Table 4.2.2.1. *K-series reference wavelengths in Å; bold numbers indicate a directly measured line*

Numbers in parentheses are standard uncertainties in the least-significant figures.

Z	Symbol	A	$K\alpha_2$	$K\alpha_1$	$K\beta_3$	$K\beta_1$	References
12	Mg		**9.89153 (10)**	**9.889554 (88)**			(*a*)
13	Al		**8.341831 (58)**	**8.339514 (58)**			(*a*)
14	Si		**7.12801 (14)**	**7.125588 (78)**			(*b*)
16	S		**5.374960 (89)**	**5.372200 (78)**			(*b*)
17	Cl		**4.730693 (71)**	**4.727818 (71)**			(*b*)
18	Ar		**4.194939 (23)**	**4.191938 (23)**			(*c*)
19	K		**3.7443932 (68)**	**3.7412838 (56)**			(*d*)
24	Cr		**2.2936510 (30)**	**2.2897260 (30)**	**2.0848810 (40)**	**2.0848810 (40)**	(*e*)
25	Mn		**2.1058220 (30)**	**2.1018540 (30)**	**1.9102160 (40)**	**1.9102160 (40)**	(*e*)
26	Fe		**1.9399730 (30)**	**1.9360410 (30)**	**1.7566040 (40)**	**1.7566040 (40)**	(*e*)
27	Co		**1.7928350 (10)**	**1.7889960 (10)**	**1.6208260 (30)**	**1.6208260 (30)**	(*e*)
28	Ni		**1.6617560 (10)**	**1.6579300 (10)**	**1.5001520 (30)**	**1.5001520 (30)**	(*e*)
29	Cu		**1.54442740 (50)**	**1.54059290 (50)**	**1.3922340 (60)**	**1.3922340 (60)**	(*e*)
31	Ga		**1.3440260 (40)**	**1.3401270 (96)**	1.208390 (75)	1.207930 (34)	(*b*),(*f*)
33	As		**1.108830 (31)**	**1.104780 (12)**	0.992689 (79)	0.992189 (53)	(*b*),(*f*)
34	Se		1.043836 (30)	**1.039756 (30)**	0.933284 (74)	0.932804 (30)	(*b*),(*f*)
36	Kr		**0.9843590 (44)**	**0.9802670 (40)**	**0.8790110 (70)**	**0.8785220 (50)**	(*b*)
40	Zr		**0.7901790 (25)**	**0.7859579 (27)**	**0.7023554 (30)**	**0.7018008 (30)**	(*b*)
42	Mo		0.713607 (12)	**0.70931715 (41)**	0.632887 (13)	0.632303 (13)	(*d*),(*f*)
44	Ru		0.6474205 (61)	0.6430994 (61)	0.5730816 (42)	0.5724966 (42)	(*d*),(*f*)
45	Rh		0.6176458 (61)	0.6132937 (61)	0.5462139 (42)	0.5456189 (42)	(*d*),(*f*)
46	Pd		0.5898351 (60)	0.5854639 (46)	0.5211363 (41)	0.5205333 (41)	(*d*),(*f*)
47	Ag		**0.5638131 (26)**	**0.55942178 (76)**	0.4976977 (60)	0.4970817 (60)	(*d*),(*f*)
48	Cd		0.5394358 (46)	0.5350147 (46)	0.4757401 (71)	0.4751181 (71)	(*d*),(*f*)
49	In		0.5165572 (60)	0.5121251 (46)	0.4551966 (41)	0.4545616 (41)	(*d*),(*f*)
50	Sn		0.4950646 (46)	0.4906115 (46)	0.4358821 (51)	0.4352421 (51)	(*d*),(*f*)
51	Sb		0.4748391 (45)	0.4703700 (45)	0.4177477 (41)	0.4170966 (31)	(*d*),(*f*)
54	Xe		**0.42088103 (71)**	**0.4163508 (14)**	**0.3694051 (13)**	**0.3687346 (13)**	(*d*)
56	Ba		**0.38968378 (74)**	**0.38512464 (84)**	**0.3415228 (11)**	**0.34082708 (75)**	(*d*)
60	Nd		**0.3248079 (59)**	**0.3201648 (59)**	0.283634 (59)	0.282904 (44)	(*d*),(*f*)
62	Sm		**0.31369830 (79)**	**0.30904506 (46)**	0.273764 (30)	0.273014 (30)	(*d*),(*f*)
67	Ho		0.26549088 (84)	0.2607608 (42)	0.230834 (30)	0.230124 (30)	(*f*),(*g*)
68	Er		**0.2571133 (11)**	**0.25237359 (62)**	**0.2234766 (14)**	**0.22269866 (72)**	(*d*)
69	Tm		0.24910095 (61)	0.24434486 (44)	0.216366 (30)	0.21559182 (57)	(*f*),(*h*)
74	W		0.21383304 (50)	**0.20901314 (18)**	0.18518317 (70)	0.1843768 (30)	(*d*),(*f*)
79	Au		**0.18507664 (61)**	**0.18019780 (47)**	**0.1598249 (13)**	**0.15899527 (77)**	(*d*)
82	Pb		**0.17029527 (56)**	**0.16537816 (38)**	**0.1468129 (10)**	**0.14596836 (58)**	(*d*)
83	Bi		0.1657183 (20)	0.1607903 (46)	0.142780 (11)	0.1419492 (54)	(*f*),(*g*)
90	Th	230	**0.13782600 (31)**	**0.13282021 (36)**	**0.11828686 (78)**	**0.11740759 (59)**	(*d*)
91	Pa	231	0.1343516 (29)	0.1293302 (27)	0.1152427 (21)	0.1143583 (21)	(*i*)
92	U	238	**0.13099111 (78)**	**0.12595977 (36)**	**0.11228858 (66)**	**0.11140132 (65)**	(*d*)
93	Np	237	0.1277287 (39)	0.1226882 (36)	0.1094230 (39)	0.1085265 (28)	(*i*)
94	Pu	239	0.1245782 (15)	0.11952120 (69)			(*h*)
94	Pu	244	0.1245705 (25)	0.1195140 (23)	0.1066611 (18)	0.1057595 (18)	(*i*)
95	Am	243	0.1215158 (24)	0.1164463 (33)	0.1039794 (17)	0.1030803 (17)	(*i*)
96	Cm	248	0.1185427 (23)	0.1134635 (21)	0.1013753 (17)	0.1004708 (16)	(*i*)
97	Bk	249	0.1156630 (54)	0.1105745 (49)	0.0988598 (55)	0.0979514 (54)	(*i*)
98	Cf	250	0.1128799 (82)	0.1077793 (75)			(*i*)

References: (*a*) Schweppe *et al.* (1994); (*b*) Mooney (1996); (*c*) Schweppe (1995); (*d*) Deslattes & Kessler (1985); (*e*) Hölzer *et al.* (1997); (*f*) Bearden (1967); (*g*) Borchert, Hansen, Jonson, Ravn & Desclaux (1980); (*h*) Borchert (1976); (*i*) Barreau, Börner, Egidy & Hoff (1982).

theoretical framework (see below) has been undertaken and will be made available in the longer publication and on the web site.

The feature of absorption spectra customarily designated as 'the absorption edge' has been variously associated with: the first inflection point of the absorption spectrum; the energy needed to produce a single inner vacancy with the photo-electron 'at rest at infinity'; or the energy needed to remove an electron from an inner shell and place it in the lowest unoccupied energy level. A general discussion of this question has been given by Parratt (1959). If we choose the second alternative, then it is easy to see that, with some care for symmetry restrictions, one can estimate the absorption-edge energy by combining the binding energy for any accessible outer shell with the energy of an emission line for which the transition terminus lies in the same outer shell. Of course, this procedure does not focus on the details of absorption thresholds, the locations of which are important for a number of structural applications. On the other hand, our choice gives greater regularity with respect to nuclear charge and facilitates use of electron binding energies, since they are referenced to the Fermi energy or the vacuum.

Electron binding energies have been tabulated for the principal electron shells of all the elements considered in the present table (Fuggle, Burr, Watson, Fabian & Lang, 1974; Cardona & Ley, 1978; Nyholm, Berndtsson & Mårtensson,