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DATA ON COLLISIONS OF HYDROGEN ATOMS AND  
IONS WITH ATOMS AND MOLECULES (III)  
(CROSS SECTIONS FOR CHARGE TRANSFER OF H, H<sup>+</sup>  
AND H<sup>-</sup> WITH METAL VAPORS)

September 1984

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Data on Collisions of Hydrogen Atoms and Ions  
with Atoms and Molecules (III)

(Cross Sections for Charge Transfer of H, H<sup>+</sup> and H<sup>-</sup> with Metal Vapors)

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( Received August 23, 1984 )

This report presents a compilation of the experimental data on cross sections for charge transfer of H, H<sup>+</sup> and H<sup>-</sup> with metal vapors of Li, Na, Mg, K, Ca, Rb, Sr, Cs, Ba and Pb.

A systematical survey has been made of the literatures up to the middle of 1984. The cross sections are given in graphs and tables as a function of projectile energy; a list of references is also attached.

Keywords: Charge Transfer, Hydrogen Ion, Hydrogen Atom, Metal Vapor,  
Negative Ion, Atomic Data, Atomic Collision

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水素原子・イオンと原子分子の衝突に関するデータ集(Ⅲ)  
(H, H<sup>+</sup>およびH<sup>-</sup>と金属蒸気の電荷移動断面積)

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(1984年8月23日受理)

この報告書は、H, H<sup>+</sup>およびH<sup>-</sup>とLi, Na, Mg, K, Ca, Rb, Sr, BaおよびPbなどの金属蒸気の電荷移動断面積の実験データを収集したものである。すなわち、上述の過程の1984年の6月末までに発表された文献を調べ、その結果をまとめたものである。断面積の値を入射粒子のエネルギーの関数として、グラフおよび数値表の形にまとめ、これに文献リストを付している。

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## 1. Introduction

Atomic and molecular processes have a major role in many fields such as radiation physics, astrophysics, medical science and so on. Especially for fusion research the processes are crucial to plasma modelling, diagnostics and design of devices<sup>1)</sup>. The charge transfer process is the most determining one among the atomic and molecular processes in fusion plasma.

In the previous reports<sup>2),3)</sup> the compilations were performed on the charge transfer cross sections for H, H<sup>+</sup>, and H<sup>-</sup> incident on various gases. In this report a series of compilations is extended to those on metal vapors.

These collision processes and cross section data are of especial importance in fusion research. First, for the plasma heating of future large tokamak and prototype fusion reactor, it has been proposed to use intense, high-energy (100 keV - 1 MeV) neutral beams. At these energies it will be more desirable to neutralize a beam of negative ions since the neutralization efficiency is almost independent of ion energy. The most promising method to obtain negative ions is use of a conventional positive ion source to produce a low-energy (1.5 keV) beam which is passed through a metal vapor cell to form the required negative ions. The negative ions are then accelerated to desired energy and neutralized in a suitable target. Second, in the outermost layers of confined plasma, i.e., in front of a material wall, charge transfer processes of hydrogen with impurity metal vapors are particularly important for plasma diagnostics and particle recycling. Third, fast neutral and ion beams of metals can also provide useful tools for plasma diagnostics<sup>4)</sup>. Thus the knowledge of charge transfer cross sections on the metal vapors is indispensable to the elucidation of atomic and molecular problems.

This report presents a compilation in graphs and tables of the experimental cross sections for charge transfer of H, H<sup>+</sup>, and H<sup>-</sup> with Li, Na, Mg, K, Ca, Rb, Sr, Cs, Ba and Pb. The literatures up to the middle of 1984 are surveyed for the present compilation.

The numerical data are stored in the Atomic and Molecular Data Storage and Retrieval System (AMSTOR) of JAERI, being available to interested users on magnetic tape for their requests.

#### References for Introduction

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2. Data on Charge Transfer Cross Sections

2.1 Table of Compiled Processes

Table 2.1.1 Compiled Processes

Type of Cross Sections	Processes	
I. Electron Capture		
$\sigma_{10}$	(1) $H^+ + Li \rightarrow H$	(6) $H^+ + Rb \rightarrow H$
	(2) $H^+ + Na \rightarrow H$	(7) $H^+ + Sr \rightarrow H$
	(3) $H^+ + Mg \rightarrow H$	(8) $H^+ + Cs \rightarrow H$
	(4) $H^+ + K \rightarrow H$	(9) $H^+ + Ba \rightarrow H$
	(5) $H^+ + Ca \rightarrow H$	(10) $H^+ + Pb \rightarrow H$
$\sigma_{0-1}$	(11) $H + Li \rightarrow H^-$	(16) $H + Rb \rightarrow H^-$
	(12) $H + Na \rightarrow H^-$	(17) $H + Sr \rightarrow H^-$
	(13) $H + Mg \rightarrow H^-$	(18) $H + Cs \rightarrow H^-$
	(14) $H + K \rightarrow H^-$	(19) $H + Pb \rightarrow H^-$
	(15) $H + Ca \rightarrow H^-$	
$\sigma_{1-1}$	(20) $H^+ + Li \rightarrow H^-$	(25) $H^+ + Sr \rightarrow H^-$
	(21) $H^+ + Na \rightarrow H^-$	(26) $H^+ + Cs \rightarrow H^-$
	(22) $H^+ + Mg \rightarrow H^-$	(27) $H^+ + Ba \rightarrow H^-$
	(23) $H^+ + K \rightarrow H^-$	(28) $H^+ + Pb \rightarrow H^-$
	(24) $H^+ + Ca \rightarrow H^-$	



Table 2.1.1 Compiled Processes (Continued)

Type of Cross Sections	Processes	
II. Electron Loss		
$\sigma_{01}$	(29) $H + Li \rightarrow H^+$	(34) $H + Rb \rightarrow H^+$
	(30) $H + Na \rightarrow H^+$	(35) $H + Sr \rightarrow H^+$
	(31) $H + Mg \rightarrow H^+$	(36) $H + Cs \rightarrow H^+$
	(32) $H + K \rightarrow H^+$	(37) $H + Ba \rightarrow H^+$
	(33) $H + Ca \rightarrow H^+$	(38) $H + Pb \rightarrow H^+$
$\sigma_{-10}$	(39) $H^- + Li \rightarrow H$	(43) $H^- + Ca \rightarrow H$
	(40) $H^- + Na \rightarrow H$	(44) $H^- + Rb \rightarrow H$
	(41) $H^- + Mg \rightarrow H$	(45) $H^- + Sr \rightarrow H$
	(42) $H^- + K \rightarrow H$	(46) $H^- + Cs \rightarrow H$
$\sigma_{-11}$	(47) $H^- + Li \rightarrow H^+$	(50) $H^- + Rb \rightarrow H^+$
	(48) $H^- + Na \rightarrow H^+$	(51) $H^- + Cs \rightarrow H^+$
	(49) $H^- + K \rightarrow H^+$	

Note: Numbers indicated in processes correspond to the numbers of figures and tables of cross section data.

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Charge transfer cross sections and equilibrium fractions for 1-25 keV  $H^+$  ions incident on a Na vapor target
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Electron capture and loss in collisions of  $H^+$  and H with Pb vapors
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Total charge transfer cross sections for  $H^+$ ,  $H_2^+$ ,  $H_3^+$ ,  $He^+$ ,  $N^+$ ,  $N_2^+$ ,  $Ne^+$ ,  $Ar^+$ ,  $Kr^+$ , and  $Xe^+$  incident on Cs
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Single electron capture and loss by  $H^+$ ,  $H^0$ , and  $H^-$  in Cs vapour in the energy range 0.1-2.0 keV
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Single and double electron capture by 1-100 keV protons in collisions with magnesium and barium atoms

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 Charge-exchange collisions between hydrogen ions and cesium vapor in  
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 Electron capture from lithium by protons and helium ions

2.3 Lists of Experimental Data for  $\sigma_{10}$ ,  $\sigma_{0-1}$ ,  $\sigma_{1-1}$ ,  $\sigma_{01}$ ,  $\sigma_{-10}$ , and  $\sigma_{-11}$

Note on Table

Meth. : Experimental method<sup>\*</sup>

A : Attenuation method

C : Condenser method

E : Equilibrium method

G : Growth method

MS : Mass spectrometric method

F/T

F : Data from figures read by using program READXY<sup>\*\*,\*\*</sup>

T : Data from tables

\* For the detailed discussions on the experimental method, see the Appendix of ref. (2) of Introduction.

\*\* READXY was prepared by T. Nakagawa, Nuclear Data Center.

\*\*\* Numerical values are read from figures of references by us under our responsibility.

Table 2.3.1 List of Experimental Data for  $\sigma_{10}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Il'in et al	1967	1.00+4 ~ 1.80+5	Li,Na,K,Cs	G	F	9
Berkner et al	1969	5.00+3 ~ 7.00+4	Mg	G	T	4
Schlachter et al	1969	2.00+3 ~ 1.50+4	Cs	G	T	19
Gruebler et al	1970	1.00+3 ~ 2.06+4	Li,Na,K,Cs	G	F	6
Spiess et al	1972	5.50+2 ~ 2.50+3	Cs	G	F	21
Baragiola & Salvatlelli	1973	7.50+3 ~ 4.00+4	Pb	G	T	3
Meyer & Anderson	1975	1.84+3 ~ 2.85+4	Cs	G	F	12
O'Hare et al	1975	2.00+4 ~ 1.00+5	Na,K	MS	F	17
Meyer et al	1977	4.00+4 ~ 1.20+5	Cs	G	F	13
Anderson et al	1979	1.00+3 ~ 2.50+4	Na	G	T	2
Morgan & Erikson	1979	1.02+3 ~ 9.00+4	Mg,Ba	G	F	15
Meyer	1980	1.00+2 ~ 2.00+3	Cs	G	T	14
Nagata	1980	4.00+2 ~ 5.00+3	Na,K,Rb,Cs	G	T	16
Mayo et al	1983	1.00+3 ~ 7.00+4	Ca,Sr	G	F	11
Verghese et al	1984	2.57+2 ~ 3.85+3	Li	G	T	22

Table 2.3.2 List of Experimental Data for  $\sigma_{0-1}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Berkner et al	1969	5.00+3 ~ 7.00+4	Mg	G	T	4
Schlachter et al	1969	2.00+3 ~ 1.50+4	Cs	G	T	19
Baragiola & Salvatlelli	1973	1.00+4 ~ 4.00+4	Pb	G	T	3
Girnius et al	1977	3.00+4 ~ 2.00+5	Cs	G	T	5
Anderson et al	1980	3.00+4 ~ 2.00+5	Li,Na,K,Rb,Cs	G	T	1
Meyer	1980	1.00+2 ~ 2.00+3	Cs	G	T	14
Nagata	1980	5.00+2 ~ 5.00+3	Na,K,Rb,Cs	G	T	16
Schlachter et al	1980	1.25+3 ~ 5.00+3	Cs	G	T	20
Mayo et al	1983	1.00+3 ~ 7.00+4	Ca,Sr	G	F	11
Howald et al	1984	1.00+3 ~ 2.50+4	Na	A	F	8

Table 2.3.3 List of Experimental Data for  $\sigma_{1-1}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Schlachter et al	1969	2.00+3 ~ 1.50+4	Cs	G	T	19
Gruebler et al	1970	1.00+3 ~ 2.06+4	Li,Na,K,Cs,	G	F	6
Baragiola & Salvatlelli	1973	7.50+3 ~ 4.00+4	Pb	G	T	3
Anderson et al	1979	1.00+3 ~ 1.00+4	Na	G	T	2
Morgan & Erikson	1979	1.06+3 ~ 9.00+4	Mg,Ba	G	F	15
Mayo et al	1983	1.00+3 ~ 7.00+4	Ca,Sr	G	F	11

Table 2.3.4 List of Experimental Data for  $\sigma_{01}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Oparin et al	1967	1.50+4 ~ 6.00+4	Na,Mg,Cd	E	T	18
Berkner et al	1969	5.00+3 ~ 7.00+4	Mg	G	T	4
Schlachter et al	1969	2.00+3 ~ 1.50+4	Cs	G	T	19
Baragiola & Salvatlelli	1973	1.00+4 ~ 4.00+4	Pb	G	T	3
Girnius et al	1977	3.00+4 ~ 2.00+5	Cs	G	T	5
Anderson et al	1980	3.00+4 ~ 2.00+5	Li,Na,K,Rb,Cs	G	T	1
Mayo et al	1983	1.50+3 ~ 7.00+4	Ca,Sr	G	F	11
Howald et al	1984	2.00+3 ~ 3.00+4	Na	A	F	8

Table 2.3.5 List of Experimental Data for  $\sigma_{-10}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Berkner et al	1969	1.00+4 ~ 7.00+4	Mg	G	T	4
Leslie et al	1971	2.00+3 ~ 3.00+4	Cs	G	T	10
Girnius et al	1977	3.00+4 ~ 2.00+5	Cs	G	T	5
Anderson et al	1980	3.00+4 ~ 2.00+5	Li,Na,K,Rb,Cs	G	T	1
Meyer	1980	1.50+2 ~ 2.00+3	Cs	G	T	14
Schlachter et al	1980	1.25+3 ~ 5.00+3	Cs	E	T	20
Howald et al	1981	1.00+3 ~ 2.50+4	Na	A	T	7
Mayo et al	1983	1.00+3 ~ 7.00+4	Ca,Sr	G	F	11

Table 2.3.6 List of Experimental Data for  $\sigma_{-11}$ 

Authors	Year	Energy Range(eV)	Target	Meth.	F/T	Ref.
Leslie et al	1971	2.00+3 ~ 3.00+4	Cs	G	T	10
Girnius et al	1977	3.00+4 ~ 2.00+5	Cs	G	T	5
Anderson et al	1980	3.00+4 ~ 2.00+5	Li,Na,K,Rb,Cs	G	T	1
Howald et al	1981	7.50+3 ~ 2.50+4	Na	A	T	7

## 2.4 Graphs and Tables of Cross Sections

### Note on Tables

E(EV)	Projectile Energy in eV
V(10(8)*CM/SEC)	Projectile Velocity in $10^8$ cm/sec
SIGMA(CM(2))	Cross Section in $\text{cm}^2$



Fig. 1  $H^+ + Li \rightarrow H (\sigma_{10})$

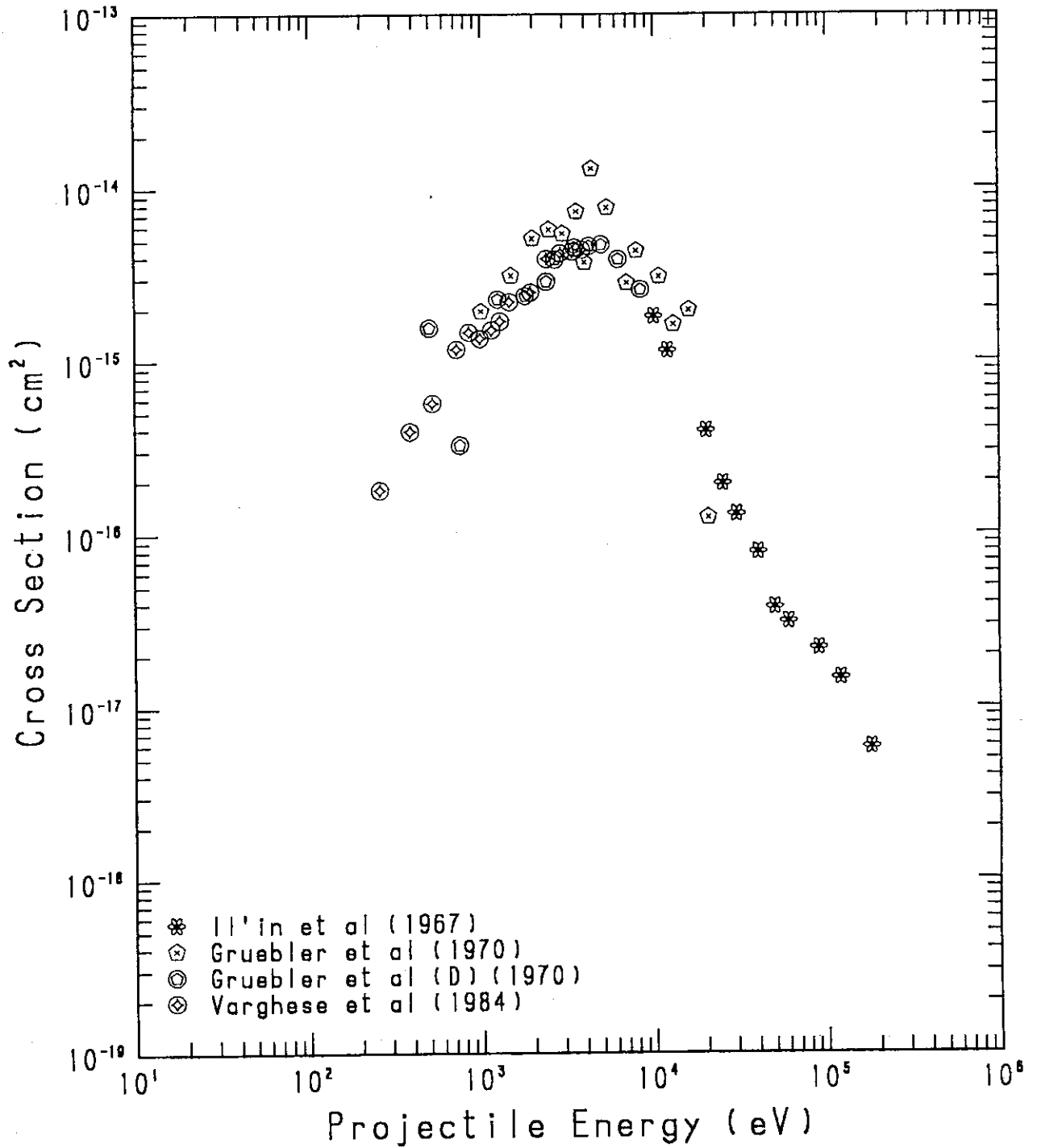


TABLE 1

PROCESS : H+ + LI = H (10)

IL'IN ET AL, SOV. PHYS. TECH. PHYS. 11 921 (1967)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	1.81E-15
1.20E+04	1.52E+00	1.15E-15
2.00E+04	1.96E+00	3.92E-16
2.50E+04	2.20E+00	1.95E-16
3.00E+04	2.41E+00	1.30E-16
4.00E+04	2.78E+00	7.87E-17
5.00E+04	3.11E+00	3.79E-17
6.00E+04	3.40E+00	3.14E-17
9.00E+04	4.17E+00	2.20E-17
1.20E+05	4.81E+00	1.48E-17
1.80E+05	5.89E+00	5.84E-18

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	1.94E-15
1.50E+03	5.38E-01	3.13E-15
2.00E+03	6.21E-01	5.12E-15
2.50E+03	6.95E-01	5.76E-15
3.00E+03	7.61E-01	5.46E-15
3.60E+03	8.33E-01	7.31E-15
4.00E+03	8.79E-01	3.72E-15
4.40E+03	9.21E-01	1.29E-14
5.40E+03	1.02E+00	7.70E-15
7.00E+03	1.16E+00	2.83E-15
8.00E+03	1.24E+00	4.32E-15
1.08E+04	1.44E+00	3.07E-15
1.30E+04	1.58E+00	1.62E-15
1.60E+04	1.76E+00	1.96E-15
2.06E+04	1.99E+00	1.24E-16

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	1.56E-15
7.50E+02	3.80E-01	3.25E-16
1.25E+03	4.91E-01	2.28E-15
1.80E+03	5.89E-01	2.38E-15
2.40E+03	6.81E-01	2.88E-15
2.70E+03	7.22E-01	3.86E-15
3.50E+03	8.22E-01	4.53E-15
4.25E+03	9.06E-01	4.62E-15
5.00E+03	9.82E-01	4.71E-15

TABLE 1 -CONTINUED

6.25E+03	1.10E+00	3.87E-15
8.40E+03	1.27E+00	2.58E-15

VARGHESE ET AL, PHYS. REV. A29 2453 (1984)

## DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.57E+02	2.23E-01	1.80E-16
3.85E+02	2.73E-01	3.90E-16
5.20E+02	3.17E-01	5.70E-16
7.18E+02	3.72E-01	1.17E-15
8.48E+02	4.05E-01	1.47E-15
9.85E+02	4.36E-01	1.35E-15
1.15E+03	4.71E-01	1.51E-15
1.29E+03	4.99E-01	1.70E-15
1.46E+03	5.31E-01	2.20E-15
1.94E+03	6.12E-01	2.50E-15
2.41E+03	6.82E-01	3.90E-15
2.90E+03	7.48E-01	4.20E-15
3.39E+03	8.09E-01	4.30E-15
3.85E+03	8.62E-01	4.40E-15

Fig. 2  $H^+ + Na \rightarrow H$  ( $\sigma_{10}$ )

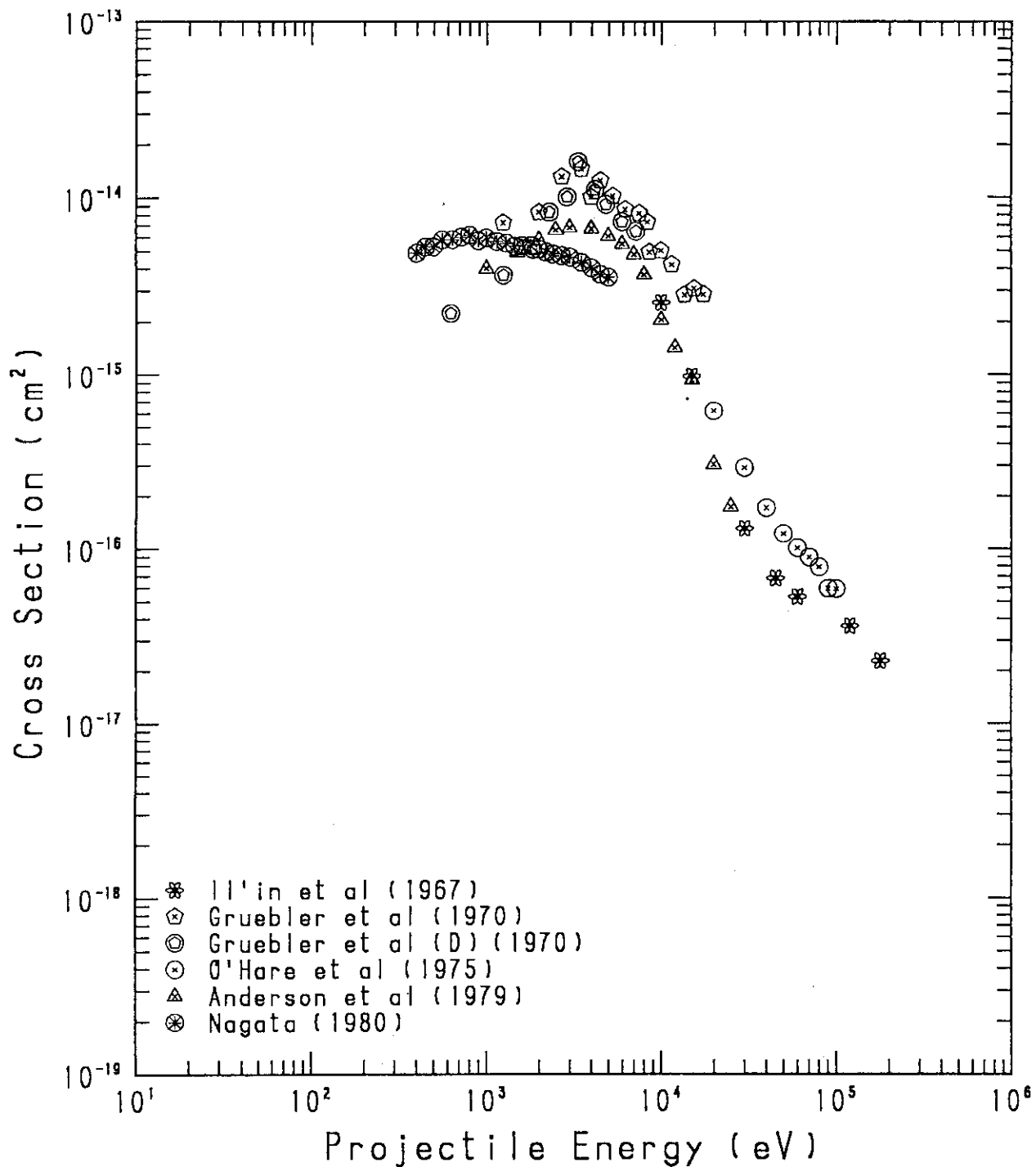


TABLE 2

PROCESS : H+ + NA = H ( 10 )

IL'IN ET AL, SOV. PHYS. TECH. PHYS. 11 921 (1967)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	2.57E-15
1.50E+04	1.70E+00	9.82E-16
3.00E+04	2.41E+00	1.31E-16
4.50E+04	2.95E+00	6.82E-17
6.00E+04	3.40E+00	5.34E-17
1.20E+05	4.81E+00	3.63E-17
1.80E+05	5.89E+00	2.28E-17

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.25E+03	4.91E-01	7.26E-15
2.00E+03	6.21E-01	8.31E-15
2.70E+03	7.22E-01	1.31E-14
3.50E+03	8.22E-01	1.45E-14
4.00E+03	8.79E-01	1.01E-14
4.50E+03	9.32E-01	1.25E-14
5.30E+03	1.01E+00	1.02E-14
6.25E+03	1.10E+00	8.61E-15
7.50E+03	1.20E+00	8.18E-15
8.40E+03	1.27E+00	7.31E-15
8.60E+03	1.29E+00	4.94E-15
1.00E+04	1.39E+00	5.05E-15
1.15E+04	1.49E+00	4.21E-15
1.36E+04	1.62E+00	2.84E-15
1.54E+04	1.72E+00	3.08E-15
1.74E+04	1.83E+00	2.85E-15

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
6.25E+02	3.47E-01	2.23E-15
1.25E+03	4.91E-01	3.67E-15
1.85E+03	5.97E-01	5.14E-15
2.30E+03	6.66E-01	8.32E-15
2.90E+03	7.48E-01	1.01E-14
3.35E+03	8.04E-01	1.59E-14
4.20E+03	9.00E-01	1.11E-14
4.85E+03	9.67E-01	9.19E-15
6.00E+03	1.08E+00	7.33E-15
7.20E+03	1.18E+00	6.47E-15

TABLE 2 -CONTINUED

O'HARE ET AL, J. PHYS. B8 2968 (1975)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+04	1.96E+00	6.20E-16
3.00E+04	2.41E+00	2.92E-16
4.00E+04	2.78E+00	1.72E-16
5.00E+04	3.11E+00	1.22E-16
6.00E+04	3.40E+00	1.01E-16
7.00E+04	3.68E+00	8.94E-17
8.00E+04	3.93E+00	7.87E-17
9.00E+04	4.17E+00	5.95E-17
1.00E+05	4.39E+00	5.91E-17

ANDERSON ET AL, NUCL. INSTR. METH. 143 583 (1979)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	4.00E-15
1.50E+03	5.38E-01	4.95E-15
2.00E+03	6.21E-01	5.80E-15
2.50E+03	6.95E-01	6.60E-15
3.00E+03	7.61E-01	6.80E-15
4.00E+03	8.79E-01	6.70E-15
5.00E+03	9.82E-01	6.10E-15
6.00E+03	1.08E+00	5.50E-15
7.00E+03	1.16E+00	4.80E-15
8.00E+03	1.24E+00	3.70E-15
1.00E+04	1.39E+00	2.05E-15
1.20E+04	1.52E+00	1.43E-15
1.50E+04	1.70E+00	9.40E-16
2.00E+04	1.96E+00	3.05E-16
2.50E+04	2.20E+00	1.75E-16

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
4.00E+02	2.78E-01	4.90E-15
4.50E+02	2.95E-01	5.30E-15
5.00E+02	3.11E-01	5.32E-15
5.60E+02	3.29E-01	5.81E-15
6.40E+02	3.51E-01	5.83E-15
7.20E+02	3.73E-01	6.02E-15
8.00E+02	3.93E-01	6.17E-15
9.00E+02	4.17E-01	5.75E-15
1.00E+03	4.39E-01	5.96E-15
1.15E+03	4.71E-01	5.67E-15
1.30E+03	5.01E-01	5.56E-15
1.45E+03	5.29E-01	5.34E-15

TABLE 2 -CONTINUED

1.60E+03	5.56E-01	5.40E-15
1.80E+03	5.89E-01	5.40E-15
2.00E+03	6.21E-01	5.15E-15
2.20E+03	6.52E-01	4.96E-15
2.40E+03	6.81E-01	4.84E-15
2.70E+03	7.22E-01	4.73E-15
3.00E+03	7.61E-01	4.65E-15
3.50E+03	8.22E-01	4.33E-15
4.00E+03	8.79E-01	4.04E-15
4.50E+03	9.32E-01	3.71E-15
5.00E+03	9.82E-01	3.57E-15

Fig. 3  $H^+ + Mg \rightarrow H (\sigma_{10})$

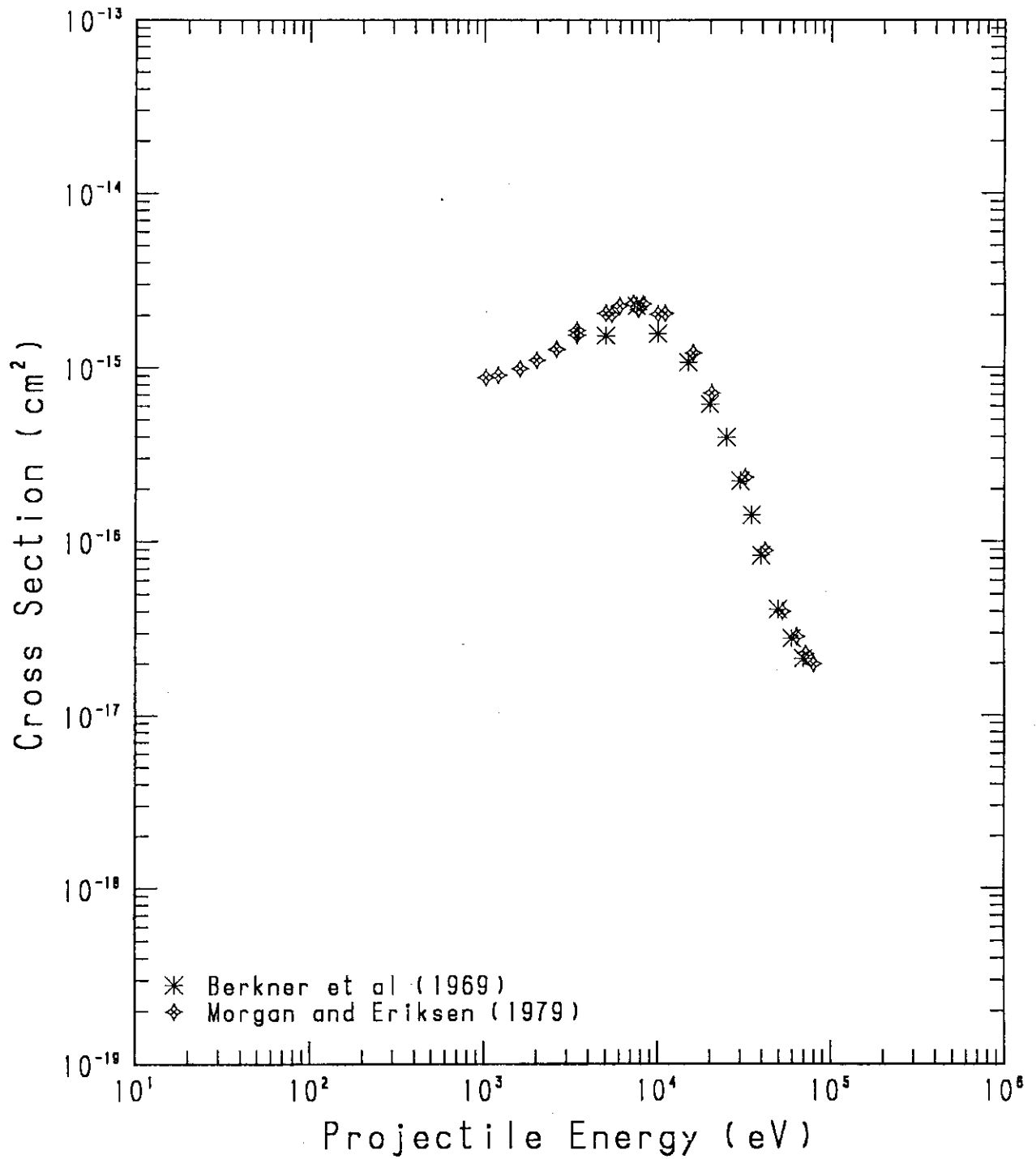




TABLE 3

PROCESS : H+ + MG = H (10)

BERKNER ET AL, PHYS. REV. 178 248 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+03	9.82E-01	1.52E-15
7.50E+03	1.20E+00	2.25E-15
1.00E+04	1.39E+00	1.56E-15
1.50E+04	1.70E+00	1.07E-15
2.00E+04	1.96E+00	6.16E-16
2.50E+04	2.20E+00	3.94E-16
3.00E+04	2.41E+00	2.22E-16
3.50E+04	2.60E+00	1.42E-16
4.00E+04	2.78E+00	8.30E-17
5.00E+04	3.11E+00	4.08E-17
6.00E+04	3.40E+00	2.78E-17
7.00E+04	3.68E+00	2.13E-17

MORGAN AND ERIKSEN, PHYS. REV. A19 1448 (1979)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.02E+03	4.44E-01	8.75E-16
1.20E+03	4.81E-01	9.01E-16
1.60E+03	5.56E-01	9.85E-16
2.00E+03	6.21E-01	1.10E-15
2.60E+03	7.08E-01	1.27E-15
3.40E+03	8.10E-01	1.63E-15
3.40E+03	8.10E-01	1.53E-15
5.00E+03	9.82E-01	2.04E-15
5.40E+03	1.02E+00	2.01E-15
6.00E+03	1.08E+00	2.25E-15
7.20E+03	1.18E+00	2.32E-15
7.70E+03	1.22E+00	2.15E-15
8.20E+03	1.26E+00	2.31E-15
1.00E+04	1.39E+00	2.02E-15
1.10E+04	1.46E+00	2.04E-15
1.60E+04	1.76E+00	1.21E-15
2.05E+04	1.99E+00	7.13E-16
3.20E+04	2.48E+00	2.33E-16
4.20E+04	2.85E+00	8.81E-17
5.30E+04	3.20E+00	3.97E-17
6.40E+04	3.51E+00	2.85E-17
7.20E+04	3.73E+00	2.27E-17
8.00E+04	3.93E+00	1.98E-17

Fig. 4  $H^+ + K \rightarrow H (\sigma_{10})$

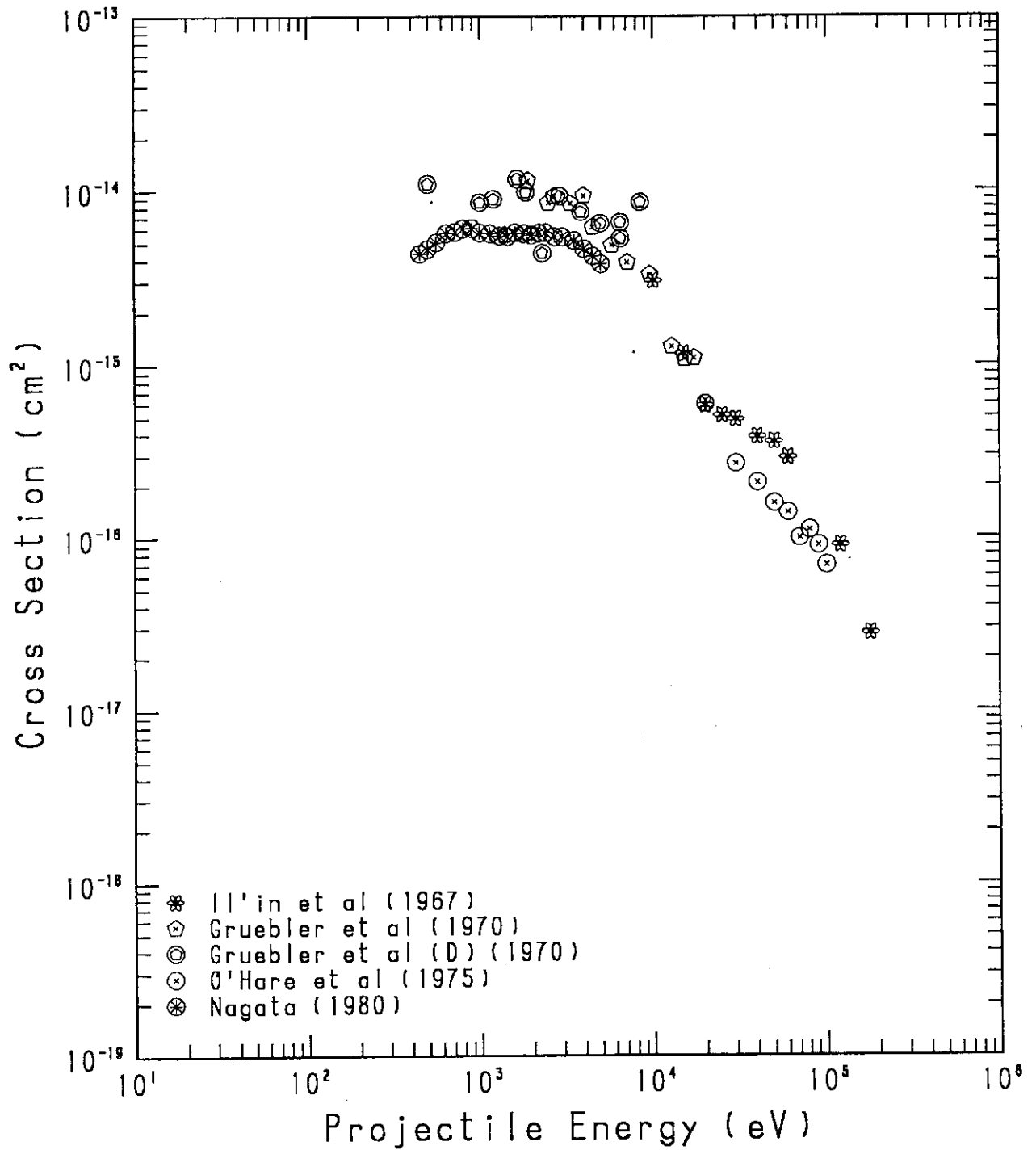


TABLE 4

PROCESS : H+ + K = H (10)

IL'IN ET AL, SOV. PHYS. TECH. PHYS. 11 921 (1967)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	3.04E-15
1.50E+04	1.70E+00	1.16E-15
2.00E+04	1.96E+00	5.84E-16
2.50E+04	2.20E+00	5.11E-16
3.00E+04	2.41E+00	4.84E-16
4.00E+04	2.78E+00	3.83E-16
5.00E+04	3.11E+00	3.59E-16
6.00E+04	3.40E+00	2.91E-16
1.20E+05	4.81E+00	8.99E-17
1.80E+05	5.89E+00	2.78E-17

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.40E+03	5.20E-01	5.56E-15
1.90E+03	6.05E-01	1.13E-14
2.50E+03	6.95E-01	8.48E-15
2.70E+03	7.22E-01	9.25E-15
3.35E+03	8.04E-01	8.39E-15
4.00E+03	8.79E-01	9.30E-15
4.50E+03	9.32E-01	6.14E-15
5.80E+03	1.06E+00	4.83E-15
7.10E+03	1.17E+00	3.86E-15
9.60E+03	1.36E+00	3.28E-15
1.28E+04	1.57E+00	1.27E-15
1.52E+04	1.71E+00	1.08E-15
1.72E+04	1.82E+00	1.09E-15

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	1.09E-14
1.00E+03	4.39E-01	8.55E-15
1.20E+03	4.81E-01	8.93E-15
1.65E+03	5.64E-01	1.16E-14
1.85E+03	5.97E-01	9.77E-15
2.30E+03	6.66E-01	4.37E-15
2.90E+03	7.48E-01	9.26E-15
3.85E+03	8.62E-01	7.49E-15
5.00E+03	9.82E-01	6.43E-15
6.50E+03	1.12E+00	5.29E-15
6.50E+03	1.12E+00	6.52E-15
8.50E+03	1.28E+00	8.52E-15

TABLE 4 -CONTINUED

O'HARE ET AL, J. PHYS. B8 2968 (1975)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+04	1.96E+00	5.97E-16
3.00E+04	2.41E+00	2.68E-16
4.00E+04	2.78E+00	2.08E-16
5.00E+04	3.11E+00	1.58E-16
6.00E+04	3.40E+00	1.39E-16
7.00E+04	3.68E+00	9.91E-17
8.00E+04	3.93E+00	1.10E-16
9.00E+04	4.17E+00	8.98E-17
1.00E+05	4.39E+00	6.91E-17

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
4.50E+02	2.95E-01	4.35E-15
5.00E+02	3.11E-01	4.62E-15
5.60E+02	3.29E-01	5.04E-15
6.40E+02	3.51E-01	5.68E-15
7.20E+02	3.73E-01	5.77E-15
8.00E+02	3.93E-01	6.03E-15
9.00E+02	4.17E-01	6.07E-15
1.00E+03	4.39E-01	5.72E-15
1.15E+03	4.71E-01	5.64E-15
1.30E+03	5.01E-01	5.48E-15
1.45E+03	5.29E-01	5.45E-15
1.60E+03	5.56E-01	5.70E-15
1.80E+03	5.89E-01	5.64E-15
2.00E+03	6.21E-01	5.54E-15
2.20E+03	6.52E-01	5.68E-15
2.40E+03	6.81E-01	5.72E-15
2.70E+03	7.22E-01	5.42E-15
3.00E+03	7.61E-01	5.41E-15
3.50E+03	8.22E-01	5.14E-15
4.00E+03	8.79E-01	4.60E-15
4.50E+03	9.32E-01	4.19E-15
5.00E+03	9.82E-01	3.78E-15

Fig. 5  $H^+ + Ca \rightarrow H (\sigma_{10})$

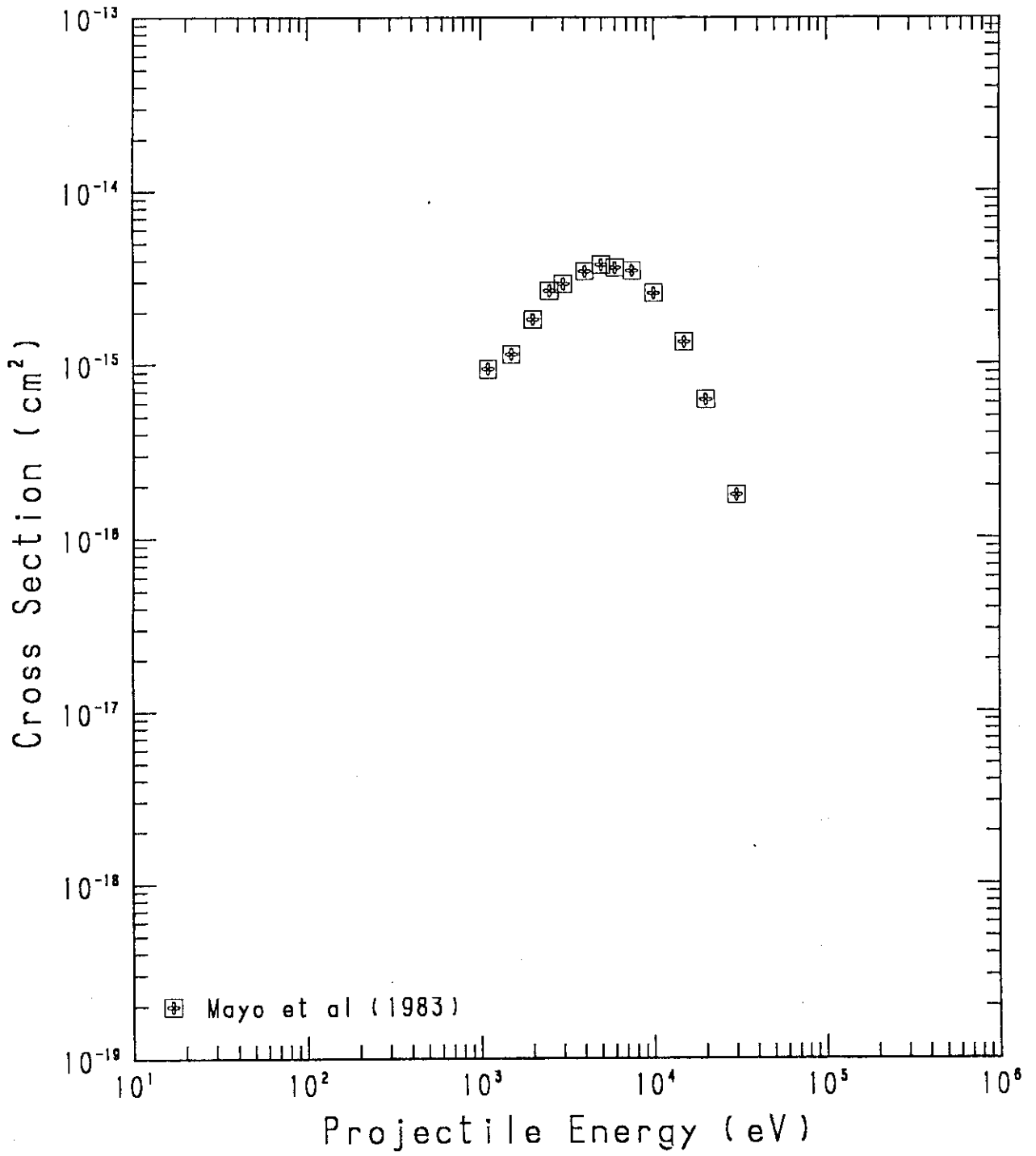


TABLE 5

PROCESS : H+ + CA = H (10)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.10E+03	4.61E-01	9.38E-16
1.50E+03	5.38E-01	1.14E-15
2.00E+03	6.21E-01	1.81E-15
2.50E+03	6.95E-01	2.66E-15
3.00E+03	7.61E-01	2.91E-15
4.00E+03	8.79E-01	3.44E-15
5.00E+03	9.82E-01	3.76E-15
6.00E+03	1.08E+00	3.61E-15
7.50E+03	1.20E+00	3.47E-15
1.00E+04	1.39E+00	2.57E-15
1.50E+04	1.70E+00	1.34E-15
2.00E+04	1.96E+00	6.27E-16
3.00E+04	2.41E+00	1.78E-16

Fig. 6  $H^+ + Rb \rightarrow H (\sigma_{10})$

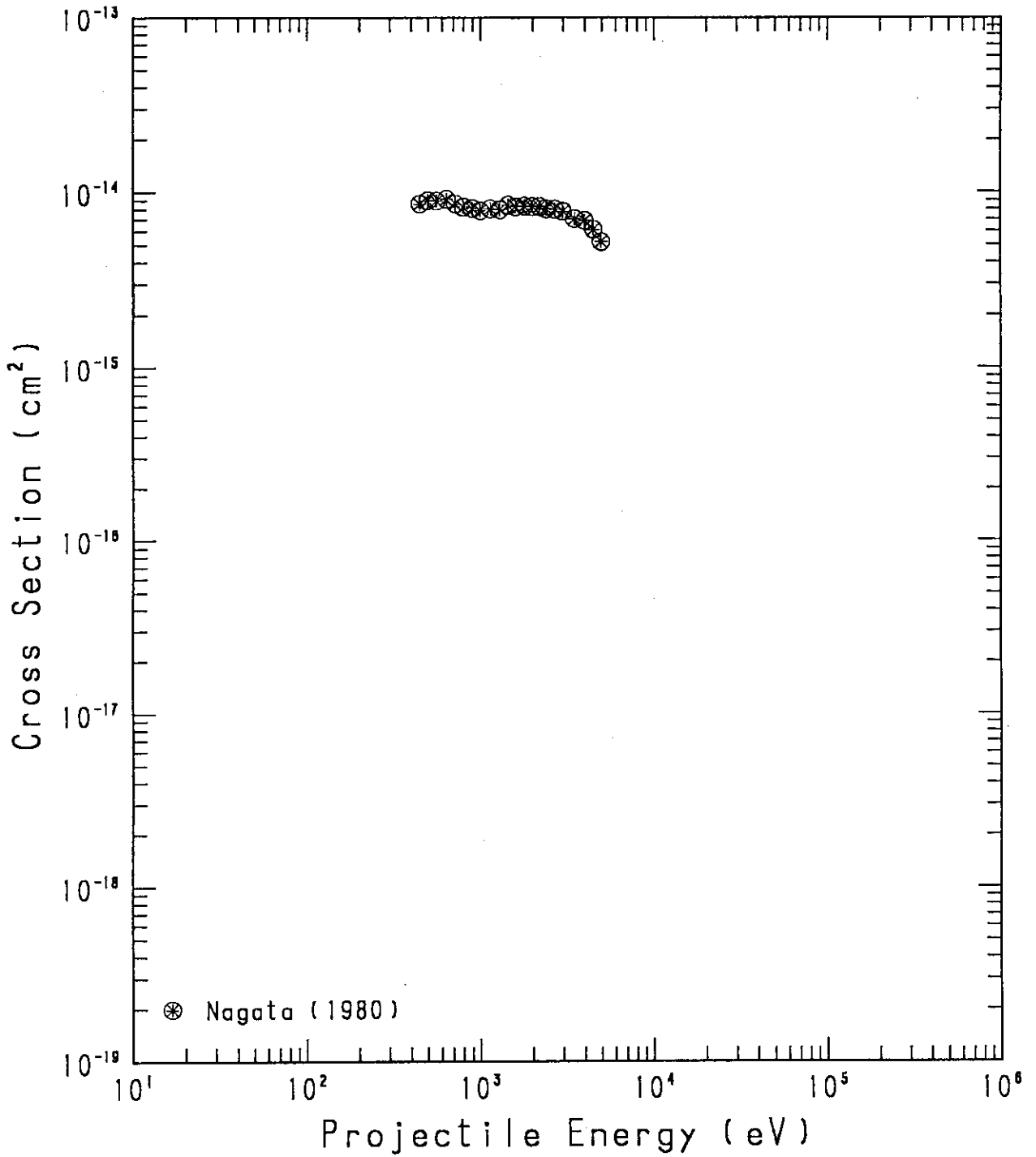


TABLE 6

PROCESS : H+ + RB = H (10)

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
4.50E+02	2.95E-01	8.57E-15
5.00E+02	3.11E-01	8.95E-15
5.60E+02	3.29E-01	8.91E-15
6.40E+02	3.51E-01	9.13E-15
7.20E+02	3.73E-01	8.57E-15
8.00E+02	3.93E-01	8.22E-15
9.00E+02	4.17E-01	8.10E-15
1.00E+03	4.39E-01	7.85E-15
1.15E+03	4.71E-01	8.04E-15
1.30E+03	5.01E-01	7.95E-15
1.45E+03	5.29E-01	8.43E-15
1.60E+03	5.56E-01	8.27E-15
1.80E+03	5.89E-01	8.33E-15
2.00E+03	6.21E-01	8.29E-15
2.20E+03	6.52E-01	8.27E-15
2.40E+03	6.81E-01	8.05E-15
2.70E+03	7.22E-01	7.99E-15
3.00E+03	7.61E-01	7.77E-15
3.50E+03	8.22E-01	7.05E-15
4.00E+03	8.79E-01	6.89E-15
4.50E+03	9.32E-01	6.13E-15
5.00E+03	9.82E-01	5.22E-15



Fig. 7  $H^+ + Sr \rightarrow H$  ( $\sigma_{10}$ )

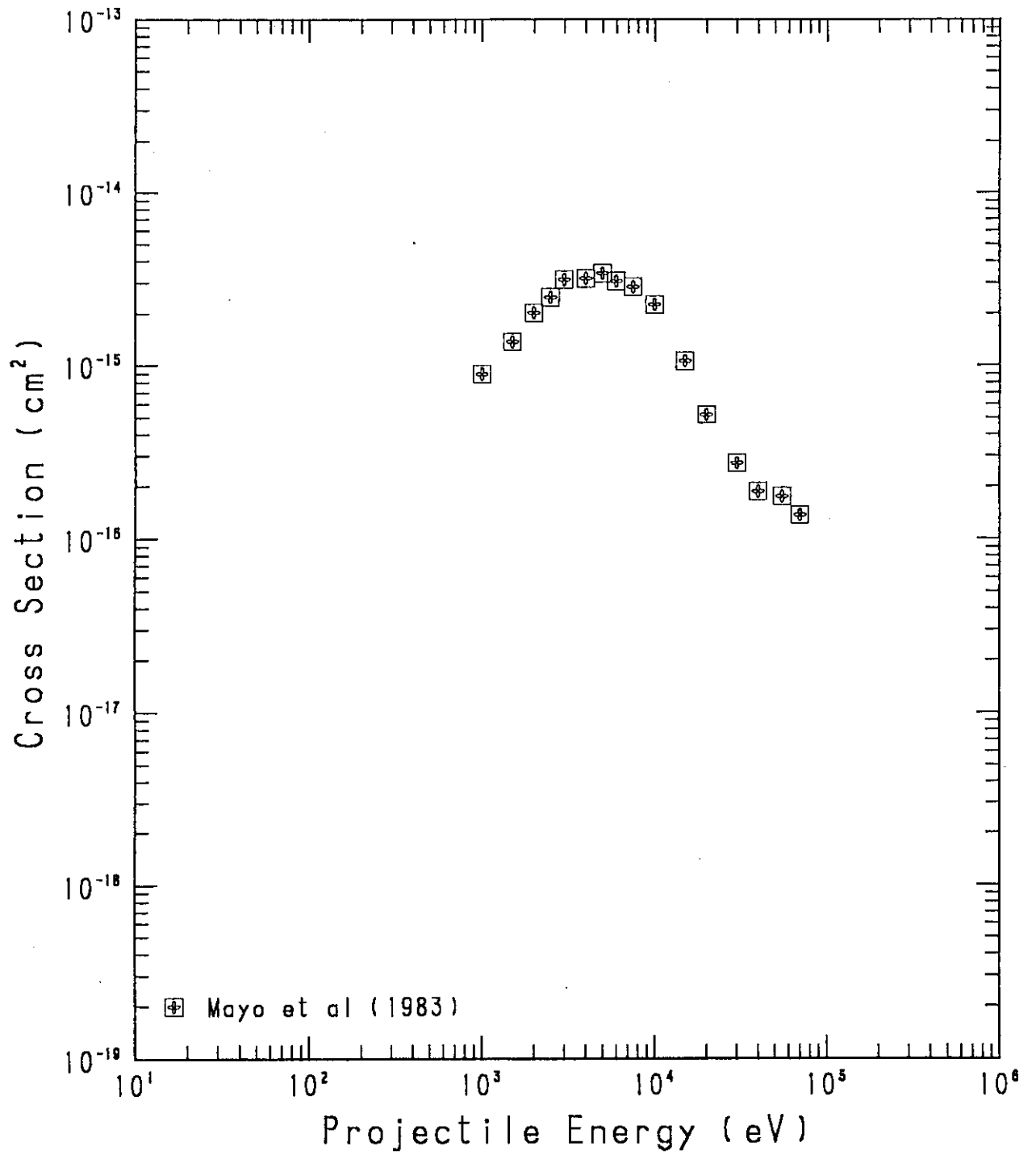


TABLE 7

PROCESS : H+ + SR = H (10)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	8.95E-16
1.50E+03	5.38E-01	1.37E-15
2.00E+03	6.21E-01	2.02E-15
2.50E+03	6.95E-01	2.48E-15
3.00E+03	7.61E-01	3.14E-15
4.00E+03	8.79E-01	3.19E-15
5.00E+03	9.82E-01	3.41E-15
6.00E+03	1.08E+00	3.07E-15
7.50E+03	1.20E+00	2.85E-15
1.00E+04	1.39E+00	2.25E-15
1.50E+04	1.70E+00	1.06E-15
2.00E+04	1.96E+00	5.20E-16
3.00E+04	2.41E+00	2.72E-16
4.00E+04	2.78E+00	1.87E-16
5.50E+04	3.26E+00	1.75E-16
7.00E+04	3.68E+00	1.37E-16

Fig. 8  $H^+ + Cs \rightarrow H$  ( $\sigma_{10}$ )

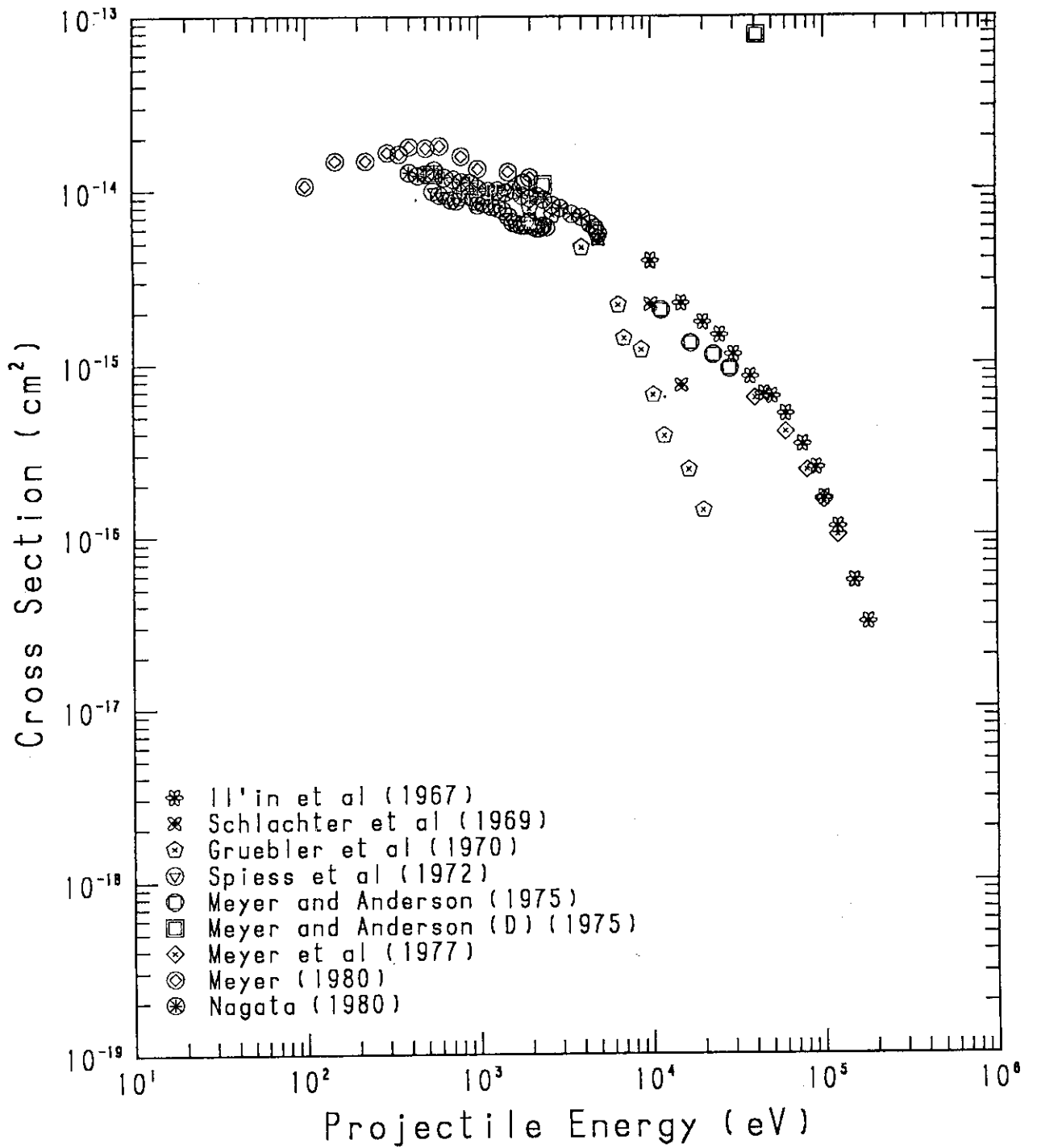


TABLE 8

PROCESS : H+ + CS = H (10)

IL'IN ET AL, SOV. PHYS. TECH. PHYS. 11 921 (1967)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	3.92E-15
1.50E+04	1.70E+00	2.23E-15
2.00E+04	1.96E+00	1.73E-15
2.50E+04	2.20E+00	1.46E-15
3.00E+04	2.41E+00	1.13E-15
3.75E+04	2.69E+00	8.41E-16
4.50E+04	2.95E+00	6.67E-16
5.00E+04	3.11E+00	6.45E-16
6.00E+04	3.40E+00	5.11E-16
7.50E+04	3.80E+00	3.39E-16
9.00E+04	4.17E+00	2.49E-16
1.00E+05	4.39E+00	1.65E-16
1.20E+05	4.81E+00	1.12E-16
1.50E+05	5.38E+00	5.46E-17
1.80E+05	5.89E+00	3.14E-17

SCHLACHTER ET AL, PHYS. REV. 177 184 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	6.80E-15
5.00E+03	9.82E-01	5.20E-15
1.00E+04	1.39E+00	2.20E-15
1.50E+04	1.70E+00	7.50E-16

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	8.48E-15
1.35E+03	5.10E-01	9.56E-15
2.00E+03	6.21E-01	7.85E-15
2.70E+03	7.22E-01	7.14E-15
4.00E+03	8.79E-01	4.67E-15
5.00E+03	9.82E-01	5.30E-15
6.50E+03	1.12E+00	2.18E-15
7.00E+03	1.16E+00	1.40E-15
8.80E+03	1.30E+00	1.20E-15
1.03E+04	1.41E+00	6.59E-16
1.19E+04	1.52E+00	3.80E-16
1.65E+04	1.78E+00	2.42E-16
2.00E+04	1.96E+00	1.40E-16

TABLE 8 -CONTINUED

SPIESS ET AL, PHYS. REV. A6 746 (1972)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.50E+02	3.26E-01	9.83E-15
6.00E+02	3.40E-01	9.35E-15
6.50E+02	3.54E-01	9.39E-15
7.00E+02	3.68E-01	8.75E-15
7.50E+02	3.80E-01	8.63E-15
8.00E+02	3.93E-01	9.21E-15
8.50E+02	4.05E-01	9.84E-15
9.00E+02	4.17E-01	9.20E-15
9.50E+02	4.28E-01	9.12E-15
1.00E+03	4.39E-01	8.17E-15
1.10E+03	4.61E-01	8.35E-15
1.20E+03	4.81E-01	8.03E-15
1.30E+03	5.01E-01	7.86E-15
1.40E+03	5.20E-01	7.62E-15
1.50E+03	5.38E-01	7.05E-15
1.60E+03	5.56E-01	6.49E-15
1.70E+03	5.73E-01	6.36E-15
1.80E+03	5.89E-01	6.27E-15
1.90E+03	6.05E-01	6.26E-15
2.00E+03	6.21E-01	6.57E-15
2.10E+03	6.37E-01	6.17E-15
2.20E+03	6.52E-01	6.04E-15
2.30E+03	6.66E-01	6.03E-15
2.40E+03	6.81E-01	6.21E-15
2.50E+03	6.95E-01	6.09E-15

MEYER AND ANDERSON, PHYS. LETT. 54A 333 (1975)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.84E+03	5.96E-01	1.10E-14
4.80E+03	9.62E-01	5.99E-15
1.15E+04	1.49E+00	2.04E-15
1.70E+04	1.81E+00	1.31E-15
2.30E+04	2.11E+00	1.12E-15
2.85E+04	2.35E+00	9.36E-16

MEYER AND ANDERSON (D), PHYS. LETT. 54A 333 (1975)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.50E+02	3.26E-01	1.23E-14
2.40E+03	6.81E-01	1.07E-14
4.10E+04	2.81E+00	7.75E-14

TABLE 8 -CONTINUED

MEYER ET AL, PHYS. REV. A15 455 (1977)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
4.00E+04	2.78E+00	6.30E-16
6.00E+04	3.40E+00	4.00E-16
8.00E+04	3.93E+00	2.40E-16
1.00E+05	4.39E+00	1.60E-16
1.20E+05	4.81E+00	1.00E-16

MEYER, J. PHYS. B13 3823 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+02	1.39E-01	1.06E-14
1.50E+02	1.70E-01	1.47E-14
2.25E+02	2.08E-01	1.47E-14
3.00E+02	2.41E-01	1.64E-14
3.50E+02	2.60E-01	1.61E-14
4.00E+02	2.78E-01	1.77E-14
5.00E+02	3.11E-01	1.74E-14
6.00E+02	3.40E-01	1.79E-14
8.00E+02	3.93E-01	1.56E-14
1.00E+03	4.39E-01	1.32E-14
1.50E+03	5.38E-01	1.27E-14
2.00E+03	6.21E-01	1.18E-14

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
4.00E+02	2.78E-01	1.26E-14
4.50E+02	2.95E-01	1.21E-14
5.00E+02	3.11E-01	1.24E-14
5.60E+02	3.29E-01	1.30E-14
6.40E+02	3.51E-01	1.18E-14
7.20E+02	3.73E-01	1.15E-14
8.00E+02	3.93E-01	1.11E-14
9.00E+02	4.17E-01	1.10E-14
1.00E+03	4.39E-01	1.02E-14
1.15E+03	4.71E-01	9.89E-15
1.30E+03	5.01E-01	9.95E-15
1.45E+03	5.29E-01	9.68E-15
1.60E+03	5.56E-01	1.00E-14
1.80E+03	5.89E-01	9.30E-15
2.00E+03	6.21E-01	8.98E-15
2.20E+03	6.52E-01	9.22E-15
2.40E+03	6.81E-01	8.82E-15
2.70E+03	7.22E-01	8.18E-15
3.00E+03	7.61E-01	7.85E-15

TABLE 8 -CONTINUED

3.50E+03	8.22E-01	7.25E-15
4.00E+03	8.79E-01	6.95E-15
4.50E+03	9.32E-01	6.35E-15
5.00E+03	9.82E-01	5.58E-15

Fig. 9  $H^+ + Ba \rightarrow H (\sigma_{10})$

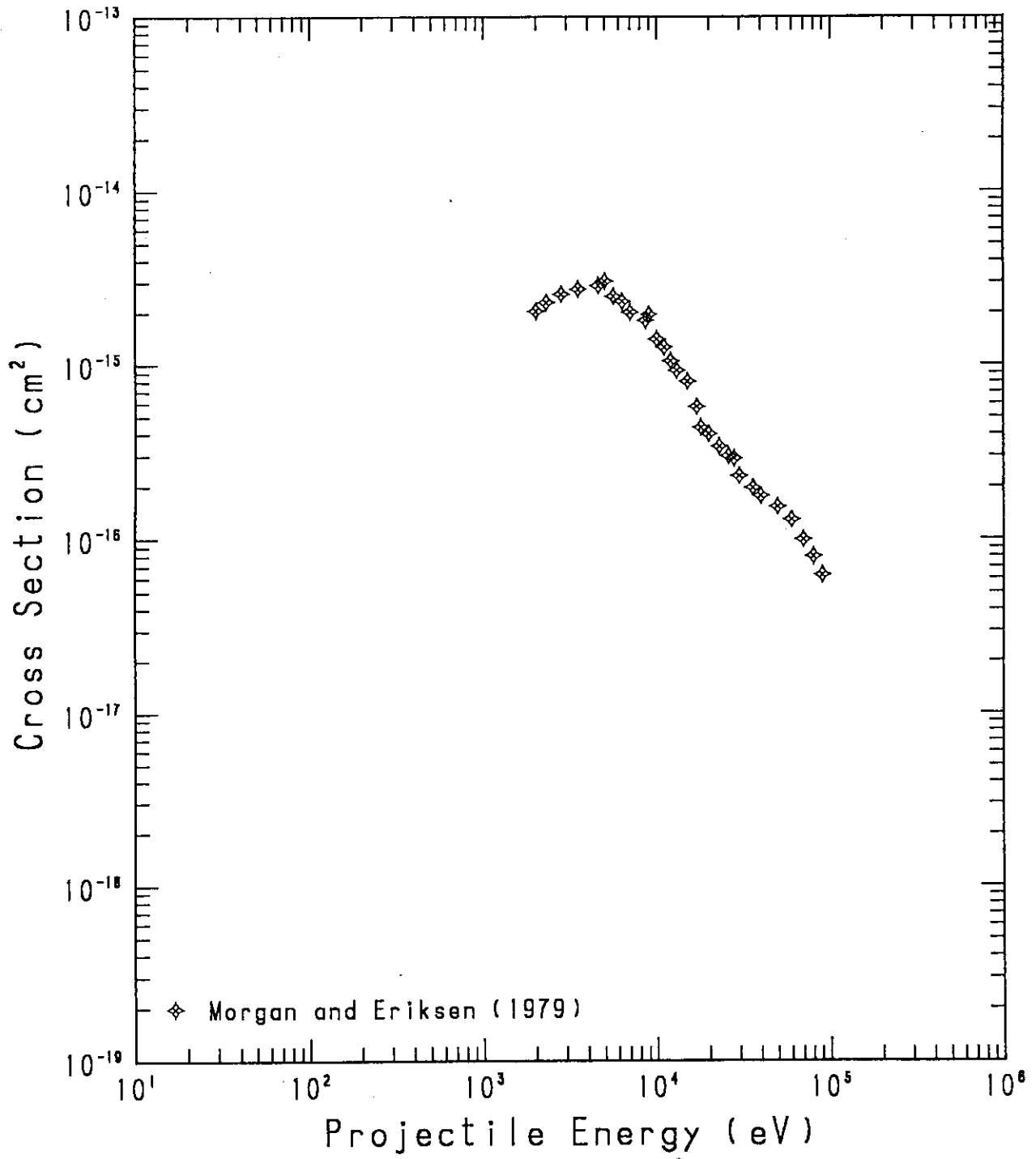




TABLE 9

PROCESS : H+ + BA = H (10)

MORGAN AND ERIKSEN, PHYS. REV. A19 1448 (1979)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	2.04E-15
2.30E+03	6.66E-01	2.29E-15
2.80E+03	7.35E-01	2.56E-15
3.50E+03	8.22E-01	2.74E-15
4.60E+03	9.42E-01	2.87E-15
5.00E+03	9.82E-01	3.04E-15
5.60E+03	1.04E+00	2.48E-15
6.30E+03	1.10E+00	2.32E-15
7.00E+03	1.16E+00	2.01E-15
8.60E+03	1.29E+00	1.80E-15
9.00E+03	1.32E+00	1.95E-15
1.00E+04	1.39E+00	1.40E-15
1.10E+04	1.46E+00	1.26E-15
1.20E+04	1.52E+00	1.05E-15
1.30E+04	1.58E+00	9.27E-16
1.50E+04	1.70E+00	8.02E-16
1.70E+04	1.81E+00	5.73E-16
1.80E+04	1.86E+00	4.34E-16
2.00E+04	1.96E+00	3.98E-16
2.30E+04	2.11E+00	3.38E-16
2.60E+04	2.24E+00	2.98E-16
2.80E+04	2.32E+00	2.89E-16
3.00E+04	2.41E+00	2.30E-16
3.60E+04	2.64E+00	1.97E-16
4.00E+04	2.78E+00	1.77E-16
5.00E+04	3.11E+00	1.53E-16
6.00E+04	3.40E+00	1.29E-16
7.00E+04	3.68E+00	9.92E-17
8.00E+04	3.93E+00	7.95E-17
9.00E+04	4.17E+00	6.25E-17

Fig.10  $H^+ + Pb \rightarrow H (\sigma_{10})$

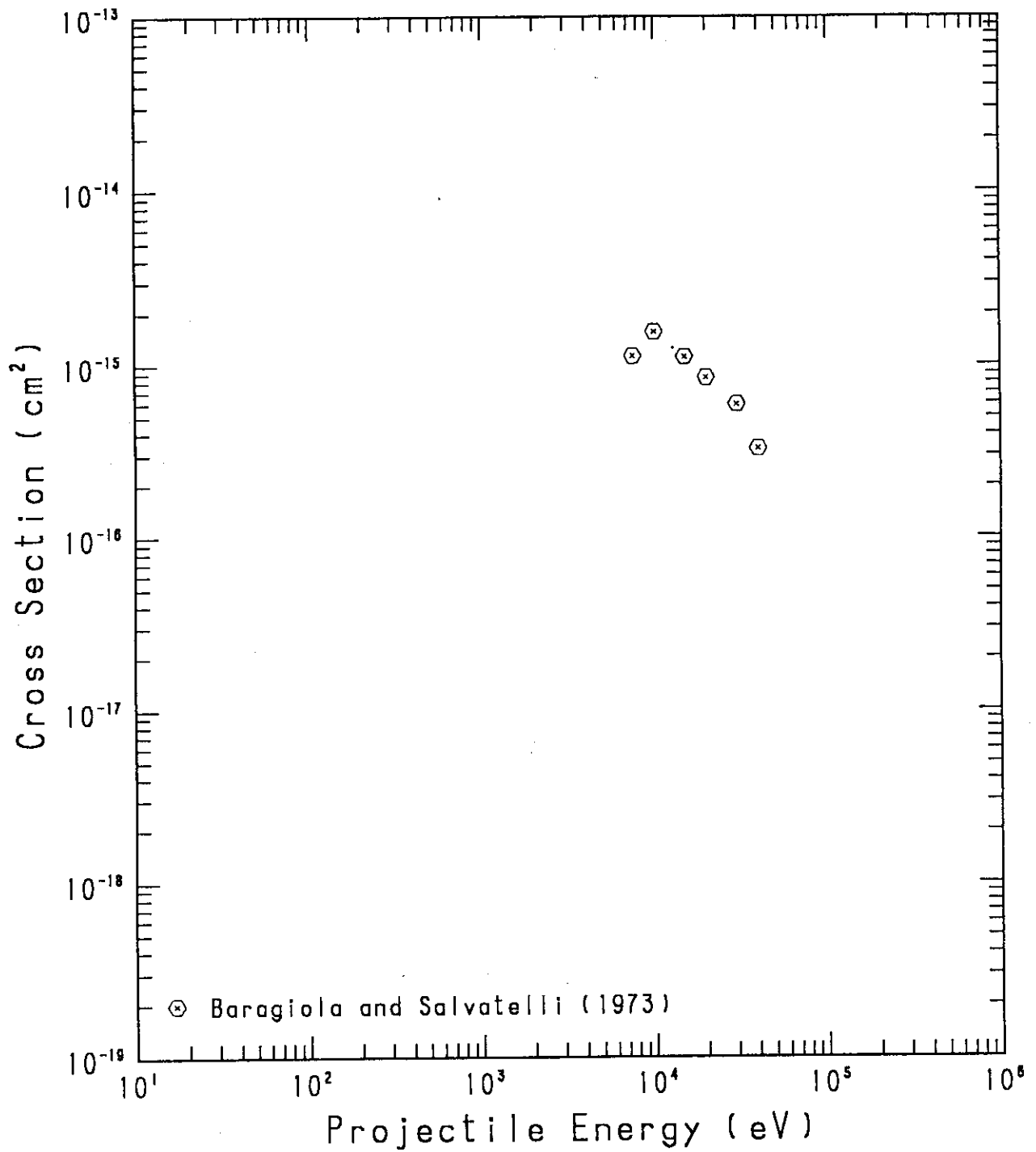


TABLE 10

PROCESS : H+ + PB = H (10)

BARAGIOLA AND SALVATELLI, NUCL. INSTR. METH. 110 503 (1973)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
7.50E+03	1.20E+00	1.13E-15
1.00E+04	1.39E+00	1.56E-15
1.50E+04	1.70E+00	1.12E-15
2.00E+04	1.96E+00	8.48E-16
3.00E+04	2.41E+00	5.90E-16
4.00E+04	2.78E+00	3.27E-16

Fig.11 H + Li → H<sup>-</sup> (σ<sub>0-1</sub>)

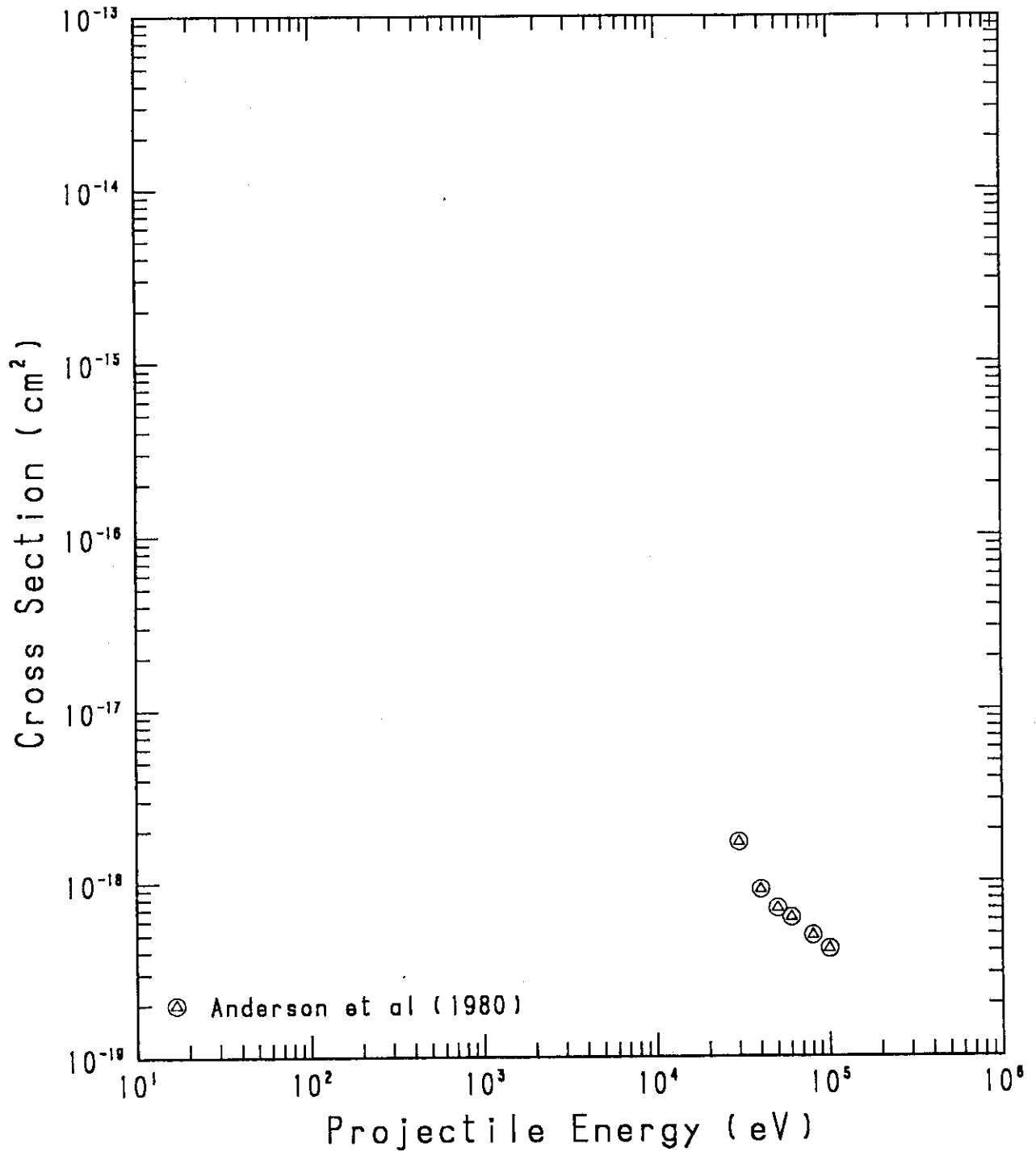


TABLE 11

PROCESS : H + LI = H- (0-1)

ANDERSON ET AL, PHYS. REV. A22, 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	1.70E-18
4.00E+04	2.78E+00	9.00E-19
5.00E+04	3.11E+00	7.00E-19
6.00E+04	3.40E+00	6.20E-19
8.00E+04	3.93E+00	4.90E-19
1.00E+05	4.39E+00	4.10E-19

Fig.12 H + Na → H<sup>-</sup> (σ<sub>0-1</sub>)

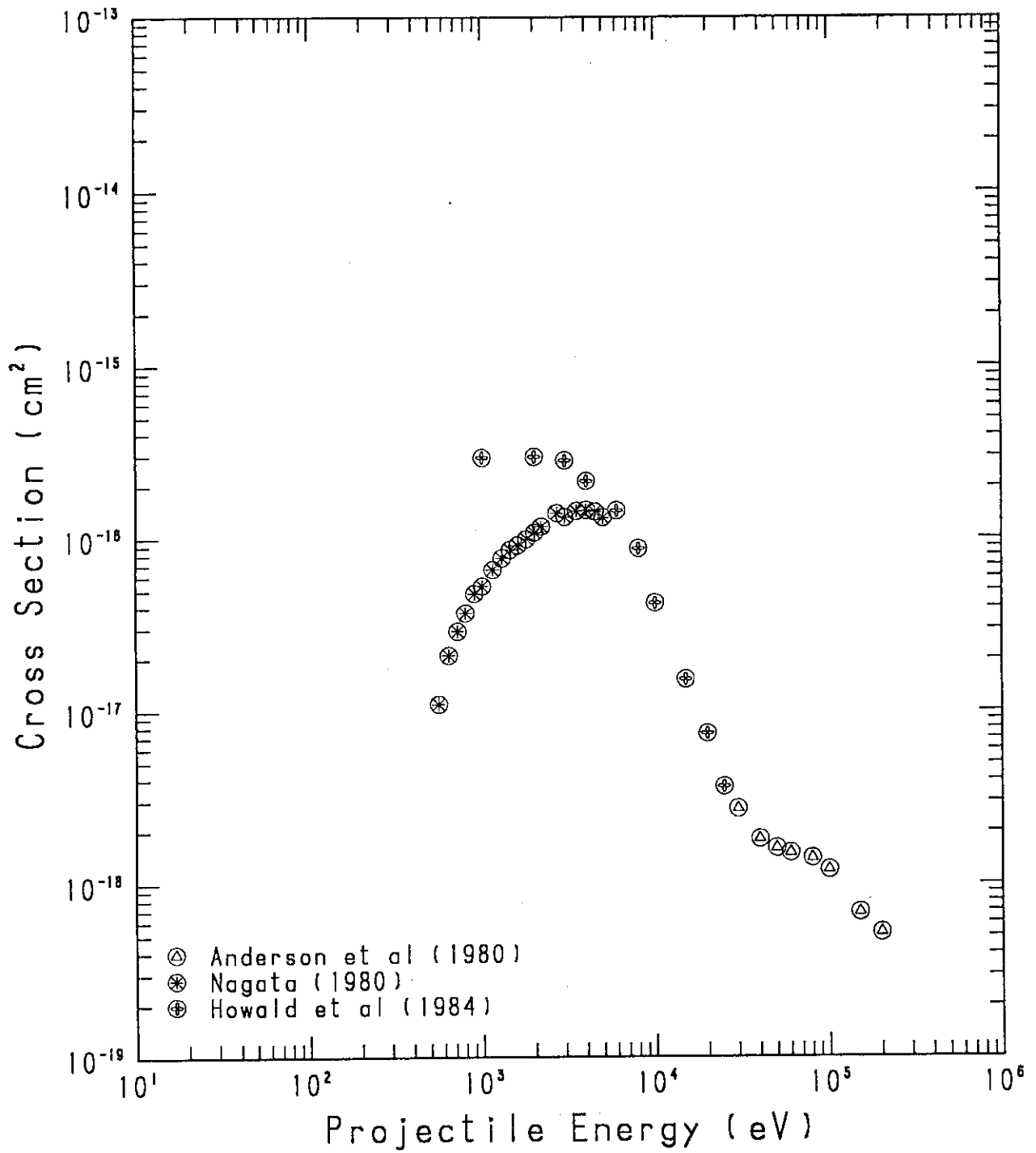


TABLE 12

PROCESS : H + NA = H- (O-1)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.70E-18
4.00E+04	2.78E+00	1.80E-18
5.00E+04	3.11E+00	1.60E-18
6.00E+04	3.40E+00	1.50E-18
8.00E+04	3.93E+00	1.40E-18
1.00E+05	4.39E+00	1.20E-18
1.50E+05	5.38E+00	6.80E-19
2.00E+05	6.21E+00	5.20E-19

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.60E+02	3.29E-01	1.10E-17
6.40E+02	3.51E-01	2.10E-17
7.20E+02	3.73E-01	2.90E-17
8.00E+02	3.93E-01	3.70E-17
9.00E+02	4.17E-01	4.80E-17
1.00E+03	4.39E-01	5.30E-17
1.15E+03	4.71E-01	6.60E-17
1.30E+03	5.01E-01	7.70E-17
1.45E+03	5.29E-01	8.60E-17
1.60E+03	5.56E-01	9.10E-17
1.80E+03	5.89E-01	9.90E-17
2.00E+03	6.21E-01	1.08E-16
2.20E+03	6.52E-01	1.17E-16
2.40E+03	6.81E-01	1.24E-16
2.70E+03	7.22E-01	1.40E-16
3.00E+03	7.61E-01	1.33E-16
3.50E+03	8.22E-01	1.44E-16
4.00E+03	8.79E-01	1.46E-16
4.50E+03	9.32E-01	1.43E-16
5.00E+03	9.82E-01	1.32E-16

HOWALD ET AL, PHYS. REV. A29 1083 (1984)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	2.94E-16
2.00E+03	6.21E-01	2.97E-16
3.00E+03	7.61E-01	2.83E-16
4.00E+03	8.79E-01	2.15E-16
6.00E+03	1.08E+00	1.45E-16
8.00E+03	1.24E+00	8.71E-17
1.00E+04	1.39E+00	4.22E-17

TABLE 12 -CONTINUED

1.50E+04	1.70E+00	1.52E-17
2.00E+04	1.96E+00	7.38E-18
2.50E+04	2.20E+00	3.63E-18



Fig.13 H + Mg → H<sup>-</sup> (σ<sub>0-1</sub>)

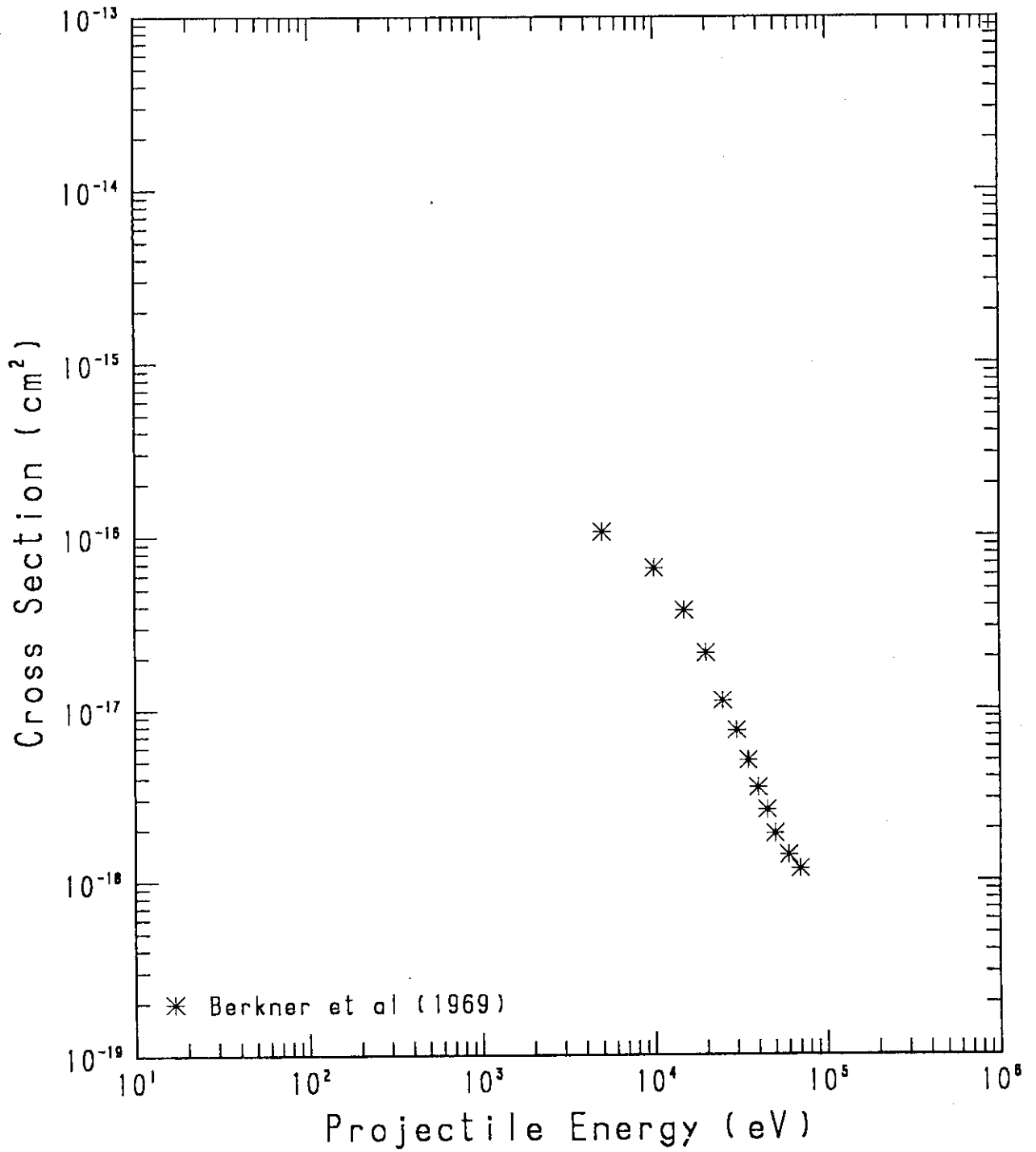


TABLE 13

PROCESS : H + MG = H- (0-1)

BERKNER ET AL, PHYS. REV. 178 248 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+03	9.82E-01	1.06E-16
1.00E+04	1.39E+00	6.59E-17
1.50E+04	1.70E+00	3.75E-17
2.00E+04	1.96E+00	2.12E-17
2.50E+04	2.20E+00	1.12E-17
3.00E+04	2.41E+00	7.49E-18
3.50E+04	2.60E+00	5.00E-18
4.00E+04	2.78E+00	3.46E-18
4.50E+04	2.95E+00	2.58E-18
5.00E+04	3.11E+00	1.87E-18
6.00E+04	3.40E+00	1.41E-18
7.00E+04	3.68E+00	1.17E-18

Fig.14 H + K → H<sup>-</sup> (σ<sub>0-1</sub>)

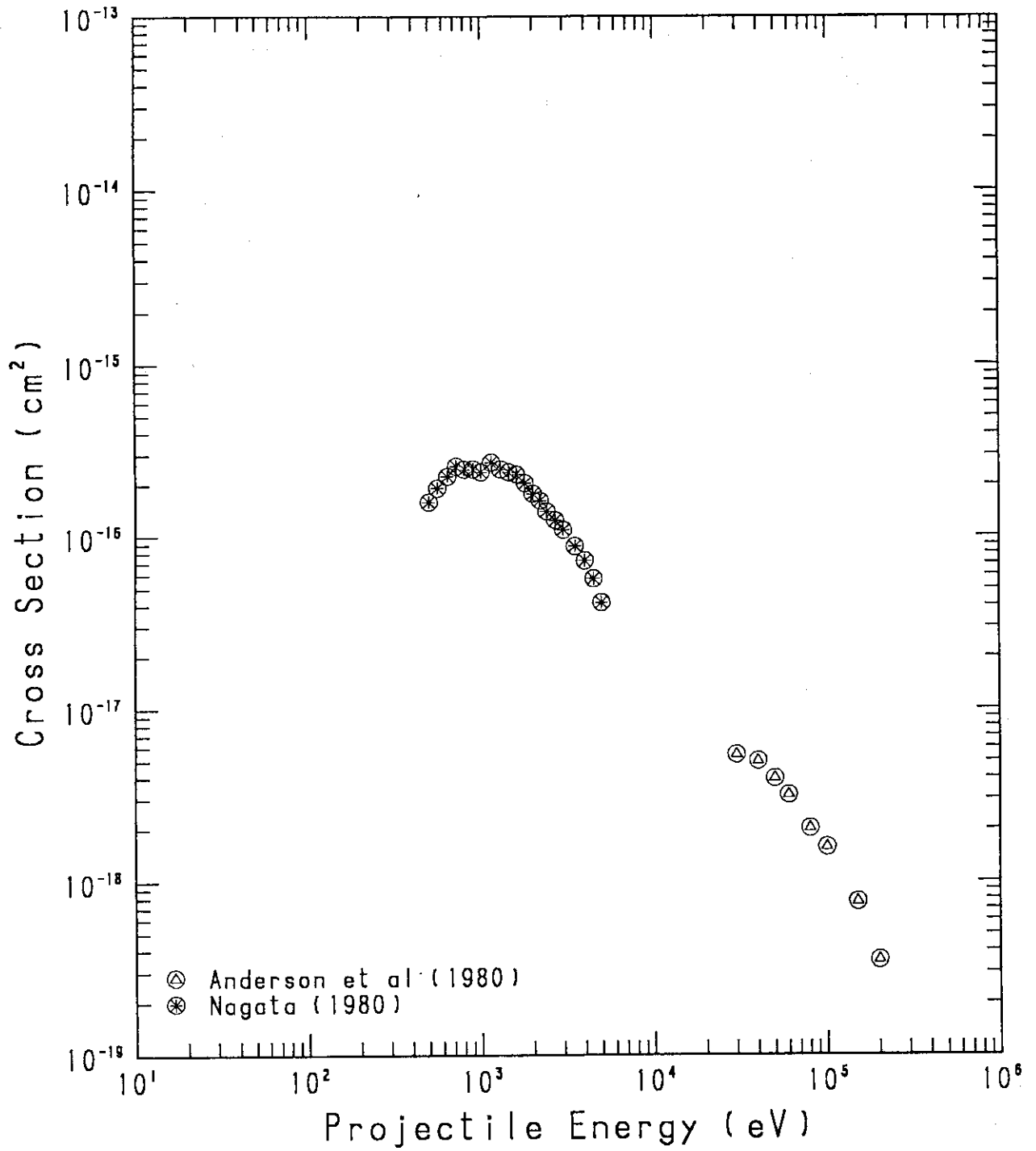


TABLE 14

PROCESS : H + K = H- (0-1)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	5.41E-18
4.00E+04	2.78E+00	4.97E-18
5.00E+04	3.11E+00	3.93E-18
6.00E+04	3.40E+00	3.14E-18
8.00E+04	3.93E+00	2.01E-18
1.00E+05	4.39E+00	1.57E-18
1.50E+05	5.38E+00	7.60E-19
2.00E+05	6.21E+00	3.50E-19

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	1.59E-16
5.60E+02	3.29E-01	1.92E-16
6.40E+02	3.51E-01	2.25E-16
7.20E+02	3.73E-01	2.57E-16
8.00E+02	3.93E-01	2.47E-16
9.00E+02	4.17E-01	2.47E-16
1.00E+03	4.39E-01	2.38E-16
1.15E+03	4.71E-01	2.71E-16
1.30E+03	5.01E-01	2.47E-16
1.45E+03	5.29E-01	2.38E-16
1.60E+03	5.56E-01	2.31E-16
1.80E+03	5.89E-01	2.05E-16
2.00E+03	6.21E-01	1.78E-16
2.20E+03	6.52E-01	1.62E-16
2.40E+03	6.81E-01	1.40E-16
2.70E+03	7.22E-01	1.24E-16
3.00E+03	7.61E-01	1.09E-16
3.50E+03	8.22E-01	8.75E-17
4.00E+03	8.79E-01	7.23E-17
4.50E+03	9.32E-01	5.70E-17
5.00E+03	9.82E-01	4.15E-17

Fig.15 H + Ca → H<sup>-</sup> (σ<sub>0-1</sub>)

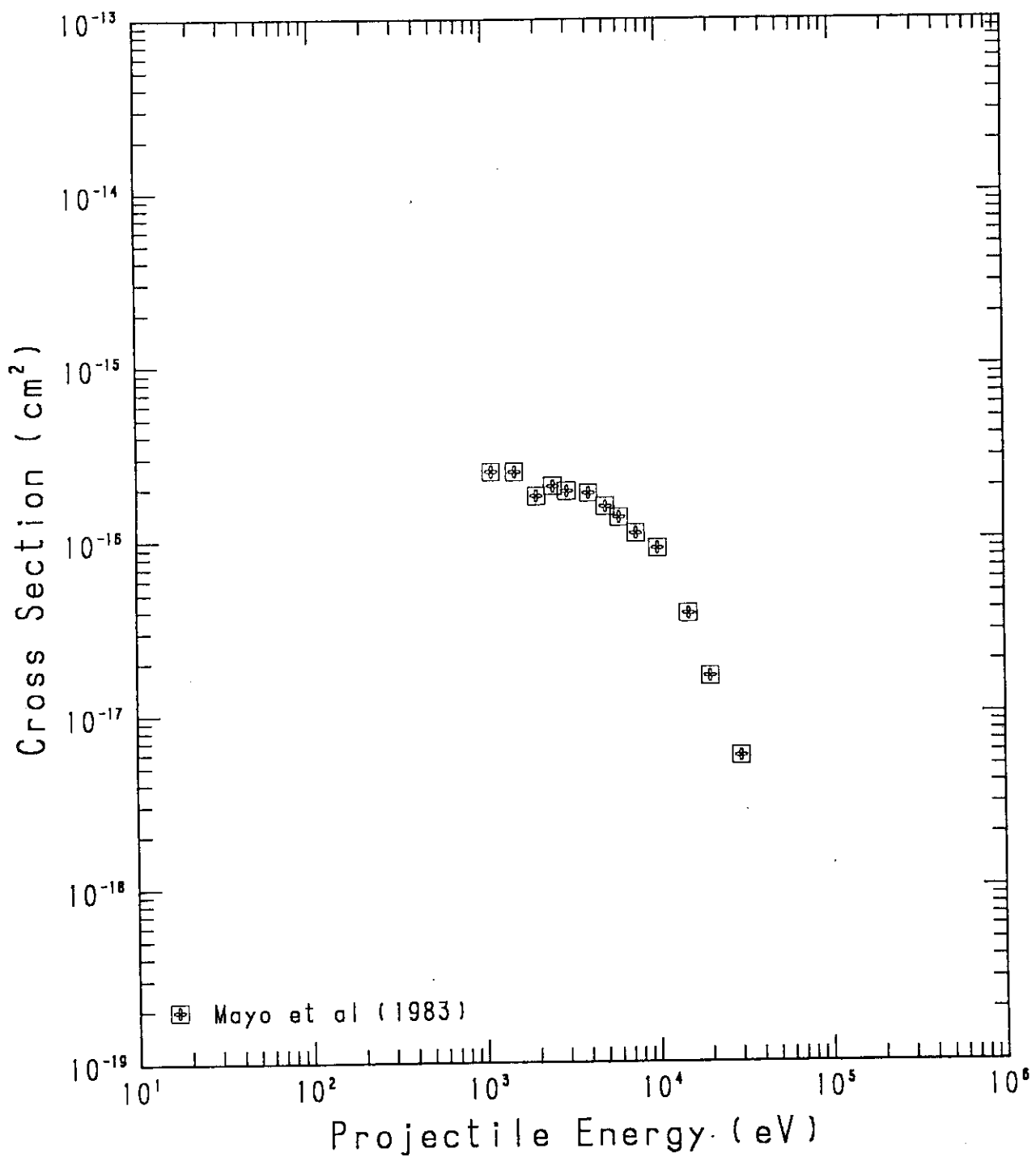


TABLE 15

PROCESS : H + CA = H- (0-1)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.10E+03	4.61E-01	2.49E-16
1.50E+03	5.38E-01	2.48E-16
2.00E+03	6.21E-01	1.80E-16
2.50E+03	6.95E-01	2.05E-16
3.00E+03	7.61E-01	1.92E-16
4.00E+03	8.79E-01	1.87E-16
5.00E+03	9.82E-01	1.56E-16
7.50E+03	1.20E+00	1.09E-16
1.00E+04	1.39E+00	8.94E-17
1.50E+04	1.70E+00	3.80E-17
2.00E+04	1.96E+00	1.64E-17
3.00E+04	2.41E+00	5.68E-18

Fig.16 H + Rb → H<sup>-</sup> (σ<sub>0-1</sub>)

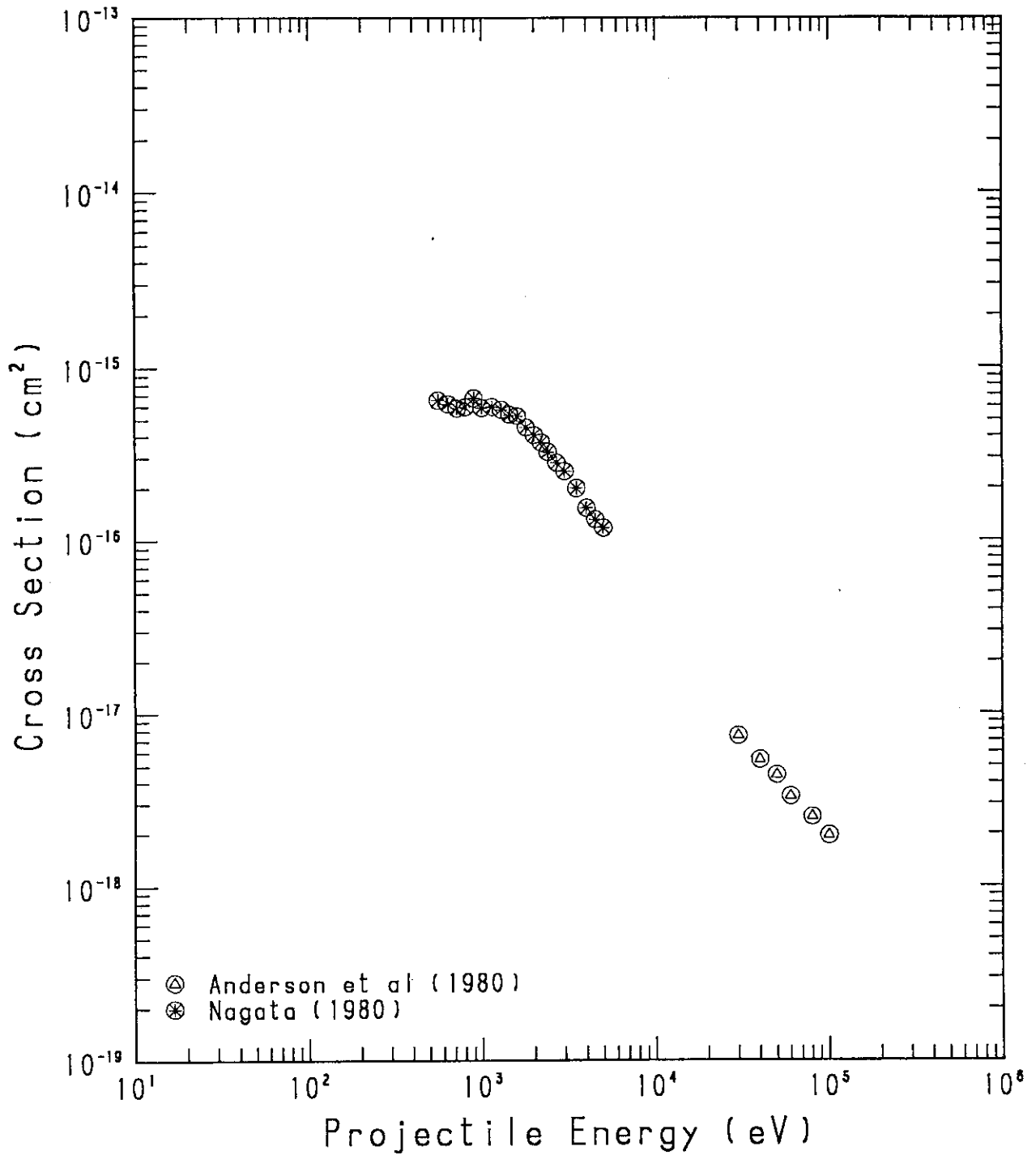


TABLE 16

PROCESS : H + RB = H- (0-1)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	7.40E-18
4.00E+04	2.78E+00	5.40E-18
5.00E+04	3.11E+00	4.40E-18
6.00E+04	3.40E+00	3.30E-18
8.00E+04	3.93E+00	2.50E-18
1.00E+05	4.39E+00	1.95E-18

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.60E+02	3.29E-01	6.52E-16
6.40E+02	3.51E-01	6.20E-16
7.20E+02	3.73E-01	5.85E-16
8.00E+02	3.93E-01	5.96E-16
9.00E+02	4.17E-01	6.71E-16
1.00E+03	4.39E-01	5.89E-16
1.15E+03	4.71E-01	5.97E-16
1.30E+03	5.01E-01	5.75E-16
1.45E+03	5.29E-01	5.36E-16
1.60E+03	5.56E-01	5.26E-16
1.80E+03	5.89E-01	4.50E-16
2.00E+03	6.21E-01	4.06E-16
2.20E+03	6.52E-01	3.67E-16
2.40E+03	6.81E-01	3.23E-16
2.70E+03	7.22E-01	2.80E-16
3.00E+03	7.61E-01	2.50E-16
3.50E+03	8.22E-01	2.00E-16
4.00E+03	8.79E-01	1.54E-16
4.50E+03	9.32E-01	1.32E-16
5.00E+03	9.82E-01	1.18E-16



Fig.17 H + Sr → H<sup>-</sup> (σ<sub>0-1</sub>)

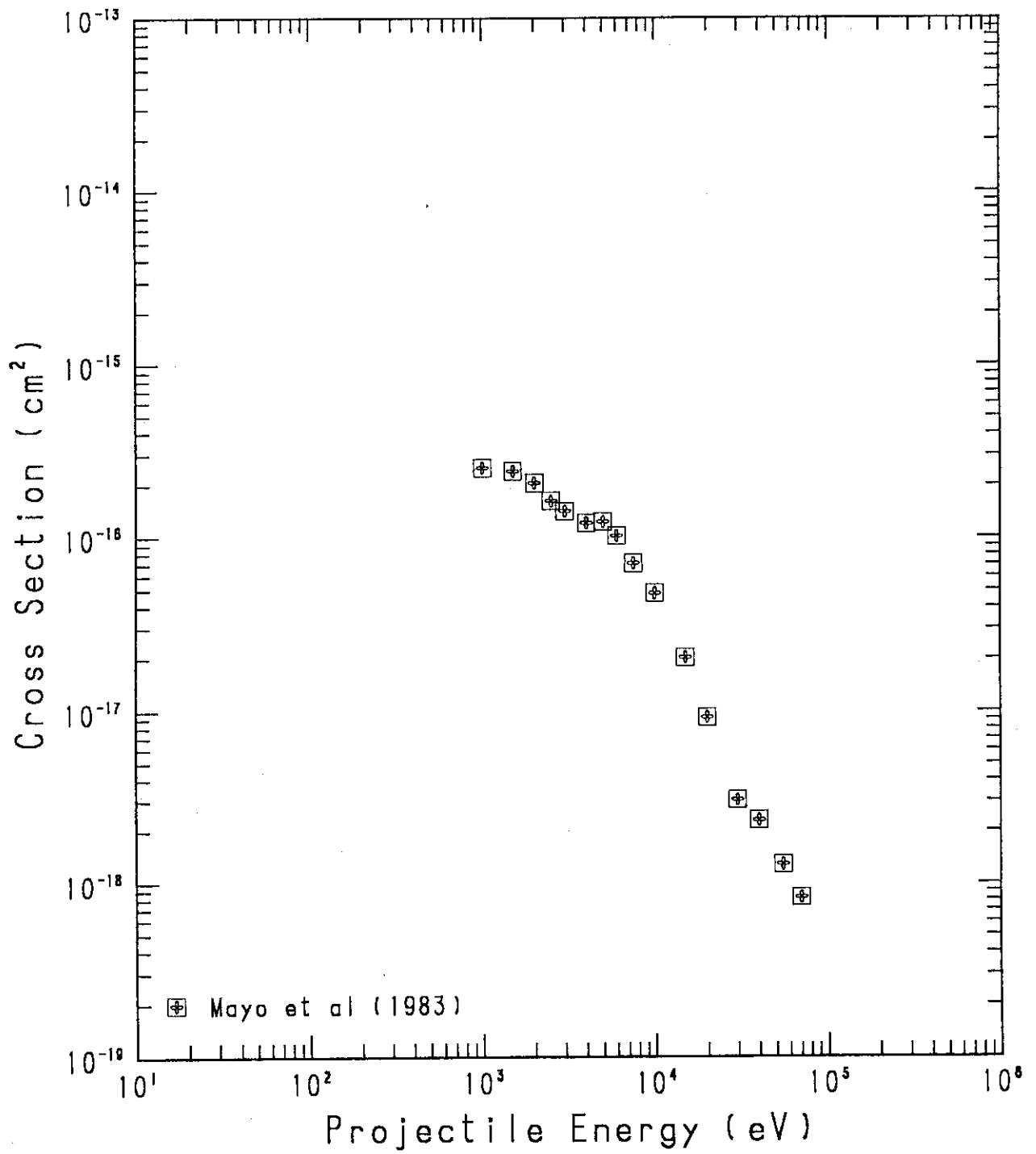


TABLE 17

PROCESS : H + SR = H- (0-1)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	2.53E-16
1.50E+03	5.38E-01	2.42E-16
2.00E+03	6.21E-01	2.07E-16
2.50E+03	6.95E-01	1.63E-16
3.00E+03	7.61E-01	1.42E-16
4.00E+03	8.79E-01	1.21E-16
5.00E+03	9.82E-01	1.23E-16
6.00E+03	1.08E+00	1.02E-16
7.50E+03	1.20E+00	7.09E-17
1.00E+04	1.39E+00	4.78E-17
1.50E+04	1.70E+00	2.03E-17
2.00E+04	1.96E+00	9.21E-18
3.00E+04	2.41E+00	3.03E-18
4.00E+04	2.78E+00	2.30E-18
5.50E+04	3.26E+00	1.28E-18
7.00E+04	3.68E+00	8.21E-19

Fig.18 H + Cs → H<sup>-</sup> (σ<sub>0-1</sub>)

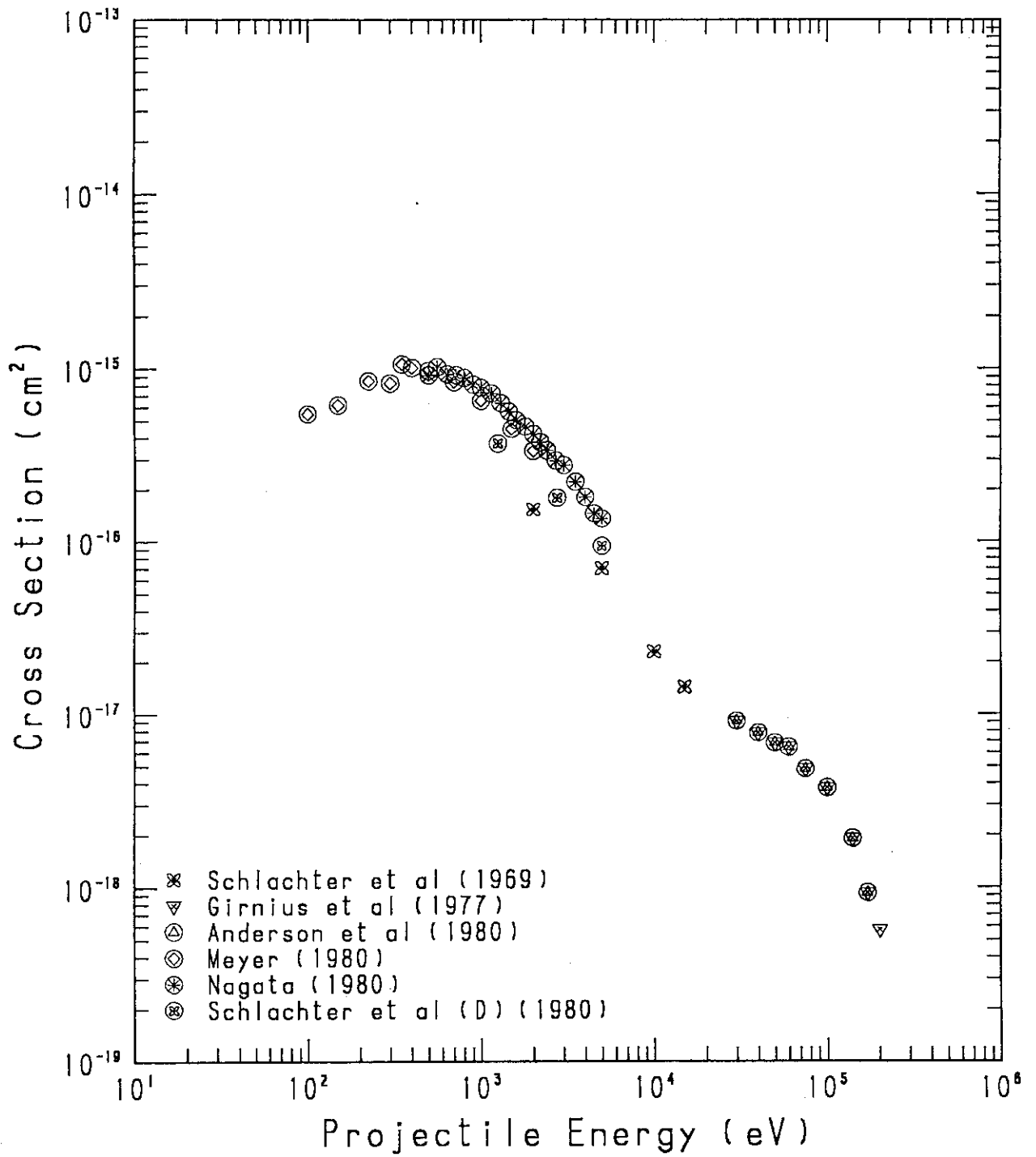


TABLE 18

PROCESS : H + CS = H- (0-1)

SCHLACHTER ET AL, PHYS. REV. 177 184 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	1.54E-16
5.00E+03	9.82E-01	7.00E-17
1.00E+04	1.39E+00	2.30E-17
1.50E+04	1.70E+00	1.43E-17

GIRNIUS ET AL, PHYS. REV. A16 2225 (1977)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	9.10E-18
4.00E+04	2.78E+00	7.76E-18
5.00E+04	3.11E+00	6.79E-18
6.00E+04	3.40E+00	6.42E-18
7.50E+04	3.80E+00	4.82E-18
1.00E+05	4.39E+00	3.75E-18
1.40E+05	5.20E+00	1.91E-18
1.70E+05	5.73E+00	9.30E-19
2.00E+05	6.21E+00	5.70E-19

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	9.10E-18
4.00E+04	2.78E+00	7.76E-18
5.00E+04	3.11E+00	6.79E-18
6.00E+04	3.40E+00	6.42E-18
7.50E+04	3.80E+00	4.82E-18
1.00E+05	4.39E+00	3.75E-18
1.40E+05	5.20E+00	1.91E-18
1.70E+05	5.73E+00	9.30E-19

MEYER, J.PHYS. B13 3823 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+02	1.39E-01	5.49E-16
1.50E+02	1.70E-01	6.17E-16
2.25E+02	2.08E-01	8.50E-16
3.00E+02	2.41E-01	8.25E-16
3.50E+02	2.60E-01	1.06E-15
4.00E+02	2.78E-01	1.01E-15
5.00E+02	3.11E-01	9.72E-16
7.00E+02	3.68E-01	8.39E-16

TABLE 18 -CONTINUED

1.00E+03	4.39E-01	6.54E-16
1.50E+03	5.38E-01	4.49E-16
2.00E+03	6.21E-01	3.36E-16

NAGATA, J. PHYS. SOC. JAPAN 48 2068 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	9.16E-16
5.60E+02	3.29E-01	1.02E-15
6.40E+02	3.51E-01	9.31E-16
7.20E+02	3.73E-01	9.20E-16
8.00E+02	3.93E-01	8.86E-16
9.00E+02	4.17E-01	8.13E-16
1.00E+03	4.39E-01	7.78E-16
1.15E+03	4.71E-01	7.22E-16
1.30E+03	5.01E-01	6.35E-16
1.45E+03	5.29E-01	5.67E-16
1.60E+03	5.56E-01	5.06E-16
1.80E+03	5.89E-01	4.63E-16
2.00E+03	6.21E-01	4.20E-16
2.20E+03	6.52E-01	3.76E-16
2.40E+03	6.81E-01	3.38E-16
2.70E+03	7.22E-01	2.95E-16
3.00E+03	7.61E-01	2.78E-16
3.50E+03	8.22E-01	2.23E-16
4.00E+03	8.79E-01	1.82E-16
4.50E+03	9.32E-01	1.46E-16
5.00E+03	9.82E-01	1.36E-16

SCHLACHTER ET AL (D), PHYS. REV. A22 2494 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.25E+03	4.91E-01	3.70E-16
2.75E+03	7.28E-01	1.80E-16
5.00E+03	9.82E-01	9.40E-17

Fig.19 H + Pb → H<sup>-</sup> (σ<sub>0-1</sub>)

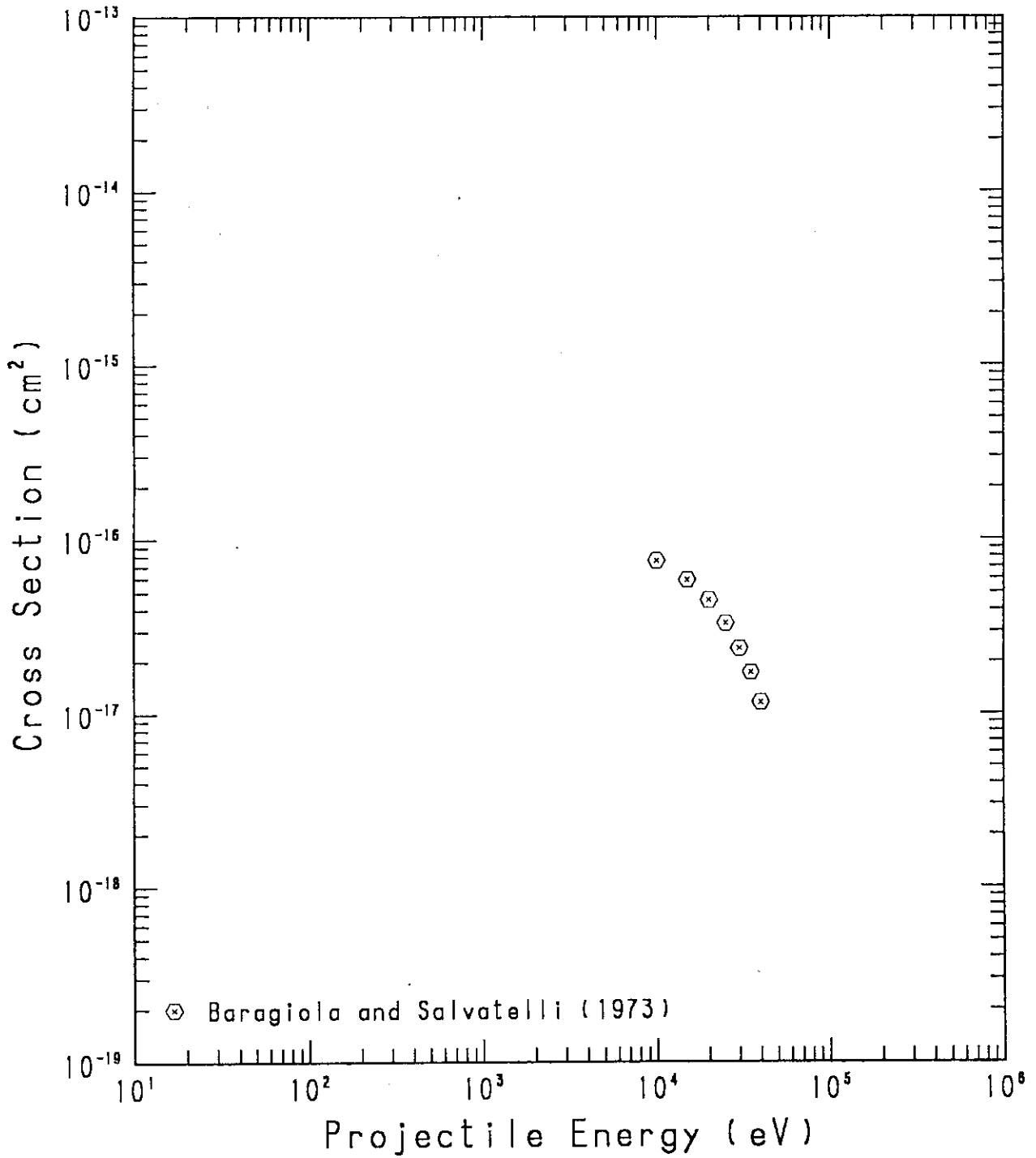


TABLE 19

PROCESS : H + PB = H- (0-1)

BARAGIOLA AND SALVATELLI, NUCL. INSTR. METH. 110 503 (1973)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	7.52E-17
1.50E+04	1.70E+00	5.86E-17
2.00E+04	1.96E+00	4.49E-17
2.50E+04	2.20E+00	3.32E-17
3.00E+04	2.41E+00	2.37E-17
3.50E+04	2.60E+00	1.72E-17
4.00E+04	2.78E+00	1.16E-17

Fig.20  $H^+ + Li \rightarrow H^-$  ( $\sigma_{l-1}$ )

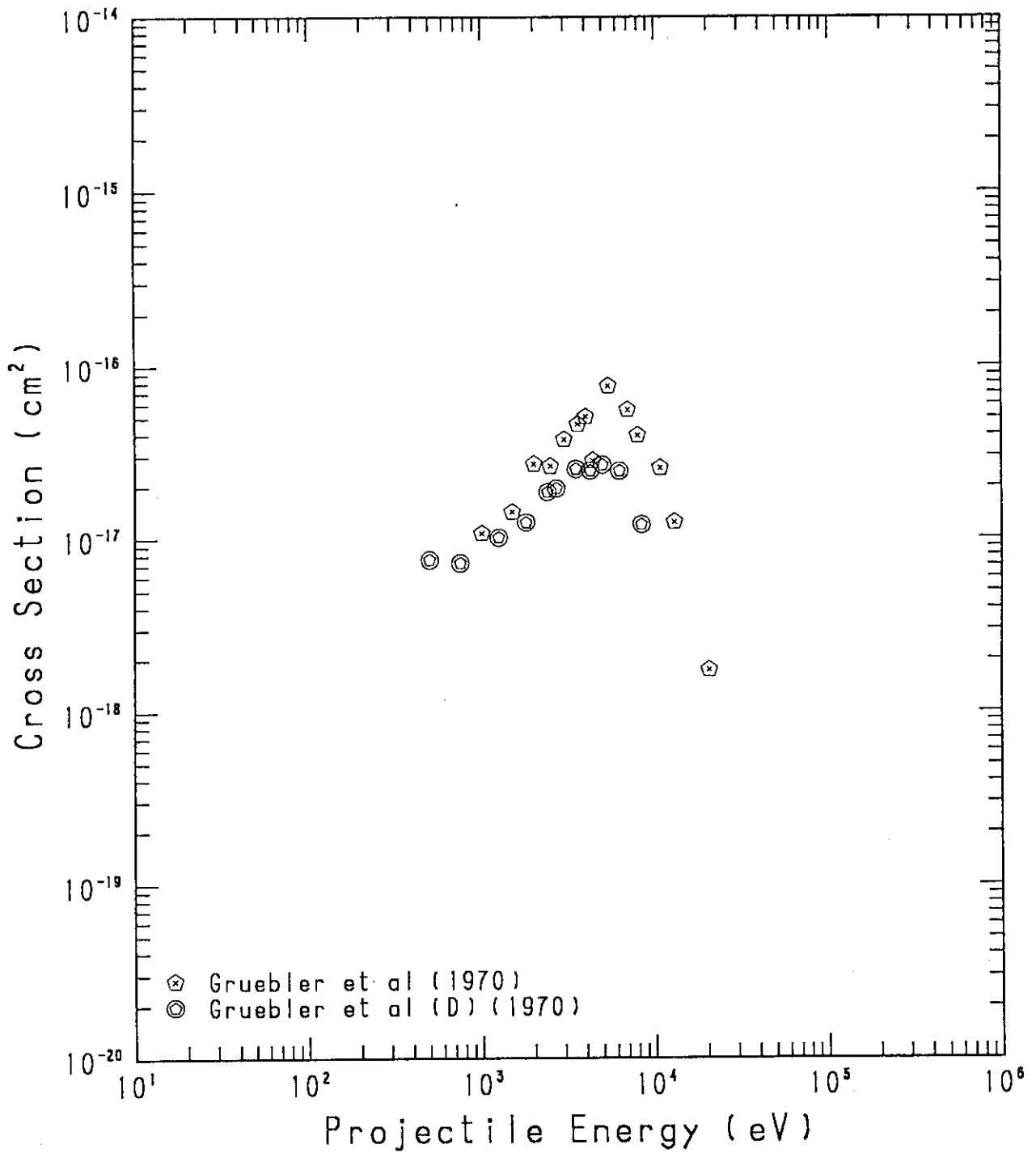




TABLE 20

PROCESS : H+ + LI = H- (1-1)

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	1.07E-17
1.50E+03	5.38E-01	1.43E-17
2.00E+03	6.21E-01	2.70E-17
2.50E+03	6.95E-01	2.63E-17
3.00E+03	7.61E-01	3.73E-17
3.60E+03	8.33E-01	4.58E-17
4.00E+03	8.79E-01	5.07E-17
4.40E+03	9.21E-01	2.82E-17
5.40E+03	1.02E+00	7.66E-17
7.00E+03	1.16E+00	5.54E-17
8.00E+03	1.24E+00	3.94E-17
1.08E+04	1.44E+00	2.56E-17
1.30E+04	1.58E+00	1.24E-17
2.06E+04	1.99E+00	1.73E-18

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	7.54E-18
7.50E+02	3.80E-01	7.23E-18
1.25E+03	4.91E-01	1.01E-17
1.80E+03	5.89E-01	1.24E-17
2.40E+03	6.81E-01	1.86E-17
2.70E+03	7.22E-01	1.95E-17
3.50E+03	8.22E-01	2.53E-17
4.25E+03	9.06E-01	2.47E-17
5.00E+03	9.82E-01	2.67E-17
6.25E+03	1.10E+00	2.46E-17
8.40E+03	1.27E+00	1.20E-17

Fig.21  $H^+ + Na \rightarrow H^-$  ( $\sigma_{1-1}$ )

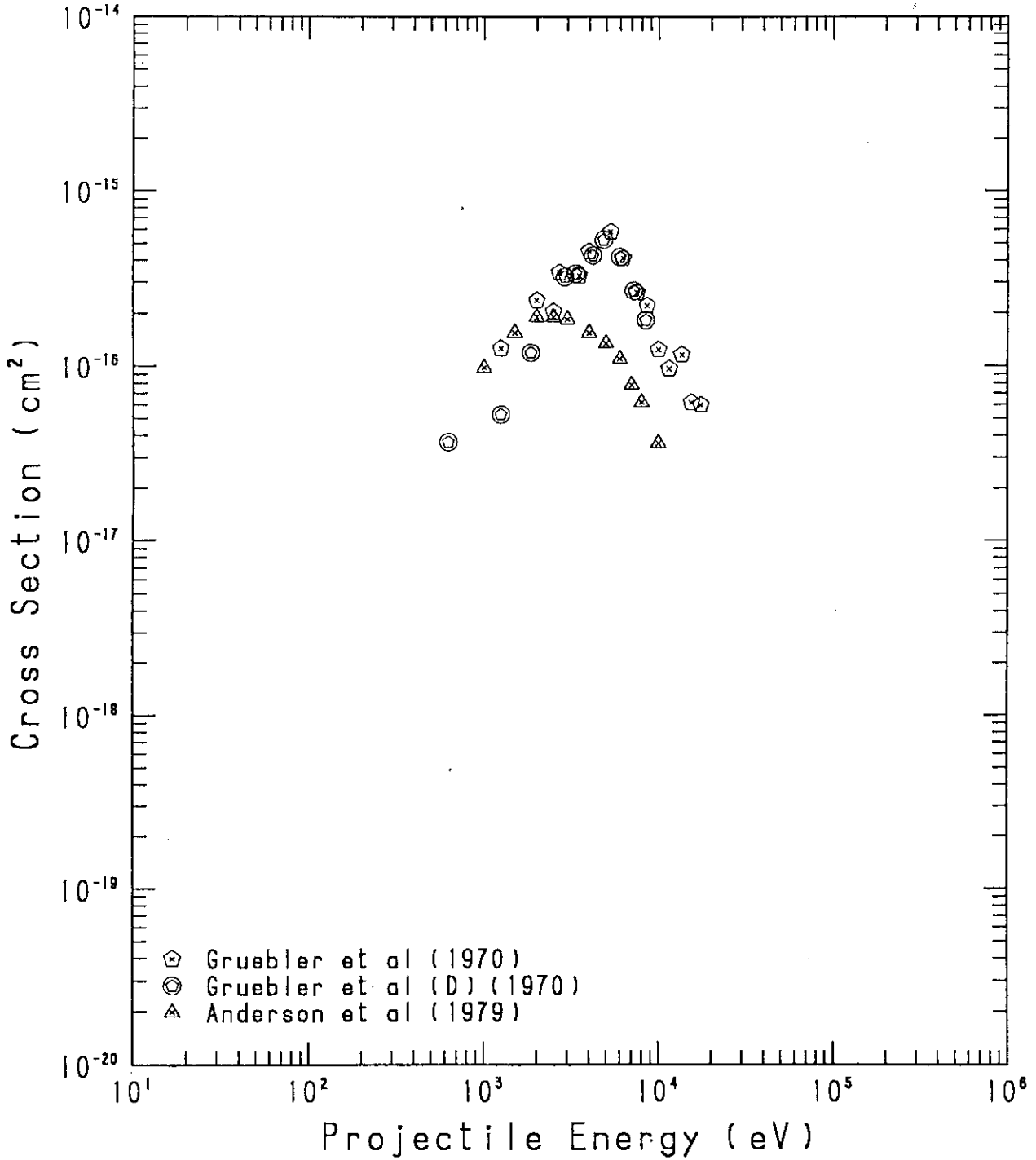


TABLE 21

PROCESS : H+ + NA = H- (1-1)

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.25E+03	4.91E-01	1.26E-16
2.00E+03	6.21E-01	2.37E-16
2.50E+03	6.95E-01	2.05E-16
2.70E+03	7.22E-01	3.41E-16
3.50E+03	8.22E-01	3.28E-16
4.00E+03	8.79E-01	4.52E-16
5.30E+03	1.01E+00	5.83E-16
6.25E+03	1.10E+00	4.13E-16
7.50E+03	1.20E+00	2.62E-16
8.60E+03	1.29E+00	2.21E-16
1.00E+04	1.39E+00	1.24E-16
1.15E+04	1.49E+00	9.65E-17
1.36E+04	1.62E+00	1.16E-16
1.54E+04	1.72E+00	6.18E-17
1.75E+04	1.84E+00	5.98E-17

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
6.25E+02	3.47E-01	3.66E-17
1.25E+03	4.91E-01	5.27E-17
1.85E+03	5.97E-01	1.19E-16
2.90E+03	7.48E-01	3.22E-16
3.35E+03	8.04E-01	3.37E-16
4.20E+03	9.00E-01	4.27E-16
4.85E+03	9.67E-01	5.26E-16
6.00E+03	1.08E+00	4.19E-16
7.20E+03	1.18E+00	2.69E-16
8.45E+03	1.28E+00	1.83E-16

ANDERSON ET AL, NUCL. INSTR. METH. 143 583 (1979)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	9.80E-17
1.50E+03	5.38E-01	1.55E-16
2.00E+03	6.21E-01	1.90E-16
2.50E+03	6.95E-01	1.90E-16
3.00E+03	7.61E-01	1.85E-16
4.00E+03	8.79E-01	1.55E-16
5.00E+03	9.82E-01	1.35E-16
6.00E+03	1.08E+00	1.10E-16
7.00E+03	1.16E+00	7.80E-17
8.00E+03	1.24E+00	6.20E-17
1.00E+04	1.39E+00	3.60E-17

Fig.22  $H^+ + Mg \rightarrow H^-$  ( $\sigma_{1-1}$ )

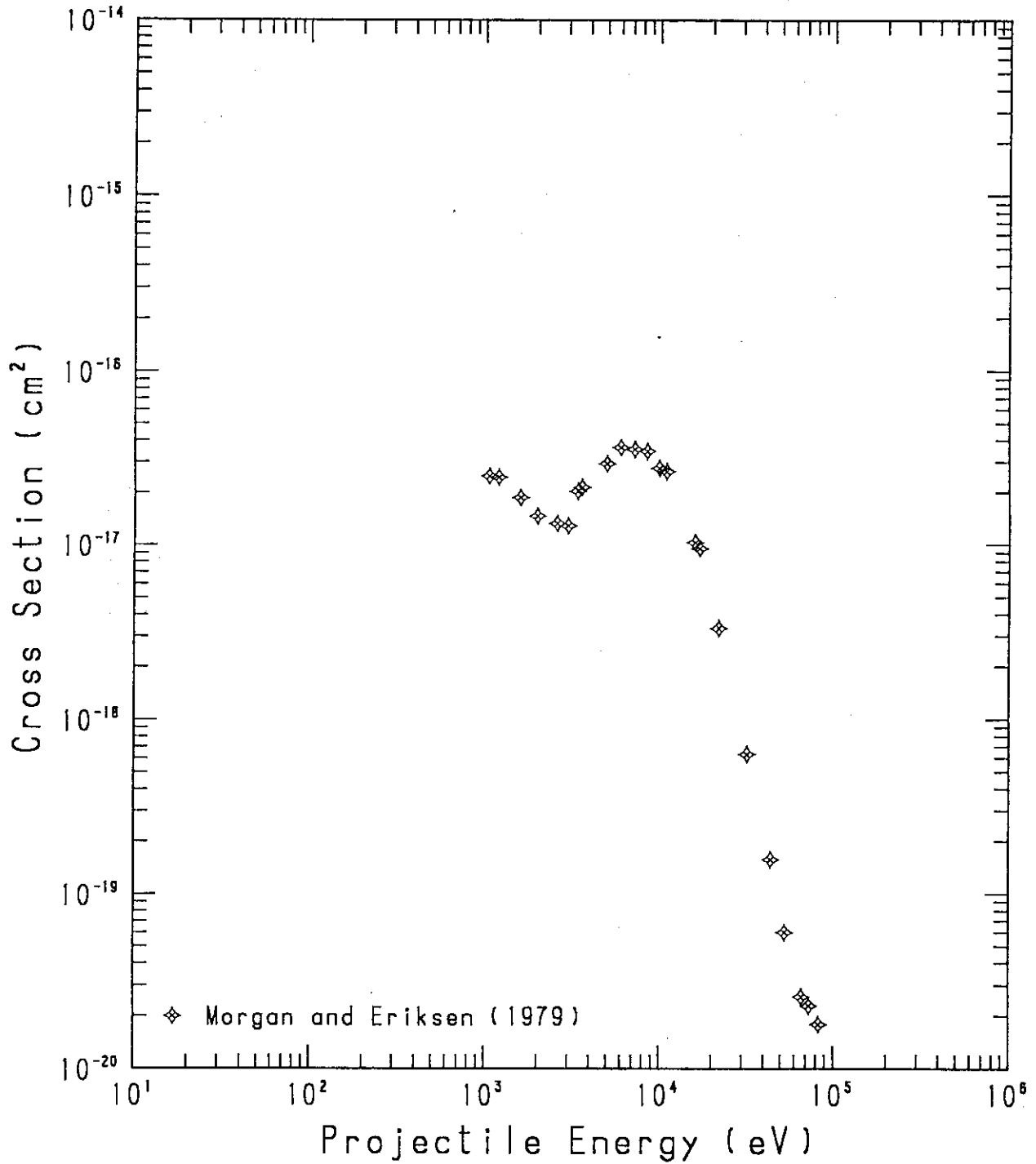


TABLE 22

PROCESS : H+ + MG = H- (1-1)

MORGAN AND ERIKSEN, PHYS. REV. A19 1448 (1979)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.06E+03	4.52E-01	2.49E-17
1.20E+03	4.81E-01	2.45E-17
1.60E+03	5.56E-01	1.88E-17
2.00E+03	6.21E-01	1.47E-17
2.60E+03	7.08E-01	1.33E-17
3.00E+03	7.61E-01	1.29E-17
3.40E+03	8.10E-01	2.04E-17
3.60E+03	8.33E-01	2.15E-17
5.00E+03	9.82E-01	2.93E-17
6.00E+03	1.08E+00	3.63E-17
7.20E+03	1.18E+00	3.54E-17
8.50E+03	1.28E+00	3.45E-17
1.00E+04	1.39E+00	2.76E-17
1.10E+04	1.46E+00	2.64E-17
1.60E+04	1.76E+00	1.03E-17
1.70E+04	1.81E+00	9.50E-18
2.20E+04	2.06E+00	3.32E-18
3.20E+04	2.48E+00	6.29E-19
4.40E+04	2.91E+00	1.57E-19
5.30E+04	3.20E+00	5.98E-20
6.60E+04	3.57E+00	2.57E-20
7.30E+04	3.75E+00	2.28E-20
8.30E+04	4.00E+00	1.79E-20

Fig.23  $H^+ + K \rightarrow H^-$  ( $\sigma_{1-1}$ )

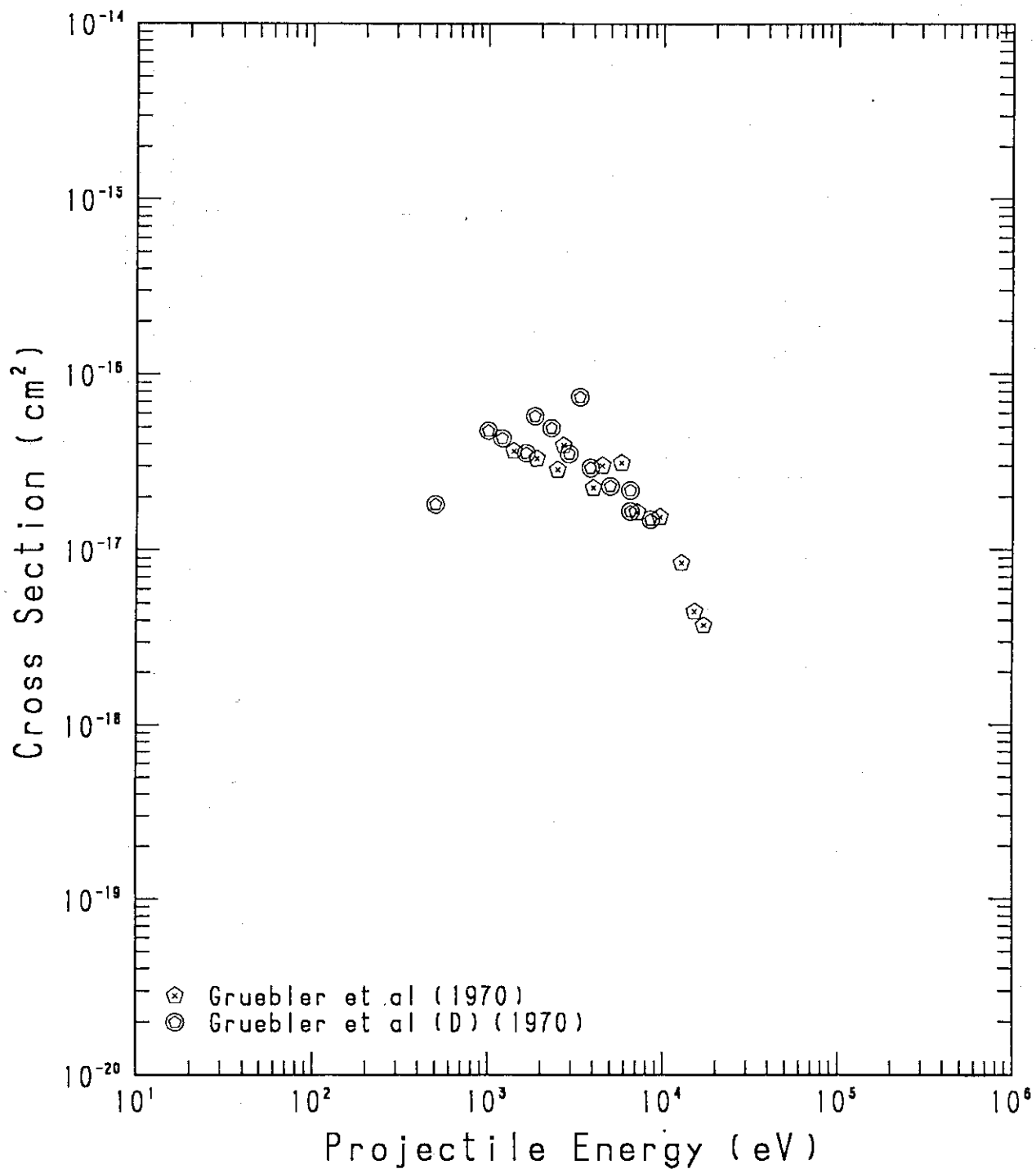


TABLE 23

PROCESS : H+ + K = H- (1-1)

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.40E+03	5.20E-01	3.64E-17
1.90E+03	6.05E-01	3.30E-17
2.50E+03	6.95E-01	2.86E-17
2.70E+03	7.22E-01	3.93E-17
4.00E+03	8.79E-01	2.25E-17
4.50E+03	9.32E-01	3.01E-17
5.80E+03	1.06E+00	3.12E-17
7.10E+03	1.17E+00	1.64E-17
9.60E+03	1.36E+00	1.54E-17
1.28E+04	1.57E+00	8.42E-18
1.52E+04	1.71E+00	4.45E-18
1.72E+04	1.82E+00	3.72E-18

GRUEBLER ET AL (D), HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+02	3.11E-01	1.82E-17
1.00E+03	4.39E-01	4.77E-17
1.20E+03	4.81E-01	4.32E-17
1.65E+03	5.64E-01	3.54E-17
1.85E+03	5.97E-01	5.78E-17
2.30E+03	6.66E-01	4.94E-17
2.90E+03	7.48E-01	3.51E-17
3.35E+03	8.04E-01	7.43E-17
3.85E+03	8.62E-01	2.92E-17
5.00E+03	9.82E-01	2.30E-17
6.50E+03	1.12E+00	2.18E-17
6.50E+03	1.12E+00	1.66E-17
8.50E+03	1.28E+00	1.49E-17

Fig.24  $H^+ + Ca \rightarrow H^-$  ( $\sigma_{1-1}$ )

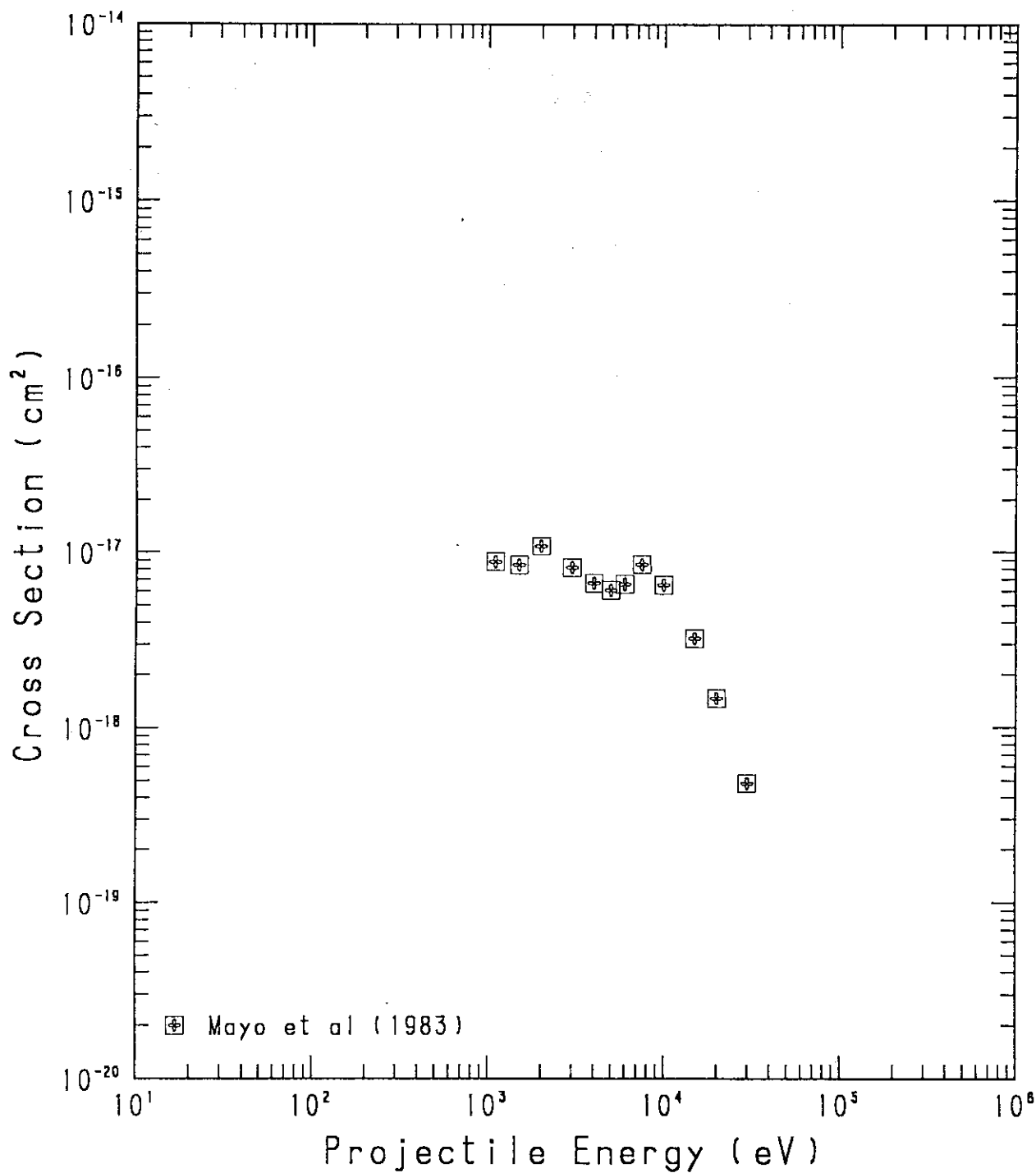




TABLE 24

PROCESS :  $H^+ + CA = H^-$  (1-1)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.10E+03	4.61E-01	8.79E-18
1.50E+03	5.38E-01	8.44E-18
2.00E+03	6.21E-01	1.08E-17
3.00E+03	7.61E-01	8.15E-18
4.00E+03	8.79E-01	6.66E-18
5.00E+03	9.82E-01	6.08E-18
6.00E+03	1.08E+00	6.56E-18
7.50E+03	1.20E+00	8.48E-18
1.00E+04	1.39E+00	6.50E-18
1.50E+04	1.70E+00	3.23E-18
2.00E+04	1.96E+00	1.46E-18
3.00E+04	2.41E+00	4.79E-19

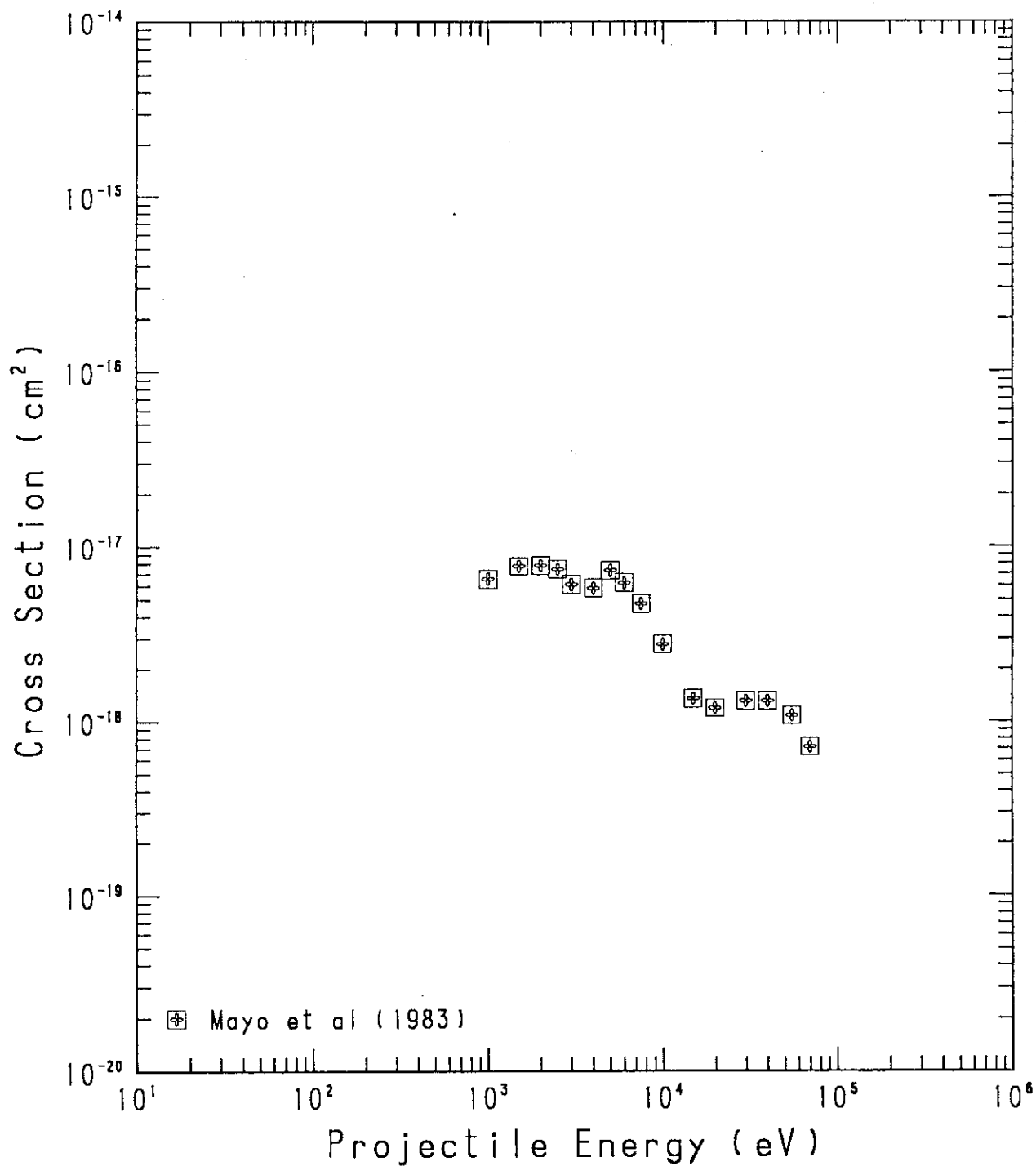
Fig.25  $H^+ + Sr \rightarrow H^-$  ( $\sigma_{l-1}$ )

TABLE 25

PROCESS :  $H^+ + SR = H^-$  (1-1)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E (EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	6.55E-18
1.50E+03	5.38E-01	7.73E-18
2.00E+03	6.21E-01	7.79E-18
2.50E+03	6.95E-01	7.42E-18
3.00E+03	7.61E-01	6.10E-18
4.00E+03	8.79E-01	5.81E-18
5.00E+03	9.82E-01	7.31E-18
6.00E+03	1.08E+00	6.21E-18
7.50E+03	1.20E+00	4.74E-18
1.00E+04	1.39E+00	2.78E-18
1.50E+04	1.70E+00	1.35E-18
2.00E+04	1.96E+00	1.19E-18
3.00E+04	2.41E+00	1.31E-18
4.00E+04	2.78E+00	1.31E-18
5.50E+04	3.26E+00	1.08E-18
7.00E+04	3.68E+00	7.11E-19

Fig.26  $H^+ + Cs \rightarrow H^-$  ( $\sigma_{1-1}$ )

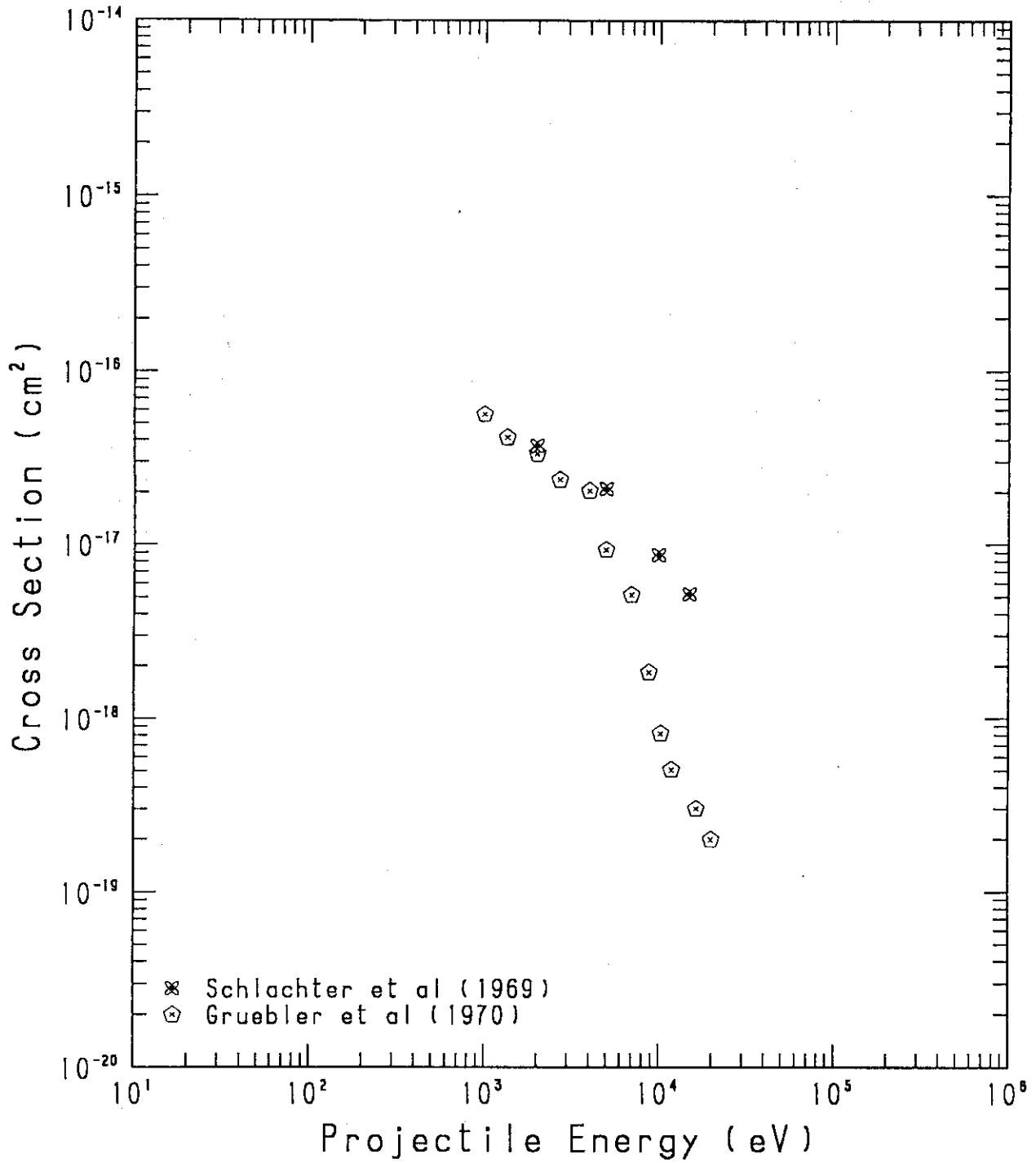


TABLE 26

PROCESS :  $H^+ + CS = H^-$  (1-1)

SCHLACHTER ET AL, PHYS. REV. 177 184 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	3.70E-17
5.00E+03	9.82E-01	2.10E-17
1.00E+04	1.39E+00	8.70E-18
1.50E+04	1.70E+00	5.20E-18

GRUEBLER ET AL, HELV. PHYS. ACTA 43 254 (1970)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	5.66E-17
1.35E+03	5.10E-01	4.13E-17
2.00E+03	6.21E-01	3.34E-17
2.70E+03	7.22E-01	2.37E-17
4.00E+03	8.79E-01	2.05E-17
5.00E+03	9.82E-01	9.30E-18
7.00E+03	1.16E+00	5.16E-18
8.80E+03	1.30E+00	1.84E-18
1.03E+04	1.41E+00	8.17E-19
1.19E+04	1.52E+00	5.06E-19
1.65E+04	1.78E+00	3.00E-19
2.00E+04	1.96E+00	1.99E-19

Fig.27  $H^+ + Ba \rightarrow H^-$  ( $\sigma_{l-1}$ )

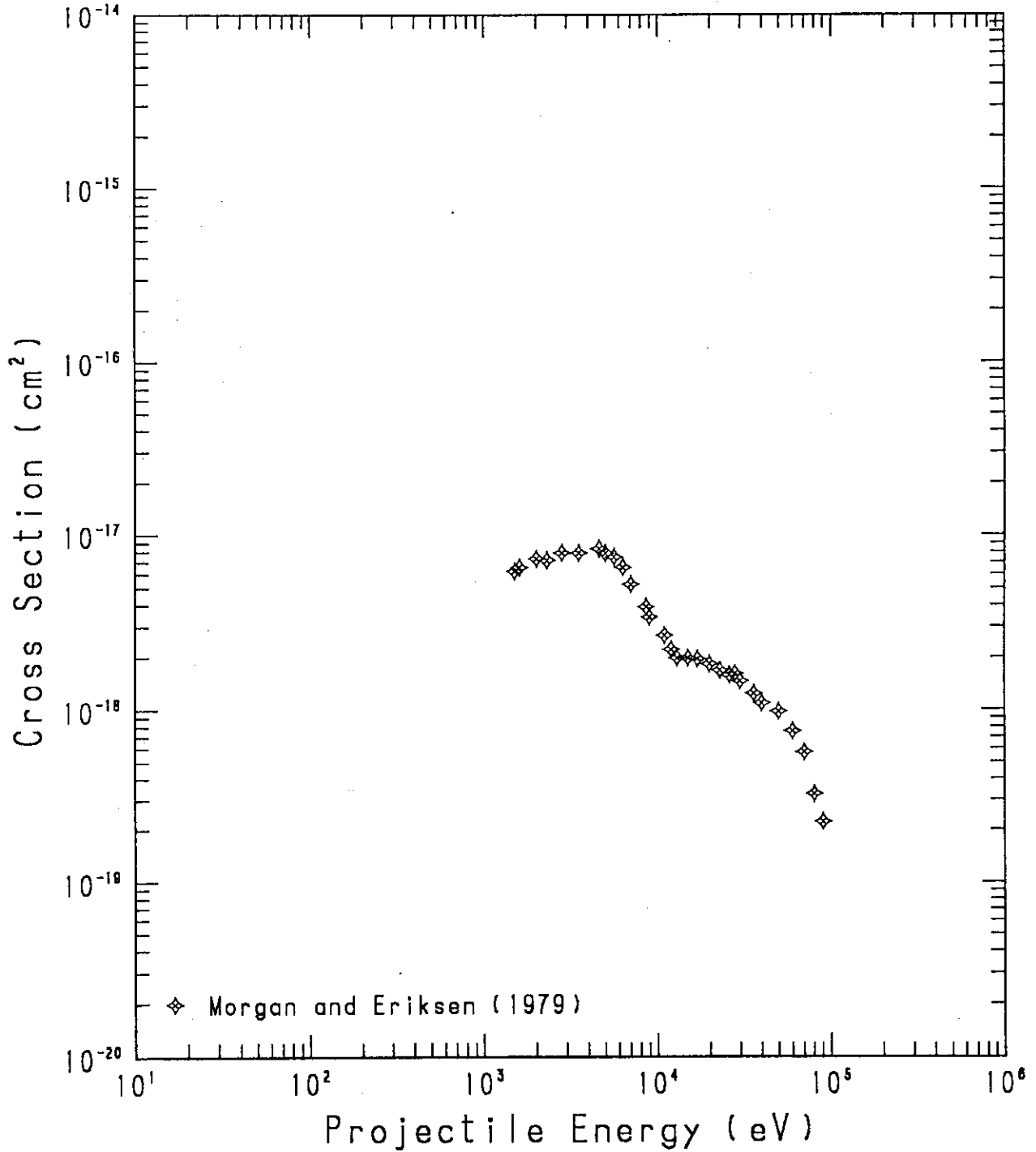


TABLE 27

PROCESS : H+ + BA = H- (1-1)

MORGAN AND ERIKSEN, PHYS. REV. A19 1448 (1979)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+03	5.38E-01	6.22E-18
1.60E+03	5.56E-01	6.53E-18
2.00E+03	6.21E-01	7.31E-18
2.30E+03	6.66E-01	7.17E-18
2.80E+03	7.35E-01	7.88E-18
3.50E+03	8.22E-01	7.87E-18
4.60E+03	9.42E-01	8.32E-18
5.00E+03	9.82E-01	7.85E-18
5.60E+03	1.04E+00	7.48E-18
6.30E+03	1.10E+00	6.54E-18
7.00E+03	1.16E+00	5.24E-18
8.60E+03	1.29E+00	3.89E-18
9.00E+03	1.32E+00	3.40E-18
1.10E+04	1.46E+00	2.67E-18
1.20E+04	1.52E+00	2.22E-18
1.30E+04	1.58E+00	1.98E-18
1.50E+04	1.70E+00	1.98E-18
1.70E+04	1.81E+00	1.96E-18
2.00E+04	1.96E+00	1.83E-18
2.30E+04	2.11E+00	1.68E-18
2.60E+04	2.24E+00	1.58E-18
2.80E+04	2.32E+00	1.61E-18
3.00E+04	2.41E+00	1.46E-18
3.60E+04	2.64E+00	1.24E-18
4.00E+04	2.78E+00	1.09E-18
5.00E+04	3.11E+00	9.75E-19
6.00E+04	3.40E+00	7.52E-19
7.00E+04	3.68E+00	5.69E-19
8.00E+04	3.93E+00	3.23E-19
9.00E+04	4.17E+00	2.22E-19

Fig.28  $H^+ + Pb \rightarrow H^-$  ( $\sigma_{1-1}$ )

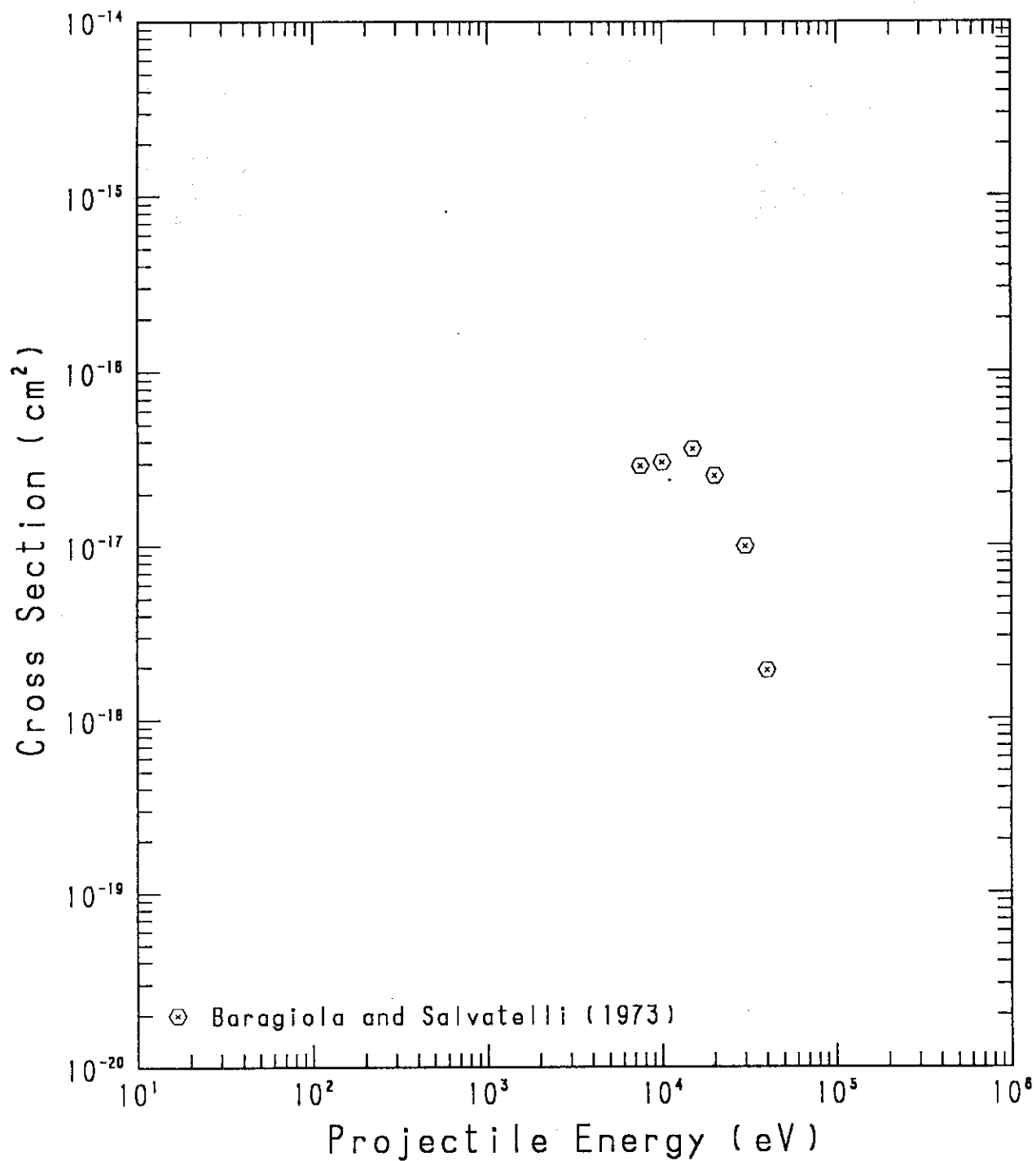




TABLE 28

PROCESS : H+ + PB = H- (1-1)

BARAGIOLA AND SALVATELLI, NUCL. INSTR. METH. 110 503 (1973)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
7.50E+03	1.20E+00	2.89E-17
1.00E+04	1.39E+00	3.02E-17
1.50E+04	1.70E+00	3.61E-17
2.00E+04	1.96E+00	2.53E-17
3.00E+04	2.41E+00	9.90E-18
4.00E+04	2.78E+00	1.91E-18

Fig.29 H + Li → H<sup>+</sup> (σ<sub>01</sub>)

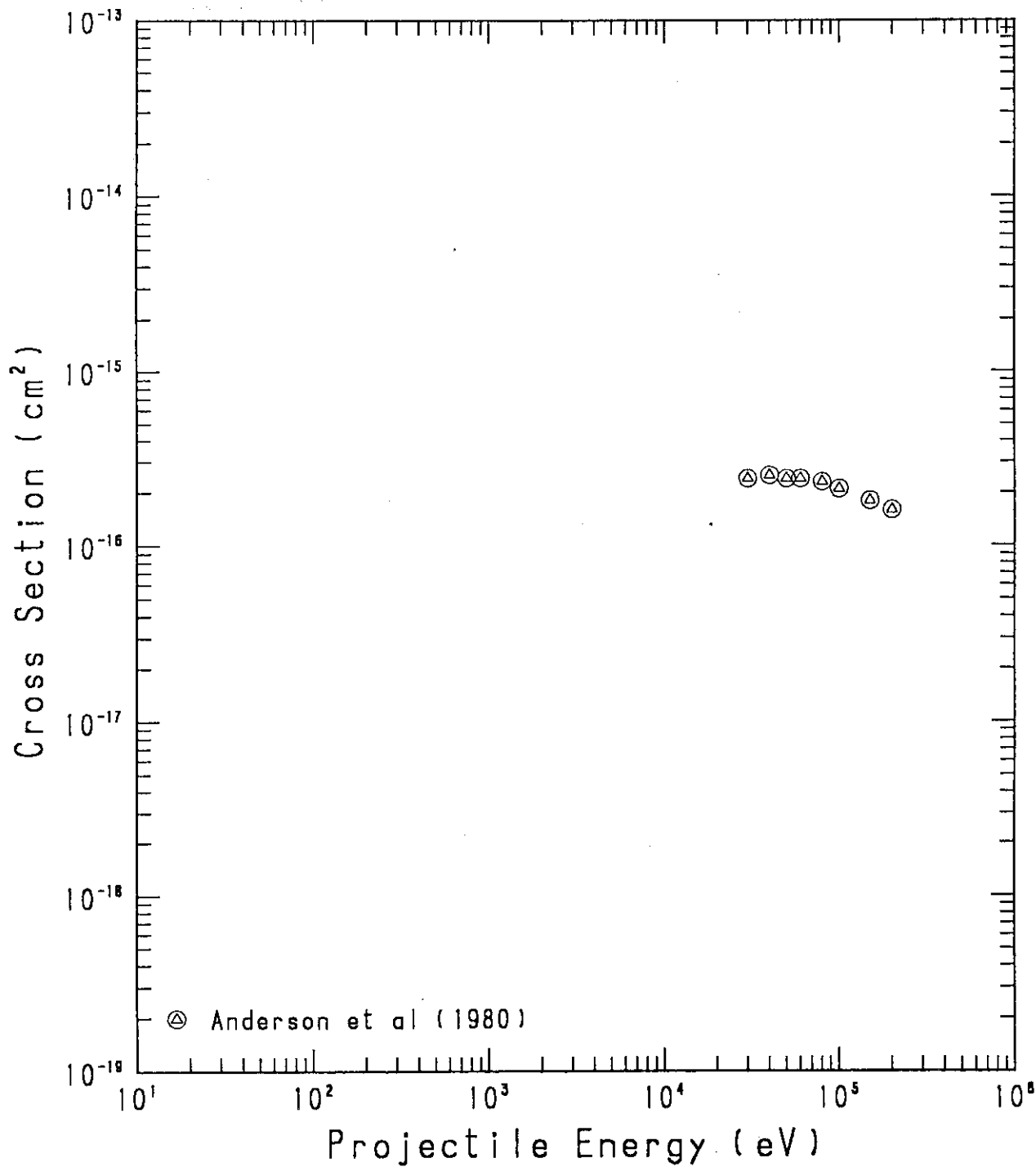


TABLE 29

PROCESS : H + LI = H+ (01)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E (EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.40E-16
4.00E+04	2.78E+00	2.50E-16
5.00E+04	3.11E+00	2.40E-16
6.00E+04	3.40E+00	2.40E-16
8.00E+04	3.93E+00	2.30E-16
1.00E+05	4.39E+00	2.10E-16
1.50E+05	5.38E+00	1.80E-16
2.00E+05	6.21E+00	1.60E-16

Fig.30  $H + Na \rightarrow H^+ (\sigma_{01})$

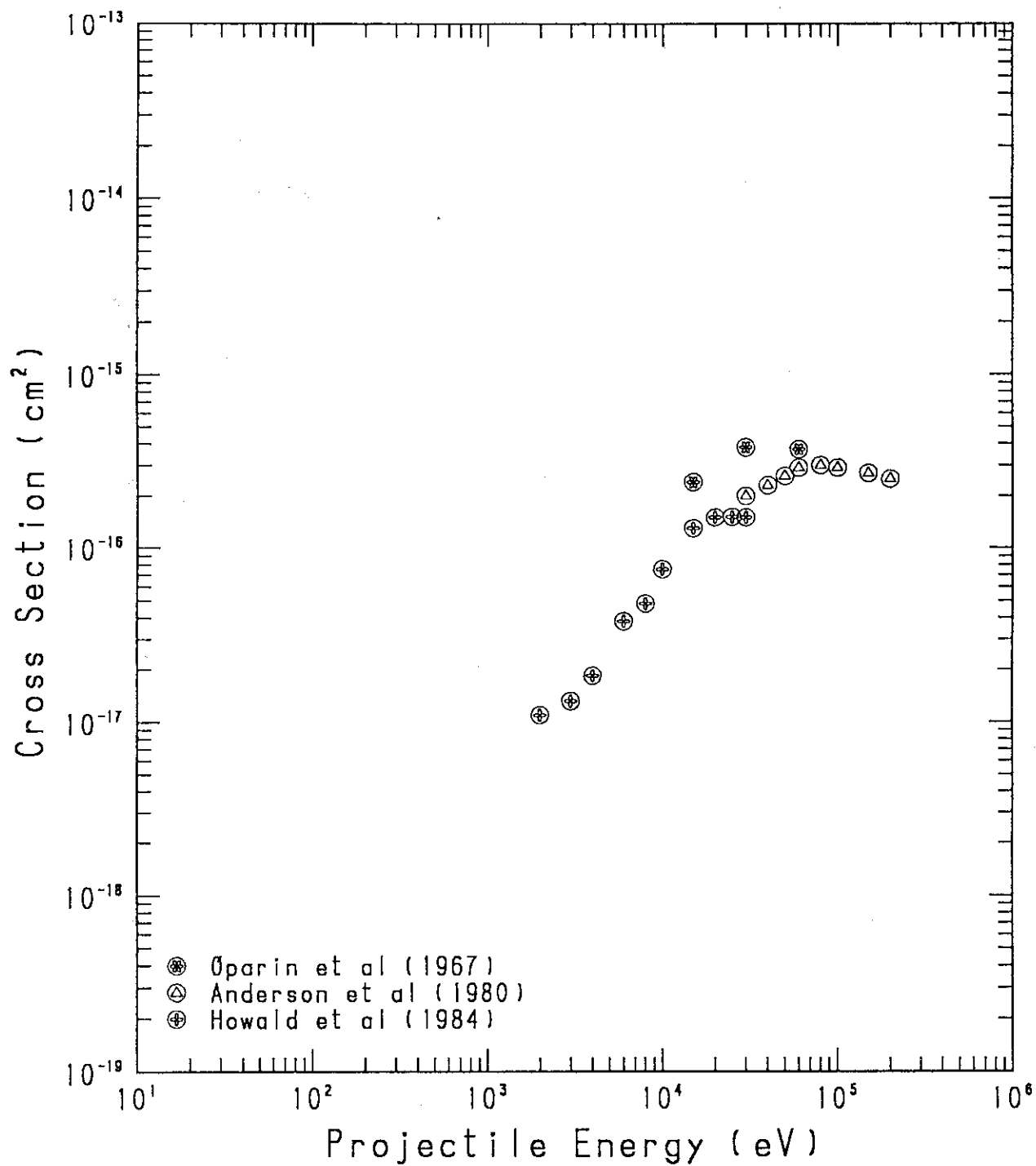


TABLE 30

PROCESS : H + NA = H+ (01)

OPARIN ET AL, SOV. PHYS. JETP 25 240 (1967)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+04	1.70E+00	2.40E-16
3.00E+04	2.41E+00	3.80E-16
6.00E+04	3.40E+00	3.70E-16

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.00E-16
4.00E+04	2.78E+00	2.30E-16
5.00E+04	3.11E+00	2.60E-16
6.00E+04	3.40E+00	2.90E-16
8.00E+04	3.93E+00	3.00E-16
1.00E+05	4.39E+00	2.90E-16
1.50E+05	5.38E+00	2.70E-16
2.00E+05	6.21E+00	2.50E-16

HOWALD ET AL, PHYS. REV. A29 1083 (1984)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	1.10E-17
3.00E+03	7.61E-01	1.32E-17
4.00E+03	8.79E-01	1.85E-17
6.00E+03	1.08E+00	3.82E-17
8.00E+03	1.24E+00	4.82E-17
1.00E+04	1.39E+00	7.53E-17
1.50E+04	1.70E+00	1.30E-16
2.00E+04	1.96E+00	1.50E-16
2.50E+04	2.20E+00	1.51E-16
3.00E+04	2.41E+00	1.50E-16

Fig.31 H + Mg → H<sup>+</sup> (σ<sub>01</sub>)

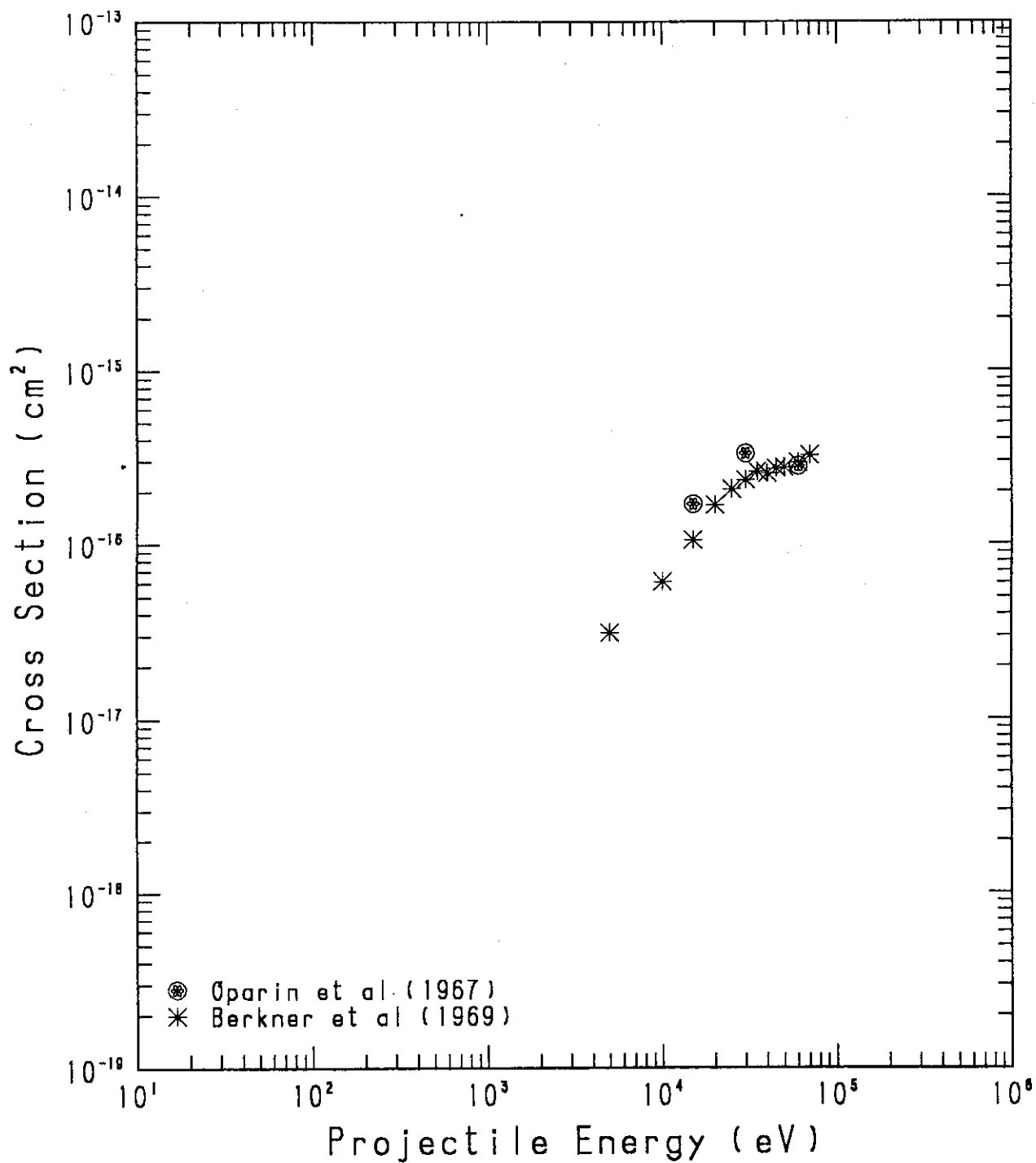


TABLE 31

PROCESS : H + MG = H+ (01)

OPARIN ET AL, SOV. PHYS. JETP 25 240 (1967)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+04	1.70E+00	1.70E-16
3.00E+04	2.41E+00	3.30E-16
6.00E+04	3.40E+00	2.80E-16

BERKNER ET AL, PHYS. REV. 178 248 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
5.00E+03	9.82E-01	3.13E-17
1.00E+04	1.39E+00	6.09E-17
1.50E+04	1.70E+00	1.05E-16
2.00E+04	1.96E+00	1.68E-16
2.50E+04	2.20E+00	2.07E-16
3.00E+04	2.41E+00	2.34E-16
3.50E+04	2.60E+00	2.61E-16
4.00E+04	2.78E+00	2.54E-16
4.50E+04	2.95E+00	2.71E-16
5.00E+04	3.11E+00	2.75E-16
6.00E+04	3.40E+00	2.92E-16
7.00E+04	3.68E+00	3.23E-16

Fig.32 H + K → H<sup>+</sup> (σ<sub>01</sub>)

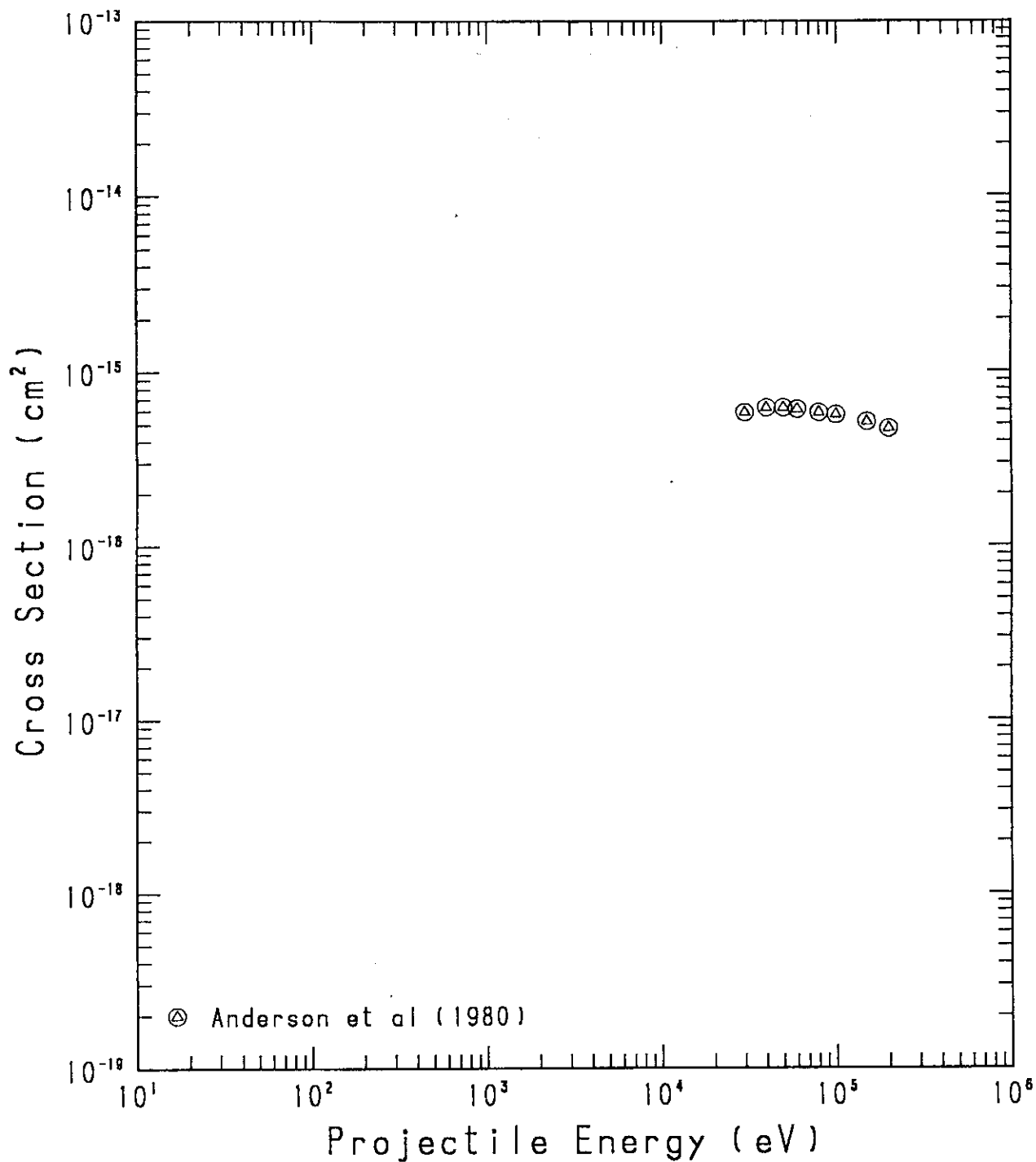




TABLE 32

PROCESS : H + K = H+ (01)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E (EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	5.84E-16
4.00E+04	2.78E+00	6.22E-16
5.00E+04	3.11E+00	6.22E-16
6.00E+04	3.40E+00	6.11E-16
8.00E+04	3.93E+00	5.83E-16
1.00E+05	4.39E+00	5.67E-16
1.50E+05	5.38E+00	5.15E-16
2.00E+05	6.21E+00	4.71E-16

Fig.33 H + Ca → H<sup>+</sup> (σ<sub>01</sub>)

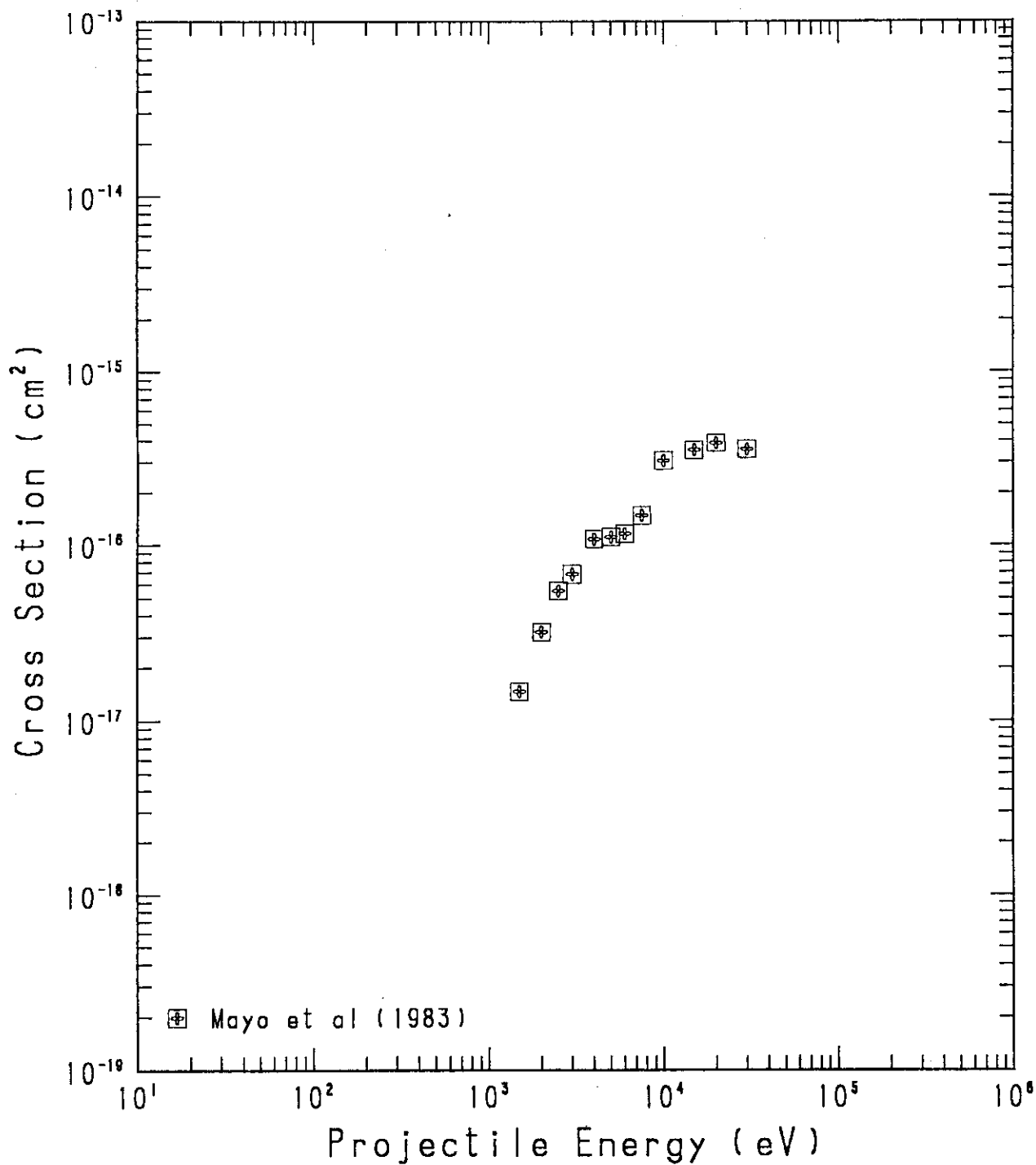


TABLE 33

PROCESS : H + CA = H+ (01)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10 <sup>(8)</sup> *CM/SEC)	SIGMA(CM <sup>(2)</sup> )
1.50E+03	5.38E-01	1.46E-17
2.00E+03	6.21E-01	3.21E-17
2.50E+03	6.95E-01	5.50E-17
3.00E+03	7.61E-01	6.82E-17
4.00E+03	8.79E-01	1.08E-16
5.00E+03	9.82E-01	1.11E-16
6.00E+03	1.08E+00	1.16E-16
7.50E+03	1.20E+00	1.48E-16
1.00E+04	1.39E+00	3.05E-16
1.50E+04	1.70E+00	3.52E-16
2.00E+04	1.96E+00	3.86E-16
3.00E+04	2.41E+00	3.55E-16

Fig.34 H + Rb → H<sup>+</sup> (σ<sub>01</sub>)

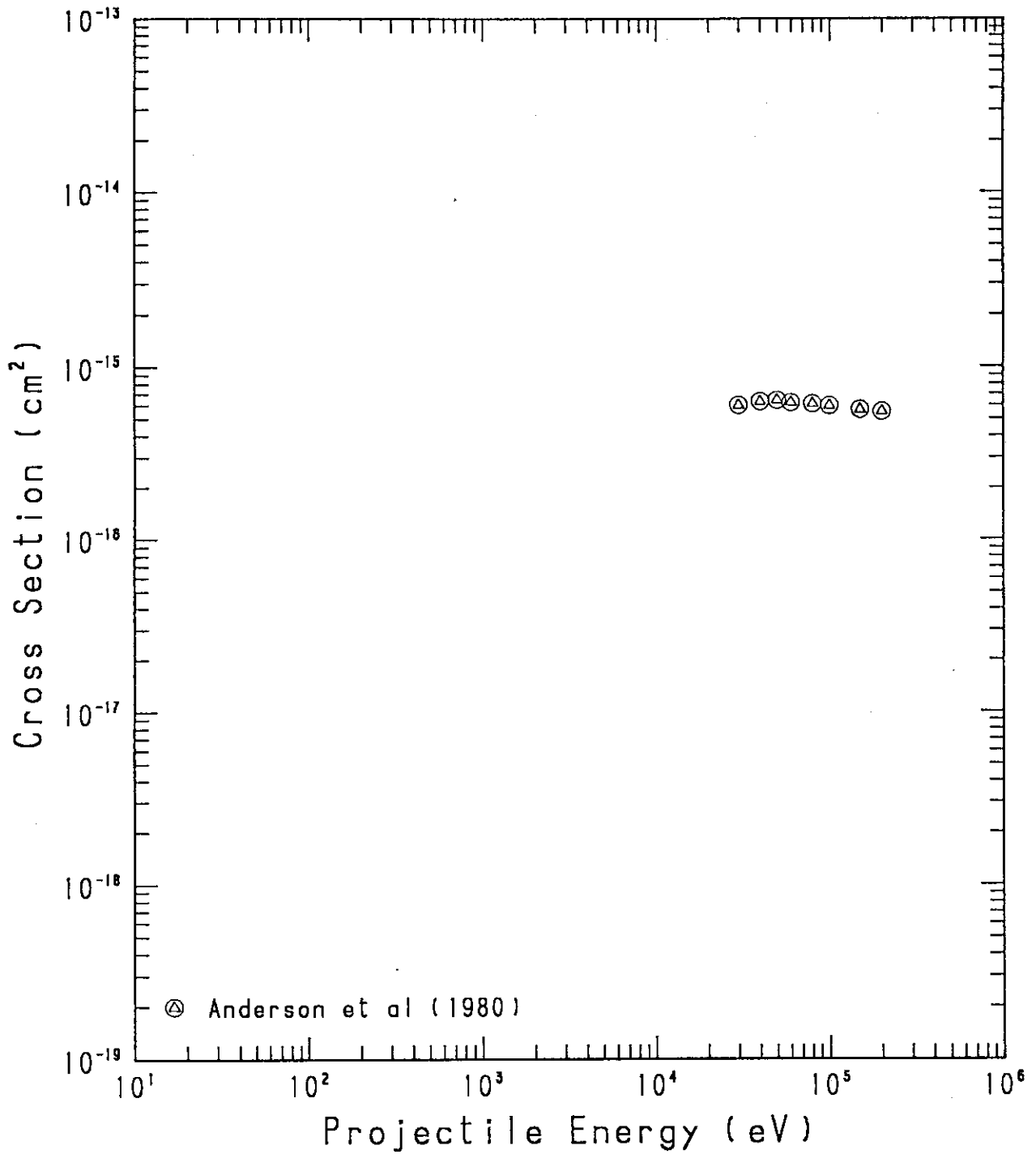


TABLE 34

PROCESS : H + RB = H+ (01)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	6.00E-16
4.00E+04	2.78E+00	6.30E-16
5.00E+04	3.11E+00	6.40E-16
6.00E+04	3.40E+00	6.20E-16
8.00E+04	3.93E+00	6.10E-16
1.00E+05	4.39E+00	5.95E-16
1.50E+05	5.38E+00	5.65E-16
2.00E+05	6.21E+00	5.50E-16

Fig.35 H + Sr → H<sup>+</sup> (σ<sub>01</sub>)

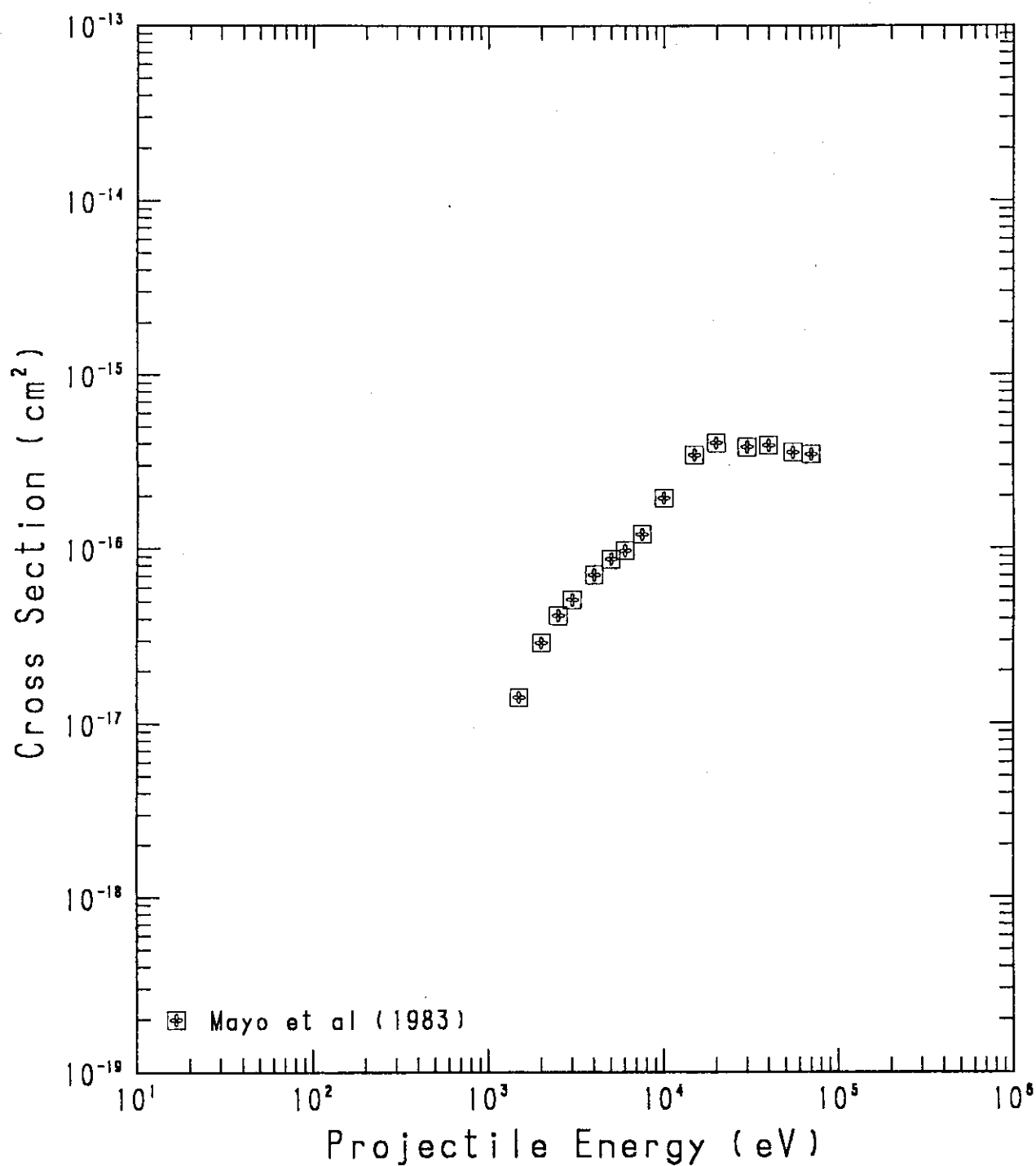


TABLE 35

PROCESS : H + SR = H+ (01)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+03	5.38E-01	1.41E-17
2.00E+03	6.21E-01	2.91E-17
2.50E+03	6.95E-01	4.17E-17
3.00E+03	7.61E-01	5.12E-17
4.00E+03	8.79E-01	7.07E-17
5.00E+03	9.82E-01	8.67E-17
6.00E+03	1.08E+00	9.69E-17
7.50E+03	1.20E+00	1.20E-16
1.00E+04	1.39E+00	1.95E-16
1.50E+04	1.70E+00	3.43E-16
2.00E+04	1.96E+00	4.02E-16
3.00E+04	2.41E+00	3.81E-16
4.00E+04	2.78E+00	3.89E-16
5.50E+04	3.26E+00	3.55E-16
7.00E+04	3.68E+00	3.46E-16

Fig.36 H + Cs → H<sup>+</sup> (σ<sub>01</sub>)

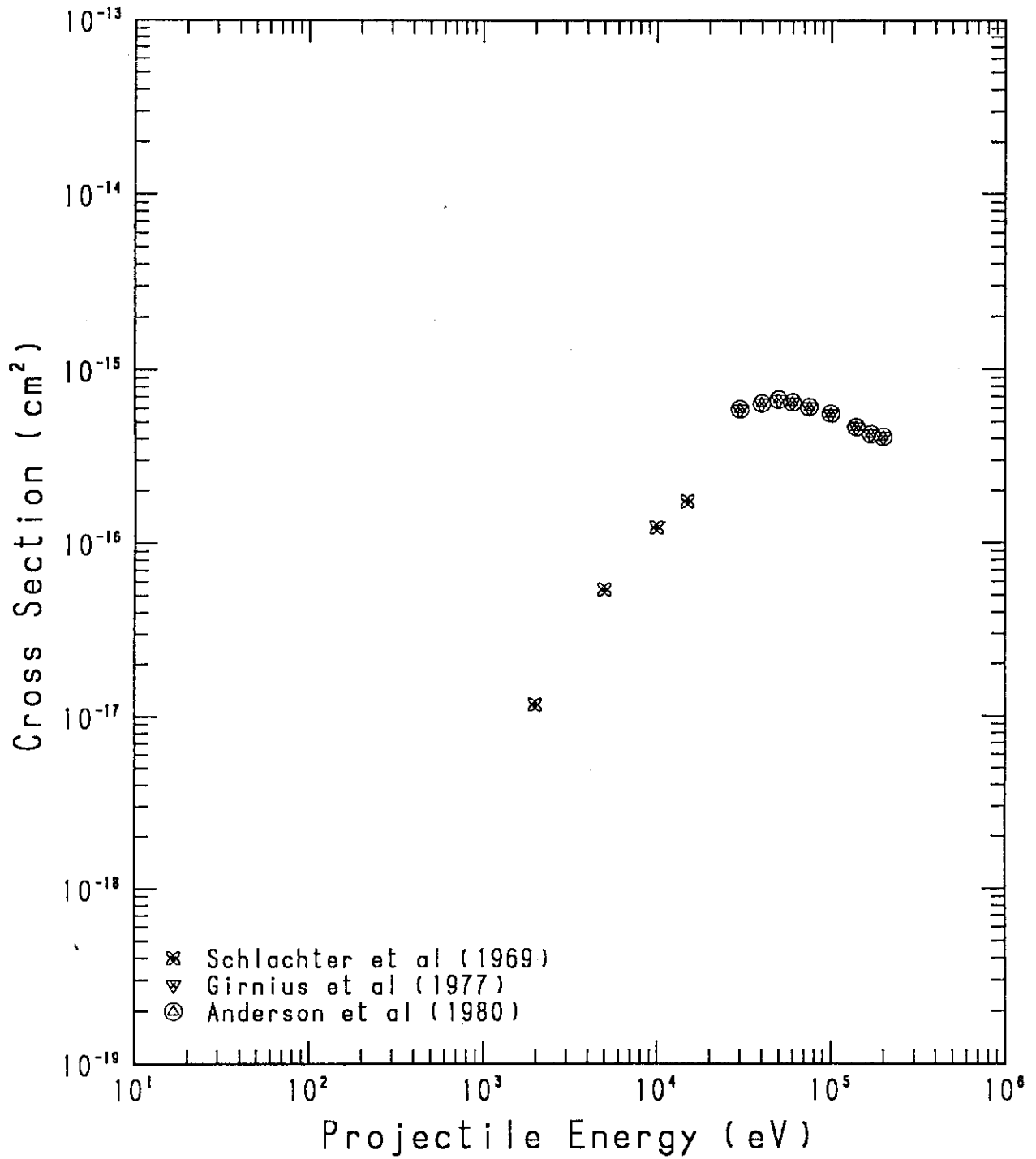




TABLE 36

PROCESS : H + CS = H+ (01)

SCHLACHTER ET AL, PHYS. REV. 177 184 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	1.17E-17
5.00E+03	9.82E-01	5.40E-17
1.00E+04	1.39E+00	1.23E-16
1.50E+04	1.70E+00	1.74E-16

GIRNIUS ET AL, PHYS. REV. A16 2225 (1977)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	5.92E-16
4.00E+04	2.78E+00	6.39E-16
5.00E+04	3.11E+00	6.72E-16
6.00E+04	3.40E+00	6.48E-16
7.50E+04	3.80E+00	6.09E-16
1.00E+05	4.39E+00	5.58E-16
1.40E+05	5.20E+00	4.65E-16
1.70E+05	5.73E+00	4.23E-16
2.00E+05	6.21E+00	4.08E-16

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	5.92E-16
4.00E+04	2.78E+00	6.39E-16
5.00E+04	3.11E+00	6.72E-16
6.00E+04	3.40E+00	6.48E-16
7.50E+04	3.80E+00	6.09E-16
1.00E+05	4.39E+00	5.58E-16
1.40E+05	5.20E+00	4.65E-16
1.70E+05	5.73E+00	4.23E-16
2.00E+05	6.21E+00	4.08E-16

Fig.37 H + Cd → H<sup>+</sup> (σ<sub>01</sub>)

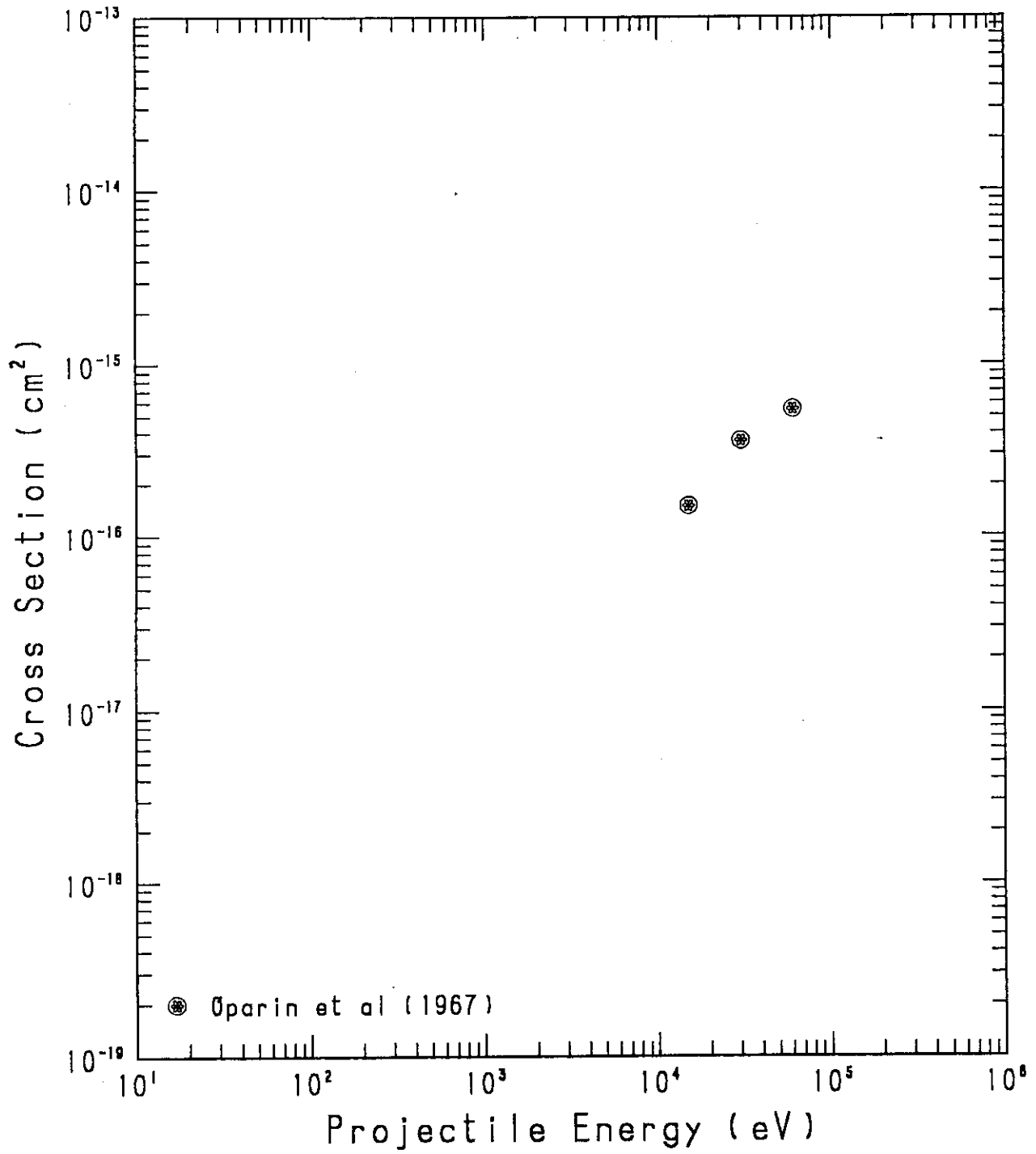


TABLE 37

PROCESS : H + CD = H+ (01)

OPARIN ET AL, SOV. PHYS. JETP 25 240 (1967)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+04	1.70E+00	1.50E-16
3.00E+04	2.41E+00	3.60E-16
6.00E+04	3.40E+00	5.50E-16

Fig.38 H + Pb → H<sup>+</sup> (σ<sub>01</sub>)

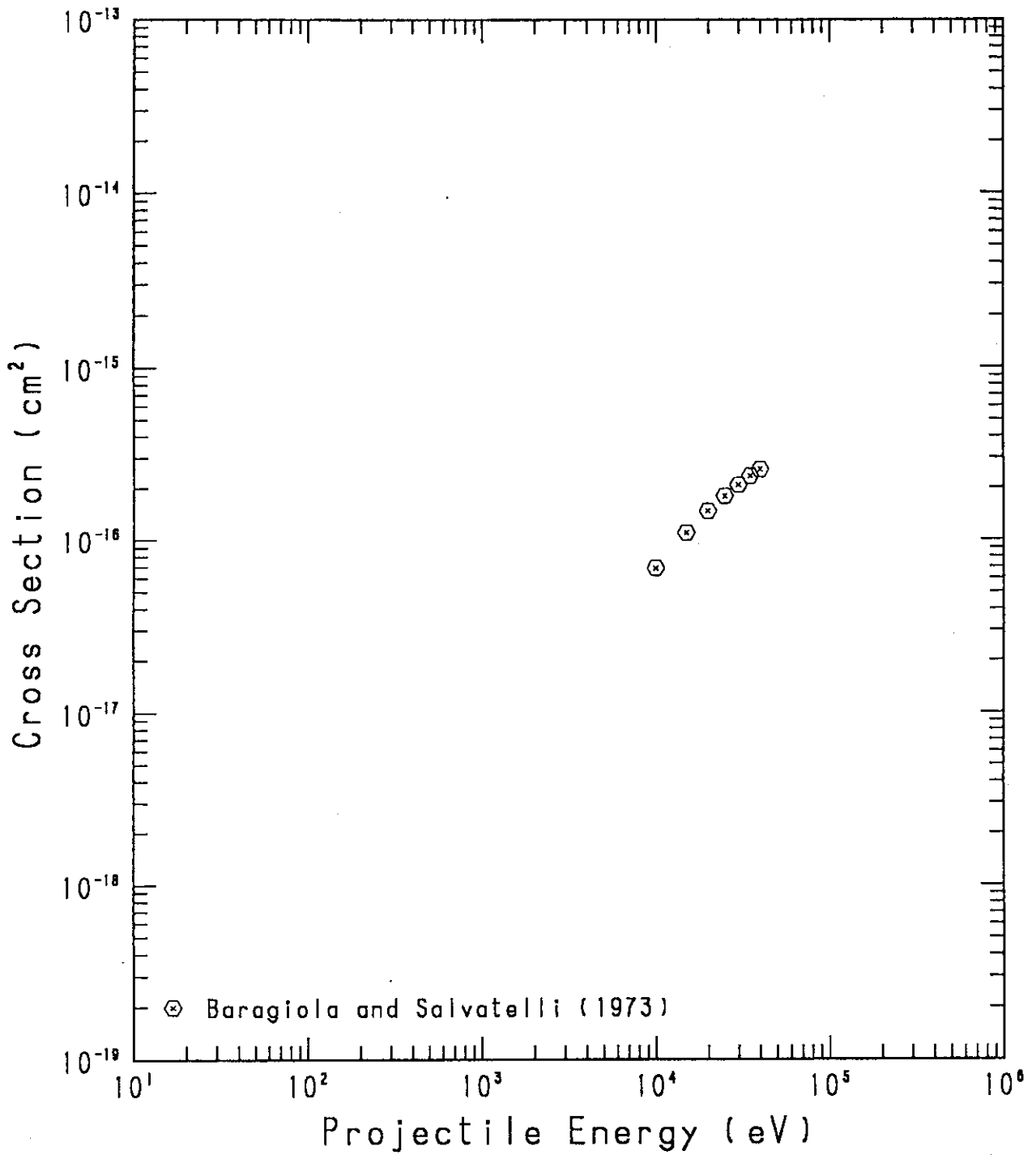


TABLE 38

PROCESS : H + PB = H+ (01)

BARAGIOLA AND SALVATELLI, NUCL. INSTR. METH. 110 503 (1973)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	6.87E-17
1.50E+04	1.70E+00	1.10E-16
2.00E+04	1.96E+00	1.47E-16
2.50E+04	2.20E+00	1.80E-16
3.00E+04	2.41E+00	2.09E-16
3.50E+04	2.60E+00	2.36E-16
4.00E+04	2.78E+00	2.57E-16

Fig.39  $H^- + Li \rightarrow H$  ( $\sigma_{-10}$ )

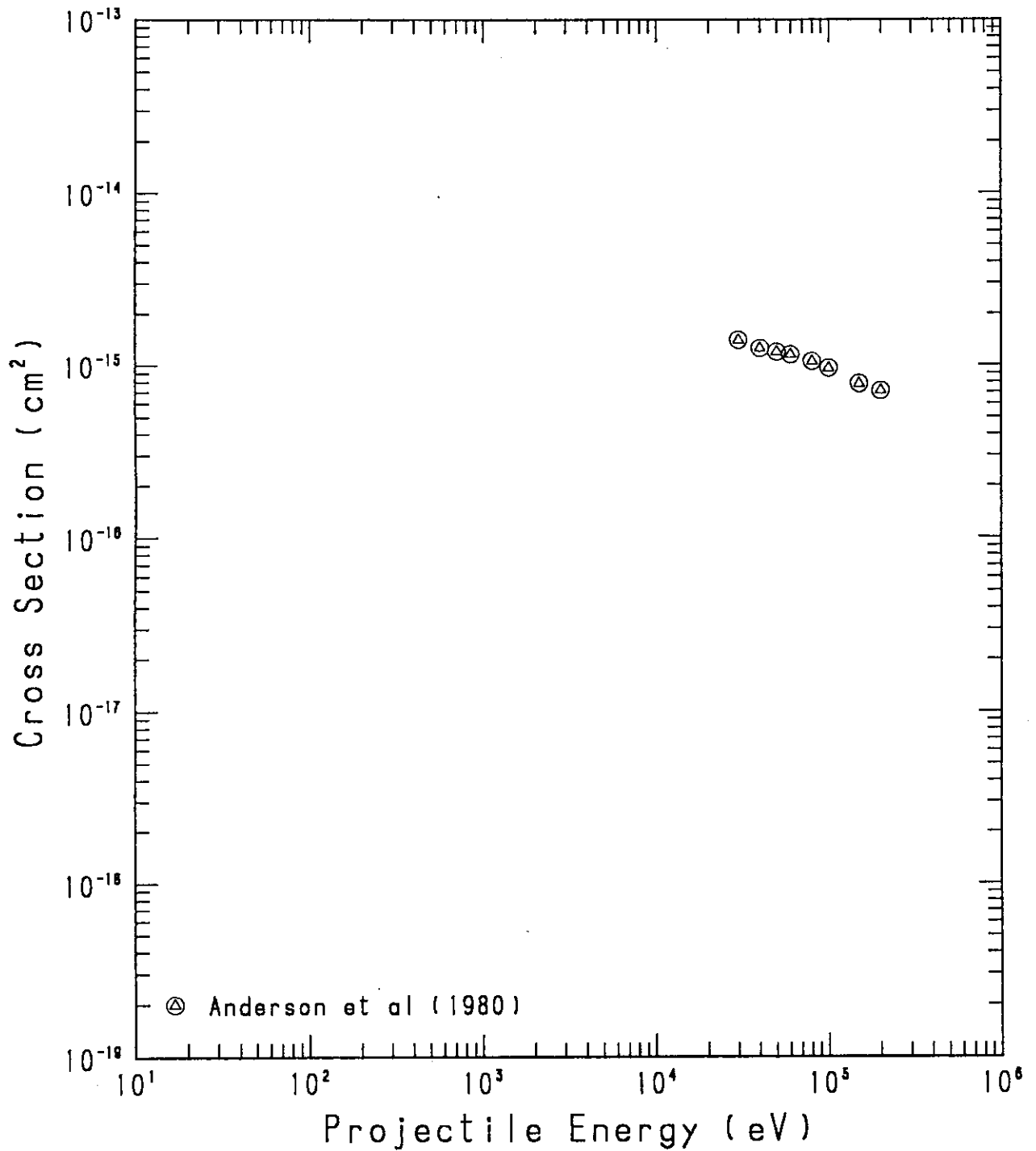


TABLE 39

PROCESS : H- + LI = H (-10)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	1.40E-15
4.00E+04	2.78E+00	1.25E-15
5.00E+04	3.11E+00	1.19E-15
6.00E+04	3.40E+00	1.15E-15
8.00E+04	3.93E+00	1.05E-15
1.00E+05	4.39E+00	9.60E-16
1.50E+05	5.38E+00	7.80E-16
2.00E+05	6.21E+00	7.10E-16

Fig.40  $H^- + Na \rightarrow H (\sigma_{-10})$

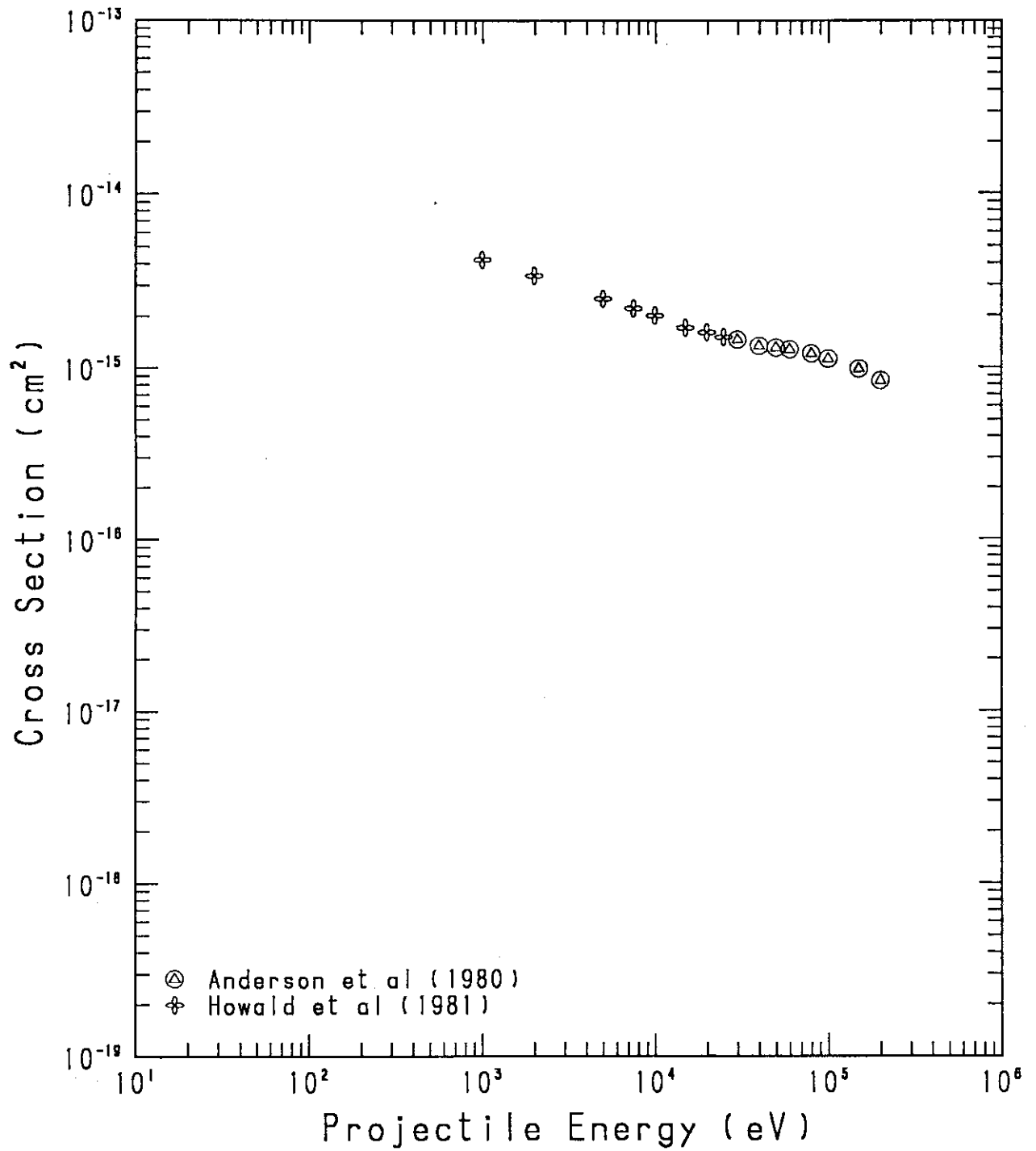




TABLE 40

PROCESS : H- + NA = H (-10)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	1.45E-15
4.00E+04	2.78E+00	1.33E-15
5.00E+04	3.11E+00	1.30E-15
6.00E+04	3.40E+00	1.27E-15
8.00E+04	3.93E+00	1.20E-15
1.00E+05	4.39E+00	1.12E-15
1.50E+05	5.38E+00	9.80E-16
2.00E+05	6.21E+00	8.40E-16

HOWALD ET AL, PHYS. REV. A24 44 (1981)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	4.20E-15
2.00E+03	6.21E-01	3.40E-15
5.00E+03	9.82E-01	2.50E-15
7.50E+03	1.20E+00	2.20E-15
1.00E+04	1.39E+00	2.00E-15
1.50E+04	1.70E+00	1.70E-15
2.00E+04	1.96E+00	1.60E-15
2.50E+04	2.20E+00	1.50E-15

Fig.41  $H^- + Mg \rightarrow H (\sigma_{-10})$

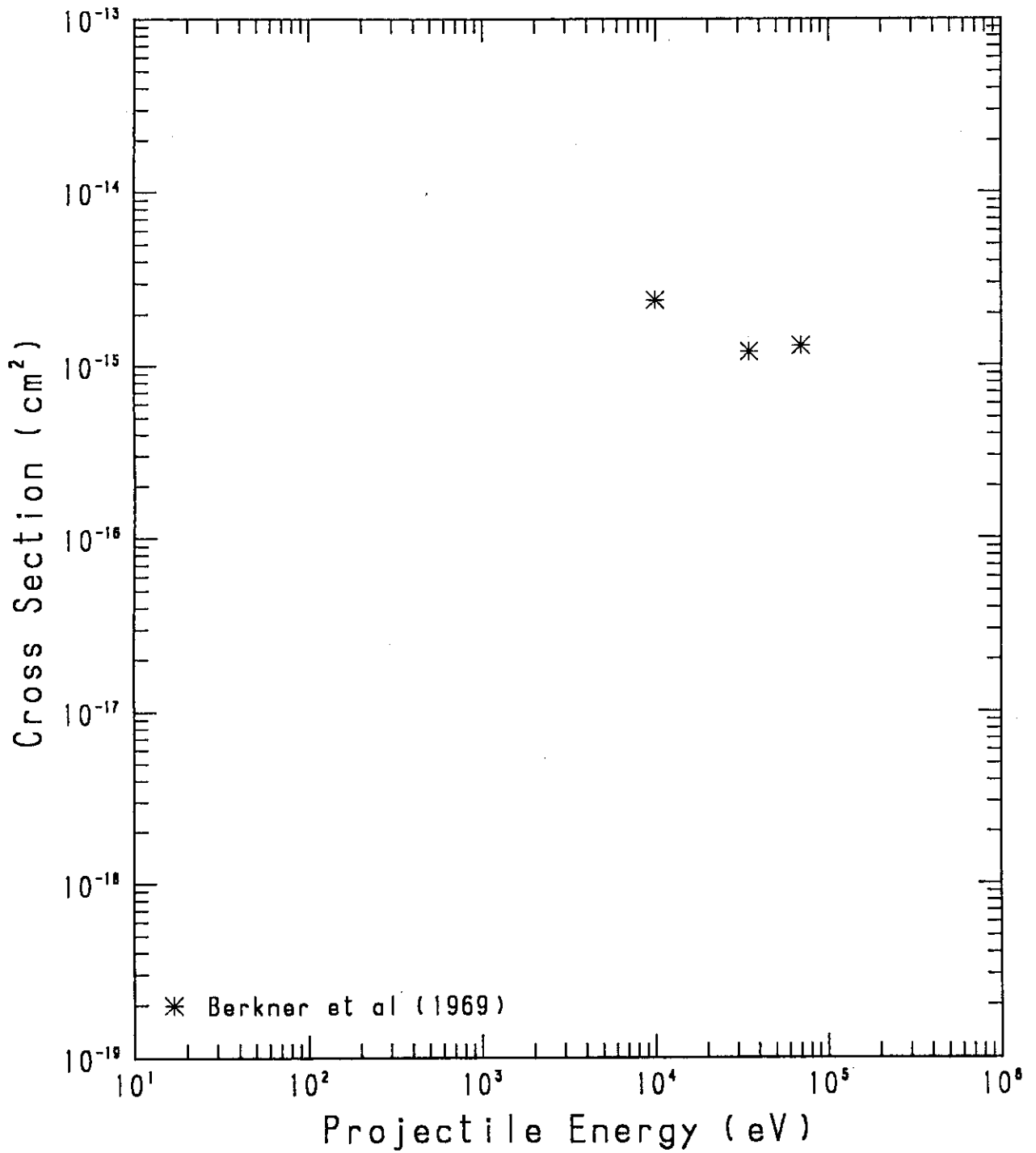


TABLE 41

PROCESS : H- + MG = H (-10)

BERKNER ET AL, PHYS. REV. 178 248 (1969)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+04	1.39E+00	2.40E-15
3.50E+04	2.60E+00	1.20E-15
7.00E+04	3.68E+00	1.30E-15

Fig.42  $H^- + K \rightarrow H (\sigma_{-10})$

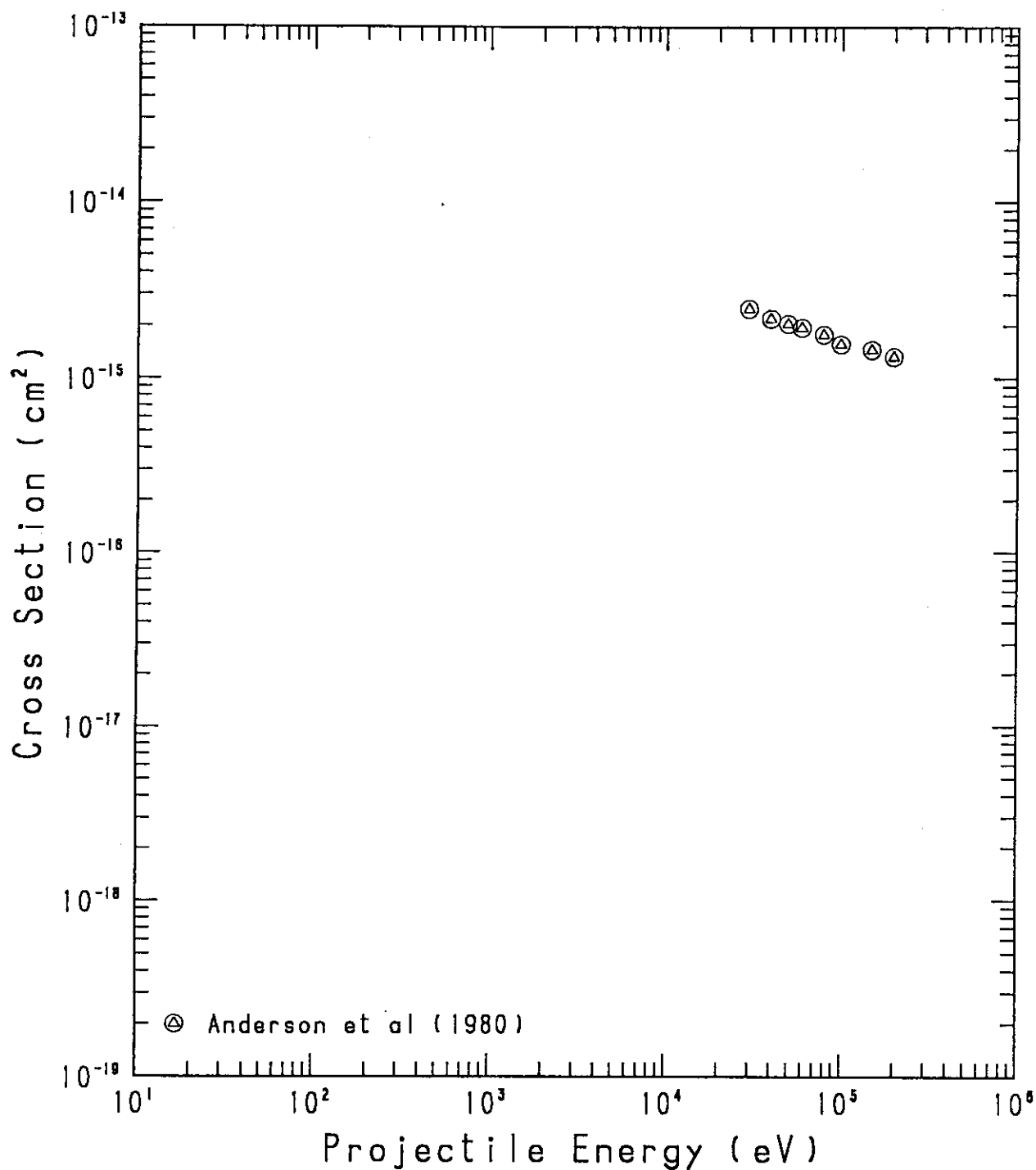


TABLE 42

PROCESS : H- + K = H (-10)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.49E-15
4.00E+04	2.78E+00	2.19E-15
5.00E+04	3.11E+00	2.05E-15
6.00E+04	3.40E+00	1.95E-15
8.00E+04	3.93E+00	1.78E-15
1.00E+05	4.39E+00	1.57E-15
1.50E+05	5.38E+00	1.46E-15
2.00E+05	6.21E+00	1.33E-15

Fig.43  $H^- + Ca \rightarrow H$  ( $\sigma_{-10}$ )

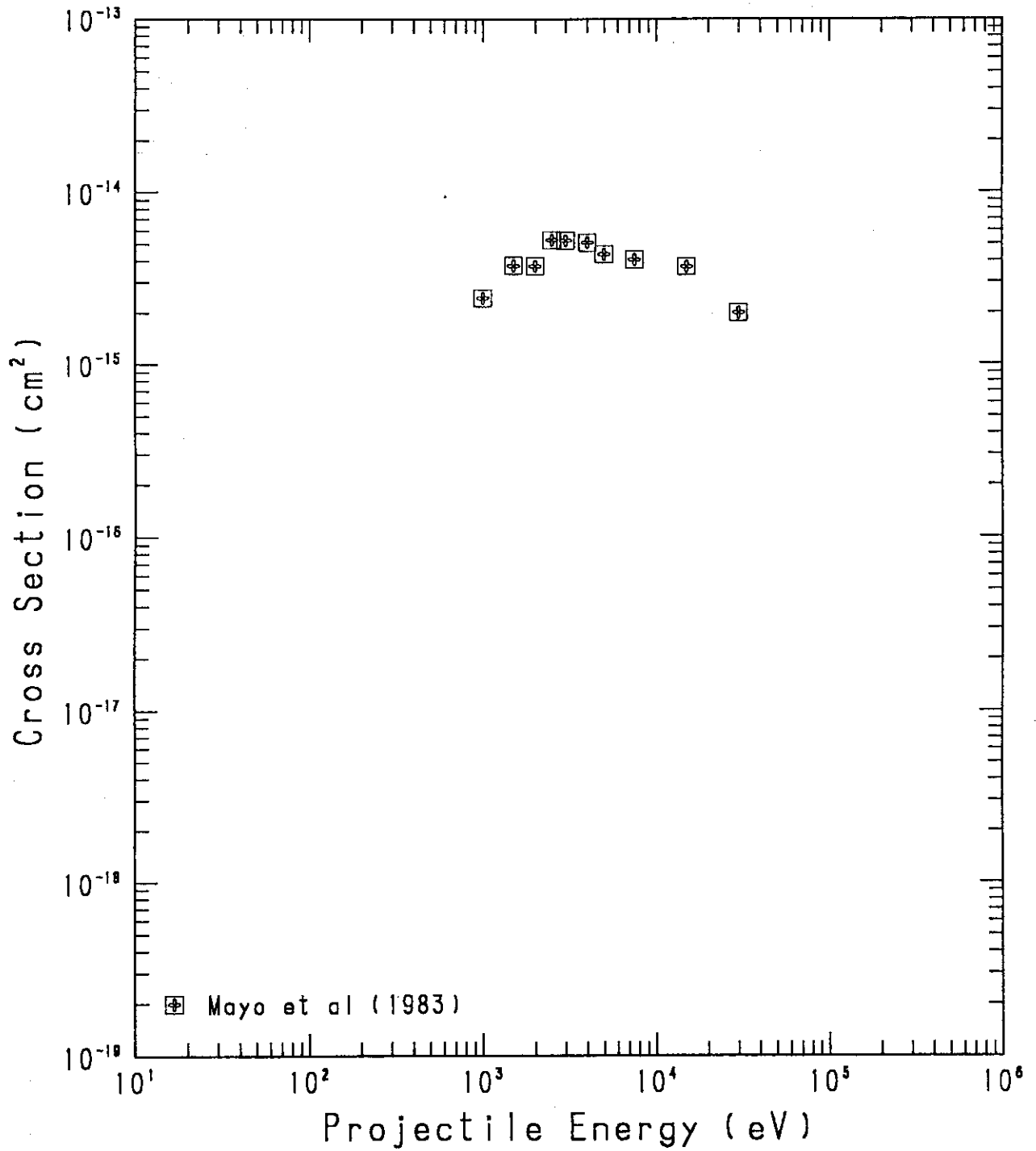


TABLE 43

PROCESS : H- + CA = H (-10)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	2.43E-15
1.50E+03	5.38E-01	3.75E-15
2.00E+03	6.21E-01	3.73E-15
2.50E+03	6.95E-01	5.29E-15
3.00E+03	7.61E-01	5.25E-15
4.00E+03	8.79E-01	5.10E-15
5.00E+03	9.82E-01	4.36E-15
7.50E+03	1.20E+00	4.06E-15
1.50E+04	1.70E+00	3.70E-15
3.00E+04	2.41E+00	2.00E-15

Fig.44  $H^- + Rb \rightarrow H (\sigma_{-10})$

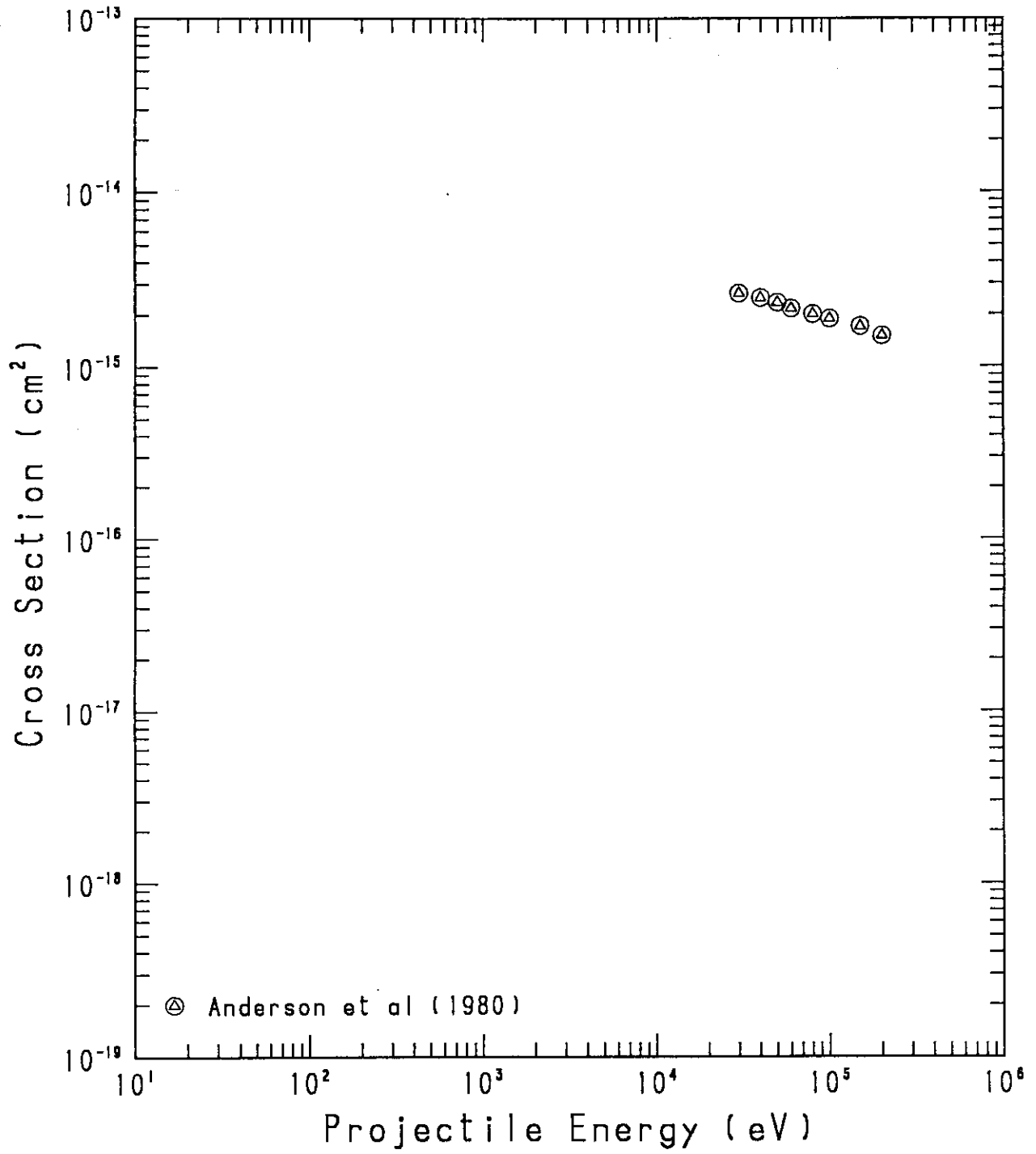




TABLE 44

PROCESS : H- + RB = H (-10)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.63E-15
4.00E+04	2.78E+00	2.48E-15
5.00E+04	3.11E+00	2.33E-15
6.00E+04	3.40E+00	2.15E-15
8.00E+04	3.93E+00	2.00E-15
1.00E+05	4.39E+00	1.88E-15
1.50E+05	5.38E+00	1.70E-15
2.00E+05	6.21E+00	1.50E-15

Fig.45  $H^- + Sr \rightarrow H$  ( $\sigma_{-10}$ )

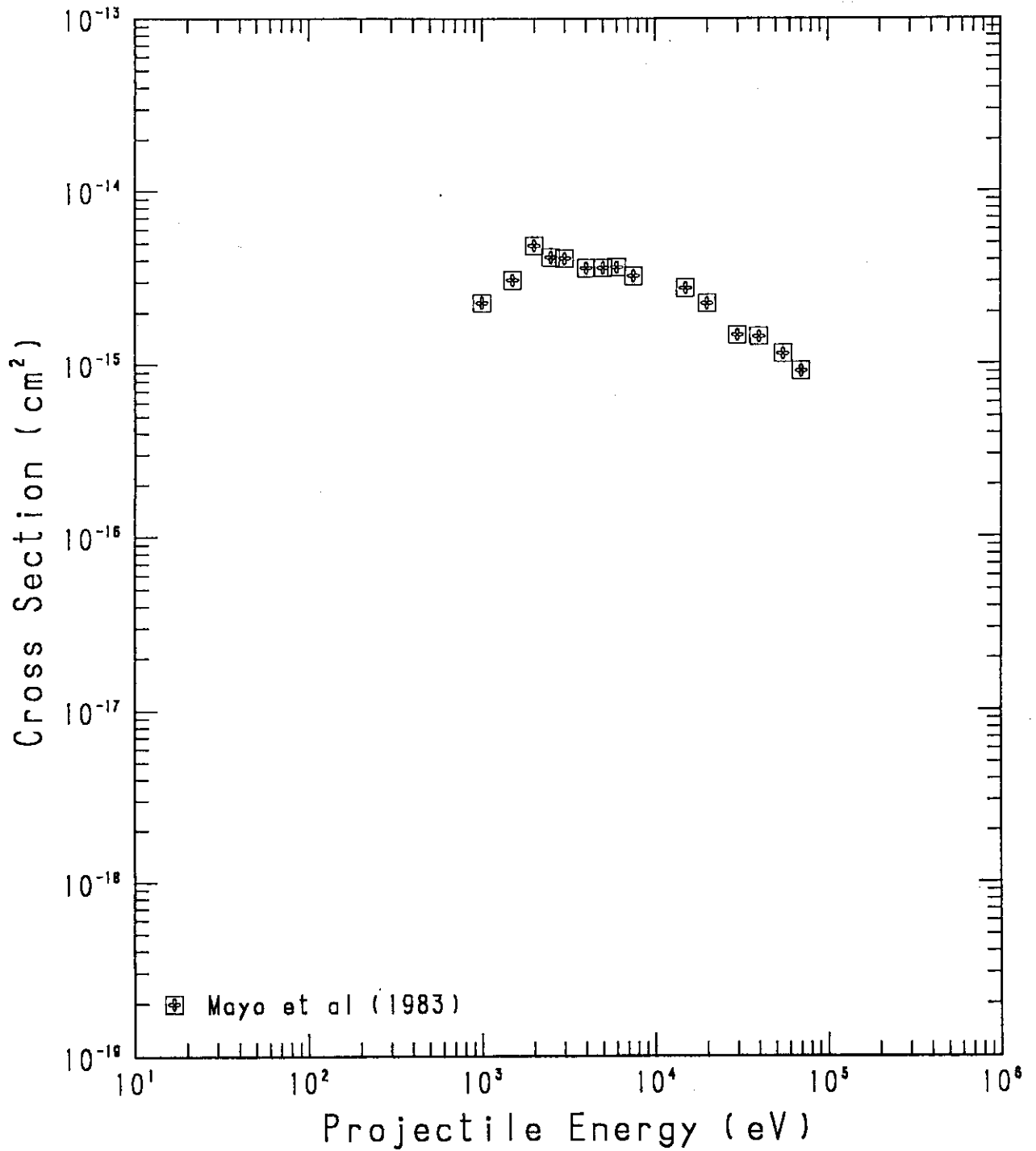


TABLE 45

PROCESS : H- + SR = H (-10)

MAYO ET AL, PHYS. REV. A28 1315 (1983)

DATA FROM FIGURE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.00E+03	4.39E-01	2.27E-15
1.50E+03	5.38E-01	3.07E-15
2.00E+03	6.21E-01	4.86E-15
2.50E+03	6.95E-01	4.16E-15
3.00E+03	7.61E-01	4.10E-15
4.00E+03	8.79E-01	3.60E-15
5.00E+03	9.82E-01	3.61E-15
6.00E+03	1.08E+00	3.64E-15
7.50E+03	1.20E+00	3.25E-15
1.50E+04	1.70E+00	2.77E-15
2.00E+04	1.96E+00	2.26E-15
3.00E+04	2.41E+00	1.48E-15
4.00E+04	2.78E+00	1.45E-15
5.50E+04	3.26E+00	1.15E-15
7.00E+04	3.68E+00	9.12E-16

Fig.46  $H^- + Cs \rightarrow H (\sigma_{-10})$

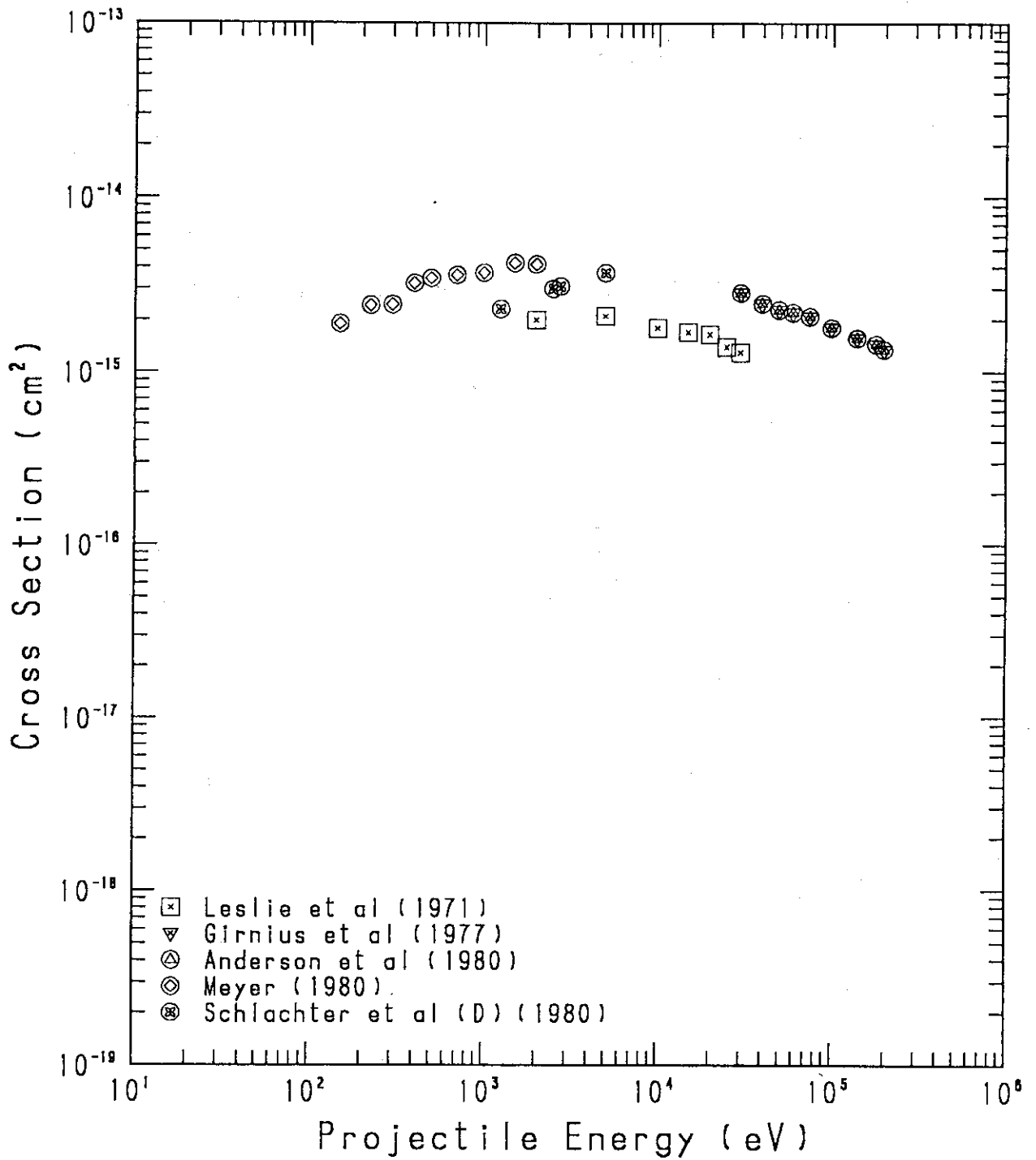


TABLE 46

PROCESS : H- + CS = H (-10)

LESLIE ET AL, PHYS. REV. A4 408 (1971)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	2.00E-15
5.00E+03	9.82E-01	2.10E-15
1.00E+04	1.39E+00	1.80E-15
1.50E+04	1.70E+00	1.70E-15
2.00E+04	1.96E+00	1.65E-15
2.50E+04	2.20E+00	1.40E-15
3.00E+04	2.41E+00	1.30E-15

GIRNIUS ET AL, PHYS. REV. A16 2225 (1977)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.84E-15
4.00E+04	2.78E+00	2.47E-15
5.00E+04	3.11E+00	2.28E-15
6.00E+04	3.40E+00	2.20E-15
7.50E+04	3.80E+00	2.09E-15
1.00E+05	4.39E+00	1.80E-15
1.40E+05	5.20E+00	1.57E-15
1.80E+05	5.89E+00	1.45E-15
2.00E+05	6.21E+00	1.35E-15

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.84E-15
4.00E+04	2.78E+00	2.47E-15
5.00E+04	3.11E+00	2.28E-15
6.00E+04	3.40E+00	2.20E-15
7.50E+04	3.80E+00	2.09E-15
1.00E+05	4.39E+00	1.80E-15
1.40E+05	5.20E+00	1.57E-15
1.80E+05	5.89E+00	1.45E-15
2.00E+05	6.21E+00	1.35E-15

MEYER, J.PHYS. B13 3823 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.50E+02	1.70E-01	1.90E-15
2.25E+02	2.08E-01	2.42E-15
3.00E+02	2.41E-01	2.44E-15
4.00E+02	2.78E-01	3.23E-15

TABLE 46 -CONTINUED

5.00E+02	3.11E-01	3.45E-15
7.00E+02	3.68E-01	3.59E-15
1.00E+03	4.39E-01	3.70E-15
1.50E+03	5.38E-01	4.22E-15
2.00E+03	6.21E-01	4.15E-15

SCHLACHTER ET AL (D), PHYS. REV. A22 2494 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
1.25E+03	4.91E-01	2.30E-15
2.50E+03	6.95E-01	3.00E-15
2.75E+03	7.28E-01	3.10E-15
5.00E+03	9.82E-01	3.70E-15

Fig.47  $H^- + Li \rightarrow H^+ (\sigma_{-11})$

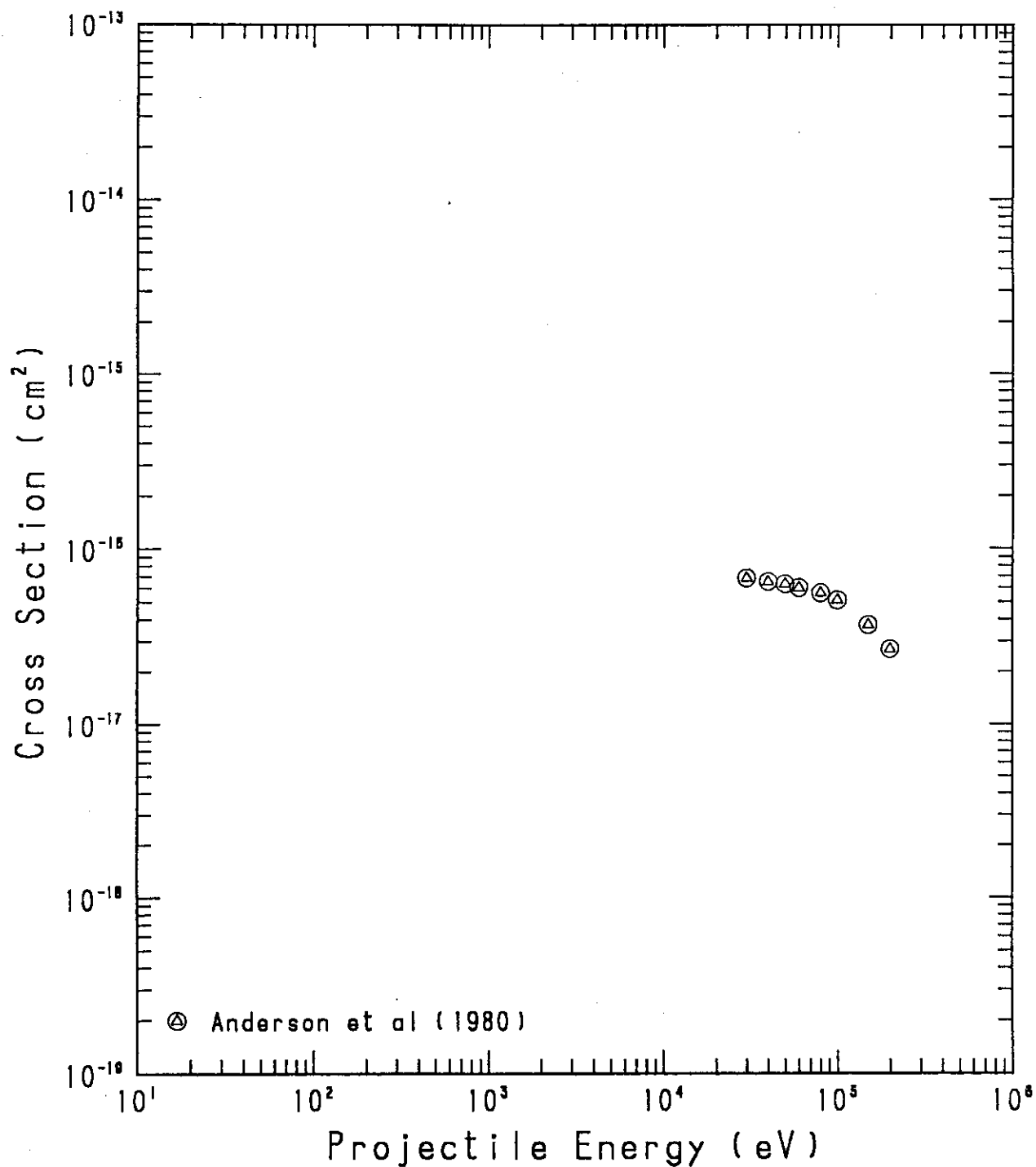


TABLE 47

PROCESS : H- + LI = H+ (-11)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	6.80E-17
4.00E+04	2.78E+00	6.50E-17
5.00E+04	3.11E+00	6.30E-17
6.00E+04	3.40E+00	6.00E-17
8.00E+04	3.93E+00	5.60E-17
1.00E+05	4.39E+00	5.10E-17
1.50E+05	5.38E+00	3.70E-17
2.00E+05	6.21E+00	2.70E-17



Fig.48  $H^- + Na \rightarrow H^+ (\sigma_{-11})$

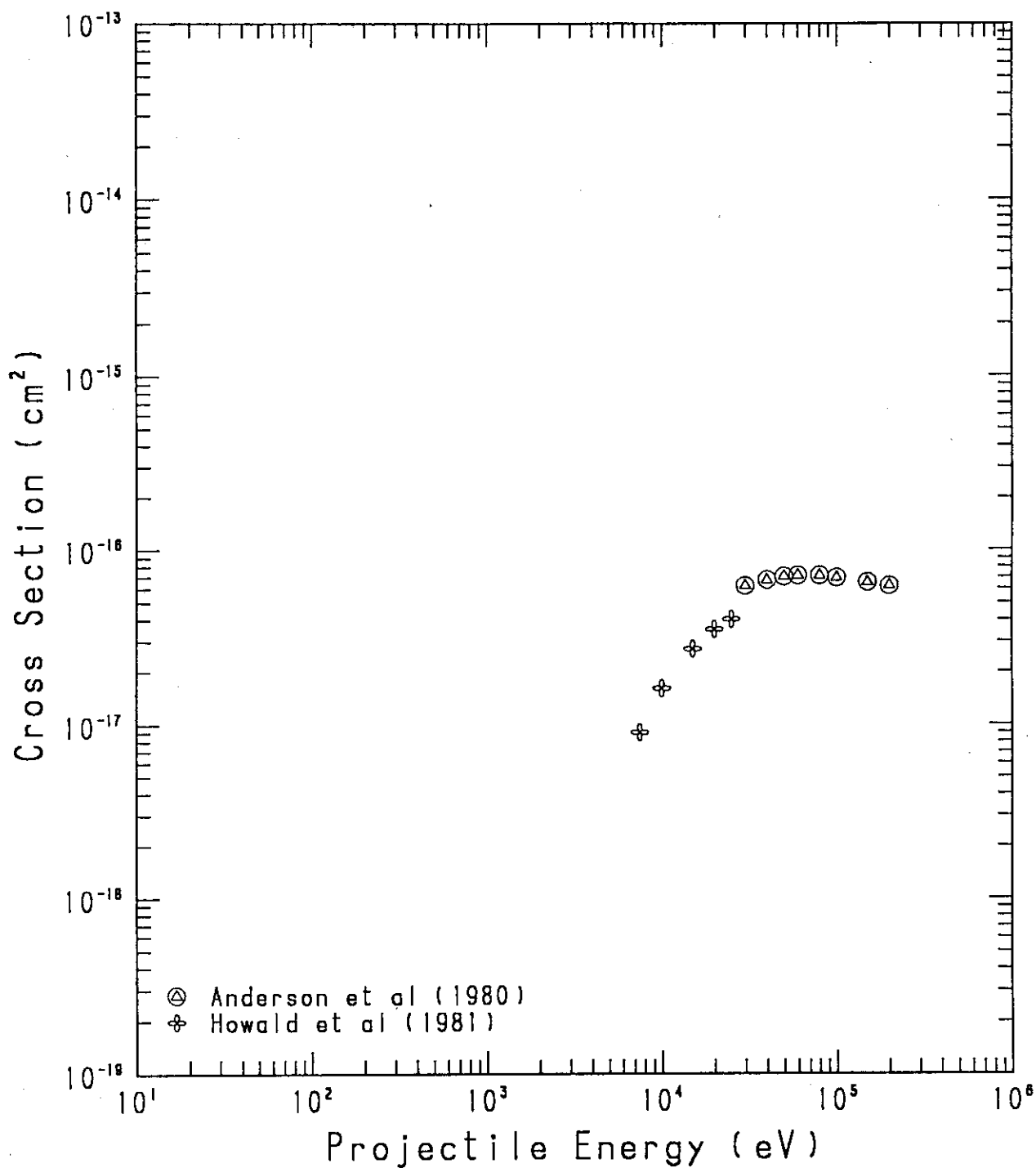


TABLE 48

PROCESS : H- + NA = H+ (-11)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	6.20E-17
4.00E+04	2.78E+00	6.70E-17
5.00E+04	3.11E+00	7.00E-17
6.00E+04	3.40E+00	7.10E-17
8.00E+04	3.93E+00	7.10E-17
1.00E+05	4.39E+00	6.90E-17
1.50E+05	5.38E+00	6.50E-17
2.00E+05	6.21E+00	6.20E-17

HOWALD ET AL, PHYS. REV. A24 44 (1981)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
7.50E+03	1.20E+00	9.00E-18
1.00E+04	1.39E+00	1.60E-17
1.50E+04	1.70E+00	2.70E-17
2.00E+04	1.96E+00	3.50E-17
2.50E+04	2.20E+00	4.00E-17

Fig.49  $H^- + K \rightarrow H^+$  ( $\sigma_{-11}$ )

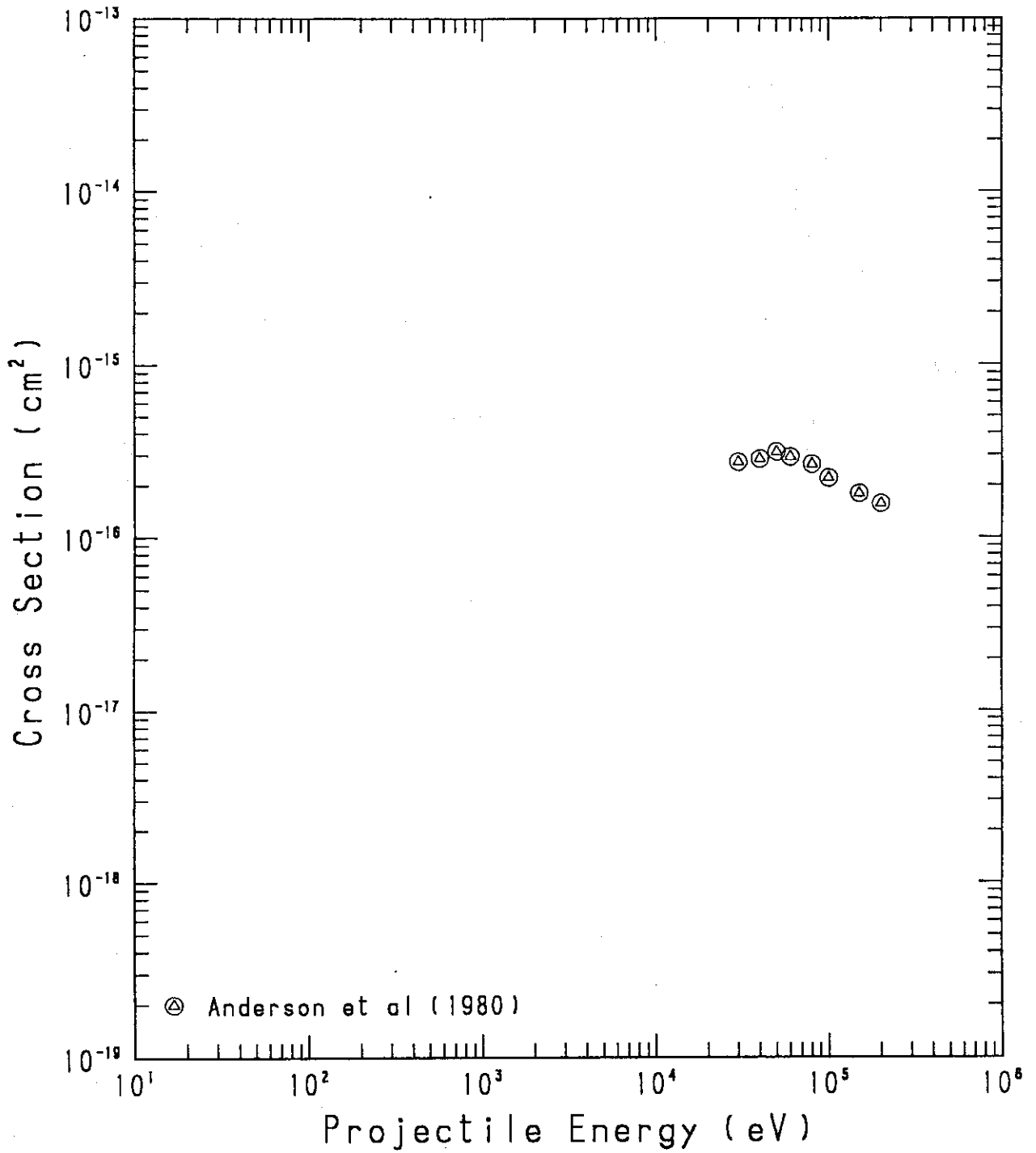


TABLE 49

PROCESS : H- + K = H+ (-11)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.72E-16
4.00E+04	2.78E+00	2.83E-16
5.00E+04	3.11E+00	3.11E-16
6.00E+04	3.40E+00	2.91E-16
8.00E+04	3.93E+00	2.64E-16
1.00E+05	4.39E+00	2.20E-16
1.50E+05	5.38E+00	1.79E-16
2.00E+05	6.21E+00	1.57E-16

Fig.50  $H^- + Rb \rightarrow H^+ (\sigma_{-11})$

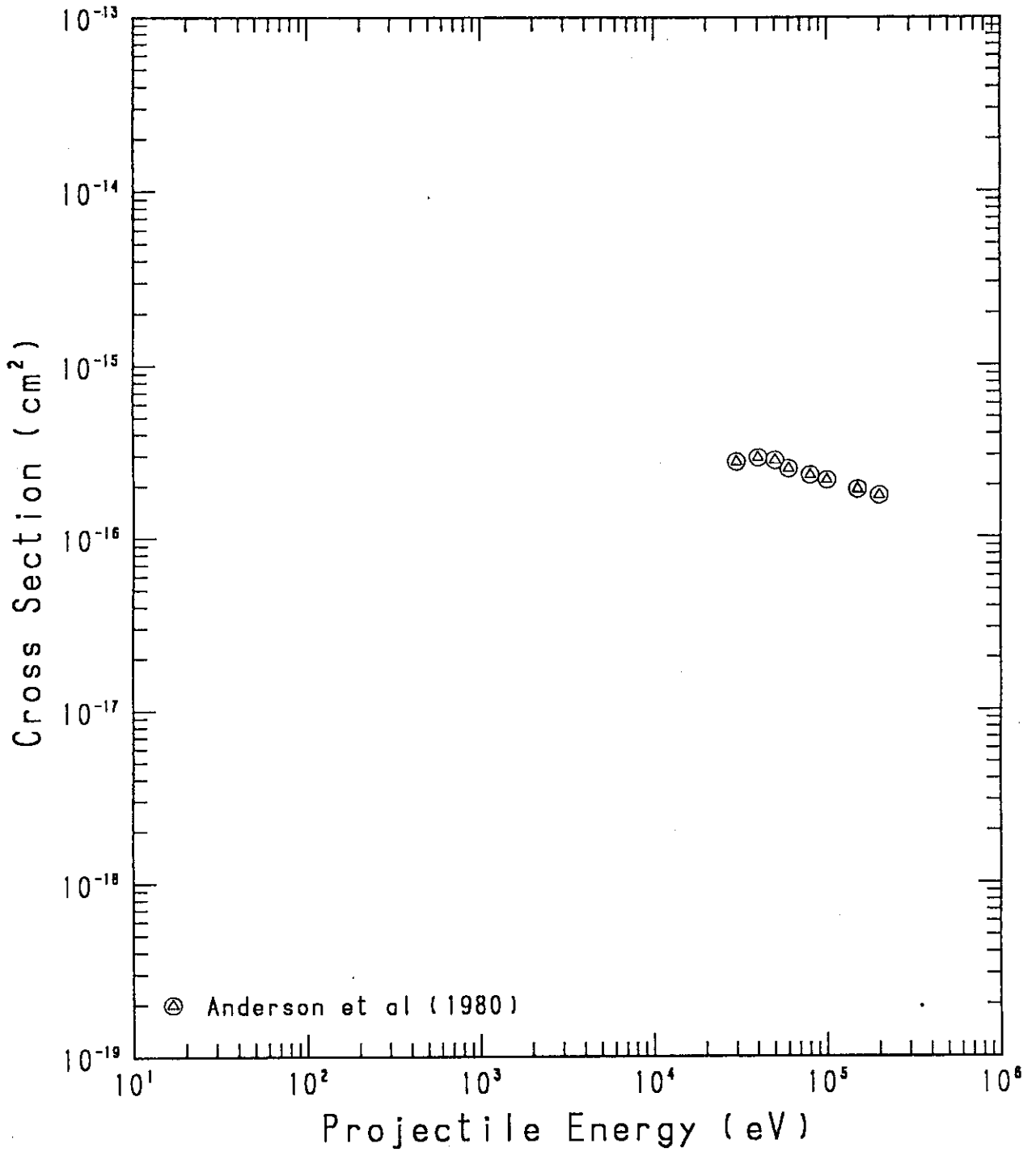


TABLE 50

PROCESS : H- + RB = H+ (-11)

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.75E-16
4.00E+04	2.78E+00	2.90E-16
5.00E+04	3.11E+00	2.80E-16
6.00E+04	3.40E+00	2.50E-16
8.00E+04	3.93E+00	2.30E-16
1.00E+05	4.39E+00	2.15E-16
1.50E+05	5.38E+00	1.90E-16
2.00E+05	6.21E+00	1.75E-16

Fig.51  $H^- + Cs \rightarrow H^+ (\sigma_{-11})$

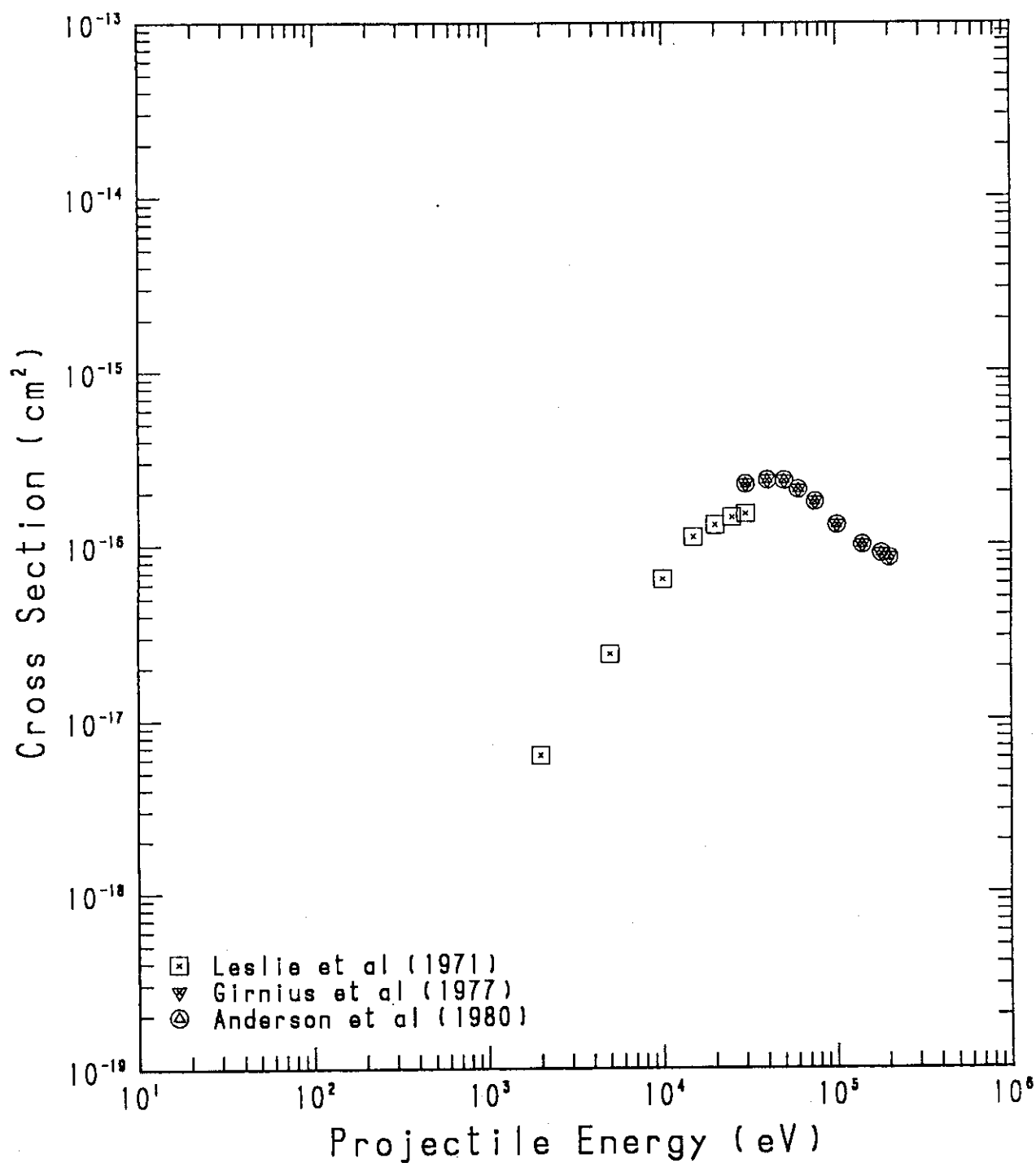


TABLE 51

PROCESS : H- + CS = H+ (-11)

LESLIE ET AL, PHYS. REV. A4 408 (1971)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
2.00E+03	6.21E-01	6.30E-18
5.00E+03	9.82E-01	2.40E-17
1.00E+04	1.39E+00	6.40E-17
1.50E+04	1.70E+00	1.11E-16
2.00E+04	1.96E+00	1.30E-16
2.50E+04	2.20E+00	1.44E-16
3.00E+04	2.41E+00	1.51E-16

GIRNIUS ET AL, PHYS. REV. A16 2225 (1977)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.23E-16
4.00E+04	2.78E+00	2.35E-16
5.00E+04	3.11E+00	2.34E-16
6.00E+04	3.40E+00	2.08E-16
7.50E+04	3.80E+00	1.77E-16
1.00E+05	4.39E+00	1.30E-16
1.40E+05	5.20E+00	1.00E-16
1.80E+05	5.89E+00	8.90E-17
2.00E+05	6.21E+00	8.40E-17

ANDERSON ET AL, PHYS. REV. A22 822 (1980)

DATA FROM TABLE

E(EV)	V(10(8)*CM/SEC)	SIGMA(CM(2))
3.00E+04	2.41E+00	2.23E-16
4.00E+04	2.78E+00	2.35E-16
5.00E+04	3.11E+00	2.34E-16
6.00E+04	3.40E+00	2.08E-16
7.50E+04	3.80E+00	1.77E-16
1.00E+05	4.39E+00	1.30E-16
1.40E+05	5.20E+00	1.00E-16
1.80E+05	5.89E+00	8.90E-17
2.00E+05	6.21E+00	8.40E-17