

Neon (Ne)

1. Recommended electron collision cross sections^[1]

The following cross section set was compiled so that it can reproduce the drift velocity, the ND_L and the Townsend's ionization coefficient measured in Ne gas by the two-term Boltzmann code.

(1) Elastic momentum transfer cross section

Energy(eV)	Cross section(A_2)	Energy(eV)	Cross section(A_2)
0	0.1610 ^[1]	1	1.6190
0.003	0.2410	1.2	1.6850
0.01	0.3140	1.5	1.7530
0.02	0.3860	1.8	1.7930
0.03	0.4420	2	1.8150
0.04	0.5040 ^[2]	2.5	1.8600
0.05	0.5360	3	1.9060
0.06	0.5660	4	1.9840
0.07	0.6010	5	2.0700
0.08	0.6360	6	2.1440
0.09	0.6690	7	2.2130
0.1	0.7010	7.5	2.2825 ^[3]
0.12	0.7540	10	2.4455
0.15	0.8280	12.5	2.6040
0.18	0.8930	15	2.7440
0.2	0.9300	17.5	2.8605
0.25	1.0180	20	2.9509
0.3	1.0910	30	3.0898
0.4	1.2250	40	2.9882
0.5	1.3210	50	2.7790
0.6	1.4020	60	2.6827
0.7	1.4720	70	2.5119
0.8	1.5280	80	2.3195
0.9	1.5800	100	2.1309

(2) Electronic excitation cross section 1 (3P_2), Threshold = 16.2 eV, Energy loss = 16.2 eV

Energy (eV)	Cross section(A_2)	Energy (eV)	Cross section(A_2)
16.2000	0.0000 ^[4]	18.7000	0.0071
16.8000	0.0022	18.8000	0.0045
16.9000	0.0056	19.0000	0.0050
17.0000	0.0036	20.0000	0.0065
17.2000	0.0025	25.0000	0.0103
17.4000	0.0025	30.0000	0.0101
17.6000	0.0029	35.0000	0.0076
17.8000	0.0033	40.0000	0.0058
18.0000	0.0038	50.0000	0.0043
18.2000	0.0043	60.0000	0.0034
18.4000	0.0046	70.0000	0.0026
18.5000	0.0043	80.0000	0.0020
18.5700	0.0096	100.000	0.0012
18.6000	0.0057	200.000	0.0000
18.6700	0.0107		

(3) Electronic excitation cross section 2 (3P_1), Threshold = 16.67 eV, Energy loss = 16.67 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
16.6700	0.0000 ^[4]	18.8000	0.0030
16.8000	0.0008	19.0000	0.0033
16.8500	0.0011	20.0000	0.0048
16.9500	0.0028	25.0000	0.0084
17.0000	0.0026	30.0000	0.0116
17.2000	0.0019	40.0000	0.0119
17.4000	0.0018	60.0000	0.0099
17.6000	0.0018	80.0000	0.0087
17.8000	0.0020	100.000	0.0078
18.0000	0.0022	120.000	0.0072
18.2000	0.0024	140.000	0.0066
18.4000	0.0026	160.000	0.0061
18.6000	0.0029	200.000	0.0053
18.7000	0.0040		

(4) Electronic excitation cross section 3 (³P₀), Threshold = 16.72 eV, Energy loss = 16.72 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
16.7200	0.0000 ^[4]	18.7000	0.0016
16.8000	0.0005	18.8000	0.0010
16.9000	0.0013	19.0000	0.0012
17.0000	0.0008	20.0000	0.0015
17.2000	0.0006	25.0000	0.0024
17.4000	0.0006	30.0000	0.0023
17.6000	0.0007	35.0000	0.0019
17.8000	0.0008	40.0000	0.0016
18.0000	0.0009	50.0000	0.0012
18.2000	0.0010	60.0000	0.0010
18.4000	0.0011	70.0000	0.0008
18.5000	0.0010	80.0000	0.0007
18.5700	0.0022	100.000	0.0004
18.6000	0.0013	200.000	0.0000
18.6700	0.0025		

(5) Electronic excitation cross section 4 (¹P₁), Threshold = 16.85 eV, Energy loss = 16.85 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
16.8500	0.0000 ^[4]	20.0000	0.0195
16.9500	0.0119	25.0000	0.0480
17.0000	0.0110	30.0000	0.0715
17.2000	0.0080	35.0000	0.0840
17.4000	0.0076	40.0000	0.0940
17.6000	0.0078	60.0000	0.1130
17.8000	0.0085	80.0000	0.1000
18.0000	0.0094	100.000	0.1000
18.2000	0.0103	120.000	0.0910
18.4000	0.0110	140.000	0.0850
18.6000	0.0124	160.000	0.0790
18.7000	0.0170	180.000	0.0730
18.8000	0.0129	200.000	0.0670
19.0000	0.0140		

(6) Electronic excitation cross section 5 (Σ 2p, sum of 2p levels),

Threshold = 18.38 eV, Energy loss = 18.38 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
18.3800	0.0000 ^[4]	40.0000	0.0538
19.0000	0.0064	50.0000	0.0487
20.0000	0.0156	60.0000	0.0426
21.0000	0.0235	80.0000	0.0260
22.0000	0.0300	100.0000	0.0150
24.0000	0.0395	120.0000	0.0100
28.0000	0.0503	140.0000	0.0060
30.0000	0.0525	160.0000	0.0030
32.0000	0.0537	180.0000	0.0010
36.0000	0.0545	200.0000	0.0005

(7) Electronic excitation cross section 6 (HL, sum of higher levels),

Threshold = 20.00 eV, Energy loss = 20.00 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
20.0000	0.0000 ^[4]	60.0000	0.0290
22.0000	0.0070	70.0000	0.0285
25.0000	0.0166	80.0000	0.0283
30.0000	0.0282	100.0000	0.0275
35.0000	0.0310	150.0000	0.0265
40.0000	0.0316	200.0000	0.0260
50.0000	0.0308		

(8) Ionization cross section, Threshold = 21.56 eV, Energy loss = 21.56 eV

Energy (eV)	Cross section(A ₂)	Energy (eV)	Cross section(A ₂)
21.56	0.0000 ^[5]	31.5	0.1213
22.	0.0033	32	0.1284
22.5	0.0089	33	0.1416
23.	0.0146	34	0.1539
23.5	0.0202	36	0.1794
24.	0.0260	38	0.2840
24.5	0.0321	40	0.2277
25.	0.0380	45	0.2823
25.5	0.0438	50	0.3376
26.	0.0498	55	0.3913
26.5	0.0566	60	0.4352
27.	0.0631	65	0.4766
27.5	0.0696	70	0.5135
28.	0.0761	75	0.5469
28.5	0.0825	80	0.5768
29.	0.0888	85	0.6041
29.5	0.0958	90	0.6278
30.	0.1020	95	0.6489
30.5	0.1082	100	0.6665
31.	0.1152		

[1] T. F. O'Malley and R. W. Crompton, *J. Phys.B*, **13** (1980) 3451 - 3464

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[4] K. Tachibana and A. V. Phelps, *Phys. Rev. A*, **15** (1987) 999 - 1007

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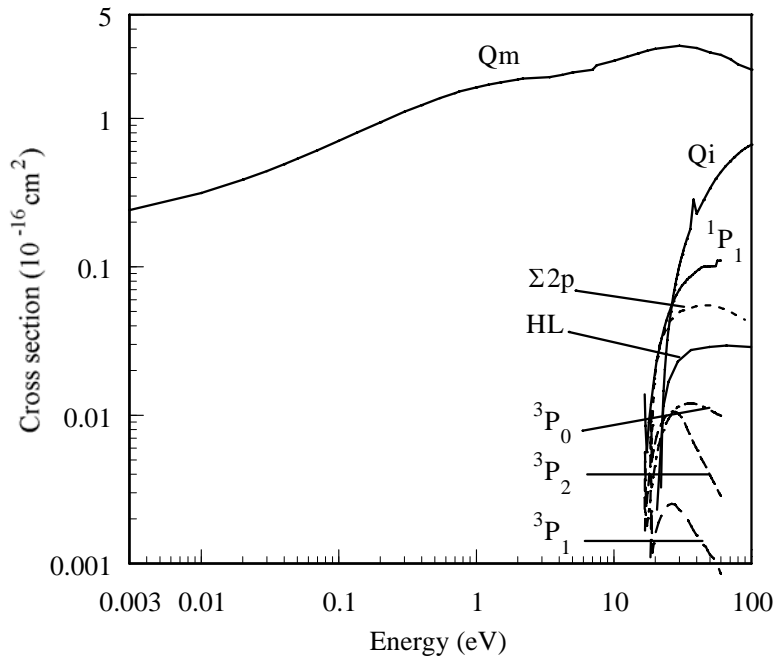


Fig.1 Recommended cross sections for Ne

2. Related electron swarm data

(1) Electron drift velocity, W , in Ne

E/N (Td)	W (10^6 cm/s)	E/N (Td)	W (10^6 cm/s)
0.001107	0.251 ^[6]	0.304	3.4
0.001318	0.32	0.364	3.7
0.001538	0.34	0.425	4.0
0.001854	0.37	0.455	4.1
0.002143	0.36	0.486	4.2
0.00308	0.44	0.546	4.5
0.00311	0.51	0.607	4.7
0.00374	0.54	0.759	5.2
0.00619	0.65	0.911	5.6
0.0074	0.71	1.062	5.9
0.01518	0.98	1.214	6.3
0.01821	1.05 ^[7]	1.336	6.5
0.02125	1.12	1.821	7.8
0.02428	1.19	2.003	8.5
0.02732	1.24	2.80092	11.4855 ^[8]
0.0304	1.30	5.49997	19.307
0.0455	1.53	8.12879	30.2833
0.0607	1.72	13.848	47.4998
0.0911	2.04	18.7281	68.3261
0.1214	2.3	27.1924	90.1337
0.1518	2.5	78.9173	237.651
0.1821	2.7	103.004	292.527
0.2125	2.9	132.076	360.073
0.2428	3.1	157.741	413.563
0.2732	3.3	185.077	474.998

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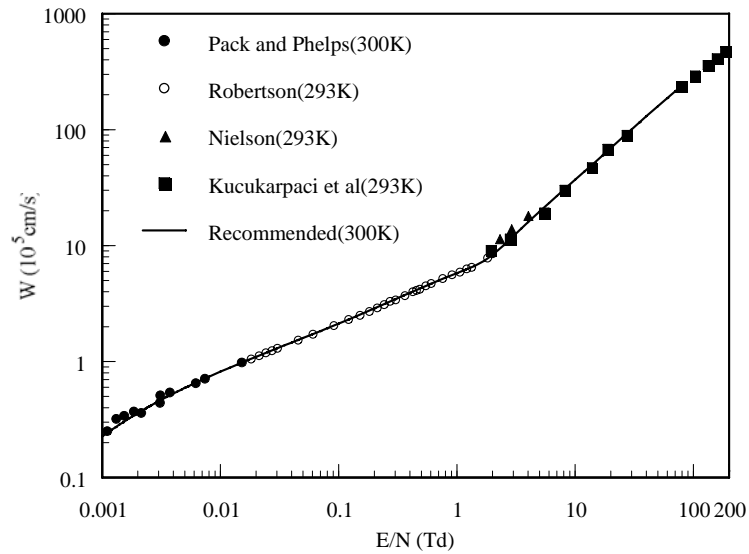


Fig.2 Electron drift velocity in Ne

(2) Ratio of longitudinal diffusion coefficient to mobility, D_L/μ , in Ne

E/N (Td)	D_L/μ (V)	E/N (Td)	D_L/μ (V)
2.00436	2.79172 ^[10]	56.7071	6.63512
2.78319	4.45162	84.9169	7.98743
5.55817	5.45355	113.304	9.09469
8.47454	5.0511	142.699	9.97734
13.9623	5.53503	169.668	10.9483
19.7336	6.30079	201.751	12.2408
27.8604	5.62319		

[10] H. N. Kucukarpaci, H. T. Saelee and J. Lucas, *J. Phys. D*, **14** (1981) 9 – 25

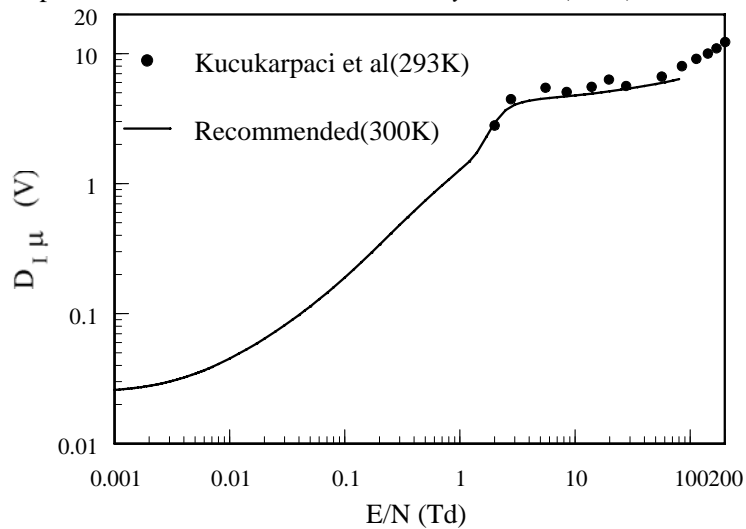


Fig.3 D_L/μ in Ne

(3) Ratio of ionization coefficient to gas number density, α/N , in Xe

E/N (Td)	α/N (10^{-19} cm ²)	28.25	0.0181
22.60	0.0054 ^[11]	31.1	0.030
25.42	0.0102	33.9	0.048

39.6	0.109	141.2	12.5
45.2	0.215	169.5	18.8
50.9	0.38	197.7	26.0
56.5	0.62	226.0	34
62.2	0.92	254.2	42
70.6	1.51	282.5	51
79.1	2.27	339.	68
90.4	3.6	396.	85
101.7	5.1	452.	103
E/N (Td)	$\alpha/N (10^{-19} \text{ cm}^2)$	509.	121
113.0	7.0	565.	140
127.1	9.6		

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