

Disilane (Si₂H₆)

1. Recommended electron collision cross section

(1) Elastic momentum transfer cross section (Q_m)

Energy(eV)	Cross section(Å ²)	Energy(eV)	Cross section(Å ²)
0.00000	190.70000	1.70000	36.10000
0.01000	132.04000	1.80000	38.10000
0.01500	102.70000	1.90000	40.00000
0.02000	85.90000	2.00000	41.60000
0.03000	66.91000	2.10000	43.30000
0.04000	55.82000	2.20000	44.65000
0.05000	46.80000	2.30000	46.00000
0.06000	38.94000	2.40000	47.05000
0.08000	26.32000	2.50000	48.00000
0.10000	18.08000	2.60000	48.50000
0.12000	13.00000	2.70000	48.85000
0.15000	7.92000	2.80000	49.10000
0.20000	4.24000	3.00000	49.12000
0.22000	3.64000	3.25000	48.80000
0.24000	3.22000	3.50000	48.20000
0.27000	2.80000	4.00000	46.80000
0.30000	2.64000	5.00000	44.00000
0.35000	2.70000	6.00000	41.20000
0.40000	2.91000	7.00000	38.70000
0.50000	3.68000	8.00000	36.50000
0.60000	4.93000	10.00000	33.20000
0.70000	6.80000	12.00000	30.50000
0.80000	9.45000	15.00000	27.36000
0.90000	13.10000	20.00000	24.16000
1.00000	16.80000	30.00000	19.68000
1.20000	23.30000	40.00000	17.13000
1.40000	28.60000	60.00000	13.93000
1.50000	31.20000	80.00000	11.90000
1.60000	33.70000	100.00000	10.56000

(2) Vibrational excitation cross section (Q_{v1}) Threshold = 0.0536eV, Energy loss =0.0536eV

Energy(eV)	Cross section(Å ²)	Energy(eV)	Cross section(Å ²)
0.05360	0.00000	0.20000	1.40000
0.05400	0.10000	0.25000	1.20000
0.05500	0.50000	0.30000	1.04000
0.05600	1.00000	0.40000	0.90000
0.05800	2.20000	0.50000	0.84000
0.06000	3.00000	0.60000	0.84000
0.06400	3.50000	0.70000	0.90000
0.06800	3.60000	0.80000	1.10000
0.07200	3.60000	0.90000	1.60000
0.08000	3.30000	1.00000	2.30000
0.09000	2.90000	1.10000	3.10000
0.10000	2.60000	1.20000	3.80000
0.12000	2.20000	1.30000	4.00000
0.14000	1.90000	1.40000	3.80000
0.17000	1.60000	1.50000	3.50000

1.60000	3.10000	4.00000	0.57000
1.70000	2.80000	5.00000	0.37000
1.80000	2.50000	7.00000	0.18000
2.00000	2.10000	9.00000	0.10000
2.30000	1.60000	10.00000	0.00000
2.70000	1.20000	100.00000	0.00000
3.00000	1.00000		

(3) Vibrational excitation cross section (Q_{v2}) Threshold = 0.07eV, Energy loss =0.07eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
0.07000	0.00000	0.90000	3.70000
0.07100	0.10000	1.00000	5.00000
0.07200	1.00000	1.10000	6.40000
0.07400	3.00000	1.15000	6.80000
0.07600	5.00000	1.20000	7.00000
0.08000	5.80000	1.30000	6.80000
0.09000	6.00000	1.40000	6.30000
0.10000	6.00000	1.60000	5.10000
0.13000	5.80000	2.00000	3.60000
0.15000	5.60000	2.50000	2.40000
0.20000	5.10000	3.00000	1.70000
0.30000	4.20000	4.00000	1.00000
0.40000	3.50000	6.00000	0.47000
0.50000	3.00000	8.00000	0.26000
0.60000	2.75000	12.00000	0.10000
0.70000	2.65000	15.00000	0.00000
0.80000	2.80000	100.00000	0.00000

(4) Vibrational excitation cross section (Q_{v3}) Threshold = 0.11eV, Energy loss =0.11eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
0.11000	0.00000	0.80000	5.00000
0.11200	0.10000	0.90000	7.60000
0.11400	0.70000	1.00000	10.70000
0.11500	2.50000	1.05000	12.00000
0.11700	5.00000	1.10000	13.50000
0.12000	8.00000	1.15000	15.00000
0.13000	10.00000	1.25000	16.00000
0.13500	10.50000	1.30000	16.00000
0.14000	10.70000	1.40000	15.20000
0.15000	11.00000	1.60000	13.40000
0.16000	11.00000	1.80000	11.70000
0.17500	10.70000	2.00000	10.30000
0.19000	10.00000	2.30000	8.70000
0.22000	8.60000	2.70000	7.30000
0.24000	7.80000	3.00000	6.20000
0.30000	5.80000	3.50000	4.90000
0.40000	3.90000	4.00000	4.00000
0.45000	3.40000	5.00000	2.80000
0.50000	3.10000	6.00000	2.10000
0.55000	3.00000	7.40000	1.50000
0.60000	3.00000	9.00000	1.10000
0.65000	3.10000	11.00000	0.83000
0.70000	3.40000	14.00000	0.60000
0.75000	4.00000	18.00000	0.43800

24.00000	0.30000	50.00000	0.00000
32.00000	0.19000	100.00000	0.00000
46.00000	0.10000		

(5) Vibrational excitation cross section (Q_{v4}) Threshold = 0.273eV, Energy loss =0.273eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
0.27300	0.00000	1.40000	7.60000
0.27500	0.10000	1.60000	6.80000
0.28000	0.40000	1.80000	5.90000
0.30000	1.00000	2.00000	5.20000
0.32000	1.70000	2.20000	4.60000
0.35000	2.50000	2.50000	3.80000
0.37000	2.80000	2.80000	3.20000
0.40000	3.00000	3.00000	2.85000
0.45000	3.00000	3.50000	2.25000
0.50000	2.80000	4.00000	1.80000
0.55000	2.50000	5.00000	1.20000
0.60000	2.35000	6.20000	0.80000
0.70000	2.35000	7.00000	0.65000
0.80000	3.30000	8.20000	0.50000
0.90000	4.70000	10.00000	0.33500
1.00000	6.20000	12.00000	0.24000
1.10000	7.40000	14.00000	0.18000
1.15000	7.80000	19.00000	0.10000
1.20000	8.00000	25.00000	0.00000
1.30000	8.00000	100.00000	0.00000

(6) Inelastic cross section (Q_{in1}) Threshold = 0.8eV, Energy loss =0.8eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
0.80000	0.00000	1.20000	1.70000
0.82000	0.10000	1.40000	1.30000
0.84000	0.48000	1.70000	0.80000
0.86000	1.40000	2.00000	0.52000
0.88000	1.60000	2.30000	0.30000
0.90000	1.80000	2.90000	0.10000
0.94000	2.00000	4.00000	0.00000
1.00000	2.00000	100.00000	0.00000
1.10000	1.90000		

(7) Inelastic cross section (Q_{in2}) Threshold = 1.3eV, Energy loss =1.3eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
1.30000	0.00000	1.80000	1.70000
1.32000	0.10000	2.10000	1.50000
1.35000	0.40000	2.50000	1.10000
1.40000	1.20000	3.30000	0.55000
1.45000	1.70000	6.00000	0.10000
1.50000	1.80000	7.00000	0.00000
1.70000	1.80000	100.00000	0.00000

(8) Excitation cross section (Q_{exc}) Threshold = 6.3eV, Energy loss =6.3eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
6.30000	0.00000	7.30000	3.00000
6.90000	0.10000	7.50000	4.00000
7.00000	1.00000	8.00000	5.10000

8.50000	5.65000	18.00000	3.30000
9.00000	5.80000	20.00000	2.90000
9.50000	5.85000	25.00000	2.10000
10.00000	5.80000	30.00000	1.60000
11.00000	5.55000	40.00000	1.00000
12.00000	5.30000	60.00000	0.50000
14.00000	4.50000	80.00000	0.35000
16.00000	3.80000	100.00000	0.28000

(9) Electron attachment cross section ($Q_a(x100)$) Threshold = 7.0eV, Energy loss =7.0eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
7.00000	0.00000	9.00000	4.00000
7.50000	5.00000	10.00000	0.10000
8.60000	10.00000		

(10) Neutral dissociation cross section (Q_{nd}) Threshold = 12.5eV, Energy loss =12.5eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
12.50000	0.00000	23.00000	9.10000
12.55000	0.12000	24.00000	9.20000
12.60000	3.12000	25.00000	9.70000
13.00000	4.32000	27.00000	10.90000
14.00000	5.04000	30.00000	11.72000
15.00000	5.89800	35.00000	13.14000
16.00000	6.00000	40.00000	14.03000
17.00000	6.24000	45.00000	14.75000
18.00000	6.66000	50.00000	15.44000
19.00000	6.84000	70.00000	16.53000
20.00000	7.20000	80.00000	16.28000
21.00000	8.19000	100.00000	15.22000
22.00000	8.80000		

(11) Ionization cross section (Q_i) Threshold = 10.6eV, Energy loss =10.6eV

Energy(eV)	Cross section(\AA^2)	Energy(eV)	Cross section(\AA^2)
10.60000	0.00000	35.00000	9.45000
11.00000	0.22000	40.00000	10.10000
12.00000	0.78000	45.00000	10.60000
13.00000	1.60000	50.00000	10.80000
14.00000	2.36000	60.00000	10.70000
16.00000	3.69000	70.00000	10.30000
18.00000	4.80000	80.00000	9.95000
20.00000	5.70000	90.00000	9.60000
25.00000	7.43000	100.00000	9.35000
30.00000	8.60000		

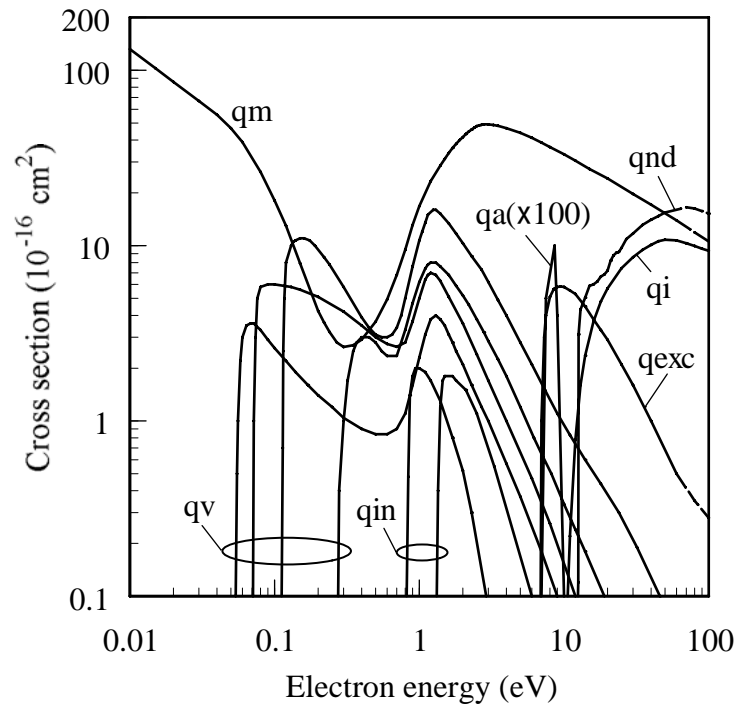


Fig.1 Recommended electron collision cross sections for Si₂H₆

2.Related electron swarm date

(1) Electron drift velocity, W, in Si₂H₆-Ar mixtures

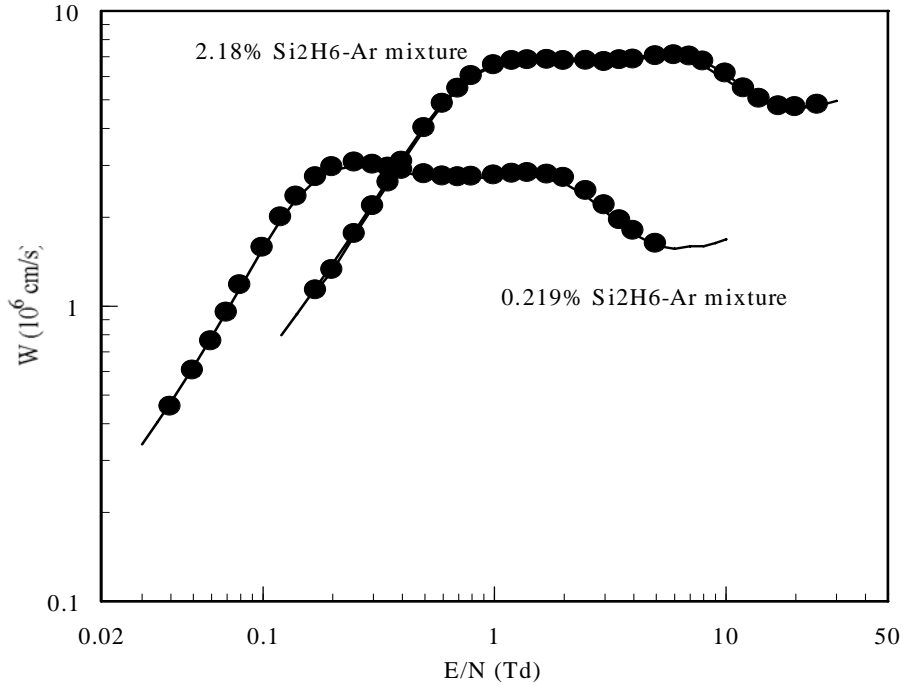
0.219% Si₂H₆-Ar mixture

E/N (Td)	W (10 ⁶ cm/s)	E/N (Td)	W (10 ⁶ cm/s)
0.04	0.4554	0.5	2.796
0.05	0.604	0.6	2.745
0.06	0.7588	0.7	2.729
0.07	0.9486	0.8	2.74
0.08	1.175	1.0	2.768
0.1	1.575	1.2	2.805
0.12	1.997	1.4	2.822
0.14	2.346	1.7	2.786
0.17	2.73	2.0	2.715
0.2	2.953	2.5	2.453
0.25	3.061	3.0	2.193
0.3	3.012	3.5	1.951
0.35	2.945	4.0	1.797
0.4	2.891	5.0	1.624

2.18% Si₂H₆-Ar mixture

E/N (Td)	W (10 ⁶ cm/s)	E/N (Td)	W (10 ⁶ cm/s)
0.17	1.129	0.6	4.841
0.2	1.323	0.7	5.449
0.25	1.752	0.8	6.006
0.3	2.178	1.0	6.542
0.35	2.618	1.2	6.761
0.4	3.083	1.4	6.802
0.5	4.002	1.7	6.819

2.0	6.761	8.0	6.735
2.5	6.771	10.0	6.131
3.0	6.706	12.0	5.457
3.5	6.798	14.0	5.034
4.0	6.840	17.0	4.748
5.0	7.020	20.0	4.715
6.0	7.073	25.0	4.804
7.0	7.001		



**Fig.2 Electron drift velocity in Si₂H₆-Ar mixtures;
measured(•), calculated(—)**

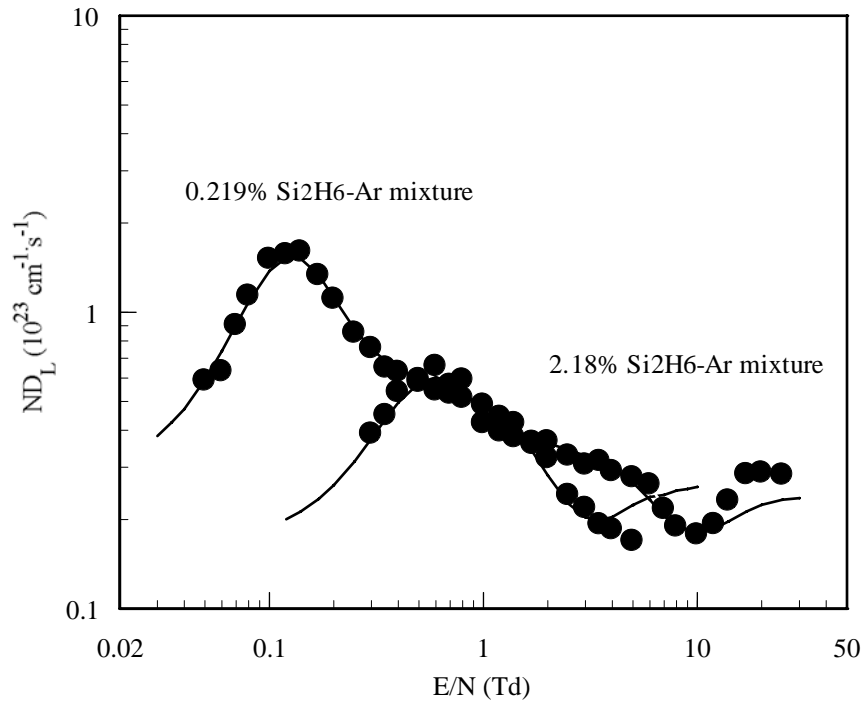
(2) Product of longitudinal diffusion coefficient and gas number density, ND_L in Si₂H₆-Ar mixtures

0.219% Si₂H₆-Ar mixture

E/N (Td)	ND _L (10 ²² cm ⁻¹ s ⁻¹)	E/N (Td)	ND _L (10 ²² cm ⁻¹ s ⁻¹)
0.05	0.5868	0.6	0.5431
0.06	0.6308	0.7	0.5298
0.07	0.9028	0.8	0.5129
0.08	1.135	1.0	0.4861
0.1	1.51	1.2	0.4428
0.12	1.564	1.4	0.4218
0.14	1.598	1.7	0.3588
0.17	1.332	2.0	0.3214
0.2	1.108	2.5	0.2413
0.25	0.8512	3.0	0.2182
0.3	0.7551	3.5	0.1922
0.35	0.6492	4.0	0.1849
0.4	0.6283	5.0	0.169
0.5	0.5808		

2.18% Si₂H₆-Ar mixture

E/N (Td)	ND _L (10 ²² cm ⁻¹ s ⁻¹)	E/N (Td)	ND _L (10 ²² cm ⁻¹ s ⁻¹)
0.3	0.3886	3.0	0.3055
0.35	0.4483	3.5	0.3144
0.4	0.5372	4.0	0.2905
0.5	0.5936	5.0	0.2769
0.6	0.6575	6.0	0.2621
0.7	0.5680	7.0	0.2166
0.8	0.5916	8.0	0.1888
1.0	0.4216	10.0	0.1777
1.2	0.3954	12.0	0.1924
1.4	0.3779	14.0	0.2310
1.7	0.3646	17.0	0.2835
2.0	0.3660	20.0	0.2870
2.5	0.3275	25.0	0.2827



**Fig.3 ND_L in Si₂H₆-Ar mixtures;
measured(●), calculated(—)**

(3) Ionization coefficient, α/N, in pure Si₂H₆

E/N (Td)	α/N (10 ⁻¹⁷ cm ²)	E/N (Td)	α/N (10 ⁻¹⁷ cm ²)
276	0.108	436	0.787
306	0.13	470	1.1
308	0.149	498	1.33
340	0.258	521	1.61
368	0.402	526	1.69
405	0.563	558	2.13

589	2.55	708	4.08
623	2.94	750	4.53
651	3.25	778	5.01
679	3.59		

(4) Attachment coefficient, η/N , in pure Si_2H_6

E/N (Td)	$\eta/N (10^{-17} \text{ cm}^2)$	E/N (Td)	$\eta/N (10^{-17} \text{ cm}^2)$
277	0.246	498	0.308
314	0.289	532	0.247
314	0.171	535	0.439
340	0.283	560	0.484
368	0.317	594	0.422
405	0.297	623	0.427
436	0.32	651	0.258
473	0.388		

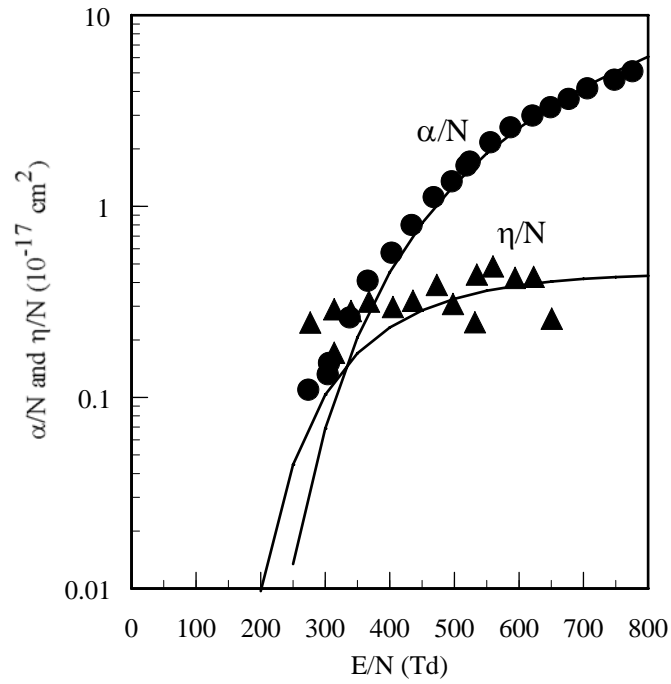


Fig.4 α/N and η/N in pure Si_2H_6 ;

measured(●,▲), calculated(—)