TABLE VII. β-Ga_2O_3 powder data (Cu$K\alpha$ radiation).

hkl	d_c	d_o	I_c	ΣI_c	I_o
200	5.942	-	0.0	0.0	-
001	5.635	5.62	1.6	1.6	VW
201	4.679	4.67	3.8	3.8	W
201	3.677	3.66	(2.0)	2.0	VW
400	2.971	2.95	21.7	22.8	VS
110	2.945		1.1		
401	2.930	2.92	26.1	26.1	VS
002	2.817	2.81	27.5	45.5	VVS
202			18.0		
111	2.675	2.66	12.7	12.7	W-M
111	2.549	2.536	50.2	50.2	VVS
310	2.412	-	0.2	0.2	-
401	2.403	2.390	17.7	17.7	M-S
311	2.343		29.1		
202	2.340	2.332	1.1	31.8	S
402	2.340		1.6		
311	2.109	2.100	4.5	8.2	W-M
112	2.098		3.7		
601	2.024	2.014	2.4	2.4	W
600	1.980		1.5		
112	1.979	1.971	3.4	13.1	M
312	1.978		8.2		
203	1.927	-	.3	0.3	-
511	1.885	-	1.1	1.1	-
003	1.878		0.0		
510	1.872	1.865	4.8	4.8	M
402	1.838	1.831	2.5	3.4	W
602	1.838		0.9		
403	1.791	1.788	1.6	1.6	VW
601	1.744	1.736	1.0	1.0	VVW
312	1.714		0.0		
513	1.714	-	0.1	0.1	-
511	1.685	1.677	2.8	4.7	W-M
203	1.680		1.9		
113	1.628	1.622	1.4	1.4	VW
313	1.598	1.595	13.2	13.2	M-S
603	1.560	1.559	3.7	3.7	W
113	1.543	1.539	11.8	11.8	M
801	1.528	1.525	5.9	16.4	M-S,
020	1.520		10.5		Br.
711	1.512	-	0.2	0.2	-
800	1.485	1.479	0.2	3.5	W-M
710	1.482		3.3		
220	1.473		0.0		
513	1.470		0.1		
021	1.468	-	0.0	0.2	-
602	1.465		0.1		
802	1.465		0.0		
204	1.450	1.449	7.9	7.9	M
221	1.446	-	0.2	0.2	-
403	1.441		1.0		
512	1.440	1.436	14.9	31.9	VS
712	1.440		16.0		
004	1.409		0.2		
404	1.409	-	0.1	0.4	-
221	1.405		0.1		
313	1.388	-	0.4	0.4	-
711	1.366	-	0.0	0.0	-
801	1.359		3.5		
420	1.353	1.355	1.7	9.2	M,Br.
421	1.349		4.0		
022	1.338		2.4		
223	1.338	1.336	3.1	5.6	W-M
803	1.328		0.7	0.7	-
204	1.303		2.1		
604	1.303		0.8		
713	1.302	1.301	0.6	3.8	W-M
114	1.301		0.0		
314	1.301		0.3		
421	1.285	1.281	4.1	4.1	W

hkl	d_c	d_o	I_c	ΣI_c	I_o
222	1.275		0.6		
221	1.275	-	0.7	1.3	-
114	1.243		0.1		
511	1.243	-	0.2	0.4	-
911	1.241		0.1		
603	1.226		1.9		
10,0,1	1.223	1.223	0.2	2.1	W
513	1.217		0.4		
621	1.215	-	0.8	1.2	-
712	1.212		0.1		
912	1.212	1.209	0.0	1.0	VVW,
910	1.211		0.9		Br.
620	1.206		0.2		
802	1.202	-	0.0	0.2	-
10,0,2	1.201		0.0		
223	1.193		0.2		
10,0,0	1.188	-	0.0	0.2	-
023	1.182	-	0.0	0.0	-
422	1.171		1.0		
622	1.171	1.168	0.4	1.6	VW,
404	1.170		0.1		Br.
804	1.170		0.1		
423	1.159	-	0.6	0.6	-
205	1.159		0.0		
405	1.148		0.1		
314	1.147	1.146	0.9	4.2	W-M
714	1.146		2.8		
621	1.146		0.4		
913	1.136	-	0.0	0.0	-
911	1.134		0.6		
10,0,3	1.132	1.132	1.3	1.9	W
223	1.127	-	0.9	0.9	-
005	1.127		0.0		
10,0,1	1.111	-	0.1	0.1	-
605	1.098	1.098	1.7	1.7	W
623	1.089	1.086	2.2	2.2	VVW
315	1.083	-	1.0	1.0	-
821	1.077	1.075	3.6	5.7	W-M,
115	1.074		2.1		Br.
820	1.062		0.0		
205	1.062	1.061	1.0	1.0	VW
713	1.062		0.0		
515	1.057		1.0		
622	1.055	-	0.1	1.1	-
822	1.055		0.0		
803	1.050	1.048	0.5	5.6	M
224	1.049		5.1		
423	1.046	-	0.7	0.7	-
11,1,1	1.043	1.043	1.3	1.3	VVW
604	1.038	-	0.0	0.2	-
10,0,4	1.037		0.2		
514	1.037		2.5		
914	1.036		1.3		
912	1.034		2.7		
11,1,2	1.034	1.033	2.1	10.0	M-S,
024	1.033		0.1		Br.
424	1.033		0.1		
115	1.033		1.2		
805	1.022	-	0.1	0.1	-
11,1,0	1.018	1.015	0.5	1.1	VW
12,0,1	1.017		0.6		
821	1.013		2.9		
10,0,2	1.012	1.011	0.2	3.6	W
12,0,2	1.012		0.5		
130	1.010		0.0		
715	1.003		0.1		
823	1.000	1.000	0.6	1.3	VW
131	0.997		0.6		
11,1,3	0.992		1.3		
131	0.990		2.5		
12,0,0	0.990	0.989	1.9	8.3	M-S,
224	0.989		1.9		Br.
624	0.989		0.7		

hkl	d_c	d_o	I_c	ΣI_c	I_o
330	0.982	-	0.1	0.1	-
405	0.980		0.0		
331	0.977	0.976	0.5	1.8	VW
12,0,3	0.977		1.3		
315	0.969	-	0.6	0.6	-
11,1,1	0.965		0.5		
206	0.964	0.964	1.3	2.1	W
406	0.963		0.3		
331	0.958	-	0.4	0.5	-
132	0.957		0.1		
623	0.954	0.952	2.1	2.3	W
10,2,1	0.953		0.2		
132	0.944	0.945	0.3	1.1	VVW
332	0.944		0.8		
822	0.943		0.0	0.0	-
10,2,2	0.943		0.0		
006	0.939		0.1		
606	0.939		0.2		
12,0,1	0.938	0.937	0.3	1.8	W
10,2,0	0.936		0.0		
10,0,5	0.936		1.2		
531	0.934	-	0.1	0.1	-
915	0.932		0.0		
530	0.932		0.6		
913	0.930	0.929	1.0	2.9	W,Br.
714	0.930		0.4		
11,1,4	0.929		0.9		
424	0.927	-	0.0	0.1	-
824	0.927		0.1		
225	0.921		0.0		
316	0.921	-	0.0	0.0	-
804	0.919		0.0		
12,0,4	0.919		0.0		
425	0.916		0.1	0.1	-
10,0,3	0.911		0.6		
332	0.911		0.0		
532	0.911	0.910	0.0	3.8	W,Br.
116	0.910		0.0		
516	0.910		1.3		
10,2,3	0.908		1.9		
531	0.906	-	0.5	0.5	-
025	0.905		0.0		
133	0.897		0.3		
10,2,1	0.897		0.2		
13,1,1	0.896		0.3		
11,1,2	0.896	0.895	0.1	1.8	VVW,
206	0.896		0.6		Br.
13,1,2	0.895		0.2		
806	0.895		0.0		
515	0.895		0.1		
605	0.893		1.8		
333	0.892	0.892	2.8	7.3	M,Br.
625	0.890		2.7		
133	0.882		2.9		
116	0.880	0.880	0.1	3.3	W
716	0.880		0.3		
731	0.876	-	0.1	0.2	-
13,1,0	0.875		0.1		
13,1,3	0.873	-	0.3	0.3	-
12,0,2	0.872		1.0		
14,0,2	0.872		0.8		
225	0.871	0.870	1.9	4.7	M
14,0,1	0.870		0.0		
730	0.870		1.0		
533	0.868	-	0.0	0.0	-
823	0.864	-	1.0	1.0	-
532	0.861	0.861	4.7	9.8	M-S,
732	0.861		5.1		Br.
624	0.857		0.0		
10,2,4	0.857	-	0.4	0.8	-
11,1,5	0.856		0.4		
14,0,3	0.853	-	0.5	0.5	-
12,0,5	0.850		0.0		
333	0.850	-	0.2	0.4	-
14,0,0	0.849		0.0		
825	0.848		0.2		

hkl	d_c	d_o	I_c	ΣI_o	I_o
12,2,1	0.845	0.845	1.4	1.4	VW
731	0.845		0.0		
10,2,2	0.843	0.843	0.5	1.7	VW
12,2,2	0.842		1.2		
406	0.840	-	0.1	0.1	-
10,0,6	0.840		0.0		
13,1,1	0.837		2.9		
316	0.835	0.835	4.0	12.0	M-S,
916	0.835		5.1		Br.
914	0.833	0.834	2.1	2.6	W,Br.
13,1,4	0.833		0.5		
12,2,0	0.830		2.3		
733	0.829	0.829	0.4	3.1	W-M
134	0.829		0.0		
334	0.829		0.4		
407	0.828	-	0.1	0.1	-
207	0.824	-	0.0	0.1	-
425	0.823		0.1		
12,2,3	0.822	-	0.4	0.5	-
11,1,3	0.821		0.1		
715	0.819	-	0.1	0.1	-
10,0,4	0.818	0.818	1.9	1.9	W
14,0,4	0.818	0.817	2.7	3.4	W†
607	0.816		0.7		
226	0.814	0.814	3.9	4.9	W-M†
426	0.814		1.0		
134	0.813		0.2		
534	0.813	-	0.3	0.6	-
931	0.812		0.1		
14,0,1	0.811	-	0.0	0.1	-
805	0.810		0.1		
533	0.806	-	0.4	0.6	-
007	0.805		0.2		
732	0.804		0.1		
932	0.804	-	0.0	0.7	-
930	0.804		0.6		
12,0,3	0.801		0.2		
026	0.800	-	0.2	0.5	-
317	0.800		0.1		
626	0.799		0.9		
12,2,1	0.798	0.798	1.4	8.8	M
10,2,5	0.797		6.3		
517	0.795	0.796	4.9	4.9	W†
807	0.790	0.789	1.5	9.6	M
117	0.788		8.1		
13,1,2	0.787		0.3		
15,1,2	0.787	-	0.0	0.3	-
824	0.787		0.0		
12,2,4	0.786	-	0.2	0.2	-
334	0.784		1.6		
734	0.784	0.784	5.1	13.3	M-S
15,1,1	0.784		6.6		
516	0.783		0.9		†
11,1,6	0.783	0.782	0.5	8.4	W,Br.
13,1,5	0.783		3.3		
10,2,3	0.782		3.7		
933	0.781		0.1		
931	0.780	-	1.4	1.6	-
606	0.780		0.0		
12,0,6	0.780		0.1		
717	0.778	-	0.1	0.1	-
15,1,3	0.775	0.775	15.7	15.7	M-S

* Beginning with this line the α_1, α_2 doublet on the powder photograph was resolved.
† α_2 Line from previous reflection overlaps α_1 of this reflection.

that there are six interactions of a tetrahedrally coordinated ion with octahedrally coordinated ions and six interactions of an octahedrally coordinated ion with tetrahedrally coordinated ions. Thus there would be six important magnetic interactions per magnetic ion. From the recent paper by Gilleo,[28] one would estimate a Néel temperature of about 700°K for an Fe_2O_3 phase isostructural with β-Ga_2O_3.

Now, the facts that: (1) the β-Ga_2O_3 structure appears to be favorable to antiferromagnetic interaction, (2) that Fe^{3+} ion has a crystal chemistry similar to that of Ga^{3+} ion, and (3) that the Fe^{3+} ion would prefer octahedral sites if substituted for Ga^{3+} in yttrium-gallium garnet, all would immediately indicate the possibility of producing a ferrimagnetic material from solid solutions of Fe_2O_3 in β-Ga_2O_3. However, experiments made by Remeika *prior* to the determination of this structure, indicated that not much Fe^{3+} ion could be made to dissolve in β-Ga_2O_3 by solid-solid reaction,[30] not enough, that is, to produce strong enough interac-

[30] J. P. Remeika (private communication).