

ADAS Subroutine qhe

```
FUNCTION QHE (EPRO, TTAR, ISEL, ZSEL, NSEL, IORD, EA, OA, N, IPASS,  
&           DSLPATH)  
C  
C   IMPLICIT REAL*8 (A-H, O-Z)  
C  
C-----  
C  
C ***** FORTRAN77 FUNCTION: QHE *****  
C  
C   PURPOSE : TO EVALUATE MAXWELL AVERAGED TOTAL IONISATION, EXCITATION  
C             AND CHARGE EXCHANGE RATE COEFFICIENTS. FUNCTION ALSO  
C             RETURNS THE RAW CROSS SECTION DATA FOR VERIFICATION AND  
C             GRAPHING PURPOSES.  
C             THE INCIDENT PARTICLE IS A MONOENERGETIC  
C             BEAM AND THE TARGET IS A MAXWELL DISTRIBUTION. THE TARGET AND  
C             PROJECTILE ROLES MAY BE REVERSED. ARBITRARY RELATIVE SPEEDS  
C             ARE ALLOWED.  
C  
C   HISTORY : ROUTINE WAS ORIGINALLY WRITTEN BY H.P.SUMMERS AND MODIFIED  
C             AND RESTRUCTURED BY HARVEY ANDERSON.  
C  
C   DATA   : ROUTINE UTILISES THE ION/ATOM COLLISION DATABASE ASSEMBLED FOR  
C             HELIUM IN INTERACTION WITH IMPURITIES UPTO THE SECOND  
C             PERIOD. THE DATA BASE IS OF ADAS ADF02 TYPE FORMAT :  
C  
C /ADAS/ADF02/SIA#HE/SIA#HE_J91#HE.DAT  
C  
C   INPUT  :  
C  
C           (R*8) EPRO : INCIDENT PARTICLE ENERGY (EV/AMU).  
C           (R*8) TTAR : MAXWELL TEMPERATURE OF TARGET  
C           PARTICLES (EV) IF (TTAR.LE.0) THEN  
C           ONLY RAW SOURCE VALUES ARE RETURNED  
C           IN ARRAYS (EA(I), OA(I), I=1, N).  
C           (R*8)      ZSEL : NUCLEAR CHARGE (REQUIRED ONLY FOR  
C           PARTICULAR ISEL).  
C           (I*4) ISEL : SELECTOR FOR PARTICULAR RATE COEFFT.  
C           CHOSEN FROM TABLE BELOW (SEE ALSO  
C           NOTES ON DATA).  
C           (I*4) NSEL : PRINC. QUANTUM NO. (REQUIRED ONLY FOR  
C           PARTICULAR ISEL NB. NSEL SHOULD BE  
C           ZERO ON ENTRY OTHERWISE).  
C           (I*4)      IORD  : 1 FOR 1ST PARTICLE INCIDENT AND  
C           MONOENERGETIC = 2 FOR 2ND PARTICLE  
C           INCIDENT AND MONOENERGETIC.  
C           (I*4) IPASS : 0 IF DATA FILE TO BE READ IN AFRESH  
C           1 IF DATA FILE IS NOT TO BE READ IN  
C           AGAIN.  
C  
C  
C   OUTPUT :  
C           (R*8) QHE      : RATE COEFFICIENT (CM3 SEC-1).
```

C (R*8) EA : SET OF ENERGIES (EV/AMU) FOR SELECTED
C SOURCE DATA.
C (R*8) OA : CROSS-SECTIONS (CM**2) FOR SELECTED
C SOURCE DATA.
C (I*4) N : NUMBER OF SOURCE DATA VALUES
C (CHR) TITLF : INFORMATION STRING.
C
C
C

C CONTACT : HARVEY ANDERSON
C UNIVERSITY OF STRATHCLYDE.
C ANDERSON@CHAMBA.PHYS.STRATH.AC.UK
C

C DATE : 05/10/97
C
C

C VERSION: 1.2 DATE: 15-10-99
C MODIFIED: RICHARD MARTIN
C REMOVED 'ACTION' FROM OPEN STATEMENT.
C

C VERSION: 1.3 DATE: 07-07-2004
C MODIFIED: ALLAN WHITEFORD
C -CHANGED CALLS FROM DXNB{A,B}F TO XXNB{A,B}F
C

C-----
CHARACTER*80 DSLPATH
INTEGER IORD, IPASS, ISEL, N
INTEGER NSEL
REAL*8 EA(24), EPRO, OA(24), TTAR
REAL*8 ZSEL