

Table 1-1. Electron binding energies, in electron volts, for the elements H to Tl in their natural forms. \*

Element	K 1s	L <sub>1</sub> 2s	L <sub>2</sub> 2p <sub>1/2</sub>	L <sub>3</sub> 2p <sub>3/2</sub>	M <sub>1</sub> 3s	M <sub>2</sub> 3p <sub>1/2</sub>	M <sub>3</sub> 3p <sub>3/2</sub>	M <sub>4</sub> 3d <sub>3/2</sub>	M <sub>5</sub> 3d <sub>5/2</sub>	N <sub>1</sub> 4s	N <sub>2</sub> 4p <sub>1/2</sub>	N <sub>3</sub> 4p <sub>3/2</sub>	N <sub>4</sub> 4d <sub>3/2</sub>	N <sub>5</sub> 4d <sub>5/2</sub>	N <sub>6</sub> 4f <sub>5/2</sub>	N <sub>7</sub> 4f <sub>7/2</sub>	O <sub>1</sub> 5s	O <sub>2</sub> 5p <sub>1/2</sub>	O <sub>3</sub> 5p <sub>3/2</sub>	O <sub>4</sub> 5d <sub>3/2</sub>	O <sub>5</sub> 5d <sub>5/2</sub>	P <sub>1</sub> 6s	P <sub>2</sub> 6p <sub>1/2</sub>	P <sub>3</sub> 6p <sub>3/2</sub>		
1 H	13.6																									
2 He	24.6*																									
3 Li	54.7*																									
4 Be	111.5*																									
5 B	188*																									
6 C	284.2*																									
7 N	409.9*	37.3*																								
8 O	543.1*	41.6*																								
9 F	696.7*																									
10 Ne	870.2*	48.5*	21.7*	21.6*																						
11 Na	1070.8†	63.5†	30.65	30.81																						
12 Mg	1303.0†	88.7†	49.78	49.5																						
13 Al	1583.6	117.8	72.95	72.55																						
14 Si	1839	149.7* <b>b</b>	99.82	99.42																						
15 P	2145.5	189*	136*	135*																						
16 S	2472	230.9	163.6*	162.5*																						
17 Cl	2822.4	270*	202*	200*																						
18 Ar	3205.9*	326.3*	250.6†	248.4*	29.3*	15.9*	15.7*																			
19 K	3608.5*	378.0*	297.3*	294.6*	34.8*	18.3*	18.3*																			
20 Ca	4038.5*	438.4†	349.7†	346.2†	44.3†	25.4†	25.4†																			
21 Sc	4492	498.0*	403.6*	398.7*	51.1*	28.3*	28.3*																			
22 Ti	4966	560.9†	460.2†	453.8†	58.7†	32.6†	32.6†																			
23 V	5465	626.7†	519.8†	512.1†	66.3†	37.2†	37.2†																			
24 Cr	5989	696.0†	583.8†	574.1†	74.1†	42.2†	42.2†																			
25 Mn	6539	769.1†	648.9†	638.7†	82.3†	47.2†	47.2†																			
26 Fe	7112	844.6†	719.9†	706.8†	91.3†	52.7†	52.7†																			
27 Co	7709	925.1†	793.2†	778.1†	101.0†	58.9†	58.9†																			
28 Ni	8333	1008.6†	870.0†	852.7†	110.8†	68.0†	66.2†																			
29 Cu	8979	1096.7†	952.3†	932.7†	122.5†	77.3†	75.1†																			
30 Zn	9659	1196.2*	1044.9*	1021.8*	139.8*	91.4*	88.6*	10.2*	10.1*																	
31 Ga	10367	1299.0* <b>b</b>	1143.2†	1116.4†	159.5†	103.5†	100.0†	18.7†	18.7†																	
32 Ge	11103	1414.0* <b>b</b>	1248.1* <b>b</b>	1217.0* <b>b</b>	180.1*	124.9*	120.8*	29.8	29.2																	
33 As	11867	1527.0* <b>b</b>	1359.1* <b>b</b>	1323.6* <b>b</b>	204.7*	146.2*	141.2*	41.7*	41.7*																	
34 Se	12658	1652.0* <b>b</b>	1474.3* <b>b</b>	1433.9* <b>b</b>	229.6*	166.5*	160.7*	55.5*	54.6*																	
35 Br	13474	1782*	1596*	1550*	257*	189*	182*	70*	69*																	
36 Kr	14326	1921	1730.9*	1678.4*	292.8*	222.2*	214.4	95.0*	93.8*	27.5*	14.1*	14.1*														
37 Rb	15200	2065	1864	1804	326.7*	248.7*	239.1*	113.0*	112*	30.5*	16.3*	15.3*														
38 Sr	16105	2216	2007	1940	358.7†	280.3†	270.0†	136.0†	134.2†	38.9†	21.3	20.1														
39 Y	17038	2373	2156	2080	392.0* <b>b</b>	310.6*	298.3*	157.7†	155.8†	43.3*	24.6*	23.1*														
40 Zr	17998	2532	2307	2223	430.3†	343.5†	329.8†	181.1†	178.8†	50.6†	28.5†	27.1†														
41 Nb	18986	2698	2465	2371	466.6†	376.1†	360.6†	205.0†	203.2†	56.4†	32.6†	30.8†														
42 Mo	20000	2866	2625	2520	506.3†	411.6†	394.0†	231.1†	227.9†	63.2†	37.6†	35.5†														
43 Tc	21044	3043	2793	2677	544*	447.6	417.7	257.6	253.9*	69.5*	42.3*	39.9*														
44 Ru	22117	3224	2967	2838	586.1*	483.5†	461.4†	284.2†	280.0†	75.0†	46.3†	43.2†														
45 Rh	23220	3412	3146	3004	628.1†	521.3†	496.5†	311.9†	307.2†	81.4* <b>b</b>	50.5†	47.3†														
46 Pd	24350	3604	3330	3173	671.6†	559.9†	532.3†	340.5†	335.2†	87.1* <b>b</b>	55.7† <b>a</b>	50.0†														
47 Ag	25514	3806	3524	3351	719.0†	603.8†	573.0†	374.0†	368.3†	97.0†	63.7†	58.3†														
48 Cd	26711	4018	3727	3538	772.0†	652.6†	618.4†	411.9†	405.2†	109.8†	63.9† <b>a</b>	63.9† <b>a</b>	11.7†	10.7†												
49 In	27940	4238	3938	3730	827.2†	703.2†	665.3†	451.4†	443.9†	122.9†	73.5† <b>a</b>	73.5† <b>a</b>	17.7†	16.9†												
50 Sn	29200	4465	4156	3929	884.7†	756.5†	714.6†	493.2†	484.9†	137.1†	83.6† <b>a</b>	83.6† <b>a</b>	24.9†	23.9†												
51 Sb	30491	4698	4380	4132	946†	812.7†	766.4†	537.5†	528.2†	153.2†	95.6† <b>a</b>	95.6† <b>a</b>	33.3†	32.1†												
52 Te	31814	4939	4612	4341	1006†	870.8†	820.0†	583.4†	573.0†	169.4†	103.3† <b>a</b>	103.3† <b>a</b>	41.9†	40.4†												
53 I	33169	5188	4852	4557	1072*	931*	875*	630.8	619.3	185*	123*	50.6	48.9													
54 Xe	34561	5453	5107	4786	1148.7*	1002.1*	940.6*	689.0*	676.4*	213.2*	146.7	145.5*	69.5*	67.5*	—	—	23.3*	13.4*	12.1*							
55 Cs	35985	5714	5359	5012	1211* <b>b</b>	1071*	1003*	740.5*	726.6*	232.3*	172.4*	161.3*	79.8*	77.5*	—	—	22.7	14.2*	12.1*							
56 Ba	37441	5989	5624	5247	1293* <b>b</b>	1137* <b>b</b>	1063* <b>b</b>	795.7†	780.5*	253.5†	192	178.6†	92.6†	89.9†	—	—	30.3†	17.0†	14.8†							
57 La	38925	6266	5891	5483	1362* <b>b</b>	1209* <b>b</b>	1128* <b>b</b>	853*	836*	274.7*	205.8	196.0*	106.3*	102.5*	—	—	34.3*	19.3*	16.8*							
58 Ce	40443	6549	6164	5723	1436* <b>b</b>	1274* <b>b</b>	1187* <b>b</b>	902.4*	883.3*	291.0*	223.2	206.5*	109*	0.1	0.1	37.8	19.8*	17.0*								
59 Pr	41991	6835	6440	5964	1511	1337	1242	948.3*	928.8*	304.5	236.3	217.6	115.1*	115.1*	?	?	37.4	22.3	22.3							
60 Nd	43569	7126	6722	6208	1575	1403	1297	1003.3*	980.4*	319.2*	243.3	224.6	120.5*	120.5*	1.5	1.5	37.5	21.1	21.1							
61 Pm	45184	7428	7013	6459	—	1471	1357	1052	1027	—	242	242	120	120	—	—	—	—	—							
62 Sm	46834	7737	7312	6716	1723	1541	1420	1110.9*	1083.4*	347.2*	265.6	247.4	129	129	5.2	5.2	37.4	21.3	21.3							
63 Eu	48519	8052	7617	6977	1800	1614	1481	1158.6*	1127.5*	360	284	257	133	127.7*	8.0	8.0	32	22	22							
64 Gd	50239	8376	7930	7243	1881	1688	1544	1221.9*	1189.6*	378.6*	286	271	—	142.6*	3.6*	3.6*	36	28	28							
65 Tb	51996	8708	8252	7514	1968	1768	1611	1276.9*	1241.1*	396.0*	322.4*	284.1*	—	150.5*	150.5*	7.7*	2.4*	45.6*	28.7*	22.6*						
66 Dy	53789	9046	8581	7790	2047	1842	1676	1333	1292.6*	414.2*	333.5*	293.2*	153.6*	153.6*	8.0*	4.3*	49.9*	26.3	26.3							
67 Ho	55618	9394	8918	8071	2128	1923	1741	1392	1351	432.4*	343.5	308.2*	160*	160*	8.6*	5.2*	49.3*	30.8*	24.1*							
68 Er</																										