
^{109}Pd	k_0	Beam cho	
^{116m,n}In	k_0,Q_0		
^{134m}Cs			
^{36}S#			y, Jonah
^{49}Ca#			Révay, Jonah
^{95}Zr			all participants could undertake measurements
^{90m}Y			Blaauw
^{58}Fe			problem when compared with the resonance integral value from differential data
^{186}W	k_0,Q_0		

^{192}Ir: unfortunately, when moving our lab, all remaining files were classified vertically.

So, even after a careful search, no output of a former measurement could be recovered.

† k_0 value was not included in the original publication, but was thought to have been measured.
Frans De Corte and András Simonits, *Recommended nuclear data for use in the k_0 standardization of neutron activation analysis*, Atomic Data and Nuclear Data Tables 85 (2003) 47–67, doi:10.1016/S0092-640X(03)00036-6

‡ listed together as often only available as a mixed source.

requires extension of the energy efficiency curve beyond the usual upper energy limit, which could be achieved using a locally produced ^{24}Na source (has a γ-ray at 3.75 MeV).

Recommended k_0 (Q_0, σ_0, $T_{1/2}$, ---) values

Table 3: Problematic nuclei requi...

Nuclide			
^{115}			
^{192}			
^{197}H			
^{75}Se			
^{153}Gd			
^{159}Gd			
^{131}Ba			
^{109}Pd			
^{116m,n}In			
^{134m}Cs			Révay, Jonah
^{36}S#		...chopper/enriched sample	Révay, Jonah
^{49}Ca#	k_0	Beam chopper	Révay, Jonah
^{95}Zr	k_0,Q_0		all participants could undertake measurements
^{88m}Y	k_0,Q_0		Blaauw
^{58}Fe	k_0,Q_0	}	problem when compared with the resonance integral value from differential data
^{186}W	k_0,Q_0		

Accurate Determination of the k_0-values for Reactions ^{94}Zr (n, γ) ^{95}Zr and ^{96}Zr (n, γ)

^{97}Zr/^{97m}Nb

Xilei Lin

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(10-September-2007)

44/04

* ^{95,97}Zr k_0's: **Lin Xilei's measurements and results – in quasi-ideal conditions of very highly thermalized neutron flux - were studied in great detail.**

Recommended k_0 (Q_0, σ_0, $T_{1/2}$, ---) values

Table 3: Problematic nuclei requiring further investigation/measurement

Nuclide	Value	Method	Capability exists/comments
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^{197}Hg	k_0,Q_0		Arribére, Jonah
^{75}Se	k_0,Q_0		Kenned
^{153}Gd/^{153}Sm‡	k_0		
^{159}Gd	k_0		
^{131}Ba	k_0,Q_0	Two channel/G	
^{109}Pd	k_0	Bea	
^{116m,n}In	k		
^{134m}Cs			Jonah
^{36}S#			Révay, Jonah
^{49}Ca#			Révay, Jonah
^{95}Zr			all participants could undertake measurements
^{90m}Y			Blaauw
^{58}Fe	$_0$,Q_0	}	problem when compared with the resonance integral value from differential data
^{186}W	k_0,Q_0		

*k_0's etc. for other problematic nuclei: will be studied when available as output of Tables 2 and 3 in "Summary Report of the 2nd RCM – Section 8"

† k_0 value was not included in the original publication, but was thought to have been measured.

* Frans De Corte and András Simonits, *Recommended nuclear data for use in the k_0 standardization of neutron activation analysis*, Atomic Data and Nuclear Data Tables 85 (2003) 47–67, doi:10.1016/S0092-640X(03)00036-6

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requires extension of the energy efficiency curve beyond the usual upper energy limit, which could be achieved using a locally produced ^{24}Na source (has a γ-ray at 3.75 MeV).

Discussions on these and other topics will be contributed to by FDC in the coming sessions of the present RCM