

Rubidium (Rb)

1. Recommended electron collision cross sections

Source: Y. Nakamura and M. Sakai, *Trans.IEE of Japan* 102-A(1982)397-404

The following cross section set was compiled so that it can reproduce the drift velocity measured in pure rubidium vapour by a two-term Boltzmann code.

(1) Elastic momentum transfer cross section[1]

Energy(eV)	Cross section(cm ²)	Energy(eV)	Cross section(cm ²)
0	2.40×10 ⁻¹²	0.5	2.50×10 ⁻¹⁴
0.04	2.40	0.52	2.00
0.05	2.45	0.54	1.70
0.06	2.50	0.56	1.50
0.07	2.38	0.58	1.37
0.08	2.12	0.60	1.26
0.09	1.80	0.65	1.08
0.1	1.42	0.7	9.70×10 ⁻¹⁵
0.11	1.02	0.80	8.30
0.12	7.60×10 ⁻¹³	0.90	7.45
0.13	6.45	1.00	6.90
0.14	5.65	1.20	6.20
0.15	5.15	1.40	5.80
0.17	4.42	1.70	5.35
0.2	3.70	2.00	4.90
0.25	2.90	2.50	4.00
0.3	2.23	3.00	3.30
0.32	2.00	4.00	2.52
0.35	1.60	5.00	2.16
0.37	1.30	6.00	1.95
0.4	9.20×10 ⁻¹⁴	7.00	1.82
0.42	6.60	8.00	1.74
0.45	4.50	10.00	1.64
0.47	3.30		

(2) Electronic excitation cross section for 5²P_{1/2} state (threshold = 1.56eV)[2]

Energy(eV)	Cross section(cm ²)	Energy(eV)	Cross section(cm ²)
1.56	0	3.5	1.07×10 ⁻¹⁵
1.6	1.00×10 ⁻¹⁶	4.0	1.21
1.7	2.05	4.5	1.32
1.8	2.72	5.0	1.40
1.9	3.25	5.5	1.40
2.0	3.74	6.0	1.42
2.2	4.82	6.5	1.49
2.4	5.85	7.0	1.53
2.6	6.85	8.0	1.57
2.8	7.80	10.0	1.60
3.0	8.70		

(3) Electronic excitation cross section for 5²P_{3/2} state (threshold = 1.59eV)[2]

Energy(eV)	Cross section(cm ²)	Energy(eV)	Cross section(cm ²)
1.59	0	1.6	1.40×10 ⁻¹⁶

1.7	2.80	3.0	1.56
1.8	4.10	3.2	1.90
1.9	5.60	3.4	2.22
2.0	7.30	3.6	2.60
2.1	9.80	3.8	2.76
2.2	1.12×10^{-15}	4.0	2.82
2.3	1.17	4.5	2.90
2.4	1.10	5.0	2.94
2.5	1.08	6.0	3.04
2.6	1.21	7.0	3.10
2.7	1.37	8.0	3.12
2.8	1.32	10.0	3.15
2.9	1.40		

(4) Electronic excitation cross section for 5D state (threshold = 3.19 eV)[3]

Energy(eV)	Cross section(cm^2)	Energy(eV)	Cross section(cm^2)
3.19	0	4.0	1.27×10^{-16}
3.3	1.00×10^{-17}	4.5	1.21
3.35	6.00	5.0	1.16
3.4	1.20×10^{-16}	6.0	1.07
3.5	1.27	7.0	1.00
3.6	1.29	8.0	9.45×10^{-17}
3.7	1.30	10.0	8.40
3.8	1.30		

(5) Electronic excitation cross section for 7S state (threshold = 3.26 eV)[3]

Energy(eV)	Cross section(cm^2)	Energy(eV)	Cross section(cm^2)
3.26	0	4.5	5.95
3.4	1.00×10^{-17}	4.7	5.92
3.45	3.00	4.8	5.85
3.5	3.40	4.9	5.60
3.6	4.10	5.0	5.45
3.7	4.70	5.5	5.30
3.8	5.30	6.0	5.15
3.9	5.45	7.0	4.50
4.0	5.65	8.0	3.92
4.2	5.86	9.0	3.57
4.4	5.95	10.0	3.30

(6) Electronic excitation cross section for 6D state (threshold = 3.56 eV)[3]

Energy(eV)	Cross section(cm^2)	Energy(eV)	Cross section(cm^2)
3.56	0	4.8	3.85
3.75	1.00×10^{-17}	5.0	3.82
3.8	2.00	5.5	3.62
3.9	2.4	6.0	3.41
4.0	2.65	7.0	3.07
4.2	3.25	8.0	2.78
4.4	3.55	9.0	2.54
4.6	3.76	10.0	2.32

(7) Total ionization cross section for 6D state (threshold = 4.17 eV)[4]

Energy(eV)	Cross section(cm ²)	Energy(eV)	Cross section(cm ²)
4.17	0	5.2	3.40
4.25	1.00×10 ⁻¹⁷	5.4	4.05
4.3	6.00	5.6	4.60
4.4	9.20	5.8	5.00
4.5	1.22×10 ⁻¹⁶	6.0	5.60
4.6	1.55	6.5	7.00
4.7	1.85	7.0	7.60
4.8	2.15	8.0	8.50
4.9	2.45	9.0	8.90
5.0	2.85	10.0	9.00

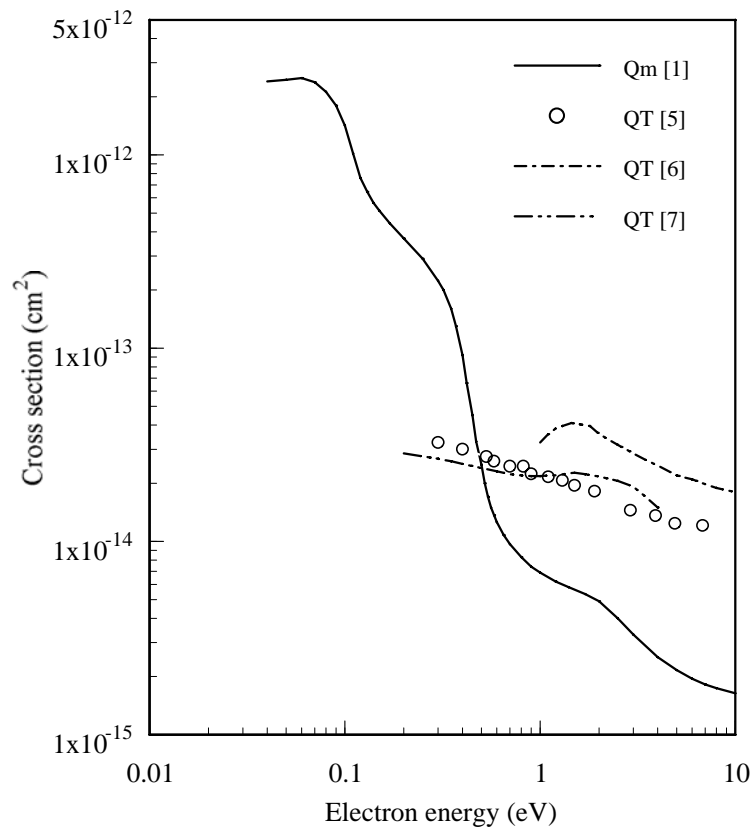


Fig. 1. Recommended momentum transfer cross section Q_M of rubidium atom.

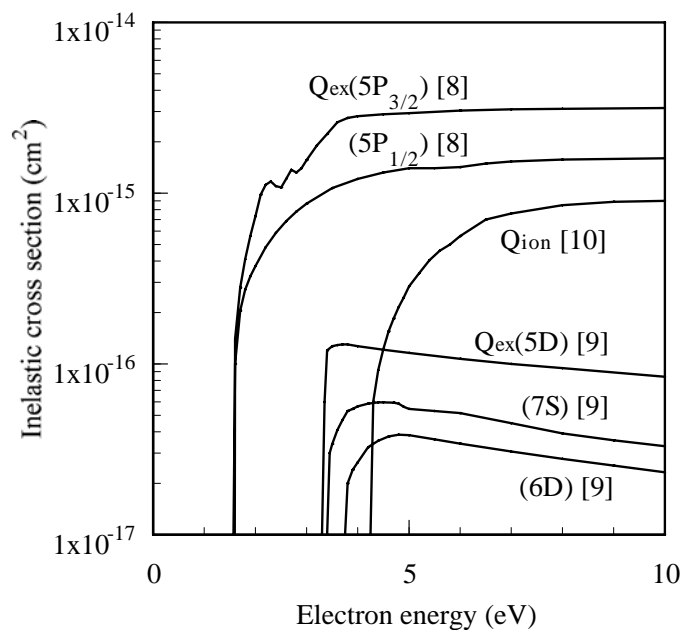


Fig. 2. Recommended inelastic collision cross sections of rubidium atom.

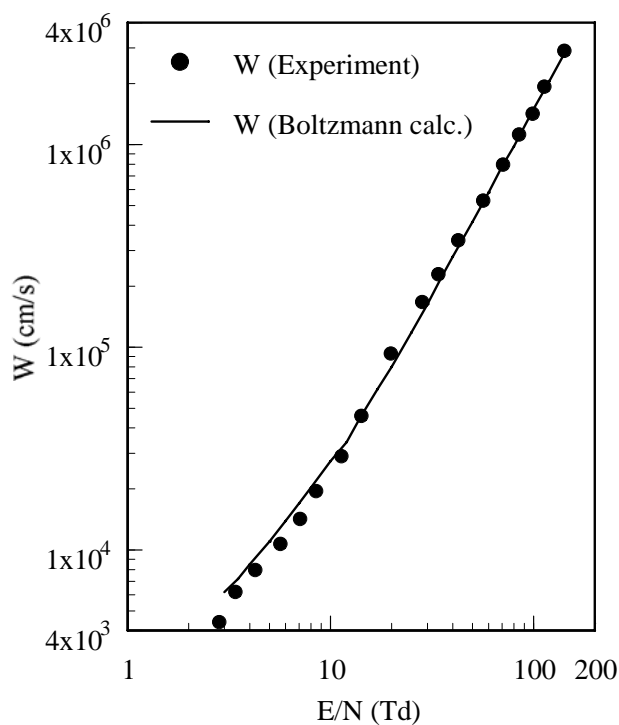


Fig. 3. Electron drift velocity in pure rubidium vapour. [1]

References

[1] Y. Nakamura and M. Sakai, *Trans. IEE of Japan*, **102-A**, 397 (1982)

- [2] I. P. Zapesochnyi et al., *Opt. Spectra*, **21**, 155 (1966)
- [3] I. P. Zapesochnyi et al., *Opt. Spectra*, **20**, 525 (1966)
- [4] R. H. McFarland, *Phys. Rev.*, **139**, 1A, 40 (1965)
- [5] P. J. Visconti et al., *Phys. Rev. A*, **3**, 1310 (1971)
- [6] R. B. Brode, *Phys. Rev.*, **34**, 673 (1929)
- [7] L. C. Balling, *Phys. Rev.*, **179**, 78 (1969)