Atomic Data and Analysis Structure

Appendices

ADAS data formats

The various permanent data sets in ADAS fall into a number of categories with precisely defined organisation and formatting. The specifications of these are called 'ADAS data formats' or ADF's for short. Those relevant to the this manual are as follow:

ADF04	resolved specific ion data collections
ADF08	direct resolved radiative recombination coefficients
ADF09	direct resolved dielectronic recombination coefficients
ADF10	isoelectronic master files
ADF11	isonuclear master files
ADF13	ionisation per photon coefficients
ADF14	thermal charge exchange coefficients

ADF15	photon emissivity coefficients
ADF16	generalised contribution functions
ADF17	condensed projection coefficients
ADF18	cross-referencing data
ADF23	state selective electron impact ionisation coefficients
ADF24	state selective charge transfer cross-sections
ADF25	driver datasets for ADAS204 calculation

ADF04

Provides all required energy level and rate coefficient data for specified low levels of an ion. The data set is complete for a low level population calculation. Specific level selective free electron recombination and charge exchange recombination is included. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS201 ADAS205

ADAS206 ADAS208

'JETSHP.STRIP.FORT(SSSUBL)'

'JETSHP.STRIP.FORT(SSSUBJ)'

Formatted files to ADF04 specification :

Database Status Date = October 28, 1997 Data type = specific ion file Data root = */.../adas/adas/adf04/*

Sequence	*Members*	*Library*	*Comments*	*Resolution*	*Quality*
H-like	H,He,Li,Be,B,C,N,O,F,Ne	copha#h	Anderson (n=1,2,3,4,5)	n & nl	best available
He-like	Li,Be,B,C,N,O,F,Ne	copha#he	Anderson (n=1,2,3,4,5)	l	best available
Li-like	Be,C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	coppm#li	McWhirter (n=2,3,4,5)	j	best available
Be-like	C,N,O,Ne,Mg,Al,Si,S,Ar, Ca,Ti,Fe,Ni	copjl#be	Lang (n=2,3)	j best available	
C-like	Ca,Fe,Mg,Ne,O,S,Si	clike	Monsignori-Fossi(n=2)	j	assessed
N-like	Ar,Ca,Mg,S,Si	nlike	Landini(n=2)	j	assessed
O-like	Ne,Mg,Al,Si,S,Ar, Ca,Ti,Fe,Ni	olike	Lang/Summers (n=2)	j	best available

Notes:
1. *copha#h* directory has four groups of members (a) prefix '*bn#h*'=> n--shell, high temperature set (b) prefix '*bn#l*'=>n-shell, low temperature set (c) prefix '*hah*'=> nl-shell, high temperature set (d) prefix '*hal*'=>nl-shell, low temperature set.
2. *copha#he* directory members have prefix '*sm#*'=>initial data based on Sampson calculations. Improved data then introduced where available.
3. There are many specific ion files individually assessed for ions of light elements and ions of special fusion interest in the ADAS database. These are in iso-electronic sequence sub-directories with members named by date and originator as */.../adf04/<seq>like/<seq>like_<source><year><el>.dat*

where <seq> is the ioslectronic sequence symbol, <source> is the orginator's initials, <year> a two digit year number and <el> the element symbol.

4. Lang has prepared a detailed document on adf04 files for matching to SOHO/CDS specific needs as detailed by the 'Blue Book'. This is available in the *datastatus* section of ADAS documentation on the web.

Li-like	Be,C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#li	Sampson/Zhang(n=2,3,4,5)	j	medium
Be-like	C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#be	Sampson/Zhang(n=2)	j	medium
B-like	C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#b	Sampson/Zhang(n=2,3)	j	medium
C-like	N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#c	Sampson/Zhang(n=2,3)	j	medium
F-like	Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#f	Sampson/Zhang(n=2,3)	j	medium
Ne-like	Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#ne	Sampson/Zhang(n=3,4)	j	medium
Na-like	Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copsm#na	Sampson/Zhang(n=3,4,5)	j	medium
Li-like	Be,C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#li	Superst/dipole i.p.(n=2,3,4,5)	j	low
Be-like	C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#be	Superst/dipole i.p.(n=2)	j	low
B-like	C,N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#b	Superst/dipole i.p.(n=2,3)	j	low
C-like	N,O,Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#c	Superst/dipole i.p.(n=2,3)	j	low
F-like	Ne,Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#f	Superst/dipole i.p.(n=2,3)	j	low
Ne-like	Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#ne	Superst/dipole i.p.(n=3,4)	j	low

Na-like	Mg,Al,Si,S,Ar Ca,Ti,Fe,Ni	copss#na	Superst/dipole i.p.(n=3,4,5)	j	low
Be isonuc.	all ions	copmm#4	Cowan/Born(n=2,3)	j & ls	low
C isonuc.	all ions	copmm#6	Cowan/Born(n=2,3)	j & ls	low
N isonuc.	all ions	copmm#7	Cowan/Born(n=2,3)	j & ls	low
O isonuc.	all ions	copmm#8	Cowan/Born(n=2,3)	j & ls	low
Ne isonuc.	all ions	copmm#10	Cowan/Born(n=2,3)	j & ls	low
Mg isonuc.	all ions	copmm#12	Cowan/Born(n=2,3)	j & ls	low
Si isonuc.	all ions	copmm#16	Cowan/Born(n=2,3)	j & ls	low
Cl isonuc.	all ions	copmm#17	Cowan/Born(n=2,3)	j & ls	low
Ar isonuc.	all ions	copmm#18	Cowan/Born(n=2,3)	j & ls	low
Fe isonuc.	all ions	copmm#26	Cowan/Born(n=2,3)	j & ls	low
Ni isonuc.	all ions	copmm#28	Cowan/Born(n=2,3)	j & ls	low
Kr isonuc.	all ions	copmm#36	Cowan/Born(n=2,3)	j & ls	low

Notes:
1. *copss* filess contain dipole collision rate coefficients only. They are often used for supplementation of higher quality data sets which lack dipole allowed transitions between higher levels.
2. *copmm* files contain dipole and non-dipole non-spin change collision rate coefficients only. Exchange collisions are not present.
3. *copmm* & *copss* files are useful for initial survey and radiated power assessment in ADAS series 4 codes.
4. *copss* & *copmm* files are generally created with Eissner configuration notation for automatic initial set up of metastable resolved collisional radiative recombination/ionisation calculation with ADAS series 2 codes.

Data lines : *Format:*

SYM , IZ , IZ0 , IZ1 , BWNO1 , [(PTRM1) , BWNO2 , (PTRM2) .....] , ADFID

until IND = -1

IND , SPEC , IS , IL , IJ , WNO , [(IP1) , IZTA1 , (IP2) , IZTA2 .....]

-1 , (EORB(I),I = 1, 14)

ZEFF , ITYP , (TEA(I), = 1, MAXT)

until INDU = -1 and INDL = -1

until INDU = -1

ICODE, INDU , INDL , AVAL, (GAM(I),I=1,MAXT)

-1

-1 -1

variable identification :

	name	*meaning*
	SYM	element symbol in form ##+
	IZ	charge of the ion
	IZ0	nuclear charge
	IZ1	ion charge + 1
	BWNO1	ionisation potential of lowest level (cm-1) rel. to 1st parent term.
[	PTRM1	term of the 1st parent
	BWNO2	ionisation potential of lowest level (cm-1) rel. to 2nd parent term.
	PTRM2	term of the 2nd parent
	...	]
	ADFID	ADAS data file type code
	IND	index of level
	SPEC	configuration specification of level
	IS	multiplicity (2*S+1)
	IL	total orbital angular momentum quantum number
	IJ	(statistical weight of level - 1)/2
	WNO	wave number of level relative to the lowest level (cm-1)
[	IP1	index of parent accessible by ionisation

IZTA1	shell weighting factor for ionisation to this parent	
IP2	index of parent accessible by ionisation	
IZTA2	shell weighting factor for ionisation to this parent	
....		]
EORB()	orbital energies (Ryd) (optional - compatible only when	
	level configurations are given in Eissner notation)	
ZEFF	set equal to IZ1 for normal usage	
ITYP	set equal to 3 for normal usage	
TEA()	set of electron temperature (Kelvin)	
MAXT	number of temperatures (maximum 8)	
ICODE	transition data type code:	
	' ' => electron impact transition	
	'P' => proton impact transition	
	'H' => charge exchange recombination	
	'R' => free electron recombination	
INDU	transition: upper energy level index (case ' ' & 'P')	
	receiving level index (case 'H' & 'R')	
INDU	transition: lower energy level index (case ' ' & 'P')	
	recombining parent index (case 'H' & 'R')	
AVAL	transition: Einstein A-value (sec-1) (case ' ' & 'P')	
	beam energy (ev/amu) (case 'H')	
	--- not used --- (case 'R')	
GAM()	transition: gamma (upsilon) (case ' ' & 'P')	
	rate coefft.(cm**3 sec-1) (case 'H')	
	rate coefft.(cm**3 sec-1) (case 'R')	

Items in square brackets are only used by program ADAS208. They are ignored by the other processing programs

Table B4c - example.

```
C + 2         6         3        386241.0(2S)
    1 2S2               (1)0( 0.0)             0.0   {1}2.000
    2 2S1 2P1           (3)1( 4.0)          52419.4   {1}1.000
    3 2S1 2P1           (1)1( 1.0)         102352.0   {1}1.000
    4 2P2               (3)1( 4.0)         137477.7   {X}
    5 2P2               (1)2( 2.0)         145876.1   {X}
    6 2P2               (1)0( 0.0)         182519.9   {X}
    7 2S1 3S1           (3)0( 1.0)         238213.0   {1}1.000
    8 2S1 3S1           (1)0( 0.0)         247170.3   {1}1.000
    9 2S1 3P1           (3)1( 4.0)         259717.9   {1}1.000
   10 2S1 3P1           (1)1( 1.0)         258931.3   {1}1.000

                           .        .        .

   40 2S1 5D1           (1)2( 2.0)         346658.3   {1}1.0
   41 2S1 5F1           (3)3(10.0)         347153.8   {1}1.0
   42 2S1 5G1           (3)4(13.0)         346579.4   {1}1.0
   43 2S1 5G1           (1)4( 4.0)         346579.3   {1}1.0
   44 2S1 5F1           (1)3( 3.0)         344955.8   {1}1.0
   -1      26.47    4.37    3.29    1.32    1.15    1.06    0.69    0.62    0.58    0.57    0.42    0.39    0.37    0.36    0.36
  3.0     3       9.00+03 1.80+04 4.50+04 9.00+04 1.80+05 4.50+05 9.00+05 1.80+06
   4    1 2.16-02 1.17-02 1.58-02 2.23-02 2.28-02 1.95-02 1.31-02 8.79-03 6.81-03
   5    1 2.37+03 3.85-01 3.89-01 3.94-01 3.84-01 3.63-01 3.38-01 3.15-01 3.02-01

                 .        .        .

43  30 2.67+02 1.10-03 1.21-03 1.49-03 1.84-03 2.30-03 3.03-03 3.65-03 4.31-03
  43  34 2.87+06 1.91+02 2.16+02 2.69+02 3.23+02 3.86+02 4.78+02 5.53+02 6.31+02
  44  43 7.77+04 7.05+02 8.03+02 9.57+02 1.09+03 1.22+03 1.41+03 1.56+03 1.70+03
   7   1 1.00-30 2.67-01 2.28-01 1.55-01 1.06-01 7.12-02 4.20-02 2.80-02 1.60-02
   7   6 1.00-30 5.32-01 4.48-01 2.86-01 1.79-01 1.05-01 5.09-02 2.84-02 1.51-02
   8   7 1.00-30 3.56+00 2.70+00 1.58+00 9.87-01 6.16-01 3.29-01 1.97-01 1.05-01
R  1  +1         1.64-13 1.17-13 7.42-14 5.28-14 3.82-14 2.54-14 1.83-14 1.26-14
R  2  +1         1.13-12 8.31-13 5.34-13 3.55-13 2.21-13 1.13-13 9.22-14 9.22-14
R  3  +1         3.88-13 2.39-13 1.31-13 8.30-14 5.07-14 2.48-14 1.76-14 1.53-14
R  4  +1         1.60-12 7.60-13 2.95-13 1.36-13 5.69-14 1.62-14 6.70-15 3.54-15

                           .        .        .

R 43  +1         2.31-14 3.60-14 2.72-14 1.50-14 8.87-15 4.42-15 2.12-15 8.88-16
R 44  +1         3.63-14 3.95-14 2.71-14 1.55-14 1.09-14 6.42-15 3.24-15 1.42-15
  -1
  -1  -1
C-------------------------------------------------------------------------------
C
C Combined two specific ion files
C
C Target         : JETXPQ.COPMM#BE.DATA(C2#LS#C)
C Supplementary  : JETSHP.BELIKE.DATA(LDH96#C)
C
C Replace SUPPLEMENTARY level into TARGET level
```

```
C
C                     1                1
C                     2                2
C                     3                3
C                     4                4
C                     5                5
C                     6                6
C                     7                7
C                     8                8
C                     9               10
C                    10                9
C                    11               11
C                    12               12
C
C Code : JETXPQ.ATS.FORT(CADF04)
C
C        16:08  20/10/1997
C
C-----------------------------------------------------------------------------
C Update A values of following transitions from supplementary file
C
C      6   1,   8   1,  11   1,  12   1,   5   4,   6   4,   8   4,  11
C     12   4,   7   5,   8   5,  11   5,  12   5,   8   6,  11   6,  12
C     11   7,  12   7,  11   8,  12   8,  12  11,   9   2,  10   2,   9
C     10   3,  10   9,  10   4,   9   5,   9   6,   7   3,  10   7,   8
C      9   8,  11   3,  11  10,  12   2,  12   9
C
C                                                    Martin O'Mullane
C                                                    28-10-97
C-----------------------------------------------------------------------------
C Comments from target file
C-------------------------------------------------------------------------------
C
C     Generated from Cowan Atomic Structure Program
C     M O'Mullane        15:49  20/10/1997
C
C     SCF method used                     : HR
C     Scale factors for Slater Parameters  : 85 99 75 80 65
C     Optically allowed transitions        : yes
C     Optically forbidden transitions M1   : both
C     Optically forbidden transitions E2   : both
C     Born Collision-Strength  - print     :  9
C                              - forbidden :  0 -> 2
C                              - allowed   :  1 -> 1
C                              - included  : 13,all
C     Parity 1    Parity 2    Allowed
C          761         904       1330     initially
C          349         302        599     reduced
C
C-------------------------------------------------------------------------------
C Comments from supplementary file
C-----------------------------------------------------------------------------
C
C  File generated by compression of a J-resolved file
C
C  Program: ADAS209
C
C  Source file: /export/home/adas/adas/adf04/copjl#be/copjl#be_jl#c2j.dat
```

```
C
C  Original level indexing:
C     1    2    3    4    5    6    7    8    9   10
C    11   12   13   14   15   16   17   18   19   20
C  Selection Vector:
C     1    2    2    2    3    4    4    4    5    6
C     7    8    9   10   10   10   11   11   11   12
C
C  Original parent metastables:
C    (1S)
C  Parent bundling vector:
C     0
C
C
C  Producer: adas
C  Date: 05/03/96
C
C-----------------------------------------------------------------------------
C
C  Ionisation potential to (2S) modified to old (JL1990C) value.
C
C  Lorne Horton 13.3.96
C
C-----------------------------------------------------------------------------
C     Note connection to 2p (2P) parent removed following the example
C     of belike_wjd91#be.dat.
C                                         16.03.1996
C-----------------------------------------------------------------------------
C
C   RADIATIVE RECOMBINATION DATA ADDED
C
C   PROCESSED BY ADAS211 ON :
C   /home/mog/adas/adf08/rrc96#li/rrc96#li_c3ls.old
C
C                                                     Martin O'Mullane
C                                                     20-10-97
C-----------------------------------------------------------------------------
C
C     Dielectronic data is post-processed from Badnell files as follows:
C
C      /u/adas/adas/adf09/mom96#li/mom96#li_c3ls12.dat
C      /u/adas/adas/adf09/mom96#li/mom96#li_c3ls22.dat
C      /u/adas/adas/adf09/mom96#li/mom96#li_c3ls23.dat
C
C     The cross-referencing file is as follows:
C
C      /home/mog/adas/adf18/a09_a04/mom96#be/mom96#be_c2ls.dat
C
C     The parent metastable indices are as follows:
C     N.B.:  The dielectronic data from the 2P parent has been manually
C            deleted.
C
C     1.    1S2 2S1             (2)0( 0.5)
C
C     Dielectronic data added to  27 existing rad. recom. level sets
C
C                                                     Martin O'Mullane
C                                                     22-10-97
```

```
C-----------------------------------------------------------------------
```

ADF08

Provides resolved radiative recombination coefficient data. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS208

Formatted files to ADF08 specification :

Database Status Date = July, 20 1996 Data type =rrc files Data root =/.../adas/adas/adf08/

Recombining seq.	*Members*	*Library*	*Comments*	*Quality*
various		radrec	older versions	varied
bare nucl.	B, Be, C, H, He, O	rrc93##	LS resolution	high
H-like.	B, Be,C, He, O	rrc93#h	LS resolution	medium
He-like	B, Be, C, O	rrc93#he	LS resolution	medium
Li-like	B, Be, C, O	rrc93#li	LS resolution	medium
Be-like	B, C, O	rrc93#be	LS resolution	medium
B-like	C, O	rrc93#b	LS resolution	medium
C-like	O	rrc93#c	LS resolution	medium
N-like	O	rrc93#n	LS resolution	medium
Ti-like	Cr	rrc93#ti	LS resolution	medium
V-like	Cr	rrc93#v	LS resolution	medium
Zr-like	Mo	rrc93#zr	LS resolution	medium
Nb-like	Mo	rrc93#nb	LS resolution	medium

Notes:
1. In the individual data set names, the recombining ion symbol is followed by '*ls*' to indicate LS resolution.
2. For proton or deuteron recombination, the '*ls*' postfix on the dataset names is followed by '*h*' or '*l*' to denote high and low temperature ranges.

Data lines : *Format:*

seq='SEQ' nucchg=IZ0 ADFID

```
parent term indexing          bwnp= BWNP  nprnt= NPRNT
--------------------------
indp code          wnp
---- ----      ----------
for indp=1,NPRNT
          INDP  CCPI          WNPI
repeat
ls resolved term indexing     bwnr= BWNR  nlev= NLEV
-------------------------
indx code          s l   xj       wnr
---- ----          - -   --    ------------
for indx=1,NLEV
          INDX  CCI         (M)L(  WJ)          WNRI
repeat
for IPRT=1,NPRNT
          ---------------------------------------------
          prt=IP  trmprt= (TP)  spnprt= SP  nsys= NSYS
          indx  Te=     TE1       TE2       TE3      TE4       TE5       TE6
          ----  ---
          for indx=1,NLEV
                    INDX      ALT1I    ALT2I    ALT3I    ALT4I    ALT5I    ALT6I
          repeat
repeat
-----------------------------------------------------------------------
DESCRIPTIVE TEXT
```

---

variable identification :

name	*meaning*
SEQ	sequence identifier (two characters)
IZ0	nuclear charge
ADFID	ADAS data file type code (ADF08)
BWNP	binding wave number of lowest parent(cm-1)
NPRNT	number of metastable parents
INDP	index of parent
CCPI	configuration (or Eissner code therefor) for parent.
WNPI	energy of parent relative to lowest parent (cm-1)
BWNR	binding wave number of lowest resolved level (cm-1)
NLEV	number of levels in LS-resolved set
INDX	index value for level
CCI	configuration (or Eissner code therefor) for level.
M	multiplicity for level (2*S+1)
L	total orbital quantum number for level
WJ	(statist. weight - 1)/2 in LS case or J quantum number in LSJ case.
WNRI	energy of level relative to ground (cm-1)
IP	index of parent
TP	term specification of parent
SP	spin multiplicity of parent
TE1,--	electron temperatures (K)

INDX	index of level
ALT1I,--	radiative recombination coefficients for level

Table B8c - example.

```
SEQ='C '     NUCCHG= 8

   PARENT TERM INDEXING            BWNP=    624383.8   NPRNTI= 2
   --------------------
   INDP    CODE                 S L   WI        WNP
   ----    ----                 - -   --  ----------
     1     2S2 2P1             (2)1( 2.5)        0.0
     2     2S1 2P2             (4)1( 5.5)    71641.0

   LS RESOLVED TERM INDEXING       BWNR=    443086.0    NTRM= 26
   -------------------------
   INDX    CODE                 S L   WJ        WNR
   ----    ----                 - -   --  ----------
     1     2S2 2P2             (3)1( 4.0)      208.    {1}2.000 {2}1.333
     2     2S2 2P2             (1)2( 2.0)    20274.    {1}2.000
     3     2S2 2P2             (1)0( 0.0)    43186.    {1}2.000
     4     2S1 2P3             (5)0( 2.0)    60325.    {2}3.000
     5     2S1 2P3             (3)2( 7.0)   120041.    {2}2.000
     6     2S1 2P3             (3)1( 4.0)   142384.    {2}2.000
     7     2S1 2P3             (1)2( 2.0)   187052.    {X}
     8     2S1 2P3             (3)0( 1.0)   197086.    {2}2.000
     9     2S1 2P3             (1)1( 1.0)   210462.    {X}
    10     2S2 2P1 3S1         (3)1( 4.0)   267400.    {1}1.0
    11     2S2 2P1 3S1         (1)1( 1.0)   273080.    {1}1.0
    12     2P4                 (3)1( 4.0)   283867.    {X}0.0
    13     2S2 2P1 3P1         (1)1( 1.0)   290956.    {1}1.0
    14     2S2 2P1 3P1         (3)2( 7.0)   294000.    {1}1.0
    15     2S2 2P1 3P1         (3)0( 1.0)   297557.    {1}1.0
    16     2S2 2P1 3P1         (3)1( 4.0)   300320.    {1}1.0
    17     2P4                 (1)2( 2.0)   298292.    {X}0.0
    18     2S2 2P1 3P1         (1)2( 2.0)   306584.    {1}1.0
    19     2S2 2P1 3P1         (1)0( 0.0)   313801.    {1}1.0
    20     2S2 2P1 3D1         (1)2( 2.0)   324734.    {1}1.0
    21     2S2 2P1 3D1         (3)3(10.0)   324650.    {1}1.0
    22     2S2 2P1 3D1         (3)2( 7.0)   327300.    {1}1.0
    23     2S2 2P1 3D1         (3)1( 4.0)   329600.    {1}1.0
    24     2S2 2P1 3D1         (1)3( 3.0)   331820.    {1}1.0
    25     2S2 2P1 3D1         (1)1( 1.0)   332777.    {1}1.0
    26     2P4                 (1)0( 0.0)   343305.    {X}0.0


 ---------------------------------
 PRTI= 1  TRMPRT= (2P)  SPNPRT= 2

   INDX TE=  9.00D+03  1.80D+04  4.50D+04  9.00D+04  1.80D+05  4.50D+05  9.00D+05  1.80D+06
     1       1.33D-12  9.40D-13  5.90D-13  4.10D-13  2.79D-13  1.57D-13  9.39D-14  5.16D-14
     2       6.84D-13  4.83D-13  3.03D-13  2.11D-13  1.44D-13  8.09D-14  4.85D-14  2.67D-14
     3       1.24D-13  8.76D-14  5.50D-14  3.83D-14  2.61D-14  1.47D-14  8.80D-15  4.84D-15
```

```
    10       4.96D-14  3.58D-14  2.39D-14  1.80D-14  1.39D-14  1.01D-14  7.80D-15  5.71D-15
    11       1.51D-14  1.09D-14  7.29D-15  5.52D-15  4.27D-15  3.11D-15  2.41D-15  1.77D-15
    13       2.67D-14  1.92D-14  1.27D-14  9.30D-15  6.72D-15  4.08D-15  2.57D-15  1.47D-15
    14       1.29D-13  9.30D-14  6.13D-14  4.49D-14  3.24D-14  1.96D-14  1.23D-14  6.99D-15
    15       2.51D-14  1.81D-14  1.19D-14  8.69D-15  6.25D-15  3.76D-15  2.35D-15  1.33D-15
    16       7.44D-14  5.36D-14  3.51D-14  2.56D-14  1.84D-14  1.10D-14  6.81D-15  3.84D-15
    18       4.15D-14  2.98D-14  1.94D-14  1.39D-14  9.84D-15  5.77D-15  3.53D-15  1.97D-15
    19       8.54D-15  6.08D-15  3.88D-15  2.73D-15  1.88D-15  1.06D-15  6.35D-16  3.48D-16
    20       4.01D-14  2.72D-14  1.54D-14  9.46D-15  5.42D-15  2.29D-15  1.08D-15  4.74D-16
    21       1.69D-13  1.15D-13  6.51D-14  3.99D-14  2.29D-14  9.68D-15  4.58D-15  2.00D-15
    22       1.05D-13  7.05D-14  3.96D-14  2.40D-14  1.35D-14  5.60D-15  2.62D-15  1.13D-15
    23       5.43D-14  3.64D-14  2.02D-14  1.21D-14  6.68D-15  2.69D-15  1.24D-15  5.28D-16
    24       3.58D-14  2.38D-14  1.30D-14  7.63D-15  4.12D-15  1.60D-15  7.15D-16  2.99D-16
    25       1.40D-14  9.30D-15  5.03D-15  2.91D-15  1.55D-15  5.89D-16  2.58D-16  1.06D-16


 ---------------------------------
 PRTI= 2  TRMPRT= (4P)  SPNPRT= 4

   INDX TE=  9.00D+03  1.80D+04  4.50D+04  9.00D+04  1.80D+05  4.50D+05  9.00D+05  1.80D+06
     1       1.83D-13  1.31D-13  8.52D-14  6.30D-14  4.77D-14  3.42D-14  2.66D-14  1.96D-14
     4       5.80D-13  4.09D-13  2.57D-13  1.78D-13  1.21D-13  6.81D-14  4.08D-14  2.24D-14
     5       9.11D-13  6.43D-13  4.04D-13  2.81D-13  1.91D-13  1.08D-13  6.47D-14  3.55D-14
     6       4.91D-13  3.46D-13  2.17D-13  1.51D-13  1.03D-13  5.76D-14  3.45D-14  1.89D-14
     8       1.18D-13  8.30D-14  5.15D-14  3.53D-14  2.35D-14  1.29D-14  7.57D-15  4.11D-15

•
```

ADF09

Formatting conventions and variable storage are given below for transfer files from Nigel Badnell's dielectronic calculations. Data for an ion is specified by the isoelectronic sequence of the final (ie. recombined) ion and nuclear charge of the element. There are distinct blocks of data for LS-resolved low levels and bundle-n levels. The former is divided according to recombining ion metastable parents(including ground state) and the latter by both parents and recombined ion spin system. Representative bundle-n levels are used. In this organisation, recombination data is provided as a function of temperature. Up to 10 temperatures may be given with some preference for using the tmperature set Te(k)=z1**2*theta(k) where z1 is the recombining ion charge and theta=1.0d3,2.0d3,5.0d3,1.0d4,2.0d4,5.0d4,1.0d5,2.0d5,5.0d5,1.0d6. The secondary Auger rate coefficient associated with metastable parent change is required.

Utilising subroutines :

ADAS204 ADAS208

Formatted files to ADF09 specification :

Database Status Date = October 28, 1997 Data type =drc files Data root =/.../adas/adas/adf09/

Recombining seq.	*Members*	*Library*	*n-n'*	*Comments*	*Quality*	
H-like.	Ar,B,Be,C,Fe,He,Li, Mg,O,Sn,Y,	nrb93#h	1-2	LS resolution		medium
He-like	Ar,B,Be,C,Fe,Li,Mg, O,Sn,Y	nrb93#he	1-2, 2-2	LS resolution		medium
Li-like	Ar,B,Be,C,Fe,Mg, O,Sn,Y	nrb93#li	1-2, 2-2, 2-3	LS resolution		medium
Be-like	Ar,B,C,Fe,Mg, O,Sn,Y	nrb93#be	2-2, 2-3	LS resolution		medium
B-like	Ar,C,Fe,Mg, O,Sn,Y	nrb93#b	2-2, 2-3	LS resolution	medium	
C-like	Ar, Fe,Mg,O,Y	nrb93#c	2-2, 2-3	LS resolution		medium
N-like	Ar,Fe,Mg,O,Y	nrb93#n	2-2, 2-3	LS resolution		medium
O-like	Ar,Fe,Mg,Y	nrb93#o	2-2, 2-3	LS resolutiio	medium	
F-like	Ar,Fe,Mg,Y	nrb93#f	2-2, 2-3	LS resolution		medium
Ne-like	Ar,Fe,Mg,Y	nrb93#ne	2-3	LS resolution		medium
H-like.	C, N, Ne	mom96#h	1-2	LS resolution		medium

He-like	C, N, Ne	mom96#he	1-2, 2-2	LS resolution		medium
Li-like	C, N, Ne	mom96#li	1-2, 2-2, 2-3	LS resolution		medium
Be-like	C, N, Ne	mom96#be	2-2, 2-3	LS resolution		medium
B-like	C, N, O, Ne	mom96#b	2-2, 2-3	LS resolution		medium
C-like	N, O, Ne	mom96#c	2-2, 2-3	LS resolution		medium
N-like	O, Ne	mom96#n	2-2, 2-3	LS resolution		medium
O-like	Ne, Mg	mom96#o	2-2, 2-3	LS resolutiio	medium	
F-like	Ne, Mg	mom96#f	2-2, 2-3	LS resolution		medium

Notes: 1. The 'mom96' data includes some overlaps with the 'nrb93' data. These were created to review and verify tho older data.

Data lines : *Format:*

```
seq='SEQ'   nucchg=IZ0                                  ADFID
parent term indexing         bwnp= BWNP  nprnt= NPRNT
--------------------------
indp code          wnp
---- ----      ----------
for indp=1,NPRNT
            INDP  CCPI          WNPI
repeat
ls resolved term indexing     bwnr= BWNR  nlev= NLEV
-------------------------
indx code           s l   xj        wnr
---- ----          - -   --    ------------
for indx=1,NLEV
```

```
          INDX  CCI         (M)L(  WJ)          WNRI
repeat
n-shell indexing & Auger rates            nrep= NREP
------------------------------
irep   n  m'-m = TRNS1     TRNS2     TRNS3
----   -  ------
for irep=1,NREP
          IREP   NR       AA21I     AA31I     AA32I
repeat
for IPRT=1,NPRNT
          ---------------------------------------------
          prt=IP  trmprt= (TP)  spnprt= SP  nsys= NSYS
          indx  Te=     TE1       TE2       TE3       TE4       TE5       TE6
          ----  ---
          for indx=1,NLEV
                    INDX      ALT1I    ALT2I    ALT3I    ALT4I    ALT5I    ALT6I
          repeat
          for isys=1,NSYS
                     ----------------------
                    sys= IS  spnsys= SS
                     irep
                     ----
                    for irep=1,NREP
                              IREP    ANT1I  ANT2I  ANT3I  ANT4I  ANT5I  ANT6I
                    repeat
```

repeat

repeat

DESCRIPTIVE TEXT

---

variable identification :

name	*meaning*
SEQ	sequence identifier (two characters)
IZ0	nuclear charge
ADFID	ADAS data file type code (ADF09)
BWNP	binding wave number of lowest parent(cm-1)
NPRNT	number of metastable parents
INDP	index of parent
CCPI	configuration (or Eissner code therefor) for parent.
WNPI	energy of parent relative to lowest parent (cm-1)
BWNR	binding wave number of lowest resolved level (cm-1)
NLEV	number of levels in LS-resolved set
INDX	index value for level
CCI	configuration (or Eissner code therefor) for level.
M	multiplicity for level (2*S+1)
L	total orbital quantum number for level
WJ	(statist. weight - 1)/2 in LS case or J quantum number in LSJ case.
WNRI	energy of level relative to ground (cm-1)

NREP	number of representative n-shells
TRNS1,--	specifies metastable to metastable secondary Auger path written as m'-m where m' and m are metastable parent indices.
IREP	index of representative n-shells
NR	principal quantum number
AA21I,--	Auger rate coefficients (sec-1)
IP	index of parent
TP	term specification of parent
SP	spin multiplicity of parent
NSYS	number of spin systems associated with recombination stating with this parent (1 or 2)
TE1,--	electron temperatures (K)
INDX	index of level
ALT1I,--	dielectronic coefficients for level
IS	index of spin system
SS	spin multiplicity of spin system
IREP	index of representative n-shell
ANT1I,--	dielectronic coefficients for n-shell

Table B9c - example.

```
SEQ='HE'     NUCCHG=18

  PARENT TERM INDEXING            BWNP=  35554796.2   NPRNTI= 1   NPRNTF= 1
  --------------------
  INDP    CODE                S L   WI         WNP
  ----    ----                - -   --   ----------
    1     1S1                (2)0( 0.5)         0.0
```

LS RESOLVED TERM INDEXING BWNR= 43705714.3 NTRM= 58

INDX	CODE	S	L	WJ	WNR
1	1S1 2S1	(3)	0	(1.0)	0.0
2	1S1 2P1	(3)	1	(4.0)	146281.7
3	1S1 2S1	(1)	0	(0.0)	167385.9
4	1S1 2P1	(1)	1	(1.0)	275729.5
5	1S1 3S1	(3)	0	(1.0)	4563528.2
55	1S1 8G1	(1)	4	(4.0)	7650835.2
56	1S1 8F1	(1)	3	(3.0)	7650836.9
57	1S1 8D1	(1)	2	(2.0)	7650879.5
58	1S1 8P1	(1)	1	(1.0)	7651271.0

N-SHELL INDEXING & AUGER RATES NREP= 42

IREP	N
1	1
2	2
3	3
4	4
5	5
.	.
40	700
41	811
42	999

PRTI= 1 TRMPRT= (2S) SPNPRT= 2

INDX	TE= 2.89E+05	5.78E+05	1.44E+06	2.89E+06	5.78E+06	1.45E+07	2.89E+07	5.78E+07	1.44E+08	2.89E+08
1	0.00E+00	3.99E-31	7.48E-20	2.41E-16	8.24E-15	3.30E-14	2.94E-14	1.66E-14	5.54E-15	2.15E-15
2	0.00E+00	1.49E-37	3.78E-23	1.40E-18	1.65E-16	1.38E-15	1.57E-15	9.96E-16	3.58E-16	1.42E-16
3	0.00E+00	3.08E-31	8.11E-20	2.92E-16	1.06E-14	4.36E-14	3.93E-14	2.22E-14	7.44E-15	2.89E-15
4	0.00E+00	1.20E-30	2.98E-19	1.06E-15	3.80E-14	1.57E-13	1.42E-13	8.03E-14	2.69E-14	1.05E-14
5	0.00E+00	1.10E-36	2.41E-22	8.11E-18	8.86E-16	6.99E-15	7.78E-15	4.88E-15	1.74E-15	6.90E-16
.	.	.	.							
54	0.00E+00	4.13E-42	9.87E-26	1.59E-20	3.79E-18	4.78E-17	6.22E-17	4.22E-17	1.58E-17	6.36E-18
55	0.00E+00	7.77E-43	1.86E-26	2.99E-21	7.14E-19	9.01E-18	1.17E-17	7.95E-18	2.97E-18	1.20E-18
56	0.00E+00	1.09E-40	2.61E-24	4.20E-19	1.00E-16	1.26E-15	1.64E-15	1.12E-15	4.17E-16	1.68E-16
57	0.00E+00	1.78E-40	4.26E-24	6.87E-19	1.64E-16	2.07E-15	2.69E-15	1.82E-15	6.82E-16	2.75E-16
58	0.00E+00	3.49E-40	8.31E-24	1.34E-18	3.19E-16	4.01E-15	5.22E-15	3.54E-15	1.32E-15	5.33E-16

PRTF= 1 TRMPRT= (2S) SPNPRT= 2 NSYS= 2

									SYS= 1	SPNSYS= 1
IREP										
2	0.00E+00	1.51E-30	3.79E-19	1.35E-15	4.86E-14	2.01E-13	1.81E-13	1.02E-13	3.44E-14	1.34E-14
3	0.00E+00	1.02E-35	2.62E-21	9.33E-17	1.05E-14	8.39E-14	9.38E-14	5.90E-14	2.11E-14	8.37E-15
4	0.00E+00	1.52E-37	3.92E-22	3.00E-17	4.94E-15	4.99E-14	6.03E-14	3.94E-14	1.44E-14	5.76E-15
5	0.00E+00	1.64E-38	1.23E-22	1.35E-17	2.65E-15	2.98E-14	3.72E-14	2.48E-14	9.16E-15	3.67E-15
	.	.	.							
39	0.00E+00	7.64E-46	3.83E-29	7.89E-24	2.13E-21	2.89E-20	3.85E-20	2.65E-20	9.97E-21	4.03E-21
40	0.00E+00	3.41E-46	1.71E-29	3.52E-24	9.50E-22	1.29E-20	1.72E-20	1.18E-20	4.45E-21	1.80E-21
41	0.00E+00	2.19E-46	1.10E-29	2.26E-24	6.11E-22	8.30E-21	1.11E-20	7.60E-21	2.86E-21	1.16E-21
42	0.00E+00	1.17E-46	5.88E-30	1.21E-24	3.27E-22	4.44E-21	5.92E-21	4.06E-21	1.53E-21	6.18E-22

									SYS= 2	SPNSYS= 3
IREP										
2	0.00E+00	3.99E-31	7.48E-20	2.42E-16	8.41E-15	3.44E-14	3.10E-14	1.76E-14	5.90E-15	2.29E-15
3	0.00E+00	4.04E-36	9.41E-22	3.24E-17	3.57E-15	2.83E-14	3.16E-14	1.98E-14	7.09E-15	2.81E-15
4	0.00E+00	4.64E-38	1.16E-22	8.80E-18	1.44E-15	1.45E-14	1.75E-14	1.14E-14	4.18E-15	1.67E-15
5	0.00E+00	4.44E-39	3.29E-23	3.58E-18	7.03E-16	7.88E-15	9.86E-15	6.56E-15	2.42E-15	9.73E-16
	.	.	.							
39	0.00E+00	1.80E-46	9.03E-30	1.86E-24	5.02E-22	6.82E-21	9.09E-21	6.24E-21	2.35E-21	9.49E-22
40	0.00E+00	8.04E-47	4.03E-30	8.30E-25	2.24E-22	3.04E-21	4.06E-21	2.79E-21	1.05E-21	4.24E-22
41	0.00E+00	5.17E-47	2.59E-30	5.34E-25	1.44E-22	1.96E-21	2.61E-21	1.79E-21	6.75E-22	2.73E-22
42	0.00E+00	2.77E-47	1.39E-30	2.86E-25	7.71E-23	1.05E-21	1.40E-21	9.59E-22	3.61E-22	1.46E-22

ADF10

Isoelectronic master file data. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS404

Formatted files to ADF10 specification :

Database Status | Date = July, 30 1996 | Data type = isoelectronic master files | Data root = /.../adas/adas/adf10/

Classes	*Sequence*	*Directory*	*z1 range*	*Comments*	*Resolution*	*Quality*
acd, scd	al,ar,b,be,c,cl,f,h,he, li,mg,n,na,ne,o,p,s,si	<class>74	2-19	Summers, c-r	unresolved	medium
acd, scd, xcd, qcd, prb, plt	h,he,li,be,b,c,n,o	<class>93	1-8	ADAS208, c-r	LS	medium
acd, scd	v, cr, nb, mo	<class>93	0-1	ADAS208, c-r	LS	medium

Notes:
1. Summers denotes Summers (1974) Appleton Laboratory Report IM3657.
2. c-r denotes collisional radiative data with density dependence.
3. LS resolved datasets have the notation <seq><metp><met>.dat where <seq> denotes the isoelectronic sequence, <metp> denotes the recombining ion (parent) metastable index and <met> denotes the recombined ion metastable index.

Data lines : *Format:*

Partial file - class 1-7

IPRT, TRMPRT, SPNPRT, NCTPRT, IGRD, SPNSYS, SSYWT

IZE, ITE, IDE [, CPOT]

(ZIPT(IZ),IZ=1,IZE)

[(EIA(I),I=1,IPOT)] class 2 only

(DENSR(ID),ID=1,IDE)

(TR(IT),IT=1,ITE)

for IZ=1,IZE

IPRT, IGRD, IZ1, DATE

for IT=1,ITE

(AIPT(ID,IT,IZ), ID=1,IDE)

repeat

repeat

Standard file

IZE, ITE, IDE [, CPOT]

(ZIPT(IZ),IZ=1,IZE)

[(EIA(I),I=1,IPOT)] classes 2, 8 & 9 only

(DENSR(ID),ID=1,IDE)

(TR(IT),IT=1,ITE)

for IZ=1,IZE

IZ1, DATE

for IT=1,ITE

(AIPT(ID,IT,IZ), ID=1,IDE)

repeat

repeat

Partial file - class 8-9

NMET

(IORD(I),I=1,NMET)

(DESIG(I),I=1,NMET)

```
        (CPIND(I),I=1,NMET)
        (PRTREF(I),I=1,NMET)
        (SPNREF(I),I=1,NMET)
        IZE, ITE, IDE [, CPOT]
        (ZIPT(IZ),IZ=1,IZE)
[       (EIA(I),I=1,IPOT)          ]        classes 8 & 9 only
        (DENSR(ID),ID=1,IDE)
        (TR(IT),IT=1,ITE)
        for IZ=1,IZE
                for I=1,NMET
                        IMET
                        for IT=1,ITE
                                (AIPT(ID,IT,IZ), ID=1,IDE)
                        repeat
                repeat
        repeat
```

variable identification :

name	*meaning*
IPRT	index of parent metastable
TRMPRT	parent term
SPNPRT	parent spin (multiplicity)
NCTPRT	n-shell cut-off for parent based levels
IGRD	index of recombined ion metastable
SPNSYS	spin system (multiplicity)

SSYWT	spin system fractional weighting factor
NMET	number of metastables
IORD()	order of listing fro metastables
DESIG()	designation of metastables
CPIND()	specific ion file index referencing for metastables
PRTREF()	parent reference (unset)
SPNREF()	parent spin reference (unset)
IZE	number of sequence members
ITE	number of temperatures
IDE	number of densities
CPOT	number of ionisation potentials given for sequence
ZIPT()	recombining ion charges
EIA()	ionisation potentials (cm-1)
DENSR()	z-scaled (reduced) densities (cm-3)
TR()	z-scaled (reduced) temperatures (K)
IZ1	recombining ion charge
DATE	date
IMET	metastable index
AIPT(,,)	generalised collisional radiative coefficients (units according to class)

Table B10c - partial file - class 2

```
================================================================================
IPRT= 1  TRMPRT=(2S)  SPNPRT= 2.  NCTPRT=1000  IGRD= 1  SPNSYS= 1.  SSYSWT= 0.25
--------------------------------------------------------------------------------
    3   11    8   50
   1.00000   3.00000   5.00000
--------------------------------------------------------------------------------
     75192.1    202887.4    386241.0    624866.0    918657.0   1267622.0
   1671792.0   2130800.0   2647400.0   3221080.0   3839800.0   4520100.0
   5255900.0   6047200.0   6894200.0   7810000.0   8770000.0   9780000.0
  10860000.0  11990000.0  13180000.0  14420000.0  15730000.0  17090000.0
  18510000.0  19830000.0  21350000.0  22900000.0  24530000.0  26200000.0
  27930000.0  29710000.0  31550000.0  33496000.0  35544000.0  37693000.0
  39943000.0  42290000.0  44730000.0  47258000.0  49867000.0  52547000.0
  55286000.0  58073000.0  60890000.0  63721000.0  66546000.0  69241000.0
  72081000.0  74740000.0
--------------------------------------------------------------------------------
  1.00D-03  1.00D+00  1.00D+03  1.00D+06  1.00D+09  1.00D+12  1.00D+15  1.00D+18
  1.00D+03  2.00D+03  5.00D+03  1.00D+04  2.00D+04  5.00D+04  1.00D+05  2.00D+05
  5.00D+05  1.00D+06  2.00D+06
------------------------------/ IPRT= 1  / IGRD= 1  / Z1= 1   / DATE=05/03/93
  1.96D-55  1.96D-55  1.96D-55  2.19D-55  1.30D-53  4.51D-49  8.59D-46  1.31D-45
  6.10D-32  6.10D-32  6.10D-32  6.57D-32  1.15D-31  1.28D-29  1.36D-26  2.38D-26
  7.59D-18  7.59D-18  7.60D-18  7.95D-18  1.15D-17  5.05D-17  6.97D-15  1.26D-14
  3.79D-13  3.79D-13  3.79D-13  3.91D-13  5.18D-13  1.50D-12  3.52D-11  6.00D-11
  1.22D-10  1.22D-10  1.22D-10  1.23D-10  1.44D-10  2.86D-10  2.30D-09  3.96D-09
  5.89D-09  5.89D-09  5.89D-09  5.92D-09  6.27D-09  8.74D-09  3.59D-08  5.64D-08
  2.44D-08  2.44D-08  2.44D-08  2.44D-08  2.51D-08  3.09D-08  1.07D-07  1.52D-07
  5.34D-08  5.34D-08  5.34D-08  5.35D-08  5.44D-08  6.24D-08  1.97D-07  2.62D-07
  8.71D-08  8.71D-08  8.71D-08  8.72D-08  8.80D-08  9.58D-08  2.79D-07  3.60D-07
  9.96D-08  9.96D-08  9.96D-08  9.97D-08  1.00D-07  1.07D-07  2.84D-07  3.69D-07
  1.01D-07  1.01D-07  1.01D-07  1.01D-07  1.01D-07  1.06D-07  2.68D-07  3.54D-07
------------------------------/ IPRT= 1  / IGRD= 1  / Z1= 3   / DATE=07/03/93
  3.43D-36  3.43D-36  3.44D-36  3.89D-36  1.10D-35  1.06D-31  2.88D-29  2.94D-29
  1.00D-22  1.00D-22  1.01D-22  1.08D-22  1.93D-22  2.57D-20  6.77D-18  6.99D-18
  1.68D-14  1.68D-14  1.68D-14  1.73D-14  2.23D-14  1.68D-13  2.10D-11  2.21D-11
  1.07D-11  1.07D-11  1.07D-11  1.09D-11  1.26D-11  3.82D-11  1.62D-09  1.69D-09
  3.06D-10  3.06D-10  3.06D-10  3.08D-10  3.33D-10  6.66D-10  1.07D-08  1.10D-08
  2.53D-09  2.53D-09  2.53D-09  2.54D-09  2.64D-09  4.07D-09  3.11D-08  3.17D-08
  5.29D-09  5.29D-09  5.29D-09  5.30D-09  5.44D-09  7.53D-09  4.31D-08  4.38D-08
  7.57D-09  7.57D-09  7.57D-09  7.58D-09  7.72D-09  9.93D-09  4.74D-08  4.81D-08
  8.84D-09  8.84D-09  8.84D-09  8.84D-09  8.95D-09  1.08D-08  4.54D-08  4.61D-08
  8.65D-09  8.65D-09  8.65D-09  8.65D-09  8.74D-09  1.02D-08  4.11D-08  4.18D-08
  7.81D-09  7.81D-09  7.81D-09  7.82D-09  7.88D-09  8.96D-09  3.60D-08  3.67D-08
------------------------------/ IPRT= 1  / IGRD= 1  / Z1= 5   / DATE=16/03/93
  6.65D-33  6.65D-33  6.66D-33  7.78D-33  2.53D-32  6.93D-29  7.77D-27  7.94D-27
  2.78D-21  2.78D-21  2.78D-21  3.00D-21  5.48D-21  5.25D-19  6.26D-17  6.49D-17
  3.24D-14  3.24D-14  3.24D-14  3.33D-14  4.32D-14  4.35D-13  1.87D-11  1.94D-11
  8.42D-12  8.42D-12  8.42D-12  8.54D-12  9.85D-12  4.92D-11  7.80D-10  7.97D-10
  1.49D-10  1.49D-10  1.49D-10  1.50D-10  1.63D-10  5.76D-10  4.50D-09  4.56D-09
  9.00D-10  9.00D-10  9.00D-10  9.03D-10  9.43D-10  2.56D-09  1.22D-08  1.23D-08
  1.66D-09  1.66D-09  1.66D-09  1.67D-09  1.72D-09  4.02D-09  1.60D-08  1.61D-08
  2.21D-09  2.21D-09  2.21D-09  2.22D-09  2.26D-09  4.69D-09  1.69D-08  1.70D-08
  2.45D-09  2.45D-09  2.45D-09  2.45D-09  2.49D-09  4.48D-09  1.55D-08  1.56D-08
  2.34D-09  2.34D-09  2.34D-09  2.34D-09  2.37D-09  3.91D-09  1.38D-08  1.39D-08
```

```
  2.10D-09  2.10D-09  2.10D-09  2.10D-09  2.13D-09  3.23D-09  1.19D-08  1.20D-08
```

Table B10e - partial file - class 8

```
================================================================================
NMET         = 2
ORDER        =             1            2
DESIGNATION  =  2S2(1S)      2S2P(3P)
COPDAT INDEX =             1            2
PARENT REF.  =             *            *
SPNSYS REF.  =             *            *
--------------------------------------------------------------------------------
    3   11    8
   1.00000   3.00000   5.00000
--------------------------------------------------------------------------------
--------------------------------------------------------------------------------
  1.00D-03  1.00D+00  1.00D+03  1.00D+06  1.00D+09  1.00D+12  1.00D+15  1.00D+18
  1.00D+03  2.00D+03  5.00D+03  1.00D+04  2.00D+04  5.00D+04  1.00D+05  2.00D+05
  5.00D+05  1.00D+06  2.00D+06
------------------ TOTAL LINE POWER ------------------/ Z1= 1   / DATE= 05/03/93
/1/
  4.00D-45  4.00D-45  4.00D-45  4.00D-45  4.00D-45  3.99D-45  1.63D-45  2.76D-48
  6.76D-32  6.76D-32  6.76D-32  6.76D-32  6.76D-32  6.75D-32  3.42D-32  6.90D-35
  5.35D-24  5.35D-24  5.35D-24  5.35D-24  5.35D-24  5.35D-24  3.31D-24  8.77D-27
  2.46D-21  2.46D-21  2.46D-21  2.46D-21  2.46D-21  2.45D-21  1.50D-21  4.48D-24
  6.79D-20  6.79D-20  6.79D-20  6.79D-20  6.78D-20  6.67D-20  3.57D-20  1.00D-22
  6.51D-19  6.51D-19  6.51D-19  6.50D-19  6.48D-19  6.29D-19  2.74D-19  6.10D-22
  1.56D-18  1.56D-18  1.56D-18  1.56D-18  1.56D-18  1.51D-18  5.43D-19  1.00D-21
  2.50D-18  2.50D-18  2.50D-18  2.50D-18  2.49D-18  2.42D-18  7.47D-19  1.22D-21
  3.21D-18  3.21D-18  3.21D-18  3.21D-18  3.21D-18  3.13D-18  9.22D-19  1.42D-21
  3.16D-18  3.16D-18  3.16D-18  3.16D-18  3.16D-18  3.10D-18  9.68D-19  1.52D-21
  2.96D-18  2.96D-18  2.96D-18  2.96D-18  2.95D-18  2.91D-18  9.89D-19  1.61D-21
/2/
  1.34D-11  1.34D-14  1.34D-17  1.34D-20  1.34D-23  1.34D-26  1.35D-29  1.36D-32
  1.34D-11  1.34D-14  1.34D-17  1.34D-20  1.39D-23  5.18D-25  2.55D-25  5.15D-28
  1.34D-11  1.34D-14  1.34D-17  1.56D-20  2.24D-21  2.22D-21  1.36D-21  3.66D-24
  1.34D-11  1.34D-14  1.34D-17  5.10D-20  3.76D-20  3.74D-20  2.10D-20  7.38D-23
  1.34D-11  1.34D-14  1.36D-17  1.93D-19  1.79D-19  1.74D-19  7.55D-20  3.64D-22
  1.34D-11  1.34D-14  1.40D-17  5.88D-19  5.71D-19  5.36D-19  1.92D-19  8.78D-22
  1.34D-11  1.34D-14  1.44D-17  1.05D-18  1.03D-18  9.68D-19  3.42D-19  1.16D-21
  1.34D-11  1.34D-14  1.49D-17  1.51D-18  1.49D-18  1.40D-18  4.90D-19  1.35D-21
  1.34D-11  1.34D-14  1.53D-17  1.88D-18  1.86D-18  1.78D-18  6.14D-19  1.49D-21
  1.34D-11  1.34D-14  1.52D-17  1.78D-18  1.76D-18  1.69D-18  5.96D-19  1.48D-21
  1.34D-11  1.34D-14  1.50D-17  1.59D-18  1.57D-18  1.52D-18  5.56D-19  1.46D-21
------------------ TOTAL LINE POWER ------------------/ Z1= 3   / DATE= 05/03/93
/1/
  5.43D-25  5.43D-25  5.43D-25  5.43D-25  5.43D-25  4.23D-25  1.91D-27  1.92D-30
  1.42D-21  1.42D-21  1.42D-21  1.42D-21  1.42D-21  1.18D-21  6.79D-24  6.82D-27
  1.34D-19  1.34D-19  1.34D-19  1.34D-19  1.34D-19  1.19D-19  1.09D-21  1.11D-24
  5.67D-19  5.67D-19  5.67D-19  5.67D-19  5.67D-19  5.28D-19  8.95D-21  9.17D-24
  1.14D-18  1.14D-18  1.14D-18  1.14D-18  1.14D-18  1.11D-18  2.48D-20  2.54D-23
  1.67D-18  1.67D-18  1.67D-18  1.67D-18  1.67D-18  1.65D-18  4.02D-20  4.10D-23
  1.76D-18  1.76D-18  1.76D-18  1.76D-18  1.75D-18  1.75D-18  4.42D-20  4.49D-23
  1.63D-18  1.63D-18  1.63D-18  1.63D-18  1.62D-18  1.62D-18  4.42D-20  4.49D-23
```

```
  1.36D-18  1.36D-18  1.36D-18  1.36D-18  1.36D-18  1.36D-18  4.33D-20  4.42D-23
  1.16D-18  1.16D-18  1.16D-18  1.16D-18  1.16D-18  1.16D-18  4.35D-20  4.45D-23
  9.88D-19  9.88D-19  9.88D-19  9.88D-19  9.87D-19  9.93D-19  4.45D-20  4.57D-23
/2/
  1.52D-10  1.52D-13  1.52D-16  1.53D-19  3.64D-22  1.65D-22  7.44D-25  7.47D-28
  1.52D-10  1.52D-13  1.52D-16  1.63D-19  1.11D-20  9.04D-21  5.23D-23  5.26D-26
  1.52D-10  1.52D-13  1.53D-16  3.19D-19  1.66D-19  1.46D-19  1.45D-21  1.47D-24
  1.52D-10  1.52D-13  1.53D-16  6.10D-19  4.58D-19  4.19D-19  7.37D-21  7.57D-24
  1.52D-10  1.52D-13  1.53D-16  9.46D-19  7.93D-19  7.37D-19  1.54D-20  1.58D-23
  1.52D-10  1.52D-13  1.53D-16  1.24D-18  1.08D-18  1.00D-18  2.09D-20  2.13D-23
  1.52D-10  1.52D-13  1.53D-16  1.29D-18  1.13D-18  1.04D-18  2.21D-20  2.26D-23
  1.52D-10  1.52D-13  1.53D-16  1.22D-18  1.07D-18  9.83D-19  2.22D-20  2.27D-23
  1.52D-10  1.52D-13  1.53D-16  1.07D-18  9.16D-19  8.52D-19  2.24D-20  2.29D-23
  1.52D-10  1.52D-13  1.53D-16  9.54D-19  8.00D-19  7.50D-19  2.28D-20  2.34D-23
  1.52D-10  1.52D-13  1.53D-16  8.47D-19  6.93D-19  6.56D-19  2.34D-20  2.43D-23
------------------ TOTAL LINE POWER ------------------/ Z1= 5   / DATE= 16/03/93
/1/
  5.03D-22  5.03D-22  5.03D-22  5.03D-22  5.02D-22  1.59D-22  2.32D-25  2.32D-28
  3.55D-20  3.55D-20  3.55D-20  3.55D-20  3.54D-20  1.40D-20  2.30D-23  2.30D-26
  3.76D-19  3.76D-19  3.76D-19  3.76D-19  3.76D-19  2.02D-19  5.47D-22  5.53D-25
  7.54D-19  7.54D-19  7.54D-19  7.54D-19  7.53D-19  5.26D-19  3.36D-21  3.41D-24
  1.05D-18  1.05D-18  1.05D-18  1.05D-18  1.04D-18  9.05D-19  8.61D-21  8.73D-24
  1.18D-18  1.18D-18  1.18D-18  1.17D-18  1.17D-18  1.17D-18  1.28D-20  1.29D-23
  1.11D-18  1.11D-18  1.11D-18  1.11D-18  1.11D-18  1.15D-18  1.31D-20  1.33D-23
  9.77D-19  9.77D-19  9.77D-19  9.77D-19  9.75D-19  1.03D-18  1.26D-20  1.27D-23
  7.92D-19  7.92D-19  7.92D-19  7.92D-19  7.91D-19  8.49D-19  1.22D-20  1.23D-23
  6.69D-19  6.69D-19  6.69D-19  6.69D-19  6.68D-19  7.25D-19  1.24D-20  1.26D-23
  5.65D-19  5.65D-19  5.65D-19  5.65D-19  5.64D-19  6.18D-19  1.30D-20  1.32D-23
/2/
  1.51D-10  1.51D-13  1.51D-16  1.56D-19  5.01D-21  1.49D-21  2.15D-24  2.16D-27
  1.51D-10  1.51D-13  1.51D-16  2.09D-19  5.79D-20  2.09D-20  3.31D-23  3.31D-26
  1.51D-10  1.51D-13  1.51D-16  4.26D-19  2.75D-19  1.28D-19  4.66D-22  4.75D-25
  1.51D-10  1.51D-13  1.52D-16  6.20D-19  4.69D-19  2.78D-19  2.40D-21  2.46D-24
  1.51D-10  1.51D-13  1.52D-16  7.96D-19  6.44D-19  4.49D-19  4.76D-21  4.84D-24
  1.51D-10  1.51D-13  1.52D-16  9.19D-19  7.64D-19  5.81D-19  6.39D-21  6.49D-24
  1.51D-10  1.51D-13  1.52D-16  9.09D-19  7.54D-19  5.89D-19  6.63D-21  6.73D-24
  1.51D-10  1.51D-13  1.52D-16  8.48D-19  6.93D-19  5.53D-19  6.67D-21  6.77D-24
  1.51D-10  1.51D-13  1.52D-16  7.41D-19  5.88D-19  4.84D-19  6.84D-21  6.96D-24
  1.51D-10  1.51D-13  1.52D-16  6.62D-19  5.09D-19  4.30D-19  7.14D-21  7.29D-24
  1.51D-10  1.51D-13  1.52D-16  5.90D-19  4.37D-19  3.79D-19  7.59D-21  7.79D-24
•
```

Table B10e - standard file

```
    5   10    8   50
   2.00000   3.00000   5.00000   9.00000  19.00000
--------------------------------------------------------------------------------
    198305.0    610079.0   1240815.0   2091618.0   3162477.0   4453397.0
   5964387.0   7695434.0   9646532.0  11817690.0  14208910.0  16820190.0
  19651550.0  22702940.0  25974410.0  29465950.0  33177500.0  37109150.0
  41260860.0  45632640.0  50224460.0  55036330.0  60068320.0  65320270.0
  70792410.0  76484540.0  82396700.0  88528940.0  94881210.0 101453600.0
 108246006.6 115258471.7 122490993.6 129943572.2 137616207.7 145508899.9
 153621648.9 161954454.8 170507317.4 179280236.8 188273213.1 197486246.1
 206919335.9 216572482.5 226445685.9 236538946.1 246852263.1 257385636.9
 268139067.4 279112554.8
```

```
------------------------------------------------------------------------------
  1.00D-03  1.00D+00  1.00D+03  1.00D+06  1.00D+09  1.00D+12  1.00D+15  1.00D+18
  5.00D+03  1.00D+04  2.00D+04  5.00D+04  1.00D+05  2.00D+05  5.00D+05  1.00D+06
  2.00D+06  5.00D+06
-----------------------------------------------------/ Z = 2   / DATE= ??.??.1974
  7.85D-29  7.85D-29  7.87D-29  7.99D-29  8.87D-29  2.40D-28  8.50D-26  1.02D-24
  4.01D-19  4.01D-19  4.01D-19  4.04D-19  4.25D-19  6.81D-19  4.16D-17  1.63D-16
  3.47D-14  3.49D-14  3.49D-14  3.49D-14  3.57D-14  4.48D-14  5.91D-13  1.15D-12
  4.06D-11  4.06D-11  4.06D-11  4.07D-11  4.11D-11  4.51D-11  1.63D-10  2.22D-10
  4.88D-10  4.88D-10  4.88D-10  4.88D-10  4.90D-10  5.16D-10  1.11D-09  1.35D-09
  1.81D-09  1.81D-09  1.81D-09  1.81D-09  1.81D-09  1.87D-09  3.09D-09  3.54D-09
  4.09D-09  4.09D-09  4.09D-09  4.09D-09  4.10D-09  4.18D-09  5.86D-09  6.51D-09
  5.27D-09  5.27D-09  5.27D-09  5.27D-09  5.28D-09  5.36D-09  7.02D-09  7.72D-09
  5.66D-09  5.66D-09  5.66D-09  5.66D-09  5.67D-09  5.74D-09  7.22D-09  7.95D-09
  5.24D-09  5.24D-09  5.24D-09  5.24D-09  5.25D-09  5.31D-09  6.44D-09  7.14D-09
-----------------------------------------------------/ Z = 3   / DATE= ??.??.1974
  2.03D-27  2.03D-27  2.04D-27  2.07D-27  2.30D-27  6.72D-27  2.88D-24  2.30D-23
  1.26D-18  1.26D-18  1.26D-18  1.27D-18  1.33D-18  2.24D-18  1.72D-16  6.19D-16
  3.78D-14  3.78D-14  3.78D-14  3.80D-14  3.89D-14  5.03D-14  8.42D-13  1.62D-12
  2.31D-11  2.31D-11  2.31D-11  2.31D-11  2.33D-11  2.59D-11  1.15D-10  1.59D-10
  2.19D-10  2.19D-10  2.19D-10  2.20D-10  2.20D-10  2.34D-10  5.97D-10  7.37D-10
  7.16D-10  7.16D-10  7.16D-10  7.16D-10  7.20D-10  7.46D-10  1.39D-09  1.62D-09
  1.48D-09  1.48D-09  1.48D-09  1.48D-09  1.48D-09  1.51D-09  2.32D-09  2.62D-09
  1.83D-09  1.83D-09  1.83D-09  1.83D-09  1.83D-09  1.86D-09  2.62D-09  2.94D-09
  1.91D-09  1.91D-09  1.91D-09  1.91D-09  1.92D-09  1.95D-09  2.61D-09  2.93D-09
  1.73D-09  1.73D-09  1.73D-09  1.73D-09  1.73D-09  1.76D-09  2.25D-09  2.56D-09
-----------------------------------------------------/ Z = 5   / DATE= ??.??.1974
  1.44D-26  1.44D-26  1.45D-26  1.47D-26  1.63D-26  5.11D-26  2.28D-23  1.38D-22
  1.73D-18  1.73D-18  1.73D-18  1.74D-18  1.83D-18  3.21D-18  2.69D-16  8.93D-16
  2.28D-14  2.28D-14  2.29D-14  2.29D-14  2.34D-14  3.09D-14  5.93D-13  1.12D-12
  8.35D-12  8.35D-12  8.35D-12  8.37D-12  8.45D-12  9.50D-12  4.86D-11  6.72D-11
  6.63D-11  6.63D-11  6.63D-11  6.64D-11  6.67D-11  7.13D-11  2.07D-10  2.58D-10
  1.96D-10  1.96D-10  1.96D-10  1.96D-10  1.96D-10  2.04D-10  4.31D-10  5.11D-10
  3.76D-10  3.76D-10  3.76D-10  3.76D-10  3.77D-10  3.87D-10  6.48D-10  7.44D-10
  4.49D-10  4.49D-10  4.49D-10  4.49D-10  4.50D-10  4.60D-10  6.99D-10  7.99D-10
  4.60D-10  4.60D-10  4.60D-10  4.60D-10  4.61D-10  4.70D-10  6.73D-10  7.73D-10
  4.08D-10  4.08D-10  4.08D-10  4.08D-10  4.09D-10  4.16D-10  5.66D-10  6.58D-10
-----------------------------------------------------/ Z = 9   / DATE= ??.??.1974
  2.43D-26  2.43D-26  2.43D-26  2.47D-26  2.75D-26  9.01D-26  3.98D-23  2.04D-22
  1.00D-18  1.00D-18  1.01D-18  1.01D-18  1.06D-18  1.91D-18  1.64D-16  5.14D-16
  7.72D-15  7.72D-15  7.72D-15  7.76D-15  7.95D-15  1.06D-14  2.13D-13  3.96D-13
  2.02D-12  2.02D-12  2.02D-12  2.03D-12  2.05D-12  2.32D-12  1.28D-11  1.76D-11
  1.43D-11  1.43D-11  1.43D-11  1.43D-11  1.43D-11  1.54D-11  4.83D-11  6.06D-11
  3.93D-11  3.93D-11  3.93D-11  3.93D-11  3.95D-11  4.13D-11  9.51D-11  1.14D-10
  7.17D-11  7.17D-11  7.17D-11  7.17D-11  7.24D-11  7.45D-11  1.33D-10  1.55D-10
  8.42D-11  8.42D-11  8.42D-11  8.43D-11  8.43D-11  8.68D-11  1.40D-10  1.62D-10
  8.49D-11  8.49D-11  8.49D-11  8.49D-11  8.51D-11  8.69D-11  1.32D-10  1.54D-10
  7.44D-11  7.44D-11  7.44D-11  7.44D-11  7.46D-11  7.61D-11  1.09D-10  1.29D-10
-----------------------------------------------------/ Z =19   / DATE= ??.??.1974
  1.14D-26  1.14D-26  1.14D-26  1.17D-26  1.29D-26  4.36D-26  1.89D-23  8.74D-23
  2.36D-19  2.36D-19  2.36D-19  2.38D-19  2.50D-19  4.59D-19  3.95D-17  1.19D-16
  1.28D-15  1.28D-15  1.28D-15  1.28D-15  1.32D-15  1.78D-15  3.68D-14  6.74D-14
  2.70D-13  2.70D-13  2.70D-13  2.71D-13  2.73D-13  3.12D-13  1.81D-12  2.49D-12
  1.76D-12  1.76D-12  1.76D-12  1.76D-12  1.76D-12  1.77D-12  1.91D-12  6.31D-12  7.94D-12
  4.66D-12  4.66D-12  4.66D-12  4.66D-12  4.66D-12  4.88D-12  1.18D-11  1.42D-11
  8.28D-12  8.28D-12  8.28D-12  8.28D-12  8.28D-12  8.56D-12  1.62D-11  1.89D-11
  9.50D-12  9.50D-12  9.50D-12  9.50D-12  9.50D-12  9.76D-12  1.66D-11  1.93D-11
  9.48D-12  9.48D-12  9.48D-12  9.48D-12  9.50D-12  9.73D-12  1.54D-11  1.82D-11
```

```
  8.24D-12  8.24D-12  8.24D-12  8.24D-12  8.26D-12  8.44D-12  1.25D-11  1.50D-11
-------------------------------------------------------------------------------
•
```

ADF11

Isonuclear master file data. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS405 ADAS406

Formatted files to ADF11 specification :

Database Status Date = October 28, 1997 Data type = isonuclear master files Data root = /.../adas/adas/adf11/

Element	*Classes*	*Datasets*	*Comments*	*Resolution*	*Quality*
Hydrogen	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89#h.dat	JET base line	unresolved	low
Hydrogen	acd, scd,qcd,xcd,prb,plt	/<class>93r/<class>93r_h.dat	ADAS208, c-r	resolved	high
Helium	acd, scd	/<class>74/<class>74_he.dat	Summers, c-r	unresolved	medium
Helium	acd, scd	/<class>85/<class>85_he.dat	Arnaud & Rothenflug *HPS c-r	unresolved	medium
Helium	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_he.dat	JET base line	unresolved	low
Helium	acd, scd,qcd,xcd,prb,plt	/<class>93r/<class>93r_he.dat	ADAS208, c-r	resolved	high
Beryllium	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_be.dat	JET base line	unresolved	low
Beryllium	acd, scd,qcd,xcd,prb,plt	/<class>93r/<class>93r_be.dat	ADAS208, c-r	resolved	high
Boron	acd, scd	/<class>74/<class>74_b.dat	Summers, c-r	unresolved	medium
Boron	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_b.dat	JET base line	unresolved	low
Carbon	acd, scd	/<class>74/<class>74_c.dat	Summers, c-r	unresolved	medium
Carbon	acd, scd	/<class>85/<class>85_c.dat	Arnaud & Rothenflug *HPS c-r	unresolved	medium
Carbon	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_c.dat	JET base line	unresolved	low
Carbon	acd, scd,qcd,xcd,prb,plt	/<class>93r/<class>93r_c.dat	ADAS208, c-r	resolved	high
Nitrogen	acd, scd	/<class>74/<class>74_n.dat	Summers, c-r	unresolved	medium

Nitrogen	acd, scd	/<class>85/<class>85_n.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Nitrogen	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_n.dat	JET base line	unresolved	low	
Oxygen	acd, scd	/<class>74/<class>74_o.dat	Summers, c-r	unresolved		medium
Oxygen	acd, scd	/<class>85/<class>85_o.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Oxygen	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_o.dat	JET base line	unresolved	low	
Oxygen	acd, scd,qcd,xcd,prb,plt	/<class>93r/<class>93r_o.dat	ADAS208, c-r	resolved		high
Fluorine	acd, scd	/<class>74/<class>74_f.dat	Summers, c-r	unresolved		medium
Fluorine	acd, scd	/<class>85/<class>85_f.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Fluorine	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_f.dat	JET base line	unresolved	low	
Neon	acd, scd	/<class>74/<class>74_ne.dat	Summers, c-r	unresolved		medium
Neon	acd, scd	/<class>85/<class>85_ne.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Neon	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_ne.dat	JET base line	unresolved	low	
Sodium	acd, scd	/<class>74/<class>74_na.dat	Summers, c-r	unresolved		medium
Sodium	acd, scd	/<class>85/<class>85_na.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Magnesium	acd, scd	/<class>74/<class>74_mg.dat	Summers, c-r	unresolved		medium
Magnesium	acd, scd	/<class>85/<class>85_mg.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Aluminium	acd, scd	/<class>74/<class>74_al.dat	Summers, c-r	unresolved		medium
Aluminium	acd, scd	/<class>85/<class>85_al.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Silicon	acd, scd	/<class>74/<class>74_si.dat	Summers, c-r	unresolved		medium
Silicon	acd, scd	/<class>85/<class>85_si.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Silicon	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_si.dat	JET base line	unresolved	low	
Sulphur	acd, scd	/<class>74/<class>74_s.dat	Summers, c-r	unresolved		medium
Sulphur	acd, scd	/<class>85/<class>85_s.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Sulphur	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_s.dat	JET base line	unresolved	low	

Chlorine	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_cl.dat	JET base line	unresolved	low	
Argon	acd, scd	/<class>74/<class>74_ar.dat	Summers, c-r	unresolved		medium
Argon	acd, scd	/<class>85/<class>85_ar.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Argon	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_ar.dat	JET base line	unresolved	low	
Calcium	acd, scd	/<class>74/<class>74_ca.dat	Summers, c-r	unresolved		medium
Calcium	acd, scd	/<class>85/<class>85_ca.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Iron	acd, scd	/<class>74/<class>74_fe.dat	Summers, c-r	unresolved		medium
Iron	acd, scd	/<class>85/<class>85_fe.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Iron	acd, scd	/<class>93/<class>93_fe.dat	ADAS208, c-r	unresolved		medium
Nickel	acd, scd	/<class>74/<class>74_ni.dat	Summers, c-r	unresolved		medium
Nickel	acd, scd	/<class>85/<class>85_ni.dat	Arnaud & Rothenflug *HPS c-r	unresolved		medium
Nickel	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_ni.dat	JET base line	unresolved	low	
Krypton	acd, scd,ccd,prb,prc,plt,pls	/<class>89/<class>89_ni.dat	JET base line	unresolved	low	

Notes:
1. Summers denotes Summers (1974) Appleton Laboratory Report IM3657. Arnaud & Rothenflug denotes
2. c-r denotes collisional radiative data with density dependence. *HPS c-r indicates Summers (1974) density variation imposed on zero density data.
3. JET base line denotes simplified calculations reproducable by ADAS408 using *adf03* data sets.
4. r denotes resolved data format generated by ADAS208 in combination with ADAS204 to give *adf10* iso-electronic data type, post-processed with ADAS404 to give adf11 isonuclear data type.

Data lines : *Format:*

Resolved files

IZMAX, IDMAXD, ITMAXD, IZ1MIN, IZ1MAX

(NMETA(I),I=1,IZMAX+1)

(DDENSD(ID),ID=1,IDMAXD)

(DTEVD(IT),IT=1,ITMAXD)

for IZ1=1,IZMAX

    for IPRT and IGRD

        IPRT, IGRD [,WVLEN], IZ1, DATE

        for IT=1,ITMAXD

            (DRCOFD(*,IT,ID),ID=1,IDMAXD)

        repeat

    repeat

repeat

Unresolved files

IZMAX, IDMAXD, ITMAXD, IZ1MIN, IZ1MAX

(DDENSD(ID),ID=1,IDMAXD)

(DTEVD(IT),IT=1,ITMAXD)

for IZ1=1,IZMAX

    [WVLEN,] IZ1, DATE

    for IT=1,ITMAXD

        (DRCOFD(*,IT,ID),ID=1,IDMAXD)

    repeat

repeat

variable identification :

name *meaning*

	IZMAX	nuclear charge	
	IDMAXD	number of densities	
	ITMAXD	number of densities	
	IZ1MIN	lowest ion charge +1	
	IZ1MAX	highest ion charge	
	NMETA()	number of metastables for each ionisation stage	
	DDENSD()	log10(electron density (cm-3))	
	DTEVD()	log10(electron temperature (K))	
	IPRT	parent metastable index	
	IGRD	recombined ion metastable index	
[	WVLEN	specific line wavelength (Angstrom)	class 9 only]
	IZ1	recombining ion charge	
	DATE	date	
	DRCOFD(,,)	log10(generalised collisional radiative coefficients) (units according to class)	

Table B11c - resolved data

```
   4   26   35    1    4     /BERYLLIUM          /DICKSON ET AL 1992
------------------------------------------------------------------------
   2    1    2    1    1
------------------------------------------------------------------------
 10.00000  10.20003  10.40002  10.59999  10.80003  11.00000  11.20003  11.40002
 11.59999  11.80003  12.00000  12.20003  12.40002  12.59999  12.80003  13.00000
 13.20003  13.40002  13.59999  13.80003  14.00000  14.20003  14.40002  14.59999
 14.80003  15.00000
```

```
   0.00015   0.10016   0.20015   0.30015   0.40015   0.50015   0.60015   0.70015
   0.80015   0.90015   1.00015   1.10016   1.20015   1.30015   1.40015   1.50015
   1.60015   1.70015   1.80015   1.90015   2.00015   2.20015   2.40015   2.60015
   2.80015   3.00015   3.20015   3.40015   3.60015   3.80015   4.00015   4.20015
   4.40015   4.60015   4.70015
---------------------/ IPRT= 1  / IGRD= 1  /--------/ Z1= 1   / DATE= 16/11/93
 -11.57681 -11.55926 -11.53861 -11.51437 -11.48604 -11.45315 -11.41518 -11.37166
 -11.32210 -11.26598 -11.20285 -11.13244 -11.05561 -10.97341 -10.88689 -10.79719
 -10.70532 -10.61241 -10.51952 -10.42769 -10.33806 -10.25165 -10.16957 -10.09290
 -10.02268  -9.96003
.
.
  -7.20840  -7.21561  -7.22233  -7.22831  -7.23329  -7.23700  -7.23918  -7.23957
  -7.23791  -7.23394  -7.22740  -7.21811  -7.20627  -7.19216  -7.17605  -7.15822
  -7.13895  -7.11852  -7.09722  -7.07531  -7.05308  -7.03080  -7.00876  -6.98724
  -6.96650  -6.94684
  -6.85348  -6.85100
.
.
.
.
---------------------/ IPRT= 1  / IGRD= 1  /--------/ Z1= 4   / DATE= 16/11/93
 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000
 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000
 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000 -74.00000
 -74.00000 -74.00000
.
.
  -9.42566  -9.42504  -9.42431  -9.42348  -9.42260  -9.42169  -9.42080  -9.41994
  -9.41916  -9.41849  -9.41796  -9.41761  -9.41747  -9.41757  -9.41794  -9.41862
  -9.41964  -9.42102  -9.42267  -9.42448  -9.42633  -9.42810  -9.42968  -9.43096
  -9.43182  -9.43215
--------------------------------------------------------------------------------
C
C
C     RATE COEFFICIENTS IN UNITS OF CM**3 S-1
C     ---------------------------------------
C
C     PREPARED USING CODE JETXLE.IONBAL.FORT(WJD404R)
C
C           WILLIAM J. DICKSON   16/11/93
C--------------------------------------------------------------------------------
```

Table B11d - unresolved data

```
    2   13   51    1    2     /HELIUM         / ARNAUD-ROTHEN(NE SCALED) 9/11/90
 ------------------------------------------------------------------------------
   4.00000   5.00000   6.00000   7.00000   8.00000   9.00000  10.00000  11.00000
  12.00000  13.00000  14.00000  15.00000  16.00000
  -0.06466   0.03533   0.13534   0.23535   0.33534   0.43534   0.53534   0.63534
   0.73534   0.83534   0.93534   1.03533   1.13534   1.23535   1.33534   1.43534
   1.53534   1.63534   1.73534   1.83534   1.93534   2.03533   2.13534   2.23535
   2.33534   2.43534   2.53534   2.63534   2.73534   2.83534   2.93534   3.03533
   3.13534   3.23535   3.33534   3.43534   3.53534   3.63534   3.73534   3.83534
   3.93534   4.03533   4.13534   4.23535   4.33534   4.43534   4.53534   4.63534
   4.73534   4.83534   4.93534
```

```
 -------------------------------------------------/ Z1= 1   / DATE= 09/11/90
 -21.02274 -21.02448 -21.01428 -20.98969 -20.97136 -20.98573 -21.03465 -21.02173
 -20.82594 -20.37585 -19.79799 -19.26837 -18.92128
.
.
  -8.26043  -8.26360  -8.25394  -8.22642  -8.19355  -8.17223  -8.17398  -8.18895
  -8.20194  -8.20187  -8.19411  -8.18816  -8.19132
 -------------------------------------------------/ Z1= 2   / DATE= 09/11/90
 -36.43890 -36.43925 -36.43584 -36.42578 -36.40593 -36.37265 -36.31938 -36.23863
 -36.10640 -35.80753 -35.19548 -34.17990 -32.98088
.
.
  -9.04721  -9.04720  -9.04707  -9.04648  -9.04495  -9.04234  -9.04021  -9.04073
  -9.04481  -9.04660  -9.03791  -9.01206  -8.97073
```

ADF13

Provides ionisation per photon data for selected spectrum lines. The formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS501

Formatted files to ADF13 specification :

Database Status Date = July, 30 1996 Data type = sxb files Data root = /.../adas/adas/adf13/

Element	*Members*	*Prefix*	*Library*	*Resolution*	*Comments*	*Quality*
Be	be0,be1,be2,be3	llu,llr,pju,pjr	sxb93#be	LS	Dickson '93	good
C	c0,c1,c2,c3	llu,llr,pju,pjr	sxb93#c	LS	Dickson '93	good
Cr	cr0	llu,llr	sxb93#cr	LS	Summers & Badnell '95	good
He	he0	llu,llr,pju,pjr	sxb93#he	LS	Dickson '93	good
Mo	mo0	llu,llr	sxb93#mo	LS	Summers & Badnell '95	good
N	n4	llu,llr	sxb93#n	LS	Summers '95	good
O	o1,o4,o5	llu,llr,pju,pjr	sxb93#o	LS	Dickson '93	good
C	c5	pju,pjr	sxb96#c	LS	Summers '96	good
H	h0	pju,pjr	sxb96#h	LS	Summers '96	good
He	he1	pju,pjr	sxb96#he	LS	Summers '96	good

Notes: 1. Prefixes are as follow: 'llu' => low level, metastable unresolved; 'llr'=> low level, metastable resolved;

'pju'=> including projection matrices, metastable unresolved; 'pjr'=> including projection matrices, metastable resolved.

2. sxb96 data for hydrogenic ions are calculated using an infinite n-shell dedicated hydrogenic ion code (ADAS310 - variant); all other data are calculated using ADAS208.

Data lines : *Format:*

NSEL, TEXT

```
for ISEL= 1 to NSEL
        WLNG , NDENS ,  NTE  , FILMEM,  CODE ,  INDM ,  ISEL
        (DENS(IN), IN=1,NDENS)
        (TE(IT), IT=1,NTE)
        for IN = 1 to NDENS
                (SXB(IN,IT), IT=1,NTE)
        repeat
repeat
```

variable identification :

name	*meaning*
NSEL	number of transitions available
TEXT	information
WLNG	wavelength of transition (Ang)
NDENS	number of densities
NTE	number of temperatures
FILMEM	source specific ion excitation file
CODE	processing code
INDM	associated metastable index in source file
ISEL	transition index
DENS()	electron densities (cm-3)
TE()	electron temperatures (eV)
SXB(,)	finite density ionisation per photon values 1st parameter electron density index 2nd parameter electron temperature index

Table B13c - example.

```
    3    /BE+0 IONISATIONS PER PHOTON        /
8254.0 A     5   7 /FILMEM = FBBH91BE/CODE = V2BNDLN1  /INDM = 1/ISEL=    1
 1.00D+11 1.00D+12 5.00D+12 1.00D+13 1.00D+14
 2.00D+00 5.00D+00 1.00D+01 2.00D+01 3.00D+01 5.00D+01 8.00D+01
 8.46D-01 2.55D+00 3.54D+00 4.48D+00 5.06D+00 6.01D+00 7.08D+00
 1.25D+00 3.38D+00 4.60D+00 5.63D+00 6.24D+00 7.20D+00 8.36D+00
 2.14D+00 5.95D+00 8.19D+00 9.80D+00 1.06D+01 1.17D+01 1.31D+01
 3.25D+00 8.80D+00 1.28D+01 1.51D+01 1.60D+01 1.74D+01 1.88D+01
 2.97D+01 7.52D+01 9.60D+01 1.05D+02 1.06D+02 1.07D+02 1.07D+02
4573.0 A     4   7 /FILMEM = FBBH91BE/CODE = V2BNDLN1  /INDM = 1/ISEL=    2
 1.00D+11 1.00D+12 1.00D+13 1.00D+14
 2.00D+00 5.00D+00 1.00D+01 2.00D+01 3.00D+01 5.00D+01 8.00D+01
 3.99D+00 6.51D+00 8.83D+00 1.19D+01 1.42D+01 1.77D+01 2.10D+01
 6.99D+00 8.97D+00 1.08D+01 1.33D+01 1.54D+01 1.87D+01 2.21D+01
 8.68D+00 1.16D+01 1.41D+01 1.59D+01 1.70D+01 1.87D+01 2.02D+01
 3.71D+01 5.63D+01 6.04D+01 6.06D+01 5.90D+01 5.68D+01 5.52D+01
4408.0 A     5   7 /FILMEM = FBBH91BE/CODE = V2BNDLN1  /INDM = 1/ISEL=    3
 1.00D+11 1.00D+12 5.00D+12 1.00D+13 1.00D+14
 2.00D+00 5.00D+00 1.00D+01 2.00D+01 3.00D+01 5.00D+01 8.00D+01
 2.96D+01 4.20D+01 5.18D+01 6.13D+01 6.85D+01 7.97D+01 9.07D+01
 5.37D+01 7.04D+01 8.36D+01 9.56D+01 1.04D+02 1.15D+02 1.25D+02
 1.37D+02 1.80D+02 2.09D+02 2.32D+02 2.69D+02 2.82D+02 2.89D+02
 2.28D+02 2.94D+02 3.59D+02 3.93D+02 4.06D+02 4.23D+02 4.31D+02
 2.01D+03 2.72D+03 3.01D+03 3.16D+03 3.19D+03 3.18D+03 3.11D+03
C-------------------------------------------------------------------------------
C
C  IONISATION/PHOTON LIST:
C
C     ISEL     WAVELENGTH   TRANSITION     INFORMATION
C     ----     ----------   ----------     ------------
C       1.       8254.0     2S2P-2S3S      SINGLET FLUX
C       2.       4573.0     2S2P-2S3D      SINGLET FLUX
C       3.       4408.0     2S2P-2S4S      SINGLET FLUX
C
C
C          WILLIAM J. DICKSON   JET    21ST FEB 1991
C
C-------------------------------------------------------------------------------
```

ADF14

The data set provides thermally averaged charge transfer rate coefficients. They are double Maxwell averages over the donor and receiver temperatures. The formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS505

Formatted files to ADF14 specification :

Database Status Date = July, 30 1996 Data type = tcx files Data root = /.../adas/adas/adf14/

Donors	*Receiver/members*	*Prefix*	*Library*	*Comments*	*Quality*
H0	h, he, be,c,o		tcx#h0	Janev/ORNL,total coeffts	good
	c1,c2,c3,c4,c5,c6	cfm	tcx#h0	Maggi, state selective rate coeffts.	good

Notes: 1. Total coefficients give the charge exchange recombination coefficient summed over all levels of the receiving ion.

Data lines : *Format:*

NSEL

for ISEL= 1 to NSEL

REACT, NTD , NTR , ATMSD , ATMR , INFO , ISEL

(TID(ITD), ITD=1,NTD)

(TIR(ITR), ITR=1,NTR)

for ITD = 1 to NTD

QCXE , (QCX(ITD,ITR), ITR=1,NTR)

repeat

repeat

variable identification :

name	*meaning*
NSEL	number of reactions available
REACT	specification of reactants (text) (eg. H /BE+2)
NTD	number of donor temperatures
NTR	number of receiver temperatures
ATMSD	atomic mass of donor
ATMR	atomic mass of receiver
INFO	information on data source
ISEL	transition index
TID()	donor temperatures (eV)
TIR()	receiver temperatures (eV)
QCXE	charge exchange rate coefficient (cm**3 sec-1) for equal donor and receiver temperatures
QCX(,)	charge exchange rate coefficient (cm**3 sec-1) 1st parameter donor temperature index 2nd parameter receiver temperature index

Table B14c - example.

```
    3
H + 0 (1)/C + 2 (1)  11  11/AMD=   2.0/AMR=  12.0/FST=2p (2P)   /ISEL=    1
 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01 3.45D+01
 6.90D+01 1.72D+02 3.45D+02
 *EQUAL** 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01
 3.45D+01 6.90D+01 1.72D+02 3.45D+02
```

```
 6.34D-13 6.34D-13 7.87D-13 8.98D-13 9.58D-13 1.01D-12 6.82D-13 2.90D-13
 1.62D-13 2.78D-13 1.51D-18 1.05D-23
 8.04D-13 6.70D-13 8.04D-13 9.01D-13 9.64D-13 1.01D-12 7.02D-13 3.07D-13
 1.64D-13 2.65D-13 2.01D-18 1.21D-23
 9.10D-13 7.28D-13 8.30D-13 9.10D-13 9.73D-13 1.02D-12 7.37D-13 3.32D-13
 1.70D-13 2.45D-13 3.69D-18 1.61D-23
 9.87D-13 8.30D-13 8.81D-13 9.29D-13 9.87D-13 1.03D-12 8.02D-13 3.73D-13
 1.85D-13 2.09D-13 2.84D-17 4.06D-23
 1.03D-12 9.02D-13 9.24D-13 9.50D-13 1.00D-12 1.03D-12 8.38D-13 3.97D-13
 1.96D-13 1.77D-13 3.73D-16 2.73D-22
 8.27D-13 9.51D-13 9.62D-13 9.81D-13 1.02D-12 1.01D-12 8.27D-13 4.05D-13
 1.98D-13 1.48D-13 2.96D-15 6.27D-20
 3.84D-13 1.02D-12 1.03D-12 1.03D-12 1.01D-12 9.34D-13 7.31D-13 3.84D-13
 1.87D-13 1.13D-13 1.29D-14 8.23D-17
 1.75D-13 9.22D-13 9.18D-13 9.14D-13 8.66D-13 7.63D-13 6.10D-13 3.37D-13
 1.75D-13 9.02D-14 2.29D-14 1.10D-15
 7.41D-14 8.51D-13 7.66D-13 6.77D-13 5.90D-13 5.23D-13 4.31D-13 2.58D-13
 1.49D-13 7.41D-14 2.40D-14 4.86D-15
 2.04D-14 1.68D-13 1.78D-13 1.95D-13 2.22D-13 2.22D-13 1.99D-13 1.43D-13
 9.45D-14 5.55D-14 2.04D-14 9.39D-15
 6.72D-15 2.61D-13 2.33D-13 2.00D-13 1.55D-13 1.25D-13 1.03D-13 7.87D-14
 6.01D-14 3.19D-14 1.69D-14 6.72D-15
H + 0 (1)/C + 2 (1)  11  11/AMD=   2.0/AMR=  12.0/FST=2p2(2D)   /ISEL=    2
 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01 3.45D+01
 6.90D+01 1.72D+02 3.45D+02
 *EQUAL** 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01
 3.45D+01 6.90D+01 1.72D+02 3.45D+02
 2.35D-18 2.35D-18 2.96D-18 7.53D-18 1.19D-14 6.70D-13 1.02D-11 1.32D-10
 4.94D-10 1.46D-09 4.25D-09 7.75D-09
 3.05D-18 2.48D-18 3.05D-18 9.45D-18 1.37D-14 7.05D-13 1.03D-11 1.33D-10
 4.95D-10 1.47D-09 4.25D-09 7.75D-09
 1.60D-17 2.71D-18 3.21D-18 1.60D-17 1.78D-14 7.62D-13 1.06D-11 1.34D-10
 4.97D-10 1.47D-09 4.25D-09 7.75D-09
 3.31D-14 3.21D-18 4.56D-18 8.78D-17 3.31D-14 9.21D-13 1.15D-11 1.37D-10
 5.03D-10 1.47D-09 4.26D-09 7.75D-09
 1.25D-12 9.40D-18 5.04D-17 9.48D-16 7.59D-14 1.25D-12 1.30D-11 1.42D-10
 5.12D-10 1.48D-09 4.26D-09 7.76D-09
 1.65D-11 1.40D-15 3.88D-15 1.83D-14 2.61D-13 2.16D-12 1.65D-11 1.52D-10
 5.28D-10 1.49D-09 4.28D-09 7.77D-09
 1.83D-10 3.41D-13 4.58D-13 7.32D-13 2.15D-12 7.27D-12 3.01D-11 1.83D-10
 5.75D-10 1.53D-09 4.32D-09 7.80D-09
 6.50D-10 5.55D-12 6.29D-12 7.73D-12 1.29D-11 2.50D-11 6.17D-11 2.40D-10
 6.50D-10 1.61D-09 4.38D-09 7.85D-09
 1.77D-09 4.92D-11 5.14D-11 5.58D-11 6.93D-11 9.39D-11 1.51D-10 3.66D-10
 8.01D-10 1.77D-09 4.52D-09 7.95D-09
 4.92D-09 3.69D-10 3.73D-10 3.81D-10 4.06D-10 4.47D-10 5.32D-10 8.01D-10
 1.28D-09 2.26D-09 4.92D-09 8.24D-09
 8.70D-09 1.14D-09 1.14D-09 1.15D-09 1.17D-09 1.22D-09 1.31D-09 1.60D-09
 2.09D-09 3.05D-09 5.55D-09 8.70D-09
H + 0 (1)/C + 2 (1)  11  11/AMD=   2.0/AMR=  12.0/FST=Total     /ISEL=    3
 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01 3.45D+01
 6.90D+01 1.72D+02 3.45D+02
 *EQUAL** 1.72D-01 3.45D-01 6.90D-01 1.72D+00 3.45D+00 6.90D+00 1.72D+01
 3.45D+01 6.90D+01 1.72D+02 3.45D+02
 6.35D-13 6.35D-13 7.92D-13 9.03D-13 9.86D-13 1.70D-12 1.16D-11 1.32D-10
 5.02D-10 1.45D-09 4.25D-09 7.74D-09
 8.09D-13 6.72D-13 8.09D-13 9.07D-13 9.93D-13 1.72D-12 1.18D-11 1.32D-10
 5.03D-10 1.45D-09 4.25D-09 7.74D-09
```

```
 9.15D-13 7.31D-13 8.36D-13 9.15D-13 1.00D-12 1.78D-12 1.21D-11 1.33D-10
 5.04D-10 1.45D-09 4.25D-09 7.74D-09
 1.03D-12 8.36D-13 8.87D-13 9.35D-13 1.03D-12 1.96D-12 1.30D-11 1.36D-10
 5.08D-10 1.46D-09 4.26D-09 7.75D-09
 2.33D-12 9.08D-13 9.30D-13 9.59D-13 1.09D-12 2.33D-12 1.47D-11 1.41D-10
 5.16D-10 1.46D-09 4.27D-09 7.75D-09
 1.84D-11 9.61D-13 9.76D-13 1.01D-12 1.28D-12 3.32D-12 1.84D-11 1.51D-10
 5.30D-10 1.48D-09 4.28D-09 7.76D-09
 1.82D-10 1.38D-12 1.49D-12 1.78D-12 3.31D-12 8.75D-12 3.20D-11 1.82D-10
 5.74D-10 1.53D-09 4.32D-09 7.79D-09
 6.48D-10 7.16D-12 7.82D-12 9.27D-12 1.46D-11 2.70D-11 6.32D-11 2.39D-10
 6.48D-10 1.61D-09 4.38D-09 7.85D-09
 1.77D-09 5.20D-11 5.39D-11 5.79D-11 7.07D-11 9.49D-11 1.51D-10 3.64D-10
 8.00D-10 1.77D-09 4.52D-09 7.95D-09
 4.92D-09 3.68D-10 3.72D-10 3.80D-10 4.05D-10 4.46D-10 5.30D-10 7.99D-10
 1.28D-09 2.26D-09 4.92D-09 8.24D-09
 8.70D-09 1.13D-09 1.13D-09 1.14D-09 1.17D-09 1.21D-09 1.31D-09 1.60D-09
 2.09D-09 3.05D-09 5.55D-09 8.70D-09
C-----------------------------------------------------------------------------
C   THERMAL CHARGE EXCHANGE RATE COEFFICIENT SOURCE LIST
C
C   ISEL  DONOR      RECEIVER   FINAL STATE  SOURCE
C   ----  ---------  ---------  -----------  ----------------------------------
C     1   H + 0 (1)  C + 2 (1)  2p (2P)      /u/cfm/adas/adf24/scx#h0/scx#h0_cfm#c2.dat
C     2   H + 0 (1)  C + 2 (1)  2p2(2D)      /u/cfm/adas/adf24/scx#h0/scx#h0_cfm#c2.dat
C     3   H + 0 (1)  C + 2 (1)  Total        /u/cfm/adas/adf24/scx#h0/scx#h0_cfm#c2.dat
C
C
C
C   Processing code: ADAS509
C   Producer:        C.F. Maggi
C   Date:            27/11/97
C
C-----------------------------------------------------------------------------
```

ADF15

Provides photon emissivity coefficients. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS503

Formatted files to ADF15 specification :

Database Status | Date = July, 30 1996 | Data type = pec files | Data root = /.../adas/adas/adf15/

Element	*Members*	*Prefix*	*Library*	*Resolution*	*Comments*	*Quality*
B	b0,b1,b2,b3,b4	llu,llr	pec93#b	LS	Dickson '93	moderate
Be	be0,be1,be2,be3	llu,llr,pju,pjr	pec93#be	LS	Dickson '93	good
C	c0,c1,c2,c3	llu,llr,pju,pjr	pec93#c	LS	Dickson '93	good
Cr	cr0	llu,llr	pec93#cr	LS	Summers & Badnell '95	good
He	he0	llu,llr,pju,pjr	pec93#he	LS	Dickson '93	good
Mo	mo0	llu,llr	pec93#mo	LS	Summers & Badnell '95	good
N	n4	llu,llr	pec93#n	LS	Summers '95	good
O	o1,o4,o5	llu,llr,pju,pjr	pec93#o	LS	Dickson '93	good
C	c5	pju,pjr	pec96#c	LS	Summers '96	good
H	h0	pju,pjr	pec96#h	LS	Summers '96	good
He	he1	pju,pjr	pec96#he	LS	Summers '96	good

Notes: 1. Prefixes are as follow: 'llu' => low level, metastable unresolved; 'llr'=> low level, metastable resolved;

'pju'=> including projection matrices, metastable unresolved; 'pjr'=> including projection matrices, metastable resolved.

2. pec96 data for hydrogenic ions are calculated using an infinite n-shell dedicated hydrogenic ion code (ADAS310 - variant); all other data are calculated using ADAS208.

Data lines : *Format:*

NSEL, TEXT

```
for ISEL= 1 to NSEL
        WLNG , NDENS ,  NTE  , FILMEM,  TYPE ,  INDM ,  ISEL
        (DENS(IN), IN=1,NDENS)
        (TE(IT), IT=1,NTE)
        for IN = 1 to NDENS
                (PEC(IN,IT), IT=1,NTE)
        repeat
repeat
```

variable identification :

name	*meaning*
NSEL	number of transitions available
TEXT	information
WLNG	wavelength of transition (Ang)
NDENS	number of densities
NTE	number of temperatures
FILMEM	source specific ion excitation file
TYPE	type of photon emissivity (excit, recomb, cx)
INDM	associated metastable index in source file
ISEL	transition index
DENS()	electron densities (cm-3)
TE()	electron temperatures (eV)
PEC(,)	finite density photon emissivity coefficients (cm3 s-1) 1st parameter electron density index 2nd parameter electron temperature index

Table B15c

```
   45    /HE+ 0 PHOTON EMISSIVITY COEFFICIENTS/
   584.4 A  24  24 /FILMEM =         /TYPE = EXCIT    /INDM = 1/ISEL =    1
1.00E+01 1.00E+02 1.00E+03 1.00E+04 1.00E+05 1.00E+06 3.00E+06 1.00E+07
3.00E+07 1.00E+08 3.00E+08 1.00E+09 3.00E+09 1.00E+10 3.00E+10 1.00E+11
3.00E+11 1.00E+12 3.00E+12 1.00E+13 3.00E+13 1.00E+14 3.00E+14 1.00E+15
4.31E-02 6.03E-02 8.62E-02 1.29E-01 1.72E-01 2.59E-01 4.31E-01 6.03E-01
8.62E-01 1.29E+00 1.72E+00 2.59E+00 4.31E+00 6.03E+00 8.62E+00 1.29E+01
1.72E+01 2.59E+01 4.31E+01 6.03E+01 8.62E+01 1.29E+02 1.72E+02 2.59E+02
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.15E-12 3.02E-11 1.27E-10 3.90E-10 9.81E-10
1.60E-09 2.69E-09 4.19E-09 5.12E-09 5.95E-09 6.66E-09 7.00E-09 7.20E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.15E-12 3.02E-11 1.27E-10 3.90E-10 9.81E-10
1.60E-09 2.69E-09 4.19E-09 5.12E-09 5.95E-09 6.66E-09 7.00E-09 7.20E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.15E-12 3.02E-11 1.27E-10 3.90E-10 9.81E-10
1.60E-09 2.69E-09 4.19E-09 5.12E-09 5.95E-09 6.66E-09 7.00E-09 7.20E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.15E-12 3.02E-11 1.27E-10 3.58E-10 9.17E-10
1.60E-09 2.69E-09 4.19E-09 5.12E-09 5.95E-09 6.66E-09 7.00E-09 7.20E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.15E-12 3.02E-11 1.26E-10 3.90E-10 9.79E-10
1.60E-09 2.67E-09 4.19E-09 5.12E-09 5.95E-09 6.63E-09 6.96E-09 7.19E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.94E-09 6.65E-09 6.99E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.11E-09 5.94E-09 6.65E-09 6.99E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.52E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.11E-09 5.94E-09 6.65E-09 6.99E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.93E-09 6.65E-09 6.98E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 2.52E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.93E-09 6.65E-09 6.98E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.68E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.77E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.93E-09 6.65E-09 6.98E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.77E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.89E-10 9.76E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.93E-09 6.64E-09 6.98E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.68E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 2.00E-14 1.14E-12 3.01E-11 1.27E-10 3.88E-10 9.76E-10
1.59E-09 2.68E-09 4.18E-09 5.10E-09 5.93E-09 6.64E-09 6.98E-09 7.18E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.69E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 1.99E-14 1.14E-12 3.00E-11 1.27E-10 3.88E-10 9.75E-10
1.59E-09 2.67E-09 4.17E-09 5.09E-09 5.92E-09 6.64E-09 6.97E-09 7.17E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.70E-44 2.82E-30 3.22E-24
1.08E-19 3.51E-16 1.99E-14 1.14E-12 3.00E-11 1.26E-10 3.87E-10 9.73E-10
1.59E-09 2.67E-09 4.16E-09 5.09E-09 5.92E-09 6.63E-09 6.97E-09 7.17E-09
1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.70E-44 2.82E-30 3.22E-24
```

```
 1.08E-19 3.50E-16 1.98E-14 1.13E-12 2.98E-11 1.25E-10 3.85E-10 9.67E-10
 1.58E-09 2.66E-09 4.15E-09 5.07E-09 5.90E-09 6.62E-09 6.96E-09 7.16E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.70E-44 2.82E-30 3.22E-24
 1.08E-19 3.48E-16 1.97E-14 1.12E-12 2.94E-11 1.24E-10 3.81E-10 9.59E-10
 1.57E-09 2.64E-09 4.13E-09 5.05E-09 5.88E-09 6.60E-09 6.94E-09 7.15E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.71E-44 2.83E-30 3.22E-24
 1.07E-19 3.45E-16 1.94E-14 1.10E-12 2.88E-11 1.22E-10 3.74E-10 9.45E-10
 1.55E-09 2.61E-09 4.10E-09 5.02E-09 5.86E-09 6.58E-09 6.92E-09 7.13E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.72E-44 2.84E-30 3.22E-24
 1.07E-19 3.42E-16 1.92E-14 1.08E-12 2.83E-11 1.19E-10 3.68E-10 9.30E-10
 1.53E-09 2.58E-09 4.07E-09 4.99E-09 5.83E-09 6.55E-09 6.90E-09 7.11E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.76E-44 2.88E-30 3.26E-24
 1.08E-19 3.42E-16 1.91E-14 1.07E-12 2.79E-11 1.17E-10 3.61E-10 9.15E-10
 1.50E-09 2.55E-09 4.02E-09 4.94E-09 5.78E-09 6.51E-09 6.87E-09 7.09E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.83E-44 2.96E-30 3.34E-24
 1.10E-19 3.45E-16 1.91E-14 1.06E-12 2.74E-11 1.15E-10 3.54E-10 8.96E-10
 1.47E-09 2.50E-09 3.95E-09 4.86E-09 5.70E-09 6.43E-09 6.79E-09 7.02E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.91E-44 3.04E-30 3.39E-24
 1.10E-19 3.43E-16 1.88E-14 1.04E-12 2.65E-11 1.11E-10 3.38E-10 8.54E-10
 1.40E-09 2.38E-09 3.77E-09 4.65E-09 5.47E-09 6.19E-09 6.55E-09 6.80E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.88E-44 2.97E-30 3.31E-24
 1.07E-19 3.29E-16 1.79E-14 9.69E-13 2.43E-11 1.01E-10 3.05E-10 7.65E-10
 1.25E-09 2.13E-09 3.38E-09 4.19E-09 4.95E-09 5.65E-09 6.01E-09 6.29E-09
 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.00E-74 1.59E-44 2.59E-30 2.93E-24
 9.49E-20 2.86E-16 1.52E-14 7.95E-13 1.90E-11 7.69E-11 2.29E-10 5.64E-10
 9.19E-10 1.56E-09 2.51E-09 3.14E-09 3.76E-09 4.36E-09 4.71E-09 5.03E-09

                          .       .       .

  4923.2 A  24  24 /FILMEM =         /TYPE = RECOM    /INDM =+1/ISEL =   45
 1.00E+01 1.00E+02 1.00E+03 1.00E+04 1.00E+05 1.00E+06 3.00E+06 1.00E+07
 3.00E+07 1.00E+08 3.00E+08 1.00E+09 3.00E+09 1.00E+10 3.00E+10 1.00E+11
 3.00E+11 1.00E+12 3.00E+12 1.00E+13 3.00E+13 1.00E+14 3.00E+14 1.00E+15
 4.31E-02 6.03E-02 8.62E-02 1.29E-01 1.72E-01 2.59E-01 4.31E-01 6.03E-01
 8.62E-01 1.29E+00 1.72E+00 2.59E+00 4.31E+00 6.03E+00 8.62E+00 1.29E+01
 1.72E+01 2.59E+01 4.31E+01 6.03E+01 8.62E+01 1.29E+02 1.72E+02 2.59E+02
 7.95E-14 5.90E-14 5.27E-14 7.86E-14 1.12E-13 1.56E-13 1.68E-13 1.47E-13
 1.14E-13 7.83E-14 5.73E-14 3.51E-14 1.86E-14 1.32E-14 1.19E-14 1.58E-14
 1.98E-14 2.24E-14 1.87E-14 1.44E-14 1.01E-14 5.66E-15 3.66E-15 1.98E-15
 7.99E-14 5.90E-14 4.99E-14 6.50E-14 8.67E-14 1.15E-13 1.22E-13 1.06E-13
 8.22E-14 5.64E-14 4.12E-14 2.50E-14 1.33E-14 9.83E-15 9.83E-15 1.46E-14
 1.90E-14 2.19E-14 1.84E-14 1.42E-14 1.00E-14 5.60E-15 3.63E-15 1.96E-15
 8.05E-14 5.95E-14 4.78E-14 5.49E-14 6.79E-14 8.54E-14 8.89E-14 7.71E-14
 5.96E-14 4.10E-14 2.99E-14 1.81E-14 9.75E-15 7.55E-15 8.42E-15 1.37E-14
 1.84E-14 2.15E-14 1.82E-14 1.41E-14 9.93E-15 5.55E-15 3.60E-15 1.95E-15
 8.17E-14 6.10E-14 4.67E-14 4.79E-14 5.48E-14 6.47E-14 6.54E-14 5.62E-14
 4.33E-14 2.98E-14 2.17E-14 1.30E-14 7.10E-15 5.86E-15 7.33E-15 1.30E-14
 1.78E-14 2.11E-14 1.80E-14 1.39E-14 9.82E-15 5.49E-15 3.56E-15 1.93E-15
 8.40E-14 6.10E-14 4.63E-14 4.30E-14 4.55E-14 5.00E-14 4.88E-14 4.15E-14
 3.18E-14 2.19E-14 1.60E-14 9.45E-15 5.27E-15 4.69E-15 6.55E-15 1.24E-14
 1.73E-14 2.07E-14 1.76E-14 1.37E-14 9.65E-15 5.40E-15 3.50E-15 1.90E-15
 8.88E-14 6.36E-14 4.68E-14 3.94E-14 3.84E-14 3.87E-14 3.57E-14 2.99E-14
 2.28E-14 1.57E-14 1.14E-14 6.65E-15 3.82E-15 3.74E-15 5.85E-15 1.17E-14
 1.66E-14 2.00E-14 1.71E-14 1.33E-14 9.36E-15 5.25E-15 3.40E-15 1.85E-15
 9.21E-14 6.54E-14 4.74E-14 3.83E-14 3.60E-14 3.47E-14 3.11E-14 2.58E-14
 1.95E-14 1.34E-14 9.73E-15 5.61E-15 3.27E-15 3.37E-15 5.54E-15 1.14E-14
 1.61E-14 1.95E-14 1.67E-14 1.30E-14 9.16E-15 5.14E-15 3.34E-15 1.81E-15
 9.65E-14 6.78E-14 4.84E-14 3.77E-14 3.42E-14 3.16E-14 2.75E-14 2.25E-14
```

```
 1.69E-14 1.16E-14 8.39E-15 4.79E-15 2.83E-15 3.05E-15 5.26E-15 1.10E-14
 1.57E-14 1.90E-14 1.63E-14 1.27E-14 8.93E-15 5.02E-15 3.25E-15 1.77E-15
 1.03E-13 7.14E-14 5.01E-14 3.76E-14 3.31E-14 2.92E-14 2.45E-14 1.99E-14
 1.48E-14 1.02E-14 7.33E-15 4.16E-15 2.49E-15 2.79E-15 5.00E-15 1.06E-14
 1.52E-14 1.84E-14 1.58E-14 1.23E-14 8.68E-15 4.89E-15 3.17E-15 1.72E-15
 1.16E-13 7.77E-14 5.31E-14 3.81E-14 3.21E-14 2.69E-14 2.15E-14 1.72E-14
 1.28E-14 8.71E-15 6.27E-15 3.54E-15 2.15E-15 2.51E-15 4.70E-15 1.01E-14
 1.45E-14 1.76E-14 1.52E-14 1.18E-14 8.34E-15 4.70E-15 3.05E-15 1.66E-15
 1.35E-13 8.65E-14 5.71E-14 3.92E-14 3.18E-14 2.53E-14 1.93E-14 1.51E-14
 1.11E-14 7.57E-15 5.44E-15 3.05E-15 1.87E-15 2.27E-15 4.42E-15 9.66E-15
 1.38E-14 1.68E-14 1.45E-14 1.13E-14 7.96E-15 4.50E-15 2.92E-15 1.59E-15
 1.70E-13 1.02E-13 6.37E-14 4.13E-14 3.22E-14 2.41E-14 1.74E-14 1.34E-14
 9.74E-15 6.59E-15 4.72E-15 2.64E-15 1.63E-15 2.05E-15 4.14E-15 9.14E-15
 1.30E-14 1.58E-14 1.37E-14 1.07E-14 7.52E-15 4.26E-15 2.77E-15 1.51E-15
 2.26E-13 1.24E-13 7.31E-14 4.46E-14 3.34E-14 2.37E-14 1.62E-14 1.22E-14
 8.78E-15 5.90E-15 4.22E-15 2.35E-15 1.46E-15 1.87E-15 3.88E-15 8.65E-15
 1.23E-14 1.50E-14 1.30E-14 1.01E-14 7.11E-15 4.04E-15 2.62E-15 1.43E-15
 3.53E-13 1.72E-13 9.13E-14 5.09E-14 3.61E-14 2.40E-14 1.53E-14 1.12E-14
 7.93E-15 5.27E-15 3.75E-15 2.09E-15 1.30E-15 1.69E-15 3.58E-15 8.03E-15
 1.14E-14 1.39E-14 1.21E-14 9.45E-15 6.62E-15 3.77E-15 2.45E-15 1.34E-15
 6.22E-13 2.64E-13 1.23E-13 6.11E-14 4.04E-14 2.47E-14 1.46E-14 1.04E-14
 7.20E-15 4.72E-15 3.35E-15 1.86E-15 1.15E-15 1.50E-15 3.23E-15 7.31E-15
 1.04E-14 1.26E-14 1.11E-14 8.69E-15 6.09E-15 3.49E-15 2.27E-15 1.24E-15
 1.32E-12 4.73E-13 1.88E-13 7.95E-14 4.77E-14 2.61E-14 1.39E-14 9.46E-15
 6.33E-15 4.05E-15 2.85E-15 1.58E-15 9.65E-16 1.24E-15 2.69E-15 6.14E-15
 8.72E-15 1.07E-14 9.53E-15 7.53E-15 5.31E-15 3.07E-15 2.01E-15 1.11E-15
 2.77E-12 8.56E-13 2.92E-13 1.05E-13 5.75E-14 2.80E-14 1.33E-14 8.56E-15
 5.51E-15 3.41E-15 2.37E-15 1.32E-15 7.82E-16 9.57E-16 2.05E-15 4.69E-15
 6.65E-15 8.21E-15 7.48E-15 6.00E-15 4.28E-15 2.52E-15 1.67E-15 9.29E-16
 7.43E-12 1.96E-12 5.63E-13 1.69E-13 8.18E-14 3.44E-14 1.41E-14 8.41E-15
 5.09E-15 2.99E-15 2.04E-15 1.13E-15 6.37E-16 6.99E-16 1.37E-15 3.06E-15
 4.29E-15 5.29E-15 4.90E-15 3.98E-15 2.88E-15 1.73E-15 1.16E-15 6.63E-16
 2.43E-11 5.74E-12 1.42E-12 3.58E-13 1.54E-13 5.60E-14 1.95E-14 1.07E-14
 6.01E-15 3.29E-15 2.17E-15 1.18E-15 6.19E-16 5.76E-16 9.45E-16 1.94E-15
 2.65E-15 3.21E-15 2.95E-15 2.40E-15 1.74E-15 1.06E-15 7.16E-16 4.15E-16
 1.06E-10 2.34E-11 5.14E-12 1.09E-12 4.14E-13 1.27E-13 3.67E-14 1.82E-14
 9.29E-15 4.63E-15 2.90E-15 1.52E-15 7.27E-16 5.48E-16 6.54E-16 1.12E-15
 1.45E-15 1.70E-15 1.54E-15 1.25E-15 9.04E-16 5.49E-16 3.74E-16 2.18E-16
 3.49E-10 7.62E-11 1.57E-11 2.93E-12 9.97E-13 2.63E-13 6.48E-14 2.94E-14
 1.39E-14 6.40E-15 3.84E-15 1.93E-15 8.66E-16 5.68E-16 4.95E-16 6.41E-16
 7.66E-16 8.53E-16 7.57E-16 6.10E-16 4.42E-16 2.70E-16 1.85E-16 1.09E-16
 8.73E-10 1.91E-10 3.78E-11 6.35E-12 1.97E-12 4.57E-13 9.86E-14 4.19E-14
 1.86E-14 8.16E-15 4.75E-15 2.31E-15 9.92E-16 6.01E-16 4.11E-16 3.69E-16
 3.76E-16 3.74E-16 3.15E-16 2.51E-16 1.80E-16 1.10E-16 7.59E-17 4.50E-17
 1.36E-09 3.02E-10 5.84E-11 9.28E-12 2.74E-12 6.03E-13 1.25E-13 5.13E-14
 2.21E-14 9.37E-15 5.34E-15 2.55E-15 1.07E-15 6.24E-16 3.80E-16 2.60E-16
 2.21E-16 1.86E-16 1.41E-16 1.09E-16 7.69E-17 4.69E-17 3.22E-17 1.91E-17
 1.67E-09 3.72E-10 7.14E-11 1.11E-11 3.24E-12 7.19E-13 1.47E-13 5.89E-14
 2.46E-14 1.01E-14 5.70E-15 2.68E-15 1.11E-15 6.38E-16 3.69E-16 2.14E-16
 1.55E-16 1.06E-16 6.72E-17 4.84E-17 3.27E-17 1.95E-17 1.33E-17 7.80E-18
C-----------------------------------------------------------------------
C
C  PHOTON EMISSIVITY COEFFICIENTS:
C
C  SOURCE SPECIFIC ION   FILE:/home/mog/adas/adf04/helike/helike_kvi97#he0.dat
C  SOURCE IONIS. COEFFT. FILE:/u/adas/adas/adf07/szd93#he/szd93#he_he0.dat
C  META. ION. COEFF. SELECTOR:  1(1,1)
C                               2(2,1)
```

```
C  POPULATION PROCESSING CODE:  ADAS208
C
C  ISEL  WAVELENGTH      TRANSITION            TYPE    METASTABLE  IMET NMET  IP
C  ----  ----------  ------------------------  -----  ------------ ---- ----  --
C   1.     584.4     5(1)1( 1.0)- 1(1)0(  .0)  EXCIT   1(1)0(  .0)   1     2
C   2.     537.0    11(1)1( 1.0)- 1(1)0(  .0)  EXCIT   1(1)0(  .0)   1     2
C   3.     522.2    19(1)1( 1.0)- 1(1)0(  .0)  EXCIT   1(1)0(  .0)   1     2
C   4.    5017.1    11(1)1( 1.0)- 3(1)0(  .0)  EXCIT   1(1)0(  .0)   1     2
C   5.    3965.7    19(1)1( 1.0)- 3(1)0(  .0)  EXCIT   1(1)0(  .0)   1     2

                          .       .       .

C  38.    7067.6     6(3)0( 1.0)- 4(3)1( 4.0)  RECOM  SEE                   +1
C  39.    5877.5     9(3)2( 7.0)- 4(3)1( 4.0)  RECOM  SEE                   +1
C  40.    4714.8    12(3)0( 1.0)- 4(3)1( 4.0)  RECOM  SEE                   +1
C  41.    4472.9    15(3)2( 7.0)- 4(3)1( 4.0)  RECOM  SEE                   +1
C  42.    7283.3     7(1)0(  .0)- 5(1)1( 1.0)  RECOM  SEE                   +1
C  43.    6680.0    10(1)2( 2.0)- 5(1)1( 1.0)  RECOM  SEE                   +1
C  44.    5049.0    13(1)0(  .0)- 5(1)1( 1.0)  RECOM  SEE                   +1
C  45.    4923.2    16(1)2( 2.0)- 5(1)1( 1.0)  RECOM  SEE                   +1
C
C   NOTES:  PROCESSED 19.11.97
C
C-------------------------------------------------------------------------------
```

ADF17

Provides condensed projection data. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS208

Formatted files to ADF17 specification :

Database Status Date = July, 29 1996 Data type = condensed projection matrices Data root = /.../adas/adas/adf17/

sequence	*members*	*libraries*	*Comments*	*Resolution*	*Quality*
Hydrogen	be3ls,c5ls,h0ls,he1ls,o7ls	cbnm93#h	Dickson '93 grids	LS metastable	medium
Helium	be2ls,c4ls,he0ls,o6ls	cbnm93#he	Dickson '93 grids	LS metastable	medium
Lithium	be1ls,c3ls,o5ls	cbnm93#li	Dickson '93 grids	LS metastable	medium
Beryllium	c2ls,o4ls	cbnm93#be	Dickson '93 grids	LS metastable	medium
Boron	c1ls,o3ls	cbnm93#b	Dickson '93 grids	LS metastable	medium
Carbon	o2ls	cbnm93#c	Dickson '93 grids	LS metastable	medium
Nitrogen	o1ls	cbnm93#n	Dickson '93 grids	LS metastable	medium
Oxygen	o0ls	cbnm93#o	Dickson '93 grids	LS metastable	medium

Notes:

Data lines : *Format:*

SEQM, NUCGM, NPRTM, MAXDM, MAXTM

IEDMAT,IECION,IETREC,IEDREC,IERREC,IEXREC,IERSYS,IEFPRS,IEFPRE

(DENSM(IN),IN=1,MAXTM)

(TEM(IT),IT=1,MAXTM)

for IPRT=1,NPRTM

```
        IPRTM, TRMPM, SPNPM
        for SPNSYS
                SSYSM(IPRT, ISYSM), NSHLM(IPRT,ISYSM)
                for IN=1,MAXDM
                        for IT=1,MAXTM
                                for I=1,NSHLM
                                        NM, (PCRTMP(I,J),J=1,5),
(PIOTMP(I,J),J=1,4),
                                        PRHTMP(I)
                                repeat
                                for I=1,NSHLM
                                        NM, (DCRTMP(I,J),J=1,5),
(DIOMAT(IT,IN,I,J),J=1,4),
                                        DTREC(IT,I),DDREC(IT,I),
DRREC(IT,I),DXREC(IT,I)
                                repeat
                                (PQPTMP(J),J=1,4)
                        repeat
                repeat
```

variable identification :

name	*meaning*
SEQM	sequence identifier
NUCGM	nuclear charge
NPRTM	number of parents
MAXDM	number of densities

MAXTM	number of densities
IEDMAT	(0=> PCRL added onto PCRMAT; 1=> not added)
IECION	(0=> PCION added onto PCRMAT; 1=> not added)
IETREC	(0=> PTREC added onto PCRRHS; 1=> not added)
IEDREC	(0=> PDREC added onto PCRRHS; 1=> not added)
IERREC	(0=> PRREC added onto PCRRHS; 1=> not added)
IEXREC	(0=> PXREC added onto PCRRHS; 1=> not added)
IERSYS	(0=> recom. rates multiplied by spin system weight 1=> not multiplied)
IEFPRS	
IEFPRE	
DENSM()	electron densities (cm-3)
TEM()	electron temperatures (K)
IPRTM	parent index
TRMPM	parent term specification
SPNPM	parent spin (multiplicity)
SSYSM(,)	spin systems based
NSHLM(,)	number of n-shells
NM	n-shell
PCRTMP(,)	projected collisional radiative matrix
PIOTMP(,)	projected ionisation matrix
PRHTMP()	projected right hand side matrix
DCRTMP()	projected direct colliisonal radiative matrix
DIOMAT(,,,)	direct collisional radiative ionisation matrix
DTREC(,)	direct three body recombination coefficients

DDREC(,)	direct dielectronic recombination coefficients
DRREC(,)	direct radiative recombination coefficients
DXREC(,)	direct charge exchange recombination coefficients
PQPTMP()	indirect parent QC coefficient

Table B17c - (data set right hand side incomplete - extended records used)

```
SEQUENCE = BE   NUCCHG = 6   NPARNT = 1   MAXD = 8   MAXT =12

IEDMAT = 0   IECION = 0   IETREC = 0   IEDREC = 0   IERREC = 0   IEXREC = 0   IERSYS = 0   IEFPRS = 0   IEFPRE = 1

NE(CM-3) =   2.19D+00  2.19D+03  2.19D+06  2.19D+09  2.19D+12  2.19D+15  2.19D+18  2.19D+21
TE(K)    =   4.50D+03  9.00D+03  1.80D+04  4.50D+04  9.00D+04  1.80D+05  4.50D+05  9.00D+05  1.80D+06  4.50D+06  9.00D+06  1.80D+07

IPRT =  1     TRMPRT = (2S)     SPNPRT =  2.
---------------------------------------------
                                          SPNSYS =  1.     NSHEL =  4
                                          --------------------------
ID= 1 IT= 1 N= 2   4.7110177062D-46-3.4695454293D+09-7.6262217993D+08-2.3980476208D+08                  1.1794820136D-62
            N= 3  -4.7110174206D-46 3.4695454293D+09-7.2823476024D+08-1.7848851190D+08                  4.5762217755D-24
            N= 4  -2.8548724255D-53-7.1165450634D-14 1.4908569402D+09-2.1873221154D+08                  6.6282007374D-17
            N= 5  -1.0462862210D-56-2.4392077064D-17-5.3979811644D-10 6.3702548552D+08                  1.9465468787D-13
      (DIR) N= 2   4.7110177062D-46-3.4695454293D+09-7.6262217993D+08-2.3980476208D+08                  1.1794820118D-62
            N= 3  -4.7110174206D-46 3.4695454293D+09-7.2823476024D+08-1.7848851190D+08                  4.5762217471D-24
            N= 4  -2.8548697673D-53-7.1165393594D-14 1.4908569402D+09-2.1873221154D+08                  6.6282006979D-17
            N= 5  -1.0427932507D-56-2.4317070644D-17-5.3824604211D-10 6.3702548552D+08                  1.9465468665D-13
                                                                                                        0.0000000000D+00

ID= 1 IT= 2 N= 2   5.3149309656D-27-3.4695454293D+09-7.6262217993D+08-2.3980476208D+08                  7.5730401486D-36
            N= 3  -5.3142292866D-27 3.4695454293D+09-7.2823476024D+08-1.7848851190D+08                  2.6304465451D-16
            N= 4  -6.9260886215D-31-1.1610445257D-10 1.4908569402D+09-2.1873221154D+08                  1.7395984088D-12
            N= 5  -9.0625678853D-33-1.3744224121D-12-1.5727158663D-08 6.3702548552D+08                  1.4395062543D-10
      (DIR) N= 2   5.3149303326D-27-3.4695454293D+09-7.6262217993D+08-2.3980476208D+08                  7.5730401423D-36
            N= 3  -5.3142290915D-27 3.4695454293D+09-7.2823476024D+08-1.7848851190D+08                  2.6304465385D-16
            N= 4  -6.9241949464D-31-1.1607863029D-10 1.4908569402D+09-2.1873221154D+08                  1.7395984046D-12
            N= 5  -8.8216911940D-33-1.3414624025D-12-1.5401533252D-08 6.3702548552D+08                  1.4395062505D-10
                                                                                                        0.0000000000D+00

                                          SPNSYS =  3.     NSHEL =  4
                                          --------------------------
ID= 1 IT= 1 N= 2   9.6942914961D-39-3.4398711235D+09-7.3080447937D+08-2.2699665813D+08                  2.0092571353D-55
            N= 3  -9.6942908721D-39 3.4398711235D+09-7.2823476024D+08-1.7848851190D+08                  4.5762217758D-24
            N= 4  -6.2380918324D-46-7.1165451714D-14 1.4590392396D+09-2.1873221154D+08                  6.6282007378D-17
            N= 5  -2.3286404147D-49-2.4393497335D-17-5.3982747696D-10 6.2421738157D+08                  1.9465468788D-13
      (DIR) N= 2   9.6942914961D-39-3.4398711235D+09-7.3080447937D+08-2.2699665813D+08                  2.0092571312D-55
            N= 3  -9.6942908721D-39 3.4398711235D+09-7.2823476024D+08-1.7848851190D+08                  4.5762217471D-24
            N= 4  -6.2380857480D-46-7.1165393594D-14 1.4590392396D+09-2.1873221154D+08                  6.6282006979D-17
            N= 5  -2.3206456406D-49-2.4317070644D-17-5.3824604211D-10 6.2421738157D+08                  1.9465468665D-13
                                                                                                        0.0000000000D+00

ID= 1 IT= 2 N= 2   2.5130119811D-23-3.4398711235D+09-7.3080447937D+08-2.2699665813D+08                  2.9863157116D-32
```

```
            N= 3  -2.5126601751D-23 3.4398711235D+09-7.2823476024D+08-1.7848851190D+08                2.6304465451D-16
            N= 4  -3.4717523370D-27-1.1610495867D-10 1.4590392396D+09-2.1873221154D+08                1.7395984089D-12
            N= 5  -4.6277813621D-29-1.3750699818D-12-1.5733519696D-08 6.2421738157D+08                1.4395062543D-10
      (DIR) N= 2   2.5130116492D-23-3.4398711235D+09-7.3080447937D+08-2.2699665813D+08                2.9863157082D-32
            N= 3  -2.5126600725D-23 3.4398711235D+09-7.2823476024D+08-1.7848851190D+08                2.6304465385D-16
            N= 4  -3.4707564194D-27-1.1607863029D-10 1.4590392396D+09-2.1873221154D+08                1.7395984046D-12
            N= 5  -4.5011377348D-29-1.3414624025D-12-1.5401533252D-08 6.2421738157D+08                1.4395062505D-10
                                                                                                      0.0000000000D+00
```

ADF18

Provides cross-referencing data. Formatting conventions and variable storage are given below.

Utilising subroutines :

ADAS208

Formatted files to ADF18 specification :

Database Status Date = July, 29 1996 Data type =expansion definition files Data root =/.../adas/adas/adf18/

Library	*Utilising code*	*Sequences*	*Prefix*	*Comments*
a09_a04	ADAS212	b,be,c,f,he,li,n,ne,o	nrb93	Prepares diel. data for specific ion files
a09_p204	ADAS204	b,be,c,f,he,li,n,ne,o	nrb93	Prepares diel. data for bundle-nS models
a17_p208	ADAS208	b,be,c,h,he,li,n,o	exp93	Maps projection data for association with specific ion files
(data set)*	ADAS310	bndlen_exp#h0.data		Maps

Notes:

a09_a04 data lines : *Format:*

/SEQINF/

(PTSYMA(K),K=1,NPARNT)

(NPTSPA(K),K=1,NPARNT)

(NSPSYS(K),K=1,NPARNT)

for IPARNT=1,NPARNT

IPARNT

(NSPNA(K,IPARNT), K=1,NSPSYS(IPARNT))

(NLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(IMAXSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(PLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(FLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

repeat

(N(ISHEL),ISHEL=1,NSHEL)

until end of file

INDA,LVSYMA,LSZDA, LSPA, LSHA, LPTA, (WGHTA(J),J=1,NSHEL)

variable identification :

name	*meaning*
SEQ	
DSNREF	specific ion reference file for expansion
DSNCPM	condensed projection file
NPARNT	number of parent states
NSHEL	number of n-shells involved in expansion
NLEV	number of energy levels in specific ion file
PTSYMA()	parent (term) symmetry
NPTSPA()	parent spin (multiplicity)
NSPSYS()	numbre of spin systems associated with parent
IPARNT	parent counter
NSPNA(,)	spin of recombined system (multiplicity)
NLWSTA(,)	lowest n-shell included for spin system
IMAXSTA(,)	
PLWSTA(,)	phase space occupancy factor for lowest n-shell for spin system

FLWSTA(,)	fractional parentage for ionisation from lowest level of spin system
N()	n-shells included in expansion
INDA	level index with respect to specific ion file for record
LVSYMA	level symmetry (including configuration) for record
LSZDA	SZD file selector for record (if required)
LSPA	spin system (multiplicity) for record
LSHA	active n-shell for record
LPTA	parent index for record
WGHTA()	weighting for n-shell in expansion for record

Table B18c

```
Specific ion input file
-----------------------
"ADASUSER"/adf04/clike/clike_mom97#c0.dat    : specific ion file

Badnell dielectronic files
--------------------------
"ADASCENT"/adf09/nrb93#b/nrb93#b_c1ls22.dat  : 1st. Badnell file
"ADASCENT"/adf09/nrb93#b/nrb93#b_c1ls23.dat  : 2nd. Badnell file

Output files
------------------------
"ADASUSER"/pass/postllev.pass         : supplemented spec. ion file
"ADASUSER"/pass/postllev.pass1        : dielectronic data for MAINCL codes

Level cross-reference lists for specific ion and badnell files
--------------------------------------------------------------

    sp.        bd1.        bd2.        bd3.        bd4.        bd5.        bd6.
    ---        ----        ----        ----        ----        ----        ----
      1           1           0
      2           2           0
      3           4           0
      4           3           0
      5           5           1
      6           6           2
      7         172           0
      8           7           3
      9           8           6
     10          11           9
     11          42          15
     12         171          84
     13         174           0
```

14	173	0
15	9	68
16	13	96
17	10	134
18	12	10
19	16	0
20	17	0
21	15	14
22	14	135
23	18	11
24	19	13
25	20	4
26	35	5
27	59	7
28	169	8
29	25	17
30	29	19
31	21	18
32	30	30
33	34	22
34	33	20
35	31	21
36	32	32
37	36	31
38	37	33
39	38	35
40	58	12
41	64	16
42	98	23
43	45	36
44	54	37
45	39	38
46	56	39
47	60	40
48	61	41
49	41	44
50	50	51
51	40	43
52	53	53
53	51	52
54	52	54
55	0	0
56	0	0
57	0	0
58	0	0
59	0	0
60	0	0
61	0	0
62	0	0
63	0	0
64	0	0

a09_p204 data lines : *Format:*

/SEQINF/

```
(PTSYMA(K),K=1,NPARNT)
(NPTSPA(K),K=1,NPARNT)
(NSPSYS(K),K=1,NPARNT)
for IPARNT=1,NPARNT
        IPARNT
        (NSPNA(K,IPARNT), K=1,NSPSYS(IPARNT))
        (NLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))
        (IMAXSTA(K,IPARNT), K=1,NSPSYS(IPARNT))
        (PLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))
        (FLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))
repeat
(N(ISHEL),ISHEL=1,NSHEL)
until end of file
        INDA,LVSYMA,LSZDA, LSPA, LSHA, LPTA, (WGHTA(J),J=1,NSHEL)
```

variable identification :

name	*meaning*
SEQ	
DSNREF	specific ion reference file for expansion
DSNCPM	condensed projection file
NPARNT	number of parent states
NSHEL	number of n-shells involved in expansion
NLEV	number of energy levels in specific ion file
PTSYMA()	parent (term) symmetry
NPTSPA()	parent spin (multiplicity)

NSPSYS()	numbre of spin systems associated with parent
IPARNT	parent counter
NSPNA(,)	spin of recombined system (multiplicity)
NLWSTA(,)	lowest n-shell included for spin system
IMAXSTA(,)	
PLWSTA(,)	phase space occupancy factor for lowest n-shell for spin system
FLWSTA(,)	fractional parentage for ionisation from lowest level of spin system
N()	n-shells included in expansion
INDA	level index with respect to specific ion file for record
LVSYMA	level symmetry (including configuration) for record
LSZDA	SZD file selector for record (if required)
LSPA	spin system (multiplicity) for record
LSHA	active n-shell for record
LPTA	parent index for record
WGHTA()	weighting for n-shell in expansion for record

Table B18c

```
ADAS204 driver dataset.
-----------------------
"ADASCENT"/adf25/bns96#c/bns96#c_c0.dat

Dielectronic recombination files.
---------------------------------
"ADASCENT"/adf09/nrb93#b/nrb93#b_c1ls22.dat    : 1st. file of diel. data
"ADASCENT"/adf09/nrb93#b/nrb93#b_c1ls23.dat    : 2nd. file of diel. data

Output file.
------------
"ADASUSER"/pass/adas204.pass     : passing file (not used at present)

Parent cross-reference lists for maincl and Badnell files
---------------------------------------------------------

    mn.        bd1.        bd2.        bd3.        bd4.        bd5.        bd6.
    ---        ----        ----        ----        ----        ----        ----
```

```
      1           1           1
      2           2           2
      3           3           3
      4           4           4
      5           5           0

Supplementary LS-breakdown autoionisation data between parent spin pairs
-------------------------------------------------------------------------

  (pmni,isysi ; pmnf)           ncut1    A Auger        slope
  -------------------           -----   ---------       -----
     2     2      1               4    1.115d+09
                                  5    3.967d+09
                                  6    1.750d+09
                                  7    1.077d+09
                                  8    8.581d+08
                                  9    8.595d+08
                                 10    7.019d+08
                                 11    6.149d+08
                                 12    6.373d+08
                                 13    5.763d+08
                                 14    5.194d+08
                                 15    3.699d+08
                                 16    3.000d+08
                                 18    1.672d+08
                                 20    1.038d+08
                                 22    6.726d+07
                                 25    3.781d+07       -5.0
```

a17_p208 data lines : *Format:*

/SEQINF/

(PTSYMA(K),K=1,NPARNT)

(NPTSPA(K),K=1,NPARNT)

(NSPSYS(K),K=1,NPARNT)

for IPARNT=1,NPARNT

IPARNT

(NSPNA(K,IPARNT), K=1,NSPSYS(IPARNT))

(NLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(IMAXSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(PLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(FLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

repeat

(N(ISHEL),ISHEL=1,NSHEL)

until end of file

INDA,LVSYMA,LSZDA, LSPA, LSHA, LPTA, (WGHTA(J),J=1,NSHEL)

variable identification :

name	*meaning*
SEQ	
DSNREF	specific ion reference file for expansion
DSNCPM	condensed projection file
NPARNT	number of parent states
NSHEL	number of n-shells involved in expansion
NLEV	number of energy levels in specific ion file
PTSYMA()	parent (term) symmetry
NPTSPA()	parent spin (multiplicity)
NSPSYS()	numbre of spin systems associated with parent
IPARNT	parent counter
NSPNA(,)	spin of recombined system (multiplicity)
NLWSTA(,)	lowest n-shell included for spin system
IMAXSTA(,)	
PLWSTA(,)	phase space occupancy factor for lowest n-shell for spin system
FLWSTA(,)	fractional parentage for ionisation from lowest level of spin system
N()	n-shells included in expansion
INDA	level index with respect to specific ion file for record

LVSYMA	level symmetry (including configuration) for record
LSZDA	SZD file selector for record (if required)
LSPA	spin system (multiplicity) for record
LSHA	active n-shell for record
LPTA	parent index for record
WGHTA()	weighting for n-shell in expansion for record

Table B18c

```
 &SEQINF SEQ='B ',
         DSNREF='"ADASUSER"/adf04/blike/blike_mom97#c1.dat',
         DSNCPM='"ADASUSER"/adf17/cbnm96#b/cbnm96#b_c1ls.dat'
         NPARNT=2,
         NSHEL=5,
         NLEV=67,
 &END

       PARENT      :(1S)       :(3P)       :          :          :
       SPINPRT     :1          :3          :          :          :
       NSPNSYS     :1          :2          :          :          :

    PARENT =  1
    -----------
       SPINSYS     :2          :           :          :          :
       LOWESTN     :2          :           :          :          :
       IMAX        :2          :           :          :          :
       LOWESTP     :1.0        :           :          :          :
       FRPARNT     :0.25       :           :          :          :

    PARENT =  2
    -----------
       SPINSYS     :2          :4          :          :          :
       LOWESTN     :2          :2          :          :          :
       IMAX        :1          :2          :          :          :
       LOWESTP     :1.0        :1.0        :          :          :
       FRPARNT     :0.75       :1.0        :          :          :


 RESOLVED NL  <-- BUNDLE-N               N:1     N:2     N:3     N:4     N:5

INDX CODE                 SZD SP SH PT   N-SHELL NORMALISED WEIGHTS
---- ----                 --- -- -- --   --------------------------
  1* 2S2 2P    (2)1( 2.5)   0  2  2  1  :       : 0.25  :       :       :
  1  2S2 2P    (2)1( 2.5)   0  2  2  2  :       : 0.25  :       :       :
  2* 2S1 2P2   (4)1( 5.5)   0  4  2  2  :       : 1.00  :       :       :
  3  2S1 2P2   (2)2( 4.5)   0  2  2  1  :       : 0.4167:       :       :
  3  2S1 2P2   (2)2( 4.5)   0  2  2  2  :       : 0.4167:       :       :
  4  2S1 2P2   (2)0( 0.5)   0  2  2  1  :       : 0.0833:       :       :
```

4	2S1 2P2	(2)0(0.5)	0	2	2	2	:	:	0.0833:	:	:	:	
5	2S1 2P2	(2)1(2.5)	0	2	2	1	:	:	0.25 :	:	:	:	
5	2S1 2P2	(2)1(2.5)	0	2	2	2	:	:	0.25 :	:	:	:	
6	2S2 3S	(2)0(0.5)	0	2	3	1	:	:	:	0.1111:	:	:	
7	2S2 3P	(2)1(2.5)	0	2	3	1	:	:	:	0.3333:	:	:	
8	2P3	(4)0(1.5)	0	4	2	0	:	:	:	:	:	:	
9	2S2 3D	(2)2(4.5)	0	2	3	1	:	:	:	0.5556:	:	:	
10	2P3	(2)2(4.5)	0	2	2	0	:	:	:	:	:	:	
11	2S2P 3S	(4)1(5.5)	0	4	3	2	:	:	:	0.1111:	:	:	
12	2S2 4S	(2)0(0.5)	0	2	4	1	:	:	:	:	:	0.0625:	
13	2P3	(2)1(2.5)	0	2	2	0	:	:	:	:	:	:	
14	2S2 4P	(2)1(2.5)	0	2	4	1	:	:	:	:	:	0.1875:	
15	2S2P 3S	(2)1(2.5)	0	2	3	2	:	:	:	0.1111:	:	:	
16	2S2 4D	(2)2(4.5)	0	2	4	1	:	:	:	:	:	0.3125:	
17	2S2 4F	(2)3(6.5)	0	2	4	1	:	:	:	:	:	0.4375:	
18	2S2P 3P	(4)2(9.5)	0	4	3	2	:	:	:	0.1852:	:	:	
19	2S2P 3P	(4)0(1.5)	0	4	3	2	:	:	:	0.0371:	:	:	
20	2S2P 3P	(2)1(2.5)	0	2	3	2	:	:	:	0.1111:	:	:	
21	2S2 5S	(2)0(0.5)	0	2	5	1	:	:	:	:	:	:	0.0400
22	2S2 5P	(2)1(2.5)	0	2	5	1	:	:	:	:	:	:	0.1200
23	2S2P 3P	(4)1(5.5)	0	4	3	2	:	:	:	0.1111:	:	:	
24	2S2 5D	(2)2(4.5)	0	2	5	1	:	:	:	:	:	:	0.2000
25	2S2 5F	(2)3(6.5)	0	2	5	1	:	:	:	:	:	:	0.2800
26	2S2 5G	(2)4(8.5)	0	2	5	1	:	:	:	:	:	:	0.3600
27	2S2P 3P	(2)2(4.5)	0	2	3	2	:	:	:	0.1852:	:	:	
28	2S2P 3P	(2)0(0.5)	0	2	3	2	:	:	:	0.0371:	:	:	
29	2S2P 3D	(4)3(13.5)	0	4	3	2	:	:	:	0.2592:	:	:	
30	2S2P 3D	(4)2(9.5)	0	4	3	2	:	:	:	0.1852:	:	:	
31	2S2P 3D	(2)2(4.5)	0	2	3	2	:	:	:	0.1852:	:	:	
32	2S2P 3D	(4)1(5.5)	0	4	3	2	:	:	:	0.1111:	:	:	
33	2S2P 3D	(2)3(6.5)	0	2	3	2	:	:	:	0.2592:	:	:	
34	2S2P 3D	(2)1(2.5)	0	2	3	2	:	:	:	0.1111:	:	:	
35	2S2P 3S	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
36	2S2P 3P	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
37	2S2P 3P	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
38	2S2P 3P	(2)0(0.5)	0	2	3	0	:	:	:	:	:	:	
39	2S2P 3D	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
40	2S2P 3D	(2)3(6.5)	0	2	3	0	:	:	:	:	:	:	
41	2S2P 3D	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
42	2S2 3S	(4)1(5.5)	0	4	3	0	:	:	:	:	:	:	
43	2S2 3P	(2)0(0.5)	0	2	3	0	:	:	:	:	:	:	
44	2S2 3S	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
45	2S2 3P	(4)2(9.5)	0	4	3	0	:	:	:	:	:	:	
46	2S2 3P	(4)1(5.5)	0	4	3	0	:	:	:	:	:	:	
47	2S2 3P	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
48	2S2 3S	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
49	2S2 3P	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
50	2S2 3P	(4)0(1.5)	0	4	3	0	:	:	:	:	:	:	
51	2S2 3D	(4)3(13.5)	0	4	3	0	:	:	:	:	:	:	
52	2S2 3D	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
53	2S2 3D	(4)2(9.5)	0	4	3	0	:	:	:	:	:	:	
54	2S2 3P	(2)3(6.5)	0	2	3	0	:	:	:	:	:	:	
55	2S2 3D	(4)1(5.5)	0	4	3	0	:	:	:	:	:	:	
56	2S2 3D	(2)3(6.5)	0	2	3	0	:	:	:	:	:	:	
57	2S2 3D	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
58	2S2 3P	(2)2(4.5)	0	2	3	0	:	:	:	:	:	:	
59	2S2 3P	(2)1(2.5)	0	2	3	0	:	:	:	:	:	:	
60	2S2 3D	(2)4(8.5)	0	2	3	0	:	:	:	:	:	:	

```
61  2S2 3D    (2)3( 6.5)   0  2  3  0  :       :       :       :       :
62  2S2 3D    (2)2( 4.5)   0  2  3  0  :       :       :       :       :
63  2S2 3D    (2)0( 0.5)   0  2  3  0  :       :       :       :       :
64  2S2 3D    (2)1( 2.5)   0  2  3  0  :       :       :       :       :
65  2S2 3S    (2)0( 0.5)   0  2  3  0  :       :       :       :       :
66  2S2 3P    (2)1( 2.5)   0  2  3  0  :       :       :       :       :
67  2S2 3D    (2)2( 4.5)   0  2  3  0  :       :       :       :       :
```

a23_a04 data lines : *Format:*

/SEQINF/

(PTSYMA(K),K=1,NPARNT)

(NPTSPA(K),K=1,NPARNT)

(NSPSYS(K),K=1,NPARNT)

for IPARNT=1,NPARNT

IPARNT

(NSPNA(K,IPARNT), K=1,NSPSYS(IPARNT))

(NLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(IMAXSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(PLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

(FLWSTA(K,IPARNT), K=1,NSPSYS(IPARNT))

repeat

(N(ISHEL),ISHEL=1,NSHEL)

until end of file

INDA,LVSYMA,LSZDA, LSPA, LSHA, LPTA, (WGHTA(J),J=1,NSHEL)

variable identification :

name	*meaning*
SEQ	

DSNREF	specific ion reference file for expansion
DSNCPM	condensed projection file
NPARNT	number of parent states
NSHEL	number of n-shells involved in expansion
NLEV	number of energy levels in specific ion file
PTSYMA()	parent (term) symmetry
NPTSPA()	parent spin (multiplicity)
NSPSYS()	numbre of spin systems associated with parent
IPARNT	parent counter
NSPNA(,)	spin of recombined system (multiplicity)
NLWSTA(,)	lowest n-shell included for spin system
IMAXSTA(,)	
PLWSTA(,)	phase space occupancy factor for lowest n-shell for spin system
FLWSTA(,)	fractional parentage for ionisation from lowest level of spin system
N()	n-shells included in expansion
INDA	level index with respect to specific ion file for record
LVSYMA	level symmetry (including configuration) for record
LSZDA	SZD file selector for record (if required)
LSPA	spin system (multiplicity) for record
LSHA	active n-shell for record
LPTA	parent index for record
WGHTA()	weighting for n-shell in expansion for record

Table B18c

```
Specific ion input file
```

```
------------------------
"ADASCENT"/adf04/belike/belike_jl1990c.dat    : specific ion file for supplementation

Ionisation file (Griffin)
-------------------------
"ADASUSER"/adf23/grf95#be/belike_th_c2ls.dat   : file of ionis. & excit/auto. data

Output files
------------------------
"ADASUSER"/pass/adas213_adf04.pass            : supplemented specific ion file

Term/parent cross-reference lists for specific ion and ionisation file
-----------------------------------------------------------------------
  adf04-trm   adf23-trm
  ---------   ---------
      1           1
      2           2

  adf04-ptrm  adf23-ptrm
  ----------  ----------
     +1          +1
     +2          +2

C-------------------------------------------------------------------------------
C
C  Note
C  ----
C  (a) For ionisation, different adf23-lvls referenced to the same adf04-lvl
C      implies summing over the multiple adf23-lvls and accumulating in the
C      adf04-lvl.
C  (b) For excitation, no radiative A-value is entered in the first column
C      following the transition indexing.  This must be added separately if
C      the excitation line is not present in the original data set.  If there
C      is already an excitation transition line, then the radiative A-value is
C      kept and the collisional-data is substituted.
C  (c) '+' signs are used for parent indices.
C  (d) Term coupling datas sets have 'trm' in the headings.  Intermediate
C       coupling datasets have 'lvl' in the headings.
C-------------------------------------------------------------------------------
```

ADF23

Formatting conventions and variable storage suggested for transfer files from Pindzola/Griffin ionisation calculations. Data for an ion is specified by the isoelectronic sequence of the initial (ie. ionising) ion and nuclear charge of the element. An indexed list of LS resolved final (ionised) ion terms is given, with the metastables distinguished by *'s. The other final terms are ordinary terms which may occur as the final term of a direct ionising or autoionising event. An indexed list of terms of the initial ion is given composed of the initial metastable terms (*'d) and then an LS resolved set of auto-ionising terms accessible by excitation. These are relevant to population stucture of the ionising ion. A table of autoionisation rates follows the list connecting the resolved initial ion autoioising terms to the various resolved final terms. There are then distinct blocks of data for each LS-resolved initial metastable term. The direct ionisation rates to the resolved final terms are given first. These data may incorporate autoionisations via parents not identified in the final term list. Then the direct excitations to the resolved autoionising terms are given. Sub-blocks then follow according to spin system and final parent. Only data for the *'d parent metastables is given. A representative n-shell indexing is used. This index is associated to n-shell in an immediately following block which gives the autoionisation rates to the metastable parent terms. Excitation to parent and spin system separated autoionising n-shells is then given. Representative bundle-n levels are used. In this organisation, ionisation and excitation data is provided as a function of temperature. Up to 10 temperatures may be given with some preference for using the temperature set Te(k)=z1**2*theta(k)

where z1 is the recombining ion charge and theta = 1.0d3, 2.0d3, 5.0d3,1.0d4, 2.0d4,5.0d4, 1.0d5, 2.0d5, 5.0d5, 1.0d6

Utilising subroutines :

JETSHP.ADAS9120.fort(ADAS204)-generalised collisional dielectronic calculations

JETSHP.ADAS9120.fort(ADAS208)-low level population/projection calculation, line emission and power

Formatted files to ADF23 specification :

Database Status Date = July, 29 1996 Data type =cio files Data root =/.../adas/adas/adf23/

Ionising seq.	*Members*	*Library*	*Prefix*	*Comments*	*Quality*
H-like.		grf95#h	th	LS resolution	medium
He-like	b3,be2,c4,n5,o6	grf95#he	th	LS resolution	medium
Li-like	b2,be1,c3,n4,o5	grf95#he	th, exp	LS resolution	medium
Be-like	b1,be0,c2,n3,o4	grf95#he	th	LS resolution	medium
B-like	b0,c1,n2,o3	grf95#he	th	LS resolution	medium
C-like	c0,n1,o2	grf95#he	th, exp	LS resolution	medium
N-like	n0,o1	grf95#he	th, exp	LS resolution	medium
N-like	o0	grf95#he	th, exp	LS resolution	medium

Notes: 1. The prefixes ‘th’ indicates that the normalisation of the state selective metastable resolved data is to give consistency with the best available theoretical data for the unresoved inisation from the ground state. The prefixes ‘exp’ indicates that the normalisation of the state selective metastable resolved data is to give consistency with the best available experimental data for the unresoved inisation from the ground state.

Data lines : *Format:*

```
seq='SEQ'   nucchg=IZ0                                  ADFID
final term indexing         bwnf= BWNF  nprf = NPRF
 --------------------
indf code       S L   WJ      wnf
---- ----       - -   --  ----------
for indf=1,NPRF
            INDF CCFI          TRFI        WNFI
repeat
initial term indexing       bwni= BWNI  nlev = NLEV
 ----------------------
indf code       S L   WJ      wnf
---- ----       - -   --  ----------
for indi=1,NLEV
            INDI CCII          TRII        WNII
repeat
Auger rates
-----------
indi\indf           1        2        3  .... NPRF
---------
for indi=(.ne.*), NLEV
```

```
        INDI            AA1IF     AA2IF     AA3IF  .... NPRF
repeat
for INDI=1,NLEV(.and.*)
        ------------------------------------------
        meti*=MI  nsys = NSYSI  nrep=NREP

        ionis rates
        -----------
           indf  Te=     TE1       TE2       TE3      TE4       TE5       TE6  .....
            ----  ---
        for indf=1,NPRF
                    INDF        QI1IF     QI2IF     QI3IF     QI4IF     QI5IF     QI6IF                repeat
        excit rates
         -----------
            indi  Te=     TE1       TE2       TE3      TE4       TE5       TE6  .....
            ----  ---
        for indi=1,NLEV (indi.ne.*)
                    INDI        EX1II     EX2II     EX3II     EX4II     EX5II     EX6II  .             repeat
        for metf=1,NPRF (metf.eq.*)
                for isys=1,NSYS
                                                    --------------------------
                                                    metf*=MF sys =IS spnsys=SS
                        Auger rates
                        -----------
                        irep   n    f =       IF1       IF2  ....
```

```
                    ----   -   -
                for irep=1,NREP
                        IREP   N     AN1IF     AN2IF  ....          T6I
                repeat
                    excit rates
                    -----------
                    irep  Te=    TE1     TE2     TE3     TE4     TE5     TE6  .                    ----  ---
                for irep=1,NREP
                        IREP  N1II EN2II EN3II  EN4II  EN5II EN6II                    repeat
            repeat
        repeat
    repeat
```

variable identification :

name	*meaning*
SEQ	sequence identifier for initial ion (two characters)
IZ0	nuclear charge
ADFID	ADAS data file type code (ADF23)
BWNF	binding wave number of lowest final term (cm-1)
NPRF	number of final terms
INDF	ndex of final terms
CCFI	configuration (or Eissner code thereof) for final term
TRFI	term and weight (wt=2*wj+1) specification for term
WNFI	energy of final term relative to lowest (cm-1)
BWNI	binding wave number of lowest initial term (cm-1)

NLEV	number of terms specified in initial ion
INDI	index of initial terms
CCII	configuration (or Eissner code thereof) for initial term
TRII	term and weight (wt=2*wj+1) specification for term
WNRI	energy of initial term relative to lowest (cm-1)
AA1IF,--	Auger rates from initial (autoionising only) terms to final terms (sec-1)
MI	initial ion metastable index
NSYSI	number of spin systems for autoionising n-shells of initial ion
NREP	number of representative n-shells of initial ion
TE1 ,--	electron temperatures (K)
QI1IF,--	ionisation rate coefficients from initial metastable term to final terms (cm+3 sec-1)
EX1II,--	excitation rate coefficients from initial metastable term to autoionising initial ion terms (cm+3 sec-1)
MF	final ion metastable index
IS	initial ion spin system index
SS	initial ion spin (2S+1)
IF1 ,--	index of final metastable terms
IREP	index of representative n-shells
N	principal quantum number
AN1IF,--	Auger rate coefficients (sec-1) from nS shell of initial ion to final metastable term
EN1II,--	Excitation rate coefficients to nS shell built on

final parent metastable MF from initial metastable MI

Table B23c - example.

```
seq ='Cl'    nucch1 =18                                                    ADF23

  final term indexing        bwnf =    328458.6     nprf = 23
  --------------------
  indf    code           S L   WJ       wnf
  ----    ----           - -   --  ------------
    1  3s23p43d0        (3)1( 4.0)          0.0
    2  3s23p43d0        (1)2( 2.0)      13662.9
    3  3s23p43d0        (1)0( 0.0)      32915.2
    4  3s13p53d0        (3)1( 4.0)     113957.2
    5  3s13p53d0        (1)1( 1.0)     143670.4
    6  3s23p33d1        (5)2(12.0)     144347.9
    7  3s23p33d1        (3)2( 7.0)     156397.7
    8  3s23p33d1        (1)2( 2.0)     177069.5
    9  3s23p33d1        (1)0( 0.0)     182642.8
   10  3s23p33d1        (3)3(10.0)     185207.6
   11  3s23p33d1        (3)3(10.0)     186062.5
   12  3s23p33d1        (3)2( 7.0)     187014.3
   13  3s23p33d1        (3)1( 4.0)     187417.5
   14  3s23p33d1        (3)4(13.0)     190272.7
   15  3s23p33d1        (1)4( 4.0)     195257.2
   16  3s23p33d1        (1)1( 1.0)     202572.6
   17  3s23p33d1        (3)0( 1.0)     204177.6
   18  3s23p33d1        (3)2( 7.0)     210194.4
   19  3s23p33d1        (3)1( 4.0)     213598.1
   20  3s23p33d1        (1)3( 3.0)     213799.7
   21  3s23p33d1        (1)1( 1.0)     251893.0
   22  3s23p33d1        (1)2( 2.0)     252207.5
   23  3s23p33d1        (1)3( 3.0)     253118.9

  initial term indexing      bwni =    222905.6     nlev =  3
  --------------------
  indi    code           S L   WJ       wni
  ----    ----           - -   --  ------------
    1  3s23p53d0        (2)1( 2.5)          0.0
    2  3s23p43d1        (4)2( 9.5)     131991.6
    3  3s23p43d1        (4)3(13.5)     142702.5

-------------------------------------------------------------------------------
meti*= 1

  ionis rates
  -----------
  indf Te= 8.00D+03  2.00D+04  4.00D+04  8.00D+04  2.00D+05  4.00D+05  8.00D+05  2.00D+06  4.00D+06  8.00D+06  2.00D+07  4.00D+07
  ---- ---
    1      1.05D-26  1.13D-15  6.32D-12  5.18D-10  7.46D-09  1.85D-08  2.93D-08  3.75D-08  3.83D-08  3.57D-08  2.96D-08  2.45D-08
    2      4.51D-28  2.26D-16  2.12D-12  2.26D-10  3.83D-09  9.99D-09  1.63D-08  2.13D-08  2.20D-08  2.06D-08  1.72D-08  1.42D-08
    3      2.45D-30  1.08D-17  2.07D-13  3.21D-11  6.82D-10  1.92D-09  3.26D-09  4.38D-09  4.58D-09  4.33D-09  3.64D-09  3.03D-09
    4      4.35D-36  5.59D-20  1.45D-14  8.11D-12  4.07D-10  1.59D-09  3.16D-09  4.54D-09  4.73D-09  4.38D-09  3.53D-09  2.85D-09
    5      6.54D-39  2.18D-21  1.66D-15  1.60D-12  1.12D-10  4.89D-10  1.04D-09  1.55D-09  1.65D-09  1.55D-09  1.26D-09  1.02D-09
    6      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    7      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    8      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    9      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
```

10	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
11	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
12	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
13	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
14	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
15	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
16	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
17	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
18	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
19	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
20	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
21	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
22	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
23	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00

---

meti*= 2

ionis rates

indf	Te= 8.00D+03	2.00D+04	4.00D+04	8.00D+04	2.00D+05	4.00D+05	8.00D+05	2.00D+06	4.00D+06	8.00D+06	2.00D+07	4.00D+07
1	3.22D-15	8.71D-11	2.87D-09	1.73D-08	5.20D-08	7.34D-08	8.29D-08	7.99D-08	7.11D-08	6.03D-08	4.62D-08	3.68D-08
2	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
3	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
4	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
5	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
6	9.42D-28	1.80D-16	1.16D-12	1.02D-10	1.65D-09	4.33D-09	6.96D-09	8.63D-09	8.44D-09	7.50D-09	5.82D-09	4.59D-09
7	7.06D-30	5.05D-18	5.05D-14	5.53D-12	1.02D-10	2.82D-10	4.65D-10	5.88D-10	5.80D-10	5.18D-10	4.04D-10	3.20D-10
8	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
9	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
10	2.12D-31	3.55D-18	1.01D-13	1.88D-11	4.80D-10	1.48D-09	2.60D-09	3.44D-09	3.47D-09	3.14D-09	2.48D-09	1.97D-09
11	3.63D-31	6.68D-18	1.97D-13	3.70D-11	9.55D-10	2.95D-09	5.20D-09	6.89D-09	6.95D-09	6.29D-09	4.97D-09	3.95D-09
12	2.73D-32	5.57D-19	1.70D-14	3.25D-12	8.48D-11	2.63D-10	4.65D-10	6.16D-10	6.21D-10	5.63D-10	4.45D-10	3.53D-10
13	1.37D-31	2.92D-18	9.03D-14	1.74D-11	4.57D-10	1.42D-09	2.51D-09	3.33D-09	3.36D-09	3.04D-09	2.40D-09	1.91D-09
14	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
15	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
16	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
17	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
18	2.84D-33	7.32D-19	5.19D-14	1.52D-11	5.13D-10	1.74D-09	3.23D-09	4.44D-09	4.55D-09	4.17D-09	3.32D-09	2.65D-09
19	3.93D-34	1.47D-19	1.18D-14	3.68D-12	1.29D-10	4.44D-10	8.30D-10	1.15D-09	1.18D-09	1.08D-09	8.61D-10	6.88D-10
20	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
21	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
22	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
23	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00

---

meti*= 3

ionis rates

indf	Te= 8.00D+03	2.00D+04	4.00D+04	8.00D+04	2.00D+05	4.00D+05	8.00D+05	2.00D+06	4.00D+06	8.00D+06	2.00D+07	4.00D+07
1	2.21D-14	1.85D-10	4.09D-09	2.02D-08	5.32D-08	7.14D-08	7.83D-08	7.39D-08	6.51D-08	5.48D-08	4.17D-08	3.31D-08
2	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
3	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
4	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00
5	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00	0.00D+00

```
     6      6.57D-27  3.90D-16  1.70D-12  1.23D-10  1.76D-09  4.42D-09  6.94D-09  8.45D-09  8.21D-09  7.25D-09  5.61D-09  4.41D-09
     7      4.92D-29  1.09D-17  7.38D-14  6.65D-12  1.09D-10  2.88D-10  4.64D-10  5.77D-10  5.65D-10  5.02D-10  3.90D-10  3.08D-10
     8      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
     9      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    10      2.12D-30  1.10D-17  2.12D-13  3.23D-11  7.33D-10  2.17D-09  3.72D-09  4.84D-09  4.84D-09  4.36D-09  3.43D-09  2.72D-09
    11      9.06D-31  5.16D-18  1.03D-13  1.59D-11  3.64D-10  1.08D-09  1.86D-09  2.42D-09  2.42D-09  2.18D-09  1.72D-09  1.36D-09
    12      7.62D-31  4.82D-18  9.94D-14  1.57D-11  3.62D-10  1.08D-09  1.86D-09  2.43D-09  2.43D-09  2.19D-09  1.72D-09  1.37D-09
    13      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    14      1.63D-30  1.47D-17  3.41D-13  5.71D-11  1.37D-09  4.13D-09  7.17D-09  9.41D-09  9.44D-09  8.52D-09  6.71D-09  5.33D-09
    15      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    16      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    17      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    18      1.62D-33  1.29D-19  6.21D-15  1.50D-12  4.48D-11  1.46D-10  2.65D-10  3.58D-10  3.64D-10  3.32D-10  2.63D-10  2.10D-10
    19      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    20      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    21      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    22      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
    23      0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
C-----------------------------------------------------------------------
C  Data generated by Donald C. Griffin   on 08/17/96
C
C  The rates involving ionization from the  3p subshell of the ground-state
C  configuration were determined using the experimental data of:
C  Mueller et al.
C  The rates for all other subshells were generated from configuration-
C  average cross sections, with non-relativistic wavefunctions , using the
C  relaxed-core approximation, the post form  for the scattering potentials,
C  and the  natural-phase approximation.
C  They were then multiplied by the appropriate angular coefficients.
C-----------------------------------------------------------------------
```

ADF24

Provides state selective charge exchange cross-sections for partially stripped receivers. Cross-sections are stored in indexed lists with a detailed description in the comments section at the tail of the data set.

Utilising subroutines :

ADAS509

Formatted files to ADF24 specification :

Database Status Date = July, 29 1996 Data type = scx files Data root = /.../adas/adas/adf24/

Donor	*Receiver/member*	*Prefix*	*Library*	*Comments*	*Quality*
H0	c1,c2,c3,c4,c5,c6	cfm	scx#h0	Maggi assessment	medium

Notes:

Data lines :	*Format:*
NBSEL	i5
for IBLK = 1 to NBSEL	
SYMD, IZD,IREFD, SYMR, IZR, IREFR, NEN,CFSTAT, CTYPE,ALPH0,ISEL	a2,1x,i2,1x,a3,1x,a2,1x,i2,1x,a3,i4,5x,a10,6x,a2, 7x,d10.2,5x,i5
(EEA(IE), IE=1,NEN)	6d10.2
(SCX(IE), IE=1,NEN)	6d10.2
repeat	

variable identification :

name	*meaning*
NBSEL	number of cross-sections indexed
SYMD	chemical symbol of donor
IZD	charge of donor
IREFD	non-mandatory index of donor level in standard energy level list (usually in brackets)
SYMR	chemical symbol of receiver
IZR	charge of receiver
IREFR	non-mandatory index of receiver level in standard energy level list (usually in brackets)
NEN	number of energies at which cross-section is tabulated
CFSTAT	receiving level quantum number specification
CTYPE	cross-section type for determining low energy extrapolation (set to 1 - not implemented)
ALPH0	extrapolation parameter (set to 0.00d+00 - not implemented)
ISEL	index number of cross-section block
EEA()	energies (eV/amu)
SCX()	cross-sections (cm2)

Table B24c - example.

```
    2
H + 0 (1)/C + 1 (1)  24/FST= 2p2 (3P) /TYPE= 1/ALPH0=  0.00E+00/ISEL=    1
 2.000D+00 5.000D+00 1.000D+01 2.000D+01 3.000D+01 5.000D+01
 7.000D+01 1.000D+02 2.000D+02 3.000D+02 4.000D+02 5.000D+02
 7.000D+02 1.000D+03 2.000D+03 4.000D+03 7.000D+03 1.000D+04
 2.000D+04 4.000D+04 7.000D+04 1.000D+05 2.000D+05 3.300D+05
 5.000D-22 3.000D-21 1.500D-20 1.000D-19 4.000D-19 1.500D-18
 4.000D-18 1.000D-17 5.000D-17 1.000D-16 2.000D-16 3.000D-16
 5.000D-16 7.000D-16 8.290D-16 8.060D-16 7.220D-16 6.100D-16
 3.910D-16 1.920D-16 6.940D-17 2.810D-17 3.670D-18 5.630D-19
H + 0 (1)/C + 1 (1)  24/FST= Total    /TYPE= 1/ALPH0=  0.00E+00/ISEL=    2
 2.000D+00 5.000D+00 1.000D+01 2.000D+01 3.000D+01 5.000D+01
 7.000D+01 1.000D+02 2.000D+02 3.000D+02 4.000D+02 5.000D+02
 7.000D+02 1.000D+03 2.000D+03 4.000D+03 7.000D+03 1.000D+04
 2.000D+04 4.000D+04 7.000D+04 1.000D+05 2.000D+05 3.300D+05
 5.000D-22 3.000D-21 1.500D-20 1.000D-19 4.000D-19 1.500D-18
```

```
 4.000D-18 1.000D-17 5.000D-17 1.000D-16 2.000D-16 3.000D-16
 5.000D-16 7.000D-16 8.290D-16 8.060D-16 7.220D-16 6.100D-16
 3.910D-16 1.920D-16 6.940D-17 2.810D-17 3.670D-18 5.630D-19
C-----------------------------------------------------------------------
C  ISEL   DONOR STATE  RECVR. STATE  FINAL STATE  TYPE
C  ----   -----------  ------------  -----------  ----
C    1     H + 0 (1)    C + 1 (1)    2s2 2p2 (3P)   1
C    2     H + 0 (1)    C + 1 (1)      Total        1
C
C
C  NOTES:
C  ------
C  1.Preferred curve compiled from the following data:
C    * R.A. Phaneuf et al., Nucl. Fusion 75 (1992) Vol 2 (Supplement
C       of Atomic and Plasma-Material Interaction Data for Fusion).
C      (this is from the original compilation ORNL-6090, 1987).
C    * P.C. Stancil et al., submitted to Astrophys. J., Nov. 1997.
C
C  2. Total capture assumed into ground state!!
C  3. Cross section values below 20 eV/amu extrapolated at constant
C     slope down to to 2 eV/amu (=threshold for this endothermic reaction).
C
C
C   Producer:        C.F. Maggi
C   Date:            08/12/97
C
C-----------------------------------------------------------------------
```

ADF25

Provides driver data-sets for ADAS204 bundle-n population calculations.

Utilising subroutines :

ADAS204

Formatted files to ADF25 specification :

Database Status Date = July, 29 1996 Data type = ADAS204 drivers Data root = /.../adas/adas/adf25/

sequence	*members*	*Ions*	*libraries*	*Comments*	*Resolution*
Hydrogen	h	h0,he1,be3,c5,o7	bns93#h	Dickson '93	LS
Helium	he	he0,be2,c4,o6	bns93#he	Dickson '93	LS
Lithium	li	be1,c3,o5	bns93#li	Dickson '93	LS
Beryllium	be	be0,c2.o4	bns93#be	Dickson '93	LS
Boron	b	c1,o3	bns93#b	Dickson '93	LS
Carbon	c	c0,o2	bns93#c	Dickson '93	LS
Nitrogen	n	o1	bns93#n	Dickson '93	LS
Oxygen	o	o0	bns93#o	Dickson '93	LS

Notes:

Data lines : *Format:*

ZT, SVREF, SPEC, DATE, CODE

NEB, NDT, TREF

(EB(IEB), IEB=1,NEB)

(DT(IDT), IDT=1,NDT)

for IDT = 1 to NDT

(SV(IEB,IDT), IEB=1,NEB)

repeat

TT, EREF, DREF

TT(ITT), ITT=1,NTT)

SVT(ITT), ITT=1,NTT)

variable identification :

name	*meaning*
ZT	charge of target ion
SVREF	beam emission coefft. at reference beam energy, target density and temperature
SPEC	specification of target (text) (eg. BE)
DATE	date of calculation
CODE	name of source computer code for calculation
NEB	number of beam energies
NDT	number of target densities
TREF	reference target temperature (eV)
EB()	beam energies (eV/amu)
DT()	target densities (cm-3)
SV(,)	beam emission coefficient (cm3 s-1) at reference temp. 1st parameter - beam energy 2nd parameter - target density
NTT	number of target temperatures
EREF	reference beam energy (eV/amu)
DREF	reference target density (cm-3)
TT()	target temperatures (eV)

SVT() beam emission coefficient (cm3 s-1) at reference beam energy and target density

Table B25c - example.

```
 &FILINFO  NUCCHG= 6, NPARNT=2, SEQ='b ', XRMEMB='c1n     ',  &END
   24   24  4.00D+06  0.00D+00  2.00D+00  1.00D+00  1.00D+00  1.00D+00
    0    4    1    0
  1.28D+03  1.28D+04  1.28D+05  1.28D+06  1.28D+07  1.28D+08  3.84D+08
  1.28D+09  3.84D+09  1.28D+10  3.84D+10  1.28D+11  3.84D+11  1.28D+12
  3.84D+12  1.28D+13  3.84D+13  1.28D+14  3.84D+14  1.28D+15  3.84D+15
  1.28D+16  3.84D+16  1.28D+17
  2.00D+03  2.80D+03  4.00D+03  6.00D+03  8.00D+03  1.20D+04  2.00D+04
  2.80D+04  4.00D+04  6.00D+04  8.00D+04  1.20D+05  2.00D+05  2.80D+05
  4.00D+05  6.00D+05  8.00D+05  1.20D+06  2.00D+06  2.80D+06  4.00D+06
  6.00D+06  8.00D+06  1.20D+07
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00
  2.00D+03  2.80D+03  4.00D+03  6.00D+03  8.00D+03  1.20D+04  2.00D+04
  2.80D+04  4.00D+04  6.00D+04  8.00D+04  1.20D+05  2.00D+05  2.80D+05
  4.00D+05  6.00D+05  8.00D+05  1.20D+06  2.00D+06  2.80D+06  4.00D+06
  6.00D+06  8.00D+06  1.20D+07
  2.50D 04  0.00D 00
    1  520   24
    1    2    3    4    5    6    7    8    9   10   12   15   20   30
   40   50   70  100  150  200  250  300  400  500
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00  0.00D+00
  0.00D+00  0.00D+00  0.00D+00
-------------------------------------------------------------------------
PRT= 1  TRMPRT=  (1S)   SPNPRT= 1  NCTPRT=1000  SYS= 1  SPNSYS= 2
NMIN= 2   JDEF= 5     .506  .000  .000  .000  .000
    2   1.49413    .75000    .00000   1.00000
    4
 4    3   2.3250   1.0000 1000    .09690    .80543    .00000  0.00D+00
 2    2   1.3704    .8750 1000    .26006    .26181    .00000  0.00D+00
 2    2   1.3704    .8750    3    .31078    .01690    .00000  0.00D+00
 7    2   1.3704    .8750    3    .34408    .02847    .00000  0.00D+00
              FIT PARAMETERS FOR GP                   .00000   1.00000
    1    0    IBSEL1= 1
    JPRT= 1   PRTWHT= 1.000   IBSEL= 14
    JPRT= 2   PRTWHT=  .000   IBSEL=  0
    3
1.000    2   6.20750    2    .76750    1    .44804
  5.08D-12  4.10D-12  3.55D-12  3.72D-12  4.17D-12  4.73D-12  6.89D-12
  1.41D-11  2.86D-11  4.56D-11  5.20D-11  5.08D-11  3.89D-11  2.96D-11
  2.07D-11  1.30D-11  9.13D-12  5.37D-12  2.65D-12  1.65D-12  9.85D-13
  5.45D-13  3.57D-13  1.96D-13
  4.75D-71  2.05D-53  3.66D-40  7.93D-30  1.22D-24  2.00D-19  3.23D-15
  2.17D-13  5.35D-12  6.89D-11  2.59D-10  1.05D-09  3.52D-09  6.16D-09
  9.56D-09  1.36D-08  1.63D-08  1.93D-08  2.18D-08  2.26D-08  2.28D-08
  2.24D-08  2.18D-08  2.06D-08
----------
```

```
PRT= 2  TRMPRT=  (3P)   SPNPRT= 3  NCTPRT=   4  SYS= 1  SPNSYS= 2
NMIN= 2   JDEF= 5     .672  .000  .000  .000  .000
    2   1.65579    .75000    .00000   1.00000
    4
 4    3   2.3250   1.0000 1000    .08546    .29255    .00000  0.00D+00
 3    3   2.3250    .9444 1000    .18864    .05456    .00000  0.00D+00
 2    3   2.3250    .9444 1000    .22059    .56857    .00000  0.00D+00
 2    3   2.3250    .9444    5    .27495    .11796    .00000  0.00D+00
               FIT PARAMETERS FOR GP                  .00000   1.00000
    1    0    IBSEL1= 1
    JPRT= 1   PRTWHT=  .000   IBSEL=  0
    JPRT= 2   PRTWHT= 1.000   IBSEL= 15
    3
1.000    2   6.20750    1    .76750    2    .39080
  2.56D-12  2.78D-12  2.59D-12  2.07D-12  1.65D-12  1.13D-12  6.73D-13
  4.90D-13  3.80D-13  3.43D-13  3.55D-13  3.72D-13  3.33D-13  2.75D-13
  2.06D-13  1.37D-13  9.91D-14  6.01D-14  3.07D-14  1.94D-14  1.18D-14
  6.61D-15  4.38D-15  2.44D-15
  8.89D-63  2.20D-47  8.14D-36  8.67D-27  2.96D-22  1.07D-17  5.18D-14
  2.07D-12  3.43D-11  3.20D-10  1.00D-09  3.26D-09  8.77D-09  1.36D-08
  1.92D-08  2.50D-08  2.85D-08  3.21D-08  3.45D-08  3.48D-08  3.44D-08
  3.32D-08  3.19D-08  2.98D-08
----------
PRT= 2  TRMPRT=  (3P)   SPNPRT= 3  NCTPRT=   4  SYS= 2  SPNSYS= 4
NMIN= 2   JDEF= 5     .540  .000  .000  .000  .000
    2   1.49144    .75000    .00000   1.00000
    4
 4    3   2.3250   1.0000 1000    .08546    .29255    .00000  0.00D+00
 3    3   2.3250    .9444 1000    .18864    .05456    .00000  0.00D+00
 2    3   2.3250    .9444 1000    .22059    .56857    .00000  0.00D+00
 2    3   2.3250    .9444    5    .27495    .11796    .00000  0.00D+00
               FIT PARAMETERS FOR GP                  .00000   1.00000
    1    0    IBSEL1= 1
    JPRT= 1   PRTWHT=  .000   IBSEL=  0
    JPRT= 2   PRTWHT= 1.000   IBSEL= 18
    3
1.000    2   6.20750    1    .76750    2    .45794
  5.19D-12  5.61D-12  5.23D-12  4.18D-12  3.34D-12  2.29D-12  1.37D-12
  9.98D-13  7.74D-13  6.99D-13  7.21D-13  7.52D-13  6.73D-13  5.56D-13
  4.17D-13  2.78D-13  2.00D-13  1.22D-13  6.23D-14  3.94D-14  2.40D-14
  1.35D-14  8.98D-15  5.02D-15
  3.97D-72  4.20D-54  1.46D-40  5.35D-30  1.07D-24  2.27D-19  4.53D-15
  3.33D-13  8.74D-12  1.17D-10  4.42D-10  1.75D-09  5.52D-09  9.26D-09
  1.38D-08  1.89D-08  2.20D-08  2.55D-08  2.80D-08  2.87D-08  2.86D-08
  2.78D-08  2.69D-08  2.53D-08
-------------------------------------------------------------------------
 &FILINFO  NUCCHG=-1, NPARNT=0, SEQ='--', XRMEMB='        ',  &END
```

Library subroutines

Library subroutines are intended for use in application codes outside the interactive ADAS. Documentation on the subroutines is provided with the source code. Currently available subroutines include

SPEC	accesses the database of photon emissivity coefficients
SSXB	accesses the database of ionisation per photon coefficients