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Atomic scattering factors for ytterbium.

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A systematic effort was started more than a year ago in the Burroughs Professional Services group, to compute the atomic wave field of the Lanthanides and from them the atomic scattering factors. The Hartree procedure is used basically to obtain the wave functions without exchange and relativistic effects first (Holm & Eichhorn, 1961). It is intended to utilize these data later to incorporate Fock corrections.

All computations were carried out on a Burroughs 220 computer with the aid of special programs developed therefore (Eichhorn, 1959). The range of sin θ/λ was made to extend to the silver radiation wave length and the intervals of computation were chosen at the same fine mesh applied in earlier calculations (Eichhorn, 1957, 1958). The total computation time for the table listed here, was 4 hours and 34 minutes; this time includes ALGOL compilation of the relevant program version, input and output—both file cards and tabulation.

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Table 1. *Atomic scattering factors for ytterbium*

Selfconsistent field without exchange ($Z = 70$, 13 shells)

sin θ/λ cm.10^{-8}	Atomic scat. factor	sin θ/λ cm.10^{-8}	Atomic scat. factor	sin θ/λ cm.10^{-8}	Atomic scat. factor	sin θ/λ cm.10^{-8}	Atomic scat. factor
0·00	70·000	0·46	41·675	0·90	25·023	1·36	17·322
0·02	69·726	0·48	40·649	0·92	24·516	1·38	17·120
0·04	68·971			0·94	24·043		
0·06	67·896	0·50	39·654	0·96	23·591	1·40	16·924
0·08	66·660	0·52	38·690	0·98	23·149	1·42	16·734
		0·54	37·757			1·44	16·550
0·10	65·364	0·56	36·856	1·00	22·710	1·46	16·371
0·12	64·046	0·58	35·985	1·02	22·281	1·48	16·196
0·14	62·707			1·04	21·871		
0·16	61·341	0·60	35·141	1·06	21·483	1·50	16·025
0·18	59·942	0·62	34·321	1·08	21·119	1·52	15·860
		0·64	33·523			1·54	15·698
0·20	58·514	0·66	32·744	1·10	20·774	1·56	15·540
0·22	57·067	0·68	31·983	1·12	20·442	1·58	15·387
0·24	55·613			1·14	20·121		
0·26	54·167	0·70	31·242	1·16	19·810	1·60	15·238
0·28	52·741	0·72	30·523	1·18	19·508	1·62	15·092
		0·74	29·829			1·64	14·949
0·30	51·344	0·76	29·161	1·20	19·217	1·66	14·808
0·32	49·982	0·78	28·520	1·22	18·940	1·68	14·668
0·34	48·662			1·24	18·677		
0·36	47·386	0·80	27·900	1·26	18·427	1·70	14·529
0·38	46·159	0·82	27·298	1·28	18·189	1·72	14·389
		0·84	26·707			1·74	14·247
0·40	44·977	0·86	26·127	1·30	17·961	1·76	14·101
0·42	43·837	0·88	25·562	1·32	17·741	1·78	13·953
0·44	42·737			1·34	17·529		
						1·80	13·803

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Thermal expansion of tin in the β-γ transition region.

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Tin metal shows anomalous changes in some physical properties in the range 161–200 °C. These changes have been attributed to a structural transformation from tetragonal to rhombic symmetry (Evans, 1923; Mantell, 1949). However, Nishakawa & Asahara (1920) and Matuyama (1931) took X-ray photographs at high temperatures and reported that there was no evidence of a structural change.

Systematic data on the temperature variation of the lattice parameters and the coefficients of thermal ex-