

Status of Nuclear Data Evaluation Activity in KAERI

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History and Status of KAERI NDEL

1983	Test Reactor Design Nuclear Fuel Design Technology	Cross section library generation WIMS, CASMO, MCNP
1994	National Nuclear R&D Program	
1997	Nuclear Data Project	Service, Evaluation, Processing

KAERI Nuclear Data Evaluation Lab. as of 2000.

12 Staffs

= 8 regular + 4 temporal

= 7 evaluation + 4 processing + 1 computer

Computers

12 Cluster PC's with Linux OS

3 HP-700's with HP/UX

PC's with MS Windows

Evaluation

Type	Purpose	Status
Reactor Application	Burnup credit of spent fuel	F.P. resonance param. eval. with BNL/NNDC (finished) Model calc.: Fission Products
Intermediate Energy	Accelerator Driven System	Model calc. with JAERI
Charged Particle	30-50 MeV cyclotron Isotope production Thin layer activation	Model calc.
Photonuclear	e-linac based neutron source Isotope production	Model calc. as an IAEA CRP (finished)
Gamma production by neutron	Pt in-core detector	Plan and Survey

Evaluation - reactor application

19 F.P. with BNL-KAERI collaboration
5 Dy isotopes for Burnable Poison in SMART, DUPIC

Isotope	R.P.	Upto 20MeV	Isotope	R.P.	Upto 20MeV
Mo-95	Ok	TBD	Sm-149	B 6.7	Done
Tc-99	Ok	TBD	Sm-150	Ok	Done
Ru-101	Ok	TBD	Sm-151	Ok	Done
Rh-103	Ok	TBD	Sm-152	Ok	Done
Pd-105	Ok	TBD	Eu-153	B 6.7	TBD
Ag-109	Ok	TBD	Gd-155	Ok	Done
Xe-131	Ok	TBD	Gd-157	Ok	Done
Cs-133	B6.7	TBD	Dy-160	Done	Done
Pr-141	B 6.7	TBD	Dy-161	Done	Done
Nd-143	Ok	Done	Dy-162	Done	Done
Nd-145	Ok	Done	Dy-163	Done	Done
Sm-147	Ok	Done	Dy-164	Done	Done

- B6.7: ENDF/B-VI Release 7
- Ok: it will be included as ENDF/B-VI Release 8

Evaluation - Intermediate and High Energy

ADS project support (KAMAC)

- Up to 2 GeV
Al-27

- Up to 400 MeV
C-12, N-14, O-16, Si-28, Ca-40, Fe-56, Zr-90, Pb-208

Evaluation - Charged Particle

Medical Isotope production at Hospital Cyclotron + TLA
ADS project support (KAMAC)

Element	Energy	Element	Energy
N	50 MeV	Nb	TBD
O	50 MeV	Mo	150 MeV
Al	TBD	Cd	50 MeV
Ti	150 MeV	Sn	150 MeV
Cr	TBD	Sb	150 MeV
Fe	150 MeV	Te	150 MeV
Ni	150 MeV	I	50 MeV
Cu	150 MeV	Xe	150 MeV
Zn	150 MeV	Cs	150 MeV
Se	50 MeV	W	TBD
Kr	50 MeV	Tl	TBD
Rb	50 MeV	Pb	TBD

* Energy is upper range.

Evaluation - Photonuclear Data

IAEA CRP
upto 140 MeV
39 element, 143 nuclides

Structural, Shielding and Bremsstrahlung Target Materials:

^{24,25,26}Mg, ²⁷Al, ^{50,52,53,54}Cr, ⁵⁵Mn, ^{54,56,57,58}Fe, ⁵⁹Co, ^{58,60,61,62,64}Ni, ^{63,65}Cu,
^{64,66,67,68,70}Zn, ^{90,91,92,94,96}Zr, ^{92,94,95,96,97,98,100}Mo,
^{112,114,115,116,117,118,119,120,122,124}Sn, ^{120,122,123,124,125,126,128,130}Te,
¹⁴¹Pr, ¹⁶⁵Ho, ¹⁹⁷Au, ²⁰⁹Bi.

Biological Materials:

^{12,13}C, ^{14,15}N, ^{16,17,18}O, ²³Na, ^{32,33,34,36}S, ^{35,37}Cl, ^{40,42,43,44,46,48}Ca.

Nuclear Waste Transmutation:

^{84,86,87,88,90}Sr, ⁹³Zr, ^{93,94}Nb, ^{102,104,105,106,107,108}Pd, ^{107,108,109}Ag, ^{127,129}I,
^{133,135,137}Cs, ^{144,147,148,149,150,151,152,154}Sm, ^{158,159}Tb.

Activation Analysis:

^{27,28,29,30}Si, ^{36,38,40}Ar, ^{39,40,41}K, ^{46,47,48,49,50}Ti,
^{70,72,73,74,76}Ge, ¹¹⁰Pd, ^{106,108,110,111,112,113,114,116}Cd, ^{121,123}Sb.

Evaluation - Miscellaneous

Photo Resonance

- N-14(γ ,x)
- O-16(γ ,x)

Scattering Law

- poly Si-, Bi- crystal

Processing for Reactor Application

WIMS-D library	Test Reactor Operation
ORIGEN-2 library	
MCNP library	
CASMO-3 library	PWR Core Design
HELIOS library	
MATXS library	PWR PV surveillance and Dosimetry

IAEA CRP: new WIMS-D library generation (JENDL-3.2)

Experiments supported by KAERI

Current Objective

- Develop capability and manpower in Korea

Neutron Resonance

- Dy isotopes at KURRI e-linac

Neutron Source

- (e,n) source development at PAL
- (p,n) source development (1-2 MeV range)

Proton Scattering

- KAERI hospital 50 MeV cyclotron

Internet Service

Target

- Novice user (student, scientist in related field)

Table of Nuclides

MCNP, PENDF Cross section plotter

Decay scheme

Capture Cross Section plotter

Table of gamma rays

Summary

KAERI NDEL is providing:

- Evaluation
- Processing
- Internet service

to support Nuclear R&D in Korea such as

- Nuclear Fuel Cycle
- ADS, Fusion
- Use of cyclotron

We are supplementing Major Nuclear Data Files !