PERIODIC TABLE OF ELEMENTS INLC. SPECTRAL LINES FOR LASER-INDUCED BREAKDOWN SPECTROSCOPY

Rm 25
182.921
3.5642
Randomonium
•217.492 3.435
223.385 5.800
309.016 **9.075**

- Atomic number
- Atomic mass [parentheses for radioactive elements]
- 1st ionization energy in eV
- Chemical symbol
- Element name
- Line wavelength in nm
- Upper level energy in eV
- Dot for resonant lines
- Underlined lines are ionic
- Bold lines are preferred
- List of emission lines

H 1 — 1.00794, 13.598
Hydrogen
434.0472 13.05
486.1333 12.75
656.2819 **12.08**

He 2 — 4.0026, 24.587
Helium
587.562 23.074
706.519 22.718

Li 3 — 6.941, 5.392
Lithium
432.542 72.23
460.282 4.541
467.165 72.23
610.365 3.879
•**670.791** **1.848**

Be 4 — 9.0122, 9.3227
Hydrogen
•**234.861** **5.277**
265.062 7.401
•**313.042** **3.959**
457.267 7.988
467.342 14.81

B 5 — 10.811, 8.2976
Boron
•**249.678** **4.965**
•**249.773** **4.965**
345.130 **12.691**

C 6 — 12.011, 11.261
Carbon
247.856 **7.685**
392.068 **19.495**
426.726 **20.951**
431.861 **25.984**
833.515 **9.172**

N 7 — 14.007, 14.534
Nitrogen
149.263 **10.690**
399.500 21.600
444.703 23.196
500.515 23.142

O 8 — 15.999, 13.618
Oxygen
777.194 10.741
822.182 14.047
844.636 10.989

F 9 — 18.998, 17.422
Fluorine
685.603 **14.505**
703.747 14.746
712.790 **14.764**

Ne 10 — 20.180, 21.565
Neon
692.947 18.637
703.241 18.382
837.761 20.035
865.438 20.136

Na 11 — 22.990, 5.1390
Sodium
295.124 41.15
316.374 41.01
351.093 36.24
388.180 36.24
•**588.990** **2.104**

Mg 12 — 24.305, 7.6462
Magnesium
•**279.552** **4.434**
•**280.270** **4.422**
•**285.213** **4.346**
383.231 **5.946**
448.113 11.630
518.360 **5.108**

Al 13 — 26.982, 5.9854
Aluminium
•**308.215** **4.022**
309.271 **4.022**
•**394.403** **3.143**
396.152 **3.143**

Si 14 — 28.086, 8.1515
Silicon
251.611 **4.954**
263.128 6.620
288.159 **5.083**

P 15 — 30.977, 10.487
Phosphorus
•**178.287** **6.955**
213.618 **7.213**
253.612 **7.213**

S 16 — 32.065, 10.360
Sulfur
180.731 **6.861**
182.600 **6.861**
545.383 **15.944**
921.287 **7.870**

Cl 17 — 35.453, 12.968
Chlorine
386.083 19.171
479.456 15.961
542.326 15.961
837.594 **10.402**

Ar 18 — 39.948, 15.760
Argon
357.662 23.0145
358.844 22.949

K 19 — 39.098, 4.3407
Potassium
207.870 28.20
338.062 26.91
344.005 27.18
418.624 23.11
•**766.489** **1.617**
•769.896 1.610

Ca 20 — 40.078, 6.1131
Calcium
370.603 6.468
•**393.366** **3.151**
•**396.847** **3.124**
422.673 **2.972**
428.301 4.779
558.876 4.744

Sc 21 — 44.956, 6.5616
Scandium
306.512 7.496
•326.990 3.791
361.383 **3.451**
391.181 3.189

Ti 22 — 47.867, 6.8280
Titanium
323.451 **3.881**
334.900 **3.749**
365.349 **3.441**
375.929 3.904
453.324 3.583
498.173 **3.337**

V 23 — 47.867, 6.7641
Vanadium
292.402 **4.631**
411.180 **3.315**
437.924 **3.131**

Cr 24 — 51.996, 6.7668
Chromium
267.180 **6.145**
286.257 **5.855**
•**359.349** **3.449**
•**425.435** **2.913**
520.604 **3.212**

Mn 25 — 54.938, 7.4342
Manganese
•**279.482** **4.435**
293.305 **5.400**
•**403.076** **3.075**
482.352 **4.889**

Fe 26 — 55.845, 7.9027
Iron
434.0472 13.05
486.1333 12.75
656.2819 **12.08**

Co 27 — 58.933, 7.8810
Cobalt
238.892 **5.604**
•240.725 5.149
341.233 4.146
345.351 **4.021**

Ni 28 — 58.693, 7.6395
Nickel
341.476 **3.655**
351.505 **3.542**
352.454 **3.542**
377.557 3.706

Cu 29 — 63.546, 7.7266
Copper
•**324.754** **3.817**
•**327.400** **3.786**
510.554 **3.817**
521.820 **6.192**

Zn 30 — 65.380, 9.3942
Zinc
•**213.856** **5.796**
330.259 -
334.502 -
472.215 -
481.053 -

Ga 31 — 69.723, 5.9988
Gallium
•245.008 5.059
294.363 4.313
417.206 **3.074**

Ge 32 — 72.640, 7.8976
Germanium
270.962 4.644
303.907 4.962
306.702 6.071

As 33 — 74.922, 9.8150
Arsenic
228.812 **6.771**
234.984 **6.588**
274.500 **6.771**
278.022 **6.771**
286.044 **6.588**

Se 34 — 78.960, 9.7528
Selenium
203.985 6.323
•207.479 5.974

Br 35 — 79.904, 11.814
Bromine
635.073 -
826.496 -
827.244 -

Kr 36 — 83.798, 14.000
Krypton
473.900 16.604
587.092 12.144
810.437 11.445

Rb 37 — 85.468, 4.1771
Rubidium
424.440 19.45
•**780.023** **1.589**
794.7603 1.559

Sr 38 — 87.62, 5.694
Strontium
407.771 **3.040**
421.552 **2.940**
460.733 **2.690**
707.007 3.600

Y 39 — 88.906, 6.219
Yttrium
371.030 **3.521**
•407.735 3.040

Zr 40 — 91.224, 6.6341
Zirconium
339.198 3.818
349.548 5.029
360.119 **3.596**

Nb 41 — 92.906, 6.7585
Hydrogen
358.027 3.592
405.894 3.184

Mo 42 — 95.960, 7.0923
Molybdenum
280.675 **5.836**
383.375 **4.764**
407.619 **5.112**
550.649 **3.589**

Tc 43 — [98], 7.276
Technetium
403.162 3.429
•**429.710** **2.885**
485.000 3.858

Ru 44 — 101.07, 7.9027
Ruthenium
434.0472 13.05
•486.1333 12.75
656.2819 **12.08**

Rh 45 — 102.91, 7.4592
Rhodium
252.052 7.011
•369.236 3.357
379.218 4.633

Pd 46 — 106.42, 8.3370
Palladium
342.122 4.585
355.308 4.942
357.115 4.723

Ag 47 — 107.87, 7.5763
Silver
227.998 11.146
•**328.068** **3.778**
•338.289 3.664
562.248 18.026

Cd 48 — 112.44, 8.9941
Cadmium
•**214.439** **5.780**
•**226.502** **5.473**
•**228.802** **5.418**
•**326.106** **3.801**
361.200 **7.377**
508.852 **6.383**

In 49 — 114.82, 5.7864
Indium
325.856 4.078
•410.177 3.022
451.132 **3.022**
xxxxx

Sn 50 — 118.710, 7.3441
Tin
242.170 6.186
•**283.998** **4.790**
286.332 **4.329**
303.412 **4.295**

Sb 51 — 121.76, 8.6438
Antimony
252.852 6.124
259.804 5.827
323.253 **6.124**

Te 52 — 127.60, 9.009
Tellurium
•214.282 5.784
238.579 5.785

I 53 — 126.90, 10.451
Iodine
370.603 6.468
•**393.366** **3.151**

Xe 54 — 131.29, 12.130
Xenon
433.052 16.936
484.433 14.098
840.919 9.789

Cs 55 — 132.91, 3.8939
Caesium
•**455.528** **2.721**
•**459.317** **2.698**
•**852.113** **1.454**
•894.347 1.385

Ba 56 — 137.33, 5.2117
Barium
413.064 5.722
455.403 **2.721**
489.993 5.251
•**553.548** **2.239**

Lu 71 — 174.96, 5.4257
Lutetium
•261.542 4.739
291.139 **6.018**
•331.211 3.742

Hf 72 — 178.49, 6.8248
Hafnium
•339.380 3.646
•368.224 3.366
417.343 3.262

Ta 73 — 180.95, 7.8872
Tantalum
551.891 4.401
667.373 3.067
686.623 3.322

W 74 — 183.84, 7.9805
Tungsten
259.874 5.850
294.440 4.576
400.875 3.458
429.461 3.252

Re 75 — 186.21, 7.8769
Rhenium
•**346.046** **3.582**
•346.470 3.578

Os 76 — 190.23, 8.7060
Osmium
434.0472 13.05
486.1333 12.75
656.2819 **12.08**

Ir 77 — 192.22, 9.1206
Iridium
251.258 5.527
283.324 5.828
283.916 5.989

Pt 78 — 195.08, 9.0169
Platinum
274.760 6.185
396.636 4.380
444.554 4.045

Au 79 — 196.97, 9.2252
Gold
242.794 5.105
•267.594 4.632
•460.751 8.519
627.817 4.632

Hg 80 — 200.59, 10.438
Mercury
•**253.652** **4.887**
284.768 11.867
435.834 **7.730**
439.862 16.701
567.711 15.269

Tl 81 — 204.38, 6.1087
Indium
•**276.800** **4.478**
351.924 4.488
535.046 **3.283**

Pb 82 — 207.20, 7.4167
Lead
220.350 **7.371**
•**280.200** **4.375**
368.350 **5.635**
405.780 **4.375**

Bi 83 — 208.98, 7.2861
Bismuth
239.868 6.133
302.464 6.012
•**306.772** **4.041**

Po 84 — [210], 8.4168
Polonium
300.321 5.059
417.052 5.059

At 85 — [210], 9.2242
Astatine
•224.401 5.523

Rn 86 — [220], 10.748
Radon
434.960 9.622
705.542 8.529
745.000 8.436

Fr 87 — [223], 4.0727
Francium
•717.988 1.726

Ra 88 — [226], 5.278
Radium

Lr 103 — [262], 4.871
Lawrencium

Rf 104 — [261], 6.011
Rutherfordium

Db 105 — [262]
Dubnium

Sg 106 — [266]
Seaborgium

Bh 107 — [264]
Bohrium

Hs 108 — [277]
Hassium

Mt 109 — [268]
Meitnerium

Ds 110 — [271]
Darmstadtium

Rg 111 — [272]
Roentgenium

Cn 112 — [285]
Copernicium

CEITEC LASER SPECTROSCOPY

- alkali metals
- alkaline metals
- other metals
- transition metals
- lanthanoids
- actinoids
- metalloids
- nonmetals
- halogens
- noble gases

La 57 — 138.91, 5.5770
Lanthanum
394.910 **3.542**
404.290 3.993
442.389 4.032

Ce 58 — 140.12, 5.5387
Cerium
265.101 5.888
364.794 5.535

Pr 59 — 140.91, 5.4620
Praseodymium
417.939 **3.170**
•495.136 2.504
504.552 3.000

Nd 60 — 144.24, 5.5252
Neodymium
•366.222 5.158
383.048 5.181
430.357 **2.880**
488.381 3.164

Pm 61 — [145.00], 5.5967
Promethium
441.796 2.946
480.136 2.681
•495.946 2.499

Sm 62 — 150.36, 5.6434
Samarium
356.827 **3.959**
429.674 3.383
510.039 4.054

Eu 63 — 151.96, 5.6703
Europium
386.556 5.139
•**459.404** **2.698**
•**462.723** **2.679**
•**466.188** **2.659**

Gd 64 — 157.25, 6.1502
Gadolinium
366.461 **4.374**
402.815 3.942
426.208 3.750

Tb 65 — 158.93, 5.8641
Terbium
365.889 3.514
•**384.873** **3.221**
•432.643 2.865

Dy 66 — 162.50, 5.9387
Dysprosium
•**353.171** **3.520**
384.089 5.009
393.015 4.753

Ho 67 — 164.93, 6.0216
Holmium
•**345.600** **3.586**
351.559 3.605
389.102 3.265

Er 68 — 167.26, 6.1077
Erbium
283.871 6.049
336.814 4.635
349.910 **3.597**

Tm 69 — 168.93, 6.1844
Thulium
•371.792 3.334
•**388.313** **3.192**
•409.418 3.027

Yb 70 — 173.05, 6.2538
Ytterbium
346.030 5.813
•**369.419** **3.355**
414.906 5.432

Ac 89 — [227.00], 5.1718
Actinium

Th 90 — [232.04], 6.0838
Thorium
283.730 5.139
342.121 4.238
345.351 5.510

Pa 91 — [231.04], 5.8869
Protactinium

U 92 — [238.03], 6.1937
Uranium
•358.488 3.458
379.883 4.665
409.013 **3.248**

Np 93 — [237.05], 6.2652
Neptunium

Pu 94 — [244.00], 6.0600
Plutonium

Am 95 — [243.00], 5.9901
Americium

Cm 96 — [247.00], 6.0216
Curium

Bk 97 — [247.00], 6.2289
Berkelium

Cf 98 — [251.00], 6.3015
Californium

Es 99 — [252.00], 6.4155
Einsteinium

Fm 100 — [257.00], 6.4984
Fermium

Md 101 — [258.00], 6.5813
Mendelevium

No 102 — [259.00], 6.6539
Nobelium