AN INTEGRATED SYSTEM OF PRODUCTION OF
NEUTRONICS AND PHOTONICS CALCULATIONAL
CONSTANTS. ^{#3}

VOLUME 21, PART A ^{#2}

MAXWELL-AVERAGED REACTION RATES ($\overline{\sigma v}$) FOR
SELECTED REACTIONS BETWEEN IONS WITH
ATOMIC MASS ≤ 11 [#]

MASTER

R. J. Howerton

February 14, 1979

Work performed under the auspices of the U.S. Department of
Energy by the UCLLL under contract number W-7405-ENG-48.

NOTICE

"This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy, nor any of their employees, nor any of their contractors, subcontractors, or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed, or represents that its use would not infringe privately-owned rights."

NOTICE

Reference to a company or product name does not imply approval or recommendation of the product by the University of California or the U.S. Department of Energy to the exclusion of others that may be suitable.

Printed in the United States of America

Available from

National Technical Information Service

U.S. Department of Commerce

5285 Port Royal Road

Springfield, VA 22161

Price: Printed Copy \$; Microfiche \$3.00

Page Range	Domestic Price	Page Range	Domestic Price
001-025	\$ 4.00	326-350	\$12.00
026-050	4.50	351-375	12.50
051-075	5.25	376-400	13.00
076-100	6.00	401-425	13.25
101-125	6.50	426-450	14.00
126-150	7.25	451-475	14.50
151-175	8.00	476-500	15.00
176-200	9.00	501-525	15.25
201-225	9.25	526-550	15.50
226-250	9.50	551-575	16.25
251-275	10.75	576-600	16.50
276-300	11.00	601-up	— ¹
301-325	11.75		

¹/Add \$2.50 for each additional 100 page increment from 601 pages up.

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

LAWRENCE LIVERMORE LABORATORY

University of California/Livermore, California/94550

UCRL-50400 Vol. 21, Part A

**MAXWELL-AVERAGED REACTION RATES ($\overline{\sigma v}$) FOR
SELECTED REACTIONS BETWEEN IONS WITH
ATOMIC MASS ≤ 11**

R. J. Howerton

MS. date: February 14, 1979

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Department of Energy nor any of their employees, nor any of their contractors, subcontractors or their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product or process disclosed or represents that its use would not infringe privately owned rights.

 

FOREWORD

The UCRL-50400 series describes an integrated and computer-oriented system for the production and application of neutronics and photonics calculational constants.

The system must supply reliable up-to-date data, select specific types of data on request, provide output in a variety of forms (ultimately in the form of input to other computer codes), and function rapidly and efficiently. The system has now been developed to a point where we are achieving these goals.

The UCRL-50400 series, *An Integrated System for Production of Neutronics and Photonics Calculational Constants*, comprises the following volumes:

- Vol. 1, Part A, Rev. 3, *ECSIL: A System for Storage, Retrieval, and Display of Experimental Neutron Data*, September 1976.
- Vol. 1, Part B, *Program ECSX4 (Version 78-1): Conversion of Experimentally Measured Cross-Section Data from the Four-Center-Exchange (X-4) Format to the Livermore ECSIL Format*, December 1978.
- Vol. 2, Rev. 2, *A Bibliography of the Experimental Data of Neutron-Induced Interactions*, July 1976.
- Vol. 3, Rev. 2, *An Index of the Experimental Data of Neutron-Induced Interactions*, July 1976.
- Vol. 4, *Evaluated Nuclear Cross-Section Library*, April 1971.
- Vol. 5, Part A, Rev. 1, *CLYDE: A Code for the Production of Calculational Constants from Nuclear Data*, September 1975.
- Vol. 5, Part B, Rev. 1, *Relativistic Transformations between Center-of-Mass and Laboratory Systems for Two-Body Nuclear Reactions*, April 1978.
- Vol. 6, Rev. 2, *Tables and Graphs of Photon-Interaction Cross Sections from 1 keV to 100 MeV*, December 1978.
- Vol. 7, Part A, Rev. 1, *Major Neutron-Induced Interactions ($Z \leq 55$): Graphical, Experimental Data*, July 1976.
- Vol. 7, Part B, Rev. 1, *Major Neutron-Induced Interactions ($Z > 55$): Graphical, Experimental Data*, July 1976.
- Vol. 8, Part A, Rev. 1, *Supplemental Neutron-Induced Interactions ($Z \leq 35$): Graphical, Experimental Data*, July 1976.
- Vol. 8, Part B, Rev. 1, *Supplemental Neutron-Induced Interactions ($Z > 35$): Graphical, Experimental Data*, July 1976.
- Vol. 9, *Thresholds of Nuclear Reactions Induced by Neutrons, Photons, Deuterons, Tritons, and Alpha Particles*, September 1970.
- Vol. 10, Rev. 1, *Tabulated Experimental Data for Neutron-Induced Interactions*, July 1976.
- Vol. 11, *Experimental Data, Indexes, and Techniques of Obtaining a Selected Set of Neutron Resonance Parameters*, May 1972.
- Vol. 12, *An Atlas of Resolved Neutron Resonance Parameters*, July 1972.
- Vol. 13, *An Atlas of Unresolved Neutron Resonance Parameters*, September 1972.
- Vol. 14, *TARTNP: A Coupled Neutron-Photon Monte Carlo Transport Code*, February 1976.
- Vol. 15, Part A, *The LLL Evaluated-Nuclear-Data Library (ENDL): Evaluation Techniques, Reaction Index, and Descriptions of Individual Evaluations*, September 1975.
- Vol. 15, Part B, Rev. 1, *The LLL Evaluated-Nuclear-Data Library (ENDL): Graphs of Cross Sections from the Library*, October 1978.
- Vol. 15, Part C, *The LLL Evaluated-Nuclear-Data Library (ENDL): Translation of ENDL Neutron-Induced Interaction Data into the ENDF/B Format*, April 1976.
- Vol. 15, Part D, Rev. 1, *The LLL Evaluated-Nuclear-Data Library (ENDL): Descriptions of Individual Evaluations for $Z = 0-98$* , May 1978.
- Vol. 16, Rev. 2, *Tabular and Graphical Presentation of 175 Neutron-Group Constants Derived from the LLL Evaluated-Nuclear-Data Library (ENDL)*, October 1978.
- Vol. 17, Part A, *Program LINEAR (Version 77-1): Linearize Data in the Evaluated-Nuclear-Data File/Version B (ENDF/B) Format*, January 1977.

- Vol. 17, Part B, *Program SIGMA1 (Version 77-1): Doppler Broaden Evaluated Cross Sections in the Evaluated-Nuclear-Data File/Version B (ENDF/B) Format*, January 1977.
- Vol. 17, Part C, *Program RECENT: Reconstruction of Energy-Dependent Cross Sections from Resonance Parameters in the ENDF/B Format*, 1979.
- Vol. 17, Part D, *Program GROUPIE: Calculation of Self-Shielded Cross Sections and Multiband Parameters from Evaluated Data in the ENDF/B Format*, 1979.
- Vol. 17, Part E, *Program EVALPLOT: Plot Data in the Evaluated-Nuclear-Data File/Version B (ENDF/B) Format*, February 1979.
- Vol. 18, *ACTL: Evaluated Neutron Activation Cross-Section Library*, 1979.
- Vol. 19, *Neutron-Induced Angular and Energy Distributions: Graphical Experimental Data*, April 1977.
- Vol. 20, *Bonderenko Self-Shielded Cross Sections and Multiband Parameters Derived from the LLL Evaluated-Nuclear-Data Library (ENDL)*, July 1978.

MAXWELL-AVERAGED REACTION RATES ($\overline{\sigma v}$) FOR SELECTED REACTIONS BETWEEN IONS WITH ATOMIC MASS ≤ 11

ABSTRACT

Maxwell-averaged reaction rates ($\overline{\sigma v}$) are presented for 24 interactions between ^1H , ^2H , ^3H , ^3He , ^4He , ^6Li , ^7Li , ^{10}B and ^{11}B ions. The reaction rates are calculated using the evaluated data of the LLL Evaluated Nuclear Data Library (ENDL).

INTRODUCTION

To understand the dynamics of physical configurations involving ions that are in thermodynamic equilibrium, nuclear reaction rates among the ion species must be known. Nuclear reactions, in general, either increase the equilibrium temperature (through reactions that deposit into the system energy greater than the energy that corresponds to the equilibrium temperature) or decrease the equilibrium temperature (via reactions that absorb energy from the system). These reactions can also add to or remove from the system isotopes that in future reactions will serve as sources or sinks of energy.

In systems that are in thermodynamic equilibrium, the most commonly used form for nuclear reaction rates is the Maxwell-averaged integral mean value $\overline{\sigma v}$, where σ is the microscopic cross section as a function of the relative energy E_R and v is the relative velocity V_R of the ions. Simple relationships exist between the cross sections $\sigma(E)$ and energies (E) measured in the laboratory and the corresponding relative cross sections $\sigma(E_R)$ and energies E_R that are required to obtain $\overline{\sigma v}$. In the laboratory frame of reference, one nucleus (the target with mass = m_2) is at rest and the other (the projectile with mass = m_1) is at a known energy.

The general form of a Maxwellian distribution is:

$$N(E) = A \sqrt{E} \exp(-E/kT) \quad (1)$$

where kT is the temperature in energy units. From this, the Maxwell-averaged reaction rate may be written as

$$\overline{\sigma v} = \frac{\int_0^\infty \sigma(E_R) v_R \sqrt{E_R} \exp(-E_R/kT) dE_R}{\int_0^\infty \sqrt{E_R} \exp(-E_R/kT) dE_R} \quad (2)$$

The denominator is just $(kT)^{3/2} \sqrt{\pi/2}$ and $v_R = (2E_R/m_R)^{1/2}$, so that

$$\overline{\sigma v} = 4 / \left((2m_R \pi)^{1/2} (kT)^{3/2} \right) \cdot \int_0^\infty \sigma(E_R) E_R \exp(-E_R/kT) dE_R \quad (3)$$

From the reaction kinematics and basic relationships,

$$E_R = \frac{m_R V_R^2}{2} ; \quad E = \frac{m_1 V_1^2}{2} ;$$

$$v_R = v_1 ; \quad m_R = \frac{m_1 m_2}{m_1 + m_2} ;$$

so $E_R = E m_R / m_1$

and

$$\sigma(E_R) = \sigma(E) m_R / m_1 .$$

Then

$$\overline{\sigma v} = \left(4 / (2\pi m_1)^{1/2} \right) \cdot (m_R / m_1 kT)^{3/2} \cdot \int_0^\infty dE \sigma(E) E \exp(-m_R E / m_1 kT) \quad (4)$$

CALCULATION OF MAXWELL-AVERAGED REACTION RATES

Two observations are required to evaluate the integral in Eq. 4. First, the integration is analytic if $\sigma(E)$ can be represented as a sufficiently simple function of E . Second, the infinite upper limit of the integral must be replaced by a finite value that yields an accuracy for the integral that is consistent with the accuracy of the evaluated cross sections $\sigma(E)$.

The evaluated cross sections used for these calculations are those of the LLL Evaluated Nuclear Data Library (ENDL). Documentation of the evaluations for each reaction is provided in Ref. 1. The ENDL evaluations for charged-particle-induced reaction cross sections are tabulated such that log-log interpolation is valid: specifically, 50 points were inserted by log-log interpolation between each 2 points of the original ta-

bles. This resulted in tables that satisfy the linear-linear interpolation criterion.

All evaluated cross sections used in the $\overline{\sigma v}$ calculations are provided for incident charged particle energies ≤ 20 MeV. Since the maximum ion temperature for which $\overline{\sigma v}$ is calculated is one MeV and the controlling quantity of the integral is the exponential term, the upper limit of the integral may be taken as 20 MeV without risking inaccuracy. (All cross sections used for the $\overline{\sigma v}$ calculations are well-behaved and, specifically, are monotonic-non-increasing for energies greater than 20 MeV.)

Figures 1-5 and Tables 1-5 present the results of the $\overline{\sigma v}$ calculations. The tables are log-log interpolable. Calculated values $\leq 10^{-40}$ cm³/sec were suppressed.

FIG. 1. Reaction rates for selected reactions involving hydrogen and helium isotopes.

FIG. 2. Reaction rates for selected reactions involving ${}^6\text{Li}$ and isotopes of hydrogen and helium. The $t + d$ reaction rate is shown for comparison.

FIG. 3 Reaction rates for selected reactions involving ${}^7\text{Li}$ and isotopes of hydrogen and helium. The $t + d$ reaction rate is shown for comparison.

FIG. 4 Reaction rates for selected reactions involved ^{10}B and isotopes of hydrogen. The $t + d$ reaction rate is shown for comparison.

FIG. 5 Reaction rates for selected reactions involved ^{11}B and isotopes of hydrogen. The $t + d$ reaction rate is shown for comparison.

Table 1. Reaction rates for selected reactions involving hydrogen and helium isotopes.

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)				
	D+D>N+HE-3 Q= 3,370 MEV	D+D>P+T Q= 4,034 MEV	T+P>N+HE-3 Q= -0,764 MEV	T+D>N+HE-4 Q= 17,590 MEV	HE-3+D>P+HE-4 Q= 18,354 MEV
1,00E-04	1,286E-15	2,207E-15	0,	2,420E-14	0,
1,20E-04	1,228E-14	1,943E-14	0,	2,830E-13	7,633E-24
1,40E-04	7,456E-14	1,111E-13	0,	1,993E-12	3,261E-22
1,60E-04	3,303E-13	4,704E-13	0,	9,887E-12	5,951E-21
1,80E-04	1,162E-12	1,597E-12	0,	3,805E-11	6,201E-20
2,00E-04	3,434E-12	4,585E-12	0,	1,209E-10	4,374E-19
2,20E-04	8,854E-12	1,154E-11	0,	3,313E-10	2,319E-18
2,40E-04	2,047E-11	2,616E-11	0,	8,061E-10	9,895E-18
2,60E-04	4,328E-11	5,441E-11	0,	1,781E-09	3,562E-17
2,80E-04	8,501E-11	1,054E-10	0,	3,636E-09	1,118E-16
3,00E-04	1,569E-10	1,921E-10	0,	6,943E-09	3,137E-16
3,20E-04	2,748E-10	3,327E-10	0,	1,253E-08	8,012E-16
3,40E-04	4,598E-10	5,515E-10	0,	2,154E-08	1,889E-15
3,60E-04	7,397E-10	8,798E-10	0,	3,552E-08	4,161E-15
3,80E-04	1,150E-09	1,357E-09	0,	5,645E-08	8,634E-15
4,00E-04	1,734E-09	2,033E-09	0,	8,690E-08	1,701E-14
4,20E-04	2,545E-09	2,965E-09	0,	1,300E-07	3,200E-14
4,40E-04	3,647E-09	4,226E-09	0,	1,897E-07	5,781E-14
4,60E-04	5,116E-09	5,898E-09	0,	2,705E-07	1,007E-13
4,80E-04	7,039E-09	8,076E-09	0,	3,779E-07	1,699E-13
5,00E-04	9,516E-09	1,087E-08	0,	5,185E-07	2,783E-13
5,20E-04	1,266E-08	1,441E-08	0,	6,995E-07	4,442E-13
5,40E-04	1,660E-08	1,882E-08	0,	9,296E-07	6,922E-13
5,60E-04	2,149E-08	2,428E-08	0,	1,218E-06	1,056E-12
5,80E-04	2,747E-08	3,094E-08	0,	1,576E-06	1,579E-12
6,00E-04	3,472E-08	3,899E-08	0,	2,016E-06	2,318E-12
6,20E-04	4,344E-08	4,865E-08	0,	2,550E-06	3,349E-12
6,40E-04	5,393E-08	6,012E-08	0,	3,194E-06	4,763E-12
6,60E-04	6,611E-08	7,365E-08	0,	3,964E-06	6,681E-12
6,80E-04	8,052E-08	8,950E-08	0,	4,877E-06	9,248E-12
7,00E-04	9,731E-08	1,079E-07	0,	5,952E-06	1,264E-11
7,20E-04	1,168E-07	1,292E-07	0,	7,211E-06	1,709E-11
7,40E-04	1,392E-07	1,537E-07	0,	8,674E-06	2,287E-11
7,60E-04	1,648E-07	1,817E-07	0,	1,037E-05	3,028E-11
7,80E-04	1,940E-07	2,136E-07	0,	1,231E-05	3,972E-11
8,00E-04	2,271E-07	2,496E-07	0,	1,454E-05	5,165E-11
8,20E-04	2,645E-07	2,902E-07	0,	1,708E-05	6,660E-11
8,40E-04	3,065E-07	3,358E-07	0,	1,996E-05	8,519E-11
8,60E-04	3,535E-07	3,867E-07	0,	2,321E-05	1,082E-10
8,80E-04	4,059E-07	4,434E-07	0,	2,687E-05	1,364E-10
9,00E-04	4,641E-07	5,062E-07	0,	3,096E-05	1,708E-10
9,20E-04	5,285E-07	5,758E-07	0,	3,554E-05	2,125E-10
9,40E-04	5,995E-07	6,524E-07	0,	4,063E-05	2,628E-10
9,60E-04	6,777E-07	7,366E-07	0,	4,629E-05	3,231E-10
9,80E-04	7,635E-07	8,289E-07	0,	5,254E-05	3,951E-10
1,00E-03	8,572E-07	9,297E-07	0,	5,943E-05	4,805E-10
1,02E-03	9,595E-07	1,039E-06	0,	6,702E-05	5,815E-10
1,22E-03	2,565E-06	2,754E-06	0,	1,921E-04	3,095E-09
1,42E-03	5,619E-06	5,993E-06	0,	4,485E-04	1,187E-08
1,62E-03	1,072E-05	1,137E-05	0,	9,076E-04	3,612E-08
1,82E-03	1,849E-05	1,952E-05	0,	1,653E-03	9,269E-08
2,02E-03	2,955E-05	3,106E-05	0,	2,780E-03	2,038E-07
2,22E-03	4,448E-05	4,656E-05	0,	4,389E-03	4,246E-07
2,42E-03	6,383E-05	6,658E-05	0,	6,586E-03	7,949E-07
2,62E-03	8,811E-05	9,159E-05	0,	9,481E-03	1,391E-06
2,82E-03	1,178E-04	1,220E-04	0,	1,318E-02	2,302E-06
3,02E-03	1,532E-04	1,583E-04	0,	1,780E-02	3,633E-06
3,22E-03	1,948E-04	2,007E-04	0,	2,343E-02	5,508E-06
3,42E-03	2,429E-04	2,495E-04	0,	3,019E-02	8,067E-06
3,62E-03	2,977E-04	3,049E-04	0,	3,816E-02	1,147E-05
3,82E-03	3,595E-04	3,672E-04	0,	4,743E-02	1,588E-05
4,02E-03	4,285E-04	4,365E-04	0,	5,808E-02	2,149E-05
4,22E-03	5,048E-04	5,129E-04	0,	7,019E-02	2,851E-05
4,42E-03	5,886E-04	5,965E-04	0,	8,383E-02	3,713E-05
4,62E-03	6,799E-04	6,874E-04	0,	9,904E-02	4,760E-05
4,82E-03	7,788E-04	7,856E-04	0,	1,159E-01	6,013E-05
5,02E-03	8,855E-04	8,911E-04	0,	1,344E-01	7,497E-05
5,22E-03	9,999E-04	1,004E-03	0,	1,546E-01	9,238E-05
5,42E-03	1,122E-03	1,124E-03	0,	1,765E-01	1,126E-04
5,62E-03	1,252E-03	1,252E-03	0,	2,002E-01	1,359E-04
5,82E-03	1,390E-03	1,386E-03	0,	2,257E-01	1,626E-04
6,02E-03	1,535E-03	1,528E-03	0,	2,529E-01	1,930E-04
6,22E-03	1,688E-03	1,677E-03	0,	2,818E-01	2,272E-04
6,42E-03	1,849E-03	1,833E-03	0,	3,125E-01	2,657E-04
6,62E-03	2,017E-03	1,996E-03	0,	3,450E-01	3,088E-04
6,82E-03	2,193E-03	2,166E-03	0,	3,791E-01	3,566E-04
7,02E-03	2,377E-03	2,342E-03	0,	4,150E-01	4,096E-04
7,22E-03	2,568E-03	2,526E-03	0,	4,525E-01	4,680E-04
7,42E-03	2,766E-03	2,715E-03	0,	4,916E-01	5,322E-04
7,62E-03	2,972E-03	2,912E-03	0,	5,324E-01	6,026E-04
7,82E-03	3,185E-03	3,114E-03	0,	5,746E-01	6,793E-04
8,02E-03	3,405E-03	3,323E-03	0,	6,185E-01	7,627E-04
8,22E-03	3,632E-03	3,538E-03	0,	6,637E-01	8,533E-04
8,42E-03	3,866E-03	3,760E-03	0,	7,104E-01	9,513E-04
8,62E-03	4,107E-03	3,987E-03	0,	7,585E-01	1,057E-03
8,82E-03	4,354E-03	4,220E-03	0,	8,079E-01	1,171E-03
9,02E-03	4,609E-03	4,458E-03	0,	8,586E-01	1,293E-03

Table 1. Reaction rates for selected reactions involving hydrogen and helium isotopes. (Continued)

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)				
	D+D>N+HE-3 Q= 3,370 MEV	D+D>P+T Q= 4,034 MEV	T+P>N+HE-3 Q= -0,764 MEV	T+D>N+HE-4 Q= 17,590 MEV	HE-3+D>P+HE-4 Q= 18,354 MEV
9,22E-03	4,870E-03	4,703E-03	0,	9,105E-01	1,425E-03
9,42E-03	5,137E-03	4,952E-03	0,	9,635E-01	1,565E-03
9,62E-03	5,411E-03	5,206E-03	0,	1,018E+00	1,715E-03
9,82E-03	5,691E-03	5,468E-03	0,	1,073E+00	1,875E-03
1,00E-02	5,977E-03	5,734E-03	0,	1,129E+00	2,045E-03
1,20E-02	9,163E-03	8,655E-03	0,	1,736E+00	4,399E-03
1,40E-02	1,287E-02	1,199E-02	0,	2,390E+00	8,216E-03
1,60E-02	1,702E-02	1,567E-02	1,971E-23	3,054E+00	1,390E-02
1,80E-02	2,153E-02	1,961E-02	8,843E-21	3,699E+00	2,183E-02
2,00E-02	2,636E-02	2,377E-02	1,170E-18	4,309E+00	3,235E-02
2,20E-02	3,144E-02	2,812E-02	6,367E-17	4,875E+00	4,576E-02
2,40E-02	3,674E-02	3,260E-02	1,778E-15	5,392E+00	6,227E-02
2,60E-02	4,221E-02	3,720E-02	2,971E-14	5,860E+00	8,199E-02
2,80E-02	4,784E-02	4,189E-02	3,318E-13	6,279E+00	1,050E-01
3,00E-02	5,359E-02	4,665E-02	2,683E-12	6,652E+00	1,312E-01
3,20E-02	5,945E-02	5,147E-02	1,669E-11	6,982E+00	1,606E-01
3,40E-02	6,539E-02	5,634E-02	8,369E-11	7,273E+00	1,930E-01
3,60E-02	7,141E-02	6,124E-02	3,505E-10	7,527E+00	2,282E-01
3,80E-02	7,748E-02	6,616E-02	1,262E-09	7,749E+00	2,661E-01
4,00E-02	8,360E-02	7,111E-02	3,994E-09	7,942E+00	3,062E-01
4,20E-02	8,975E-02	7,606E-02	1,132E-08	8,108E+00	3,484E-01
4,40E-02	9,594E-02	8,103E-02	2,919E-08	8,250E+00	3,925E-01
4,60E-02	1,021E-01	8,599E-02	6,926E-08	8,371E+00	4,381E-01
4,80E-02	1,084E-01	9,096E-02	1,529E-07	8,473E+00	4,851E-01
5,00E-02	1,146E-01	9,592E-02	3,166E-07	8,558E+00	5,331E-01
5,20E-02	1,208E-01	1,009E-01	6,198E-07	8,627E+00	5,819E-01
5,40E-02	1,271E-01	1,058E-01	1,154E-06	8,683E+00	6,314E-01
5,60E-02	1,333E-01	1,107E-01	2,056E-06	8,727E+00	6,812E-01
5,80E-02	1,395E-01	1,157E-01	3,517E-06	8,761E+00	7,314E-01
6,00E-02	1,457E-01	1,206E-01	5,806E-06	8,784E+00	7,815E-01
6,20E-02	1,519E-01	1,254E-01	9,277E-06	8,799E+00	8,316E-01
6,40E-02	1,581E-01	1,303E-01	1,439E-05	8,807E+00	8,815E-01
6,60E-02	1,643E-01	1,352E-01	2,174E-05	8,807E+00	9,310E-01
6,80E-02	1,704E-01	1,400E-01	3,205E-05	8,802E+00	9,801E-01
7,00E-02	1,766E-01	1,448E-01	4,621E-05	8,791E+00	1,029E+00
7,20E-02	1,827E-01	1,496E-01	6,527E-05	8,775E+00	1,077E+00
7,40E-02	1,888E-01	1,544E-01	9,049E-05	8,755E+00	1,124E+00
7,60E-02	1,949E-01	1,591E-01	1,233E-04	8,732E+00	1,170E+00
7,80E-02	2,009E-01	1,639E-01	1,654E-04	8,705E+00	1,216E+00
8,00E-02	2,069E-01	1,686E-01	2,185E-04	8,675E+00	1,261E+00
8,20E-02	2,129E-01	1,733E-01	2,849E-04	8,643E+00	1,305E+00
8,40E-02	2,189E-01	1,779E-01	3,667E-04	8,608E+00	1,347E+00
8,60E-02	2,248E-01	1,826E-01	4,666E-04	8,571E+00	1,390E+00
8,80E-02	2,308E-01	1,872E-01	5,871E-04	8,533E+00	1,431E+00
9,00E-02	2,367E-01	1,918E-01	7,312E-04	8,493E+00	1,471E+00
9,20E-02	2,425E-01	1,964E-01	9,021E-04	8,451E+00	1,510E+00
9,40E-02	2,484E-01	2,010E-01	1,103E-03	8,409E+00	1,548E+00
9,60E-02	2,542E-01	2,055E-01	1,337E-03	8,366E+00	1,585E+00
9,80E-02	2,600E-01	2,100E-01	1,609E-03	8,321E+00	1,621E+00
1,00E-01	2,657E-01	2,145E-01	1,921E-03	8,276E+00	1,656E+00
1,20E-01	3,217E-01	2,585E-01	8,187E-03	7,810E+00	1,957E+00
1,40E-01	3,750E-01	3,006E-01	2,311E-02	7,354E+00	2,176E+00
1,60E-01	4,256E-01	3,411E-01	5,046E-02	6,931E+00	2,332E+00
1,80E-01	4,738E-01	3,802E-01	9,289E-02	6,549E+00	2,439E+00
2,00E-01	5,197E-01	4,178E-01	1,517E-01	6,207E+00	2,511E+00
2,20E-01	5,635E-01	4,542E-01	2,273E-01	5,900E+00	2,558E+00
2,40E-01	6,055E-01	4,893E-01	3,190E-01	5,625E+00	2,585E+00
2,60E-01	6,456E-01	5,234E-01	4,256E-01	5,378E+00	2,598E+00
2,80E-01	6,841E-01	5,564E-01	5,458E-01	5,155E+00	2,601E+00
3,00E-01	7,210E-01	5,885E-01	6,781E-01	4,953E+00	2,596E+00
3,20E-01	7,565E-01	6,195E-01	8,206E-01	4,770E+00	2,586E+00
3,40E-01	7,907E-01	6,497E-01	9,720E-01	4,603E+00	2,573E+00
3,60E-01	8,236E-01	6,791E-01	1,131E+00	4,451E+00	2,557E+00
3,80E-01	8,553E-01	7,076E-01	1,295E+00	4,311E+00	2,539E+00
4,00E-01	8,860E-01	7,353E-01	1,464E+00	4,182E+00	2,520E+00
4,20E-01	9,155E-01	7,623E-01	1,637E+00	4,064E+00	2,500E+00
4,40E-01	9,441E-01	7,885E-01	1,811E+00	3,954E+00	2,479E+00
4,60E-01	9,718E-01	8,141E-01	1,987E+00	3,853E+00	2,459E+00
4,80E-01	9,986E-01	8,390E-01	2,164E+00	3,759E+00	2,439E+00
5,00E-01	1,024E+00	8,632E-01	2,341E+00	3,672E+00	2,419E+00
5,20E-01	1,050E+00	8,869E-01	2,517E+00	3,590E+00	2,400E+00
5,40E-01	1,074E+00	9,099E-01	2,691E+00	3,514E+00	2,380E+00
5,60E-01	1,098E+00	9,324E-01	2,864E+00	3,443E+00	2,362E+00
5,80E-01	1,121E+00	9,543E-01	3,035E+00	3,377E+00	2,344E+00
6,00E-01	1,143E+00	9,757E-01	3,203E+00	3,315E+00	2,326E+00
6,20E-01	1,165E+00	9,966E-01	3,368E+00	3,256E+00	2,309E+00
6,40E-01	1,186E+00	1,017E+00	3,531E+00	3,201E+00	2,292E+00
6,60E-01	1,206E+00	1,037E+00	3,690E+00	3,149E+00	2,276E+00
6,80E-01	1,226E+00	1,056E+00	3,846E+00	3,100E+00	2,261E+00
7,00E-01	1,246E+00	1,075E+00	3,999E+00	3,054E+00	2,246E+00
7,20E-01	1,265E+00	1,094E+00	4,148E+00	3,011E+00	2,231E+00
7,40E-01	1,283E+00	1,112E+00	4,293E+00	2,969E+00	2,217E+00
7,60E-01	1,301E+00	1,130E+00	4,435E+00	2,930E+00	2,204E+00
7,80E-01	1,319E+00	1,147E+00	4,573E+00	2,893E+00	2,191E+00
8,00E-01	1,336E+00	1,164E+00	4,708E+00	2,858E+00	2,178E+00
8,20E-01	1,352E+00	1,181E+00	4,839E+00	2,824E+00	2,166E+00
8,40E-01	1,369E+00	1,197E+00	4,967E+00	2,792E+00	2,154E+00

Table 1. Reaction rates for selected reactions involving hydrogen and helium isotopes. (Continued)

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)				
	D+D>N+HE-3 Q= 3,370 MEV	D+D>P+T Q= 4,034 MEV	T+P>N+HE-3 Q= -0,764 MEV	T+D>N+HE-4 Q= 17,590 MEV	HE-3+D>P+HE-4 Q= 18,354 MEV
8,60E-01	1,384E+00	1,213E+00	5,090E+00	2,762E+00	2,143E+00
8,80E-01	1,400E+00	1,228E+00	5,211E+00	2,733E+00	2,132E+00
9,00E-01	1,415E+00	1,244E+00	5,328E+00	2,706E+00	2,121E+00
9,20E-01	1,430E+00	1,259E+00	5,441E+00	2,679E+00	2,110E+00
9,40E-01	1,444E+00	1,273E+00	5,552E+00	2,654E+00	2,100E+00
9,60E-01	1,458E+00	1,287E+00	5,659E+00	2,630E+00	2,090E+00
9,80E-01	1,472E+00	1,301E+00	5,762E+00	2,607E+00	2,081E+00
1,00E+00	1,486E+00	1,315E+00	5,863E+00	2,585E+00	2,072E+00

Table 2. Reaction rates for selected reactions involving ⁶Li and isotopes of hydrogen and helium.

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)					
	LI-6+D>N+BE-7 Q= 3,382 MEV	LI-6+T>2N+BE-7 Q= -2,870 MEV	LI-6+D>P+LI-7 Q= 5,027 MEV	LI-6+HE-3>D+BE-7 Q= 0,110 MEV	LI-6+D>T+P+HE-4 Q= 2,558 MEV	LI-6+D>HE-4+HE-4 Q= 22,374 MEV
3,00E-04	2,175E-24	0,	2,117E-24	0,	0,	0,
3,20E-04	8,845E-24	0,	8,747E-24	0,	2,800E-24	3,835E-24
3,40E-04	3,218E-23	0,	3,214E-23	0,	1,021E-23	1,364E-23
3,60E-04	1,063E-22	0,	1,067E-22	0,	3,382E-23	4,383E-23
3,80E-04	3,224E-22	0,	3,240E-22	0,	1,029E-22	1,269E-22
4,00E-04	9,076E-22	0,	9,103E-22	0,	2,906E-22	3,506E-22
4,20E-04	2,390E-21	0,	2,386E-21	0,	7,677E-22	8,906E-22
4,40E-04	5,932E-21	0,	5,880E-21	0,	1,911E-21	2,130E-21
4,60E-04	1,396E-20	0,	1,371E-20	0,	4,511E-21	4,825E-21
4,80E-04	3,128E-20	0,	3,043E-20	0,	1,014E-20	1,042E-20
5,00E-04	6,712E-20	0,	6,457E-20	0,	2,184E-20	2,153E-20
5,20E-04	1,384E-19	0,	1,315E-19	0,	4,517E-20	4,278E-20
5,40E-04	2,751E-19	0,	2,581E-19	0,	9,009E-20	8,204E-20
5,60E-04	5,290E-19	0,	4,896E-19	0,	1,737E-19	1,523E-19
5,80E-04	9,864E-19	0,	9,004E-19	0,	3,249E-19	2,744E-19
6,00E-04	1,788E-18	0,	1,609E-18	0,	5,907E-19	4,811E-19
6,20E-04	3,158E-18	0,	2,800E-18	0,	1,046E-18	8,227E-19
6,40E-04	5,444E-18	0,	4,757E-18	0,	1,808E-18	1,375E-18
6,60E-04	9,174E-18	0,	7,898E-18	0,	3,054E-18	2,248E-18
6,80E-04	1,514E-17	0,	1,284E-17	0,	5,052E-18	3,605E-18
7,00E-04	2,450E-17	0,	2,048E-17	0,	8,195E-18	5,675E-18
7,20E-04	3,893E-17	0,	3,206E-17	0,	1,305E-17	8,781E-18
7,40E-04	6,081E-17	0,	4,934E-17	0,	2,043E-17	1,337E-17
7,60E-04	9,346E-17	0,	7,475E-17	0,	3,147E-17	2,006E-17
7,80E-04	1,415E-16	0,	1,116E-16	0,	4,774E-17	2,967E-17
8,00E-04	2,111E-16	0,	1,642E-16	0,	7,141E-17	4,332E-17
8,20E-04	3,109E-16	0,	2,385E-16	0,	1,054E-16	6,246E-17
8,40E-04	4,520E-16	0,	3,421E-16	0,	1,535E-16	8,901E-17
8,60E-04	6,494E-16	0,	4,851E-16	0,	2,210E-16	1,254E-16
8,80E-04	9,223E-16	0,	6,804E-16	0,	3,145E-16	1,750E-16
9,00E-04	1,296E-15	0,	9,442E-16	0,	4,427E-16	2,416E-16
9,20E-04	1,802E-15	0,	1,298E-15	0,	6,169E-16	3,305E-16
9,40E-04	2,483E-15	0,	1,767E-15	0,	8,514E-16	4,481E-16
9,60E-04	3,388E-15	0,	2,384E-15	0,	1,164E-15	6,025E-16
9,80E-04	4,583E-15	0,	3,190E-15	0,	1,577E-15	8,035E-16
1,00E-03	6,148E-15	0,	4,234E-15	0,	2,120E-15	1,063E-15
1,02E-03	8,182E-15	0,	5,577E-15	0,	2,826E-15	1,397E-15
1,22E-03	9,854E-14	0,	6,160E-14	0,	3,458E-14	1,522E-14
1,42E-03	7,144E-13	0,	4,188E-13	0,	2,536E-13	1,038E-13
1,62E-03	3,641E-12	0,	2,034E-12	0,	1,303E-12	5,099E-13
1,82E-03	1,436E-11	0,	7,735E-12	0,	5,175E-12	1,970E-12
2,02E-03	4,659E-11	0,	2,444E-11	0,	1,693E-11	6,332E-12
2,22E-03	1,299E-10	0,	6,685E-11	0,	4,765E-11	1,763E-11
2,42E-03	3,210E-10	0,	1,629E-10	0,	1,190E-10	4,371E-11
2,62E-03	7,191E-10	0,	3,614E-10	0,	2,695E-10	9,861E-11
2,82E-03	1,485E-09	0,	7,420E-10	0,	5,627E-10	2,056E-10
3,02E-03	2,864E-09	0,	1,427E-09	0,	1,097E-09	4,010E-10
3,22E-03	5,214E-09	0,	2,597E-09	0,	2,019E-09	7,391E-10
3,42E-03	9,029E-09	0,	4,508E-09	0,	3,534E-09	1,297E-09
3,62E-03	1,497E-08	0,	7,507E-09	5,076E-24	5,920E-09	2,182E-09
3,82E-03	2,391E-08	0,	1,206E-08	5,468E-23	9,548E-09	3,536E-09
4,02E-03	3,694E-08	0,	1,876E-08	4,651E-22	1,489E-08	5,546E-09
4,22E-03	5,539E-08	0,	2,837E-08	3,230E-21	2,254E-08	8,448E-09
4,42E-03	8,091E-08	0,	4,183E-08	1,883E-20	3,324E-08	1,254E-08
4,62E-03	1,154E-07	0,	6,027E-08	9,427E-20	4,787E-08	1,818E-08
4,82E-03	1,612E-07	0,	8,508E-08	4,130E-19	6,749E-08	2,581E-08
5,02E-03	2,209E-07	0,	1,179E-07	1,609E-18	9,333E-08	3,594E-08
5,22E-03	2,975E-07	0,	1,605E-07	5,653E-18	1,268E-07	4,920E-08
5,42E-03	3,944E-07	0,	2,152E-07	1,810E-17	1,697E-07	6,627E-08
5,62E-03	5,153E-07	0,	2,844E-07	5,339E-17	2,238E-07	8,799E-08
5,82E-03	6,644E-07	0,	3,709E-07	1,463E-16	2,912E-07	1,153E-07
6,02E-03	8,463E-07	0,	4,779E-07	3,749E-16	3,743E-07	1,491E-07
6,22E-03	1,066E-06	0,	6,089E-07	9,050E-16	4,758E-07	1,907E-07
6,42E-03	1,329E-06	0,	7,677E-07	2,069E-15	5,986E-07	2,414E-07

Table 2. Reaction rates for selected reactions involving ${}^6\text{Li}$ and isotopes of hydrogen and helium. (Continued)

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)					
	LI-6+D>N+BE-7 Q= 3,382 MEV	LI-6+T>2N+BE-7 Q= -2,870 MEV	LI-6+D>P+LI-7 Q= 5,027 MEV	LI-6+HE-3>D+BE-7 Q= 0,110 MEV	LI-6+D>T+P+HE-4 Q= 2,558 MEV	LI-6+D>HE-4+HE-4 Q= 22,374 MEV
6,62E-03	1,641E-06	0,	9,586E-07	4,501E-15	7,459E-07	3,024E-07
6,82E-03	2,008E-06	0,	1,186E-06	9,362E-15	9,211E-07	3,755E-07
7,02E-03	2,437E-06	0,	1,456E-06	1,869E-14	1,128E-06	4,622E-07
7,22E-03	2,934E-06	0,	1,772E-06	3,591E-14	1,371E-06	5,644E-07
7,42E-03	3,509E-06	0,	2,141E-06	6,668E-14	1,654E-06	6,840E-07
7,62E-03	4,167E-06	0,	2,570E-06	1,199E-13	1,982E-06	8,232E-07
7,82E-03	4,918E-06	0,	3,064E-06	2,093E-13	2,360E-06	9,840E-07
8,02E-03	5,769E-06	0,	3,631E-06	3,557E-13	2,794E-06	1,169E-06
8,22E-03	6,730E-06	0,	4,279E-06	5,892E-13	3,288E-06	1,381E-06
8,42E-03	7,810E-06	0,	5,014E-06	9,536E-13	3,850E-06	1,621E-06
8,62E-03	9,019E-06	0,	5,846E-06	1,510E-12	4,485E-06	1,894E-06
8,82E-03	1,037E-05	0,	6,783E-06	2,343E-12	5,200E-06	2,202E-06
9,02E-03	1,186E-05	0,	7,833E-06	3,568E-12	6,001E-06	2,548E-06
9,22E-03	1,352E-05	0,	9,007E-06	5,337E-12	6,897E-06	2,935E-06
9,42E-03	1,534E-05	0,	1,031E-05	7,853E-12	7,895E-06	3,366E-06
9,62E-03	1,734E-05	0,	1,176E-05	1,138E-11	9,003E-06	3,845E-06
9,82E-03	1,954E-05	0,	1,337E-05	1,625E-11	1,023E-05	4,376E-06
1,00E-02	2,194E-05	0,	1,513E-05	2,288E-11	1,158E-05	4,961E-06
1,20E-02	5,971E-05	0,	4,444E-05	3,866E-10	3,414E-05	1,473E-05
1,40E-02	1,313E-04	0,	1,041E-04	3,060E-09	8,080E-05	3,476E-05
1,60E-02	2,496E-04	0,	2,087E-04	1,513E-08	1,642E-04	7,006E-05
1,80E-02	4,270E-04	0,	3,737E-04	5,483E-08	2,987E-04	1,260E-04
2,00E-02	6,749E-04	0,	6,145E-04	1,598E-07	4,995E-04	2,080E-04
2,20E-02	1,003E-03	0,	9,459E-04	3,972E-07	7,820E-04	3,211E-04
2,40E-02	1,421E-03	0,	1,382E-03	8,756E-07	1,162E-03	4,704E-04
2,60E-02	1,936E-03	0,	1,934E-03	1,757E-06	1,653E-03	6,600E-04
2,80E-02	2,553E-03	0,	2,614E-03	3,271E-06	2,269E-03	8,932E-04
3,00E-02	3,277E-03	0,	3,431E-03	5,728E-06	3,022E-03	1,175E-03
3,20E-02	4,111E-03	0,	4,394E-03	9,529E-06	3,925E-03	1,507E-03
3,40E-02	5,057E-03	0,	5,508E-03	1,518E-05	4,986E-03	1,890E-03
3,60E-02	6,118E-03	0,	6,779E-03	2,332E-05	6,213E-03	2,328E-03
3,80E-02	7,293E-03	0,	8,213E-03	3,469E-05	7,615E-03	2,820E-03
4,00E-02	8,584E-03	0,	9,810E-03	5,019E-05	9,196E-03	3,368E-03
4,20E-02	9,988E-03	0,	1,157E-02	7,084E-05	1,096E-02	3,971E-03
4,40E-02	1,150E-02	0,	1,351E-02	9,784E-05	1,291E-02	4,629E-03
4,60E-02	1,313E-02	0,	1,561E-02	1,325E-04	1,506E-02	5,343E-03
4,80E-02	1,487E-02	0,	1,788E-02	1,763E-04	1,739E-02	6,110E-03
5,00E-02	1,672E-02	0,	2,032E-02	2,308E-04	1,991E-02	6,930E-03
5,20E-02	1,867E-02	0,	2,292E-02	2,979E-04	2,263E-02	7,801E-03
5,40E-02	2,072E-02	1,479E-24	2,569E-02	3,793E-04	2,554E-02	8,723E-03
5,60E-02	2,287E-02	1,053E-23	2,862E-02	4,771E-04	2,863E-02	9,693E-03
5,80E-02	2,513E-02	6,542E-23	3,171E-02	5,934E-04	3,191E-02	1,071E-02
6,00E-02	2,747E-02	3,599E-22	3,495E-02	7,303E-04	3,537E-02	1,177E-02
6,20E-02	2,991E-02	1,773E-21	3,835E-02	8,902E-04	3,902E-02	1,287E-02
6,40E-02	3,243E-02	7,909E-21	4,189E-02	1,075E-03	4,284E-02	1,402E-02
6,60E-02	3,504E-02	3,221E-20	4,559E-02	1,288E-03	4,684E-02	1,520E-02
6,80E-02	3,774E-02	1,208E-19	4,942E-02	1,531E-03	5,100E-02	1,643E-02
7,00E-02	4,051E-02	4,198E-19	5,339E-02	1,806E-03	5,533E-02	1,768E-02
7,20E-02	4,336E-02	1,362E-18	5,749E-02	2,117E-03	5,982E-02	1,897E-02
7,40E-02	4,628E-02	4,145E-18	6,172E-02	2,465E-03	6,446E-02	2,025E-02
7,60E-02	4,928E-02	1,190E-17	6,607E-02	2,853E-03	6,926E-02	2,164E-02
7,80E-02	5,234E-02	3,234E-17	7,054E-02	3,284E-03	7,420E-02	2,302E-02
8,00E-02	5,547E-02	8,365E-17	7,513E-02	3,759E-03	7,929E-02	2,442E-02
8,20E-02	5,866E-02	2,065E-16	7,983E-02	4,282E-03	8,451E-02	2,585E-02
8,40E-02	6,191E-02	4,884E-16	8,463E-02	4,855E-03	8,987E-02	2,729E-02
8,60E-02	6,522E-02	1,110E-15	8,954E-02	5,480E-03	9,535E-02	2,876E-02
8,80E-02	6,858E-02	2,429E-15	9,454E-02	6,160E-03	1,010E-01	3,025E-02
9,00E-02	7,200E-02	5,134E-15	9,964E-02	6,896E-03	1,067E-01	3,175E-02
9,20E-02	7,546E-02	1,050E-14	1,048E-01	7,691E-03	1,125E-01	3,327E-02
9,40E-02	7,898E-02	2,085E-14	1,101E-01	8,547E-03	1,185E-01	3,480E-02
9,60E-02	8,254E-02	4,022E-14	1,154E-01	9,466E-03	1,245E-01	3,635E-02
9,80E-02	8,614E-02	7,552E-14	1,209E-01	1,045E-02	1,307E-01	3,790E-02
1,00E-01	8,979E-02	1,383E-13	1,264E-01	1,150E-02	1,369E-01	3,947E-02
1,20E-01	1,281E-01	1,933E-11	1,846E-01	2,605E-02	2,039E-01	5,542E-02
1,40E-01	1,686E-01	6,600E-10	2,465E-01	4,876E-02	2,765E-01	7,128E-02
1,60E-01	2,102E-01	9,342E-09	3,099E-01	8,018E-02	3,523E-01	8,648E-02
1,80E-01	2,520E-01	7,356E-08	3,731E-01	1,202E-01	4,294E-01	1,007E-01
2,00E-01	2,933E-01	3,844E-07	4,354E-01	1,683E-01	5,066E-01	1,138E-01
2,20E-01	3,338E-01	1,491E-06	4,960E-01	2,238E-01	5,833E-01	1,258E-01
2,40E-01	3,732E-01	4,623E-06	5,546E-01	2,857E-01	6,589E-01	1,368E-01
2,60E-01	4,113E-01	1,207E-05	6,110E-01	3,532E-01	7,332E-01	1,468E-01
2,80E-01	4,481E-01	2,755E-05	6,652E-01	4,254E-01	8,060E-01	1,559E-01
3,00E-01	4,835E-01	5,640E-05	7,172E-01	5,015E-01	8,774E-01	1,642E-01
3,20E-01	5,175E-01	1,058E-04	7,670E-01	5,807E-01	9,472E-01	1,718E-01
3,40E-01	5,502E-01	1,845E-04	8,146E-01	6,624E-01	1,015E+00	1,789E-01
3,60E-01	5,814E-01	3,030E-04	8,601E-01	7,461E-01	1,082E+00	1,854E-01
3,80E-01	6,113E-01	4,728E-04	9,036E-01	8,312E-01	1,147E+00	1,914E-01
4,00E-01	6,399E-01	7,066E-04	9,452E-01	9,172E-01	1,211E+00	1,971E-01
4,20E-01	6,672E-01	1,017E-03	9,850E-01	1,004E+00	1,274E+00	2,024E-01
4,40E-01	6,934E-01	1,419E-03	1,023E+00	1,091E+00	1,334E+00	2,075E-01
4,60E-01	7,184E-01	1,923E-03	1,059E+00	1,177E+00	1,394E+00	2,122E-01
4,80E-01	7,423E-01	2,544E-03	1,094E+00	1,264E+00	1,452E+00	2,168E-01
5,00E-01	7,652E-01	3,294E-03	1,128E+00	1,350E+00	1,508E+00	2,211E-01
5,20E-01	7,871E-01	4,184E-03	1,159E+00	1,435E+00	1,563E+00	2,252E-01
5,40E-01	8,080E-01	5,223E-03	1,190E+00	1,520E+00	1,617E+00	2,291E-01

Table 2. Reaction rates for selected reactions involving ${}^6\text{Li}$ and isotopes of hydrogen and helium. (Continued)

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)					
	LI-6+D>N+BE-7 Q= 3,382 MEV	LI-6+T>2N+BE-7 Q= -2,870 MEV	LI-6+D>P+LI-7 Q= 5,027 MEV	LI-6+HE-3>D+BE-7 Q= 0,110 MEV	LI-6+D>T+P+HE-4 Q= 2,558 MEV	LI-6+D>HE-4+HE-4 Q= 22,374 MEV
5,60E-01	8,280E-01	6,423E-03	1,219E+00	1,604E+00	1,668E+00	2,329E-01
5,80E-01	8,472E-01	7,790E-03	1,247E+00	1,686E+00	1,719E+00	2,365E-01
6,00E-01	8,656E-01	9,331E-03	1,274E+00	1,768E+00	1,768E+00	2,400E-01
6,20E-01	8,832E-01	1,105E-02	1,300E+00	1,848E+00	1,815E+00	2,433E-01
6,40E-01	9,000E-01	1,296E-02	1,325E+00	1,928E+00	1,862E+00	2,465E-01
6,60E-01	9,162E-01	1,506E-02	1,348E+00	2,006E+00	1,906E+00	2,496E-01
6,80E-01	9,317E-01	1,735E-02	1,371E+00	2,083E+00	1,949E+00	2,526E-01
7,00E-01	9,465E-01	1,983E-02	1,393E+00	2,158E+00	1,991E+00	2,554E-01
7,20E-01	9,608E-01	2,250E-02	1,414E+00	2,232E+00	2,031E+00	2,581E-01
7,40E-01	9,744E-01	2,537E-02	1,434E+00	2,305E+00	2,070E+00	2,607E-01
7,60E-01	9,876E-01	2,844E-02	1,453E+00	2,377E+00	2,108E+00	2,632E-01
7,80E-01	1,000E+00	3,169E-02	1,472E+00	2,448E+00	2,144E+00	2,656E-01
8,00E-01	1,012E+00	3,514E-02	1,490E+00	2,517E+00	2,179E+00	2,679E-01
8,20E-01	1,024E+00	3,877E-02	1,507E+00	2,585E+00	2,212E+00	2,701E-01
8,40E-01	1,035E+00	4,258E-02	1,524E+00	2,651E+00	2,245E+00	2,722E-01
8,60E-01	1,046E+00	4,657E-02	1,540E+00	2,717E+00	2,276E+00	2,742E-01
8,80E-01	1,056E+00	5,074E-02	1,555E+00	2,781E+00	2,306E+00	2,761E-01
9,00E-01	1,066E+00	5,508E-02	1,570E+00	2,844E+00	2,334E+00	2,779E-01
9,20E-01	1,076E+00	5,958E-02	1,584E+00	2,905E+00	2,362E+00	2,796E-01
9,40E-01	1,085E+00	6,425E-02	1,598E+00	2,966E+00	2,388E+00	2,812E-01
9,60E-01	1,094E+00	6,907E-02	1,611E+00	3,025E+00	2,413E+00	2,827E-01
9,80E-01	1,103E+00	7,405E-02	1,624E+00	3,083E+00	2,438E+00	2,842E-01
1,00E+00	1,111E+00	7,917E-02	1,637E+00	3,141E+00	2,461E+00	2,855E-01

Table 3. Reaction rates for selected reactions involving ${}^7\text{Li}$ and isotopes of hydrogen and helium.

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)			
	LI-7+P>N+BE-7 Q= -1,640 MEV	LI-7+D>2N+BE-7 Q= -3,860 MEV	LI-7+T>3N+BE-7 Q=-10,130 MEV	LI-7+HE-3>T+BE-7 Q= -0,880 MEV
2,00E-02	0,	0,	0,	1,564E-23
2,20E-02	0,	0,	0,	1,596E-21
2,40E-02	0,	0,	0,	7,568E-20
2,60E-02	0,	0,	0,	1,987E-18
2,80E-02	0,	0,	0,	3,277E-17
3,00E-02	4,962E-24	0,	0,	3,721E-16
3,20E-02	1,748E-22	0,	0,	3,121E-15
3,40E-02	4,056E-21	0,	0,	2,039E-14
3,60E-02	6,647E-20	0,	0,	1,082E-13
3,80E-02	8,124E-19	0,	0,	4,817E-13
4,00E-02	7,737E-18	0,	0,	1,847E-12
4,20E-02	5,949E-17	0,	0,	6,234E-12
4,40E-02	3,801E-16	0,	0,	1,884E-11
4,60E-02	2,068E-15	0,	0,	5,173E-11
4,80E-02	9,771E-15	0,	0,	1,306E-10
5,00E-02	4,078E-14	0,	0,	3,062E-10
5,20E-02	1,525E-13	0,	0,	6,726E-10
5,40E-02	5,173E-13	0,	0,	1,394E-09
5,60E-02	1,608E-12	0,	0,	2,743E-09
5,80E-02	4,622E-12	0,	0,	5,154E-09
6,00E-02	1,238E-11	0,	0,	9,287E-09
6,20E-02	3,113E-11	0,	0,	1,611E-08
6,40E-02	7,386E-11	0,	0,	2,702E-08
6,60E-02	1,663E-10	0,	0,	4,393E-08
6,80E-02	3,569E-10	0,	0,	6,942E-08
7,00E-02	7,331E-10	0,	0,	1,069E-07
7,20E-02	1,447E-09	1,372E-24	0,	1,608E-07
7,40E-02	2,751E-09	6,004E-24	0,	2,367E-07
7,60E-02	5,058E-09	2,431E-23	0,	3,414E-07
7,80E-02	9,011E-09	9,159E-23	0,	4,835E-07
8,00E-02	1,559E-08	3,230E-22	0,	6,731E-07
8,20E-02	2,627E-08	1,071E-21	0,	9,224E-07
8,40E-02	4,315E-08	3,355E-21	0,	1,246E-06
8,60E-02	6,927E-08	9,966E-21	0,	1,659E-06
8,80E-02	1,088E-07	2,817E-20	0,	2,183E-06
9,00E-02	1,675E-07	7,606E-20	0,	2,837E-06
9,20E-02	2,529E-07	1,966E-19	0,	3,648E-06
9,40E-02	3,753E-07	4,883E-19	0,	4,642E-06
9,60E-02	5,477E-07	1,167E-18	0,	5,849E-06
9,80E-02	7,869E-07	2,694E-18	0,	7,305E-06
1,00E-01	1,114E-06	6,012E-18	0,	9,045E-06
1,20E-01	1,891E-05	4,240E-15	0,	5,271E-05
1,40E-01	1,412E-04	4,618E-13	0,	1,913E-04
1,60E-01	6,316E-04	1,566E-11	0,	5,174E-04
1,80E-01	2,008E-03	2,439E-10	0,	1,149E-03
2,00E-01	5,034E-03	2,205E-09	0,	2,221E-03
2,20E-01	1,062E-02	1,342E-08	0,	3,874E-03
2,40E-01	1,969E-02	6,064E-08	0,	6,242E-03
2,60E-01	3,309E-02	2,181E-07	2,997E-23	9,451E-03

Table 3. Reaction rates for selected reactions involving ^7Li and isotopes of hydrogen and helium. (Continued)

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)			
	$\text{Li-7}+\text{p} \rightarrow \text{n}+\text{He-7}$ Q= -1,640 MEV	$\text{Li-7}+\text{D} \rightarrow \text{2n}+\text{He-7}$ Q= -3,860 MEV	$\text{Li-7}+\text{T} \rightarrow \text{3n}+\text{He-7}$ Q= -10,130 MEV	$\text{Li-7}+\text{He-3} \rightarrow \text{T}+\text{He-7}$ Q= -0,880 MEV
2,80E-01	5,146E-02	5,549E-07	8,892E-22	1,361E-02
3,00E-01	7,528E-02	1,703E-06	1,736E-20	1,800E-02
3,20E-01	1,048E-01	3,939E-06	2,386E-19	2,509E-02
3,40E-01	1,400E-01	8,271E-06	2,436E-18	3,254E-02
3,60E-01	1,810E-01	1,602E-05	1,933E-17	4,116E-02
3,80E-01	2,274E-01	2,900E-05	1,238E-16	5,096E-02
4,00E-01	2,789E-01	4,954E-05	6,600E-16	6,195E-02
4,20E-01	3,352E-01	8,052E-05	3,001E-15	7,412E-02
4,40E-01	3,959E-01	1,254E-04	1,189E-14	8,742E-02
4,60E-01	4,606E-01	1,881E-04	4,176E-14	1,018E-01
4,80E-01	5,289E-01	2,730E-04	1,320E-13	1,173E-01
5,00E-01	6,003E-01	3,851E-04	3,801E-13	1,338E-01
5,20E-01	6,745E-01	5,294E-04	1,008E-12	1,514E-01
5,40E-01	7,511E-01	7,115E-04	2,483E-12	1,698E-01
5,60E-01	8,297E-01	9,369E-04	5,730E-12	1,891E-01
5,80E-01	9,100E-01	1,211E-03	1,246E-11	2,093E-01
6,00E-01	9,917E-01	1,541E-03	2,572E-11	2,302E-01
6,20E-01	1,074E+00	1,931E-03	5,058E-11	2,519E-01
6,40E-01	1,158E+00	2,387E-03	9,525E-11	2,742E-01
6,60E-01	1,242E+00	2,915E-03	1,724E-10	2,972E-01
6,80E-01	1,327E+00	3,520E-03	3,011E-10	3,208E-01
7,00E-01	1,412E+00	4,207E-03	5,089E-10	3,449E-01
7,20E-01	1,497E+00	4,981E-03	8,344E-10	3,695E-01
7,40E-01	1,582E+00	5,845E-03	1,331E-09	3,946E-01
7,60E-01	1,666E+00	6,806E-03	2,069E-09	4,200E-01
7,80E-01	1,750E+00	7,865E-03	3,143E-09	4,459E-01
8,00E-01	1,834E+00	9,027E-03	4,670E-09	4,721E-01
8,20E-01	1,917E+00	1,029E-02	6,802E-09	4,986E-01
8,40E-01	1,999E+00	1,167E-02	9,723E-09	5,253E-01
8,60E-01	2,080E+00	1,316E-02	1,366E-08	5,523E-01
8,80E-01	2,160E+00	1,476E-02	1,888E-08	5,795E-01
9,00E-01	2,240E+00	1,647E-02	2,571E-08	6,069E-01
9,20E-01	2,318E+00	1,830E-02	3,452E-08	6,344E-01
9,40E-01	2,395E+00	2,025E-02	4,574E-08	6,621E-01
9,60E-01	2,472E+00	2,232E-02	5,987E-08	6,898E-01
9,80E-01	2,547E+00	2,450E-02	7,745E-08	7,177E-01
1,00E+00	2,620E+00	2,681E-02	9,912E-08	7,456E-01

Table 4. Reaction rates for selected reactions involving ^{10}B and isotopes of hydrogen.

TEMPERATURE MEV	SIGMA-V-BAR (BARN CM/SH)				
	$\text{B-10}+\text{D} \rightarrow \text{n}+\text{C-11}$ Q= 6,470 MEV	$\text{B-10}+\text{D} \rightarrow \text{p}+\text{B-11}$ Q= 9,230 MEV	$\text{B-10}+\text{p} \rightarrow \text{He-3}+\text{2He-4}$ Q= -0,440 MEV	$\text{B-10}+\text{p} \rightarrow \text{He-4}+\text{He-7}$ Q= 1,150 MEV	$\text{B-10}+\text{D} \rightarrow \text{He-4}+\text{2He-4}$ Q= 17,914 MEV
1,82E-03	3,691E-23	0,	0,	0,	3,611E-24
2,02E-03	3,298E-21	0,	0,	1,093E-22	3,219E-22
2,22E-03	1,310E-19	0,	0,	6,070E-21	1,275E-20
2,42E-03	2,829E-18	4,188E-24	0,	1,733E-19	2,745E-19
2,62E-03	3,819E-17	5,808E-23	0,	2,962E-18	3,696E-18
2,82E-03	3,563E-16	5,774E-22	0,	3,381E-17	3,438E-17
3,02E-03	2,473E-15	4,209E-21	0,	2,795E-16	2,379E-16
3,22E-03	1,350E-14	2,418E-20	0,	1,776E-15	1,295E-15
3,42E-03	6,042E-14	1,143E-19	0,	9,089E-15	5,777E-15
3,62E-03	2,293E-13	4,590E-19	0,	3,883E-14	2,185E-14
3,82E-03	7,570E-13	1,609E-18	0,	1,425E-13	7,192E-14
4,02E-03	2,220E-12	5,028E-18	0,	4,595E-13	2,103E-13
4,22E-03	5,885E-12	1,424E-17	0,	1,326E-12	5,555E-13
4,42E-03	1,429E-11	3,707E-17	0,	3,478E-12	1,344E-12
4,62E-03	3,216E-11	8,971E-17	0,	8,393E-12	3,015E-12
4,82E-03	6,770E-11	2,038E-16	0,	1,883E-11	6,325E-12
5,02E-03	1,344E-10	4,381E-16	0,	3,963E-11	1,251E-11
5,22E-03	2,534E-10	8,973E-16	0,	7,881E-11	2,351E-11
5,42E-03	4,564E-10	1,761E-15	0,	1,490E-10	4,217E-11
5,62E-03	7,886E-10	3,328E-15	0,	2,694E-10	7,260E-11
5,82E-03	1,314E-09	6,081E-15	0,	4,677E-10	1,205E-10
6,02E-03	2,117E-09	1,078E-14	0,	7,832E-10	1,934E-10
6,22E-03	3,311E-09	1,862E-14	0,	1,269E-09	3,013E-10
6,42E-03	5,041E-09	3,138E-14	0,	1,997E-09	4,569E-10
6,62E-03	7,487E-09	5,175E-14	0,	3,058E-09	6,759E-10
6,82E-03	1,087E-08	8,367E-14	0,	4,570E-09	9,777E-10
7,02E-03	1,548E-08	1,329E-13	0,	6,677E-09	1,386E-09
7,22E-03	2,162E-08	2,075E-13	0,	9,558E-09	1,927E-09
7,42E-03	2,968E-08	3,194E-13	0,	1,343E-08	2,635E-09
7,62E-03	4,011E-08	4,846E-13	0,	1,853E-08	3,545E-09
7,82E-03	5,341E-08	7,260E-13	0,	2,518E-08	4,700E-09
8,02E-03	7,018E-08	1,075E-12	0,	3,371E-08	6,149E-09
8,22E-03	9,107E-08	1,573E-12	0,	4,450E-08	7,943E-09
8,42E-03	1,168E-07	2,279E-12	0,	5,802E-08	1,014E-08
8,62E-03	1,482E-07	3,270E-12	0,	7,475E-08	1,281E-08

Table 4. Reaction rates for selected reactions involving ^{10}B and isotopes of hydrogen. (Continued)

SIGMA-V-BAR (BARN CM/SH)					
TEMPERATURE MEV	B-10+D>N+C-11 Q= 6.470 MEV	B-10+D>P+B-11 Q= 9.230 MEV	B-10+P>HE-3+2HE-4 Q= -0.440 MEV	B-10+P>HE-4+BE-7 Q= 1.150 MEV	B-10+D>HE-4+2HE-4 Q= 17.914 MEV
8.82E-03	1.863E-07	4.648E-12	0.	9.524E-08	1.602E-08
9.02E-03	2.318E-07	6.548E-12	0.	1.201E-07	1.985E-08
9.22E-03	2.860E-07	9.149E-12	0.	1.500E-07	2.437E-08
9.42E-03	3.501E-07	1.268E-11	0.	1.957E-07	2.969E-08
9.62E-03	4.252E-07	1.744E-11	0.	2.280E-07	3.588E-08
9.82E-03	5.127E-07	2.382E-11	0.	2.777E-07	4.306E-08
1.00E-02	6.142E-07	3.229E-11	0.	3.357E-07	5.132E-08
1.20E-02	2.781E-06	4.805E-10	1.279E-24	1.617E-06	2.207E-07
1.40E-02	8.662E-06	4.237E-09	2.372E-22	5.162E-06	6.522E-07
1.60E-02	2.134E-05	2.488E-08	1.213E-20	1.276E-05	1.527E-06
1.80E-02	4.481E-05	1.069E-07	2.635E-19	2.665E-05	3.062E-06
2.00E-02	8.378E-05	3.617E-07	3.150E-18	4.940E-05	5.513E-06
2.20E-02	1.434E-04	1.019E-06	2.443E-17	8.396E-05	9.174E-06
2.40E-02	2.288E-04	2.485E-06	1.373E-16	1.335E-04	1.438E-05
2.60E-02	3.451E-04	5.410E-06	6.029E-16	2.015E-04	2.151E-05
2.80E-02	4.968E-04	1.074E-05	2.185E-15	2.913E-04	3.100E-05
3.00E-02	6.878E-04	1.979E-05	6.802E-15	4.065E-04	4.330E-05
3.20E-02	9.215E-04	3.422E-05	1.873E-14	5.504E-04	5.892E-05
3.40E-02	1.200E-03	5.613E-05	4.670E-14	7.263E-04	7.839E-05
3.60E-02	1.527E-03	8.801E-05	1.072E-13	9.371E-04	1.023E-04
3.80E-02	1.902E-03	1.327E-04	2.299E-13	1.186E-03	1.312E-04
4.00E-02	2.328E-03	1.936E-04	4.654E-13	1.474E-03	1.657E-04
4.20E-02	2.805E-03	2.741E-04	8.971E-13	1.805E-03	2.064E-04
4.40E-02	3.333E-03	3.782E-04	1.658E-12	2.180E-03	2.539E-04
4.60E-02	3.914E-03	5.100E-04	2.957E-12	2.601E-03	3.089E-04
4.80E-02	4.547E-03	6.739E-04	5.108E-12	3.069E-03	3.721E-04
5.00E-02	5.232E-03	8.744E-04	8.584E-12	3.586E-03	4.438E-04
5.20E-02	5.970E-03	1.116E-03	1.407E-11	4.153E-03	5.252E-04
5.40E-02	6.761E-03	1.404E-03	2.258E-11	4.770E-03	6.164E-04
5.60E-02	7.605E-03	1.743E-03	3.553E-11	5.439E-03	7.182E-04
5.80E-02	8.501E-03	2.137E-03	5.492E-11	6.160E-03	8.314E-04
6.00E-02	9.451E-03	2.592E-03	8.355E-11	6.935E-03	9.563E-04
6.20E-02	1.045E-02	3.112E-03	1.252E-10	7.764E-03	1.094E-03
6.40E-02	1.151E-02	3.702E-03	1.852E-10	8.648E-03	1.244E-03
6.60E-02	1.262E-02	4.367E-03	2.706E-10	9.587E-03	1.408E-03
6.80E-02	1.378E-02	5.110E-03	3.908E-10	1.058E-02	1.587E-03
7.00E-02	1.500E-02	5.938E-03	5.584E-10	1.164E-02	1.780E-03
7.20E-02	1.627E-02	6.853E-03	7.898E-10	1.275E-02	1.988E-03
7.40E-02	1.760E-02	7.860E-03	1.107E-09	1.392E-02	2.213E-03
7.60E-02	1.898E-02	8.964E-03	1.536E-09	1.515E-02	2.453E-03
7.80E-02	2.042E-02	1.017E-02	2.115E-09	1.645E-02	2.710E-03
8.00E-02	2.191E-02	1.147E-02	2.888E-09	1.781E-02	2.985E-03
8.20E-02	2.346E-02	1.288E-02	3.911E-09	1.923E-02	3.277E-03
8.40E-02	2.507E-02	1.441E-02	5.258E-09	2.072E-02	3.588E-03
8.60E-02	2.673E-02	1.604E-02	7.016E-09	2.227E-02	3.917E-03
8.80E-02	2.845E-02	1.779E-02	9.295E-09	2.389E-02	4.264E-03
9.00E-02	3.022E-02	1.966E-02	1.223E-08	2.558E-02	4.631E-03
9.20E-02	3.205E-02	2.165E-02	1.598E-08	2.734E-02	5.017E-03
9.40E-02	3.394E-02	2.376E-02	2.074E-08	2.918E-02	5.423E-03
9.60E-02	3.589E-02	2.599E-02	2.675E-08	3.108E-02	5.849E-03
9.80E-02	3.789E-02	2.835E-02	3.428E-08	3.307E-02	6.295E-03
1.00E-01	3.995E-02	3.084E-02	4.366E-08	3.512E-02	6.762E-03
1.20E-01	6.371E-02	6.302E-02	3.606E-07	6.013E-02	1.257E-02
1.40E-01	9.312E-02	1.087E-01	1.873E-06	9.379E-02	2.043E-02
1.60E-01	1.279E-01	1.674E-01	6.907E-06	1.363E-01	3.020E-02
1.80E-01	1.675E-01	2.382E-01	1.980E-05	1.871E-01	4.162E-02
2.00E-01	2.116E-01	3.198E-01	4.713E-05	2.452E-01	5.442E-02
2.20E-01	2.595E-01	4.107E-01	9.748E-05	3.092E-01	6.833E-02
2.40E-01	3.106E-01	5.096E-01	1.810E-04	3.776E-01	8.309E-02
2.60E-01	3.645E-01	6.152E-01	3.089E-04	4.490E-01	9.850E-02
2.80E-01	4.205E-01	7.263E-01	4.930E-04	5.221E-01	1.144E-01
3.00E-01	4.781E-01	8.419E-01	7.452E-04	5.958E-01	1.306E-01
3.20E-01	5.370E-01	9.608E-01	1.077E-03	6.691E-01	1.469E-01
3.40E-01	5.965E-01	1.082E+00	1.500E-03	7.413E-01	1.634E-01
3.60E-01	6.565E-01	1.206E+00	2.026E-03	8.119E-01	1.799E-01
3.80E-01	7.164E-01	1.330E+00	2.663E-03	8.803E-01	1.963E-01
4.00E-01	7.760E-01	1.456E+00	3.422E-03	9.463E-01	2.127E-01
4.20E-01	8.351E-01	1.582E+00	4.311E-03	1.010E+00	2.289E-01
4.40E-01	8.935E-01	1.707E+00	5.337E-03	1.070E+00	2.449E-01
4.60E-01	9.508E-01	1.832E+00	6.506E-03	1.128E+00	2.608E-01
4.80E-01	1.007E+00	1.956E+00	7.824E-03	1.183E+00	2.764E-01
5.00E-01	1.062E+00	2.080E+00	9.295E-03	1.236E+00	2.919E-01
5.20E-01	1.116E+00	2.202E+00	1.092E-02	1.285E+00	3.071E-01
5.40E-01	1.168E+00	2.323E+00	1.271E-02	1.333E+00	3.220E-01
5.60E-01	1.219E+00	2.442E+00	1.465E-02	1.377E+00	3.367E-01
5.80E-01	1.268E+00	2.560E+00	1.675E-02	1.420E+00	3.512E-01
6.00E-01	1.316E+00	2.677E+00	1.902E-02	1.460E+00	3.654E-01
6.20E-01	1.362E+00	2.792E+00	2.143E-02	1.498E+00	3.793E-01
6.40E-01	1.407E+00	2.905E+00	2.401E-02	1.534E+00	3.931E-01
6.60E-01	1.450E+00	3.016E+00	2.673E-02	1.569E+00	4.065E-01
6.80E-01	1.492E+00	3.126E+00	2.961E-02	1.601E+00	4.198E-01
7.00E-01	1.532E+00	3.233E+00	3.263E-02	1.632E+00	4.328E-01
7.20E-01	1.571E+00	3.339E+00	3.579E-02	1.662E+00	4.455E-01
7.40E-01	1.608E+00	3.444E+00	3.908E-02	1.690E+00	4.580E-01
7.60E-01	1.644E+00	3.546E+00	4.250E-02	1.717E+00	4.703E-01
7.80E-01	1.678E+00	3.647E+00	4.605E-02	1.742E+00	4.824E-01

Table 4. Reaction rates for selected reactions involving ^{10}B and isotopes of hydrogen. (Continued)

SIGMA-V-BAR (BARN CM/SH)					
TEMPERATURE MEV	B-10+D>N+C-11 Q= 6,470 MEV	B-10+D>P+B-11 Q= 9,230 MEV	B-10+P>HE-3+2HE-4 Q= -0,440 MEV	B-10+P>HE-4+BE-7 Q= 1,150 MEV	B-10+D>HE-4+2HE-4 Q= 17,914 MEV
8,00E-01	1,711E+00	3,746E+00	4,972E-02	1,767E+00	4,943E-01
8,20E-01	1,743E+00	3,844E+00	5,350E-02	1,790E+00	5,059E-01
8,40E-01	1,773E+00	3,939E+00	5,739E-02	1,813E+00	5,173E-01
8,60E-01	1,803E+00	4,033E+00	6,137E-02	1,834E+00	5,285E-01
8,80E-01	1,831E+00	4,126E+00	6,545E-02	1,855E+00	5,395E-01
9,00E-01	1,857E+00	4,216E+00	6,962E-02	1,875E+00	5,504E-01
9,20E-01	1,883E+00	4,306E+00	7,388E-02	1,894E+00	5,610E-01
9,40E-01	1,908E+00	4,393E+00	7,821E-02	1,912E+00	5,714E-01
9,60E-01	1,931E+00	4,479E+00	8,261E-02	1,930E+00	5,817E-01
9,80E-01	1,954E+00	4,564E+00	8,707E-02	1,947E+00	5,917E-01
1,00E+00	1,976E+00	4,647E+00	9,160E-02	1,963E+00	6,016E-01

Table 5. Reaction rates for selected reactions involving ^{11}B and isotopes of hydrogen.

SIGMA-V-BAR (BARN CM/SH)				
TEMPERATURE MEV	B-11+P>N+C-11 Q= -2,770 MEV	B-11+D>N+C-12 Q= 13,370 MEV	B-11+D>P+B-12 Q= 1,140 MEV	B-11+P>HE-4+2HE-4 Q= 8,683 MEV
1,42E-03	0,	0,	0,	3,360E-24
1,62E-03	0,	0,	0,	7,486E-22
1,82E-03	0,	1,856E-23	1,803E-23	5,126E-20
2,02E-03	0,	1,780E-21	1,723E-21	1,533E-18
2,22E-03	0,	7,494E-20	7,229E-20	2,507E-17
2,42E-03	0,	1,699E-18	1,633E-18	2,609E-16
2,62E-03	0,	2,391E-17	2,289E-17	1,917E-15
2,82E-03	0,	2,313E-16	2,206E-16	1,072E-14
3,02E-03	0,	1,656E-15	1,573E-15	4,821E-14
3,22E-03	0,	9,291E-15	8,792E-15	1,817E-13
3,42E-03	0,	4,262E-14	4,017E-14	5,926E-13
3,62E-03	0,	1,653E-13	1,551E-13	1,713E-12
3,82E-03	0,	5,568E-13	5,203E-13	4,476E-12
4,02E-03	0,	1,663E-12	1,547E-12	1,073E-11
4,22E-03	0,	4,481E-12	4,151E-12	2,393E-11
4,42E-03	0,	1,105E-11	1,019E-11	5,007E-11
4,62E-03	0,	2,521E-11	2,314E-11	9,919E-11
4,82E-03	0,	5,376E-11	4,913E-11	1,873E-10
5,02E-03	0,	1,080E-10	9,826E-11	3,390E-10
5,22E-03	0,	2,060E-10	1,865E-10	5,909E-10
5,42E-03	0,	3,749E-10	3,377E-10	9,961E-10
5,62E-03	0,	6,544E-10	5,864E-10	1,630E-09
5,82E-03	0,	1,100E-09	9,811E-10	2,595E-09
6,02E-03	0,	1,789E-09	1,587E-09	4,032E-09
6,22E-03	0,	2,823E-09	2,490E-09	6,128E-09
6,42E-03	0,	4,332E-09	3,802E-09	9,128E-09
6,62E-03	0,	6,486E-09	5,661E-09	1,334E-08
6,82E-03	0,	9,491E-09	8,238E-09	1,918E-08
7,02E-03	0,	1,360E-08	1,174E-08	2,715E-08
7,22E-03	0,	1,913E-08	1,642E-08	3,788E-08
7,42E-03	0,	2,644E-08	2,256E-08	5,216E-08
7,62E-03	0,	3,597E-08	3,051E-08	7,094E-08
7,82E-03	0,	4,820E-08	4,065E-08	9,538E-08
8,02E-03	0,	6,372E-08	5,341E-08	1,269E-07
8,22E-03	0,	8,317E-08	6,930E-08	1,671E-07
8,42E-03	0,	1,073E-07	8,885E-08	2,181E-07
8,62E-03	0,	1,369E-07	1,127E-07	2,821E-07
8,82E-03	0,	1,730E-07	1,414E-07	3,618E-07
9,02E-03	0,	2,165E-07	1,759E-07	4,605E-07
9,22E-03	0,	2,685E-07	2,167E-07	5,817E-07
9,42E-03	0,	3,303E-07	2,649E-07	7,296E-07
9,62E-03	0,	4,032E-07	3,212E-07	9,089E-07
9,82E-03	0,	4,886E-07	3,867E-07	1,125E-06
1,00E-02	0,	5,881E-07	4,623E-07	1,384E-06
1,20E-02	0,	2,786E-06	2,041E-06	8,191E-06
1,40E-02	0,	9,033E-06	6,152E-06	3,197E-05
1,60E-02	0,	2,307E-05	1,462E-05	9,280E-05
1,80E-02	0,	5,002E-05	2,965E-05	2,178E-04
2,00E-02	0,	9,617E-05	5,371E-05	4,379E-04
2,20E-02	0,	1,685E-04	8,950E-05	7,848E-04
2,40E-02	0,	2,743E-04	1,398E-04	1,290E-03
2,60E-02	0,	4,204E-04	2,075E-04	1,983E-03
2,80E-02	0,	6,133E-04	2,953E-04	2,896E-03
3,00E-02	0,	8,581E-04	4,061E-04	4,056E-03
3,20E-02	0,	1,159E-03	5,423E-04	5,496E-03
3,40E-02	0,	1,520E-03	7,066E-04	7,247E-03
3,60E-02	0,	1,944E-03	9,012E-04	9,343E-03
3,80E-02	0,	2,431E-03	1,129E-03	1,182E-02
4,00E-02	0,	2,982E-03	1,391E-03	1,471E-02
4,20E-02	0,	3,599E-03	1,690E-03	1,805E-02
4,40E-02	0,	4,281E-03	2,029E-03	2,188E-02
4,60E-02	0,	5,027E-03	2,408E-03	2,623E-02

Table 5. Reaction rates for selected reactions involving ^{11}B and isotopes of hydrogen. (Continued)

SIGMA-V-BAR (BARN CM/SH)				
TEMPERATURE MEV	B-11+P>N+C-11 Q= -2,770 MEV	B-11+D>N+C-12 Q= 13,370 MEV	B-11+D>P+B-12 Q= 1,140 MEV	B-11+P>HE-4+2HE-4 Q= 8,683 MEV
4,80E-02	0.	5,837E-03	2,831E-03	3,115E-02
5,00E-02	1,218E-24	6,710E-03	3,298E-03	3,666E-02
5,20E-02	1,062E-23	7,645E-03	3,813E-03	4,280E-02
5,40E-02	7,884E-23	8,642E-03	4,376E-03	4,960E-02
5,60E-02	5,071E-22	9,699E-03	4,990E-03	5,709E-02
5,80E-02	2,868E-21	1,082E-02	5,656E-03	6,530E-02
6,00E-02	1,445E-20	1,199E-02	6,377E-03	7,423E-02
6,20E-02	6,557E-20	1,322E-02	7,155E-03	8,392E-02
6,40E-02	2,707E-19	1,452E-02	7,991E-03	9,436E-02
6,60E-02	1,025E-18	1,586E-02	8,886E-03	1,056E-01
6,80E-02	3,591E-18	1,727E-02	9,844E-03	1,176E-01
7,00E-02	1,171E-17	1,873E-02	1,087E-02	1,304E-01
7,20E-02	3,573E-17	2,024E-02	1,195E-02	1,439E-01
7,40E-02	1,027E-16	2,182E-02	1,311E-02	1,582E-01
7,60E-02	2,791E-16	2,344E-02	1,433E-02	1,733E-01
7,80E-02	7,207E-16	2,512E-02	1,563E-02	1,891E-01
8,00E-02	1,775E-15	2,686E-02	1,700E-02	2,057E-01
8,20E-02	4,182E-15	2,865E-02	1,844E-02	2,230E-01
8,40E-02	9,460E-15	3,050E-02	1,996E-02	2,409E-01
8,60E-02	2,060E-14	3,240E-02	2,156E-02	2,595E-01
8,80E-02	4,331E-14	3,435E-02	2,323E-02	2,788E-01
9,00E-02	8,808E-14	3,636E-02	2,499E-02	2,987E-01
9,20E-02	1,737E-13	3,843E-02	2,683E-02	3,192E-01
9,40E-02	3,328E-13	4,055E-02	2,876E-02	3,402E-01
9,60E-02	6,205E-13	4,272E-02	3,077E-02	3,618E-01
9,80E-02	1,128E-12	4,495E-02	3,287E-02	3,838E-01
1,00E-01	2,002E-12	4,723E-02	3,505E-02	4,064E-01
1,20E-01	2,189E-10	7,305E-02	6,209E-02	6,511E-01
1,40E-01	6,163E-09	1,042E-01	9,920E-02	9,120E-01
1,60E-01	7,584E-08	1,405E-01	1,470E-01	1,169E+00
1,80E-01	5,340E-07	1,815E-01	2,055E-01	1,409E+00
2,00E-01	2,543E-06	2,269E-01	2,746E-01	1,627E+00
2,20E-01	9,112E-06	2,761E-01	3,535E-01	1,821E+00
2,40E-01	2,637E-05	3,287E-01	4,415E-01	1,992E+00
2,60E-01	6,479E-05	3,840E-01	5,377E-01	2,141E+00
2,80E-01	1,399E-04	4,417E-01	6,412E-01	2,272E+00
3,00E-01	2,727E-04	5,011E-01	7,510E-01	2,385E+00
3,20E-01	4,888E-04	5,618E-01	8,663E-01	2,485E+00
3,40E-01	8,182E-04	6,234E-01	9,862E-01	2,572E+00
3,60E-01	1,294E-03	6,854E-01	1,110E+00	2,649E+00
3,80E-01	1,950E-03	7,476E-01	1,237E+00	2,717E+00
4,00E-01	2,822E-03	8,097E-01	1,366E+00	2,777E+00
4,20E-01	3,945E-03	8,713E-01	1,498E+00	2,831E+00
4,40E-01	5,351E-03	9,323E-01	1,631E+00	2,880E+00
4,60E-01	7,074E-03	9,924E-01	1,765E+00	2,924E+00
4,80E-01	9,141E-03	1,051E+00	1,899E+00	2,964E+00
5,00E-01	1,158E-02	1,109E+00	2,035E+00	3,001E+00
5,20E-01	1,441E-02	1,166E+00	2,170E+00	3,035E+00
5,40E-01	1,765E-02	1,222E+00	2,305E+00	3,067E+00
5,60E-01	2,133E-02	1,276E+00	2,440E+00	3,096E+00
5,80E-01	2,545E-02	1,328E+00	2,574E+00	3,124E+00
6,00E-01	3,002E-02	1,379E+00	2,707E+00	3,150E+00
6,20E-01	3,505E-02	1,429E+00	2,840E+00	3,175E+00
6,40E-01	4,055E-02	1,477E+00	2,972E+00	3,198E+00
6,60E-01	4,652E-02	1,523E+00	3,103E+00	3,220E+00
6,80E-01	5,296E-02	1,568E+00	3,232E+00	3,242E+00
7,00E-01	5,986E-02	1,612E+00	3,361E+00	3,262E+00
7,20E-01	6,723E-02	1,654E+00	3,488E+00	3,281E+00
7,40E-01	7,506E-02	1,695E+00	3,614E+00	3,300E+00
7,60E-01	8,334E-02	1,734E+00	3,739E+00	3,318E+00
7,80E-01	9,206E-02	1,772E+00	3,862E+00	3,336E+00
8,00E-01	1,012E-01	1,809E+00	3,984E+00	3,353E+00
8,20E-01	1,108E-01	1,844E+00	4,105E+00	3,369E+00
8,40E-01	1,208E-01	1,878E+00	4,224E+00	3,385E+00
8,60E-01	1,311E-01	1,911E+00	4,342E+00	3,400E+00
8,80E-01	1,419E-01	1,942E+00	4,458E+00	3,415E+00
9,00E-01	1,530E-01	1,973E+00	4,574E+00	3,430E+00
9,20E-01	1,645E-01	2,002E+00	4,687E+00	3,444E+00
9,40E-01	1,764E-01	2,030E+00	4,799E+00	3,457E+00
9,60E-01	1,886E-01	2,057E+00	4,910E+00	3,471E+00
9,80E-01	2,010E-01	2,083E+00	5,020E+00	3,484E+00
1,00E+00	2,138E-01	2,109E+00	5,128E+00	3,496E+00

REFERENCE

1. R. J. Howerton, *The LLL Evaluated Nuclear Data Library (ENDL): Description of Evaluations for Individual Charged-Particle-Induced Reactions for $Z < 10$* , Lawrence Livermore Laboratory, Livermore, Calif., UCRL-50400, Vol. 15, Part E, (to be issued).