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Rev. 0

INTERNATIONAL ATOMIC ENERGY AGENCY

NUCLEAR DATA SERVICES

DOCUMENTATION SERIES OF THE IAEA NUCLEAR DATA SECTION

XA9950005

A-chain evaluations for ENSDF

J.K. Tuli, M.R. Bhat, A. Lorenz

Contents:

January 1982

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BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

NS-IA/24

DATE: July 15, 1981

TO: Distribution

FROM: M.R. Bhat

SUBJECT: Distribution of ENSDF Physics Processing Codes

The ENSDF physics processing codes: ANGCOR, GTOL, HSICC and LOGFT are ready for distribution. All known bugs in them have been corrected and they have been run and checked out on DEC System-10, CDC-7600 and IBM-370 computers.

NNDC will distribute these programs along with the subroutine libraries (NSDLIB [single and double precision versions], CDLIB and FORSTR) to the NSDD network with test problems and their output.

BROOKHAVEN NATIONAL LABORATORY

MEMORANDUM

NS-1A/28

DATE: December 21, 1981

TO: NDS Evaluation Centers

FROM: J. K. Tuli

SUBJECT: A-chain Evaluations

Evaluators are requested that while sending the evaluations to NNDC they should include the following (please use the transmittal form given [Encl. -1]):

1. An abstract (Data Set called "Comments") in the format enclosed [Encl. -1A].

2. A copyright release form [Encl. -2] duly signed by the authors.

3. A statement to the effect that existing entries in ENSDF for their A-chain be replaced by their evaluation.

4. A request stating whether NNDC should run HSICC and LOGFT programs for them and include the data cards generated by these programs in their evaluation. In absence of this request evaluators' G, B, E and their continuation cards would be preserved as sent to us.

Also, please note the following:

1. Older version of HSICC puts a '$' at the end of 2 G cards which if left undeleted, would result in a spurious ';'. New version of HSICC which does not do that is available from NNDC.

2. Description of acceptable I.D. records for data sets in ENSDF is contained in my memo NS/1A-20 dated march 18, 1981 [Encl. -3].

3. New specifications for continuation cards have been developed and are given in Encl. -4. As far as possible these specifications should be used.

4. ENSDF translation dictionary is constantly updated. The latest version is shown in Encl. 5. Please note that our edit routine recognizes the following characters as delimeters :, (,), -, =, +, >, <, /, $, blank, . followed by blank, ; , comma

cont'd

5. NNDC will make necessary data corrections based upon format and physics checking programs and advise the evaluator of the changes in form of marked data listing. If the evaluator disgrees with any of the changes, NNDC should immediately be informed and changes will be reversed.

6. In order to speed up the publication of evaluations, the A-chains will be sent for review as soon as a reasonable layout of drawings and tables is achieved. Please remember that the copies of the tables and drawings sent to you at this stage are in a very preleiminary form. After review and corrections in the A-chain, they will be thoroughly edited and their appearance markedly changed. Evaluators are encouraged, infact they are expected to, advise NNDC of changes in appearance and contents of nuclear data sheets for their A-chain. This can be done by marking the copy at the preliminary stage. Changes at a later stage are expensive and delay publication.

NDS Evaluation Transmittal

Mail to: Dr. J. K. Tuli
National Nuclear Data Center
Building 197D
Brookhaven National Laboratory
Upton, N.Y. 11973, U.S.A.

Please include the following for prompt processing of your A-chain:

A. MASS NUMBER =

Evaluator Name:

INSTITUTE:

ADDRESS:

B. ITEMS ENCLOSED

1. MAGNETIC TAPE
DESCRIPTION: MODE — EBCDIC/ASCII/BCD
No. of Tracks: — 9 Tr/7 Tr
DENSITY: — 556/800/1600/6250
BLOCKING Factor:
No. of Records (if known):

2. DATA BANK LISTING (optional) — Yes/No

3. ABSTRACT

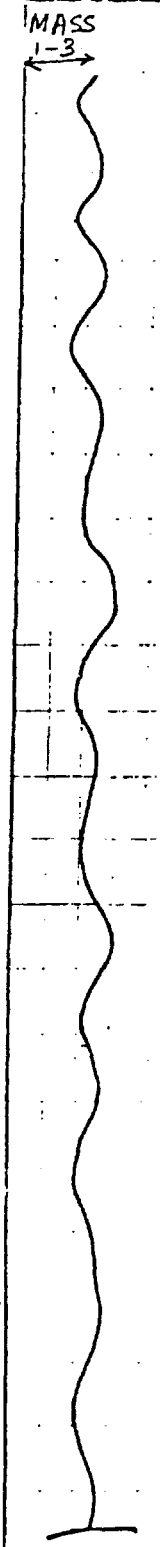
4. COPYRIGHT RELEASE FORM

5. REQUEST TO REPLACE EXISING ENTRIES IN ENSDF for this A-number

C. SHOULD THE FOLLOWING PROGRAMS BE RUN AND NEW RECORDS INSERTED IN YOUR EVALUATION?

HSICC — Yes/No
LOGFT — Yes/No

D. ANY OTHER COMMENTS:




```
C    COMMENTS
C
C    EVALUATOR:
C
C    INSTITUTION:
2C
C
C    ABSTRACT:
2C
3C
4C
C
C    CUTOFF DATE:
2C
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C    ACKNOWLEDGMENTS:
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C    *RESEARCH SPONSORED BY
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C    CITATION:                    , NDS    ,    (19
C
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Please return form to (name of journal), Journal Division, Academic Press, Inc., 111 Fifth Avenue, New York, N. Y. 10003.

Rules for Constructing Data Set ID's

March 12, 1981

The Data Set ID for an ENSDF data set must serve as a unique, computer recognizable identification for the data set. For that purpose, the following rules are proposed for future ENSDF entries. Upper case letters in the rules below indicate that the word is required and must be entered exactly as it appears in this document. Single blanks have meaning and should be used according to the formats below. A colon may be used to signal that any text following will be ignored in generating a table heading or figure caption in the Nuclear Data Sheets. All characters must be confined to the 30 spaces allowed. Optional fields are given in italics. General categories are given in upper and lower case and further defined.

I. GENERAL ID'S

REFERENCES (1)
COMMENTS
ADOPTED LEVELS
ADOPTED LEVELS, GAMMAS

II. DECAY DATA SET ID'S

Parent Mode DECAY *(Half_life units)* (2)

Parent should be the parent isotope symbol (e.g.) 52CR
Mode may be one of B+, B−, EC, IT, A or SF.
Half_life should be a floating point number.
Units should be the abbreviation for a standard unit of time. (See the manual)

MUONIC ATOM (3)

III. REACTION DATA SET ID'S

Target(Reaction).*(Reaction). Target(Reaction) E=Energy Qualifier* (4)

Target should be the target(isotope or element) symbol
Reaction should be a reaction symbol (e.g.) N,P
Energy may be one of the following
Floating_point_number,*Floating_point_number* Units
Floating_point_number−Floating_point_number Units
THERMAL
RESONANCE
Qualifier may be one of the following
RES
IAR
IAS
PRIMARY GAMMAS †
SECONDARY GAMMAS †

COULOMB EXCITATION *(Reaction)* (5)
INELASTIC SCATTERING
(HI,XNG)
PICKUP REACTIONS †
STRIPPING REACTIONS †

† Obsolete, not to be used in the future

Continuation Records in ENSDF

The following is the format for continuation records in ENSDF:

<nucid>N_R_<quant><op><value>[<op><value>][<ref>]$ ...

<nucid>: Nucleus id.
N: 2, 3, 4, ...
_: required space.
R: Record type L, B, E or G.
<quant>: Standard symbol for a quantity as defined in ORNL - 5054/R1 pp. 24-26.
Note: Ratios of more than two should be indicated by colons and not by slashes (e.g., K:L1:L2:L3 and not K/L1/L2/L3).
<op>: =, _EQ_, _AP_, <, _LT_, <=, _LE_, >=, _GE_, >, _GT_.
Note: For ranges, only the last 8 operators are valid.
<value>: Numeric value with units as needed and optional uncertainty. Uncertainty is as defined in ORNL - 5054/R1 p. 19 sec A.
Note: For ranges, uncertainties should not be included.
[]: Optional.
Note: To specify a range of values a second operator and value are required.
<ref>: 6 character key numbers separated by commas and enclosed within parentheses (e.g., (76TU01, 81BO01)).
$: Delimiter (end of record is also a delimiter, thus '$' should not be the last character for the record)

Examples:

```
188RE2 G EKC = 1.5 10 (78SC10, 72SH13)$ K/L LT 5.9 GT 3.5
188RE2 B EAV=728.6 4
```

ENSDF DICTIONARY

23-Dec-81

ENSDF	TRANSLATION
%A	%α
%B	%β
%EC	%ε
%IT	%IT
%IT-BRANCHING	%IT-branching
%IT-DECAY	%IT-decay
%IT=	%IT=
%SF	%SF
(1+CC)	(1+α)
(A)	(α)
(B)	(β)
(B+)	(β^+)
(B++EC)	(ε+β+)
(B-)	(β^-)
(BETA*R	(βR
(EC+B+)	(ε+β+)
(G)	(γ)
(G0)	(γ_0)
(H,T)	(H,t)
(IT)	(IT)
(L)	(L)
(M)	(M)
(M,N,O+)	(M,N,O+)
(ML)	(ML)
(NE)	(≠)
(023)	
(T)	(t)
(THETA,H,TEMP)	(θ,H,T)
(UP)	(↑)
*	*
**2	^{2}
*R	R
*T1/2	$*T_{1/2}$
1.33LC	1.33α(L)
2J	2J
2MC2	$2mc^2$
4PI	4π
4PID	4πβ
4PIBG	4πβγ
A DECAY	α decay
A SYST	α syst
A'	α'
A)	α)
A,	α,
A-N	A-N
A-SYST	α-syst
A/	α/
A0	A_0
A1	A_1
A2	A_2
A3	A_3
A4	A_4
A=	A=
AAS	AAS
ACE	(α)(ce)
AG	αγ
AJ	AJ
ALAGA	Alaga
ALPHA	α
ANTI-COMPTON	anti-Compton
AP	≈
APRIL	April
AUGER	Auger
AUGUST	August
AUSTERN	Austern

ENSDF	TRANSLATION
AXK	(α)(K X-ray)
AY	Ay
B	β
B*R	βR
B+	β^+
B2	β_2
B3	β_3
B4	β_4
B5	β_5
B6	β_6
B=	B=
BCE	βce
BCE(T)	βce(t)
BE1	B(E1)
BE1W	B(E1)(W.u.)
BE2	B(E2)
BE2W	B(E2)(W.u.)
BE3	B(E3)
BE3W	B(E3)(W.u.)
BE4	B(E4)
BE4W	B(E4)(W.u.)
BE5	B(E5)
BEL	B(EL)
BERKELEY	Berkeley
BESSEL	Bessel
BETA	β
BETA(T)	β(t)
BF3	BF_3
BG	βγ
BIEDENHARN	Biedenharn
BJ**2	BJ^2
BL	β_L
BLAIR	Blair
BM1	B(M1)
BM1W	B(M1)(W.u.)
BM2	B(M2)
BM2W	B(M2)(W.u.)
BM3	B(M3)
BM3W	B(M3)(W.u.)
BM4	B(M4)
BM4W	B(M4)(W.u.)
BOHR	Bohr
BORN	Born
BR	Branching
BREIT	Breit
C	C
C.M.	c.m.
C2S	C^2S
CC	α
CCBA	CCBA
CEB	ceβ
CEG	ceγ
CEK	ce(K)
CEL	ce(L)
CEL1	ce(L1)
CEL12	ce(L12)
CEL2	ce(L2)
CEL23	ce(L23)
CEL3	ce(L3)
CEM	ce(M)
CEM1	ce(M1)
CEM2	ce(M2)
CEM3	ce(M3)
CEM4	ce(M4)
CEM45	ce(M45)

ENSDF DICTIONARY

23-Dec-81

ENSDF	TRANSLATION
CEM5	ce(M5)
CEN	ce(N)
CEN1	ce(N1)
CEN2	ce(N2)
CEN3	ce(N3)
CEN4	ce(N4)
CEN45	ce(N45)
CEN5	ce(N5)
CEO	ce(O)
CEO1	ce(O1)
CHI	χ
CHI**2	χ^2
CK	εK
CL	εL
CLEBSCH	Clebsch
CM	εM
COMPTON	Compton
CONF	configuration
CONF=	configuration=
CORIOLIS	Coriolis
COSTER	Coster
COUL	Coul
COULOMB	Coulomb
CP	CP
CURIE	Curie
D)	D)
D+Q	D+Q
DBR	branching uncertainty
DCC	$\Delta\alpha$
DE	ΔE
DECEMBER	December
DEG	°
DELTA	Δ
DFT	Δ(log ft)
DHF	Δ(HF)
DIA	$\Delta I\alpha$
DIB	$\Delta I\beta$
DIE	ΔIc
DJ	ΔJ
DK	ΔK
DL	ΔL
DMR	$\Delta\delta$
DNR	Δ(γ-normalization)
DOPPLER	Doppler
DQ+	ΔQ+
DQA	$\Delta Q\alpha$
DRI	$\Delta I\gamma$
DS	ΔS
DS/DW	$d\sigma/d\Omega$
DSA	DSA
DSAM	DSA
DT	$\Delta T_{1/2}$
DT1/2	$\Delta T_{1/2}$
DTI	$\Delta I(\gamma+ce)$
DWBA	DWBA
DWIA	DWIA
E	E
E**1/2	$E^{1/2}$
E+	e+
E-	e-
E.G.	*e.g.*
E/DE	E/ΔE
E0	E0
E1	E1
E1*	E1*
E2	E2
E2*	E2*
E3	E3
E3*	E3*
E4	E4
E4*	E4*
EA	Eα
EAV	avg Eβ
EB	Eβ
EB(	εB(
EC	ε
ECC	α(exp)
ECE	E(ce)
ECK	εK(exp)
ECL	εL(exp)
ED	Ed
EEC	Eε
EG	Eγ
EG**3	$E\gamma^3$
EKC	α(K)exp
EL	EL
EL1C	α(L1)exp
EL23C	α(L23)exp
EL2C	α(L2)exp
EL3C	α(L3)exp
ELC	α(L)exp
ELC+	α(L+...)exp
EMC	α(M)exp
EMC+	α(M+...)exp
EN	E(n)
ENC	α(N)exp
ENC+	α(N+...)exp
ENDOR	ENDOR
ENSDF	ENSDF
EP	Ep
EPR	EPR
EPSILON	ε
EPSILONB	εB
ESR	ESR
ET	Et
EV	eV
F	F
FEBRUARY	February
FERMI	Fermi
FESHBACH	Feshbach
FG	(fragment)γ
FM**2	fm^2
FM-1	fm^{-1}
FOURIER	Fourier
FRENCH	French
FWHM	FWHM
G	γ
G*T	εT
G*W*WIDTH(0)**2	g$w\Gamma^2$(0)
G*WIDTH	gΓ
G+-	$\gamma^{\pm}$
G-FACTOR	g-factor
G-G	γ-γ
G-RADIATIONS	γ-radiations
G.S.	g.s.
G/100	γ/100
G/A	γ/α
G0	γ_0
G=	g=
GALLAGHER	Gallagher

ENSDF DICTIONARY

23-Dec-81

ENSDF	TRANSLATION
GAMMA	γ
GAMOW	Gamow
GAUSSIAN	Gaussian
GCE	γce
GDR	GDR
GE	≥
GELI	Ge(Li)
GEV	GeV
GG	γγ
GGG	γγγ
GLENDENNING	Glendenning
GORDAN	Gordan
GQR	GQR
GS	g.s.
GT	>
H(	H(
H,	H,
H=	H=
HAGER	Hager
HAUSER	Hauser
HF	HF
HI	HI
I	I
I.E.	i.e.
IA	Iα
IAR	IAR
IAS	IAS
IB	Iβ
IB+	Iβ+
IB-	Iβ-
IBS	IBS
ICC	α
ICE	Ice
IE	Iε
IEC	Ic
IG	Iγ
IMPAC	IMPAC
ISOLDE	ISOLDE
ISPIN	T
ISPINZ	T_z
IT DECAY	IT decay
IT DECAYS	IT decays
IT=	IT=
J	J
J**2	J^2
J0	J_0
J2	J_2
JANUARY	January
JF	Jf
JI	Ji
JMAX	Jmax
JMIN	Jmin
JPI	Jπ
JULY	July
JUNE	June
K	K
K/T	ce(K)/(γ+ce)
KAPPA	κ
KC	α(K)
KEV	keV
KEVIN	Kelvin
KG	kG
KLL	KLL
KNIGHT	Knight
KPI	Kπ

ENSDF	TRANSLATION
KRANE	Krane
KRONIG	Kronig
KURIE	Kurie
KXY	KXY
L	L
L(2N)	L(2n)
L/T	ce(L)/(γ+ce)
L1	L1
L1C	α(L1)
L2	L2
L2C	α(L2)
L3	L3
L3C	α(L3)
LAMBDA	λ
LASER	LASER
LC	α(L)
LE	≤
LEGENDRE	Legendre
LM	LM
LMN	LMN
LN	L(n)
LOG FIT	log $f't$
LOG FIUT	log $f'^{u}t$
LOG FT	log ft
LOGFIT	log $f't$
LOGFIUT	log $f'^{u}t$
LOGFT	log ft
LORENTZIAN	Lorentzian
LP	L(p)
LT	<
M	m
M(	M(
M+=	M+=
M-SHELL	M-shell
M-SUBSHELL	M-subshell
M/T	ce(M)/(γ+ce)
M1	M1
M1*	M1*
M1C	α(M1)
M2	M2
M2*	M2*
M2C	α(M2)
M3	M3
M4	M4
M=	mult=
MAG	magnetic
MARCH	March
MB	mb
MB/SR	mb/sr
MC	α(M)
MC+	α(M+..)
MEDLIST	MEDLIST
MEV	MeV
MICROBARNS/SR	μb/sr
ML	ML
MOME2	Q
MOMM1	μ
MOSS	Moss
MOSSBAUER	Mossbauer
MOSZKOWSKI	Moszkowski
MR	δ
MR**2	δ^2
MS	ms
MU	μ
N	N

ENSDF DICTIONARY

23-Dec-81

ENSDF	TRANSLATION
N)	n)
N+/T	ce(N+)/(γ+ce)
N,	n,
N-CAPTURE	n-capture
N-SHELL	N-shell
N-SUBSHELL	N-subshell
N-Z	N-Z
N/	N/
N1/N2/N3	N1/N2/N3
N1C	α(N1)
N2C	α(N2)
N3C	α(N3)
N<	N<
N=	N=
NA2WO4	Na_2WO_4
NAI	NaI
NB	β,ε-normalization
NB/SR	nb/sr
NBS	NBS
NC	α(N)
NC+	α(N+..)
NDS	Nuclear Data Sheets
NE	≠
NG	nγ
NILSSON	Nilsson
NMR	NMR
NORDHEIM	Nordhiem
NOTE:	Note:
NOVEMBER	November
NQR	NQR
NR	Iγ-normalization
NT	I(γ+ce)-normalization
NU	ν
O	O
OCTOBER	October
OMEGA	ω
ORNL	ORNL
OSIRIS	OSIRIS
P	p
P(	P(
P)	p)
P,	p,
P-WIDTH	p-width
P0	P_0
PAC	PAC
PAD	PAD
PG	pγ
PGG	pγγ
PHI	Φ
PI	π
PRI	Δ1γ(%)
PSI	Ψ
PWBA	PWBA
Q	Q
Q-	Q(β-)
Q3D	Q3D
QA	Q(α)
R	R
R**2	r^2
R0	r_0
RASMUSSEN	Rasmussen
RHO	ρ
RI	Iγ
ROSE	Rose
S	s

ENSDF	TRANSLATION
S'	S'
S(	S(
S/	S/
S=	S=
SA	Sα
SCHMIDT	Schmidt
SEEGER	Seeger
SELTZER	Seltzer
SEPTEMBER	September
SF	SF
SIGMA	σ
SIGNA	σ(nα)
SIGNG	σ(nγ)
SILI	Si(Li)
SN	S(n)
SP	S(p)
STEFFEN	Steffen
SUB-COULOMB	sub-Coulomb
SY	syst
T	$T_{1/2}$
T)	t)
T,	t,
T/	T/
T1/2	$T_{1/2}$
T=	$T_{1/2}$=
TAU	τ
TELLER	Teller
TEMP	T
THETA	θ
TI	I(γ+ce)
TRISTAN	TRISTAN
TRIUMPH	TRIUMPH
U	U
UB	μb
UB/SR	μb/sr
US	μs
V	V
W	W
W.U.	W.u.
WEISSKOPF	Weisskopf
WIDTH	Γ
WIGNER	Wigner
WINTHER	Winther
X	x
X=	x=
XG	Xγ
XK	K X-ray
XKA	Kα X-ray
XKA1	$Kα_1$ X-ray
XKA2	$Kα_2$ X-ray
XKB	Kβ X-ray
XKB1P	$Kβ_1'$ X-ray
XKB2P	$Kβ_2'$ X-ray
XKG	(K X-ray)γ
XKO2	K(O2)X-ray
XKO3	K(O3)X-ray
XL	L X-ray
XLA1	$Lα_1$ X-ray
XLA2	$Lα_2$ X-ray
XLB1	$Lβ_1$ X-ray
XLB2	$Lβ_2$ X-ray
XLG1	$Lγ_1$ X-ray
XLG2	$Lγ_2$ X-ray
Y	y
Z	z

ENSDF DICTIONARY

23-Dec-81

ENSDF	TRANSLATION
11/2(505)	11/2[505]
CONF=(N,NLJ)	configuration=(ν nlj)
CONF=(N,NLJ,-1)	configuration=(ν nlj)$^{-1}$
CONF=(N,1G9/2)	configuration=(ν $1g_{9/2}$)
CONF=(N,3G9/2,+3,23/2-)	configuration=(ν $3g_{9/2}$)$^{+3}$23/2-
CONF=(N,3P1/2,-1)	configuration=(ν $3p_{1/2}$)$^{-1}$
CONF=((208PB 3-)(P,1H9/2))15/2+	configuration=((^{208}Pb 3-)(π $1h_{9/2}$))15/2+
CONF=(P,1G9/2)	configuration=(π $1g_{9/2}$)
CONF=((P,1H9/2,+2,8+)(N,2F5/2,-3,11/2-))25/2-	configuration=((π $1h_{9/2}{}^{2}{}_{8+}$(ν $2f_{5/2}$)$^{-3}{}_{11/2-}$)25/2-
CONF=(P,3G9/2,+3,23/2-)	configuration=(π $3g_{9/2}$)$^{+3}$23/2-