Acta Cryst. (1965). **19**, 337

Lattice Constants of Orthoferrites*†

BY M. EIBSCHÜTZ

Department of Electronics, The Weizmann Institute of Science, Rehovoth, Israel

(*Received* 22 *December* 1964)

The lattice parameters of the orthoferrites $RFeO_3$ where R is Y or one of the trivalent rare earth ions Tb, Dy, Ho, Er, Tm, Yb and Lu, are calculated by Cohen's analytical method. The parameters, a and c, vary regularly with the atomic number (or the ionic radius) of R; however the b parameter remains almost constant.

The lattice constants of the rare earth orthoferrites with chemical formula $RFeO_3$, where R is Y, Tb, Dy, Ho, Er, Tm, Yb and Lu, were calculated from X-ray powder data.

The materials employed in this work were prepared by the ceramic method from the oxides R_2O_3 and Fe_2O_3 of a purity of 99·9% or better. The oxides were heated in a furnace to 1380–1420 °C for 16 hours in air.

The X-ray powder photographs were taken with a Norelco Straumanis camera with a diameter of 114·6 mm and cobalt radiation filtered through an iron foil. The powder photographs were indexed on the basis of the orthorhombic cell (Geller & Wood, 1956; Geller, 1956; Wold & Croft, 1959), Geller's (1958) $YFeO_3$ crystallographic constants being used. No additional lines were observed, indicating that the reaction between the oxides R_2O_3 and Fe_2O_3 had gone to completion and that all the compounds have the same space group as $YFeO_3$, *Pbnm* (D_{2h}^{16}) (Geller & Wood, 1956; Geller 1958; Coppens & Eibschütz, 1965).

* The research reported in this document has been sponsored in part by the Air Force Materials Laboratory Research and Technology Division AFSC through the European Office of Aerospace Research, United States Air Force.

† Part of this work was done in partial fulfilment of the Ph. D. requirements of the author.

Accurate lattice constants were calculated from 30 back reflexions only, by Cohen's (1935) analytical least-squares method. A least-squares program for the computer Control Data Corporation 1604 was written for this purpose.

The powder diffraction data for all the compounds are listed in Table 1. The crystallographic constants on

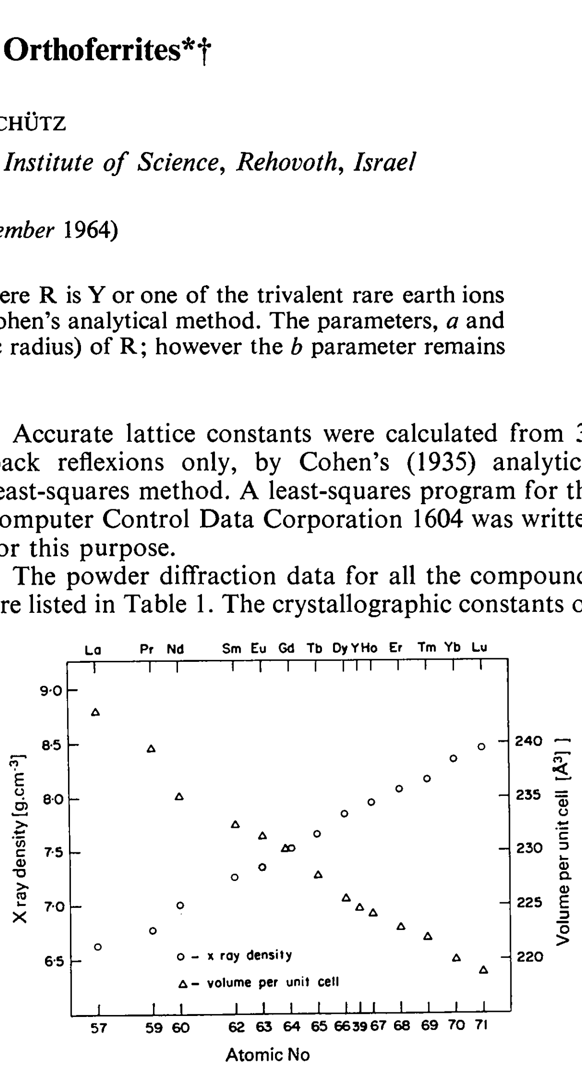

Fig. 2. Volume per unit cell and X-ray density *versus* atomic number for the rare earth orthoferrites. (The values for La to Gd are taken from Geller & Wood, 1956).

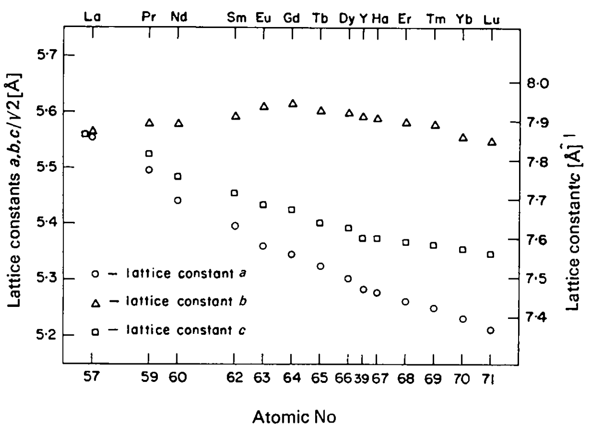

Fig. 1. Lattice constants a, b, c and $c/\sqrt{2}$ *versus* atomic number for the rare earth orthoferrites. (The values for La to Gd are taken from Geller & Wood, 1956).

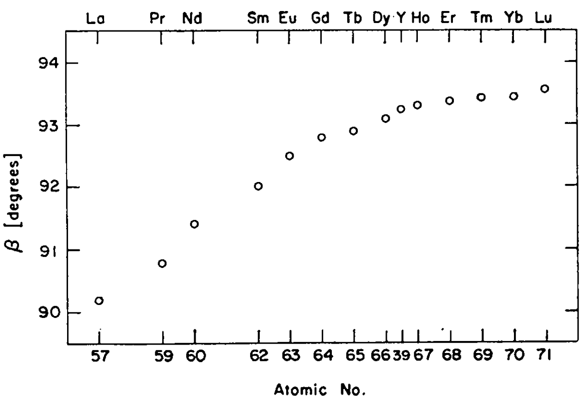

Fig. 3. Angle *versus* atomic number for the rare earth orthoferrites. (The value for La to Gd are taken from Geller & Wood, 1956).

these orthoferrites are listed in Table 2. The standard deviations of each lattice constant are $\pm 0{\cdot}003$ Å. The calculated data for $DyFeO_3$ are in good agreement with those obtained by Dalziel & Welch (1960).

The results are plotted in Fig. 1, together with those given by Geller for the first half of the series (Geller & Wood, 1956; Geller, 1956). Both Table 2 and Fig. 1 show a continuous decrease in lattice constants *a* and *c*, with increasing atomic number of R while *b* remains essentially constant. The variations of volume of the unit cell and the density are shown in Fig. 2.

The perovskite-like pseudocell is almost cubic in $LaFeO_3$, as follows from the near equality of *a*, *b* and $c/\sqrt{2}$ and the β angle of 90·2°. Deviations from cubic symmetry increase with increasing atomic number as a result of the observed decrease of *a* and *c* but not of *b*, in this direction. The angle also increases in this direction (Fig. 3). The same type of regularity has been

Table 1. *Powder diffraction data for orthoferrites* $RFeO_3$

R	Tb			Dy			Y			Ho			Er			Tm			Yb			Lu		
hkl	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I
110	3.846	3.860	VS	3.828	3.849	VS	3.827	3.840	W-M	3.836	3.838	S	3.820	3.829	S	3.801	3.822	S	3.787	3.809	VS		{3.799	
002	3.801	3.818	S	3.790	3.812	S	3.790	3.802	W-M	3.792	3.801	S-M	3.786	3.795	M-S	3.768	3.792	M	3.771	3.785	S	3.776	3.783	S
111	3.429	3.445	VS	3.412	3.436	VS	3.417	3.428	S	3.390	3.426	S	3.402	3.419	S	3.395	3.414	S	3.390	3.403	VS	3.381	3.395	S
020	2.790	2.801	S	2.785	2.799	S	2.786	2.796	S	2.769	2.796	S-M	2.7909	2.7910	M	2.776	2.788	S	2.768	2.779	S	2.767	2.774	M
112	2.707	2.714	VVS	2.693	2.708	VVS	2.692	2.702	VVS	2.680	2.701	VVS	2.699	2.696	VVS	2.682	2.692	VVS	2.674	2.685	VVS	2.673	2.680	VVS
200	2.656	2.663	S	2.634	2.651	S	2.633	2.642	S	2.626	2.639	S	2.629	2.632	S	2.619	2.626	S	2.603	{2.616	S	2.598	{2.607	S
021	2.623	2.630	M-S	2.612	2.627	S	2.616	2.624	M-S	2.610	2.624	M-S	2.621	2.620	S	2.609	2.617	S		2.608			2.604	
211	2.290	2.294	M	2.274	2.286	M	2.271	2.279	M	2.262	2.277	W	2.265	2.271	W	2.259	2.267	M	2.250	2.259	W-M	2.245	2.252	W
022	2.254	2.258	M	2.244	2.256	M	2.246	2.252	W-M	2.237	2.252	M	2.245	2.249	W-M	2.240	2.246	M	2.233	2.240	W-M	2.229	2.237	W
202	2 180	2.184	S	2.164	2.176	S	2.162	2.169	M-S	2.158	1.168	S	2.156	2.163	M-S	2.152	2.159	S	2.144	2.152	S	2.138	2.146	M
113	2.121	2.125	M-S	2.111	2.121	M-S	2.133	2.115	M-S	2.104	2.115	M-S	2.102	2.110	M	2.105	2.109	M-S	2.100	2.104	M	2.095	2.101	M
122	2.073	2.079	VW	2.070	2.076	VW	2.067	2.072	VW	2.061	2.071	VVW	2.065	2.068	VVW	2.063	2.065	VVW	2.053	2.059	VW	2.053	2.055	VVW
212	2.0344	2.0349	VVW	2.025	2.028	VVW	2.016	2.022	VVW	2.011	2.021	VVW	2.013	2.017	VVW	2.009	2.013	VVW	2.004	2.007	VW	2.000	2.002	VVW
220	1.925	1.930	VS	1.918	1.925	S	1.916	1.920	S	1.915	1.919	S	1.911	1.915	S	1.908	1.911	S	1.900	1.905	S	1.914	1.899	M-S
004	1.906	1.909	S	1.899	1.906	S	1.898	1.901	S	1.896	1.901	M	1.896	1.898	S	1.894	1.896	S	1.886	1.893	S	1.887	1.891	M-S
023	1.879	1.884	M-S	1.875	1.881	M-S	1.875	1.877	M	1.874	1.877	M	1.8741	1.8746	M-S	1.869	1.873	M-S	1.863	1.868	M	1.862	1.866	W-M
221	1.867	1.871	S	1.861	1.866	S	1.860	1.862	M-S	1.855	1.861	S	1.8562	1.8567	S	1.848	1.853	S	1.842	1.847	S	1.840	1.842	M-S
213	1.744	1.748	W	1.735	1.743	VVW	1.737	1.738	VVW	1.729	1.737	VVW				1.728	1.731	VVW	1.721	1.726	VVW	1.718	1.723	VW
301		{1.729			{1.721			{1.715			{1.714			{1.709			{1.706			{1.700			{1.694	
114	1.714	1.711	VS	1.709	1.708	VS	1.711	1.704	VS	1.704	1.703	VS	1.703	1.700	VS	1.705	1.699	VS	1.697	1.695	VS	1.694	1.693	VS
131		1.717			1.715			1.713			1.712			1.709			1.707			1.701			1.698	
222		1.722			1.718			1.714			1.713			1.709			1.707			1.702			1.6935	
310	1.689	1.692	W	1.679	1.685	W	1.678	1.680	W	1.670	1.678	W	1.670	1.674	W	1.667	1.670	VW	1.661	1.664	W	1.657	1.658	VW
311	1.650	1.652	W	1.641	1.646	W	1.650	1.640	W	1.631	1.639	W	1.632	1.634	W	1.630	1.631	W-M	1.622	1.625	W	1.6189	1.6197	W
132	1.598	1.600	M	1.594	1.598	M	1.5953	1.5955	M	1.589	1.595	M	1.591	1.592	W-M	1.589	1.590	M	1.580	1.586	W	1.582	1.583	W
024	1.5774	1.5773	M-S	1.572	1.575	M-S	1.5715	1.5719	M-S	1.565	1.572	M	1.565	1.569	M	1.5672	1.5678	M-S	1.561	1.564	M	1.561	1.563	M
204	1.5524	1.5514	S				1.5424	1.5428	S				1.536	1.539					1.530	1.533	S	1.529	1.531	S
312	1.5467	1.5472	VS	1.543	1.541	S	1.539	1.536	S	1.536	1.535	S	1.532	1.531	M-S	1.535	1.528	S	1.529	1.523	S	1.528	1.519	M
133	1.4487	{1.4488	S	1.444	{1.447	S	1.4437	{1.4444	M-S	1.440	{1.444	S	1.439	{1.442	S	1.4395	{1.4400	S	1.434	{1.436	S	1.4333	{1.4336	S
303		1.4560			1.451			1.446			1.445			1.442			1.4390			1.436			1.431	
115		{1.4199			{1.418			{1.414			{1.413			{1.413			{1.4098	VVW		{1.407		1.4047	1.4056	VW
232	1.4192	1.4193	VW	1.415	1.417	VW	1.411	1.414	VW	1.409	1.413	VVW	1.407	1.410	VVW	1.4085	1.4085	VVW	1.4042	1.4039	VVW			
313	1.4087	1.4092	VVW										1.392	1.396	VVW	1.3934	1.3934	VVW	1.3882	1.3893	VVW	1.379	1.386	VVW
322	1.3950	1.3957	VVW	1.386	1.391	VVW	1.385	1.387	VVW	1.383	1.386	VVW	1.381	1.383	VVW	1.3801	1.3807	VVW	1.375	1.376	VVW			
041	1.3768	1.3775	M	1.374	1.376	M	1.3744	1.3749	W	1.3747	1.3747	V-M	1.370	1.373	W	1.3703	1.3710	M	1.3656	1.3664	W	1.3639	1.3640	W
140					{1.353			{1.3515			{1.351			{1.349			{1.347			{1.343			{1.3401	
224	1.3574	1.3571	S	1.352	1.354	S	1.3512	1.3508	S	1.349	1.350	M-S	1.345	1.348	M-S	1.3460	1.3461	M-S	1.341	1.343	M-S	1.3398	1.3402	M
025	1.343	1.354	W	1.337	1.339	VW	1.3354	1.3358	VW	1.334	1.335	VW	1.330	1.334	VW	1.3335	1.3325	VVW	1.328	1.329	VW	1.3273	1.3282	VW
400	1.3315	1.3315	W	1.324	1.326	W	1.3206	1.3208	W	1.3190	1.3195	W	1.313	1.316	W	1.3133	1.3128	VW	1.3077	1.3082	VVW	1.3028	1.3032	W
042	1.309	1.315	VW	1.312	1.314	VVW	1.3115	1.3121	VVW															
323																			1.2753	1.2749	VVW	1.2719	1.2716	VVW
006				1.2704	{1.2705	W	1.2671	{1.2672	W	1.2663	{1.2670	W		{1.265	W	1.262	{1.264	VW	1.2614	1.2616	VW	1.259	1.261	VVW
411					1.2718			1.2674			1.2663		1.2627	1.2628			1.260							
331		1.2687	M	1.2648	{1.2653	M	1.2632	1.2623	M	1.2613	{1.2616	M	1.2573	1.2580	M	1.2566	1.2566	W-M	1.2522	1.2524	M	1.2484	1.2489	M
314	1.2669	1.2663			1.2638		1.2581	1.2586	W		1.258		1.2540	1.255	W	1.2538	1.2532	W						
402				1.2512	1.2519	VVW				1.2462	1.2465	VVW	1.2429	1.2432	VVW	1.239	1.240	VW	1.2364	1.2365	VVW			
043	1.2264	1.2270	W	1.2247	1.2258	W	1.2241	1.2241	W	1.2236	1.2239	VW	1.2215	1.2220	VW	1.219	1.221	VW	1.2178	1.2170	VW	1.2153	1.2151	VW
241	1.2229	1.2235	M	1.2206	1.2216	M	1.186	1.2196	W-M	1.2187	1.2192	W-M	1.2166	1.2169	W-M	1.213	1.215	W	1.2114	1.2112	W-M	1.2092	1.2085	W
332				1.2158	1.2160	W	1.2122	1.2131	VW				1.2089	1.2098	W	1.206	1.208	W	1.2038	1.2039	VW	1.2007	1.2008	VVW
116	1.2092	1.2085	M-S	1.2056	1.2065	S	1.2025	1.2033	M-S	1.204	1.203	M-S	1.2016	1.2013	M	1.1996	1.2001	M	1.1979	1.1977	M	1.194	1.196	M
420	1.2028	1.2025	W-M	1.197	1.198	W	1.1937	1.1942	W-M	1.1938	1.1933	W-M	1.1903	1.1901	W									
225	1.1976	1.1975			{1.1951			{1.1921			{1.192			{1.1896			{1.188			{1.1852			{1.1834	
143				1.1940	1.1944	M	1.1927	1.1925	M	1.1938	1.1923	M	1.1899	1.1903	M	1.186	1.189	M	1.1851	1.1854	M	1.1825	1.1834	M
421	1.1877	1.1873	W	1.1827	1.1834	W	1.1789	1.1797	W	1.181	1.179	W	1.1753	1.1757	W				1.1694	1.1694	W			
242					{1.1771	W	1.1756	1.1751	VW				1.1728	1.1725	VW	1.1717	1.1710	W				1.1647	1.1648	W
324	1.1790	1.1792	W	1.1765	1.1759	VW							1.1704	1.1696	VW	1.169	1.168	VW						
305								{1.1509			{1.1504			{1.1480			{1.1463			{1.1434			{1.1411	
135	1.1541	1.1540	S	1.1517	1.1524	S	1.1496	1.1500	M-S	1.1491	1.1498	M	1.1487	1.1480	M-S	1.1460	1.1467	M	1.1442	1.1439	M	1.1416	1.1425	M
?06	1.1480	{1.1482	S	1.1448	{1.1457	S	1.1417	1.1425	M		1.1422		1.1403	{1.1402	S	1.137	{1.139	M-S	1.1361	1.1364	M	1.133	1.1350	M
333		1.1482			1.1454			1.1426		1.1419	1.1420	M		1.1396			1.138		1.1343	1.1343	M	1.1314	1.1316	M
26	1.1323	1.1321	VW	1.1301	1.1303	W		{1.1276																
315	1.1342	1.1337			1.1306		1.1270	1.1273	VW				1.1242	{1.1244	VW	1.122	{1.124	VW	1.1200	{1.1199	VW	1.117	{1.118	W
044								1.1262						1.1243			1.123			1.1199			1.118	
243	1.1139	1.1144	S	1.1125	1.1127	S	1.1103	1.1106	M-S	1.1110	1.1103	M-S	1.1086	1.1083	M	1.106	1.107	M-S	1.1035	1.1035	M	1.1017	1.1013	W
150	1.0965	1.0964	W	1.0949	1.0954	VW	1.0942	{1.0936	W	1.0935	{1.0939	VW	1.0917	{1.0921	W	1.0900	{1.0910	VW	1.0874	{1.0872	W	1.0859	1.0851	VVW
?40								1.0949			1.0944			1.0921			1.0904			1.0867				
404	1.0923	1.0920	M	1.0884	1.0881	M	1.0839	1.0846	M	1.0834	1.0839	M	1.0813	1.0813	M-S	1.0783	1.0792	M-S	1.0765	1.0762	M	1.074	1.073	W-M
423	1.0874	1.0873	M-S	1.0839	{1.0836	M-S	1.0800	1.0803	M-S	1.0794	1.0796	M	1.0774	1.0770	W	1.0740	1.0749	W	1.0715	1.0716	W	1.0676	1.0684	
151	1.0848	1.0853	W		1.0843		1.0823	1.0830	W				1.079	1.0810	W									
226	1.0624	1.0624	VW	1.0602	1.0603	VW				1.0580	1.0573	VW	1.0561	1.0555	VW	1.0537	1.0543	VW	1.0513	1.0591	VW	1.0495	1.0504	VW
152			VW	1.0524	1.0528	VW	1.0512	{1.0515	VW		{1.0512		1.0497	{1.0495	W	1.0473	{1.0482	W	1.0437	{1.045	VW	1.0429	1.0430	VW
342	1.0557	1.0566						1.0521		1.0520	1.0517	VW		1.0495			1.0480			1.045		1.0415	1.0420	VW
117	1.0495	1.0496	VVW	1.0478	1.0479	VVW	1.0450	1.0451	VW	1.0441	1.0449	VVW	1.0433	1.0434	VW	1.0415	1.0424	VW	1.0394	1.0403	VW	1.0389	1.0395	VVW
501																1.0396	1.0403	VW	1.0361	1.0367	VVW	1.0325	1.0328	VVW
432	1.0428	1.0429	VW	1.0393	1.0396	W	1.0369	1.0368	VW	1.0355	1.0361	VW	1.0333	1.0337	W	1.0312	1.0318	W	1.0278	1.0284	VW	1.0252	1.0254	VW
045	1.0325	{1.0321	M-S	1.0309	{1.0310	M-S	1.0288	{1.0295	M	1.0286	{1.029	M	1.0270	{1.0274	M	1.0257	{1.0264	W-M	1.0234	{1.0236	W-M	1.0225	{1.0223	W-M
250		1.0327			1 0314			1.0299			1.0296			1.0277			1.0264			1.0229			1.0208	
136		1.0316			1.0301			1.0279			1.0277			1.026			1.0251			1.0226			1.0215	
027													1.0105	1.0108	S	1.0092	1.0098	S	1.0073	1.0078	W	1.0064	1.0069	W

Table 1 (*cont.*)

hkl	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I	d_{Obs}	d_{Calc}	I
316	1.0176	1.0171	VS	1.0145	1.0145	VS	1.0110	1.0116	VS	1.0107	1.0111	VS	1.0086	1.0092	S	1.0071	1.0079	S	1.0052	1.0054	S	1.0030	1.0036	M-S
145								1.0102			1.0100			1.0084			1.0073			1.0046			1.0032	
424		1.0175			1.0142			1.0112			1.0106			1.0083			1.0065		1.0031	1.0035	M	1.0005	1.0008	M
153	1.0070	1.0069			1.0059		1.0044	1.0045	M-S	1.0034	1.0043	M	1.0034	1.0027	M	1.0010	1.0015	W-M	0.9988	0.9984	W	0.9975	0.9967	W
343		1.0094						1.0051						1.0027	M		1.0012			0.9981			0.9967	
512	1.0098	1.0092	S	1.0054	1.0050	VS	1.0008	1.0015	S	1.0002	1.0007	S	0.9976	0.9980	S	0.9949	0.9958	M	0.9922	0.9925	M	0.9885	0.9890	M
217					0.9914								0.9866	0.9868	VW	0.9857	0.9857	W	0.9840	0.9836	W	0.9829	0.9825	VW
520	0.9956	0.9956	VW	0.9916	0.9916	W																		
415							0.9810	0.9816	W	0.9805	0.9811	M	0.9790	0.9789	W	0.9776	0.9772	W						
335	0.9843	0.9839	M	0.9818	0.9817	M	0.9793	0.9793	M	0.9789	0.9789	M	0.9773	0.9770	M	0.9751	0.9757	W	0.9728	0.9730	W	0.9711	0.9710	W-M
521								0.9801			0.9793			0.9767			0.9746							
503							0.9751	0.9752	VW	0.9741	0.9744	VW	0.9716	0.9718	VVW	0.9692	0.9698	VVW	0.9682	0.9677	VVW	0.9631	0.9635	W
236				0.9766	0.9764	VW		0.9742			0.9738			0.9722			0.9710			0.9687				
326				0.9682	0.9680	VVW				0.9652	0.9649	VVW	0.9633	0.9631	VW	0.9613	0.9618	W	0.9597	0.9594	W	0.9574	0.9577	VW
513	0.9684	0.9678	W	0.9642	0.9640	VW	0.9602	0.9607	W	0.9606	0.9600	VW		0.9575			0.9555			0.9524			0.9493	
440	0.9654	0.9650	M								0.9595			0.9573			0.9557			0.9525		0.9498	0.9497	VVW
245	0.9627	0.9624	M-S	0.9607	0.9609	M-S	0.9588	0.9589	M	0.9594	0.9587	M-S	0.9572	0.9571	M-S	0.9555	0.9559	M-S	0.9532	0.9533	M-S	0.9519	0.9517	
441	0.9574	0.9574	M-S	0.9549	0.9548	M-S	0.9523	0.9525	M	0.9524	0.9519	M	0.9502	0.9498	S	0.9476	0.9482	S	0.9451	0.9450	M	0.9426	0.9423	M
008							0.9503	0.9504	W	0.9506	0.9503	W												
344	0.9530	0.9528	W	0.9507	0.9508	W		0.9488			0.9484			0.9466			0.9453	S		0.9424			0.9404	
154	0.9508	0.9507	M	0.9496	0.9497	M-S	0.9483	0.9483	M-S	0.9482	0.9481	M	0.9472	0.9466	M-S	0.9450	0.9455	M	0.9428	0.9427	M	0.9409	0.9412	M
227	0.9493	0.9496	W	0.9476	0.9478	M	0.9454	0.9454	M	0.9451	0.9451	W	0.9440	0.9435	W	0.9423	0.9425	W	0.9405	0.9404	W	0.9392	0.9393	W
350	0.9473	0.9475	W	0.9460	0.9458	M	0.9436	0.9441	W-M	0.9435	0.9437	W	0.9420	0.9419	W	0.9401	0.9405	W-M	0.9378	0.9373	W	0.9358	0.9351	W
046								0.9389			0.9387		0.9371	0.9373	W	0.9358	0.9364	W						
425	0.9453	0.9448	W-M	0.9421	0.9420	M	0.9390	0.9392	M	0.9378	0.9387	W		0.9366		0.9346	0.9351	M	0.9323	0.9325	W	0.9301	0.9302	W-M
351	0.9405	0.9403	M	0.9385	0.9386	M-S	0.9368	0.9369	M	0.9361	0.9365	M	0.9349	0.9347	M-S	0.9329	0.9337	M-S	0.9305	0.9302	M	0.9285	0.9280	M
434								0.9374			0.9369			0.9349			0.9337			0.9305			0.9281	
442	0.9360	0.9355	W		0.9331		0.9304	0.9308	VVW	0.9297	0.9303	VVW				0.9261	0.9267	VW						
060	0.9336	0.9337	VW	0.9332	0.9330	W	0.9320	0.9320	VW	0.9317	0.9318	VW	0.9302	0.9303	VW	0.9288	0.9293	VW	0.9256	0.9262	VW	0.9239	0.9245	VW
146		0.9274			0.9262			0.9244			0.9242			0.9228			0.9218			0.9195			0.9183	
137	0.9282	0.9274	S	0.9261	0.9261	S	0.9239	0.9240	S	0.9235	0.9238	S	0.9225	0.9224	S	0.9212	0.9215	S	0.9195	0.9194	S	0.9184	0.9184	S
307		0.9291			0.9270			0.9244			0.9241			0.9224			0.9212			0.9191			0.9177	
118	0.9260	0.9265	M	0.9249	0.9249	S-M	0.9220	0.9225	M-S	0.9221	0.9224	M	0.9209	0.9210	M	0.9198	0.9201	W-M	0.9175	0.9183	M	0.9174	0.9176	M
160																0.9154	0.9151	VW				0.9103	0.9103	VVW
406	0.9204	0.9199	W	0.9173	0.9172	W				0.9139	0.9139	W	0.9120	0.9120	W	0.9100	0.9105	W	0.9079	0.9082	W			
531	0.9189	0.9185	M-S	0.9155	0.9153	S	0.9123	0.9126	M-S	0.9118	0.9119	W	0.9094	0.9096	W	0.9072	0.9078	W	0.9046	0.9047	W	0.9021	0.9017	W
317	0.9169	0.9168	M	0.9146	0.9147	M-S		0.9121			0.9117	W	0.9101	0.9101	W	0.9087	0.9089	VW	0.9066	0.9068	W			
161														0.9095			0.9085			0.9054				
514										0.9101	0.9105	W	0.9081	0.9082	W	0.9060	0.9065	W	0.9031	0.9037	VW	0.9008	0.9009	W
062	0.9069	0.9069	M	0.9063	0.9062	M-S	0.9052	0.9054	M-S	0.9050	0.9050	M	0.9039	0.9036		0.9023	0.9026	M-S	0.9001	0.8996	W-M			
254					0.9071			0.9055			0.9053			0.9037			0.9027			0.8998				
336					0.9028		0.9005	0.9005	M-S		0.9002			0.8986			0.8974							
028	0.9034	0.9034	M	0.9021	0.9020	M-S	0.8999	0.8998	S	0.9002	0.8997	M-S	0.8987	0.8994	S	0.8973	0.8975	M-S						
443	0.9026	0.9023	S	0.9002	0.9000	S	0.8978	0.8978	S															
532	0.8993	0.8992	S																					

Table 2. *Crystallographic constants of orthoferrites* $RFeO_3$

R	a(Å)	b(Å)	c(Å)	$c/\sqrt{2}$(Å)	Vol. per unit cell (Å^3)	X-ray density (g/cm^3)	Pseudo-cell dimensions $a'=c'$ (Å)	b' (Å)	β(°)
Tb	5·326	5·602	7·635	5·399	227·8	7·66	3·865	3·818	92·89
Dy	5·302	5·598	7·623	5·390	225·6	7·84	3·855	3·812	93·11
Y	5·283	5·592	7·603	5·376	224·6	5·70	3·846	3·802	93·25
Ho	5·278	5·591	7·602	5·375	224·3	7·96	3·844	3·801	93·3
Er	5·263	5·582	7·591	5·367	223·0	8·07	3·836	3·796	93·37
Tm	5·251	5·576	7·584	5·363	222·1	8·16	3·830	3·792	93·44
Yb	5·233	5·557	7·570	5·353	220·1	8·35	3·817	3·785	93·44
Lu	5·213	5·547	7·565	5·349	218·8	8·46	3·806	3·783	93·56

observed in other measurements of these compounds such as internal field (Eibschütz, Gorodetsky, Shtrikman & Treves, 1964), Curie temperature (Eibschütz *et al.*, 1964) and magnetization (Gorodetsky & Treves, 1965).

The data for $YFeO_3$ fall between those for $DyFeO_3$ and $HoFeO_3$ for all the lattice parameters, as well as for the internal field and Curie temperature. These observations are consistent with the fact that the ionic radius of Y falls between those of Dy and Ho.

The author wishes to thank Professor E. Banks, S. Shtrikman and Dr D. Treves for many critical discussions, Mrs T. Gilad for measuring the powder photographs and Professor E. H. Frei under whom this work was performed.

References

COHEN, M. V. (1935). *Rev. Sci. Instrum.* **6**, 68.

COPPENS, P. & EIBSCHÜTZ, M. (1965). *Acta Cryst.* In the press.

DALZIEL, J. A. W. & WELCH, J. E. (1960). *Acta Cryst.* **13**, 1956.

EIBSCHÜTZ, M., GORODETSKY, G., SHTRIKMAN, S. & TREVES D. (1964). *J. Appl. Phys.* **35**, 1071 S.

GELLER, S. (1956). *J. Chem. Phys.* **24**, 1236.

GELLER, S. (1958). *Acta Cryst.* **11**, 565.

GELLER, S. & WOOD, E. A. (1956). *Acta Cryst.* **9**, 563.

GORODETSKY, G. & TREVES, D. (1965). In the press.

WOLD, A. & CROFT, W. (1959). *J. Phys. Chem.* **63**, 447.