Table 14.3. Mass Absorption Coefficients for $K\alpha$ Lines (? denotes significant uncertainty due to the presence of an absorption edge)

Absorber \ Emitter		183 eV B	277 eV C	392 eV N	525 eV O	677 eV F	849 eV Ne	1041 eV Na	1254 eV Mg	1487 eV Al	1740 eV Si	2014 eV P	2308 eV S	2622 eV Cl
1	H	1,723	473.7	156.8	60.7	26.2	12.3	6.2	3.3	1.9	1.1	0.7	0.4	0.3
2	He	10,677	3,190	1,136	465.7	210.1	101.8	52.4	28.4	16.1	9.5	5.9	3.7	2.4
3	Li	32,746	10,420	3,917	1,682	789.0	394.9	208.6	115.2	66.4	39.8	24.6	15.7	10.3
4	Be	69,937	23,698	9,372	4,195	2,039	1,052	570.3	322.0	188.9	114.8	71.9	46.4	30.7
5	B	2,861?	39,834	16,610	7,754	3,902	2,074	1,154	666.1	398.6	246.4	156.6	102.3	68.6
6	C	5,945	2,147	23,586	11,575	6,079	3,354	1,929	1,147	704.2	445.4	289.1	192.4	131.1
7	N	10,118	3,757	1,553	16,433	8,823	4,973	2,917	1,766	1,101	705.8	462.9	310.6	213.0
8	O	15,774	5,998	2,529	1,181	11,928	6,844	4,084	2,512	1,590	1,032	684.6	463.7	320.3
9	F	21,803	8,465	3,635	1,720	875.7	8,440	5,110	3,189	2,046	1,344	901.2	616.2	429.1
10	Ne	31,623	12,500	5,458	2,616	1,345	731.8	6,756	4,268	2,771	1,841	1,247	860.8	604.3
11	Na	40,649	16,323	7,235	3,513	1,823	998.4	574.4	5,086	3,337	2,240	1,532	1,067	754.8
12	Mg	54,026	21,998	9,886	4,858	2,545	1,404	811.1	488.0	4,168	2,823	1,948	1,367	975.1
13	Al	66,069	27,234	12,393	6,159	3,258	1,810	1,051	634.2	397.5	3,282	2,282	1,614	1,159
14	Si	83,702	34,881	16,054	8,063	4,304	2,409	1,407	851.9	535.0	347.2	2,774	1,976	1,429
15	P	83,768	41,087	19,107	9,692	5,220	2,943	1,728	1,051	661.7	430.1	287.4	2,230	1,622
16	S	101,883?	50,415	23,667	12,117	6,581	3,737	2,208	1,348	851.6	554.6	370.9	254.6	1,922
17	Cl	6,687	56,799?	26,896	13,888	7,604	4,350	2,584	1,586	1,005	655.8	439.3	301.7	212.0
18	Ar	7,943	52,948	29,456	15,332	8,459	4,872	2,912	1,796	1,142	747.1	501.2	344.6	242.3
19	K	10,616	5,287	36,562?	19,173	10,655	6,179	3,715	2,302	1,469	964.0	648.0	446.1	313.9
20	Ca	13,257	6,520	36,659	22,561	12,624	7,368	4,456	2,774	1,778	1,170	788.2	543.4	382.7
21	Sc	14,826	7,221	3,809	23,946	13,486	7,920	4,817	3,014	1,940	1,281	864.7	597.1	421.0
22	Ti	17,132	8,290	4,324	22,693	14,987	8,854	5,415	3,405	2,200	1,458	986.7	682.7	482.0
23	V	19,490	9,403	4,860	24,847?	16,504	9,805	6,029	3,810	2,472	1,643	1,116	773.4	546.9
24	Cr	22,734	10,978	5,635	3,156	16,086	11,199	6,921	4,395	2,864	1,910	1,301	903.8	640.1
25	Mn	25,257	12,257	6,266	3,481	17,498	12,245	7,606	4,852	3,175	2,126	1,452	1,011	717.4
26	Fe	28,799	14,103	7,202	3,974	2,347	13,799?	8,612	5,518	3,626	2,437	1,669	1,165	828.6
27	Co	31,293	15,527	7,945	4,365	2,559	12,755	9,321	5,999	3,958	2,669	1,834	1,284	914.9
28	Ni	35,672	18,009	9,262	5,077	2,959	1,820	10,607	6,856	4,542	3,074	2,119	1,488	1,062
29	Cu	37,111	19,140	9,925	5,441	3,158	1,930	9,469	7,163	4,764	3,236	2,238	1,575	1,127
30	Zn	40,796	21,586	11,319	6,222	3,602	2,191	8,431?	7,826	5,224	3,561	2,471	1,744	1,251
31	Ga	42,943	23,414	12,450	6,878	3,979	2,411	1,527	7,035	5,494	3,758	2,615	1,851	1,331
32	Ge	45,420?	25,647	13,864	7,715	4,469	2,701	1,704	7,510?	5,885	4,040	2,820	2,002	1,443
33	As	40,611	27,954	15,399	8,650	5,027	3,036	1,908	1,244	5,430	4,359	3,052	2,173	1,570
34	Se	46,930?	29,433	16,564	9,408	5,495	3,320	2,083	1,353	5,690?	4,582	3,219	2,298	1,665
35	Br	56,392?	31,863?	18,364	10,564	6,211	3,761	2,357	1,527	1,023	4,286	3,519	2,519	1,830
36	Kr	49,240	27,206	19,453	11,352	6,727	4,088	2,563	1,658	1,107	4,490?	3,697	2,654	1,933
37	Rb	46,766	31,266	20,986	12,440	7,440	4,543	2,853	1,843	1,228	842.6	3,413	2,863	2,090
38	Sr	37,887	34,433?	22,328	13,461	8,134	4,997	3,146	2,033	1,353	925.8	3,641?	3,062	2,241
39	Y	18,359	30,587	19,613?	14,611	8,929	5,523	3,489	2,258	1,501	1,026	717.7	2,829	2,419
40	Zr	—	31,304	22,346	15,583	9,637	6,007	3,813	2,472	1,644	1,122	783.5	3,003?	2,573
41	Nb	3,822	29,760	25,061?	16,633	10,418	6,548	4,178	2,716	1,808	1,233	860.2	613.6	2,359
42	Mo	4,208	26,159	26,458?	17,407?	11,048	7,007	4,497	2,934	1,956	1,335	930.0	662.4	1,899?
43	Tc	4,712	18,656	23,753	16,961	11,911	7,625	4,926	3,227	2,156	1,472	1,026	729.6	529.5
44	Ru	5,093	4,160?	24,016	18,583	12,396	8,013	5,212	3,431	2,299	1,571	1,095	778.5	564.3
45	Rh	5,609	4,612	24,067	20,608?	13,152	8,587	5,626	3,722	2,502	1,714	1,195	849.3	615.2
46	Pd	6,048	5,017	22,758	17,440	13,682?	9,025	5,956	3,962	2,673	1,835	1,281	910.6	659.3
47	Ag	6,613	5,545	19,417?	18,651	14,138	9,636	6,408	4,286	2,904	1,998	1,397	993.9	719.5
48	Cd	6,988	5,938	4,213	18,814	15,215	9,971	6,681	4,494	3,058	2,111	1,478	1,053	762.3
49	In	7,490	6,469	4,577	18,706	15,401	10,502	7,090	4,798	3,279	2,271	1,594	1,136	823.4
50	Sn	7,870	6,933	4,895	17,404	13,412	10,416	7,407	5,042	3,462	2,405	1,692	1,209	876.4
51	Sb	8,267	7,457	5,260	3,563	14,012	11,334	7,776	5,323	3,672	2,560	1,806	1,292	938.1
52	Te	8,425?	7,818	5,516	3,719	14,034	11,020	7,966	5,485	3,801	2,660	1,882	1,349	980.6
53	I	9,187?	8,599	6,077	4,082	14,394	9,975	7,989	5,939	4,134	2,904	2,061	1,480	1,078
54	Xe	9,701	9,051	6,417	4,296	3,367?	10,405	8,561	6,166	4,311	3,039	2,163	1,557	1,136
55	Cs	10,431	9,690	6,902	4,610	3,094	10,928	8,489	6,527	4,583	3,242	2,314	1,670	1,220
56	Ba	10,915	10,111	7,249	4,835	3,232	11,052	7,357	6,108	4,759	3,379	2,419	1,750	1,281
57	La	11,654	10,726?	7,756	5,171	3,445	11,224?	7,894	6,655	5,039	3,590	2,577	1,869	1,370
58	Ce	12,397	11,467	8,292	5,532	3,676	2,497	8,439	6,542	5,338	3,814	2,745	1,996	1,466
59	Pr	13,230	12,021	8,862	5,923	3,928	2,658	8,992	7,100?	4,995	4,056	2,927	2,133	1,570
60	Nd	13,879	12,418	9,274	6,216	4,117	2,777	9,340	6,157	5,342	4,229	3,059	2,234	1,648
61	Pm	14,509	12,814	9,717	6,541	4,329	2,912	2,324?	6,538	5,724?	4,511	3,252	2,369	1,745
62	Sm	15,042	13,141	10,110	6,841	4,530	3,040	2,095	6,885	5,459	4,585?	3,334	2,446	1,811
63	Eu	15,744	13,638	10,606	7,224	4,789	3,208	2,204	7,299	5,854?	4,279	3,452	2,549	1,897
64	Gd	16,016	13,787	10,838?	7,439	4,941	3,306	2,265	7,515	4,969	4,490	3,487	2,590	1,937
65	Tb	16,532	14,177	11,469	7,826	5,214	3,487	2,382	2,004?	5,295	4,294	3,604	2,692	2,022
66	Dy	16,865	14,443	11,627	8,122	5,431	3,633	2,477	1,731	5,559	4,535	3,417	2,764	2,084
67	Ho	17,240	14,783	11,855	8,477	5,694	3,812	2,596	1,808	5,861	3,898?	3,636	2,857	2,162
68	Er	17,676	15,223	12,174	8,841	5,970	4,003	2,723	1,892	6,156	4,130	3,865?	2,955	2,243
69	Tm	17,968	15,595	12,451	9,244	6,279	4,220	2,869	1,990	1,823?	4,385	3,666	3,070?	2,335
70	Yb	18,049	15,848	12,648	9,519	6,507	4,386	2,983	2,065	1,464	4,581	3,845	2,984	2,397
71	Lu	18,204	16,244	12,978	9,919?	6,827	4,617	3,142	2,173	1,537	4,835	3,287	3,168	2,490
72	Hf	17,904	16,326	13,077	10,336	7,097	4,818	3,283	2,269	1,601	5,037	3,447	2,965	2,564
73	Ta	17,642	16,549	13,312	10,511	7,421	5,059	3,454	2,387	1,682	1,698?	3,632	3,133	2,490
74	W	17,167	16,706	13,522	10,673	7,740	5,301	3,627	2,507	1,764	1,267	3,811	3,300	2,623

(continued)

Table 14.3. (*Continued*)

Absorber \ Emitter		183 eV B	277 eV C	392 eV N	525 eV O	677 eV F	849 eV Ne	1041 eV Na	1254 eV Mg	1487 eV Al	1740 eV Si	2014 eV P	2308 eV S	2622 eV Cl
75	Re	16,540	16,883	13,781	10,884	8,097	5,572	3,822	2,644	1,859	1,333	4,003	2,793	2,469
76	Os	15,557	16,900	13,947	11,032	8,399	5,808	3,996	2,766	1,945	1,392	1,509	2,916	2,583
77	Ir	14,376	16,964	14,198	11,259	8,893	6,119	4,223	2,928	2,058	1,472	1,071	3,073	2,730
78	Pt	12,828	16,945	14,435	11,490	9,073	6,417	4,443	3,086	2,170	1,550	1,126	3,219	2,293
79	Au	10,876	16,874	14,695	11,755	9,285	6,762	4,698	3,269	2,301	1,643	1,192	3,381?	2,418
80	Hg	8,312	16,509	14,777	11,899	9,407	7,062	4,923	3,433	2,418	1,727	1,251	1,499?	2,524
81	Tl	—	15,970	14,791	12,009	9,510	7,371?	5,156	3,604	2,541	1,815	1,314	966.5	2,633
82	Pb	—	15,338	14,828	12,163	9,655	7,646	5,420	3,798	2,681	1,916	1,386	1,018	2,752
83	Bi	—	14,635	14,939	12,410	9,884	7,827	5,721	4,018	2,841	2,031	1,469	1,078	1,398
84	Po	—	13,633	14,926	12,591	10,072	7,981	6,052	4,261	3,017	2,158	1,561	1,145	852.2
85	At	—	12,495	15,006	12,897	10,373	8,228	6,546?	4,531	3,214	2,301	1,665	1,220	907.2
86	Rn	—	10,352	14,109	12,405	10,045	7,981	6,346	4,548	3,231	2,315	1,676	1,228	912.0
87	Fr	—	8,457	13,838	12,510	10,214	8,134	6,467	4,790	3,409	2,445	1,771	1,297	962.8
88	Ra	—	6,089	13,323	12,459	10,274	8,206	6,526	4,985	3,553	2,551	1,848	1,354	1,005
89	Ac	—	—	12,728	12,413	10,359	8,306	6,610	5,276	3,722	2,676	1,939	1,421	1,054
90	Th	—	—	11,748	12,076	10,223	8,235	6,561	5,234	3,814	2,745	1,991	1,460	1,082
91	Pa	—	—	10,953	12,040	10,368	8,400	6,703	5,346	3,992	2,876	2,087	1,531	1,134
92	U	—	—	9,500	11,397	10,017	8,173	6,535	5,212	4,011	2,893	2,101	1,541	1,142
93	Np	—	—	8,185	11,053	9,956	8,190	6,567	5,239	4,200	2,991	2,174	1,595	1,182
94	Pu	—	—	6,449	10,307	9,564	7,945	6,392	5,103	4,088	2,990	2,175	1,597	1,184

Absorber \ Emitter		2958 eV Ar	3314 eV K	3692 eV Ca	4091 eV Sc	4511 eV Ti	4952 eV V	5415 eV Cr	5899 eV Mn	6403 eV Fe	6930 eV Co	7478 eV Ni	8048 eV Cu	8639 eV Zn
1	H	0.2	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	He	1.6	1.1	0.8	0.5	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.0
3	Li	6.9	4.7	3.3	2.4	1.7	1.3	0.9	0.7	0.5	0.4	0.3	0.3	0.2
4	Be	20.8	14.4	10.1	7.2	5.3	3.9	2.9	2.2	1.7	1.3	1.0	0.8	0.6
5	B	46.9	32.8	23.3	16.8	12.4	9.2	6.9	5.3	4.1	3.2	2.5	2.0	1.6
6	C	91.1	64.6	46.5	34.1	25.3	19.1	14.5	11.2	8.7	6.9	5.4	4.4	3.5
7	N	148.6	105.7	76.4	56.0	41.7	31.4	24.0	18.5	14.4	11.4	9.0	7.2	5.8
8	O	224.9	160.6	116.5	85.7	63.9	48.3	36.9	28.5	22.3	17.5	13.9	11.2	9.0
9	F	303.3	217.9	158.6	117.1	87.6	66.3	50.8	39.3	30.7	24.2	19.3	15.5	12.5
10	Ne	430.2	310.9	227.5	168.7	126.6	96.1	73.7	57.2	44.8	35.4	28.2	22.6	18.3
11	Na	541.2	393.6	289.6	215.7	162.5	123.8	95.2	74.0	58.0	45.9	36.6	29.4	23.8
12	Mg	704.0	515.2	381.2	285.3	215.9	165.0	127.3	99.2	78.0	61.8	49.4	39.7	32.2
13	Al	842.6	620.4	461.6	347.2	263.8	202.4	156.7	122.4	96.5	76.6	61.3	49.4	40.1
14	Si	1,045	773.8	578.9	437.5	333.9	257,2	199.8	156.5	123.7	98.4	78.9	63.7	51.8
15	P	1,193	888.6	668.1	507.4	388.9	300.8	234.5	184.3	146.0	116.5	93.6	75.7	61.7
16	S	1,422	1,064	804.1	613.4	472.2	366.6	286.8	226.1	179.7	143.7	115.7	93.8	76.5
17	Cl	1,558	1,172	889.5	681.5	526.8	410.5	322.2	254.8	203.1	162.8	131.5	106.8	87.3
18	Ar	173.5	1,246	950.1	730.9	567.1	443.5	349.3	277.1	221.5	178.1	144.1	117.2	96.0
19	K	224.9	164.2	1,152	890.0	693.1	543.9	429.8	342.0	274.1	220.9	179.1	146.1	119.9
20	Ca	274.4	200.3	148.5	1,022	798.7	628.9	498.5	397.8	319.7	258.3	209.9	171.6	141.0
21	Sc	302.0	220.6	163.6	123.1	832?	657.2	522.4	418.1	336.8	272.8	222.2	182.0	149.9
22	Ti	346.1	252.9	187.6	141.2	107.7	83.1	570.9	458.0	369.9	300.3	245.2	201.2	166.0
23	V	393.1	287.5	213.3	160.6	122.5	94.6	73.8	498.4	403.4	328.2	268.5	220.8	182.5
24	Cr	460.6	337.2	250.4	188.5	143.8	111.1	86.7	68.4	454.8	370.8	303.9	250.4	207.3
25	Mn	517.0	378.8	281.4	212.0	161.8	125.0	97.6	76.9	61.3	401.9	330.1	272.4	225.9
26	Fe	598.0	438.6	326.1	245.8	187.7	145.0	113.2	89.3	71.1	57.1	370.2	306.0	254.1
27	Co	661.4	485.7	361.5	272.6	208.2	160.9	125.7	99.1	79.0	63.5	51.4	329.4	274.0
28	Ni	769.2	565.7	421.4	318.1	243.1	187.9	146.8	115.8	92.3	74.1	60.0	49.0	311.2
29	Cu	817.9	602.4	449.3	339.4	259.5	200.7	156.8	123.8	98.7	79.3	64.2	52.4	43.0
30	Zn	909.6	670.9	501.0	378.9	289.9	224.3	175.4	138.4	110.4	88.7	71.8	58.6	48.2
31	Ga	969.9	716.6	535.9	405.6	310.6	240.5	188.1	148.5	118.4	95.2	77.1	62.9	51.7
32	Ge	1,054	779.9	584.0	442.6	339.2	262.8	205.6	162.5	129.6	104.2	84.4	68.9	56.6
33	As	1,149	852.0	639.0	484.8	372.0	288.4	225.8	178.5	142.4	114.5	92.8	75.7	62.3
34	Se	1,221	907.0	681.3	517.6	397.6	308.5	241.7	191.1	152.5	122.7	99.5	81.2	66.8
35	Br	1,345	1,001	753.3	573.1	440.7	342.3	268.3	212.3	169.5	136.4	110.6	90.3	74.3
36	Kr	1,424	1,062	800.4	609.8	469.5	365.0	286.4	226.7	181.1	145.8	118.2	96.6	79.4
37	Rb	1,543	1,153	870.9	664.6	512.2	398.7	313.0	248.0	198.2	159.6	129.5	105.8	87.1
38	Sr	1,658	1,242	939.4	718.0	554.1	431.8	339.3	269.0	215.2	173.3	140.7	115.0	94.6
39	Y	1,794	1,346	1,020	780.9	603.6	470.8	370.4	293.9	235.2	189.6	153.9	125.9	103.6
40	Zr	1,913	1,438	1,092	837.4	648.1	506.2	398.6	316.6	253.5	204.5	166.1	135.9	111.9
41	Nb	2,048	1,543	1,174	901.5	698.8	546.5	430.8	342.4	274.5	221.5	180.0	147.3	121.3
42	Mo	2,156	1,628	1,241	954.4	740.9	580.2	457.9	364.3	292.2	235.9	191.9	157.1	129.4
43	Tc	1,984	1,749	1,336	1,029	800.2	627.4	495.7	394.8	317.0	256.1	208.4	170.7	140.7
44	Ru	1,564	1,818	1,391	1,074	836.0	656.4	519.3	414.0	332.6	269.0	219.0	179.5	148.0
45	Rh	452.7	1,656	1,479	1,144	892.0	701.4	555.5	443.3	356.6	288.6	235.1	192.8	159.1
46	Pd	484.8	1,302	1,545	1,197	934.7	736.0	583.7	466.3	375.4	304.1	247.9	203.4	167.9
47	Ag	528.7	394.9	1,409	1,274	996.5	785.7	623.9	499.0	402.1	326.0	266.0	218.4	180.4
48	Cd	560.1	418.0	1,087	1,315	1,031	813.9	647.1	518.2	418.0	339.2	277.0	227.5	188.1

(*continued*)

Table 14.3. (*Continued*)

Absorber \ Emitter		2958 eV Ar	3314 eV K	3692 eV Ca	4091 eV Sc	4511 eV Ti	4952 eV V	5415 eV Cr	5899 eV Mn	6403 eV Fe	6930 eV Co	7478 eV Ni	8048 eV Cu	8639 eV Zn
49	In	604.9	451.3	341.1	1,188	1,086	859.1	683.9	548.3	442.8	359.6	293.9	241.6	199.8
50	Sn	644.0	480.4	362.9	916.4	1,128	893.6	712.3	571.8	462.2	375.7	307.3	252.8	209.2
51	Sb	689.7	514.5	388.6	297.3	1,011	934.8	746.2	599.7	485.3	394.9	323.3	266.2	220.4
52	Te	721.5	538.4	406.6	311.0	763.6	955?	763.6	614.4	497.7	405.4	332.2	273.7	226.8
53	I	793.7	592.5	447.5	342.2	264.7	881.1	821.9	662.1	537.0	437.8	359.1	296.1	245.5
54	Xe	837.3	625.5	472.6	361.4	279.5	669.0	728.3	684.6	555.9	453.7	372.4	307.3	255.0
55	Cs	900.7	673.4	509.0	389.3	301.1	235.4	767.3	722.2	587.0	479.6	394.1	325.5	270.3
56	Ba	946.8	708.5	535.9	410.0	317.1	247.8	579.7	639.2	606.2	495.8	407.7	337.1	280.1
57	La	1,015	760.1	575.3	440.3	340.6	266.2	210.0	673?	638.6	522.8	430.4	356.1	296.2
58	Ce	1,087	815.6	617.8	473.1	366.1	286.2	225.8	517.8	577.8	551.9	454.7	376.6	313.4
59	Pr	1,166	875.8	664.0	508.8	393.8	307.9	243.0	193.5	445.3	583.4	481.2	398.8	332.2
60	Nd	1,226	921.6	699.5	536.3	415.4	324.9	256.4	204.2	460.7	518.9	499.3	414.2	345.3
61	Pm	1,298	975.4	740.3	567.6	439.6	343.9	271.4	216.1	173.6	393.2	519.8	431.6	360.1
62	Sm	1,352	1,019	775.3	595.5	461.7	361.4	285.4	227.3	182.7	406.5	461.9	447.4	373.6
63	Eu	1,421	1,075	819.5	630.5	489.5	383.5	303.0	241.5	194.1	157.2	351.6	402?	391.5
64	Gd	1,457	1,105	844.6	651.0	506.1	396.9	313.8	250.2	201.2	162.9	358.8	410.6	400.3
65	Tb	1,526	1,161	889.3	686.6	534.5	419.6	332.0	264.8	213.0	172.5	140.8	311.9	359.0
66	Dy	1,578	1,204	923.8	714.4	556.9	437.6	346.5	276.5	222.6	180.3	147.2	321.6	370.4
67	Ho	1,642	1,255	965.2	747.6	583.5	459.0	363.7	290.4	233.8	189.5	154.7	127.1	279.8
68	Er	1,708	1,308	1,008	781.7	610.9	481.0	381.4	304.8	245.5	199.0	162.5	133.6	290.4
69	Tm	1,782	1,367	1,055	819.5	641.1	505.2	401.0	320.6	258.4	209.5	171.1	140.7	116.4
70	Yb	1,832	1,408	1,088	846.0	662.5	522.6	415.0	332.0	267.7	217.2	177.5	145.9	120.8
71	Lu	1,906	1,467	1,135	883.5	692.5	546.7	434.4	347.8	280.5	227.7	186.1	153.1	126.7
72	Hf	1,965	1,514	1,173	913.7	716.8	566.2	450.3	360.6	291.0	236.3	193.2	159.0	131.6
73	Ta	2,037	1,571	1,218	949.7	745.6	589.4	469.0	375.8	303.4	246.5	201.6	165.9	137.4
74	W	2,105	1,625	1,261	983.9	773.0	611.5	486.8	390.3	315.3	256.2	209.6	172.5	142.9
75	Re	2,181	1,685	1,308	1,022	803.2	635.7	506.4	406.2	328.3	266.9	218.4	179.8	149.0
76	Os	2,090	1,731	1,345	1,051	826.8	654.8	521.9	418.9	338.6	275.4	225.4	185.7	153.9
77	Ir	2,207	1,796	1,396	1,092	859.6	681.2	543.2	436.2	352.7	287.0	235.0	193.6	160.5
78	Pt	2,075	1,853?	1,442	1,129	889.1	705.0	562.5	451.8	365.6	297.5	243.7	200.9	166.6
79	Au	2,192	1,801	1,496	1,172	923.8	732.9	585.1	470.2	380.6	309.8	253.9	209.3	173.6
80	Hg	2,294	1,882	1,538	1,206	951.1	755.0	603.0	484.9	392.6	319.7	262.1	216.1	179.3
81	Tl	2,398?	1,770	1,472	1,240	978.8	777.6	621.4	499.9	404.9	329.9	270.5	223.1	185.2
82	Pb	2,003	1,859	1,544	1,280	1,012	804.3	643.2	517.7	419.5	341.9	280.5	231.4	192.1
83	Bi	2,110	1,962	1,471?	1,328	1,051	836.2	669.1	538.9	436.9	356.2	292.3	241.2	200.3
84	Po	2,228	2,077?	1,557	1,306	1,095	872.6	698.9	563.1	456.8	372.6	305.8	252.5	209.7
85	At	2,358	1,750	1,656	1,386	1,147	915.1	733.5	591.5	480.1	391.7	321.6	265.6	220.6
86	Rn	1,293	1,756	1,665	1,268	1,136	907.9	728.6	588.0	477.5	389.8	320.1	264.5	219.8
87	Fr	722.6	1,853	1,761	1,341	1,131	948.1	761.9	615.4	500.1	408.5	335.6	277.3	230.5
88	Ra	753.2	1,931	1,458	1,406	1,182	981.5	790.1	639.0	519.7	424.7	349.1	288.5	239.8
89	Ac	789.5	1,250	1,537	1,485	1,147	972.8	827.2	669.9	545.3	445.9	366.7	303.2	252.1
90	Th	810.0	613.8	1,591	1,542	1,191	1,007	851.4	690.8	563.0	460.7	379.1	313.5	260.8
91	Pa	848.9	642.6	1,677	1,292	1,268	991.9	899.7	731.8	597.4	489.3	402.8	333.3	277.3
92	U	854.4	646.4	1,151	1,326	1,304	1,020	864.7	749.4	613.0	502.7	414.1	342.8	285.3
93	Np	884.2	668.5	694.7	1,403	1,387	1,086	916.3	794.6	651.9	535.5	441.6	365.7	304.4
94	Pu	884.8	668.6	509.8	1,405	1,128	1,125	889.9	755.4	676.3	556.9	459.8	381.0	317.3

Absorber \ Emitter		9252 eV Ga	9886 eV Ge	10,544 eV As	11,222 eV Se	11,924 eV Br	12,649 eV Kr	13,395 eV Rb	14,165 eV Sr	14,958 eV Y	15,775 eV Zr	16,615 eV Nb	17,479 eV Mo	18,367 eV Tc	19,279 eV Ru
1	H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	He	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Li	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	Be	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.0
5	B	1.3	1.0	0.8	0.7	0.6	0.5	0.4	0.3	0.3	0.2	0.2	0.2	0.1	0.1
6	C	2.9	2.3	1.9	1.6	1.3	1.1	0.9	0.8	0.7	0.6	0.5	0.4	0.4	0.3
7	N	4.7	3.9	3.2	2.6	2.2	1.8	1.5	1.3	1.1	0.9	0.8	0.7	0.6	0.5
8	O	7.3	6.0	4.9	4.1	3.4	2.9	2.4	2.0	1.7	1.5	1.3	1.1	0.9	0.8
9	F	10.2	8.3	6.9	5.7	4.8	4.0	3.3	2.8	2.4	2.0	1.8	1.5	1.3	1.1
10	Ne	14.9	12.2	10.1	8.4	7.0	5.9	4.9	4.2	3.5	3.0	2.6	2.2	1.9	1.7
11	Na	19.4	16.0	13.2	10.9	9.1	7.7	6.5	5.5	4.6	4.0	3.4	2.9	2.5	2.2
12	Mg	26.3	21.6	17.9	14.8	12.4	10.4	8.8	7.4	6.3	5.4	4.6	4.0	3.4	3.0
13	Al	32.8	27.0	22.3	18.6	15.5	13.0	11.0	9.3	7.9	6.8	5.8	5.0	4.3	3.8
14	Si	42.4	34.9	28.9	24.1	20.1	16.9	14.3	12.1	10.3	8.8	7.6	6.5	5.7	4.9
15	P	50.5	41.7	34.5	28.8	24.1	20.3	17.1	14.6	12.4	10.6	9.1	7.9	6.8	5.9
16	S	62.8	51.8	43.0	35.9	30.1	25.3	21.4	18.2	15.5	13.3	11.4	9.9	8.5	7.4
17	Cl	71.7	59.3	49.2	41.1	34.5	29.1	24.6	21.0	17.9	15.3	13.2	11.4	9.9	8.6
18	Ar	79.0	65.4	54.4	45.5	38.2	32.3	27.4	23.3	19.9	17.1	14.7	12.7	11.0	9.5
19	K	98.8	82.0	68.3	57.2	48.1	40.6	34.5	29.4	25.1	21.5	18.6	16.0	13.9	12.1
20	Ca	116.5	96.8	80.7	67.7	57.0	48.2	40.9	34.9	29.9	25.6	22.1	19.1	16.6	14.4
21	Sc	124.0	103.2	86.2	72.4	61.0	51.6	43.9	37.5	32.1	27.6	23.8	20.6	17.9	15.6
22	Ti	137.6	114.6	95.9	80.6	68.0	57.7	49.1	41.9	35.9	30.9	26.7	23.1	20.1	17.5
23	V	151.5	126.4	105.9	89.2	75.3	63.9	54.5	46.6	39.9	34.4	29.7	25.8	22.4	19.5

(*continued*)

Table 14.3. (*Continued*)

Absorber \ Emitter		9252 eV Ga	9886 eV Ge	10,544 eV As	11,222 eV Se	11,924 eV Br	12,649 eV Kr	13,395 eV Rb	14,165 eV Sr	14,958 eV Y	15,775 eV Zr	16,615 eV Nb	17,479 eV Mo	18,367 eV Tc	19,279 eV Ru
24	Cr	172.4	144.1	120.9	101.9	86.2	73.2	62.4	53.4	45.9	39.5	34.2	29.6	25.8	22.5
25	Mn	188.1	157.5	132.3	111.6	94.5	80.4	68.6	58.8	50.5	43.6	37.7	32.7	28.5	24.9
26	Fe	212.0	177.7	149.4	126.3	107.1	91.1	77.9	66.8	57.4	49.6	42.9	37.3	32.5	28.4
27	Co	228.9	192.0	161.7	136.8	116.1	98.9	84.6	72.6	62.5	54.0	46.8	40.7	35.5	31.0
28	Ni	260.3	218.7	184.4	156.1	132.7	113.1	96.9	83.2	71.7	62.0	53.7	46.8	40.8	35.7
29	Cu	271.2	228.1	192.5	163.2	138.8	118.5	101.5	87.3	75.3	65.1	56.5	49.2	42.9	37.6
30	Zn	39.8	249.3	210.6	178.7	152.2	130.0	111.5	95.9	82.8	71.7	62.2	54.2	47.4	41.5
31	Ga	42.8	35.6	221.4	188.0	160.2	137.0	117.6	101.2	87.4	75.7	65.8	57.4	50.1	43.9
32	Ge	46.8	39.0	32.6	201.9	172.1	147.3	126.5	109.0	94.2	81.7	71.0	61.9	54.2	47.5
33	As	51.5	42.9	35.9	30.2	186.0	159.2	136.8	118.0	102.0	88.5	77.0	67.2	58.8	51.6
34	Se	55.2	46.0	38.5	32.4	27.4	23.3	144.4	124.6	107.8	93.5	81.4	71.1	62.3	54.7
35	Br	61.5	51.2	42.8	36.1	30.5	25.9	22.1	136.5	118.2	102.6	89.4	78.1	68.4	60.1
36	Kr	65.8	54.8	45.8	38.6	32.6	27.7	23.7	20.3	124.7	108.3	94.4	82.5	72.3	63.5
37	Rb	72.1	60.0	50.3	42.3	35.8	30.4	26.0	22.3	19.2	117.1	102.1	89.3	78.3	68.8
38	Sr	78.4	65.3	54.7	46.0	38.9	33.1	28.3	24.2	20.8	18.0	109.4	95.7	84.0	73.9
39	Y	85.8	71.5	59.9	50.4	42.7	36.3	31.0	26.6	22.9	19.7	17.1	103.3	90.7	79.8
40	Zr	92.7	77.2	64.7	54.5	46.1	39.2	33.5	28.7	24.7	21.3	18.5	16.1	96.5	85.0
41	Nb	100.5	83.8	70.2	59.2	50.1	42.6	36.4	31.2	26.8	23.2	20.1	17.5	15.3	90.7
42	Mo	107.3	89.5	75.0	63.2	53.5	45.5	38.9	33.3	28.7	24.8	21.5	18.7	16.3	14.3
43	Tc	116.7	97.3	81.6	68.8	58.2	49.5	42.3	36.3	31.2	27.0	23.4	20.4	17.8	15.6
44	Ru	122.8	102.5	85.9	72.4	61.3	52.2	44.6	38.2	32.9	28.5	24.7	21.5	18.8	16.4
45	Rh	132.0	110.2	92.4	77.9	66.0	56.2	48.0	41.2	35.5	30.7	26.6	23.1	20.2	17.7
46	Pd	139.4	116.4	97.7	82.4	69.8	59.4	50.8	43.6	37.5	32.5	28.2	24.5	21.4	18.7
47	Ag	149.8	125.2	105.0	88.6	75.1	63.9	54.7	46.9	40.4	35.0	30.3	26.4	23.1	20.2
48	Cd	156.3	130.6	109.6	92.5	78.4	66.8	57.1	49.0	42.3	36.5	31.7	27.5	24.1	21.1
49	In	166.1	138.9	116.6	98.5	83.5	71.1	60.8	52.2	45.0	38.9	33.8	29.4	25.7	22.5
50	Sn	174.1	145.6	122.3	103.3	87.6	74.7	63.9	54.9	47.3	40.9	35.5	30.9	27.0	23.7
51	Sb	183.5	153.5	129.0	109.0	92.5	78.8	67.5	58.0	50.0	43.2	37.6	32.7	28.6	25.0
52	Te	188.9	158.2	133.0	112.4	95.4	81.3	69.6	59.8	51.6	44.7	38.8	33.8	29.5	25.9
53	I	204.6	171.4	144.2	122.0	103.6	88.3	75.6	65.0	56.1	48.5	42.2	36.7	32.1	28.2
54	Xe	212.7	178.3	150.1	127.0	107.9	92.0	78.8	67.7	58.5	50.6	44.0	38.3	33.5	29.4
55	Cs	225.6	189.2	159.3	134.9	114.6	97.8	83.8	72.1	62.2	53.9	46.8	40.8	35.7	31.3
56	Ba	233.9	196.3	165.4	140.1	119.1	101.7	87.1	75.0	64.7	56.1	48.7	42.5	37.2	32.6
57	La	247.5	207.8	175.2	148.5	126.3	107.8	92.5	79.6	68.7	59.5	51.8	45.2	39.5	34.7
58	Ce	262.1	220.3	185.8	157.5	134.0	114.5	98.2	84.6	73.0	63.3	55.1	48.0	42.0	36.9
59	Pr	278.0	233.8	197.3	167.4	142.5	121.8	104.5	90.0	77.8	67.4	58.7	51.2	44.8	39.3
60	Nd	289.2	243.3	205.5	174.4	148.6	127.0	109.1	93.9	81.2	70.4	61.3	53.5	46.8	41.1
61	Pm	301.8	254.1	214.8	182.4	155.4	132.9	114.2	98.4	85.1	73.8	64.2	56.1	49.1	43.1
62	Sm	313.3	264.0	223.3	189.7	161.7	138.4	118.9	102.5	88.7	77.0	67.0	58.5	51.3	45.0
63	Eu	328.6	277.1	234.5	199.3	170.0	145.6	125.1	107.9	93.4	81.1	70.6	61.7	54.0	47.5
64	Gd	336.3	283.7	240.3	204.4	174.4	149.4	128.5	110.9	96.0	83.3	72.6	63.4	55.6	48.9
65	Tb	351.8	297.0	251.7	214.2	182.9	156.8	134.9	116.4	100.8	87.6	76.3	66.7	58.5	51.4
66	Dy	363.2	306.9	260.2	221.6	189.3	162.4	139.8	120.7	104.6	90.9	79.2	69.3	60.7	53.4
67	Ho	323.7	319.0	270.7	230.7	197.2	169.2	145.7	125.9	109.1	94.8	82.7	72.3	63.4	55.8
68	Er	244.7	331.5	281.4	240.0	205.3	176.2	151.8	131.2	113.8	98.9	86.3	75.5	66.2	58.3
69	Tm	255.0	296.4	293.4	250.3	214.3	184.0	158.6	137.2	119.0	103.5	90.3	79.1	69.4	61.1
70	Yb	261.7	221.7	301.3	257.2	220.3	189.3	163.2	141.2	122.5	106.7	93.1	81.5	71.6	63.0
71	Lu	272?	230.4	268.5	267.3	229.1	196.9	169.9	147.1	127.7	111.2	97.1	85.0	74.7	65.7
72	Hf	109.6	237.1	201.9	236.0	235.9	202.9	175.2	151.7	131.7	114.7	100.2	87.8	77.1	67.9
73	Ta	114.4	245?	209.0	244.2	244.1	210.1	181.5	157.2	136.6	119.0	104.0	91.2	80.1	70.6
74	W	119.1	99.8	215.7	184.6	216.0	216.8	187.3	162.4	141.1	123.0	107.6	94.3	82.9	73.1
75	Re	124.2	104.1	223?	191.0	164.0	224.2	193.8	168.1	146.2	127.5	111.5	97.8	86.0	75.8
76	Os	128.3	107.6	90.6	195.9	168.3	197.0	198.6	172.3	149.9	130.8	114.5	100.4	88.3	77.9
77	Ir	133.8	112.2	94.6	203?	174.4	150.4	176.4	178.4	155.3	135.6	118.7	104.1	91.6	80.9
78	Pt	138.9	116.5	98.2	83.2	179.8	155.1	181.5	183.7	160.0	139.7	122.3	107.4	94.6	83.4
79	Au	144.8	121.5	102.4	86.8	186?	160.7	139.2	163.0	165.5	144.6	126.7	111.3	98.0	86.5
80	Hg	149.6	125.6	105.9	89.7	76.4	164.9	143.0	124.2	169.6	148.2	129.9	114.1	100.6	88.8
81	Tl	154.6	129.7	109.4	92.7	79.0	67.5	146.7	127.6	149.0	151.9	133.1	117.0	103.1	91.1
82	Pb	160.4	134.6	113.5	96.3	82.0	70.1	151.2	131.5	114.7	134.0	137.0	120.5	106.2	93.8
83	Bi	167.2	140.4	118.5	100.5	85.6	73.2	62.9	136.2	118.9	138.5	141.6	124.5	109.8	97.1
84	Po	175.1	147.1	124.1	105.3	89.7	76.7	65.9	141.6	123.7	108.2	126.0	129.2	114.0	100.8
85	At	184.3	154.8	130.7	110.9	94.5	80.8	69.5	59.9	129.2	113.1	99.3	115.5	118.8	105.1
86	Rn	183.6	154.3	130.2	110.5	94.2	80.6	69.3	59.8	127.6	111.8	98.2	113.8	117.1	103.6
87	Fr	192.6	161.9	136.7	116.0	98.9	84.6	72.8	62.8	54.4	116.3	102.2	90.9	104.2	107.5
88	Ra	200.5	168.5	142.3	120.8	103.0	88.1	75.8	65.4	56.7	119.9	105.4	92.9	82.1	110.5
89	Ac	210.8	177.2	149.6	127.0	108.3	92.7	79.8	68.9	59.7	51.9	109.8	96.8	85.5	98.4
90	Th	218.0	183.3	154.8	131.5	112.1	96.0	82.6	71.3	61.8	53.7	112.4	99.1	87.6	77.6
91	Pa	231.9	195.0	164.7	139.9	119.3	102.2	87.9	75.9	65.8	57.2	49.9	104.2	92.1	81.7
92	U	238.6	200.7	169.5	144.0	122.8	105.2	90.5	78.1	67.7	58.9	51.4	105.9	93.7	83.1
93	Np	254.6	214.2	180.9	153.7	131.1	112.3	96.6	83.4	72.3	62.9	54.9	48.1	98.8	87.6
94	Pu	265.5	223.3	188.7	160.2	136.7	117.1	100.8	87.0	75.4	65.6	57.3	50.1	101.6	90.1

[a] Heinrich (1986).

Table 14.4. Mass Absorption Coefficients for $L\alpha$ Lines[a] (? denotes significant uncertainty due to the presence of an absorption edge)

Absorber \ Emitter		341 eV Ca	395 eV Sc	452 eV Ti	511 eV V	573 eV Cr	637 eV Mn	705 eV Fe	776 eV Co	852 eV Ni	930 eV Cu	1012 eV Zn	1098 eV Ga	1188 eV Ge
1	H	245.1	153.0	98.9	66.3	45.5	32.1	22.9	16.6	12.2	9.1	6.8	5.2	4.0
2	He	1,724	1,110	737.5	506.2	354.9	254.6	184.7	136.0	100.6	75.8	57.5	44.0	33.9
3	Li	5,818	3,833	2,602	1,821	1,299	947.6	697.9	520.9	390.6	297.4	228.1	176.2	137.1
4	Be	13,642	9,180	6,353	4,524	3,281	2,429	1,814	1,371	1,041	801.6	621.4	484.8	380.6
5	B	23,681	16,289	11,495	8,330	6,138	4,610	3,490	2,672	2,053	1,599	1,253	987.2	782.4
6	C	32,820	23,160	16,728	12,377	9,300	7,109	5,474	4,258	3,323	2,625	2,085	1,664	1,335
7	N	2,227	1,523	23,471	17,534	13,300	10,261	7,974	6,260	4,928	3,926	3,144	2,530	2,046
8	O	3,598	2,480	1,751	1,268	17,766	13,810	10,813	8,552	6,785	5.445	4,391	3,559	2,897
9	F	5,134	3,566	2,534	1,845	1,366	1,031	13,170?	10,482	8,368	6.757	5,483	4,471	3,662
10	Ne	7,657	5,356	3,830	2,804	2,086	1,580	1,207	933.2	724.8	8,870	7,236	5,931	4,884
11	Na	10,088	7,103	5,109	3,761	2,811	2,138	1,638	1,270	989.0	780.6	620.4	7,014	5.801
12	Mg	13,706	9,709	7,022	5,196	3,900	2,978	2,291	1,781	1,391	1,100	875.7	701.7	565.9
13	Al	17,092	12,174	8,852	6,580	4,961	3,803	2,936	2,290	1,793	1,421	1,134	910.1	735.0
14	Si	22,036	15,775	11,525	8,606	6,517	5,015	3,885	3,040	2,387	1,897	1,517	1,219	986.3
15	P	26,112	18,779	13,782	10,335	7,857	6,068	4,718	3,704	2,916	2,324	1,862	1,500	1,215
16	S	32,214	23,267	17,146	12,909	9,851	7,635	5,956	4,691	3,704	2,959	2,377	1,919	1,558
17	Cl	36,475	26,447	19,565	14,784	11,322	8,805	6,891	5,444	4,311	3,453	2,780	2,250	1,830
18	Ar	39,810	28,969	21,508	16,308	12,531	9,777	7,675	6,081	4,830	3,879	3,131	2,539	2,069
19	K	42,264	35,964?	26,790	20,379	15,709	12,293	9,679	7,691	6,125	4,932	3,990	3,243	2,649
20	Ca	4,489?	36,066	31,408?	23,964	18,527	14,540	11,481	9,147	7,305	5,897	4,782	3,896	3,188
21	Sc	4,935	3,756	28,503	25,418?	19,706	15,508	12,279	9,808	7,853	6,355	5,166	4,218	3,459
22	Ti	5,630	4,262	3,295?	24,074	21,810?	17,208	13,659	10,938	8,780	7,122	5,802	4,748	3,902
23	V	6,355	4,789	3,684	2,898?	20,528	18,922?	15,057	12,086	9,725	7,906	6,456	5,294	4,359
24	Cr	7,395	5,552	4,253	3,331	2,650?	18,418	17,120?	13,774	11,108	9,051	7,406	6,086	5,022
25	Mn	8,244	6,172	4,712	3,677	2,913	2,347?	15,993	15,029?	12,146	9,918	8,133	6,697	5,536
26	Fe	9,488	7,093	5,401	4,202	3,317	2,663	2,157?	14,502	13,688?	11,200	9,202	7,592	6,289
27	Co	10,470	7,824	5,949	4,617	3,635	2,910	2,349	1,917?	12,654	12,090?	9,953	8,228	6,828
28	Ni	12,193	9,121	6,933	5,373	4,221	3,370	2,713	2,208	1,806?	11,776	11,320?	9,374	7,794
29	Cu	13,036	9,775	7,436	5,760	4,519	3,602	2,893	2,348	1,916	1,582?	10,099	9,765?	8,133
30	Zn	14,816	11,150	8,498	6,586	5,166	4,112	3,297	2,671	2,174	1,791	1,485	9,128	7,615
31	Ga	16,222	12,266	9,377	7,279	5,712	4,545	3,640	2,945	2,392	1,967	1,627	1,355	7,965
32	Ge	17,963	13,663	10,487	8,162	6,413	5,105	4,088	3,304	2,680	2,200	1,817	1,509	1,262
33	As	19,824	15,181	11,710	9,145	7,202	5,740	4,598	3,716	3,012	2,469	2,036	1,689	1,409
34	Se	21,167	16,335	12,673	9,939	7,851	6,270	5,028	4,065	3,294	2,699	2,223	1,842	1,534
35	Br	23,274	18,117	14,148	11,150	8,840	7,078	5,687	4,602	3,731	3.057	2,517	2,083	1,733
36	Kr	24,433	19,200	15,102	11,968	9,529	7,655	6,165	4,998	4,056	3,324	2,737	2,264	1,883
37	Rb	26,100?	20,724	16,429	13,099	10,481	8,451	6,826	5,545	4,508	3,698	3.046	2,520	2,094
38	Sr	23,101	22,061	17,639	14,156	11,386	9,220	7,473	6,087	4,958	4,073	3,358	2,779	2,310
39	Y	26,314	23,528?	18,985	15,344	12,412	10,096	8,214	6,711	5,480	4,510	3,723	3,085	2,565
40	Zr	28,634?	21,990	20,065	16,340	13,297	10,870	8,880	7,280	5,961	4,917	4,066	3,373	2,807
41	Nb	25,679	24,698?	18,619	17,413	14,262	11,719	9,616	7,912	6,499	5,374	4,453	3,700	3,083
42	Mo	26,680	26,118?	20,828	18,194?	15,001	12,393	10,216	8,439	6,955	5,767	4,790	3,987	3,328
43	Tc	26,935	23,504	23,371?	18,042	16,033	13,321	11,034	9,151	7,569	6,296	5,242	4,373	3,656
44	Ru	24,605	23,846	19,827	19,696	15,220	13,821	11,506	9,583	7,956	6,638	5,542	4,634	3,882
45	Rh	20,976	24,013	21,157	20,664?	17,063	14,619?	12,232	10,232	8,527	7,138	5,977	5,010	4,206
46	Pd	14,680?	22,869	21,811	18,311	18,652?	14,657	12,750	10,713	8,963	7,528	6,322	5,313	4,471
47	Ag	4,594	19,810	21,919	19,431	19,236?	16,313	12,803	11,395	9,571	8,066	6,795	5,726	4,830
48	Cd	4,913	4,175	19,879	19,361	16,559	16,296?	13,837	11,746?	9,906	8,377	7,078	5,981	5,057
49	In	5,348	4,535	16,393?	18,886	17,183	14,418	15,119?	12,037	10,434	8,854	7,504	6,358	5,389
50	Sn	5,729	4,850	4,090	17,012?	17,095	14,964	12,356	13,000?	10,322	9,213	7,832	6,654	5,654
51	Sb	6,165	5,212	4,386	3,703	16,413	15,313	13,039	12,948?	11,235	8,992	8,214	6,998	5,961
52	Te	6,471	5,465	4,590	3,867	3,747?	14,879	13,247	11,096	10,928	9,570	8,408?	7,182	6,132
53	I	7,133	6,021	5,049	4,246	3,581	14,555?	13,876	11,994	9,896	9,777?	8,603	7,746	6,630
54	Xe	7.532	6,356	5,325	4,471	3,763	3,190	13,433	12,211	10,330	8,508	9,204?	7,446	6,873
55	Ca	8,097	6,837	5,725	4,800	4,034	3,413	2,896	12,365	10,861	9,111	9,107?	8,133	6,604
56	Ba	8,495	7,181	6,011	5,036	4,226	3,570	3,024	2,577?	10,999	9,465	7,869	7,861	7,056
57	La	9,072	7,683	6,433	5,386	4,515	3,808	3,220	2,739	11,192?	9,954	8,413	6,951	6,949
58	Ce	9,676	8,215	6,885	5,763	4,827	4,067	3,434	2,916	2,482	10,370	8,954	7,477	7,526?
59	Pr	10,310	8,781	7,370	6,171	5,166	4,349	3,667	3,110	2,642	2,264?	9,487	8,028	6,656
60	Nd	10,747	9,190	7,728	6,476	5,421	4,561	3,842	3,253	2,760	2,361	9,784?	8,421	7,040
61	Pm	11,210?	9,632	8,120	6,813	5,706	4,798	4,039	3,416	2,894	2,472	2,121	8,799	7,442
62	Sm	11,785?	10,023	8,477	7,125	5,971	5,022	4,225	3,570	3,020	2,576	2,207	2,208?	7,791
63	Eu	12,175	10,518	8,929	7,521	6,310	5,309	4,466	3,772	3,187	2,715	2,323	1,995	8,192
64	Gd	12,259	10,751?	9,165	7,741	6,505	5,477	4,608	3,890	3,285	2,795	2,388	2,048	2,088?
65	Tb	12,563	11,410?	9,607	8,139	6,854	5,777	4,862	4,105	3,464	2,945	2,513	2,153	1,852
66	Dy	12,764	11,565	9,930	8,442	7,125	6.015	5,066	4,278	3,609	3,067	2,614	2,237	1,922
67	Ho	13,039	11,791	10,317?	8,805	7,451	6,301	5,314	4,489	3,788	3,217	2,740	2,342	2,010
68	Er	13,410	12,107	10,706?	9,175	7,788	6,600	5,573	4,712	3,977	3,377	2,875	2,456	2,105
69	Tm	13,731	12,382	11,179	9,585	8,163	6,934	5,866	4,964	4,192	3,561	3,030	2,586	2,215
70	Yb	13,958	12,577	11,341	9,862	8,428	7,178	6,083	5,156	4,357	3,702	3,150	2,688	2,300
71	Lu	14,326	12,905	11,626	10,266?	8,806	7,520	6,387	5,421	4,587	3,899	3,319	2,831	2,422
72	Hf	14,432	13,002	11,708	10,577	9,115	7,807	6,646	5,651	4,787	4,073	3,468	2,958	2,530
73	Ta	14,681	13,237	11,917	10,758	9,488?	8,151	6,956	5,926	5,027	4,281	3,648	3,112	2,661

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		341 eV Ca	395 eV Sc	452 eV Ti	511 eV V	573 eV Cr	637 eV Mn	705 eV Fe	776 eV Co	852 eV Ni	930 eV Cu	1012 eV Zn	1098 eV Ga	1188 eV Ge
74	W	14,894	13,446	12,108	10,926	9,877	8,488	7,262	6,199	5,267	4,491	3,830	3,269	2,796
75	Re	15,149	13,704	12,349	11,143	10,067	8,865?	7,604	6,505	5,537	4,727	4,035	3,446	2,948
76	Os	15,291	13,871	12,514	11,295	10,201	9,245	7,895	6,769	5,772	4,935	4,216	3,604	3,085
77	Ir	15,511	14,123	12,763	11,527	10,411	9,431	8,285?	7,118	6,081	5,207	4,454	3,811	3,264
78	Pt	15,698	14,361	13,009	11,761	10,626	9,623	8,717	7,451	6,378	5,469	4,685	4,012	3,439
79	Au	15,890	14,623	13,287	12,031	10,876	9,850	8,920	7,838?	6,722	5,774	4,952	4,246	3,642
80	Hg	15,867	14,709	13,418	12,174	11,016	9,980	9,036	8,195	7,020	6,039	5,187	4,452	3,822
81	Tl	15,746	14,728	13,501	12,282	11,129	10,088	9,135	8,283	7,328?	6,314	5,430	4,667	4,010
82	Pb	15,618	14,771	13,622	12,433	11,286	10,240	9,275	8,409	7,617	6,626	5,707	4,910	4,223
83	Bi	15,531	14,889	13,832	12,676	11,534	10.478	9,496	8,610	7,797	7,084	6,020	5,186	4,465
84	Po	15,270	14,887	13,953	12,852	11,728	10,672	9,680	8,780	7,950	7,221	6,367?	5,490	4,732
85	At	15,046	14,978	14,192	13,151	12,044	10,982	9,973	9,051	8,197	7,443	6,763	5,829	5,029
86	Rn	13,796	14,097	13,534	12,634	11,622	10,624	9,663	8,776	7,951	7,219	6,558	5,841?	5,045
87	Fr	13,104	13,844	13,509	12,722	11,764	10,789	9,832	8,940	8,103	7,358	6,683	6,073	5,310
88	Ra	12,096	13,348	13,287	12,648	11,770	10,835	9,898	9,012	8,175	7,426	6,745	6,128	5,572
89	Ac	10,922	12,777	13,041	12,575	11,791	10,904	9,990	9,112	8,275	7,521	6,831	6,205	5,641
90	Th	9,315	11,823	12,456	12,203	11,546	10,737	9,871	9,023	8,205	7,463	6,780	6,159	5,597
91	Pa	7,720	11,062	12,143	12,129	11,602	10,859	10,025	9,189	8,370	7,620	6,926	6,293	5,718
92	U	5,517	9,641	11,178	11,439	11,088	10,459	9,703	8,922	8,143	7,423	6,752	6,136	5,576
93	Np	—	8,366	10,466	11,043	10,877	10,355	9,664	8,920	8,161	7,451	6,784	6,168	5,605
94	Pu	—	6,670	9,328	10,240	10,286	9,903	9,306	8,628	7,918	7,242	6,601	6,006	5,459

Absorber \ Emitter		1282 eV As	1379 eV Se	1480 eV Br	1586 eV Kr	1694 eV Rb	1807 eV Sr	1923 eV Y	2042 eV Zr	2166 eV Nb	2293 eV Mo	2424 eV Tc	2559 eV Ru	2697 eV Rh
1	H	3.1	2.4	1.9	1.5	1.2	1.0	0.8	0.6	0.5	0.4	0.4	0.3	0.3
2	He	26.4	20.7	16.4	13.0	10.4	8.4	6.8	5.6	4.6	3.8	3.1	2.6	2.2
3	Li	107.3	84.8	67.4	53.8	43.4	35.1	28.6	23.5	19.3	16.0	13.3	11.2	9.4
4	Be	300.6	239.4	191.8	154.1	125.0	101.8	83.4	68.8	56.9	47.3	39.6	33.2	28.0
5	B	623.6	500.8	404.4	327.5	267.6	219.3	180.8	150.0	124.8	104.5	87.8	74.0	62.8
6	C	1,077	874.8	713.9	584.1	481.9	398.6	331.6	277.4	232.7	196.2	166.1	141.1	120.4
7	N	1,662	1,359	1,116	918.7	762.0	633.4	529.3	444.7	374.3	316.7	268.8	228.9	195.8
8	O	2,369	1,950	1,611	1,334	1,112	929.2	780.2	658.3	556.5	472.5	402.4	343.8	294.9
9	F	3,012	2,493	2,071	1,724	1,455	1,213	1,024	867.4	736.3	627.6	536.5	459.9	395.8
10	Ne	4,038	3,359	2,804	2,346	1,975	1,666	1,412	1,202	1,024	876.3	751.9	646.8	558.4
11	Na	4,819	4,026	3,376	2,837	2,399	2,032	1,729	1,477	1,264	1,085	934.5	806.6	698.7
12	Mg	459.3	5,009	4,217	3,557	3,019	2,567	2,192	1,880	1,614	1,391	1,202	1,041	904.0
13	Al	597.1	489.0	402.7	4,114	3,505	2,990	2,562	2,204	1,899	1,641	1,422	1,235	1,076
14	Si	802.3	657.7	542.0	448.2	373.9	312.9	3,108	2,681	2,317	2,009	1,746	1,520	1,328
15	P	990.1	812.6	670.3	554.8	463.0	387.6	326.5	276.6	2,607	2,266	1,975	1,724	1,510
16	S	1,271	1,044	862.5	714.5	596.8	499.9	421.3	357.1	303.4	259.2	222.3	2,041	1,792
17	Cl	1,495	1,231	1,018	844.0	705.6	591.5	498.8	422.9	359.5	307.2	263.5	226.8	196.1
18	Ar	1,694	1,397	1,156	960.2	803.5	674.2	568.9	482.6	410.4	350.9	301.0	259.2	224.1
19	K	2,173	1,794	1,488	1,237	1,036	870.4	735.0	624.0	531.0	454.1	389.7	335.7	290.3
20	Ca	2,620	2,168	1,800	1,499	1,257	1,057	893.6	759.2	646.5	553.2	475.0	409.2	354.1
21	Sc	2,848	2,360	1,964	1,637	1,357	1,158	979.6	833.0	709.9	607.8	522.2	450.1	389.6
22	Ti	3,220	2,673	2,227	1,860	1,564	1,319	1,117	950.7	810.9	694.9	597.3	515.1	446.1
23	V	3,604	2,998	2,502	2,093	1,763	1,488	1,262	1,075	917.9	787.2	677.2	584.4	506.3
24	Cr	4,160	3,466	2,898	2,428	2,048	1,731	1,470	1,254	1,072	919.8	791.9	683.8	592.8
25	Mn	4,595	3,836	3,213	2,696	2,278	1,928	1,639	1,400	1,197	1,029	886.5	766.1	664.6
26	Fe	5,230	4,373	3,669	3,084	2,609	2,211	1,883	1,610	1,379	1,186	1,023	884.6	767.9
27	Co	5,688	4,765	4,004	3,372	2,857	2,425	2,067	1,770	1,517	1,306	1,128	976.3	848.3
28	Ni	6,504	5,458	4,595	3,874	3,288	2,795	2,386	2,045	1,756	1,513	1,308	1,133	985.3
29	Cu	6,799	5,714	4,819	4,070	3,459	2,944	2,517	2,160	1,857	1,602	1,386	1,202	1,046
30	Zn	7,432	6,257	5,284	4,470	3,805	3,243	2,776	2,386	2,053	1,774	1,536	1,334	1,162
31	Ga	6,684	6,568	5,556	4,707	4,012	3,425	2,936	2,526	2,177	1,883	1,632	1,418	1,237
32	Ge	7,138	6,028	5,951	5,050	4,310	3,685	3,162	2,725	2,351	2,035	1,767	1,537	1,341
33	As	1,182	6,472?	5,491	5,438	4,648	3,979	3,419	2,950	2,548	2,209	1,919	1,672	1,460
34	Se	1,285	1,084	5,753?	4,895	4,884	4,186	3,602	3,112	2,691	2,336	2,032	1,771	1,549
35	Br	1,450	1,222	1,034	4,230	4,565	4,567	3,935	3,403	2,947	2,560	2,230	1,946	1,704
36	Kr	1,573	1,324	1,120	949.7	3,775?	4,108	4,131?	3,577	3,101	2,697	2,351	2,054	1,800
37	Rb	1,749	1,471	1,242	1,053	898.7	3,464?	3,810	3,303	3,341	2,909	2,539	2,221	1,948
38	Sr	1,929	1,621	1,368	1,158	987.8	844.8	726.5	3,523	3,062	3,111	2,718	2,380	2,090
39	Y	2,142	1,800	1,519	1,285	1,095	935.4	803.6	693.8	3,292?	2,873	2,929	2,567	2,257
40	Zr	2,346	1,971	1,663	1,406	1,198	1,023	877.8	757.3	654.9	2,359	2,670	2,730	2,402
41	Nb	2,578	2,168	1,829	1,547	1,317	1,124	964.3	831.3	718.3	623.6	2,193	2,501	2,203?
42	Mo	2,786	2,334	1,979	1,674	1,425	1,216	1,043	898.7	776.1	673.3	586.0	2,013	2,315
43	Tc	3,065	2,582	2,181	1,846	1,572	1,341	1,150	990.9	855.3	741.7	645.1	563.0	1,892?
44	Ru	3,260	2,749	2,325	1,969	1,678	1,432	1,228	1,058	913.0	791.4	688.1	600.1	525.5
45	Rh	3,538	2,989	2,530	2,145	1,829	1,562	1,340	1,154	996.2	863.3	750.5	654.3	572.7
46	Pd	3,768	3,188	2,703	2,294	1,958	1,673	1,436	1,238	1,068	925.7	804.6	701.3	613.6
47	Ag	4,079	3,457	2,936	2,495	2,132	1,823	1,566	1,350	1,166	1,010	878.2	765.4	669.6
48	Cd	4,280	3,635	3,092	2,631	2,251	1,927	1,656	1,429	1,234	1,070	930.4	811.0	709.5
49	In	4,572	3,890	3,315	2,825	2,420	2,074	1,785	1,541	1,332	1,155	1,005	875.9	766.3

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		1282 eV As	1379 eV Se	1480 eV Br	1586 eV Kr	1694 eV Rb	1807 eV Sr	1923 eV Y	2042 eV Zr	2166 eV Nb	2293 eV Mo	2424 eV Tc	2559 eV Ru	2697 eV Rh
50	Sn	4,808	4,099	3,499	2,987	2,562	2,199	1,894	1,636	1,415	1,229	1,069	932.2	815.7
51	Sb	5,079	4,339	3,711	3,173	2,726	2,342	2,020	1,747	1,512	1,314	1,143	997.7	873.3
52	Te	5,237	4,483	3,841	3,290	2,830	2,436	2,102	1,820	1,577	1,371	1,194	1,043	913.1
53	I	5,675	4,867	4,177	3,584	3,088	2,661	2,300	1,994	1,729	1,504	1,311	1,146	1,004
54	Xe	5,895	5,065	4,355	3,743	3,230	2,787	2,412	2,093	1,817	1,582	1,381	1,207	1,058
55	Cs	6,243	5,374	4,629	3,985	3,444	2,976	2,578	2,240	1,947	1,697	1,482	1,296	1,137
56	Ba	5,754	5,572	4,807	4,145	3,587	3,104	2,692	2,342	2,038	1,778	1,554	1,360	1,194
57	La	6,273	5,889?	5,089	4,394	3,808	3,299	2,866	2,495	2,174	1,898	1,660	1,455	1,278
58	Ce	6,832?	5,618	5,390	4,661	4,044	3,509	3,051	2,660	2,319	2,027	1,775	1,556	1,368
59	Pr	6,703	6,128	5,060	4,948	4,299	3,734	3,251	2,837	2,476	2,166	1,898	1,666	1,466
60	Nd	5,818	5,886	5,411	5,150?	4,480	3,895	3,394	2,965	2,590	2,268	1,989	1,747	1,538
61	Pm	6,186	6,284	5,798?	4,805	4,783	4,151	3,611	3,151	2,750	2,406	2,109	1,851	1,629
62	Sm	6,527	5,426	5,529	5,120	4,278	4,229	3,694	3,233	2,830	2,483	2,181	1,919	1,692
63	Ev	6,936	5,795	4,821?	4,925	4,604	4,351?	3,814	3,349	2,940	2,587	2,278	2,008	1,774
64	Gd	7,164	6,028	5,031	5,155	4,829?	4,050	3,844	3,386	2,980	2,628	2,320	2,049	1,814
65	Tb	7,523?	6,391	5,359	4,471	4,617	4,342	3,664	3,501	3,090	2,731	2,415	2,138	1,895
66	Dy	1,658	6,667	5,626	4,707	4,874?	4,094	3,876	3,290?	3,165	2,803	2,483	2,201	1,955
67	Ho	1,732	1,860?	5,928	4,981	4,188	4,349	4,123?	3,501	3,265	2,897	2,570	2,282	2,029
68	Er	1,811	1,567	6,224	5,260	4,434	3,733?	3,902	3,722	3,170	2,996	2,662	2,366	2,106
69	Tm	1,904	1,646	1,841?	5,558	4,703	3,966	4,155	3,531	3,379	2,894	2,768	2,463	2,194
70	Yb	1,976	1,706	1,478	5,770?	4,908	4,149	3,514	3,704	3,157	3,038	2,837	2,527	2,253
71	Lu	2,078	1,793	1,552	1,346?	5,171	4,386	3,721	3,930	3,351	3,225	2,774	2,625	2,342
72	Hf	2,170	1,870	1,617	1,401	1,675	4,583	3,898	3,322	3,521	3,018	2,916	2,517	2,412
73	Ta	2,282	1,965	1,698	1,470	1,281	4,802?	4,102	3,501	2,990	3,189	2,744	2,660	2,307
74	W	2,397	2,063	1,782	1,541	1,341	1,170?	4,294	3,676	3,143	3,358?	2,891	2,497	2,430
75	Re	2,527	2,175	1,877	1,623	1,411	1,229	1,568	3,864	3,309	2,842	3,052	2,637	2,564?
76	Os	2,645	2,276	1,964	1,697	1,475	1,284	1,122	4,015?	3,450	2,967	2,557	2,758	2,394
77	Ir	2,799	2,410	2,079	1,795	1,559	1,356	1,185	1,586?	3,627	3,126	2,697	2,914?	2,530
78	Pt	2,951	2,540	2,192	1,892	1,643	1,428	1,247	1,092	1,490	3,274	2,828	2,447	2,660
79	Au	3,127	2,693	2,323	2,006	1,741	1,513	1,320	1,156	1,014	3,437?	2,978	2,580	2,242
80	Hg	3,284	2,830	2,442	2,109	1,830	1,590	1,386	1,213	1,063	935?	3,101	2,692	2,342
81	Tl	3,448	2,973	2,567	2,217	1,924	1,671	1,456	1,274	1,116	980.9	1,435	2,805	2,444
82	Pb	3,634	3,135	2,708	2,340	2,030	1,763	1,537	1,344	1,177	1,034	910.4	1,363	2,559
83	Bi	3,846	3,320	2,869	2,480	2,152	1,869	1,629	1,424	1,246	1,095	963.4	850.1	2,685?
84	Po	4,079	3,524	3,047	2,635	2,288	1,987	1,731	1,514	1,324	1,162	1,023	901.9	1,422?
85	At	4,339	3,751	3,246	2,808	2,439	2,119	1,846	1,614	1,412	1,239	1,090	960.3	849.0
86	Rn	4,356	3,769	3,263	2,824	2,454	2,132	1,858	1,624	1,421	1,247	1,096	965.6	853.3
87	Fr	4,590	3,973	3,442	2,981	2,591	2,252	1,963	1,716	1,501	1,317	1,158	1,020	900.6
88	Ra	4,777	4,139	3,587	3,108	2,703	2,350	2,049	1,792	1,567	1,375	1,208	1,064	939.5
89	Ac	4,997?	4,333	3,758	3,257	2,834	2,465	2,150	1,880	1,645	1,443	1,268	1,116	985.5
90	Th	5,091	4,438	3,851	3,340	2,907	2,530	2,207	1,930	1,689	1,482	1,302	1,146	1,012
91	Pa	5,199	4,641?	4,030	3,497	3,045	2,651	2,313	2,024	1,771	1,554	1,365	1,202	1,061
92	U	5,069	4,616	4,050	3,516	3,062	2,667	2,328	2,037	1,783	1,565	1,375	1,210	1,068
93	Np	5,095	4,638	4,226	3,633	3,166	2,758	2,409	2,108	1,846	1,620	1,423	1,253	1,105
94	Pu	4,962	4,517	4,114	3,631	3,165	2,758	2,409	2,109	1,847	1,621	1,425	1,254	1,106

Absorber \ Emitter		2839 eV Pd	2984 eV Ag	3134 eV Cd	3287 eV In	3444 eV Sn	3605 eV Sb	3769 eV Te	3938 eV I	4110 eV Xe	4287 eV Cs	4466 eV Ba	4651 eV La	4840 eV Ce
1	H	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
2	He	1.9	1.6	1.3	1.1	1.0	0.8	0.7	0.6	0.5	0.5	0.4	0.4	0.3
3	Li	7.9	6.7	5.7	4.9	4.2	3.6	3.1	2.7	2.3	2.0	1.8	1.5	1.4
4	Be	23.7	20.2	17.2	14.7	12.7	10.9	9.5	8.2	7.1	6.2	5.4	4.8	4.2
5	B	53.4	45.6	39.1	33.6	29.0	25.1	21.8	19.0	16.6	14.5	12.8	11.2	9.9
6	C	103.1	88.7	76.5	66.2	57.4	50.0	43.7	38.2	33.6	29.5	26.1	23.1	20.4
7	N	168.0	144.8	125.0	108.3	94.2	82.1	71.8	62.9	55.2	48.6	43.0	38.0	33.7
8	O	253.7	219.1	189.6	164.6	143.3	125.0	109.5	96.0	84.5	74.5	65.9	58.3	51.7
9	F	341.5	295.7	256.4	223.1	194.6	170.2	149.3	131.1	115.5	101.9	90.2	80.0	71.0
10	Ne	483.3	419.6	364.9	318.3	278.3	243.8	214.3	188.6	166.4	147.0	130.4	115.7	102.8
11	Na	606.5	528.2	460.5	402.8	353.0	310.0	273.0	240.7	212.8	188.4	167.3	148.7	132.3
12	Mg	787.1	687.4	601.0	527.0	463.0	407.6	359.8	317.9	281.6	249.7	222.1	197.7	176.3
13	Al	939.9	823.1	721.6	634.3	558.7	492.9	436.0	386.1	342.7	304.5	271.4	241.9	216.1
14	Si	1,163	1,021	897.4	790.8	698.2	617.4	547.3	485.7	432.0	384.6	343.3	306.6	274.3
15	P	1,326	1,167	1,028	907.8	803.2	711.8	632.4	562.3	501.1	446.9	399.7	357.6	320.4
16	S	1,577	1,391	1,228	1,087	963.6	855.8	761.8	678.6	605.9	541.4	485.1	434.8	390.2
17	Cl	1,725?	1,525	1,349	1,196	1,063	945.7	843.4	752.8	673.3	602.7	541.0	485.6	436.5
18	Ar	194.4	169.4	147.9	1,272	1,132	1,009	901.6	806.1	722.3	647.6	582.2	523.4	471.2
19	K	251.9	219.5	191.6	167.9	147.5	130?	1,094	980.2	879.6	790.0	711.2	640.4	577.4
20	Ca	307.3	267.8	233.8	204.9	180.1	158.7	140.3	124.2	1,010	908.8	819.4	738.8	667.1
21	Sc	338.3	294.8	257.5	225.7	198.3	174.8	154.5	136.8	121.5	108.1	96.5	770.5	696.6
22	Ti	387.5	337.8	295.1	258.7	227.4	200.4	177.2	156.9	139.4	124.0	110.7	98.9	88.6
23	V	440.0	383.7	335.3	294.1	258.5	227.9	201.5	178.5	158.6	141.1	126.0	112.6	100.8
24	Cr	515.4	449.7	393.1	344.9	303.3	267.4	236.5	209.5	186.1	165.6	147.9	132.2	118.3

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		2839 eV Pd	2984 eV Ag	3134 eV Cd	3287 eV In	3444 eV Sn	3605 eV Sb	3769 eV Te	3938 eV I	4110 eV Xe	4287 eV Cs	4466 eV Ba	4651 eV La	4840 eV Ce
25	Mn	578.1	504.8	441.4	387.4	340.8	300.5	265.8	235.5	209.3	186.3	166.4	148.7	133.1
26	Fe	668.5	583.9	510.9	448.6	394.8	348.2	308.1	273.1	242.7	216.0	193.0	172.5	154.5
27	Co	738.9	645.9	565.5	496.7	437.3	385.9	341.6	302.8	269.2	239.7	214.1	191.4	171.4
28	Ni	858.9	751.3	658.1	578.4	509.5	449.8	398.3	353.2	314.1	279.7	249.9	223.4	200.2
29	Cu	912.8	799.0	700.4	615.9	542.8	479.4	424.7	376.7	335.1	298.5	266.8	238.6	213.8
30	Zn	1,014	888.6	779.5	685.9	604.8	534.5	473.7	420.4	374.1	333.3	298.0	266.6	238.9
31	Ga	1,081	947.6	831.9	732.5	646.3	571.5	506.8	449.9	400.5	357.0	319.3	285.7	256.1
32	Ge	1,173	1,030	904.6	797.1	703.8	622.7	552.4	490.7	437.1	389.7	348.6	312.1	279.8
33	As	1,279	1,123	987.4	870.7	769.3	681.1	604.6	537.4	478.8	427.2	382.3	342.3	307.0
34	Se	1,358	1,193	1,050	926.7	819.4	725.9	644.8	573.4	511.2	456.3	408.5	365.9	328.4
35	Br	1,494	1,315	1,158	1,023	905.0	802.3	713.1	634.5	566.0	505.5	452.7	405.7	364.2
36	Kr	1,581	1,392	1,227	1,085	960.6	852.2	758.0	674.9	602.3	538.2	482.3	432.4	388.3
37	Rb	1,712	1,509	1,332	1,178	1,044	926.9	825.0	735.0	656.4	586.9	526.2	472.0	424.0
38	Sr	1,839	1,622	1,432	1,268	1,125	999.5	890.2	793.7	709.2	634.4	569.1	510.8	459.1
39	Y	1,987	1,755	1,551	1,374	1,220	1,085	967.0	862.7	771.5	690.5	619.8	556.5	500.5
40	Zr	2,118	1,872	1,656	1,469	1,305	1,161	1,036	924.6	827.3	741.0	665.5	597.9	537.9
41	Nb	2,265	2,004	1,775	1,575	1,401	1,247	1,113	994.8	890.8	798.3	717.4	644.9	580.6
42	Mo	2,045	2,110	1,870	1,662	1,479	1,318	1,177	1,053	943.1	845.8	760.5	684.0	616.2
43	Tc	2,191	1,942	2,008	1,785	1,590	1,418	1,268	1,134	1,017	912.7	821.3	739.1	666.2
44	Ru	1,726?	2,015?	1,789	1,855	1,654	1,476	1,321	1,183	1,061	952.8	857.9	772.6	696.7
45	Rh	502.6	442.7	1,436	1,690	1,757	1,569	1,405	1,259	1,131	1,016	915.2	824.7	744.2
46	Pd	538.4	474.1	418.1	1,328	1,572	1,639?	1,468	1,316	1,183	1,064	958.9	864.6	780.6
47	Ag	587.4	517.0	455.9	403.3	1,254	1,493	1,339	1,400	1,259	1,133	1,022	922.1	833.1
48	Cd	622.2	547.6	482.7	426.9	378.5	1,152	1,381	1,240	1,300	1,171	1,057	954.3	862.7
49	In	672.1	591.4	521.3	460.9	408.5	362.9	1,083	1,520?	1,174	1,233	1,114	1,006	910.3
50	Sn	715.5	629.7	555.0	490.7	434.8	386.2	344.0	1,006?	906.1	1,098	1,157?	1,046	946.5
51	Sb	766.2	674.4	594.4	525.5	465.6	413.5	368.3	328.4	293.7	850.3	1,037	937.8	989.9
52	Te	801.4	705.5	621.9	549.9	487.2	432.7	385.3	343.6	307.2	275.1	782.6	957.5	867.6
53	I	881.3	776.1	684.3	605.2	536.3	476.2	424.1	378.1	338.1	302.7	271.8	758.7	688.0
54	Xe	929.4	818.8	722.2	638.8	566.2	502.9	447.8	399.3	357.0	319.6	287.0	257.9	707.7
55	Cs	999.5	880.9	777.3	687.8	609.7	541.6	482.4	430.2	384.6	344.3	309.1	277.8	250.0
56	Ba	1,050	926.1	817.5	723.6	641.7	570.1	507.9	453.0	405.0	362.6	325.6	292.5	263.3
57	La	1,125	992.4	876.5	776.1	688.5	612.0	545.3	486.4	435.0	389.4	349.7	314.2	282.8
58	Ce	1,205	1,064	940.0	832.8	739.1	657.1	585.6	522.5	467.4	418.5	375.8	337.7	304.0
59	Pr	1,292	1,141	1,009	894.2	793.9	706.1	629.5	561.9	502.7	450.2	404.4	363.4	327.1
60	Nd	1,357	1,199	1,061	940.9	835.8	743.7	663.3	592.2	529.9	474.7	426.5	383.3	345.1
61	Pm	1,436	1,270	1,123	995.8	884.6	787.0	702.0	626.7	560.8	502.4	451.4	405.7	365.3
62	Sm	1,495	1,323	1,172	1,040	925.1	823.9	735.4	657.1	588.4	527.4	474.0	426.2	383.9
63	Eu	1,569	1,391	1,234	1,097	976.5	870.5	777.7	695.3	623.0	558.8	502.5	452.0	407.3
64	Gd	1,607	1,427	1,267	1,128	1,005	896.7	801.8	717.4	643.3	577.3	519.4	467.5	421.3
65	Tb	1,682	1,495	1,329	1,185	1,057	943.7	844.5	756.3	678.6	609.3	548.5	493.9	445.4
66	Dy	1,737	1,546	1,376	1,228	1,096	979.9	877.6	786.4	706.1	634.4	571.4	514.8	464.4
67	Ho	1,805	1,609	1,434	1,280	1,144	1,023	917.2	822.5	738.9	664.3	598.6	539.5	486.9
68	Er	1,876	1,673	1,493	1,334	1,193	1,068	958.0	859.6	772.7	695.0	626.6	565.0	510.2
69	Tm	1,956	1,746	1,559	1,394	1,248	1,118	1,003	900.8	810.1	729.0	657.6	593.2	535.8
70	Yb	2,010	1,796	1,604	1,435	1,286	1,152	1,035	929.5	836.4	753.0	679.5	613.2	554.1
71	Lu	2,090	1,869	1,670	1,496	1,340	1,202	1,080	970.3	873.5	786.7	710.2	641.2	579.5
72	Hf	2,154	1,927	1,723	1,543	1,383	1,241	1,116	1,003	903.3	813.9	735.0	663.8	600.1
73	Ta	2,232	1,997	1,787	1,601	1,436	1,289	1,159	1,042	939.0	846.3	764.5	690.6	624.6
74	W	2,306?	2,064	1,848	1,656	1,486	1,334	1,200	1,079	972.8	877.1	792.5	716.2	647.9
75	Re	2,233	2,139	1,915	1,717	1,541	1,384	1,245	1,121	1,010	911.0	823.4	744.3	673.5
76	Os	2,334	2,041	1,966	1,764	1,583	1,423	1,280	1,153	1,039	937.5	847.6	766.3	693.6
77	Ir	2,204	2,155	1,889	1,830	1,643	1,477	1,329	1,197	1,080	974.4	881.2	796.9	721.5
78	Pt	2,317	2,027	1,984	1,745	1,696	1,525	1,373	1,237	1,116	1,007	911.4	824.4	746.5
79	Au	2,447	2,141	1,877	1,841	1,759?	1,582	1,425	1,284	1,159	1,046	946.9	856.7	776.0
80	Hg	2,042	2,240	1,965	1,924?	1,698	1,626	1,465	1,321	1,192	1,077	974.7	882.2	799.3
81	Tl	2,132	2,343	2,055	1,809	1,773	1,569	1,505	1,357	1,226	1,108	1,003	908.1	823.0
82	Pb	2,235	1,957	2,158	1,900	1,677	1,645	1,461	1,401	1,266	1,144	1,037	938.9	851.2
83	Bi	2,352	2,062	1,809	2,005	1,770	1,567	1,538	1,369	1,314	1,188	1,077	975.5	884.7
84	Po	2,478	2,177	1,912	1,685	1,874	1,660	1,474	1,446	1,290	1,238	1,122	1,017	923.1
85	At	1,378	2,306	2,029	1,789	1,993?	1,765	1,568	1,395	1,369	1,224	1,175	1,066	967.7
86	Rn	755.7	1,267	2,033	1,795	1,586	1,774	1,576	1,403	1,252	1,228	1,101	1,056	959.8
87	Fr	797.2	707.6	1,227?	1,893	1,675	1,484	1,667	1,484	1,325	1,185	1,162	1,043?	1,002
88	Ra	831.2	737.5	1,306	1,970	1,750	1,552	1,380	1,555	1,389	1,242	1,114	1,090	1,037?
89	Ac	871.6	773.0	686.3	1,268	1,838	1,636	1,456	1,643	1,467	1,313	1,178	1,058?	1,033
90	Th	894.5	793.0	703.8	626.2	1,212	1,689	1,508	1,344	1,523	1,362	1,223	1,099	1,069?
91	Pa	937.6	831.0	737.2	655.7	1,160?	1,190	1,598	1,428	1,277	1,451	1,302	1,170	1,054
92	U	943.9	836.4	741.8	659.6	587.5	1,088	1,605	1,462	1,310	1,173	1,339	1,203	1,084
93	Np	977.0	865.6	767.5	682.2	607.4	541.7	1,034	1,517	1,387	1,246	1,424	1,280	1,153
94	Pu	977.7	866.1	767.8	682.3	607.3	541.5	483.9	936.9	1,399	1,285	1,158	1,326	1,195

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		5034 eV Pr	5230 eV Nd	5433 eV Pm	5636 eV Sm	5846 eV Eu	6057 eV Gd	6273 eV Tb	6495 eV Dy	6720 eV Ho	6949 eV Er	7180 eV Tm	7416 eV Yb
1	H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	He	0.3	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
3	Li	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.3
4	Be	3.7	3.3	2.9	2.6	2.3	2.0	1.8	1.6	1.4	1.3	1.2	1.0
5	B	8.7	7.8	6.9	6.1	5.5	4.9	4.4	3.9	3.5	3.2	2.8	2.6
6	C	18.1	16.1	14.4	12.9	11.5	10.3	9.3	8.4	7.5	6.8	6.2	5.6
7	N	29.9	26.7	23.8	21.3	19.0	17.1	15.4	13.8	12.5	11.3	10.2	9.3
8	O	45.9	41.0	36.5	32.7	29.3	26.3	23.7	21.3	19.2	17.4	15.8	14.3
9	F	63.1	56.3	50.3	45.0	40.4	36.3	32.7	29.4	26.6	24.0	21.8	19.8
10	Ne	91.5	81.7	73.0	65.5	58.7	52.8	47.6	42.9	38.8	35.1	31.8	28.9
11	Na	118.0	105.4	94.3	84.6	76.0	68.4	61.7	55.6	50.3	45.5	41.3	37.5
12	Mg	157.3	140.8	126.1	113.3	101.8	91.8	82.8	74.8	67.6	61.3	55.7	50.6
13	Al	193.1	173.1	155.2	139.6	125.6	113.4	102.4	92.6	83.8	76.0	69.1	62.8
14	Si	245.6	220.5	197.9	178.3	160.6	145.1	131.2	118.7	107.6	97.7	88.8	80.9
15	P	287.4	258.4	232.3	209.5	189.0	171.0	154.8	140.2	127.2	115.6	105.2	95.9
16	S	350.5	315.6	284.1	256.7	231.9	210.0	190.3	172.6	156.8	142.6	129.9	118.5
17	Cl	392.7	354.2	319.3	288.9	261.3	236.9	215.0	195.2	177.5	161.6	147.4	134.6
18	Ar	424.6	383.5	346.2	313.6	284.0	257.9	234.3	213.0	193.9	176.7	161.4	147.5
19	K	521.0	471.2	426.0	386.4	350.4	318.5	289.8	263.7	240.3	219.2	200.4	183.3
20	Ca	602.7	545.8	494.1	448.7	407.4	370.8	337.7	307.6	280.7	256.4	234.6	214.8
21	Sc	630.2	571.4	517.9	470.9	428.0	390.0	355.6	324.3	296.2	270.8	248.0	227.3
22	Ti	687.1	623.7	566.0	515.2	468.8	427.7	390.3	356.3	325.8	298.1	273.3	250.7
23	V	90.4	81.3	73.1	559.9	510.0	465.7	425.4	388.8	355.8	325.9	299.0	274.5
24	Cr	106.1	95.5	85.9	77.6	70.1	524.2	479.4	438.4	401.6	368.2	338.1	310.7
25	Mn	119.4	107.4	96.7	87.3	78.9	71.5	64.9	58.9	435.0	399.1	366.8	337.3
26	Fe	138.6	124.6	112.2	101.3	91.6	83.0	75.3	68.4	62.2	56.7	411.0	378.2
27	Co	153.8	138.4	124.5	112.5	101.7	92.1	83.6	75.9	69.1	63.0	57.5	52.6
28	Ni	179.6	161.6	145.4	131.4	118.8	107.7	97.7	88.7	80.7	73.6	67.2	61.4
29	Cu	191.8	172.6	155.4	140.4	126.9	115.1	104.4	94.8	86.3	78.7	71.9	65.7
30	Zn	214.4	193.0	173.8	157.0	141.9	128.7	116.8	106.1	96.6	88.0	80.4	73.5
31	Ga	229.9	207.0	186.4	168.5	152.3	138.1	125.3	113.9	103.6	94.5	86.3	78.9
32	Ge	251.3	226.3	203.8	184.2	166.6	151.0	137.1	124.6	113.4	103.4	94.4	86.4
33	As	275.8	248.4	223.8	202.3	183.0	165.9	150.7	136.9	124.6	113.6	103.8	94.9
34	Se	295.0	265.8	239.5	216.6	195.9	177.7	161.4	146.7	133.5	121.8	111.3	101.8
35	Br	327.3	295.0	265.9	240.5	217.6	197.5	179.3	163.0	148.4	135.4	123.7	113.2
36	Kr	349.1	314.8	283.8	256.8	232.4	210.9	191.6	174.2	158.6	144.7	132.2	121.0
37	Rb	381.4	344.0	310.2	280.8	254.2	230.8	209.7	190.7	173.7	158.4	144.8	132.5
38	Sr	413.1	372.7	336.3	304.5	275.7	250.4	227.6	207.0	188.6	172.0	157.3	144.0
39	Y	450.6	406.7	367.1	332.5	301.2	273.6	248.7	226.2	206.2	188.2	172.1	157.5
40	Zr	484.5	437.5	395.1	358.0	324.4	294.7	268.0	243.9	222.3	202.9	185.6	169.9
41	Nb	523.2	472.7	427.0	387.1	350.8	318.9	290.1	264.1	240.8	219.8	201.1	184.2
42	Mo	555.6	502.1	453.8	411.6	373.2	339.3	308.8	281.2	256.5	234.2	214.3	196.3
43	Tc	601.0	543.5	491.4	445.8	404.4	367.9	334.9	305.0	278.3	254.2	232.7	213.2
44	Ru	628.8	569.0	514.7	467.2	424.0	385.8	351.4	320.2	292.2	267.0	244.5	224.0
45	Rh	672.1	608.4	550.7	500.1	454.0	413.3	376.6	343.3	313.4	286.5	262.4	240.5
46	Pd	705.4	638.9	578.6	525.7	477.5	434.9	396.4	361.4	330.1	301.9	276.5	253.6
47	Ag	753.2	682.6	618.5	562.2	511.0	465.6	424.5	387.2	353.8	323.6	296.6	272.0
48	Cd	780.4	707.7	641.6	583.5	530.5	483.6	441.2	402.6	368.0	336.7	308.7	283.2
49	In	824.0	747.6	678.1	617.0	561.3	511.9	467.2	426.5	390.0	357.0	327.4	300.5
50	Sn	857.3	778.2	706.3	643.0	585.2	534.0	487.6	445.3	407.3	373.0	342.2	314.2
51	Sb	897.1	814.8	739.9	674.0	613.7	560.3	511.8	467.6	428.0	392.1	359.8	330.5
52	Te	917.0	833.4	757.2	690.1	628.7	574.2	524.8	479.7	439.2	402.5	369.6	339.5
53	I	846.0	896.6	815.1	743.2	677.4	619.0	566.0	517.6	474.1	434.7	399.3	367.0
54	Xe	642.5	794.0	722.2	767.9	700.4	640.3	585.7	535.9	491.1	450.5	413.9	380.6
55	Cs	674.8	614.3	761.0	694.6	738.8	675.7	618.4	566.1	519.0	476.2	437.8	402.7
56	Ba	237.3	214.5	574.9	716?	653.7	697.2	638.4	584.7	536.3	492.3	452.7	416.6
57	La	254.9	230.3	208.2	551.2	503.5	629.7	672?	616.1	565.3	519.2	477.6	439.7
58	Ce	274.0	247.6	223.8	203.0	529.4	485.0	608.1	557.5	596.5	548.0	504.4	464.5
59	Pr	294.8	266.5	240.8	218.5	198.2	511.1	468.6	588.8	540.8	579.4	533.5	491.5
60	Nd	311.1	281.1	254.1	230.5	209.1	190.3	484.7	444.7	409?	515.4	553.3	509.9
61	Pm	329.2	297.6	269.0	244.0	221.3	201.4	183.4	461.7	424.4	390.5	494.0	455.5
62	Sm	346.1	312.9	282.9	256.6	232.8	211.9	193.0	175.9	439?	403.7	372.2	471.6
63	Eu	367.3	332.2	300.4	272.5	247.3	225.1	205.0	186.9	170.6	156.0	389.0	358.9
64	Gd	380.2	343.9	311.0	282.3	256.2	233.2	212.5	193.7	176.8	161.7	148.2	366.3
65	Tb	402.0	363.7	329.1	298.7	271.2	246.9	225.0	205.1	187.3	171.3	157.0	144.0
66	Dy	419.3	379.5	343.5	311.9	283.2	257.9	235.0	214.3	195.7	179.0	164.0	150.5
67	Ho	439.8	398.2	360.5	327.5	297.4	270.9	246.9	225.2	205.7	188.1	172.4	158.2
68	Er	461.0	417.5	378.1	343.5	312.1	284.3	259.2	236.4	216.0	197.6	181.1	166.2
69	Tm	484.3	438.8	397.5	361.3	328.3	299.1	272.7	248.8	227.4	208.0	190.7	175.0
70	Yb	501.0	454.1	411.4	374.0	340.0	309.8	282.5	257.8	235.6	215.6	197.7	181.4
71	Lu	524.2	475.2	430.7	391.6	356.1	324.5	296.1	270.2	247.0	226.0	207.3	190.3
72	Hf	543.0	492.4	446.4	406.0	369.2	336.6	307.1	280.3	256.3	234.6	215.2	197.5

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		5034 eV Pr	5230 eV Nd	5433 eV Pm	5636 eV Sm	5846 eV Eu	6057 eV Gd	6273 eV Tb	6495 eV Dy	6720 eV Ho	6949 eV Er	7180 eV Tm	7416 eV Yb
73	Ta	565.3	512.8	465.0	423.0	384.8	350.9	320.2	292.3	267.3	244.7	224.5	206.1
74	W	586.5	532.1	482.7	439.2	399.6	364.4	332.6	303.7	277.8	254.4	233.4	214.3
75	Re	609.9	553.4	502.1	457.0	415.8	379.3	346.3	316.3	289.3	264.9	243.1	223.2
76	Os	628.2	570.3	517.5	471.1	428.7	391.2	357.2	326.3	298.5	273.4	250.9	230.4
77	Ir	653.6	593.4	538.6	490.4	446.4	407.4	372.0	339.9	311.0	284.9	261.5	240.2
78	Pt	676.5	614.3	557.7	507.9	462.4	422.1	385.5	352.3	322.4	295.4	271.1	249.1
79	Au	703.4	638.9	580.2	528.4	481.2	439.3	401.3	366.8	335.7	307.6	282.4	259.5
80	Hg	724.7	658.4	598.0	544.8	496.2	453.1	414.0	378.4	346.4	317.5	291.5	267.9
81	Tl	746.4	678.3	616.2	561.5	511.5	467.2	426.9	390.3	357.4	327.6	300.8	276.5
82	Pb	772.2	701.9	637.9	581.4	529.7	483.9	442.3	404.4	370.3	339.5	311.8	286.6
83	Bi	802.9	730.0	663.6	605.0	551.4	503.7	460.5	421.2	385.7	353.7	324.9	298.7
84	Po	838.0	762.2	693.1	632.0	576.2	526.5	481.5	440.4	403.4	370.0	339.9	312.5
85	At	878.9	799.8	727.5	663.6	605.1	553.1	505.9	462.8	424.1	389.0	357.4	328.7
86	Rn	872.2	794.1	722.6	659.4	601.5	549.9	503.1	460.4	421.9	387.0	355.7	327.1
87	Fr	911.1	830.0	755.7	689.9	629.5	575.8	526.9	482.3	442.0	405.6	372.8	342.9
88	Ra	943.6	860.2	783.7	715.8	653.5	598.0	547.4	501.2	459.5	421.7	387.7	356.6
89	Ac	986.1	899.9	820.5	750.0	685.1	627.1	574.3	526.0	482.4	442.8	407.2	374.7
90	Th	963.9	925.3	844.6	772.7	706.4	647.0	592.8	543.1	498.3	457.5	420.8	387.3
91	Pa	1,023	924.9	892.6	817.6	748.1	685.8	628.7	576.4	529.0	485.9	447.0	411.5
92	U	977.1	947.5	857.2	835.8	765.9	702.8	644.9	591.6	543.3	499.3	459.5	423.1
93	Np	1,040	940.4	908.4	824.9	811.7	746.0	685.4	629.4	578.4	531.8	489.7	451.1
94	Pu	1,078	974.9	882.2	851.5	773.5	771.8	710.4	653.3	601.0	553.1	509.6	469.6

Absorber \ Emitter		7656 eV Lu	7899 eV Hf	8146 eV Ta	8398 eV W	8652 eV Re	8912 eV Os	9175 eV Ir	9442 eV Pt	9713 eV Au	9989 eV Hg	10,269 eV Tl	10,552 eV Pb
1	H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	He	0.1	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Li	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1
4	Be	0.9	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3
5	B	2.3	2.1	1.9	1.7	1.6	1.4	1.3	1.2	1.1	1.0	0.9	0.8
6	C	5.1	4.6	4.2	3.8	3.5	3.2	2.9	2.7	2.5	2.3	2.1	1.9
7	N	8.4	7.7	7.0	6.4	5.8	5.3	4.9	4.5	4.1	3.8	3.5	3.2
8	O	13.0	11.8	10.8	9.8	9.0	8.2	7.5	6.9	6.3	5.8	5.4	4.9
9	F	18.0	16.4	14.9	13.6	12.4	11.4	10.4	9.6	8.8	8.1	7.4	6.9
10	Ne	26.3	23.9	21.8	19.9	18.2	16.7	15.3	14.0	12.9	11.9	10.9	10.1
11	Na	34.2	31.1	28.4	25.9	23.7	21.7	19.9	18.3	16.8	15.5	14.3	13.1
12	Mg	46.1	42.0	38.3	35.0	32.1	29.4	27.0	24.8	22.8	21.0	19.3	17.8
13	Al	57.2	52.2	47.7	43.6	39.9	36.6	33.6	30.9	28.4	26.2	24.1	22.3
14	Si	73.7	67.3	61.5	56.3	51.6	47.3	43.5	40.0	36.8	33.9	31.2	28.8
15	P	87.5	79.9	73.1	66.9	61.4	56.3	51.8	47.6	43.9	40.4	37.3	34.4
16	S	108.2	99.0	90.6	83.0	76.2	70.0	64.3	59.2	54.6	50.3	46.4	42.9
17	Cl	123.0	112.6	103.2	94.6	86.9	79.8	73.5	67.7	62.4	57.5	53.1	49.1
18	Ar	134.9	123.6	113.3	104.0	95.6	87.9	80.9	74.6	68.8	63.5	58.7	54.3
19	K	167.8	153.9	141.3	129.7	119.3	109.8	101.2	93.3	86.2	79.6	73.6	68.1
20	Ca	196.8	180.6	165.9	152.5	140.4	129.3	119.3	110.1	101.7	94.0	86.9	80.5
21	Sc	208.5	191.5	176.1	162.0	149.2	137.6	126.9	117.2	108.4	100.2	92.8	86.0
22	Ti	230.2	211.6	194.7	179.3	165.3	152.5	140.8	130.1	120.4	111.4	103.2	95.7
23	V	252.2	232.1	213.7	196.9	181.7	167.7	155.0	143.4	132.7	122.9	113.9	105.7
24	Cr	285.7	263.1	242.4	223.6	206.4	190.7	176.3	163.2	151.1	140.1	129.9	120.6
25	Mn	310.4	286.1	263.8	243.4	225.0	207.9	192.4	178.2	165.1	153.1	142.1	132.0
26	Fe	348.4	321.3	296.5	273.8	253.1	234.1	216.8	200.9	186.3	172.8	160.5	149.1
27	Co	48.1	345.6	319.2	294.9	272.9	252.5	233.9	216.9	201.3	186.8	173.6	161.4
28	Ni	56.3	51.6	47.4	334.8	310.0	287.0	266.0	246.8	229.1	212.8	197.8	184.0
29	Cu	60.1	55.2	50.7	46.6	42.9	39.5	277.1	257.2	238.9	222.0	206.4	192.1
30	Zn	67.3	61.7	56.7	52.1	48.0	44.2	40.8	37.7	261.0	242.7	225.8	210.2
31	Ga	72.3	66.3	60.9	55.9	51.5	47.5	43.8	40.4	37.4	34.6	32.1	221.0
32	Ge	79.1	72.5	66.6	61.2	56.4	52.0	47.9	44.3	40.9	37.9	35.1	32.6
33	As	87.0	79.8	73.3	67.3	62.0	57.1	52.7	48.7	45.0	41.7	38.6	35.8
34	Se	93.2	85.5	78.5	72.2	66.5	61.3	56.5	52.2	48.3	44.7	41.4	38.4
35	Br	103.6	95.1	87.3	80.3	74.0	68.2	62.9	58.1	53.7	49.7	46.1	42.8
36	Kr	110.8	101.7	93.4	85.9	79.1	72.9	67.3	62.2	57.5	53.2	49.3	45.7
37	Rb	121.4	111.4	102.4	94.1	86.7	79.9	73.8	68.1	63.0	58.3	54.1	50.2
38	Sr	131.9	121.1	111.2	102.3	94.2	86.9	80.2	74.1	68.5	63.4	58.8	54.6
39	Y	144.3	132.5	121.7	112.0	103.2	95.1	87.8	81.1	75.1	69.5	64.4	59.8
40	Zr	155.8	143.0	131.4	120.9	111.4	102.7	94.8	87.6	81.1	75.1	69.6	64.6
41	Nb	168.8	155.0	142.5	131.1	120.8	111.4	102.9	95.1	88.0	81.5	75.5	70.1
42	Mo	180.0	165.3	152.0	139.9	128.9	118.9	109.8	101.5	93.9	87.0	80.6	74.8
43	Tc	195.5	179.6	165.2	152.0	140.1	129.3	119.4	110.4	102.2	94.6	87.7	81.4
44	Ru	205.5	188.8	173.7	159.9	147.4	136.0	125.6	116.2	107.5	99.6	92.3	85.7
45	Rh	220.7	202.8	186.6	171.8	158.4	146.2	135.1	124.9	115.6	107.1	99.3	92.2

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		7656 eV Lu	7899 eV Hf	8146 eV Ta	8398 eV W	8652 eV Re	8912 eV Os	9175 eV Ir	9442 eV Pt	9713 eV Au	9989 eV Hg	10,269 eV Tl	10,552 eV Pb
46	Pd	232.7	213.9	196.9	181.3	167.2	154.3	142.6	131.9	122.1	113.2	105.0	97.5
47	Ag	249.8	229.6	211.4	194.7	179.7	165.8	153.3	141.8	131.3	121.7	112.9	104.8
48	Cd	260.1	239.2	220.3	202.9	187.3	172.9	159.8	147.9	137.0	127.0	117.8	109.4
49	In	276.1	254.0	233.9	215.6	199.0	183.8	169.9	157.3	145.7	135.0	125.3	116.4
50	Sn	288.8	265.7	244.8	225.7	208.4	192.5	178.0	164.8	152.7	141.6	131.4	122.1
51	Sb	303.8	279.7	257.7	237.7	219.5	202.8	187.6	173.7	161.0	149.3	138.6	128.8
52	Te	312.3	287.6	265.1	244.5	225.9	208.8	193.2	178.9	165.8	153.8	142.8	132.7
53	I	337.6	311.0	286.8	264.6	244.5	226.1	209.2	193.8	179.7	166.7	154.8	143.9
54	Xe	350.3	322.8	297.7	274.8	254.0	234.9	217.5	201.5	186.9	173.4	161.1	149.8
55	Cs	370.7	341.8	315.3	291.2	269.2	249.0	230.6	213.7	198.3	184.0	171.0	159.0
56	Ba	383.7	353.8	326.6	301.6	279.0	258.1	239.1	221.7	205.7	191.0	177.5	165.1
57	La	405.1	373.7	345.1	318.8	295.0	273.0	253.0	234.6	217.7	202.2	188.0	174.9
58	Ce	428.2	395.1	365.0	337.3	312.2	289.0	267.9	248.5	230.7	214.3	199.3	185.4
59	Pr	453.2	418.4	386.6	357.4	330.9	306.5	284.1	263.6	244.8	227.5	211.6	196.9
60	Nd	470.4	434.5	401.6	371.4	344.0	318.7	295.5	274.3	254.8	236.8	220.3	205.1
61	Pm	489.9	452.6	418.5	387.2	358.7	332.4	308.4	286.4	266.1	247.4	230.2	214.4
62	Sm	435.4	469.0	433.9	401.5	372.1	345.0	320.2	297.3	276.4	257.0	239.2	222.8
63	Eu	455.6	421.3	454.5	420.7	390.0	361.7	335.7	311.9	290.0	269.7	251.1	234.0
64	Gd	338.4	313.0	398.3	430.0	398.8	369.9	343.5	319.2	296.9	276.3	257.3	239.8
65	Tb	353.2	326.8	302.6	385.5	357.7	386.8	359.3	334.0	310.8	289.2	269.4	251.2
66	Dy	138.2	336.9	312.1	289.2	369.0	342.6	371.0	345.0	321.0	298.9	278.5	259.7
67	Ho	145.3	133.6	323.8	300.2	278.7	258.8	330.6	358.5	333.7	310.7	289.6	270.2
68	Er	152.6	140.4	129.3	311.5	289.3	268.7	249.9	319.4	297.4	322.9	301.0	280.9
69	Tm	160.7	147.9	136.2	125.6	301?	279.9	260.3	242.3	309.8	288.7	313.8	292.9
70	Yb	166.7	153.4	141.3	130.2	120.3	111.1	267.2	248.8	231.8	296?	276.4	300.7
71	Lu	174.8	160.9	148.2	136.6	126.2	116.6	107.9	258.4	240.8	224.5	209.5	268.0
72	Hf	181.5	167.1	153.9	141.9	131.1	121.1	112.1	103.8	247.8	231.1	215.7	201.5
73	Ta	189.4	174.3	160.6	148.1	136.8	126.5	117.0	108.4	100.5	239.1	223.2	208.6
74	W	197.0	181.3	167.1	154.1	142.4	131.6	121.8	112.8	104.6	97.1	230.3	215.3
75	Re	205.2	189.0	174.2	160.6	148.4	137.2	127.0	117.6	109.1	101.2	94.1	223?
76	Os	211.9	195.1	179.8	165.9	153.3	141.7	131.2	121.5	112.7	104.6	97.2	90.4
77	Ir	220.9	203.4	187.5	173.0	159.9	147.8	136.8	126.8	117.6	109.2	101.4	94.4
78	Pt	229.1	211.0	194.5	179.5	165.9	153.4	142.0	131.6	122.1	113.3	105.3	98.0
79	Au	238.7	219.9	202.7	187.1	172.9	159.9	148.1	137.2	127.3	118.2	109.9	102.2
80	Hg	246.4	227.0	209.4	193.2	178.6	165.2	153.0	141.8	131.6	122.2	113.5	105.6
81	Tl	254.4	234.4	216.2	199.5	184.5	170.6	158.0	146.5	135.9	126.2	117.3	109.2
82	Pb	263.7	243.0	224.2	206.9	191.4	177.0	163.9	152.0	141.1	131.0	121.8	113.3
83	Bi	274.9	253.3	233.7	215.8	199.5	184.6	171.0	158.5	147.1	136.6	127.0	118.2
84	Po	287.6	265.1	244.6	225.8	208.9	193.2	179.0	166.0	154.1	143.1	133.1	123.8
85	At	302.5	278.9	257.3	237.6	219.8	203.4	188.4	174.7	162.2	150.7	140.1	130.4
86	Rn	301.2	277.6	256.2	236.6	218.9	202.6	187.7	174.1	161.6	150.1	139.6	129.9
87	Fr	315.8	291.1	268.7	248.2	229.6	212.5	196.9	182.6	169.6	157.5	146.5	136.4
88	Ra	328.4	302.9	279.6	258.2	238.9	221.1	204.9	190.1	176.5	164.0	152.5	142.0
89	Ac	345.1	318.2	293.8	271.4	251.1	232.4	215.4	199.8	185.6	172.4	160.4	149.3
90	Th	356.8	329.1	303.8	280.7	259.7	240.4	222.9	206.8	192.0	178.4	165.9	154.5
91	Pa	379.1	349.8	323.0	298.4	276.2	255.7	237.0	219.9	204.2	189.8	176.5	164.4
92	U	389.9	359.7	332.2	307.0	284.1	263.1	243.9	226.3	210.1	195.3	181.7	169.2
93	Np	415.8	383.7	354.4	327.6	303.2	280.7	260.3	241.5	224.3	208.5	193.9	180.6
94	Pu	433.1	399.8	369.3	341.4	316.0	292.6	271.3	251.8	233.8	217.3	202.2	188.3

Absorber \ Emitter		10,839 eV Bi	11,131 eV Po	11,427 eV At	11,727 eV Rn	12,031 eV Fr	12,340 eV Ra	12,652 eV Ac	12,969 eV Th	13,291 eV Pa	13,615 eV U	13,944 eV Np	14,279 eV Pu
1	H	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	He	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	Li	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0	0.0
4	Be	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
5	B	0.8	0.7	0.7	0.6	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3
6	C	1.8	1.6	1.5	1.4	1.3	1.2	1.1	1.0	0.9	0.9	0.8	0.8
7	N	2.9	2.7	2.5	2.3	2.1	2.0	1.8	1.7	1.6	1.5	1.4	1.3
8	O	4.6	4.2	3.9	3.6	3.3	3.1	2.9	2.7	2.5	2.3	2.1	2.0
9	F	6.3	5.8	5.4	5.0	4.6	4.3	4.0	3.7	3.4	3.2	3.0	2.8
10	Ne	9.3	8.6	7.9	7.3	6.8	6.3	5.8	5.4	5.0	4.7	4.4	4.1
11	Na	12.1	11.2	10.4	9.6	8.9	8.2	7.7	7.1	6.6	6.2	5.7	5.3
12	Mg	16.4	15.2	14.1	13.0	12.1	11.2	10.4	9.7	9.0	8.4	7.8	7.3
13	Al	20.6	19.0	17.6	16.3	15.1	14.0	13.0	12.1	11.3	10.5	9.8	9.1
14	Si	26.7	24.7	22.8	21.1	19.6	18.2	16.9	15.7	14.6	13.6	12.7	11.9
15	P	31.8	29.5	27.3	25.3	23.5	21.8	20.3	18.8	17.5	16.3	15.2	14.2
16	S	39.7	36.7	34.0	31.6	29.3	27.2	25.3	23.6	21.9	20.4	19.1	17.8
17	Cl	45.5	42.1	39.0	36.2	33.6	31.3	29.1	27.1	25.2	23.5	21.9	20.5
18	Ar	50.3	46.6	43.2	40.1	37.3	34.7	32.2	30.0	28.0	26.1	24.4	22.7
19	K	63.1	58.5	54.3	50.4	46.9	43.6	40.6	37.8	35.2	32.9	30.7	28.7

(*continued*)

Table 14.4. (*Continued*)

Absorber \ Emitter		10,839 eV Bi	11,131 eV Po	11,427 eV At	11,727 eV Rn	12,031 eV Fr	12,340 eV Ra	12,652 eV Ac	12,969 eV Th	13,291 eV Pa	13,615 eV U	13,944 eV Np	14,279 eV Pu
20	Ca	74.7	69.3	64.3	59.7	55.6	51.7	48.1	44.9	41.8	39.1	36.5	34.1
21	Sc	79.8	74.0	68.8	63.9	59.5	55.4	51.6	48.1	44.9	41.9	39.2	36.6
22	Ti	88.8	82.5	76.6	71.3	66.4	61.8	57.6	53.7	50.2	46.9	43.8	41.0
23	V	98.1	91.2	84.8	78.9	73.5	68.5	63.9	59.6	55.7	52.0	48.7	45.5
24	Cr	112.1	104.2	96.9	90.2	84.1	78.4	73.1	68.3	63.8	59.7	55.8	52.2
25	Mn	122.7	114.1	106.2	99.0	92.3	86.0	80.3	75.0	70.1	65.6	61.4	57.5
26	Fe	138.7	129.1	120.2	112.0	104.5	97.5	91.1	85.1	79.6	74.5	69.7	65.3
27	Co	150.2	139.8	130.3	121.5	113.4	105.8	98.9	92.4	86.4	80.9	75.8	71.0
28	Ni	171.3	159.6	148.7	138.8	129.5	121.0	113.1	105.7	98.9	92.7	86.8	81.4
29	Cu	179.0	166.8	155.5	145.1	135.5	126.6	118.4	110.8	103.7	97.2	91.1	85.4
30	Zn	195.9	182.6	170.4	159.1	148.6	138.9	129.9	121.6	113.8	106.7	100.1	93.9
31	Ga	206.0	192.1	179.3	167.4	156.5	146.3	136.9	128.2	120.0	112.5	105.6	99.1
32	Ge	30.2	206.2	192.5	179.9	168.1	157.3	147.2	137.9	129.2	121.1	113.7	106.7
33	As	33.3	30.9	28.7	26.7	181.7	169.9	159.1	149.1	139.7	131.1	123.0	115.5
34	Se	35.7	33.1	30.8	28.7	26.7	24.9	23.3	157.3	147.4	138.3	129.9	121.9
35	Br	39.7	36.9	34.3	31.9	29.8	27.7	25.9	24.2	22.6	151.6	142.3	133.7
36	Kr	42.5	39.5	36.7	34.2	31.9	29.7	27.7	25.9	24.2	22.6	21.2	19.8
37	Rb	46.6	43.3	40.3	37.5	34.9	32.6	30.4	28.4	26.5	24.8	23.2	21.8
38	Sr	50.7	47.1	43.8	40.8	38.0	35.4	33.1	30.9	28.9	27.0	25.3	23.7
39	Y	55.5	51.6	48.0	44.7	41.6	38.8	36.2	33.9	31.6	29.6	27.7	26.0
40	Zr	60.0	55.7	51.9	48.3	45.0	42.0	39.2	36.6	34.2	32.0	30.0	28.1
41	Nb	65.1	60.5	56.3	52.4	48.9	45.6	42.5	39.7	37.2	34.8	32.6	30.5
42	Mo	69.5	64.6	60.1	56.0	52.2	48.7	45.5	42.5	39.7	37.2	34.8	32.6
43	Tc	75.6	70.3	65.4	61.0	56.8	53.0	49.5	46.2	43.2	40.5	37.9	35.5
44	Ru	79.7	74.1	68.9	64.2	59.9	55.8	52.1	48.7	45.5	42.6	39.9	37.4
45	Rh	85.7	79.7	74.2	69.1	64.4	60.1	56.1	52.4	49.0	45.9	43.0	40.3
46	Pd	90.6	84.2	78.4	73.1	68.1	63.6	59.4	55.5	51.9	48.6	45.5	42.6
47	Ag	97.4	90.6	84.4	78.6	73.3	68.4	63.9	59.7	55.8	52.3	49.0	45.9
48	Cd	101.7	94.6	88.1	82.1	76.6	71.4	66.7	62.4	58.3	54.6	51.2	48.0
49	In	108.2	100.7	93.8	87.4	81.5	76.1	71.1	66.4	62.1	58.2	54.5	51.1
50	Sn	113.5	105.6	98.4	91.7	85.5	79.8	74.6	69.7	65.2	61.1	57.3	53.7
51	Sb	119.8	111.5	103.8	96.8	90.3	84.3	78.8	73.7	68.9	64.6	60.5	56.7
52	Te	123.5	114.9	107.1	99.8	93.2	87.0	81.3	76.0	71.1	66.6	62.4	58.6
53	I	133.9	124.7	116.2	108.3	101.1	94.4	88.2	82.5	77.2	72.4	67.8	63.6
54	Xe	139.4	129.8	120.9	112.8	105.3	98.3	91.9	86.0	80.5	75.4	70.5	66.3
55	Cs	148.0	137.8	128.5	119.9	111.9	104.5	97.7	91.4	85.6	80.2	74.2	70.5
56	Ba	153.7	143.2	133.5	124.5	116.3	108.6	101.6	95.1	89.0	83.4	78.2	73.4
57	La	162.8	151.7	141.5	132.0	123.3	115.2	107.8	100.8	94.4	88.5	83.0	77.9
58	Ce	172.7	161.1	150.1	140.0	130.9	122.3	114.4	107.1	100.3	94.0	88.2	82.8
59	Pr	183.5	171.0	159.5	148.9	139.1	130.1	121.7	113.9	106.7	100.0	93.9	88.1
60	Nd	191.1	178.2	166.3	155.3	145.1	135.6	126.9	118.9	111.3	104.4	98.0	91.9
61	Pm	199.8	186.3	173.9	162.4	151.8	141.9	132.9	124.4	116.6	109.3	102.6	96.3
62	Sm	207.7	193.8	180.9	169.0	158.0	147.7	138.3	129.6	121.4	113.9	106.9	100.4
63	Eu	218.2	203.6	190.1	177.6	166.1	155.4	145.5	136.3	127.7	119.9	112.5	105.7
64	Gd	223.7	208.7	194.9	182.2	170.4	159.4	149.3	139.9	131.2	123.1	115.6	108.5
65	Tb	234.3	218.8	204.4	191.0	178.7	167.3	156.7	146.8	137.7	129.2	121.4	114.0
66	Dy	242.4	226.3	211.5	197.7	185.0	173.2	162.3	152.1	142.6	133.9	125.8	118.2
67	Ho	252.2	235.5	220.1	205.9	192.7	180.4	169.1	158.5	148.7	139.6	131.2	123.2
68	Er	262.3	245.0	229.1	214.3	200.6	187.9	176.1	165.1	154.9	145.5	136.7	128.5
69	Tm	273.5	255.6	239.0	223.6	209.4	196.2	183.9	172.5	161.9	152.1	142.9	134.3
70	Yb	280.9	262.6	245.6	229.9	215.3	201.7	189.2	177.5	166.6	156.5	147.1	138.3
71	Lu	250.4	272.9	255.3	239.0	223.9	209.8	196.8	184.7	173.4	162.9	153.2	144.0
72	Hf	257.7	241.0	262.8	246.1	230.6	216.1	202.8	190.3	178.7	168.0	157.9	148.5
73	Ta	195.0	182?	233.3	254.6	238.6	223.8	210.0	197.1	185.1	174.0	163.7	154.0
74	W	201.3	188.4	176.4	225.3	211.2	230.8	216.7	203.4	191.1	179.7	169.0	159.1
75	Re	208.3	194.9	182.6	171.1	218.3	204.8	224.1	210.4	197.7	185.9	175.0	164.7
76	Os	84.2	199.9	187.2	175.5	164.6	154.4	196.9	216?	202.6	190.6	179.4	168.8
77	Ir	87.9	81.9	193.9	181.8	170.5	160.1	150.3	191.4	179.9	197.3	185.7	174.8
78	Pt	91.2	85.0	79.3	187.4	175.8	165.0	155.0	145.7	185?	174.2	191.2	180.0
79	Au	95.2	88.7	82.7	77.2	182.1	170.9	160.6	151.0	142.0	133.6	169.6	159.7
80	Hg	98.4	91.7	85.5	79.8	74.6	175.4	164.8	155.0	145.8	137.2	129.2	163.6
81	Tl	101.7	94.8	88.4	82.5	77.1	72.1	67.5	159.0	149.6	140.9	132.7	125.0
82	Pb	105.6	98.4	91.8	85.7	80.1	74.9	70.1	65.6	154.2	145.2	136.8	128.9
83	Bi	110.1	102.7	95.8	89.4	83.6	78.2	73.2	68.5	64.2	150.4	141.7	133.5
84	Po	115.4	107.6	100.4	93.7	87.6	81.9	76.7	71.8	67.3	63.2	147.3	138.8
85	At	121.5	113.3	105.7	98.7	92.3	86.3	80.8	75.7	70.9	66.6	62.5	145.0
86	Rn	121.1	112.9	105.4	98.4	92.0	86.0	80.5	75.5	70.7	66.4	62.3	58.5
87	Fr	127.1	118.5	110.6	103.3	96.6	90.3	84.6	79.2	74.3	69.7	65.5	61.5
88	Ra	132.3	123.4	115.2	107.6	100.6	94.1	88.1	82.5	77.4	72.6	68.2	64.1
89	Ac	139.2	129.8	121.1	113.2	105.8	99.0	92.7	86.8	81.4	76.4	71.8	67.4
90	Th	144.0	134.3	125.4	117.1	109.5	102.4	95.9	89.9	84.3	79.1	74.3	69.8
91	Pa	153.2	142.9	133.4	124.6	116.5	109.0	102.1	95.7	89.7	84.2	79.1	74.3
92	U	157.7	147.1	137.3	128.3	119.9	112.2	105.1	98.5	92.4	86.7	81.4	76.5
93	Np	168.3	157.0	146.6	136.9	128.1	119.8	112.2	105.2	98.6	92.6	87.0	81.7
94	Pu	175.5	163.7	152.8	142.8	133.5	124.9	117.0	109.7	102.8	96.5	90.7	85.2

[a] Heinrich (1986).

Table 14.5. Mass Absorption Coefficients for $M\alpha$ Lines[a] (? denotes significant uncertainty due to the presence of an absorption edge)

Absorber \ Emitter		833 eV La	883 eV Ce	929 eV Pr	978 eV Nd	1029 eV Pm	1081 eV Sm	1131 eV Eu	1185 eV Gd	1240 eV Tb	1293 eV Dy	1348 eV Ho	1406 eV Er
1	H	13.1	10.8	9.1	7.7	6.5	5.5	4.7	4.0	3.5	3.0	2.6	2.3
2	He	108.2	89.7	76.0	64.3	54.5	46.3	39.9	34.2	29.5	25.7	22.3	19.4
3	Li	418.8	349.6	298.4	254.0	216.4	185.1	160.4	138.2	119.5	104.4	91.3	79.7
4	Be	1,113	936.1	804.2	689.0	590.8	508.4	442.7	383.6	333.4	292.7	257.1	225.3
5	B	2,189	1,855	1,604	1,383	1,193	1,033	904.8	788.3	688.8	607.8	536.4	472.4
6	C	3,529	3,019	2,633	2,289	1,991	1,738	1,532	1,345	1,184	1,051	933.6	827.5
7	N	5,223	4,494	3,938	3,441	3,008	2,638	2,337	2,060	1,821	1,624	1,448	1,288
8	O	7,177	6,204	5,459	4,792	4,208	3,705	3,295	2,917	2,588	2,316	2,072	1,851
9	F	8,838	7,671	6,775	5,969	5,260	4,650	4,149	3,686	3,282	2,947	2,645	2,370
10	Ne	770.5	10,039?	8,893	7,860	6,950	6,162	5,515	4,914	4,390	3,952	3,558	3,197
11	Na	1,051	898.2	782.9	680.9	592.8	7,280?	6,532	5,837	5,228	4,719	4,259	3,837
12	Mg	1,477	1,264	1,103	960.5	837.0	732.1	647.3	569.8	503.3	448.6	5,292	4,778
13	Al	1,903	1,631	1,426	1,243	1,084	949.3	840.0	740.0	654.0	583.3	520.4	463.6
14	Si	2,531	2,174	1,902	1,661	1,451	1,272	1,126	993.0	878·3	783.9	699.8	623.7
15	P	3,090	2,659	2,330	2,037	1,782	1,564	1,386	1,224	1,083	967.5	864.3	770.9
16	S	3,922	3,381	2,968	2,598	2,276	2,000	1,775	1,568	1,389	1,242	1,110	991.1
17	Cl	4,562	3,940	3,463	3,036	2,663	2,343	2,082	1,842	1,634	1,462	1,308	1,168
18	Ar	5,108	4,418	3,890	3,415	3,000	2,643	2,352	2,083	1,849	1,656	1,483	1,326
19	K	6,473	5,609	4,945	4,349	3,826	3,375	3,006	2,666	2,370	2,125	1,905	1,705
20	Ca	7,715	6,697	5,913	5,207	4,587	4,053	3,614	3,209	2,856	2,563	2,300	2,060
21	Sc	8,289	7,206	6,372	5,619	4,957	4,385	3,916	3,481	3,102	2,787	2,503	2,245
22	Ti	9,261	8,064	7,140	6,306	5,571	4,935	4,411	3,926	3,503	3,150	2,833	2,543
23	V	10,252	8,940	7,926	7,010	6,201	5,500	4,923	4,387	3,918	3,528	3,176	2,853
24	Cr	11,704	10,221	9,074	8,035	7,117	6,320	5,664	5,053	4,518	4,073	3,670	3,301
25	Mn	12,791	11,186	9,943	8,815	7,818	6,952	6,236	5,571	4,987	4,499	4,059	3,654
26	Fe	12,362	12,617	11,227	9,966	8,850	7,878	7,076	6,327	5,671	5,122	4,625	4,168
27	Co	13,312	11,673	12,120?	10,771	9,576	8,535	7,673	6,869	6,163	5,572	5,036	4,544
28	Ni	1,896	13,236?	11,804	10,503	10,894	9,721	8,748	7,840	7,042	6,373	5,766	5,207
29	Cu	2,012	1,772	1,586?	10,913	9,723	8,685	9,119	8,181	7,355	6,663	6,034	5,454
30	Zn	2,285	2,009	1,795	1,602	8,655?	9,459	8,529	7,660	8,034	7,284	6,603	5,974
31	Ga	2,515	2,209	1,971	1,757	1,567	1,403	7,250?	8,015	7,220	6,552?	6,928	6,275
32	Ge	2,819	2,473	2,205	1,963	1,749	1,564	1,411	1,269	6,227	6,999	6,355	5,761
33	As	3,169	2,778	2,475	2,201	1,960	1,750	1,578	1,417	1,277	1,159	5,479	6,188
34	Se	3,466	3,037	2,705	2,405	2,139	1,909	1,720	1,543	1,389	1,260	1,143	1,036
35	Br	3,926	3,441	3,064	2,723	2,422	2,160	1,944	1,744	1,568	1,421	1,289	1,167
36	Kr	4,267	3,741	3,332	2,961	2,633	2,348	2,113	1,894	1,702	1,542	1,397	1,265
37	Rb	4,741	4,159	3,707	3,295	2,931	2,613	2,351	2,107	1,893	1,714	1,553	1,404
38	Sr	5,212	4,578	4,083	3,632	3,231	2,882	2,593	2,324	2,088	1,890	1,712	1,548
39	Y	5,758	5,064	4,521	4,025	3,584	3,198	2,879	2,581	2,319	2,099	1,901	1,718
40	Zr	6,259	5,514	4,929	4,393	3,915	3,496	3,149	2,824	2,538	2,299	2,081	1,881
41	Nb	6,819	6,018	5,387	4,808	4,289	3,835	3,456	3,102	2,789	2,527	2,289	2,069
42	Mo	7,292	6,448	5,781	5,167	4,616	4,131	3,727	3,348	3,012	2,731	2,474	2,238
43	Tc	7,929	7,026	6,310	5,649	5,054	4,529	4,090	3,678	3,312	3,005	2,724	2,466
44	Ru	8,327	7,395	6,653	5,966	5,346	4,797	4,338	3,905	3,520	3,196	2,900	2,626
45	Rh	8,917	7,937	7,154	6,426	5,768	5,184	4,694	4,230	3,818	3,470	3,151	2,856
46	Pd	9,364	8,354	7,544	6,789	6,104	5,495	4,982	4,496	4,063	3,696	3,360	3,048
47	Ag	9,991	8,934	8,084	7,288	6,564	5,919	5,374	4,856	4,394	4,002	3,642	3,307
48	Cd	10,330	9,259	8,394	7,583	6,842	6,179	5,618	5,084	4,607	4,200	3,826	3,478
49	In	10,871?	9,767	8,872	8,030	7,258	6,566	5,979	5,418	4,916	4,487	4,093	3,724
50	Sn	10,929	9,416?	9,231	8,370	7,579	6,868	6,263	5,684	5,164	4,720	4,309	3,926
51	Sb	11,874	10,274	9,017	8,768	7,953	7,219	6,592	5,992	5,451	4,988	4,559	4,158
52	Te	11,522?	10,896?	9,596	8,404	8,145	7,405	6,772	6,164	5,615	5,144	4,708	4,298
53	I	10,400	11,078?	9,803?	9,396	8,236	7,984?	7,311	6,664	6,078	5,575	5,108	4,669
54	Xe	10,805	9,576	8,529	9,163	8,821	7,759	6,882	6,907	6,308	5,792	5,313	4,862
55	Cs	11,282	10,157	9,133	8,119	8,739	8,468?	7,527	6,649	6,675	6,136	5,634	5,161
56	Ba	11,315	10,414	9,485	8,508	7,565	8,176?	7,287	7,104	6,295	5,623?	5,838	5,353
57	La	2,744?	10,772	9,973	9,047	8,106	7,220	7,883?	6,995	6,856	6,131	5,478	5,660
58	Ce	2,581	2,332?	10,386	9,562	8,650	7,755	6,963	7,575?	6,737	6,679?	5,974	5,330
59	Pr	2,748	2,481	2,268?	10,043	9,197	8,311	7,499	6,698	5,972?	6,554	6,513?	5,816

(continued)

Table 14.5. (*Continued*)

Absorber \ Emitter		833 eV La	883 eV Ce	929 eV Pr	978 eV Nd	1029 eV Pm	1081 eV Sm	1131 eV Eu	1185 eV Gd	1240 eV Tb	1293 eV Dy	1348 eV Ho	1406 eV Er
60	Nd	2,872	2,590	2,365	2,157?	9,528	8,696	7,895	7,083	6,334	5,691?	6,252	6,215?
61	Pm	3,013	2,714	2,477	2,256	2,362?	9,056	8,294	7,486	6,721	6,054	5,438	5,970
62	Sm	3,146	2,831	2,581	2,350	2,140	2,261?	8,607	7,833	7,071	6,391	5,754	5,158
63	Eu	3,321	2,986	2,721	2,474	2,252	2,054	1,888?	8,232	7,485	6,797	6,138	5,514
64	Gd	3,423	3,077	2,801	2,546	2,314	2,109	1,937	1,773?	7,693	7,028	6,373	5,742
65	Tb	3,610	3,243	2,951	2,680	2,435	2,218	2,035	1,861	1,706?	7,392?	6,742	6,098
66	Dy	3,762	3,379	3,073	2,789	2,533	2,305	2,113	1,931	1,769	1,631?	7,011?	6,375
67	Ho	3,948	3,545	3,223	2,925	2,654	2,414	2,211	2,020	1,848	1,703	1,569?	6,680?
68	Er	4,145	3,722	3,384	3,070	2,784	2,531	2,318	2,115	1,934	1,781	1,640	1,508?
69	Tm	4,369	3,924	3,568	3,236	2,934	2,666	2,441	2,226	2,035	1,872	1,722	1,583
70	Yb	4,541	4,079	3,709	3,364	3,051	2,771	2,536	2,312	2,112	1,942	1,786	1,640
71	Lu	4,779	4,295	3,907	3,544	3,214	2,919	2,670	2,434	2,223	2,043	1,877	1,723
72	Hf	4,986	4,485	4,081	3,703	3,358	3,050	2,790	2,543	2,321	2,133	1,959	1,797
73	Ta	5,234	4,712	4,290	3,894	3,532	3,209	2,936	2,675	2,441	2,243	2,059	1,888
74	W	5,483	4,939	4,500	4,087	3,709	3,371	3,084	2,810	2,564	2,355	2,162	1,982
75	Re	5,761	5,195	4,736	4,304	3,908	3,553	3,251	2,963	2,704	2,484	2,280	2,090
76	Os	6,003	5,419	4,944	4,496	4,085	3,715	3,401	3,100	2,830	2,599	2,386	2,187
77	Ir	6,322	5,713	5,217	4,748	4,317	3,928	3,597	3,280	2,995	2,751	2,526	2,314
78	Pt	6,627	5,996	5,480	4,991	4,541	4,135	3,788	3,456	3,156	2,900	2,663	2,440
79	Au	6,982	6,323	5,785	5,273	4,801	4,374	4,010	3,660	3,344	3,073	2,822	2,587
80	Hg	7,289	6,608	6,051	5,520	5,030	4,586	4,206	3,841	3,511	3,228	2,965	2,718
81	Tl	7,688	6,902	6,326	5,776	5,267	4,806	4,411	4,030	3,685	3,389	3,115	2,856
82	Pb	7,803	7,328	6,638	6,067	5,537	5,055	4,642	4,244	3,883	3,573	3,284	3,013
83	Bi	7,989	7,501	7,093	6,397	5,843	5,338	4,905	4,487	4,108	3,781	3,477	3,191
84	Po	8,146	7,647	7,229	6,824	6,180	5,651	5,195	4,755	4,356	4,011	3,690	3,387
85	At	8,398	7,883	7,452	7,032	6,634	5,998	5,518	5,054	4,631	4,267	3,927	3,607
86	Rn	8,146	7,647	7,228	6,820	6,432	6,072	5,532	5,069	4,648	4,284	3,945	3,624
87	Fr	8,301	7,794	7,367	6,951	6,555	6,187	5,862	5,336	4,895	4,514	4,158	3,821
88	Ra	8,374	7,865	7,435	7,015	6,615	6,242	5,914	5,589	5,093	4,698	4,330	3,981
89	Ac	8,474	7,963	7,530	7,105	6,700	6,322	5,988	5,658	5,350	4,916	4,532	4,168
90	Th	8,401	7,898	7,472	7,052	6,650	6,275	5,943	5,615	5,308	5,036	4,641?	4,270
91	Pa	8,566	8,061	7,629	7,203	6,794	6,411	6,072	5,736	5,422	5,143	4,877	4,467
92	U	8,331	7,847	7,432	7,020	6,624	6,251	5,921	5,593	5,286	5,014	4,753	4,501
93	Np	8,345	8,870	7,459	7,050	6,655	6,283	5,952	5,623	5,314	5,040	4,777	4,522
94	Pu	8,091	7,641	7,250	6,858	6,477	6,117	5,797	5,476	5,176	4,908	4,652	4,403

Absorber \ Emitter		1,462 eV Tm	1,521 eV Yb	1,581 eV Lu	1,645 eV Hf	1,710 eV Ta	1,775 eV W	1,843 eV Re	1,910 eV Os	1,980 eV Ir	2,051 eV Pt	2,123 eV Au	2,195 eV Hg
1	H	2.0	1.7	1.5	1.3	1.2	1.0	0.9	0.8	0.7	0.6	0.6	0.5
2	He	17.1	15.0	13.1	11.5	10.1	8.9	7.9	7.0	6.2	5.5	4.9	4.4
3	Li	70.2	61.7	54.5	47.8	42.1	37.3	32.9	29.3	26.0	23.2	20.7	18.5
4	Be	199.3	175.9	155.7	137.3	121.4	107.7	95.6	85.2	75.9	67.8	60.7	54.5
5	B	419.7	372.1	330.7	292.8	259.9	231.7	206.3	184.7	165.1	148.0	132.9	119.8
6	C	739.5	659.6	589.5	525.1	468.8	420.1	376.0	338.3	304.1	273.8	247.1	223.6
7	N	1,155	1,034	926.9	828.4	741.8	666.7	598.4	539.8	486.4	439.0	397.0	360.0
8	O	1,665	1,495	1,345	1,206	1,084	976.7	879.2	795.3	718.5	650.1	589.3	535.7
9	F	2,139	1,927	1,739	1,564	1,409	1,274	1,150	1,043	944.5	856.9	778.6	709.4
10	Ne	2,894	2,614	2,365	2,133	1,927	1,747	1,581	1,438	1,306	1,187	1,081	987.6
11	Na	3,481	3,153	2,860	2,586	2,342	2,128	1,931	1,760	1,602	1,460	1,333	1,220
12	Mg	4,345	3,943	3,585	3,249	2,949	2,685	2,442	2,231	2,035	1,859	1,700	1,559
13	Al	416.4	373.5	4,146	3,765	3,425	3,125	2,848	2,606	2,382	2,180	1,998	1,835
14	Si	560.5	502.8	452.1	405.4	364.3	328.7	3,447?	3,160	2,893	2,652	2,435	2,241
15	P	693.1	622.1	559.6	501.9	451.2	407.2	367.1	332.7	301.2	273.3	248.4	2,523
16	S	891.7	800.8	720.7	646.7	581.6	525.1	473.6	429.3	388.7	352.7	320.7	292.5
17	Cl	1,052	945.3	851.3	764.3	687.7	621.1	560.4	508.1	460.3	417.8	379.9	346.5
18	Ar	1,195	1,075	968.4	870.0	783.3	707.8	638.9	579.5	525.2	476.8	433.7	395.7
19	K	1,537	1,383	1,248	1,122	1,010	913.5	825.0	748.7	678.8	616.5	561.0	512.0

(*continued*)

Table 14.5. (*Continued*)

Absorber \ Emitter		1,462 eV Tm	1,521 eV Yb	1,581 eV Lu	1,645 eV Hf	1,710 eV Ta	1,775 eV W	1,843 eV Re	1,910 eV Os	1,980 eV Ir	2,051 eV Pt	2,123 eV Au	2,195 eV Hg
20	Ca	1,859	1,675	1,512	1,360	1,226	1,109	1,002	910.1	825.5	750.2	682.9	623.4
21	Sc	2,028	1,828	1,651	1,487	1,341	1,213	1,098	997.6	905.4	823.1	749.6	684.7
22	Ti	2,299	2,075	1,876	1,690	1,526	1,383	1,251	1,137	1,033	939.5	856.1	782.3
23	V	2,582	2,332	2,110	1,903	1,720	1,560	1,412	1,285	1,167	1,063	968.7	885.6
24	Cr	2,990	2,703	2,448	2,210	1,999	1,814	1,644	1,496	1,361	1,239	1,131	1,034
25	Mn	3,313	2,998	2,718	2,456	2,223	2,019	1,831	1,668	1,518	1,383	1,263	1,156
26	Fe	3,783	3,427	3,109	2,812	2,547	2,315	2,102	1,916	1,745	1,591	1,454	1,331
27	Co	4,127	3,742	3,398	3,076	2,790	2,538	2,305	2,103	1,917	1,750	1,599	1,465
28	Ni	4,734	4,296	3,905	3,538	3,211	2,924	2,658	2,427	2,214	2,022	1,849	1,696
29	Cu	4,964	4,509	4,102	3,720	3,379	3,079	2,802	2,560	2,337	2,136	1,955	1,794
30	Zn	5,442	4,947	4,504	4,089	3,718	3,390	3,088	2,824	2,579	2,359	2,161	1,984
31	Ga	5,720	5,205	4,743	4,309	3,921	3,579	3,262	2,986	2,729	2,498	2,290	2,104
32	Ge	6,126	5,579	5,088	4,626	4,214	3,849	3,511	3,216	2,942	2,695	2,472	2,273
33	As	5,650	5,150	5,479	4,986	4,545	4,154	3,793	3,477	3,183	2,918	2,679	2,465
34	Se	4,726	5,399	4,932	4,492	4,776	4,369	3,992	3,662	3,355	3,078	2,828	2,604
35	Br	1,065	969.8	4,261	4,891	4,465	4,088	4,357	4,000	3,667	3,367	3,095	2,852
36	Kr	1,153	1,049	956.9	870.6	3,693	4,284	3,921	3,602	3,852	3,539	3,255	3,002
37	Rb	1,279	1,164	1,061	964.3	878.6	803.2	3,307	3,871	3,555	3,268	3,506	3,235
38	Sr	1,409	1,281	1,167	1,061	965.6	882.2	805.4	738.5	2,961	3,487	3,212	2,966
39	Y	1,564	1,422	1,295	1,176	1,070	977.1	891.5	817.0	748.2	686.4	2,684	3,190
40	Zr	1,713	1,556	1,417	1,287	1,170	1,068	974.4	892.6	817.0	749.1	688.1	633.7
41	Nb	1,884	1,712	1,559	1,415	1,287	1,174	1,071	980.6	897.2	822.3	754.9	695.0
42	Mo	2,038	1,853	1,687	1,531	1,393	1,271	1,158	1,061	970.1	888.9	815.8	750.8
43	Tc	2,246	2,042	1,860	1,689	1,536	1,402	1,278	1,170	1,070	980.1	899.3	827.4
44	Ru	2,394	2,178	1,984	1,802	1,640	1,497	1,364	1,249	1,142	1,046	960.0	883.1
45	Rh	2,605	2,371	2,161	1,964	1,788	1,632	1,488	1,363	1,246	1,142	1,047	963.5
46	Pd	2,782	2,534	2,312	2,102	1,914	1,748	1,594	1,460	1,336	1,224	1,123	1,033
47	Ag	3,021	2,754	2,514	2,287	2,084	1,904	1,738	1,592	1,457	1,335	1,225	1,127
48	Cd	3,180	2,902	2,651	2,414	2,201	2,012	1,837	1,684	1,542	1,413	1,297	1,194
49	In	3,409	3,113	2,846	2,594	2,367	2,165	1,978	1,814	1,662	1,524	1,400	1,288
50	Sn	3,597	3,288	3,009	2,744	2,506	2,294	2,098	1,925	1,764	1,619	1,487	1,370
51	Sb	3,814	3,490	3,196	2,918	2,667	2,443	2,235	2,053	1,882	1,728	1,589	1,463
52	Te	3,946	3,614	3,313	3,028	2,770	2,540	2,325	2,137	1,961	1,801	1,656	1,527
53	I	4,290	3,934	3,610	3,301	3,023	2,774	2,541	2,337	2,146	1,973	1,815	1,674
54	Xe	4,472	4,104	3,770	3,451	3,162	2,904	2,663	2,451	2,252	2,071	1,907	1,760
55	Cs	4,752	4,365	4,013	3,677	3,372	3,099	2,844	2,619	2,408	2,217	2,042	1,886
56	Ba	4,933	4,536	4,173	3,827	3,513	3,231	2,968	2,735	2,516	2,318	2,137	1,974
57	La	5,221	4,805	4,424	4,061	3,730	3,434	3,156	2,911	2,680	2,470	2,279	2,106
58	Ce	5,528	5,092	4,692	4,310	3,962	3,650	3,357	3,098	2,855	2,633	2,430	2,248
59	Pr	5,231	5,401?	4,981	4,579	4,212	3,883	3,574	3,300	3,043	2,808	2,594	2,400
60	Nd	5,594	5,024	5,184?	4,769	4,390	4,050	3,730	3,446	3,179	2,935	2,713	2,512
61	Pm	5,378	5,385	4,847	4,349?	4,686	4,318	3,973	3,667	3,380	3,119	2,881	2,666
62	Sm	5,712	5,137	5,164	4,636	4,170	4,395	4,053	3,749	3,463	3,201	2,962	2,745
63	Eu	4,979	5,511	4,967	4,986	4,487	4,052	4,174	3,870	3,582	3,317	3,074	2,854
64	Gd	5,194	4,682	5,198	4,672	4,707	4,252	3,837	3,898	3,615	3,354	3,113	2,895
65	Tb	5,530	4,993	4,509	4,997	4,501	4,558?	4,115	3,733	3,733?	3,469	3,225	3,003
66	Dy	5,800	5,249	4,747	4,273	4,752	4,297	4,352?	3,949	3,579	3,546?	3,301	3,077
67	Ho	6,105	5,542	5,022	4,527	4,084	4,564	4,123	3,742	3,808	3,460	3,149?	3,176
68	Er	6,399?	5,834	5,302	4,789	4,325	3,916	4,377	3,975	3,605	3,678	3,348	3,057
69	Tm	1,463	6,139?	5,601	5,073	4,590	4,160	3,762	4,232	3,839	3,489	3,569	3,259
70	Yb	1,515	1,398	5,813	5,284	4,791	4,349	3,937	3,578	4,026	3,660	3,333	3,420
71	Lu	1,591	1,467	1,355	5,552?	5,052	4,595	4,165	3,789	3,441	3,883	3,538	3,232
72	Hf	1,658	1,528	1,411	1,299	1,638	4,795	4,357	3,969	3,607	3,283	3,717?	3,397
73	Ta	1,742	1,604	1,480	1,362	1,256	1,621	4,573	4,175	3,800	3,460	3,155	3,588?
74	W	1,828	1,683	1,551	1,427	1,315	1,215	1,601	4,368	3,984	3,633	3,315	3,033
75	Re	1,926	1,773	1,634	1,502	1,383	1,277	1,179	1,594	4,180	3,820	3,490	3,194
76	Os	2,015	1,854	1,708	1,570	1,445	1,334	1,230	1,139	1,572?	3,971?	3,636	3,332
77	Ir	2,133	1,962	1,807	1,661	1,528	1,410	1,299	1,202	1,111	1,570?	3,817?	3,505

(*continued*)

Table 14.5. (*Continued*)

Absorber \ Emitter		1,462 eV Tm	1,521 eV Yb	1,581 eV Lu	1,645 eV Hf	1,710 eV Ta	1,775 eV W	1,843 eV Re	1,910 eV Os	1,980 eV Ir	2,051 eV Pt	2,123 eV Au	2,195 eV Hg
78	Pt	2,249	2,069	1,905	1,750	1,610	1,485	1,368	1,265	1,169	1,082	1,563?	1,442
79	Au	2,384	2,193	2,020	1,855	1,706	1,573	1,449	1,340	1,237	1,145	1,060	984.0
80	Hg	2,506	2,305	2,123	1,950	1,793	1,653	1,522	1,407	1,299	1,201	1,112	1,032
81	Tl	2,633	2,423	2,232	2,050	1,885	1,737	1,600	1,478	1,365	1,261	1,167	1,083
82	Pb	2,778	2,557	2,355	2,163	1,989	1,834	1,688	1,560	1,440	1,331	1,231	1,142
83	Bi	2,943	2,709	2,496	2,293	2,109	1,944	1,790	1,654	1,526	1,410	1,304	1,209
84	Po	3,126	2,878	2,652	2,437	2,241	2,066	1,903	1,758	1,622	1,499	1,386	1,285
85	At	3,329	3,066	2,826	2,597	2,389	2,203	2,029	1,874	1,730	1,598	1,478	1,370
86	Rn	3,346	3,083	2,843	2,613	2,404	2,217	2,042	1,887	1,741	1,608	1,487	1,378
87	Fr	3,530	3,253	3,000	2,759	2,539	2,342	2,157	1,993	1,839	1,699	1,572	1,456
88	Ra	3,678	3,391	3,129	2,877	2,649	2,444	2,251	2,080	1,920	1,774	1,641	1,520
89	Ac	3,853	3,553	3,279	3,016	2,777	2,563	2,361	2,183	2,015	1,862	1,722	1,596
90	Th	3,948	3,642	3,362	3,094	2,849	2,630	2,423	2,240	2,068	1,911	1,768	1,638
91	Pa	4,131	3,812	3,520	3,240	2,985	2,755	2,539	2,348	2,168	2,004	1,854	1,718
92	U	4,151	3,831	3,539	3,258	3,002	2,772	2,555	2,363	2,182	2,017	1,866	1,730
93	Np	4,295	3,959?	3,657	3,368	3,104	2,867	2,643	2,445	2,258	2,087	1,931	1,790
94	Pu	4,182	3,966	3,654	3,366	3,103	2,866	2,643	2,445	2,259	2,088	1,933	1,792

Absorber \ Emitter		2,271 eV Tl	2,346 eV Pb	2,423 eV Bi	2,501 eV Po	2,580 eV At	2,659 eV Rn	2,741 eV Fr	2,824 eV Ra	2,909 eV Ac	2,996 eV Th	3,028 eV Pa	3,171 eV U
1	H	0.5	0.4	0.4	0.3	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
2	He	3.9	3.5	3.2	2.8	2.6	2.3	2.1	1.9	1.7	1.5	1.4	1.3
3	Li	16.6	14.9	13.4	12.0	10.9	9.8	8.9	8.1	7.3	6.6	6.0	5.5
4	Be	48.8	44.0	39.6	35.8	32.3	29.3	26.6	24.1	21.9	19.9	18.2	16.6
5	B	107.7	97.2	87.9	79.6	72.1	65.6	59.6	54.3	49.4	45.1	41.2	37.7
6	C	202.0	183.2	166.3	151.2	137.7	125.7	114.7	104.8	95.8	87.6	80.4	73.8
7	N	325.8	296.1	269.1	245.0	223.4	204.3	186.6	170.7	156.3	143.1	131.4	120.7
8	O	485.8	442.4	402.9	367.5	335.7	307.4	281.3	257.7	236.2	216.5	199.2	183.1
9	F	644.9	588.5	537.2	491.0	449.3	412.2	377.8	346.7	318.3	292.3	269.2	247.8
10	Ne	899.8	823.0	752.7	689.4	632.2	581.1	533.6	490.6	451.1	414.9	382.7	352.8
11	Na	1,114	1,021	935.6	858.6	788.9	726.4	668.2	615.5	566.9	522.3	482.6	445.6
12	Mg	1,426	1,310	1,203	1,106	1,018	939.1	865.5	798.5	736.8	679.9	629.3	581.9
13	Al	1,682	1,548	1,424	1,311	1,209	1,117	1,032	953.2	881.0	814.3	754.8	699.1
14	Si	2,058	1,896	1,747	1,612	1,489	1,378	1,274	1,179	1,091	1,010	937.9	870.0
15	P	2,321	2,142	1,977	1,826	1,689	1,566	1,450	1,344	1,245	1,155	1,073	996.9
16	S	266.2	243.3	222.5	2,160	2,000	1,856	1,721	1,598	1,483	1,377	1,281	1,192
17	Cl	315.5	288.4	263.8	241.6	221.7	203.9	187.5	1,747?	1,624	1,509	1,406	1,310
18	Ar	360.3	329.4	301.3	276.1	253.4	233.1	214.3	197.3	181.8	167.5	154.9	143.1
19	K	466.3	426.5	390.2	357.6	328.2	301.9	277.6	255.7	235.5	217.1	200.7	185.5
20	Ca	568.0	519.6	475.5	435.9	400.1	368.2	338.6	311.9	287.3	264.9	244.9	226.4
21	Sc	624.0	571.1	522.8	479.3	440.1	405.1	372.6	343.2	316.3	291.6	269.7	249.3
22	Ti	713.3	653.0	598.0	548.5	503.7	463.8	426.7	393.1	362.4	334.1	309.0	285.7
23	V	808.0	740.0	677.9	622.0	571.5	526.3	484.4	446.4	411.5	379.5	351.1	324.7
24	Cr	943.9	864.9	792.7	727.6	668.8	616.2	567.3	522.9	482.2	444.8	411.6	380.7
25	Mn	1,056	967.8	887.5	815.0	749.4	690.7	636.1	586.5	541.0	499.3	462.1	427.5
26	Fe	1,217	1,116	1,024	940.7	865.3	797.9	735.1	678.1	625.7	577.6	534.8	494.8
27	Co	1,340	1,230	1,129	1,038	955.2	881.2	812.2	749.6	691.9	638.9	591.7	547.7
28	Ni	1,552	1,425	1,309	1,204	1,109	1,023	943.6	871.2	804.5	743.2	688.6	637.5
29	Cu	1,643	1,510	1,387	1,277	1,176	1,086	1,002	925.7	855.3	790.4	732.6	678.6
30	Zn	1,818	1,672	1,538	1,416	1,305	1,206	1,113	1,029	950.9	879.1	815.2	755.3
31	Ga	1,930	1,775	1,634	1,505	1,389	1,284	1,185	1,096	1,014	937.6	869.8	806.3
32	Ge	2,086	1,921	1,768	1,630	1,505	1,392	1,286	1,190	1,101	1,019	945.5	876.9
33	As	2,263	2,085	1,921	1,772	1,637	1,515	1,401	1,296	1,200	1,111	1,032	957.3
34	Se	2,392	2,206	2,034	1,877	1,735	1,606	1,486	1,376	1,275	1,181	1,097	1,018
35	Br	2,622	2,419	2,232	2,062	1,906	1,766	1,635	1,515	1,404	1,301	1,209	1,123
36	Kr	2,762	2,550	2,354	2,175	2,013	1,866	1,728	1,602	1,486	1,378	1,281	1,191
37	Rb	2,979	2,751	2,542	2,351	2,176	2,019	1,871	1,735	1,610	1,494	1,390	1,292
38	Sr	3,184	2,943	2,721	2,518	2,332	2,165	2,007	1,863	1,729	1,606	1,495	1,390

(*continued*)

Table 14.5. (*Continued*)

Absorber \ Emitter		2,271 eV Tl	2,346 eV Pb	2423 eV Bi	2,501 eV Po	2,580 eV At	2,659 eV Rn	2,741 eV Fr	2,824 eV Ra	2,909 eV Ac	2,996 eV Th	3,082 eV Pa	3,171 eV U
39	Y	2,941	2,720	2,932	2,715	2,516	2,337	2,168	2,014	1,870	1,737	1,618	1,506
40	Zr	2,414	2,888	2,673	2,476	2,677	2,487	2,309	2,145	1,994	1,853	1,727	1,608
41	Nb	638.7	589.2	2,195	2,643	2,453	2,280	2,468	2,295	2,134	1,984	1,850	1,723
42	Mo	689.7	635.9	586.6	541.9	1,974	2,396	2,227	2,071	2,246	2,090	1,949	1,817
43	Tc	759.8	700.4	645.8	596.4	551.5	511.2	1,820	2,219	2,066	1,923	2,092	1,951
44	Ru	810.8	747.2	688.8	635.9	587.9	544.7	504.4	467.7	1,628	1,995	1,863	1,738
45	Rh	884.5	815.0	751.2	693.4	640.9	593.7	549.6	509.4	472.4	438.2	1,495	1,844
46	Pd	948.5	873.9	805.4	743.3	686.9	636.2	588.9	545.7	505.9	469.2	436.4	406?
47	Ag	1,035	953.8	879.1	811.3	749.7	694.3	642.5	595.4	551.9	511.7	475.9	442.3
48	Cd	1,096	1,010	931.4	859.6	794.3	735.6	680.7	630.7	584.6	542.0	504.0	468.3
49	In	1,183	1,091	1,006	928.3	857.9	794.5	735.3	681.3	631.4	585.4	544.2	505.7
50	Sn	1,258	1,160	1,070	987.8	913.1	845.7	782.8	725.3	672.2	623.2	579.4	538.4
51	Sb	1,345	1,241	1,145	1,057	977.3	905.4	838.1	776.7	719.9	667.5	620.6	576.7
52	Te	1,404	1,296	1,196	1,104	1,021	946.5	876.4	812.3	753.0	698.3	649.3	603.4
53	I	1,540	1,422	1,313	1,213	1,122	1,040	963.5	893.2	828.3	768.2	714.4	663.9
54	Xe	1,620	1,496	1,382	1,278	1,182	1,096	1,016	942.0	873.7	810.5	753.9	700.8
55	Cs	1,737	1,605	1,483	1,372	1,270	1,178	1,092	1,013	939.7	872.0	811.3	754.3
56	Ba	1,819	1,682	1,555	1,439	1,333	1,237	1,147	1,064	987.6	916.7	853.1	793.3
57	La	1,942	1,797	1,662	1,539	1,426	1,324	1,228	1,140	1,058	982.4	914.5	850.7
58	Ce	2,074	1,920	1,776	1,645	1,525	1,417	1,315	1,221	1,134	1,053	980.6	912.4
59	Pr	2,216	2,052	1,900	1,761	1,633	1,517	1,408	1,309	1,216	1,130	1,052	979.3
60	Nd	2,320	2,150	1,991	1,846	1,713	1,593	1,479	1,375	1,277	1,187	1,106	1,030
61	Pm	2,461	2,279	2,111	1,956	1,815	1,687	1,566	1,455	1,352	1,257	1,171	1,090
62	Sm	2,539	2,355	2,184	2,026	1,882	1,751	1,628	1,514	1,408	1,310	1,221	1,138
63	Eu	2,644	2,455	2,280	2,119	1,970	1,835	1,707	1,590	1,480	1,378	1,286	1,199
64	Gd	2,685	2,497	2,322	2,160	2,011	1,875	1,746	1,627	1,516	1,413	1,320	1,231
65	Tb	2,789	2,597	2,417	2,251	2.098	1.958	1.825	1.703	1,588	1,481	1,384	1,292
66	Dy	2,861	2,667	2,485	2,317	2,161	2,019	1,883	1,758	1,641	1,531	1,432	1,338
67	Ho	2,957	2,759	2,573	2,401	2,241	2,095	1,956	1,827	1,707	1,594	1,491	1,394
68	Er	3,057	2,855	2,665	2,488	2,324	2,174	2,031	1,899	1,774	1,658	1,552	1,452
69	Tm	2,971	2,966	2,770	2,588	2,419	2,264	2,117	1,980	1,851	1,730	1,621	1,517
70	Yb	3,118	2,855	2,840	2,654	2,482	2,324	2,174	2,034	1,903	1,779	1,667	1,561
71	Lu	3,310?	3,031	2,777	2,757?	2,579	2,416	2,260	2,115	1,979	1,852	1,736	1,626
72	Hf	3,098	2,837	2,919	2,679	2,462	2,488	2,328	2,180	2,040	1,909	1,790	1,677
73	Ta	3,273	2,998	2,747	2,830	2,602	2,398	2,412	2,259	2,115	1,979	1,856	1,740
74	W	2,767	3,157	2,894	2,657	2,740?	2,525	2,326	2,333?	2,185	2,046	1,919	1,799
75	Re	2,916	2,673	3,055	2,805	2,579	2,378	2,455	2,265	2,091	2,120	1,989	1,864
76	Os	3,044	2,791	2,559	2,934	2,698	2,488	2,292	2,368	2,186	2,019	2,042	1,915
77	Ir	3,207	2,943	2,700	2,480	2,851	2,629	2,422	2,236	2,308?	2,132	1,976	1,830?
78	Pt	3,357	3,084	2,832	2,602	2,394	2,763?	2,547	2,350	2,170	2,005	2,075	1,922
79	Au	1,446	3,243	2,981	2,742	2,524	2,329	2,147?	2,482	2,292	2,118	1,963	2,028
80	Hg	955.9	1,441	3,105	2,860	2,635	2,432	2,243	2,071	2,399	2,216	2,055	1,904
81	Tl	1,003	931.4	1,437	2,975?	2,746	2,537	2,341	2,162	1,998	2,318	2,149	1,991
82	Pb	1,057	981.2	911.3	1,440?	1,335	2,655	2,452	2,266	2,095	1,936	2,257?	2,092
83	Bi	1,119	1,039	964.4	896.4	834?	1,351	2,577	2,385	2,206	2,040	1,892	1,754
84	Po	1,188	1,103	1,024	951.2	884.9	824.7	1,370	2,512	2,328	2,155	1,999	1,854
85	At	1,267	1,175	1,091	1,013	942.1	877.8	817.3	1,395	2,459?	2,283	2,120	1,967
86	Rn	1,275	1,183	1,097	1,019	947.3	882.4	821.3	765.2	1,340?	1,255	2,122	1,972
87	Fr	1,347	1,249	1,159	1,076	1,000	931.4	866.7	807.3	752.1	701?	1,275	2,074
88	Ra	1,406	1,304	1,210	1,123	1,044	971.7	904.0	841.9	784.1	730.4	682.2	1,279
89	Ac	1,475	1,368	1,269	1,178	1,095	1,019	948.1	882.8	822.0	765.5	714.8	667.0
90	Th	1,515	1,405	1,303	1,210	1,124	1,046	973.2	906.0	843.4	785.3	733.1	683.9
91	Pa	1,589	1,474	1,367	1,269	1,179	1,097	1,020	949.6	884.0	822.9	768.0	716.3
92	U	1,600	1,484	1,376	1,278	1,187	1,105	1,027	956.1	889.8	828.3	772.9	720.7
93	Np	1,656	1,536	1,425	1,323	1,229	1,144	1,063	989.6	920.9	857.1	799.7	745.6
94	Pu	1,657	1,537	1,426	1,324	1,230	1,145	1,064	990.4	921.6	857.7	800.1	745.9

[a] Heinrich (1986).