

Argon Atom

$Z = 18$

Atomic Mass : $M_A = 39.948$

$$\sigma_a(\text{Mb}) = 109.76097 \frac{df}{dE} (\text{eV}^{-1})$$

$$\mu_m = \sigma_a \cdot N_A \cdot M_A^{-1}$$

Table I. Discrete oscillator strength, f_n , for the ns, nd, $\underline{\text{nd}}$, ns' and nd' series.

Energy (eV)	f_n	λ (Å)	Energy (eV)	f_n	λ (Å)
1.1624E+01	5.8000E-02	1.0666E+03	1.5188E+01	4.2600E-02	8.1635E+02
1.4092E+01	2.6000E-02	8.7984E+02	1.5526E+01	5.7400E-02 ^{c)}	7.9854E+02
1.4857E+01	1.4000E-02	8.3449E+02	1.5852E+01	3.3500E-02 ^{d)}	7.8214E+02
1.5159E+01	1.3900E-02	8.1787E+02	1.1828E+01	2.2140E-01	1.0482E+03
1.5506E+01	2.1100E-02 ^{a)}	7.9957E+02	1.4257E+01	1.2000E-02	8.6963E+02
1.3606E+01	1.1000E-03	9.1127E+02	1.5025E+01	2.2100E-02	8.2518E+02
1.4717E+01	1.9000E-03	8.4248E+02	1.5572E+01	6.9000E-03 ^{e)}	7.9621E+02
1.5170E+01	4.1000E-03	8.1728E+02	1.4304E+01	1.0600E-01	8.6676E+02
1.5530E+01	6.2000E-03 ^{b)}	7.9835E+02	1.4984E+01	2.0900E-02	8.2744E+02
1.4153E+01	9.0000E-02	8.7604E+02	1.5610E+01	5.6200E-02 ^{f)}	7.9424E+02
1.4857E+01	4.8000E-02	8.3452E+02			

a) Represents $\sum_{n=8}^{\infty} f_n$ for the ns series.

b) Represents $\sum_{n=6}^{\infty} f_n$ for the nd series.

c) Represents $\sum_{n=6}^{\infty} f_n$ for the $\underline{\text{nd}}$ series.

d) Represents f for underlying continuum between ${}^2\text{P}_{3/2}$ and ${}^2\text{P}_{1/2}$.

e) Represents $\sum_{n=7}^{\infty} f_n$ for the ns' series.

f) Represents $\sum_{n=5}^{\infty} f_n$ for the nd' series.

Table II. Discrete oscillator strength, f_n , for resonance transitions; between 26.6 eV and 29.2 eV and at 3203.3 eV.

Energy (eV)	f_n	λ (Å)	Energy (eV)	f_n	λ (Å)
2.6614E+01	-3.2800E-02	4.6586E+02	2.8896E+01	-1.4500E-03	4.2907E+02
2.7996E+01	-1.0000E-02	4.4286E+02	2.8928E+01	-1.0900E-03	4.2860E+02
2.8509E+01	-4.4000E-03	4.3489E+02	2.9100E+01	-3.0000E-03	4.2606E+02
2.8756E+01	-2.3400E-03	4.3116E+02	3.2033E+03	2.2000E-03	3.8705E+00

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m .

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
1.5937E+01	2.9639E-01	3.2532E+01	4.9042E+05	7.7796E+02
1.7500E+01	3.0499E-01	3.3476E+01	5.0465E+05	7.0848E+02
2.0000E+01	3.3510E-01	3.6781E+01	5.5447E+05	6.1992E+02
2.2500E+01	3.3351E-01	3.6606E+01	5.5184E+05	5.5104E+02
2.5000E+01	3.0809E-01	3.3816E+01	5.0978E+05	4.9594E+02
2.7500E+01	2.7241E-01	2.9900E+01	4.5074E+05	4.5085E+02
3.0000E+01	1.9282E-01	2.1164E+01	3.1904E+05	4.1328E+02
3.5000E+01	8.0918E-02	8.8816E+00	1.3389E+05	3.5424E+02
4.0000E+01	2.7595E-02	3.0288E+00	4.5659E+04	3.0996E+02
4.5000E+01	8.0771E-03	8.8655E-01	1.3365E+04	2.7552E+02
4.8000E+01	4.6325E-03	5.0847E-01	7.6651E+03	2.5830E+02
5.0000E+01	6.6325E-03	7.2799E-01	1.0974E+04	2.4797E+02
6.0000E+01	9.9343E-03	1.0904E+00	1.6438E+04	2.0664E+02
7.0000E+01	1.2284E-02	1.3483E+00	2.0326E+04	1.7712E+02
8.0000E+01	1.2924E-02	1.4185E+00	2.1384E+04	1.5498E+02
9.0000E+01	1.2344E-02	1.3549E+00	2.0426E+04	1.3776E+02
1.0000E+02	1.1673E-02	1.2812E+00	1.9314E+04	1.2398E+02
1.2500E+02	9.4569E-03	1.0380E+00	1.5648E+04	9.9187E+01
1.5000E+02	7.3391E-03	8.0555E-01	1.2144E+04	8.2656E+01
1.7500E+02	5.6827E-03	6.2374E-01	9.4028E+03	7.0848E+01
2.0000E+02	4.4518E-03	4.8864E-01	7.3662E+03	6.1992E+01
2.2500E+02	3.5426E-03	3.8883E-01	5.8617E+03	5.5104E+01
2.4300E+02	3.7402E-03	4.1053E-01	6.1887E+03	5.1022E+01
2.4400E+02	5.1967E-03	5.7040E-01	8.5987E+03	5.0813E+01
2.4450E+02	7.6333E-03	8.3784E-01	1.2630E+04	5.0709E+01
2.4500E+02	6.9590E-03	7.6382E-01	1.1515E+04	5.0606E+01
2.4550E+02	5.3316E-03	5.8520E-01	8.8219E+03	5.0503E+01
2.4600E+02	5.4755E-03	6.0099E-01	9.0599E+03	5.0400E+01
2.4650E+02	9.4315E-03	1.0352E+00	1.5606E+04	5.0298E+01
2.4700E+02	1.4520E-02	1.5938E+00	2.4026E+04	5.0196E+01
2.4750E+02	1.6525E-02	1.8138E+00	2.7343E+04	5.0095E+01
2.4800E+02	1.7982E-02	1.9737E+00	2.9753E+04	4.9994E+01
2.4850E+02	2.0679E-02	2.2698E+00	3.4216E+04	4.9893E+01
2.4900E+02	2.4186E-02	2.6546E+00	4.0018E+04	4.9793E+01
2.4950E+02	2.8142E-02	3.0888E+00	4.6564E+04	4.9693E+01
2.5000E+02	3.0749E-02	3.3750E+00	5.0878E+04	4.9594E+01

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m . (Continued)

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
2.5050E+02	3.2277E-02	3.5428E+00	5.3407E+04	4.9495E+01
2.5100E+02	3.3896E-02	3.7204E+00	5.6085E+04	4.9396E+01
2.5150E+02	3.4705E-02	3.8092E+00	5.7424E+04	4.9298E+01
2.5200E+02	3.5424E-02	3.8882E+00	5.8614E+04	4.9200E+01
2.5250E+02	3.5424E-02	3.8882E+00	5.8614E+04	4.9103E+01
2.5300E+02	3.5694E-02	3.9178E+00	5.9061E+04	4.9006E+01
2.5350E+02	3.9774E-02	4.3657E+00	6.5812E+04	4.8909E+01
2.5400E+02	3.9471E-02	4.3323E+00	6.5310E+04	4.8813E+01
2.5450E+02	3.9370E-02	4.3212E+00	6.5142E+04	4.8717E+01
2.5500E+02	3.8560E-02	4.2324E+00	6.3803E+04	4.8621E+01
2.5550E+02	3.8256E-02	4.1990E+00	6.3300E+04	4.8526E+01
2.5600E+02	3.8054E-02	4.1768E+00	6.2965E+04	4.8431E+01
2.5650E+02	3.7345E-02	4.0991E+00	6.1793E+04	4.8337E+01
2.5700E+02	3.6941E-02	4.0546E+00	6.1123E+04	4.8243E+01
2.5750E+02	3.6738E-02	4.0324E+00	6.0788E+04	4.8149E+01
2.5800E+02	3.6232E-02	3.9769E+00	5.9951E+04	4.8056E+01
2.5850E+02	3.6131E-02	3.9658E+00	5.9784E+04	4.7963E+01
2.5900E+02	3.5928E-02	3.9435E+00	5.9449E+04	4.7870E+01
2.5950E+02	3.5220E-02	3.8658E+00	5.8277E+04	4.7778E+01
2.6000E+02	3.5321E-02	3.8769E+00	5.8444E+04	4.7686E+01
2.6050E+02	3.4714E-02	3.8102E+00	5.7439E+04	4.7595E+01
2.6100E+02	3.4410E-02	3.7769E+00	5.6937E+04	4.7504E+01
2.6150E+02	3.4815E-02	3.8213E+00	5.7607E+04	4.7413E+01
2.6200E+02	3.4309E-02	3.7658E+00	5.6769E+04	4.7322E+01
2.6250E+02	3.4208E-02	3.7547E+00	5.6602E+04	4.7232E+01
2.6300E+02	3.4006E-02	3.7325E+00	5.6267E+04	4.7142E+01
2.6350E+02	3.3904E-02	3.7214E+00	5.6100E+04	4.7053E+01
2.6400E+02	2.4696E-02	2.7106E+00	4.0863E+04	4.6964E+01
2.6450E+02	2.4549E-02	2.6945E+00	4.0619E+04	4.6875E+01
2.6500E+02	2.4696E-02	2.7106E+00	4.0863E+04	4.6786E+01
2.6550E+02	2.4549E-02	2.6945E+00	4.0619E+04	4.6698E+01
2.6600E+02	2.4549E-02	2.6945E+00	4.0619E+04	4.6611E+01
2.6650E+02	2.4622E-02	2.7026E+00	4.0741E+04	4.6523E+01
2.6700E+02	2.4622E-02	2.7026E+00	4.0741E+04	4.6436E+01
2.6750E+02	2.4696E-02	2.7106E+00	4.0863E+04	4.6349E+01
2.6800E+02	2.4549E-02	2.6945E+00	4.0619E+04	4.6263E+01

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m . (Continued)

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
2.6850E+02	2.4475E-02	2.6864E+00	4.0498E+04	4.6177E+01
2.6900E+02	2.4034E-02	2.6380E+00	3.9768E+04	4.6091E+01
2.6950E+02	2.3667E-02	2.5977E+00	3.9160E+04	4.6005E+01
2.7000E+02	2.3446E-02	2.5735E+00	3.8795E+04	4.5920E+01
2.7050E+02	2.3079E-02	2.5332E+00	3.8187E+04	4.5835E+01
2.7100E+02	3.0800E-02	3.3806E+00	5.0963E+04	4.5751E+01
2.7150E+02	3.0700E-02	3.3697E+00	5.0797E+04	4.5666E+01
2.7200E+02	3.0700E-02	3.3697E+00	5.0797E+04	4.5582E+01
2.7250E+02	3.0400E-02	3.3367E+00	5.0301E+04	4.5499E+01
2.7300E+02	3.0300E-02	3.3258E+00	5.0136E+04	4.5415E+01
2.7350E+02	3.0200E-02	3.3148E+00	4.9970E+04	4.5332E+01
2.7400E+02	3.0200E-02	3.3148E+00	4.9970E+04	4.5250E+01
2.7450E+02	3.0100E-02	3.3038E+00	4.9805E+04	4.5167E+01
2.7500E+02	2.9900E-02	3.2819E+00	4.9474E+04	4.5085E+01
2.7550E+02	2.9600E-02	3.2489E+00	4.8977E+04	4.5003E+01
2.7600E+02	2.9700E-02	3.2599E+00	4.9143E+04	4.4922E+01
2.7650E+02	2.9600E-02	3.2489E+00	4.8977E+04	4.4841E+01
2.7700E+02	2.9600E-02	3.2489E+00	4.8977E+04	4.4760E+01
2.7750E+02	2.9100E-02	3.1940E+00	4.8150E+04	4.4679E+01
2.7800E+02	2.9200E-02	3.2050E+00	4.8316E+04	4.4599E+01
2.7850E+02	2.9100E-02	3.1940E+00	4.8150E+04	4.4519E+01
2.7900E+02	2.9000E-02	3.1831E+00	4.7985E+04	4.4439E+01
2.7950E+02	2.9200E-02	3.2050E+00	4.8316E+04	4.4359E+01
2.8000E+02	2.8900E-02	3.1721E+00	4.7819E+04	4.4280E+01
2.8100E+02	2.8800E-02	3.1611E+00	4.7654E+04	4.4122E+01
2.8200E+02	2.8700E-02	3.1501E+00	4.7488E+04	4.3966E+01
2.8300E+02	2.8500E-02	3.1282E+00	4.7157E+04	4.3811E+01
2.8400E+02	2.8700E-02	3.1501E+00	4.7488E+04	4.3656E+01
2.8500E+02	2.8400E-02	3.1172E+00	4.6992E+04	4.3503E+01
2.8600E+02	2.8500E-02	3.1282E+00	4.7157E+04	4.3351E+01
2.8700E+02	2.8300E-02	3.1062E+00	4.6826E+04	4.3200E+01
2.8800E+02	2.8300E-02	3.1062E+00	4.6826E+04	4.3050E+01
2.8900E+02	2.8300E-02	3.1062E+00	4.6826E+04	4.2901E+01
2.9000E+02	2.8100E-02	3.0843E+00	4.6495E+04	4.2753E+01
2.9100E+02	2.7900E-02	3.0623E+00	4.6164E+04	4.2606E+01
2.9200E+02	2.7900E-02	3.0623E+00	4.6164E+04	4.2460E+01

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m . (Continued)

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
2.9300E+02	2.7700E-02	3.0404E+00	4.5834E+04	4.2315E+01
2.9400E+02	2.7600E-02	3.0294E+00	4.5668E+04	4.2171E+01
2.9500E+02	2.7400E-02	3.0075E+00	4.5337E+04	4.2029E+01
2.9600E+02	2.7600E-02	3.0294E+00	4.5668E+04	4.1887E+01
2.9700E+02	2.7500E-02	3.0184E+00	4.5503E+04	4.1746E+01
2.9800E+02	2.7400E-02	3.0075E+00	4.5337E+04	4.1605E+01
2.9900E+02	2.7100E-02	2.9745E+00	4.4841E+04	4.1466E+01
3.0000E+02	2.7100E-02	2.9745E+00	4.4841E+04	4.1328E+01
3.0100E+02	2.7300E-02	2.9965E+00	4.5172E+04	4.1191E+01
3.0200E+02	2.7000E-02	2.9635E+00	4.4675E+04	4.1054E+01
3.0300E+02	2.6700E-02	2.9306E+00	4.4179E+04	4.0919E+01
3.0400E+02	2.6700E-02	2.9306E+00	4.4179E+04	4.0784E+01
3.0500E+02	2.6700E-02	2.9306E+00	4.4179E+04	4.0651E+01
3.0600E+02	2.6600E-02	2.9196E+00	4.4013E+04	4.0518E+01
3.0700E+02	2.6700E-02	2.9306E+00	4.4179E+04	4.0386E+01
3.0800E+02	2.6400E-02	2.8977E+00	4.3683E+04	4.0255E+01
3.0900E+02	2.6200E-02	2.8757E+00	4.3352E+04	4.0124E+01
3.1000E+02	2.6300E-02	2.8867E+00	4.3517E+04	3.9995E+01
3.1100E+02	2.6300E-02	2.8867E+00	4.3517E+04	3.9866E+01
3.1200E+02	2.6200E-02	2.8757E+00	4.3352E+04	3.9739E+01
3.1300E+02	2.6200E-02	2.8757E+00	4.3352E+04	3.9612E+01
3.1400E+02	2.6300E-02	2.8867E+00	4.3517E+04	3.9485E+01
3.1500E+02	2.5900E-02	2.8428E+00	4.2855E+04	3.9360E+01
3.1600E+02	2.5700E-02	2.8209E+00	4.2524E+04	3.9236E+01
3.1700E+02	2.5900E-02	2.8428E+00	4.2855E+04	3.9112E+01
3.1800E+02	2.5900E-02	2.8428E+00	4.2855E+04	3.8989E+01
3.1900E+02	2.5700E-02	2.8209E+00	4.2524E+04	3.8867E+01
3.2000E+02	2.5900E-02	2.8428E+00	4.2855E+04	3.8745E+01
3.2100E+02	2.5900E-02	2.8428E+00	4.2855E+04	3.8624E+01
3.2200E+02	2.6000E-02	2.8538E+00	4.3021E+04	3.8504E+01
3.2300E+02	2.6600E-02	2.9196E+00	4.4013E+04	3.8385E+01
3.2400E+02	2.7000E-02	2.9635E+00	4.4675E+04	3.8267E+01
3.2500E+02	2.7400E-02	3.0075E+00	4.5337E+04	3.8149E+01
3.2600E+02	2.7400E-02	3.0075E+00	4.5337E+04	3.8032E+01
3.2700E+02	2.7000E-02	2.9635E+00	4.4675E+04	3.7916E+01
3.2800E+02	2.7400E-02	3.0075E+00	4.5337E+04	3.7800E+01

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m . (Continued)

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
3.2900E+02	2.6900E-02	2.9526E+00	4.4510E+04	3.7685E+01
3.3000E+02	2.6900E-02	2.9526E+00	4.4510E+04	3.7571E+01
3.3100E+02	2.6500E-02	2.9087E+00	4.3848E+04	3.7457E+01
3.3200E+02	2.6100E-02	2.8648E+00	4.3186E+04	3.7345E+01
3.3300E+02	2.6400E-02	2.8977E+00	4.3683E+04	3.7232E+01
3.3400E+02	2.6200E-02	2.8757E+00	4.3352E+04	3.7121E+01
3.3500E+02	2.6100E-02	2.8648E+00	4.3186E+04	3.7010E+01
3.3600E+02	2.5800E-02	2.8318E+00	4.2690E+04	3.6900E+01
3.5000E+02	2.1537E-02	2.3639E+00	3.5636E+04	3.5424E+01
4.0000E+02	1.7165E-02	1.8840E+00	2.8401E+04	3.0996E+01
4.5000E+02	1.3523E-02	1.4843E+00	2.2376E+04	2.7552E+01
5.0000E+02	1.0759E-02	1.1810E+00	1.7803E+04	2.4797E+01
6.0000E+02	7.2255E-03	7.9307E-01	1.1956E+04	2.0664E+01
7.0000E+02	5.0022E-03	5.4905E-01	8.2769E+03	1.7712E+01
8.0000E+02	3.5914E-03	3.9420E-01	5.9425E+03	1.5498E+01
9.0000E+02	2.6659E-03	2.9261E-01	4.4112E+03	1.3776E+01
1.0000E+03	2.0260E-03	2.2237E-01	3.3523E+03	1.2398E+01
1.2500E+03	1.1203E-03	1.2297E-01	1.8537E+03	9.9187E+00
1.5000E+03	6.8751E-04	7.5462E-02	1.1376E+03	8.2656E+00
1.7500E+03	4.5498E-04	4.9940E-02	7.5284E+02	7.0848E+00
2.0000E+03	3.1862E-04	3.4972E-02	5.2720E+02	6.1992E+00
2.2500E+03	2.3309E-04	2.5584E-02	3.8567E+02	5.5104E+00
2.5000E+03	1.7653E-04	1.9376E-02	2.9209E+02	4.9594E+00
2.7500E+03	1.3751E-04	1.5093E-02	2.2753E+02	4.5085E+00
3.0000E+03	1.0963E-04	1.2033E-02	1.8139E+02	4.1328E+00
3.2030E+03	9.2533E-05	1.0157E-02	1.5311E+02	3.8709E+00
3.2060E+03	8.8381E-04	9.7008E-02	1.4624E+03	3.8673E+00
3.5000E+03	6.9649E-04	7.6448E-02	1.1524E+03	3.5424E+00
4.0000E+03	4.9993E-04	5.4873E-02	8.2720E+02	3.0996E+00
4.5000E+03	3.7261E-04	4.0898E-02	6.1654E+02	2.7552E+00
5.0000E+03	2.8118E-04	3.0863E-02	4.6526E+02	2.4797E+00
6.0000E+03	1.6089E-04	1.7659E-02	2.6622E+02	2.0664E+00
7.0000E+03	1.0546E-04	1.1575E-02	1.7449E+02	1.7712E+00
8.0000E+03	7.2513E-05	7.9591E-03	1.1998E+02	1.5498E+00
9.0000E+03	5.1988E-05	5.7063E-03	8.6022E+01	1.3776E+00
1.0000E+04	3.7082E-05	4.0702E-03	6.1358E+01	1.2398E+00

Table III. Oscillator-strength density, df/dE , photoabsorption cross section, σ_a , and mass absorption coefficient, μ_m . (Continued)

Energy (eV)	f_n (eV ⁻¹)	σ_a (Mb)	μ_m (cm ² g ⁻¹)	λ (Å)
1.2500E+04	1.9470E-05	2.1370E-03	3.2216E+01	9.9187E-01
1.5000E+04	1.1420E-05	1.2535E-03	1.8896E+01	8.2656E-01
1.7500E+04	7.2078E-06	7.9113E-04	1.1926E+01	7.0848E-01
2.0000E+04	4.8403E-06	5.3128E-04	8.0090E+00	6.1992E-01
2.2500E+04	3.4070E-06	3.7395E-04	5.6373E+00	5.5104E-01
2.5000E+04	2.4887E-06	2.7317E-04	4.1180E+00	4.9594E-01
2.7500E+04	1.8660E-06	2.0481E-04	3.0875E+00	4.5085E-01
3.0000E+04	1.4256E-06	1.5647E-04	2.3588E+00	4.1328E-01
3.5000E+04	8.8390E-07	9.7018E-05	1.4625E+00	3.5424E-01
4.0000E+04	5.8435E-07	6.4139E-05	9.6689E-01	3.0996E-01
4.5000E+04	4.0566E-07	4.4526E-05	6.7123E-01	2.7552E-01
5.0000E+04	2.9269E-07	3.2125E-05	4.8429E-01	2.4797E-01
6.0000E+04	1.6638E-07	1.8262E-05	2.7530E-01	2.0664E-01
7.0000E+04	1.0298E-07	1.1303E-05	1.7039E-01	1.7712E-01
8.0000E+04	6.7465E-08	7.4051E-06	1.1163E-01	1.5498E-01
9.0000E+04	4.6388E-08	5.0916E-06	7.6756E-02	1.3776E-01
1.0000E+05	3.3182E-08	3.6421E-06	5.4905E-02	1.2398E-01

When photon energy, E , is higher than 10^5 eV, the photoabsorption cross section, σ_a , in Mb is given by

$$\sigma_a = 680 (Z - 0.3)^6 \left(\frac{Ry}{E} \right)^4 \frac{\exp[-4\chi \arctan(\chi^{-1})]}{1 - \exp(-2\pi\chi)} .$$

Here χ is represented by

$$\chi = \sqrt{\frac{E_K}{E - E_K}} ,$$

where $E_K = 3206.3$ eV.

