TABLE XXII. LEIBFRIED, MODIFIED LEIBFRIED, AND BRAGG NUMBERS—*Continued*

Element	L	L′	$\mathcal{B}$
56 Ba	0.0444	0.0396	0.0384
57 La	0.0295	0.0263	0.0173
58 Ce(α)	0.0627	0.0558	0.0342
58 Ce(γ)	0.0359	0.0320	0.0196
59 Pr	0.0356	0.0318	0.0230
60 Nd	0.0361	0.0321	0.0224
61 Pm	(0.0321)[a]	(0.0286)[a]	(0.0224)[a]
62 Sm	0.0443	0.0395	0.0320
63 Eu	(0.0536)[a]	(0.0477)[a]	(0.0507)[a]
64 Gd	0.0297	0.0264	0.0215
65 Tb	0.0308	0.0274	0.0219
66 Dy	0.0290	0.0258	(0.0202)[a]
67 Ho	0.0288	0.0257	0.0265
68 Er	0.0269	0.0240	(0.0188)[a]
69 Tm	(0.0274)[a]	(0.0244)[a]	(0.0300)[a]
70 Yb	0.0527	0.0469	0.0414
71 Lu	(0.0266)[a]	(0.0237)[a]	(0.0186)[a]
72 Hf	0.0291	0.0259	(0.0242)[a]
73 Ta	0.0367	0.0327	(0.0305)[a]
74 W	0.0208	0.0185	0.0226
75 Re	0.0180	0.0211	(0.0195)[a]
76 Os	(0.0155)[a]	(0.0181)[a]	(0.0167)[a]
77 Ir	0.0126	0.0147	(0.0136)[a]
78 Pt	0.0306	0.0357	0.0332
79 Au	0.0394	0.0461	0.0411
80 Hg	0.0138	0.0138	0.0153
81 Tl	0.1013	0.0902	0.0846
82 Pb	0.0507	0.0592	0.0454
83 Bi	0.0165	0.0446	0.0372
84 Po	(0.0201)[a]	(0.0201)[a]	(0.0167)[a]
87 Fr	(0.0548)[a]	(0.0488)[a]	(0.0454)[a]
88 Ra	(0.0348)[a]	(0.0310)[a]	(0.0289)[a]
89 Ac	(0.0360)[a]	(0.0421)[a]	(0.0389)[a]
90 Th	0.0305	0.0272	(0.0253)[a]
91 Pa	(0.0241)[a]	(0.0241)[a]	(0.0200)[a]
92 U	0.0121	0.0107	(0.0100)[a]
93 Np	(0.0145)[a]	(0.0129)[a]	(0.0120)[a]
94 Pu	0.0144	0.0128	0.0050

[a] Estimated value; see text for further discussion.

Also shown in Table XXII are the modified Leibfried numbers, L'. The modified Leibfried number differs from the Leibfried number in that the term RT_m in L is replaced by the term KT_m, where the value of K depends on the crystal structure of the element just below its melting

point. The values of K are 1.76 for body-centered cubic metals; 2.29 for face-centered cubic or hexagonal close-packed metals; 5.36 for the $A7$ arsenic-type elements (arsenic, antimony, and bismuth); 4.22 for the $A8$ selenium-type elements (selenium and tellurium); 6.50 for the $A4$ diamond-type elements (diamond, silicon, germanium, and gray tin); and 1.978 for the elements which do not fit into the above groups.

The results of a detailed examination of these three numbers is shown in the accompanying tabulation. These results indicate that Leibfried's conclusion is incorrect that $L \simeq 0.042$, but that Bragg's conclusion that $\mathcal{B} \simeq 0.034$ is in agreement with the results shown here, and that $L \simeq L' \simeq \mathcal{B}$, which is to be expected. The percentage deviation from the mean for these three quantities is quite large, which raises the question—should this percentage deviation be used as a criterion for determining whether or not something is or is not a constant, and, if so, then at what percentage does the distinction occur, at 25%, $33\frac{1}{3}$%, 50%, or even higher? This question, of course, has no single answer since any answer will depend greatly on the individual's background and philosophy. It should be mentioned in this connection that the percentage deviation from the mean for the Grüneisen constant is larger than it is for L or L' or $\mathcal{B}$; and if one accepts the premises that the Grüneisen constant is a constant and that the percentage error is a valid criterion for determining this, then L, L', and $\mathcal{B}$ must also be constants of the elements. The percentage deviations for the other constants of the elements are less than 25%, except Poisson's ratio (26.2%).

Number	L	L′	$\mathcal{B}$
Mean value	0.0305	0.0334	0.0312
Standard deviation from mean	0.0135	0.0145	0.0127
Percentage deviation from mean	44.3	43.4	40.7
Elements excluded from averaging process	C(g), Ga, Tl	C(g), Si, Ga, Tl	C(g), Si, Tl, Pu
Minimum value	0.0057	0.0057	0.0050
Element for which minimum occurs	Ga	Ga	Pu
Maximum value	1.99	1.99	5.72
Element for which maximum occurs	C(g)	C(g)	C(g)

A comparison of L and L' with $\mathcal{B}$ revealed, as would be expected if Richard's rule is a poor approximation, that L' was in better agreement with $\mathcal{B}$ for 32 of the elements (72.7%), but in poorer agreement for 12 of the elements. There were 5 elements for which L and L' were identical