Abstract: This document summarizes the contents of the Evaluated Fission-Product Cross-Section Library RCN-3 released in 1983 by the Netherlands Energy Research Foundation, ECN, and those parts of the earlier version of RCN-2 that were not superseded by RCN-3. Upon request the Library is available on magnetic tape from the IAEA Nuclear Data Section, costfree.
RCN-3
Evaluated Fission-Product Cross-Section Library

by H. Gruppelaar
ECN Netherlands, 1983

This data library is an update of the earlier library RCN-2 published by H. Gruppelaar in 1977 in the reports ECN-13 and ECN-33. For Nd and Pm isotopes see also report ECN-65. Of the library RCN-2 the evaluations for 7 Mo isotopes and 3 Ru isotopes remain valid, the others are superseded by RCN-3.

RCN-3 contains evaluated neutron cross-section data for the following 37 elements or isotopes. The evaluations taken over from RCN-2 are marked with an asterisk.

41-Nb-93
42-Mo-Nat
* 42-Mo-92, 94, 95, 96, 97, 98, 100
43-Tc-99
* 44-Ru-101, 102, 104
45-Rh-103
46-Pd-102, 104, 105, 106, 107, 108, 110
47-Ag-nat, 107, 109
53-I-127, 129
55-Cs-133
57-La-139
59-Pr-141
60-Nd-nat, 142, 143, 144, 145, 146, 147, 148, 150
61-Pm-147
62-Sm-nat, 147, 148, 149, 150, 151, 152, 154

The data library is in KEDAK-format, compare document IAEA-NDS-21.

On the following pages the documentary text contained in the library, is reproduced.

RCN-3: pages 2 - 38
* RCN-2: pages 39 - 48
| 410093 | 21 |
| 14510 | 14511 |
| 14580 | 14590 |
| 21520 | 21530 |
| 0   | 0   |

$\text{RCN 3 EVALUATION H.GRUPPELAAR } \text{NB093C} 13/10/78$

(N,\text{ALPHA}) AND (N,\text{P}) ADDED

| MINIMUM ENERGY | .00100 EV |
| CONTINUOUS STAT MODEL ABOVE | 7.37185 KEV |
| CONINUOUS STAT MODEL ABOVE | 30.40000 KEV |
| CONTINUOUS STAT MODEL ABOVE | 1.15000 MEV |
| HIGH ENERGY MODEL ABOVE | 6.50000 MEV |
| HIGH ENERGY MODEL ABOVE | 15.00000 MEV |
| LEVEL DENSITY PARAMETER NB093 | 12.58000 1/MEV |
| LEVEL DENSITY PARAMETER NB092 | 11.00000 1/MEV |

REVISED EVALUATION IN THERMAL ENERGY RANGE AND IN STRENGTH FUNCTION REGION.

RESOLVED ENERGY REGION UPTO 7.322 KEV

EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCES FROM NEUDADA-1974

HYPOTHETICAL RESONANCE ADDED AT -1.86 EV TO FIT CAPTURE CROSS SECTION AT 0.0253 EV AND THE RESONANCE INTEGRAL

SQUARED TARGET SPIN CUT-OFF PARAMETER=12 FROM EXPERIMENTAL
SRCN-2 evaluation. H. GruppeLaar 15/01/77

Minimum energy

Resolved resonances up to

Energy of first excited state

Continuum description inelastic scattering above

Discrrete inelastic scattering spectra up to

Maximum energy

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This evaluation is the result of summation of isotopic evaluations with revisions and additions.

The isotopic data have been published in:


Summed isotopic data are given up to 4.65 keV, resolved resonances are given up to 1.94 keV.

Above 4.65 the (n,g) cross section for natural Mo has been re-evaluated, taking into account recent experimental data and integral (steK) data, see:


Above 4.65 keV the total cross section is based on the summed RCN-2 values for the isotopes, with important adjustments in the energy range from 100 keV to 2 MeV to fit experimental data.

The inelastic scattering cross section is equal to the sum of RCN-2 values for the isotopes up to the (n,2n) threshold.

Spectra for 19 discrete levels have been given.

The elastic scattering cross section has been obtained by subtracting non-elastic cross sections from the total cross section. There is good agreement with experimental data.

The (n,p), (n,α), (n,2n) cross sections, the elastic scattering angular distribution and level density have been copied from KEDAK-3.

The sum of inelastic scattering cross section and the (n,2n) cross section equals that of the sum of RCN-2 values for the isotopes. See for further details:

H. GruppeLaar, evaluated neutron cross sections of natural Mo, ECN-report to be published.
430099  25  0  0  0  3  0
14510  14511  14580  14590  21520  21530  3  0
21540  30010  30011  30020  30040  30050  3  0
30051  30160  30270  31020  31030  31040  3  0
31050  31060  31070  32510  40022  50053  3  0
50163  0  0  0  0  3  0
430099  14510  0  1  1  0  3  1
288  0  0  0  0  0  3  1

$RCN 2.3 EVALUATION H.GRUPPELAAR TC099Z 27/01/76$

N, P, N, D, N, T, N, HE3, N, A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979

MINIMUM ENERGY .00100 EV

MIN EN OF STATISTICAL MODEL 1.15329 KEV

ENERGY OF FIRST EXCITED STATE .14050 MEV

CONTINUOUS STAT MODEL ABOVE 1.19900 MEV

LEVEL DENSITY PARAMETER TC099 15.80000 1/MEV

LEVEL DENSITY PARAMETER TC098 15.30000 1/MEV

ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA

RESOLVED RESONANCE REGION UPTO 1.153 KEV

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCE PARAMETERS FROM ADAMCHUK ET AL. (AD73)

SMALL 1/V-CORRECTION ADDED

UNRESOLVED RESONANCE REGION UPTO 150 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

S-WAVE STRENGTH FUNCTION S0=0.55

P-WAVE STRENGTH FUNCTION S1=8.94

CAPTURE CROSS SECTION DATA OF CHOU AND WERLE (CH73)

OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL

DORS=18.6 EV

GAMMA WIDTH =131 MV

STATISTICAL REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL FROM IGARASI ET AL. (IG74)

TC-99 LEVEL SCHEME MAINLY FROM NUCLEAR DATA SHEETS (K374)

WITH NEW LEVELS FROM SVENSSON ET AL. (SV76)

STATISTICAL DESCRIPTION OF TARGET LEVEL SCHEME ABOVE 1.199 MEV,

SQUARED TARGET SPIN CUT OFF FACTOR = 6.6 (FROM EXPERIMENTAL

LEVEL SCHEME)
<table>
<thead>
<tr>
<th>Energy (keV)</th>
<th>Capture Cross Section</th>
<th>S-Wave Strength Function SO</th>
<th>P-Wave Strength Function SI</th>
<th>Other Strength Functions</th>
<th>Level Density Parameter RH103</th>
<th>Level Density Parameter RH102</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.00100</td>
<td>1.01505</td>
<td>0.4847</td>
<td>0.332</td>
<td>1.01505</td>
<td>16.50000 1/MEV</td>
<td>16.30000 1/MEV</td>
</tr>
</tbody>
</table>

MINIMUM ENERGY: 0.00100 EV

ENERGY OF FIRST EXCITED STATE: 39.80000 MEV

LEVEL DENSITY PARAMETER RH103: 16.50000 1/MEV

LEVEL DENSITY PARAMETER RH102: 16.30000 1/MEV

RESOLVED RESONANCE REGION UP TO 4.028 KEV

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCE PARAMETERS FROM NEUDADA-1974

UNRESOLVED RESONANCE REGION UP TO 200 KEV

CAPTURE CROSS SECTION WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

S-WAVE STRENGTH FUNCTION: SO = 0.4847

P-WAVE STRENGTH FUNCTION: SI = 6.332

OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL

DOBS = 25.19 EV

GAMMA WIDTH = 160.9 MV

STATISTICAL REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL FROM IGARASI ET AL. (IG74)

RH-103 LEVEL SCHEME FROM REITMAN ET AL. (RE75A)
**RCN-3 EVALUATION---H.A.J. VAN DER KAMP AND H. GRUPPELAAR---PD102C 11/8/81**

- **MINIMUM ENERGY:** 0.00100 EV
- **MIN EN OF STATISTICAL MODEL:** 0.46500 KEV
- **ENERGY OF FIRST EXCITED STATE:** 0.55640 MEV
- **CONTINUOUS STAT MODEL ABOVE:** 2.13810 MEV
- **HIGH ENERGY MODEL ABOVE:** 6.50000 MEV
- **MAXIMUM ENERGY:** 15.00000 MEV
- **LEVEL DENSITY PARAMETER PD102:** 12.90000 1/MEV
- **LEVEL DENSITY PARAMETER PD101:** 10.90000 1/MEV

*****REVISED EVALUATION WITH NEW RESOLVED RESONANCE PARAMETERS*****

**RESOLVED ENERGY REGION UPTO 200 EV**

- EVALUATION WITH SIGMA-ECN AT 0 K
- ONE RESONANCE REPORTED AT 190.7 EV BY POPOV ET AL. (PO77)
- A NEGATIVE RESONANCE HAS BEEN ADDED TO FIT THE THERMAL
- CAPTURE CROSS SECTION

**STRENGTH FUNCTION REGION UPTO 100 KEV**

- CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
- OTHER CROSS SECTIONS WITH CODE SASSI-ECN
- S-WAVE STRENGTH FUNCTION =0.5, P-WAVE STRENGTH FUNCTION =7.5, BOTH FROM SYSTEMATICS
- OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
- DOBS= 413 EV FROM SYSTEMATICS
- AVERAGE GAMMA WIDTH= 109 MV FROM POPOV ET AL. (PO77)

**HIGH ENERGY REGION**

- ALL CROSS SECTIONS WITH CODE SASSI-ECN
- OPTICAL MODEL FROM EVALUATION OF AUTHORS
- LEVEL SCHEME OF TARGET NUCLEUS UPTO 2.1381 MEV FROM SIMMS ET AL. (SI73A)
- SQUARED SPIN CUT-OFF PARAMETER= 11.5 FROM EXPERIMENTAL
- SPIN DISTRIBUTION
- CHARGED-PARTICLE EMISSION CROSS SECTION FROM THRES-2
- RENORMALIZED AT 14.5 MEV(QA78)
RCN-3 EVALUATION --- H. GRUPPELAAR AND H. A. J. VAN DER KAMP --- PD104E 24/7/81

MIN EN OF STATISTICAL MODEL  3.17248 KEV
ENERGY OF FIRST EXCITED STATE  0.55570 KEV
CONTINUOUS STAT MODEL ABOVE  2.19320 KEV
HIGH ENERGY MODEL ABOVE  6.50000 KEV
MAXIMUM ENERGY  15.00000 KEV
LEVEL DENSITY PARAMETER PD104  15.00000 1/KEV
LEVEL DENSITY PARAMETER PD103  15.10000 1/KEV

**** REVISED EVALUATION WITH NEW RESOLVED RESONANCE PARAMETERS
AND TAKING INTO ACCOUNT THE STEK RESULTS

RESOLVED ENERGY REGION UPTO 3.2 KEV
EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA
RESOLVED RESONANCE PARAMETERS FROM STAVELOZ ET AL. (ST80)
THERMAL CROSS SECTION AND RESONANCE INTEGRAL NOT MEASURED

STRENGTH FUNCTION REGION UPTO 100 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
OTHER CROSS SECTIONS WITH CODE SASSI-ECN
S-WAVE STRENGTH FUNCTION=0.53, OBTAINED FROM MAXIMUM
LIKELY ANALYSIS OF RESOLVED RESONANCE PARAMETERS
P-WAVE STRENGTH FUNCTION =6.9, ADJUSTED TO OBTAIN
BETTER AGREEMENT WITH STEK RESULTS
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
DOBS=254 EV FROM ANALYSIS OF THE RESOLVED
RESONANCE PARAMETERS FROM STAVELOZ ET AL. (ST80).
AVERAGE GAMMA WIDTH= 96, THE AVERAGE VALUE OF STAVELOZ ET AL.
HAS BEEN ADJUSTED WITH 6 PERCENT TO OBTAIN A BETTER
AGREEMENT WITH THE STEK RESULTS

HIGH ENERGY REGION ABOVE 100 KEV
ALL CROSS SECTIONS WITH CODE SASSI-ECN
OPTICAL MODEL FROM EVALUATION OF AUTHORS
LEVEL SCHEME OF TARGET NUCLEUS UPTO 2.1932 MEV FROM
COMPIALUTION BY BASS ET AL. (BA70) AND FROM GOVOR ET AL. (GO75)
SQUARED SPIN CUT-OFF PARAMETER= 6.3 FROM EXP. SPIN
DISTRIBUTION
CHARGED-PARTICLE EMISSION CROSS SECTION FROM THRES-2,
RENORMALIZED AT 14.5 MEV (QA78)
RCN-3 EVALUATION—H.A.J. VAN DER KAMP AND H. GRUPPELAAR——PD105P 13/7/81

MINIMUM ENERGY 7

MIN EN OF STATISTICAL MODEL 2.05815 KEV

ENERGY OF FIRST EXCITED STATE .28050 MEV

CONTINUOUS STAT MODEL ABOVE .78200 MEV

MAXIMUM ENERGY 15.00000 MEV

LEVEL DENSITY PARAMETER PD105 17.28000 1/MEV

LEVEL DENSITY PARAMETER PD104 15.00000 1/MEV

*****REVISED EVALUATION WITH NEW RESOLVED RESONANCE

RESOLVED ENERGY REGION UPTO 2.1 KEV

THERMAL CROSS SECTION =22 BARN, FROM CORVI(COB1)

A NEGATIVE RESONANCE WAS FITTED TO OBTAIN AGREEMENT WITH THE

THERMAL CAPTURE CROSS SECTION. EVALUATION WITH SIGMA-ECN AT 0 K,

MULTILEVEL FORMULA. RESOLVED RESONANCES FROM STAVELOZ ET AL.(ST80)

STRENGTH FUNCTION REGION UPTO 50 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN

OTHER CROSS SECTIONS WITH CODE SASSI-ECN

S-WAVE STRENGTH FUNCTION S0=0.64 AND P-WAVE STRENGTH

FUNCTION S1=5.6 FROM MAXIMUM LIKELIHOOD ANALYSIS OF THE

RESOLVED RESONANCE PARAMETERS OF STAVELOZ ET AL.(ST80)

OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (LA77A)

DOBS=9.7 EV FROM ANALYSIS OF RESOLVED RESONANCES

AVERAGE CAPTURE WIDTH=150 MV FROM RESOLVED RESONANCES(ST80)

HIGH ENERGY REGION ABOVE 50 KEV

MOST CROSS SECTIONS WITH CODE SASSI-ECN

OPTICAL MODEL FROM EVALUATION OF AUTHORS

LEVEL SCHEME OF TARGET NUCLEUS UPTO 0.782 MEV FROM

NUCLEAR DATA SHEETS(EL79)

SQUARED SPIN CUTOFF PARAMETER = 5.6 FROM EXPERIMENTAL

SPIN DISTRIBUTION

CHARGED-PARTICLE EMISSION CROSS SECTIONS FROM THRES-2;

RENORMALIZED AT 14.5 MEV(QA78)
### Minimum Energy

<table>
<thead>
<tr>
<th>Energy</th>
<th>Value</th>
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<tbody>
<tr>
<td>KEV</td>
<td>3.12771</td>
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### Energy of First Excited State

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<th>Energy</th>
<th>Value</th>
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<tbody>
<tr>
<td>MEV</td>
<td>5.1130</td>
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### Continuous Stat Model Above

<table>
<thead>
<tr>
<th>Energy</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>MEV</td>
<td>6.50000</td>
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</tbody>
</table>

### Maximum Energy

<table>
<thead>
<tr>
<th>Energy</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>MEV</td>
<td>15.00000</td>
</tr>
</tbody>
</table>

### Level Density Parameter

- **PD106**:
  - Value: 17.23000 1/MEV
- **PD105**:
  - Value: 17.28000 1/MEV

### Revised Evaluation

**Power 10 Evaluation with new resolved resonance parameters and taking into account the Stek results**

- **Minimum Energy**: 0.01000 EV
- **Minimum Energy of Statistical Model**: 3.12771 KEV
- **Energy of First Excited State**: 5.1130 MEV
- **Continuous Stat Model Above**: 6.50000 MEV
- **Maximum Energy**: 15.00000 MEV
- **Level Density Parameter PD106**: 17.23000 1/MEV
- **Level Density Parameter PD105**: 17.28000 1/MEV

### Resolved Energy Region Upto 3.2 KEV

- **Evaluation with Sigma-ECN at 0 K, Multilevel Formula**
- **Resolved Resonance Parameters from Staveloz et al.**
- **Agreement with the Experimental Value of the Capture Cross Section**
- **Experimental Value of the Capture Cross Section**: 0.30000 ± 0.03000 from BNL-325 (MU73)
- **Calculated Value of the Capture Cross Section**: 0.30000 ± 0.03000
- **Experimental Value of Resonance Integral**: 5.73 ± 0.57 BARN
- **Calculated Value of Resonance Integral**: 6.00 BARN

### Strength Function Region Upto 100 KEV

- **Capture Cross Sections with Code FISPRO-ECN**
- **Other Cross Sections with Code SASSI-ECN**
- **S-Wave Strength Function**: 0.39 from Maximum Likelihood
- **Analysis of Resolved Resonance Parameters from Staveloz et al.**
- **P-Wave Strength Function**: 5.80, adjusted to obtain better agreement with Stek result
- **Other Strength Functions from Optical Model**
- **DOBS=172 EV, Adjusted to obtain a better agreement**
- **Average Capture Width**: 68 MEV, the average value of Staveloz et al. has been increased with 10 per cent to obtain better agreement with Stek results

### High Energy Region Above 100 KEV

- **All Cross Sections with Code SASSI-ECN**
- **Optical Model from Evaluation of Authors**
- **Level Scheme of Target Nucleus Upto 2.3660 MEV from Nuclear Data Sheets**
- **Squared Spin Cut-Off Parameter**: 5.8 from Experimental Spin Distribution
- **Charged Particle Cross Sections from THRES-2. RENORMALIZED**
- **At 14.5 MEV (QA78)**
RCN-3 EVALUATION—H.A.J. VAN DER KAMP AND H. GRUPPELAAR—PD107F 9/7/81

MIN EN OF STATISTICAL MODEL 0.00100 EV

ENERGY OF FIRST EXCITED STATE 0.65766 MEV

CONTINUOUS STAT MODEL ABOVE 0.80600 MEV

HIGH ENERGY MODEL ABOVE 6.50000 MEV

MAXIMUM ENERGY 15.00000 MEV

LEVEL DENSITY PARAMETER PD107 19.52000 1/MEV

LEVEL DENSITY PARAMETER PD106 17.23000 1/MEV

*****REVISED EVALUATION WITH NEW RESOLVED RESONANCE PARAMETERS AND TAKING INTO ACCOUNT INTEGRAL STEK DATA

RESOLVED ENERGY REGION UPTO 659 EV

THERMAL CAPTURE CROSS SECTION AND RESONANCE INTEGRAL NOT MEASURED

EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA RESOLVED RESONANCE PARAMETERS FROM SINGH ET AL. (SI78)

STRENGTH FUNCTION REGION UPTO 50 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN OTHER CROSS SECTIONS WITH CODE SASSI-ECN S-WAVE STRENGTH FUNCTION = 0.69 FROM ANALYSIS OF RESOLVED RESONANCE PARAMETERS P-WAVE STRENGTH FUNCTION = 5.6 ASSUMED TO BE THE SAME AS THE VALUE FOR PD 105 OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL DOBS = 6.13 EV FROM ADJUSTMENT TO STEK RESULTS AVERAGE CAPTURE WIDTH = 125 MV FROM SINGH ET AL. (SI78)

HIGH ENERGY REGION ABOVE 50 KEV ALL CROSS SECTIONS WITH CODE SASSI-ECN OPTICAL MODEL PARAMETERS EVALUATION OF AUTHORS LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (BE72B) WITH CORRECTIONS AND GENERATED LEVELS BY RIBON ET AL. (RI75) SQUARED SPIN CUT-OFF PARAMETER = 4.6 FROM EXPERIMENTAL SPIN DISTRIBUTION CHARGED PARTICLE EMISSION CROSS SECTION FROM THRES-2 RENORMALIZED AT 14.5 MEV (QA78)
RCN-3 EVALUATION—H. GRUPPELAAR AND H. A. J. VAN DER KAMP—PD108C 24/7/81

<table>
<thead>
<tr>
<th>MINIMUM ENERGY</th>
<th>ENERGY OF FIRST EXCITED STATE</th>
<th>CONTINUOUS STAT MODEL ABOVE</th>
<th>HIGH ENERGY MODEL ABOVE</th>
<th>MAXIMUM ENERGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>.00100 KEV</td>
<td>.43400 MEV</td>
<td>1.77130 KEV</td>
<td>6.50000 MEV</td>
<td>15.00000 MEV</td>
</tr>
</tbody>
</table>

LEVEL DENSITY PARAMETER PD108: 18.90000 1/MEV
LEVEL DENSITY PARAMETER PD107: 19.50000 1/MEV

RESOLVED ENERGY REGION UPTO 3.2 KEV

- A NEGATIVE RESONANCE HAS BEEN FITTED TO OBTAIN AGREEMENT WITH THE EXPERIMENTAL VALUE OF THE THERMAL CAPTURE CROSS SECTION

EXPERIMENTAL THERMAL CAPTURE CROSS SECTIONS:
- 6.5±0.5 BARN FROM BNL-325 (MU73) AND 7.37±0.4 BARN FROM CORVI (CO81)
- ADOPTED VALUE FROM CORVI (CO81)
- CALCULATED THERMAL CAPTURE CROSS SECTION = 7.36 BARN
- EXPERIMENTAL VALUE OF RESONANCE INTEGRAL = 173 ±9 BARN
- FROM VAN DER LINDEN (LI72) AND 250±30 B FROM BNL-325 (MU73)
- CALCULATED RESONANCE INTEGRAL = 219 BARN

EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA

STRENGTH FUNCTION REGION UPTO 100 KEV

- CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
- OTHER CROSS SECTIONS WITH CODE SASSI-ECN
- S-WAVE STRENGTH FUNCTION S0=0.64, VALUE DERIVED FROM A MAXIMUM LIKELIHOOD ANALYSIS OF THE RESOLVED RESONANCE
- PARAMETERS OF STAVELOZ ET AL. (ST80)
- P-WAVE STRENGTH FUNCTION S1=4.1, VALUE ADJUSTED TO OBTAIN A BETTER AGREEMENT WITH THE STER RESULTS
- OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
- DOBS=157 EV FROM AN ANALYSIS OF THE RESOLVED RESONANCE
- PARAMETERS OF STAVELOZ ET AL. (ST80)
- AVERAGE CAPTURE WIDTH = 54.4 MV
- FROM AN ANALYSIS OF THE RESOLVED RESONANCE PARAMETERS OF STAVELOZ ET AL. (ST80)

HIGH ENERGY REGION ABOVE 100 KEV

- ALL CROSS SECTIONS WITH CODE SASSI-ECN
- OPTICAL MODEL FROM EVALUATION OF AUTHORS
- LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (BE72A), GOVOR ET AL. (GO75) AND SINGHAL ET AL. (SI73)
- SQUARED SPIN CUT-OFF PARAMETER=5.0 FROM EXP. SPIN DISTRIBUTION
- CHARGED PARTICLE EMISSION CROSS SECTIONS FROM THRES-2,
- RENORMALIZED AT 14.5 MEV (QA78)
**RCN-3 EVALUATION---H.A.J. VAN DER KAMP AND H. GRUPPELAAR---**

**MINIMUM ENERGY**

-0.010000 EV

**MIN EN' OF STATISTICAL MODEL**

2.83408 KEV

**ENERGY OF FIRST EXCITED STATE**

1.57390 MEV

**HIGH ENERGY MODEL ABOVE**

6.50000 MEV

**MAXIMUM ENERGY**

15.00000 MEV

**LEVEL DENSITY PARAMETER PD110**

20.60000 1/MEV

**LEVEL DENSITY PARAMETER PD109**

20.90000 1/MEV

**----REVISED EVALUATION WITH NEW RESOLVED RESONANCE PARAMETERS AND TAKING INTO ACCOUNT THE STEK RESULTS**

**RESOLVED ENERGY REGION UPTO 2.9 KEV**

**EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA**

**RESOLVED RESONANCE PARAMETERS FROM STAVELOZ ET AL. (ST80)**

**A 1/V-COMPONENT HAS BEEN ADDED TO OBTAIN A BETTER AGREEMENT WITH THE EXPERIMENTAL VALUE OF THE THERMAL CAPTURE CROSS SECTION AND THE EXPERIMENTAL VALUE OF THE RESONANCE INTEGRAL**

**EXPERIMENTAL VALUE THERMAL CAPTURE CROSS SECTION: 0.2274-0.03 BARN**

**FROM BNL-325 (MU80)**

**CALCULATED VALUE THERMAL CAPTURE CROSS SECTION: 0.230 BARN**

**EXPERIMENTAL VALUE RESONANCE INTEGRAL: 3.1+-0.3 BARN**

**FROM BNL-325 (MU73)**

**CALCULATED VALUE OF RESONANCE INTEGRAL: 2.52 BARN**

**STRENGTH FUNCTION REGION UPTO 100 KEV**

**CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN**

**OTHER CROSS SECTIONS WITH CODE SASSI-ECN**

**S-WAVE STRENGTH FUNCTION = 0.22 FROM ANALYSIS**

**OF RESOLVED RESONANCE DATA FROM STAVELOZ ET AL. (ST80)**

**P-WAVE STRENGTH FUNCTION = 2.5, A GUESSED VALUE**

**OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL**

**DOBS=202 EV, VALUE ADJUSTED TO OBTAIN A BETTER AGREEMENT WITH THE STEK RESULTS**

**HIGH ENERGY REGION ABOVE 100 KEV**

**MOST CROSS SECTIONS WITH CODE SASSI-ECN**

**OPTICAL MODEL FROM EVALUATION OF AUTHORS**

**LEVEL SCHEME OF TARGET NUCLEUS FROM NUCL. DATA SHEETS (BE71)**

**AND GOVOR ET AL. (GO75)**

**SPIN DISTRIBUTION**

**CHARGED PARTICLE EMISSION CROSS SECTIONS FROM THRESH-2, RENORMALIZED AT 14.5 MEV (QA79)**
$RCN-2$ EVALUATION H. GRUPPELAAR AG000A 24/11/7 $

$\begin{array}{l}
\text{MINIMUM ENERGY} \\
\text{ENERGY OF FIRST EXCITED STATE} \\
\text{CONTINUOUS STAT. MODEL ABOVE} \\
\text{HIGH ENERGY MODEL ABOVE} \\
\text{MAXIMUM ENERGY}
\end{array}$

$\begin{array}{ll}
0.001 \text{ EV} \\
0.0880 \text{ MEV} \\
0.9729 \text{ MEV} \\
6.5 \text{ MEV} \\
15.0 \text{ MEV}
\end{array}$

*****SUMMATION OF ISOTOPIC CONTRIBUTIONS FROM REVISED AND ADJUSTED RCN-2 EVALUATION

SEE ISOTOPIC EVALUATIONS FOR Ag-107Y AND Ag-109Z IN RESOLVED RESONANCES ARE GIVEN UP TO 915 EV (126 RESONANCES).

HOWEVER, FOR THE CALCULATION OF THE POINTWISE CROSS SECTIONS, RESOLVED RESONANCES HAVE BEEN USED UP TO 976.1 EV (Ag-109).

TARGET LEVELS FOR INELASTIC SCATTERING ARE GIVEN UP TO 0.9497 MEV.
## RCN-3 Evaluation

**H. Gruppe-Laar**  
26/12/77

### Nucleus: Ag107

**(N,Alpha) and (N,P) Added**

**REVISIONS IN MOST XSECT. ABOVE 1.8 MEV TO FIT NATURAL AG DATA**

### Energy Levels

<table>
<thead>
<tr>
<th>Level ID</th>
<th>Energy</th>
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<td>470107</td>
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<tr>
<td>14510</td>
<td>14.70000</td>
</tr>
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<tr>
<td>30160</td>
<td>31.020</td>
</tr>
<tr>
<td>40022</td>
<td>50.053</td>
</tr>
</tbody>
</table>

### Parameters

- **MIN. EN. OF STATISTICAL MODEL**: .92393 keV
- **ENERGY OF FIRST EXCITED STATE**: 93.1000 keV
- **CONTINUOUS STAT MODEL ABOVE**: .97290 keV
- **HIGH ENERGY MODEL ABOVE**: 6.50000 keV
- **LEVEL DENSITY PARAMETER**: AG107
- **LEVEL DENSITY PARAMETER**: AG106

### Cross Sections

- **CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN**
- **OTHER CROSS SECTIONS WITH CODE SASSI-RCN**
- **S-WAVE STRENGTH FUNCTION, SO=0.37, RECOMMENDED BY MUSGROVE (MU73A)**
- **P-WAVE STRENGTH FUNCTION, SI=3.8, MEASURED FOR NATURAL AG (CA74)**
- **OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (MO63A)**
- **DO3B=18.1 EV (ADJUSTED PARAMETER)**
- **GAMMA WIDTH=142 MV (ADJUSTED PARAMETER)**

### Remarks

- **HIGH ENERGY REGION**
- **ALL CROSS SECTIONS WITH CODE SASSI-RCN**
- **OPTICAL MODEL FROM MOLDAER (MO63A)**
- **LEVEL SCHEME OF TARGET NUCLEUS FROM BETA DECAY (PA74) AND (P,T) WORK (BE75A), TWO LEVELS POSTULATED AT 0.6 AND 0.85 MEV**
- **REVISIONS IN MOST XSECT. ABOVE 1.8 MEV TO FIT NATURAL AG DATA**
SRCN 3 EVALUATION H. GRUPPELAAR  
470109  14510  14511  14580  14590  21520  21530  14  0  
21540  30010  30020  30040  30050  30051  14  0  
30160  30270  31020  31030  31070  32510  14  0  
40022  50053  50163  14  0  
470109  14510  0  1  1  0  14  1  
261  14  1  
$SRCN$ 3 EVALUATION H. GRUPPELAAR  
(N, ALPHA) AND (N, P) ADDED  
MINIMUM ENERGY  
MIN EN OF STATISTICAL MODEL  
ENERGY OF FIRST EXCITED STATE  
CONTINUOUS STAT MODEL ABOVE  
HIGH ENERGY MODEL ABOVE  
MAXIMUM ENERGY  
LEVEL DENSITY PARAMETER AG109  
LEVEL DENSITY PARAMETER AG108  
RESOLVED RESONANCE REGION UPTO 976.1 EV  
*****ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA*****  
EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA  
RESOLVED RESONANCES AS COMPILLED BY RIBON ET AL. (RI75), WITH  
A VALUE OF 129 MV FOR THE CAPTURE WIDTH OF RESONANCES FOR  
WHICH THIS QUANTITY IS NOT KNOWN  
STRENGTH FUNCTION REGION UPTO 100 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  
S-WAVE STRENGTH FUNCTION, S0=0.64  
P-WAVE STRENGTH FUNCTION, S1=3.95  
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (MO63A)  
DOBS=16.3 EV  
GAMMA WIDTH= 132 MV  
HIGH ENERGY REGION  
ALL CROSS SECTIONS WITH CODE SASSI-RCN  
OPTICAL MODEL FROM MOLDAUER(MO63A)  
LEVEL SCHEME OF TARGET NUCLEUS FROM EL-BEWEDI ET AL. (EL75)  
REVISING IN MOST XSECT. ABOVE 1.5 KEV TO FIT NATURAL AG DATA  
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Text  
Page 15  
RCN-3 EVALUATION H. GRUPPELAAR  
AG109Z  27/01/78  $  
REV  61178  14  1  
MINIMUM ENERGY  
MIN EN OF STATISTICAL MODEL  
ENERGY OF FIRST EXCITED STATE  
CONTINUOUS STAT MODEL ABOVE  
HIGH ENERGY MODEL ABOVE  
MAXIMUM ENERGY  
LEVEL DENSITY PARAMETER AG109  
LEVEL DENSITY PARAMETER AG108  
RESOLVED RESONANCE REGION UPTO 976.1 EV  
*****ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA*****  
EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA  
RESOLVED RESONANCES AS COMPILLED BY RIBON ET AL. (RI75), WITH  
A VALUE OF 129 MV FOR THE CAPTURE WIDTH OF RESONANCES FOR  
WHICH THIS QUANTITY IS NOT KNOWN  
STRENGTH FUNCTION REGION UPTO 100 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  
S-WAVE STRENGTH FUNCTION, S0=0.64  
P-WAVE STRENGTH FUNCTION, S1=3.95  
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (MO63A)  
DOBS=16.3 EV  
GAMMA WIDTH= 132 MV  
HIGH ENERGY REGION  
ALL CROSS SECTIONS WITH CODE SASSI-RCN  
OPTICAL MODEL FROM MOLDAUER(MO63A)  
LEVEL SCHEME OF TARGET NUCLEUS FROM EL-BEWEDI ET AL. (EL75)  
REVISING IN MOST XSECT. ABOVE 1.5 KEV TO FIT NATURAL AG DATA
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MAT MF

530127 25 0 0 0 0 0 15 0
14510 14511 14580 14590 21520 21530 15 0
21540 30010 30011 30020 30040 30050 15 0
30051 30160 30270 31020 31030 31040 15 0
31050 31060 31070 32510 40022 50053 15 0
50163 0 0 0 0 0 0 15 0
530127 14510 0 0 1 1 0 15 1
261 0 0 0 0 0 0 15 1

$RCN 2.3 EVALUATION H.GRUPPELAAR
1127Z 26/01/78 $ 15 1
N,P N,D N,T N,HE3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979 15 1
MINIMUM ENERGY .00100 EV 15 1
MIN EN OP STATISTICAL MODEL 2.02406 KEV 15 1
ENERGY OF FIRST EXCITED STATE 57.60000 KEV 15 1
CONTINUOUS STAT MODEL ABOVE 1.12400 MEV 15 1
HIGH ENERGY MODEL ABOVE 6.50000 MEV 15 1
MAXIMUM ENERGY 15.00000 MEV 15 1
LEVEL DENSITY PARAMETER 1127 17.40000 1/MEV 15 1
LEVEL DENSITY PARAMETER 1126 17.60000 1/MEV 15 1

$**ADJUSTED EVALUATION BASED ON STEK END CFRMF INTEGRAL DATA****** 15 1
RESOLVED RESONANCE REGION UPTO 2.02 KEV 15 1
EVALUATION WITH CODE SIGMA-RCN AT 0 K, MULTILEVEL FORMULA 15 1
RESOLVED RESONANCE PARAMETERS FROM ROHR (RO76) 15 1
HYPOTHETICAL NEGATIVE RESONANCE ADDED AT -5 EV 15 1
STRENGTH FUNCTION REGION UPTO 60 KEV 15 1
CAPTURE CROSS SECTION WITH CODE FISPRO-RCN 15 1
OTHER CROSS SECTIONS WITH CODE SASSI-RCN 15 1
S-WAVE STRENGTH FUNCTION= 0.87 15 1
P-WAVE STRENGTH FUNCTION=2.20 15 1
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL. 15 1
DOBS=11.3 EV 15 1
GAMMA WIDTH= 98.6 MV 15 1
HIGH ENERGY REGION 15 1
ALL CROSS SECTIONS WITH CODE SASSI-RCN (OPTICAL MODEL FROM IG74) 15 1
LEVEL SCHEME DATA FROM NUCLEAR DATA SHEETS (AU72). 15 1
SQUARED TARGET SPIN CUT-OFF FACTOR=8.0 FROM EXPERIMENTAL 15 1
LEVEL SCHEME 15 1
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MAT MF

530129  25  0  0  0  0  0  16  0
14510  14511  14580  14590  21520  21530  16  0
21540  30010  30011  30020  30040  30050  16  0
30051  30160  30270  31020  31030  31040  16  0
31050  31060  31070  32510  40022  50053  16  0
50163  0  0  0  0  16  0
530129  14510  0  0  1  1  0  16  1
261  0  0  0  0  0  16  1

$RCN 2.3 EVALUATION H.GRUPPELAAR 1129Z 27/01/78 
N,P N,D N,T N,HE3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979
MINIMUM ENERGY .00100 EV
MIN EN OF STATISTICAL MODEL .16877 KEV
ENERGY OF FIRST EXCITED STATE 27.80000 KEV
CONTINUOUS STAT MODEL ABOVE 95.00000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER 1129 16.80000 1/MEV
LEVEL DENSITY PARAMETER 1128 17.20000 1/MEV

*****ADJUSTED EVALUATION BASED ON STEK AND CFMF INTEGRAL DATA*****
RESOLVED ENERGY REGION UPTO 153 EV
EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA
RESOLVED RESONANCES FROM INL-325 (MU73)
HYPOTHETICAL NEGATIVE RESONANCE ADDED AT -5 EV
STRENGTH FUNCTION REGION UPTO 60 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN
OTHER CROSS SECTIONS WITH CODE SASSI-RCN
S-WAVE STRENGTH FUNCTION S0=0.52
P-WAVE STRENGTH FUNCTION S1=2.08
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
DOBS=31.5 EV
GAMMA WIDTH= 104.5 MV
HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-RCN
OPTICAL MODEL FROM IGARASI ET AL. (IG74)
LEVEL SCHEME OF TARGET NUCLEUS FROM DE RAEDT ET AL. (RA74)
SQUARED TARGET SPIN CUT-OFF FACTOR=7.9 FROM EXPERIMENTAL
LEVEL SCHEME
CONTINUOUS BACKGROUND FUNCTION ADDED

HINIMUH ENERGY

KIN EN OF STATISTICAL MODEL

ENERGY OF FIRST EXCITED STATE

CONTINUOUS STAT MODEL ABOVE

HIGH ENERGY MODEL ABOVE

MAXIMUM ENERGY

LEVEL DENSITY PARAMETER CS133

LEVEL DENSITY PARAMETER CS132

*****ADJUSTED AND REVISED EVALUATION BASED UPON STEK AND CFRHF INTEGRAL

DATA.

****REVISIONS:

ADDED NEGATIVE RESONANCE , UPDATED PARAMETERS

OPTICAL MODEL DOWN TO 3.5 KEV (NO STRENGTH FUNCTIONS USED)

UPDATED LEVEL SCHEME OF TARGET NUCLEUS

ADDED (N,X) CROSS SECTIONS (X=P,ALPHA,D,T,HE-3)

ADDED BACKGROUND IN RESOLVED RESONANCE REGION

RESOLVED RESONANCE REGION UPTO 3.5 KEV

EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCE PARAMETERS FROM NEUDADA-1974

SOME RESONANCE SPINS FROM RIENS AND THOMAS (RI74A)

NEGATIVE RESONANCE ADDED AT -6.25 EV

ADDITIONAL RESONANCES AT 9.5, 59.7 AND 132.6 EV FROM

ANUVRIEV ET AL. (AN77)

CONTINUOUS BACKGROUND ADDED TO AGREE WITH STEK INTEGRAL DATA.

STATISTICAL MODEL RANGE ABOVE 3.5 KEV

MOST CROSS SECTIONS WITH CODE SASSI-ECN

OPTICAL MODEL FROM IGARASI ET AL. (IG74)

DOBS=22 EV FROM ADJUSTMENT, IN AGREEMENT WITH RECENT ANALYSIS

OF RESOLVED RESONANCE PARAMETERS (DE80).

GAMMA WIDTH=125 MILLI EV FROM AVERAGE RESOLVED RESONANCE PARAM

CS-133 LEVEL SCHEME EVALUATED BY HENRY(HE74)

WITH RECENT UPDATINGS.

(N,X) CROSS SECTIONS CALCULATED WITH THRES-2, WITH

RENORMALIZATIONS TO RECENT 14.5 MEV VALUES FROM EXPERIMENTS

AND/OR SYSTEMATICS.
### MINIMUM ENERGY
- 0.0100 \text{ ev}

### MAXIMUM ENERGY
- 10.51640 \text{ kev}

### LEVEL DENSITY PARAMETER
- \text{LA139: 13.10000 1/kev, LA138: 14.50000 1/kev}

### RESOLVED RESONANCE REGION UPTO 10.4 keV
- EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA
- HYPOTHETICAL RESONANCE ADDED AT -14.67 ev

### OTHER CROSS SECTIONS
- WITH CODE SASSI-ECN
- WITH CODE SASSI-RCN

### CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
- OTHER CROSS SECTIONS WITH CODE FISPRO-ECN

### STRENGTH FUNCTION REGION UPTO 250 keV
- S-WAVE AND P-WAVE STRENGTH FUNCTION EVALUATED BY DELFINI AND GRUPPELAAR
- OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
- \text{DOM=289 EV, ADJUSTED VALUE}

### TOTAL AND ELASTIC SCATTERING XSECTS.
- FITTED TO EXP. DATA.
- \text{BUFFER SPIN CUT OFF FACTOR = 8.2 FROM EXPERIMENTAL DISTR.}

### ADJUSCTED EVALUATION BASED UPON CFRMF INTEGRAL DATA, 7-10-80
- REVISIONS: SIGTOT, SIGEL UPTO 250 keV, (N,X) CROSS SECTIONS ADDED
| Level Density Parameter | Minimum Energy | Energy of First Excited State | High Energy Model Above | Maximum Energy | Level Density Parameter
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<tr>
<td>PR141</td>
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<td>6.50000 MEV</td>
<td>15.00000 MEV</td>
<td>13.50000 1/MEV</td>
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<td>14.80000 1/MEV</td>
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*****ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA 2/10/80

REVISIONS: SIGTOT, SIGEL UPTO 300 KEV, (N,X) XSECTS. ADDED
RESOLVED RESONANCE REGION UPTO 5.7 KEV
MULTI-LEVEL B.W. FORMULA WITH PARAMETERS MAINLY FROM NEUDADA-1974
HYPOTHETICAL RESONANCE ADDED AT -14.68 EV
STRENGTH FUNCTION REGION UPTO 300 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
OTHER CROSS SECTIONS WITH CODE SASSI-ECN
SD=1.00 (VALUE ADOPTED TO FIT TOTAL CROSS SECTIONS BELOW 300 KEV).
S1=1.0 (ADJUSTED VALUE).
GAMMAWIDTH=84.87 EV, ADJUSTED VALUE
ADOPTED DOBS=121.6, ADJUSTED VALUE
TOTAL AND ELASTIC SCATTERING XSECTS. FITTED TO EXPERIMENTAL DATA.

HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-ECN
OPTICAL MODEL FROM IGARASI ET AL.(IG74)
LEVEL SCHEME OF TARGET NUCLEUS EVALUATED BY RIBON ET AL.(RI75)
SQUARED TARGET SPIN CUT-OFF FACTOR=7.0 FROM EXPERIMENTAL DISTRIBUTION
(N,X) XSECTS. FROM THRES-2 CALC., RENORMALISED TO EXP. 14.5 MEV
600000  21  0  0  0  0  0  0  0  0
14510  14580  14590  14600  14511  21520  20  0
30010  30020  30270  31020  30040  30050  20  0
30051  30150  31030  31040  31050  31060  20  0
31070  32510  40022  0  0  0  0  20  0
600000  14510  0  1  1  0  0  20  1
180  20  1

$RCN-3 EVALUATION H.GRUPPELAAR  ND000A 180979 $
MINIMUM ENERGY  0.001 EV  20  1
ENERGY OF FIRST EXCITED STATE  0.0672 MEV  20  1
CONTINUOUS STAT. MODEL ABOVE  1.020 MEV  20  1
HIGH ENERGY MODEL ABOVE  6.5 MEV  20  1
MAXIMUM ENERGY  15.0 MEV  20  1

*****SUMMATION OF ISOTOPIC CONTRIBUTIONS FROM RCN-3 EVALUATION*****
SEE ISOTOPIC EVALUATIONS FOR ND-ISOTOPES WITH ADJUSTED CAPTURE CROSS SECTIONS.
RESOLVED RESONANCES ARE GIVEN UP TO 2.16 KEV (231 RESONANCES).
HOWEVER, FOR THE CALCULATION OF POINT-WISE CROSS SECTIONS RESOLVED RESONANCES HAVE BEEN USED UP TO MAXIMUM ENERGIES OF 21.955, 4.022, 11.66, 2.157, 9.813, 7.668 AND 9.175 KEV, FOR ND-142,143,144,145, 146,148 AND 150, RESPECTIVELY. THESE CROSS SECTIONS HAVE BEEN SMOOTHED FROM 1 TO 30 KEV IN ORDER TO REDUCE THE NUMBER OF POINTS.
TARGET LEVELS FOR INELASTIC SCATTERING ARE GIVEN UP TO 0.9992 MEV.
HOWEVER, FOR THE CALCULATION OF THE TOTAL INELASTIC SCATTERING CROSS SECTION THE MAXIMUM ENERGIES OF THE TARGET LEVELS ARE 3.151, 1.9108, 2.2951, 1.1612,1.6372, 1.241 AND 1.076 MEV, FOR ND-142, 143,144,145,146,148 AND 150, RESPECTIVELY.
$RCN 2.3$ EVALUATION H.GRUPPELAAR ND142X 24/07/78 $N,P,N,D,W,T,N,HE3,W,A$ ADDED (THRE2-2), ABS AND TOTAL CORRECT REV 170979

MIN EN OF STATISTICAL MODEL 22.37990 KEV
ENERGY OF FIRST EXCITED STATE 1.57600 MEV
HIGH ENERGY MODEL ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 KEV
LEVEL DENSITY PARAMETER ND142 16.40000 1/MEV
LEVEL DENSITY PARAMETER ND141 16.00000 1/MEV

*****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA*****

*****OTHER DIFFERENCES: SO ACCORDING TO MU77, ONLY S-WAVE*****

CAPTURE WIDTH DIFFERENT.

RESOLVED ENERGY REGION UPTO 22 KEV

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA.
RESOLVED RESONANCES FROM MUSGROVE ET AL. (MU77), SUPPLEMENTED
WITH LOW-ENERGY RESONANCES GIVEN IN BNL-325(MU73)
L=0 ASSIGNMENTS FROM MU77 AND THE EVALUATOR.
SOME NEUTRON WIDTHS ARE DIFFERENT FROM THOSE GIVEN IN MU77,
THEY HAVE BEEN RECALCULATED FROM CAPTURE KERNEL AND
ADOPTED VALUES FOR J AND CAPTURE WIDTH.
A NEGATIVE RESONANCE HAS BEEN ASSUMED TO FIT THE CAPTURE
CROSS AT 0.0253 EV (MU73).

STRENGTH FUNCTION REGION UPTO 50 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN
OTHER CROSS SECTIONS WITH CODE SASSI-ECN
S-WAVE STRENGTH FUNCTION FROM MUSGROVE ET AL. (MU77), SO=1.35
P-WAVE STRENGTH FUNCTION, $S_1=1.0$ (MU77)
S-WAVE GAMMA WIDTH = 60 MV
P-WAVE AND HIGHER WAVE GAMMA WIDTH= 43 MV
DOBS=850 EV

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-ECN
OPTICAL MODEL FROM IGARASI ET AL. (IG75)
LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (LE73)
AND FROM DE GEER ET AL. (DE75B)
$RCN$ 2.3 EVALUATION H.GRUPPELAAR  
ND143X 24/07/78 $  

N,P N,D N,T N,H3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 170979  

MINIMUM ENERGY .00100  EV  
MIN EN OF STATISTICAL MODEL 4.04061  KEV  
ENERGY OF FIRST EXCITED STATE .74210  KEV  
CONTINUOUS STAT MODEL ABOVE 1.90180  5V  
HIGH ENERGY MODEL ABOVE 6.50000  MEV  
MAXIMUM ENERGY 15.00000  MEV  
LEVEL DENSITY PARAMETER ND143 17.80000  1/MEV  
LEVEL DENSITY PARAMETER ND142 16.40000  1/MEV  

*****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA*****  

*****OTHER DIFFERENCE: SO ACCORDING TO MUSGROVE ET AL.(MU77).*****  

RESOLVED ENERGY REGION UPTO 4 KEV  
EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA  
RESOLVED RESONANCES EVALUATED BY RIBON ET AL.(RI75),  
SUPPLEMENTED WITH RESONANCES OF MUSGROVE ET AL.(MU77)  
ABOVE 2.5 KEV.  
L=1 ASSIGNMENTS MAINLY FROM MUSGROVE ET AL.(MU77)  
FOR RESONANCES WITH UNKNOWN CAPTURE WIDTH THE VALUE 86 MV (MU77) HAS BEEN ASSUMED.  

NEGATIVE RESONANCE PARAMETERS HAVE BEEN FITTED TO THE THERMAL  
CAPTURE (MU73) AND SCATTERING (VE73) CROSS SECTIONS AT 0.0253 EV.  

STRENGTH FUNCTION REGION UPTO 50 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN  
OTHER CROSS SECTIONS WITH CODE SASSI-ECN  
S-WAVE STRENGTH FUNCTION, SO=3.1 (MU77)  
P-WAVE STRENGTH FUNCTION, SI= 1.1  
S-WAVE CAPTURE WIDTH = 81 MV  
P-WAVE CAPTURE WIDTH = 80 MV  
DOBS= 37 EV  

HIGH ENERGY REGION  
ALL CROSS SECTIONS WITH CODE SASSI-ECN  
OPTICAL MODEL FROM IGARASHI ET AL. (IG75)  
LEVEL SCHEMES OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (LE74A) AND FROM MORE RECENT WORK (MU76,VE75,CL77).
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MAT MF

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600144 25 0 0 0 0 0 23 0
14510 14511 14580 14590 21520 21530 23 0
21540 30010 30011 30020 30040 30050 23 0
30051 30160 30270 31020 31030 31040 23 0
31050 31060 31070 32610 40022 50053 23 0
50163 0 0 0 0 0 23 0
600144 14510 0 1 1 0 23 1
315 0 0 0 0 0 23 1

SRCN 2.3 EVALUATION H.GRUPPELAAH ND144X 24/07/78 $ 23 1
N,P,N,D,N,T,N,HE3,N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 170979 23 1
MINIMUM ENERGY 0.01000 EV 23 1
MIN EN OF STATISTICAL MODEL 11.89690 KEV 23 1
ENERGY OF FIRST EXCITED STATE 6.96650 MEV 23 1
CONTINUOUS STAT MODEL ABOVE 2.28910 MEV 23 1
HIGH ENERGY MODEL ABOVE 6.50000 MEV 23 1
MAXIMUM ENERGY 15.00000 MEV 23 1
LEVEL DENSITY PARAMETER ND144 17.60000 1/HEV 23 1
LEVEL DENSITY PARAMETER ND143 18.80000 1/MEV 23 1

*****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA***** 23 1
*****OTHER DIFFERENCE: SO ACCORDING TO MUSGROVE ET AL. (M77) 23 1
RESOLVED ENERGY REGION UPTO 12 KEV 23 1

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA. 23 1
RESOLVED RESONANCES FROM MUSGROVE ET AL. (M77), SUPPLEMENTED 23 1
WITH LOW-ENERGY RESONANCES AS GIVEN IN BNL-325 (M73). 23 1
L=0 ASSIGNMENTS FROM M77 AND THE EVALUATOR 23 1
SOME NEUTRON WIDTHS ARE DIFFERENT FROM THOSE IN M77, 23 1
THEY HAVE BEEN RECALCULATED FROM CAPTURE KERNEL AND 23 1
ADOPTED VALUES FOR J AND CAPTURE WIDTH. 23 1
A NEGATIVE RESONANCE HAS BEEN ASSUMED TO FIT THE CAPTURE 23 1
CROSS SECTION AT 0.0253 EV (M73). 23 1

STRENGTH FUNCTION REGION UPTO 50 KEV 23 1
CAPTURE CROSS SECTIONS WITH CODE SASSI-ECN 23 1
OTHER CROSS SECTIONS WITH CODE SASSI-ECN 23 1
S-WAVE STRENGTH FUNCTION, SO=-3.9 (M77) 23 1
P-WAVE STRENGTH FUNCTION, SI=-0.9 23 1
S-WAVE GAMMA WIDTH = 47 MV 23 1
P-WAVE GAMMA WIDTH = 41 MV 23 1
DOBS= 477 EV 23 1

HIGH ENERGY REGION 23 1
ALL CROSS SECTIONS WITH CODE SASSI-ECN 23 1
OPTICAL MODEL FROM IGARASI ET AL. (IG75) 23 1
LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (BH75), 23 1
VRAN DER BAAN (VA70), DE GEER ET AL. (DE76) AND BERNZIN ET AL. (BE76). 23 1
### SRCN 2.3 EVALUATION H.GRUPPELAAR

**ND145X**  
24/07/78 $\text{\textdollar}$ 24 1

N.P N.D W.T N.HE3 N.A ADDED (THRES-2). ABS AND TOTAL CORRECT REV 170979 24 1

**MINIMUM ENERGY**  0.00100 EV  24 1

**MIN EN OF STATISTICAL MODEL**  2.16546 KEV  24 1

**ENERGY OF FIRST EXCITED STATE**  67.20000 KEV  24 1

**CONTINUOUS STAT MODEL ABOVE**  1.16120 MEV  24 1

**HIGH ENERGY MODEL ABOVE**  6.50000 MEV  24 1

**MAXIMUM ENERGY**  15.00000 MEV  24 1

**LEVEL DENSITY PARAMETER ND145**  20.42000 1/KEV  24 1

**LEVEL DENSITY PARAMETER ND144**  17.60000 1/KEV  24 1

****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA****  24 1

****OTHER DIFFERENCE: SO ACCORDING TO HUSGROVE ET AL. (HU77)****  24 1

**RESOLVED ENERGY REGION UP TO 2.16 KEV**  24 1

**EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA**  24 1

**RESOLVED RESONANCES EVALUATED BY RIBON ET AL. (RI75)**  24 1

**ALL RESONANCES HAVE BEEN ASSIGNED L=0**  24 1

**FOR RESONANCES WITH UNKNOWN CAPTURE WIDTH THE VALUE 86 MV (HU77)**  24 1

**HAS BEEN INSERTED.**  24 1

**NEGATIVE RESONANCE PARAMETERS HAVE BEEN FITTED TO FIT THE**  24 1

**CAPTURE (HU73) AND SCATTERING (VE73) CROSS SECTIONS AT 0.0253 EV.**  24 1

**STRENGTH FUNCTION REGION UP TO 50 KEV**  24 1

**CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN**  24 1

**OTHER CROSS SECTIONS WITH CODE SASSI-ECN**  24 1

**S-WAVE STRENGTH FUNCTION, s0=5.2 (HU77)**  24 1

**P-WAVE STRENGTH FUNCTION, s1=0.98**  24 1

**S-WAVE CAPTURE WIDTH= 89 MV**  24 1

**P-WAVE CAPTURE WIDTH= 86 MV**  24 1

**DOS= 18.6 MV**  24 1

**HIGH ENERGY REGION**  24 1

**ALL CROSS SECTIONS WITH CODE SASSI-ECN**  24 1

**OPTICAL MODEL FROM IGARASI ET AL. (IG75)**  24 1

**LEVEL SCHEME OF TARGET NUCLEUS FROM HILLIS ET AL. (HI75)**  24 1

**AND FROM GALES ET AL. (GA73)**  24 1
SRCN 2.3 EVALUATION H.GRUPPELAAR

N,P,N,D,N,T,N,HE3,N,A ADDED (THRES-2), AB'S AND TOTAL CORRECT REV 170979

MINIMUM ENERGY 0.00100 EV

MIN EN OF STATISTICAL MODEL 9.95189 KEV

ENERGY OF FIRSTexcITED STATE .45370 MEV

CONTINUOUS STAT MODEL ABOVE 1.83720 MEV

HIGH ENERGY MODEL ABOVE 6.50000 MEV

MAXIMUM ENERGY 15.00000 MEV

LEVEL DENSITY PARAMETER ND146 20.25000 1/MEV

LEVEL DENSITY PARAMETER ND145 20.42000 1/MEV

*ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA****

OTHER DIFFERENCE: SO ACCORDING TO MUSGROVE ET AL. (HU77)

RESOLVED ENERGY REGION UPTO 10 KEV

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCES FROM MUSGROVE ET AL. (MU77), SUPPLEMENTED
WITH LOW-ENERGY RESONANCES AS GIVEN IN BNL-325 (MU73).

L=0 ASSIGNMENTS FROM MU77 AND THE EVALUATOR

THE NEUTRON WIDTHS ARE SLIGHTLY DIFFERENT FROM THOSE OF MUSGROVE,
THEY HAVE BEEN RECALCULATED FROM THE MEASURED CAPTURE KERNEL

AND THE ADOPTED VALUES OF J AND THE CAPTURE WIDTH.

A NEGATIVE RESONANCE HAS BEEN ASSUMED TO FIT THE CAPTURE

CROSS SECTION AT 0.0253 EV (MU73).

STRENGTH FUNCTION REGION UPTO 50 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN

OTHER CROSS SECTIONS WITH CODE SASSI-ECN

S-WAVE STRENGTH FUNCTION, S0=3.7 (MU77)

P-WAVE STRENGTH FUNCTION, S1=0.95

S-WAVE CAPTURE WIDTH = 51 MV

P-WAVE CAPTURE WIDTH = 40 MV

DOBS=278 EV

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-ECN

OPTICAL MODEL FROM IGARASI ET AL. (IG75)

LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (BU75A)

AND FROM BUSHNELL ET AL. (BU75).
**RCN 2.3 EVALUATION H. GRUPPELAAR**

**ND147Z 25/07/78 $**

**MINIMUM ENERGY**
0.00100 EV 26 1

**MIN EN OF STATISTICAL MODEL**
7.00000 EV 26 1

**ENERGY OF FIRST EXCITED STATE**
49.90000 KEV 26 1

**CONTINUOUS STAT MODEL ABOVE**
-46360 MEV 26 1

**HIGH ENERGY MODEL ABOVE**
6.50000 MEV 26 1

**MAXIMUM ENERGY**
15.00000 MEV 26 1

**LEVEL DENSITY PARAMETER ND147**
23.91000 1/MEV 26 1

**LEVEL DENSITY PARAMETER ND146**
20.25000 1/MEV 26 1

**RESOLVED ENERGY REGION UPTO 5 EV**

**EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA**
26 1

**NO EXPERIMENTAL RESONANCE PARAMETERS KNOWN**
26 1

**ONE HYPOTHETICAL RESONANCE ASSUMED AT 2.15 EV**
26 1

**CAPTURE CROSS SECTION AT 0.0253 EV IN AGREEMENT WITH THERMAL VALUE**
26 1

**OF HECK ET AL. (HE74B), 497 BARNs (UNCERTAINTY 170 B).**
26 1

**STRENGTH FUNCTION REGION UPTO 50 KEV**

**CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN**
26 1

**OTHER CROSS SECTIONS WITH CODE SASSI-ECN**
26 1

**S-WAVE STRENGTH FUNCTION, S0=3.2**
26 1

**P-WAVE STRENGTH FUNCTION, S1=0.78**
26 1

**CAPTURE WIDTH= 67 MV**
26 1

**DOBS= 8.6 EV**
26 1

**HIGH ENERGY REGION**
26 1

**ALL CROSS SECTIONS WITH CODE SASSI-ECN**
26 1

**OPTICAL MODEL FROM IGARASI ET AL. (IG75)**
26 1

**LEVEL SCHEME OF TARGET NUCLEUS FROM ROUSSILLE ET AL. (RO75)**
26 1
26/06/86

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SRCN 2.3 EVALUATION H. GRUPPELAAR  ND149Z  25/07/78 $  27  1
N.P N.D N.T P, HE3 N, A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 170979  27  1
MINIMUM ENERGY      .60100  EV  27  1
MIN EN OF STATISTICAL MODEL  7.75309  KEV  27  1
ENERGY OF FIRST EXCITED STATE  .30170  MEV  27  1
CONTINUOUS STAT MODEL ABOVE  1.24100  MEV  27  1
HIGH ENERGY MODEL ABOVE  6.50000  MEV  27  1
MAXIMUM ENERGY    15.00000  MEV  27  1
LEVEL DENSITY PARAMETER ND148  23.60000  1/HEV  27  1
LEVEL DENSITY PARAMETER ND147  23.91000  1/HEV  27  1

***** ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA***  27  1
RESOLVED ENERGY REGION UPTO 7.7 KEV  27  1
EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA  27  1
RESOLVED RESONANCES FROM MUSGROVE ET AL. (MU77), SUPPLEMENTED  27  1
WITH LOW-ENERGY RESONANCES AS GIVEN IN BNL-325 (MU73).  27  1
L=0 ASSIGNMENTS FROM MU77 AND THE EVALUATOR  27  1
THE NEUTRON WIDTHS ARE SLIGHTLY DIFFERENT FROM THOSE OF MUSGROVE,  27  1
THEY HAVE BEEN RECALCULATED FROM THE MEASURED CAPTURE KERNEL  27  1
AND THE ADOPTED VALUES OF J AND THE CAPTURE WIDTH.  27  1
SMALL 1/V-COMPONENT ADDED TO CAPTURE CROSS SECTION, TO CORRECT  27  1
FOR DIFFERENCE BETWEEN CALCULATED AND MEASURED THERMAL VALUE.  27  1

STRENGTH FUNCTION REGION UP TO 50 KEV  27  1
CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN  27  1
OTHER CROSS SECTIONS WITH CODE SASSI-ECN  27  1
S-WAVE STRENGTH FUNCTION, SQ= 2.7  27  1
P-WAVE STRENGTH FUNCTION, SL= 0.58  27  1
S-WAVE CAPTURE WIDTH= 46 MV  27  1
P-WAVE CAPTURE WIDTH= 40 MV  27  1
DOBS=171 EV  27  1

HIGH ENERGY REGION  27  1
ALL CROSS SECTIONS WITH CODE SASSI-ECN  27  1
OPTICAL MODEL FROM IGRASAL ET AL. (IG75)  27  1
LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (HA77)  27  1
$RCN 2.3 EVALUATION H.GRUPPELAAR

N,P N,D N,T N,HE3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 170979

MINIMUM ENERGY

MIN EN OF STATISTICAL MODEL

ENERGY OF FIRST EXCITED STATE

CONTINUOUS STAT MODEL ABOVE

HIGH ENERGY MODEL ABOVE

MAXIMUM ENERGY

LEVEL DENSITY PARAMETER ND150

LEVEL DENSITY PARAMETER ND149

*****ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA*****

RESOLVED ENERGY REGION UPTO 10 KEV

EVALUATION WITH SIGMA-2 AT 0 K, MULTILEVEL FORMULA

L=0 ASSIGNMENTS FROM EVALUATOR

A NEGATIVE RESONANCE HAS BEEN ASSUMED TO FIT THE CAPTURE

CROSS SECTION AT 0.0253 EV (MU73).

STRENGTH FUNCTION REGION UPTO 50 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-ECN

S-WAVE STRENGTH FUNCTION, S1=2.6

P-WAVE STRENGTH FUNCTION, S1=0.81

AVERAGE GAMMA WIDTH= 68 MV

DOBS=158 EV

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-ECN

OPTICAL MODEL FROM IGARASI ET AL.(IG75)

LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (BA76)

AND FROM VAN DER BAAN (VA70).
MINIMUM ENERGY
MIN EN OF STATISTICAL MODEL .31827 KEV
ENERGY OF FIRST EXCITED STATE 91.10000 KEV
CONTINUOUS STAT MODEL ABOVE .73070 MEV
HIGHER MODEL ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER PM147 20.20000 1/MEV
LEVEL DENSITY PARAMETER PM146 18.60000 1/MEV

*****ADJUSTED EVALUATION BASED ON STEK AND CFMFM INTEGRAL DATA*****

RESOLVED ENERGY REGION UPTO 319 EV
EVALUATION WITH SIGMA-ECN AT 0 K, MULTILEVEL FORMULA
RESOLVED RESONANCES FROM BNL-325 (MU73)
L=0 HAS BEEN ASSUMED FOR ALL RESONANCES
A NEGATIVE RESONANCE HAS BEEN ASSUMED AT -1.8 EV TO FIT
THE VALUE OF THE CAPTURE CROSS SECTION AT 0.0253 EV,
181 B FROM BNL-325 (MU73).

STRENGTH FUNCTION REGION UPTO 50 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRD-ECN
OTHER CROSS SECTIONS WITH CODE SASSI-ECN
S-WAVE STRENGTH FUNCTION, S0=3.2
P-WAVE STRENGTH FUNCTION, S1=0.61
CAPTURE WIDTH= 72 MV
DBE=3.6 EV

HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-ECN
OPTICAL MODEL FROM IGARASI ET AL. (IG75)
LEVEL SCHEME OF TARGET NUCLEUS FROM KORTELAHTI ET AL. (K077)
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**$RCN-3$ EVALUATION H.GRUPPELAAR**

SM000A 210979 $ $ 30 1

**MINIMUM ENERGY**

0.001 EV 30 1

**ENERGY OF FIRST EXCITED STATE**

0.0225 MEV 30 1

**CONTINUOUS STAT. MODEL ABOVE**

0.7155 MEV 30 1

**HIGH ENERGY MODEL ABOVE**

6.5 MEV 30 1

**MAXIMUM ENERGY**

15.0 MEV 30 1

*****SUMMATION OF ISOTOPIC CONTRIBUTIONS FROM RCN-3 EVALUATION***** 30 1

SEE ISOTOPIC EVALUATIONS FOR SM-ISOTOPES WITH ADJUSTED CAPTURE CROSS SECTIONS. NO DATA FOR SM-144 WERE AVAILABLE. INSTEAD THE ABUNDANCE OF SM-146 HAS BEEN INCREASED BY 0.031. 30 1

RESOLVED RESONANCES ARE GIVEN UP TO 150 EV (97 RESONANCES). 30 1

HOWEVER, FOR THE CALCULATION OF POINT-WISE CROSS SECTIONS RESOLVED RESONANCES HAVE BEEN USED UP TO MAXIMUM ENERGIES OF 0.6, 0.1495, 0.832, 2.9855 AND 3.0468 KEV FOR SM-147, -149, -150, -152 AND -154 RESPECTIVELY. NOTE THAT FOR SM-148 ONLY ONE RESONANCE IS GIVEN, WHICH HAS BEEN ASSUMED TO FIT THE CAPTURE CROSS SECTION AT 2200 M/S AND THE RESONANCE INTEGRAL. 30 1

TARGET LEVELS FOR INELASTIC SCATTERING ARE GIVEN UP TO 0.71 MEV. 30 1

HOWEVER, FOR THE CALCULATION OF THE TOTAL INELASTIC SCATTERING CROSS SECTION THE MAXIMUM ENERGIES OF THE TARGET LEVELS ARE 1.166, 1.972, 0.71, 1.449, 1.293, 1.182 FOR SM-147, -148, -149, -150, -152, -154 CROSS SECTIONS HAVE BEEN SMOOTHED FROM 1 TO 32 KEV, IN ORDER TO REDUCE THE NUMBER OF POINTS. 30 1
$RCN$ 2.3 EVALUATION H. GRUPPELAAR

N, P N, D N, T N, HE3 N, A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979

MINIMUM ENERGY

MIN EN OF STATISTICAL MODEL

ENERGY OF FIRST EXCITED STATE

CONTINUOUS STAT MODEL ABOVE

HIGH ENERGY MODEL ABOVE

MAXIMUM ENERGY

LEVEL DENSITY PARAMETER SM147

LEVEL DENSITY PARAMETER SM146

*****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA*****

RESOLVED ENERGY REGION UPTO 402 EV

EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCES FROM BNL-325 (MU73)

HYPOTHETICAL RESONANCE ADDED AT -3.0 EV

STRENGTH FUNCTION REGION UPTO 70 KEV

CAPTURE CROSS SECTION WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

S-WAVE STRENGTH FUNCTION, $\delta_0 = 4.256$

P-WAVE STRENGTH FUNCTION, $\delta_1 = 1.746$

OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (RO66)

DOBS = 6.435 EV

GAMMA WIDTH = 87.37 MV

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL FROM ROSEN ET AL. (RO66)

LEVEL SCHEME OF TARGET NUCLEUS FROM EW67, SM75 AND GA76

SQUARED SPIN CUT-OFF PARAMETER = 0.1 FROM EXP. LEVEL SCHEME
MINIMUM ENERGY 0.01000 EV
MIN EN OF STATISTICAL MODEL 0.21500 KEV
ENERGY OF FIRST EXCITED STATE 0.55030 MEV
CONTINUOUS STAT MODEL ABOVE 2.03230 MEV
HIGH ENERGY MODEL ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER SM148 20.74000 1/KEV
LEVEL DENSITY PARAMETER SM147 21.00000 1/MEV

$RCN 2.3 EVALUATION H.GRUPPELAAR SM148X 26/06/77$
N,P,N,D,N,T,N,HE3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979
MINIMUM ENERGY 0.01000 EV
MIN EN OF STATISTICAL MODEL 0.21500 KEV
ENERGY OF FIRST EXCITED STATE 0.55030 MEV
CONTINUOUS STAT MODEL ABOVE 2.03230 MEV
HIGH ENERGY MODEL ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER SM148 20.74000 1/KEV
LEVEL DENSITY PARAMETER SM147 21.00000 1/MEV

RESOLVED ENERGY REGION UPTO 154 EV
EVALUATION WITH SIGMA-RCN AT 0 K
NO EXPERIMENTAL RESONANCE PARAMETERS KNOWN
POSITIVE RESONANCE FITTED AT 100 EV IN ORDER TO
OBTAIN AGREEMENT WITH THERMAL CAPTURE CROSS SECTION AT 0.0253 EV
AND RESONANCE INTEGRAL, TAKING INTO ACCOUNT THE UNRESOLVED
RESONANCE CONTRIBUTION
STRENGTH FUNCTION REGION UPTO 70 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN
OTHER CROSS SECTIONS WITH CODE SASSI-RCN
S-WAVE STRENGTH FUNCTION, S0=3.064
P-WAVE STRENGTH FUNCTION, S1=1.147
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (RO66)
D0BS= 106.2 EV
GAMMA WIDTH= 57.25 MV

HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-RCN
OPTICAL MODEL FROM ROSEN ET AL. (RO66)
CALCULATED TOTAL CROSS SECTIONS CLOSE TO MEASURED VALUES OF
SHABU ET AL. (SH75)
LEVEL SCHEME OF TARGET NUCLEUS FROM OWN EVALUATION, MOST DATA FROM
RESONANCE NEUTRON CAPTURE BY ALDEA ET AL. (AL74)
SQUARED SPIN CUT-OFF PARAMETER = 6.1 FROM EXP. LEVEL SCHEME SM-148

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$RCN 2.3 $EVALUATION N.GRUPPELAAR

SM149X 28/06/77 $S

MIN EN OF STATISTICAL MODEL .15050 KEV

ENERGY OF FIRST EXCITED STATE 22.50000 KEV

CONTINUOUS STAT MODEL ABOVE -.72200 KEV

HIGH ENERGY MODEL ABOVE 6.50000 KEV

MAXIMUM ENERGY 15.00000 KEV

LEVEL DENSITY PARAMETER SM149 23.80000 1/MEV

LEVEL DENSITY PARAMETER SM148 20.74000 1/MEV

****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA****

RESOLVED ENERGY REGION UPTO 151 EV

EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCES FROM BNL-325 (MU73) AND BECVAR ET AL. (BE74D)

WITH SPINS FROM KARZHAVINA ET AL. (KA73)

HYPOTHETICAL NEGATIVE RESONANCE FROM BECVAR ET AL. (BE74D)

ALPHA WIDTHS FROM BNL-325 (MU73), NOT USED FOR (N,ALPHA)

STRENGTH FUNCTION REGION UPTO 70 KEV

CAPTURE CROSS SECTION WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

S-WAVE STRENGTH FUNCTION, $S_0=4.129$

P-WAVE STRENGTH FUNCTION, $S_1=2.318$

OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (RO66)

DOBS= 2.003 EV

GAMMA WIDTH =74.98 MV

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL FROM ROSEN ET AL. (RO66)

LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (RO76B)

AND OTHER RECENT DATA (SM75, LO75, GA76)

SQUARED SPIN CUT-OFF PARAMETER=6.2 FROM EXP.LEVELS SM-149
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SRCN 2.3 EVALUATION H.GRUPPELAAR  SM151X  28/06/77 $  
N.P N.D N.T N.HE3 N.A ADDED (THRES-2), ABS AND TOTAL CORRECT REV 190979 35 1
MINIMUM ENERGY  .00100  EV  35 1
MIN EN OF STATISTICAL MODEL  .10621  KEV  35 1
ENERGY OF FIRST EXCITED STATE  4.80000  KEV  35 1
CONTINUOUS STAT MODEL ABOVE  .35760  MEV  35 1
HIGH ENERGY MODEL ABOVE  6.50000  MEV  35 1
MAXIMUM ENERGY  15.000000  MEV  35 1
LEVEL DENSITY PARAMETER SM151  27.21000  1/HEV  35 1
LEVEL DENSITY PARAMETER SM150  24.00000  1/MEV  35 1
*****ADJUSTED EVALUATION BASED ON STEK INTEGRAL DATA*****
RESOLVED RESONANCE REGION UPTO 106 EV  
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA  35 1
RESOLVED RESONANCES FROM KIROUAC AND EILAND (KI75)  35 1
HYPOTHETICAL NEGATIVE RESONANCE AT -0.12 EV ALSO FROM KI75  35 1
STRENGTH FUNCTION REGION UPTO 70 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  35 1
S-WAVE STRENGTH FUNCTION,SO=2.546  35 1
P-WAVE STRENGTH FUNCTION,Sl=1.129  35 1
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (RO66)  35 1
DOBS=1.83 EV  35 1
GAMMA WIDTH= 90.89 MV  35 1
HIGH ENERGY REGION  35 1
ALL CROSS SECTIONS WITH CODE SASSI-RCN  35 1
OPTICAL MODEL FROM ROSEN ET AL. (RO66)  35 1
LEVEL SCHEME OF TARGET NUCLEUS FROM NUCLEAR DATA SHEETS (HA76)  35 1
SQUARED SPIN CUT-OFF PARAMETER= 8.2 FROM EXP. LEVELS SM-151  35 1
\begin{verbatim}
$RCN 2.3 EVALUATION H.GRUPPELAAR

SM152 31/01/78 $ 36 1

MINIMUM ENERGY .00100 EV 36 1
MIN EN OF STATISTICAL MODEL 2.72257 KEV 36 1
ENERGY OF FIRST EXCITED STATE .12180 MEV 36 1
CONTINUOUS STAT MODEL ABOVE 1.31100 MEV 36 1
HIGH ENERGY MODEL ABOVE 6.50000 MEV 36 1
MAXIMUM ENERGY 15.00000 MEV 36 1
LEVEL DENSITY PARAMETER SM152 24.10000 1/MEV 36 1
LEVEL DENSITY PARAMETER SM151 26.88000 1/MEV 36 1

*****ADJUSTED EVALUATION BASED ON STEK AND CFRHF INTEGRAL DATA***** 36 1

RESOLVED ENERGY REGION UPTO 3.01 KEV 36 1
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA 36 1
RESOLVED RESONANCES FROM BNL-325 (NU73) 36 1
SMALL 1/V-CORRECTION APPLIED TO FIT THERMAL 36 1
CAPTURE CROSS SECTION AND RESONANCE INTEGRAL 36 1

STRENGTH FUNCTION REGION UPTO 70 KEV 36 1
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN 36 1
OTHER CROSS SECTIONS WITH CODE SASSI-RCN 36 1
S-WAVE STRENGTH FUNCTIONS, S0=2.3 36 1
P-WAVE STRENGTH FUNCTION, S1=1.6 36 1
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL (RO66), S1=1.2 36 1
DBS=53.4 EV 36 1
GAMMA WIDTH=71.6 MEV 36 1
0.41 BARN 36 1

HIGH ENERGY REGION 36 1
ALL CROSS SECTIONS WITH CODE SASSI-RCN 36 1
OPTICAL MODEL FROM ROSEN ET AL. (RO66) 36 1
LEVEL SCHEME OF TARGET NUCLEUS FROM OWN EVALUATION ,WITH 36 1
MOST LEVELS FROM RECENT INELASTIC GAMMA MEASUREMENTS OF 36 1
ANDREEV ET AL. (AN76) 36 1
SQUARED SPIN CUT-OFF PARAMETER=8.4 FROM EXP. LEVELS OF SM-152 36 1
\end{verbatim}
$RCN 2.3 EVALUATION H.GRUPPELAAR  SM154Z  31/01/78 $  37 1

N,F N,D W.T N,HE3 N,A ADDED (THRES-2), ABS AND TOTAL CORRECT REV  190979  37 1

MINIMUM ENERGY  0.00100  EV  37 1

MIN EN OF STATISTICAL MODEL  3.11435  KEV  37 1

ENERGY OF FIRST EXCITED STATE  82.00000  KEV  37 1

CONTINUOUS STAT MODEL ABOVE  1.20200  MEV  37 1

HIGH ENERGY MODEL ABOVE  6.500000  MEV  37 1

MAXIMUM ENERGY  15.000000  MEV  37 1

LEVEL DENSITY PARAMETER SM154  22.80000  1/MEV  37 1

LEVEL DENSITY PARAMETER SM153  26.60000  1/MEV  37 1

****ADJUSTED EVALUATION BASED ON STEK AND CFRMF INTEGRAL DATA****  37 1

RESOLVED RESONANCE REGION UPTO 3.1 KEV  37 1

EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA  37 1

RESOLVED RESONANCES FROM BNL-325 (MU73)  37 1

HYPOTHETICAL NEGATIVE RESONANCE ADDED AT -20 EV  37 1

TO FIT THERMAL CAPTURE CROSS SECTION AT 0.0253 EV  37 1

STRENGTH FUNCTION REGION UPTO 70 KEV  37 1

CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  37 1

OTHER CROSS SECTIONS WITH CODE SASSI-RCN  37 1

S-WAVE STRENGTH FUNCTION, S0=1.8  37 1

P-WAVE STRENGTH FUNCTION, S1=1.2  37 1

DOBS= 135 EV  37 1

GAMMA WIDTH=53.8 MV  37 1

HIGH ENERGY REGION  37 1

ALL CROSS SECTIONS WITH CODE SASSI-RCN  37 1

OPTICAL MODEL FROM ROSEN ET AL. (RO66)  37 1

THIS OPTICAL MODEL HAS ALSO BEEN USED BY ELBAK ET AL (EL73)  37 1

FOR THE INTERPRETATION OF INELASTIC GAMMA MEASUREMENTS  37 1

LEVEL SCHEME OF TARGET NUCLEUS FROM ELBAK ET AL. (EL73)  37 1

SQUARED SPIN CUT-OFF PARAMETER=7.7 FROM EXP. LEVELS OF SM-154  37 1
$\sigma_{CN}$ 2.2 EVALUATION H. GRUPPELAAR NO092A 21/01/76

MINIMUM ENERGY .001000 EV

MIN EN OF STATISTICAL MODEL 33.07500 KEV

ENERGY OF FIRST EXCITED STATE 1.50900 MEV

CONTINUOUS STAT MODEL ABOVE 3.09200 MEV

MAXIMUM ENERGY 15.00000 MEV

LEVEL DENSITY PARAMETER NO092 9.000000 1/KEV

LEVEL DENSITY PARAMETER NO091 8.000000 1/KEV

RESOLVED ENERGY REGION UPTO 31.1 KEV

EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA

RESOLVED RESONANCES FROM BNL-325 (MU73) AND WASSON ET AL. (WA73), SOME SPIN ASSIGNMENTS FROM RUDAK AND RUDAK (RU75)

STRENGTH FUNCTION REGION UPTO 100 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

S- AND P-WAVE STRENGTH FUNCTIONS FROM WASSON ET AL. (WA73)

AVERAGE GAMMA WIDTH > 178 MV (EVEN L-VALUES) FROM WA73

AVERAGE GAMMA WIDTH > 180 MV (ODD L-VALUES) + P-WAVE VALENCY COMPONENT OF 105 MV, IN AGREEMENT WITH WA73

DORS> 3.92 KEV FROM RESOLVED RESONANCE ANALYSES

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SM74)

LEVEL SCHEME OF TARGET NUCLEUS UPTO 3.092 MEV MAINLY FROM

NUCLEAR DATA SHEETS (K72A), CHANGES FROM

CHARVET ET AL. (CH74A) AND GUENTHER ET AL. (GU75)

SQUARED TARGET SPIN CUT-OFF PARAMETER> 11 FROM EXPERIMENTAL

SPIN DISTRIBUTION
RESOLUTION ENERGY REGION UPTO 4.9 KEV
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA
RESOLVED RESONANCES FROM BNL-325 ([MU73])
NO EXPERIMENTAL THERMAL CROSS SECTION KNOWN
STRENGTH FUNCTION REGION UPTO 100 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN
OTHER CROSS SECTIONS WITH CODE SASSI-RCN
S-WAVE STRENGTH FUNCTION FROM BNL-325 ([MU73])
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL
AVERAGE GAMMA WIDTH FOR EVEN L-VALUES > 159 MV FROM
RESOLVED RESONANCES ([MU73])
AVERAGE GAMMA WIDTH FOR ODD L-VALUES > 200 MV,
P-WAVE VALENCY CONTRIBUTION > 54 MV
DOBS > 1.74 KEV, IN AGREEMENT WITH RESOLVED RESONANCES RESULT
HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-RCN
OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. ([SM74])
LEVEL SCHEME OF TARGET NUCLEUS UPTO 2.608 KEV FROM NUCLEAR
DATA SHEETS (KO73), ONE ADDITIONAL LEVEL AT 1.740 KEV FROM (MC74A)
SQUARED TARGET SPIN CUT-OFF PARAMETER > 6.4 FROM EXPERIMENTAL
SPIN DISTRIBUTION
01/07/86

RCN-2 LIBRARY INDEX

TEXT

12.90000 1/HEV
10.50000 1/MEV

420095 14510
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14510 14580 14590 32510 14511 21520 15 0
30270 30011 31020 30040 31050 30051 15 0
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261
15 1

$RCN 2.2 EVALUATION H.GRUPPELAAR

MINIMUM ENERGY .00100 EV
MIN EN OF STATISTICAL MODEL 2.18270 KEV
ENERGY OF FIRST EXCITED STATE .20390 MEV
CONTINUOUS STAT MODEL ABOVE 1.70700 MEV
COMpletely CONT DESCRIPTION ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER MO095 12.90000 1/HEV
LEVEL DENSITY PARAMETER MO094 10.50000 1/MEV
RESOLVED ENERGY REGION UPTO 2.14 KEV
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA
RESOLVED RESONANCES FROM BNL-325 (MU73)
BOUND LEVEL ASSUMED AT -16 EV
STRENGTH FUNCTION REGION UPTO 100 KEV
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN
OTHER CROSS SECTIONS WITH CODE SASSI-RCN
ALL STRENGTH FUNCTIONS FROM OPTICAL MODEL
AVERAGE GAMMA WIDTH > 154 MV (EVEN L-VALUES), > 265 MV (ODD
L-VALUES) IN AGREEMENT WITH RESOLVED RESONANCES
P-WAVE VALENcy CONTRIBUTION > 16 MV
D0BS>82 EV IN AGREEMENT WITH RESOLVED RESONANCES RESULT
(D0BS>87 EV WITH UNCERTAINTY OF 10 EV)
HIGH ENERGY REGION
ALL CROSS SECTIONS WITH CODE SASSI-RCN
OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SM74)
LEVEL SCHEME OF TARGET NUCLEUS UPTO 1.707 MEV EVALUATED
BY RIBON ET AL. (RI78)
SQUARED SPIN CUT-OFF PARAMETER>5.1 FROM EXPERIMENTAL
SPIN DISTRIBUTION
$RCN$ 2.2 EVALUATION H. GRUPPELAAR  MO096B  22/03/76 $  
MINIMUM ENERGY  .00100  EV  
MIN EN OF STATISTICAL MODEL  6.35529  KEV  
ENERGY OF FIRST EXCITED STATE  .77830  KEV  
CONTINUOUS STAT MODEL ABOVE  2.70000  MEV  
COMPLETELY CONT DESCRIPTION ABOVE  6.50000  MEV  
MAXIMUM ENERGY  15.00000  MEV  
LEVEL DENSITY PARAMETER MO096  14.00000  l/MEV  
LEVEL DENSITY PARAMETER MO095  12.90000  l/MEV  
RESOLVED ENERGY REGION UPTO 5.4 KEV
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA  
RESOLVED RESONANCES FROM BNL-325 (MU73)  
STRENGTH FUNCTION REGION UPTO 100 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  
OTHER CROSS SECTIONS WITH CODE SASSI-RCN  
S-WAVE STRENGTH FUNCTION ESTIMATED TO FIT CAPTURE CROSS 
SECTION AT LOW ENERGIES  
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL  
AVERAGE GAMMA WIDTH FOR EVEN L-VALUES > 152 MV FROM
RESOLVED RESONANCES (MU73)  
AVERAGE GAMMA WIDTH FOR ODD L-VALUES> 160 MV  
P-WAVE VALENCY CONTRIBUTION >42 MV  
DOBS>1.3 KEV FROM SYSTEMATICS  
HIGH ENERGY REGION  
ALL CROSS SECTIONS WITH CODE SASSI-RCN  
OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SN74)  
LEVEL SCHEME OF TARGET NUCLEUS UPTO 2.700 MEV FROM
NUCLEAR DATA SHEETS (ME72A)  
SQUARED SPIN CUT-OFF PARAMETER>6.8 FROM EXPERIMENTAL
SPIN DISTRIBUTION
MINIMUM ENERGY
-0.0100 EV

ENERGY OF FIRST EXCITED STATE
1.97394 KEV

CONTINUOUS STAT MODEL ABOVE
-48090 MEV

COMPLETELY CONT DESCRIPTION ABOVE
1.51600 MEV

MAXIMUM ENERGY
15.00000 MEV

LEVEL DENSITY PARAMETER MO097
14.60000 1/MEV

LEVEL DENSITY PARAMETER MO096
14.00000 1/MEV

RESOLVED ENERGY REGION UPTO 1.95 KEV

EVALUATION REGION UPTO 100 KEV

CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN

OTHER CROSS SECTIONS WITH CODE SASSI-RCN

ALL STRENGTH FUNCTIONS FROM OPTICAL MODEL

AVERAGE GAMMA WIDTH > 134 MV (EVEN L-VALUES),

FROM RESOLVED RESONANCES (MU73)

AVERAGE GAMMA WIDTH FOR ODD L-VALUES EQUAL TO 175 MV

P-WAVE VALENCY CONTRIBUTION > 15 MV

DOBS>66 EV IN AGREEMENT WITH RESOLVED RESONANCES RESULT

(DOBS>78 EV WITH 12 EV UNCERTAINTY)

HIGH ENERGY REGION

ALL CROSS SECTIONS WITH CODE SASSI-RCN

OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SM74)

LEVEL SCHEME OF TARGET NUCLEUS UPTO 1.516 MEV FROM (RI75),
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$\text{RCN} \ 2.2$ $\text{EVALUATION \ H.GRUPPELAAR}$

- **MINIMUM ENERGY**: 0.00100 KEV
- **ENERGY OF FIRST EXCITED STATE**: 53.10020 KEV
- **CONTINUOUS STAT MODEL ABOVE**: 6.50000 MEV
- **MAXIMUM ENERGY**: 15.00000 MEV

**LEVEL DENSITY PARAMETER**: 15.78000 1/MEV

- **RESOLVED ENERGY REGION UPTO**: 0.7 MEV
- **CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN**: 100
- **OTHER CROSS SECTIONS WITH CODE SASSI-RCN**: 100
- **S-WAVE STRENGTH FUNCTION FROM BNL-325 (MU73)**: 100
- **P-WAVE STRENGTH FUNCTION ADJUSTED TO FIT TOTAL CROSS SECTION**: 100
- **MEAN GAMMA WIDTH > 86 MV (EVEN L-VALUES)**: 100
- **P-WAVE VALENCY CONTRIBUTION > 28 MV**: 100
- **(AVERAGE GAMMA WIDTHS FROM RESOLVED RESONANCES, MU73)**: 100
- **DOBS > 1000 EV, IN AGREEMENT WITH RESOLVED RESONANCE AVERAGE**: 100
- **OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SM74)**: 100
- **ALL CROSS SECTIONS WITH CODE SASSI-RCN**: 100
- **LEVEL SCHEME OF TARGET NUCLEUS UPTO 2.738 MEV (RI75 AND ME74)**: 100
- **SQUARED SPIN CUT-OFF PARAMETER > 6.6 FROM EXPERIMENTAL SPIN DISTRIBUTION**: 100
MINIMUM ENERGY  
ENERGY OF FIRST EXCITED STATE  
CONTINUOUS STAT MODEL ABOVE  
COMpletely CONt DESCRIPTION ABOVE  
MAXIMUM ENERGY  
LEVEL DENSITY PARAMETER MO100  
LEVEL DENSITY PARAMETER MO099  
RESOLVED ENERGY REGION UPTO 4.8 KEV  
EVALUATION WITH SIGMA-RCN AT 0 K, MULTILEVEL FORMULA  
RESOLVED RESONANCES FROM BNL-325 (MU73)  
HYPOTHETICAL NEGATIVE RESONANCE ADDED TO FIT CAPTURE  
CROSS SECTION AT 0.0253 EV  
STRENGTH FUNCTION REGION UPTO 750 KEV  
CAPTURE CROSS SECTIONS WITH CODE FISPRO-RCN  
OTHER CROSS SECTIONS WITH CODE SASSI-RCN  
P-WAVE STRENGTH FUNCTION ADJUSTED TO FIT TOTAL CROSS SECTION  
OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL  
MEAN GAMMA WIDTH > 58 MV (EVEN L-VALUES), > 95 MV (ODD L-VALUES)  
FROM RESOLVED RESONANCES (MU73)  
P-WAVE VALENCY CONTRIBUTION > 20 MV  
DOBS > 700 EV (FROM STAIRCASE PLOT OF THREE S-WAVE RESONANCES  
A VALUE OF 1200 EV FOLLOWS)  
HIGH ENERGY REGION  
ALL CROSS SECTIONS WITH CODE SASSI-RCN  
OPTICAL MODEL SIMILAR TO THAT OF SMITH ET AL. (SM74)  
LEVEL SCHEME OF TARGET NUCLEUS UPTO 1.503 MEV (RI75 AND KG74)  
SQUARED SPIN CUT-OFF PARAMETER > 7.0 (GUESSED)
$\text{RCN 2.2 EVALUATION H.GRUPPELAAR} \quad \text{RU101B} \quad 19/02/75 \quad $  \\

**MINIMUM ENERGY** \quad .00100 \quad \text{EV}  \\
**MIN EN OF STATISTICAL MODEL** \quad .67433 \quad \text{KEV}  \\
**ENERGY OF FIRST EXCITED STATE** \quad .12720 \quad \text{MEV}  \\
**CONTINUOUS STAT MODEL ABOVE** \quad .64380 \quad \text{MEV}  \\
**COMPLETELY CONT DESCRIPTION ABOVE** \quad 6.50000 \quad \text{MEV}  \\
**MAXIMUM ENERGY** \quad 15.00000 \quad \text{MEV}  \\
**LEVEL DENSITY PARAMETER RU101** \quad 16.30000 \quad 1/\text{KEV}  \\
**LEVEL DENSITY PARAMETER RU100** \quad 14.50000 \quad 1/\text{MEV}  \\
**RESOLVED RESONANCE REGION UP TO 677 EV**  \\
**EVALUATION WITH SIGMA-2 AT 0 K**  \\
**RESOLVED RESONANCE PARAMETERS FROM NEUDADA-1974**  \\
**UNRESOLVED RESONANCE REGION UP TO 10 KEV**  \\
**CAPTURE CROSS SECTION WITH CODE FISPRO RCN**  \\
**OTHER CROSS SECTIONS WITH CODE SASSI-RCN**  \\
**S-WAVE STRENGTH FUNCTIONS FROM RU73**  \\
**OTHER STRENGTH FUNCTIONS FROM OPTICAL MODEL**  \\
**DOBS AND GAMMA WIDTH FROM RI75**  \\
**STATISTICAL REGION**  \\
**ALL CROSS SECTIONS WITH CODE SASSI-RCN**  \\
**(OPTICAL MODEL FROM IG74)**  \\
**LEVEL SCHEME DATA FROM TO73**
### RCN-2 Evaluation

**H. Gruppe**

**K. Ru102G**

**20/02/75**

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**MINIMUM ENERGY**

- 0.00100 EV

**Continuous State Model Above**

- 1.44288 MEV

**Maximum Energy**

- 1.578 KEV

**Level Density Parameter RU102**

- 1.570000 1/3EV

**Level Density Parameter RU101**

- 16.300000 1/MEV

**Resolved Resonance Region Up to 1.578 KEV**

**Evaluation With Code Sigma-2 At 0 K.**

**Resolved Resonance Parameters From Neudada-1974**

**Unresolved Resonance Region Up to 10 KEV**

**Capture Cross Section With Code Fispro-Rcn**

**Other Cross Sections With Code Sassi-Rcn**

**Strength Functions From Optical Model**

**Dobs Estimated From Three Known Resolved Resonances**

**Gamma Width Adjusted To Fit Experimental Points At 2 KEV (SC69) And 24 KEV (NU73)**

**Statistical Region**

**All Cross Sections With Code Sassi-Rcn**

**Optical Model From IG74**

**Level Scheme Data From RI74**
$RCN 2.2 EVALUATION H. GRUPPELAAR

MINIMUM ENERGY .00100 EV
MIN EN OF STATISTICAL MODEL 1.17353 KEV
ENERGY OF FIRST EXCITED STATE .35800 MEV
CONTINUOUS STAT MODEL ABOVE 2.03400 MEV
COMPLETELY CONT DESCRIPTION ABOVE 6.50000 MEV
MAXIMUM ENERGY 15.00000 MEV
LEVEL DENSITY PARAMETER RU104 17.00000 1/MEV
LEVEL DENSITY PARAMETER RU103 19.74000 1/MEV
RESOLVED RESONANCE REGION UP TO 1.183
EVALUATION WITH SIGMA-2 AT 0 K.
RESOLVED RESONANCE PARAMETERS FROM NEUDADA-1974
UNRESOLVED RESONANCE REGION UP TO 10 KEV
CAPTURE CROSS SECTION WITH CODE FISPRO-RCN
OTHER CROSS SECTIONS WITH CODE SASSI-RCN
STRENGTH FUNCTIONS FROM OPTICAL MODEL
DOBS FROM MU73
GAMMA WIDTH FROM WE73
STATISTICAL REGION
EVALUATION WITH CODE SASSI-RCN
OPTICAL MODEL FROM IG74
LEVEL SCHEME DATA FROM BA70, RI74