

## The structure of a strained intermediate microcline in cryptoperthitic association with twinned plagioclase

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### Abstract

The crystal structure of a strained intermediate microcline ( $a = 8.643$ ,  $b = 12.929$ ,  $c = 7.190$  Å;  $\alpha = 90.1^\circ$ ,  $\beta = 116.2^\circ$ ,  $\gamma = 89.6^\circ$ ;  $V = 720.6$  Å<sup>3</sup>;  $C\bar{1}$ ), intergrown as untwinned lamellae in a cryptoperthitic ternary feldspar of bulk composition  $Or_{33}Ab_{58}An_8Cn_1$ , has been refined to  $R = 0.049$  using 893 reflections. The cryptoperthite is specimen K-235 from the Kūngnāt syenites of SW Greenland. Unit-cell volume gives the best estimate of the composition of the microcline phase,  $Or_{61}Ab_2Cn_3$ , which constitutes ~36 percent of the bulk feldspar. The plagioclase composition, determined by mass balance, is approximately  $Ab_{37}An_{13}$ .

The plagioclase is twinned at a scale of 100-500 Å on both albite- and pericline-twin laws, and special caution was required to exclude from the refinement diffracted peaks from the microcline lattice which overlapped with diffracted peaks from these four plagioclase lattices. In spite of the non-continuous, lamellar nature of the microcline phase in the cryptoperthite, the mosaic texture resulted in only  $0.4^\circ 2\theta$  diffraction peak widths.

Due to its intergrowth with twinned plagioclase, the microcline is strained ( $\Delta a = 0.30$  Å) in the manner described by Stewart and Wright (1974). This apparently does not prohibit the use of  $b-c$  and  $\alpha^*-\gamma^*$  plots to estimate Al/Si distribution in the tetrahedral sites ( $t_{1o} \sim 0.51$ ,  $t_{1m} \sim 0.35$ ,  $t_{2o} = t_{2m} \sim 0.07$  Al); mean T-O distances ( $T_{1o} = 1.671$ ,  $T_{1m} = 1.651$ ,  $T_{2o} = 1.622$ ,  $T_{2m} = 1.627$  Å) give similar values (0.47, 0.32, and 0.10 Å, respectively). Without a meaningful basis of comparison, the effects of strain on individual bond lengths and angles could not be evaluated quantitatively.

### Introduction

In the past decade it has been shown that alkali feldspars,  $(K,Na)AlSi_3O_8$ , can be characterized most satisfactorily by their lattice parameters. Wright and Stewart (1968) proposed a plot of the  $b$  and  $c$  cell edges (see Fig. 1) "because on such a graph points for samples of different composition but equivalent Al-Si order fall into more or less linear arrays regardless of the symmetry of the starting material" (Stewart, 1975). Samples of the same composition but different Al-Si order (e.g., the maximum microcline-high sanidine series) are arrayed on subparallel lines running between the limiting arrays for the completely ordered maximum microcline-low albite series and the disordered high sanidine-analbite (or high albite) series. Using data from crystal structure analyses, Stewart and Ribbe (1969) determined that relative position on the  $b-c$  plot very closely approximates the

total aluminum content of the  $T_1$  tetrahedral sites, which are designated  $T_{1o}$  and  $T_{1m}$  in triclinic alkali feldspars. Adopting the convention introduced by Kroll (1971), in which  $t_{1o}$  represents the probability of finding aluminum in  $T_{1o}$ , they contoured the  $b-c$  quadrilateral with lines of equal Al content in the  $T_1$  sites: thus  $t_{1o} + t_{1m} = 1.00$  for the ordered series in which all the Al in the formula unit is concentrated in the  $T_{1o}$  site and Si occupies the other three sites (i.e.,  $t_{1o} = 1.00$ ;  $t_{1m} = t_{2o} = t_{2m} = 0.00$ ), and  $t_{1o} + t_{1m} = 0.50$  for the disordered series in which Al is randomly distributed over the four tetrahedral sites (i.e.,  $t_{1o} = t_{1m} = t_{2o} = t_{2m} = 0.25$ ).

Using data from homogeneous alkali feldspars, Stewart and Wright (1974) contoured the  $b-c$  plot for the  $a$  cell dimension, estimating a standard error for the contours of  $\pm 0.02$  Å. They discussed in considerable detail a phenomenon which is especially common in cryptoperthitic intergrowths of two feldspar



Table 5. Ribbe (1978). Structure factors for K-235 microcline

	H	K	L	Y(OBS)	Y(CALC)	SIG(O)				
1	5	55.7452	58.30	3.23	-4	8	4	90.7910	91.8900	4.69
1	4	61.1363	63.12	3.39	-4	8	3	36.1702	35.9341	2.69
1	3	39.7299	38.77	2.58	-4	8	8	50.2393	50.2749	3.05
1	2	43.2303	45.56	2.69	-4	8	-1	41.1007	40.8997	2.80
1	0	18.5420	18.65	2.49	-4	8	-3	18.8771	20.6568	3.21
1	-1	8.9803	8.68	4.04	-4	6	7	15.7790	16.7784	3.84
1	-2	19.7395	20.97	2.89	-4	6	6	9.6506	12.1632	5.21
1	-4	44.9299	43.83	3.09	-4	6	6	21.4984	21.7246	2.77
3	8	7.9855	1.83	6.21	-4	6	5	13.9547	15.0316	3.57
3	5	9.1975	2.69	4.64	-4	6	3	53.7676	52.3555	3.09
3	5	58.6510	72.40	3.75	-4	6	6	7.9325	7.6768	4.70
3	4	12.2029	10.64	3.36	-4	6	2	99.4450	98.2437	5.00
3	3	90.2368	92.25	4.59	-4	6	0	51.1327	50.4789	3.06
3	2	4.1012	3.82	7.83	-4	6	0	28.1074	29.3642	2.69
3	1	23.3882	23.69	2.64	-4	6	-1	37.5708	38.0166	2.70
3	0	65.3087	67.25	3.62	-4	6	-3	18.0252	18.2299	3.00
3	-1	58.7501	61.58	3.34	-4	6	-4	25.0461	23.3723	2.82
3	-2	33.9765	34.03	2.61	-4	4	8	2.2661	0.0676	26.29
3	-3	42.5675	43.06	2.90	-4	4	7	29.8872	28.5163	2.73
3	8	29.9815	31.62	2.91	-4	4	6	20.8251	25.7801	3.44
3	8	13.4013	12.02	4.34	-4	4	5	58.4580	62.1699	3.36
K	L	Y(OBS)	Y(CALC)	SIG(O)	-4	4	4	4.9835	4.4504	6.42
					-4	4	2	43.4927	42.0681	2.87
					-4	4	1	69.9230	72.2728	3.68
5	7	58.2791	57.48	3.49	-4	4	-1	33.7840	33.9100	2.45
5	6	16.1811	17.08	3.90	-4	4	-3	81.9482	82.1885	4.33
5	4	22.7537	21.12	2.68	-4	4	-5	43.4819	41.1540	3.10
5	3	57.1007	59.55	3.26	-4	4	8	10.5766	9.7019	5.23
5	2	63.2082	62.66	3.47	-4	2	2	26.9367	25.8405	2.73
5	1	47.2338	45.47	2.93	-4	2	7	12.8498	12.5495	3.62
5	-1	37.4952	37.67	2.76	-4	2	6	52.4275	54.2263	3.08
5	-2	17.4200	20.82	4.10	-4	2	5	74.3254	77.3920	3.89
5	-3	19.9483	19.29	3.35	-4	2	4	36.2008	36.2612	2.42
5	7	3.8111	0.00	13.71	-4	2	3	91.8446	93.0827	4.61
5	6	32.4643	31.78	2.86	-4	2	2	14.4903	13.6146	2.50
5	5	28.5896	29.96	2.88	-4	2	1	21.7660	22.3001	2.36
5	4	35.6493	37.46	2.79	-4	2	-1	12.8746	14.1337	3.23
5	3	11.6104	12.55	4.01	-4	2	-2	31.7642	33.5029	2.59
5	2	38.1224	36.79	2.70	-4	2	-3	35.1419	34.5163	2.85
5	1	20.7884	19.07	2.83	-4	2	-4	59.4224	60.4777	3.44
5	0	21.3602	19.97	2.43	-4	0	7	77.6785	81.3626	4.07
5	-1	22.8350	22.23	3.75	-4	0	5	86.7413	85.7372	4.37
5	-2	21.2986	21.90	3.28	-4	0	3	61.6663	63.6047	3.36
5	-3	49.0412	47.11	3.27	-4	0	1	37.5813	40.3157	2.79
5	4	20.4653	20.52	3.21	-4	0	-1	11.0306	8.8418	4.52
5	9	8.2992	10.83	3.95	-4	0	-5	22.7292	21.2319	3.27
5	9	59.9243	59.02	3.46	-3	1	8	6.3331	4.5197	7.28
5	9	12.0438	14.14	4.10	-3	1	7	67.8050	69.3412	3.72
5	9	68.8591	69.31	3.86	-3	1	6	27.8147	29.6305	2.45
5	9	9.2370	3.43	4.93	-3	1	5	14.5590	14.0644	2.57
5	9	17.7849	18.79	3.51	-3	1	4	14.3800	14.2055	2.43
5	9	2.4328	3.67	20.57	-3	1	3	81.0598	86.3285	4.08
5	9	5.5412	5.03	9.87	-3	1	2	24.5036	24.1386	2.02
5	9	21.4254	22.06	3.31	-3	1	1	61.7065	62.4153	3.25
5	9	12.1130	10.23	4.67	-3	1	0	39.5632	39.5216	2.48
5	9	33.6906	36.29	2.98	-3	1	-1			
5	9	8.5873	11.12	7.20	-3	H	L	Y(OBS)	Y(CALC)	SIG(O)
5	9	17.2148	18.38	3.71	-3	1	-2	18.4439	19.7949	2.36
5	9	48.9224	50.47	3.32	-3	1	-3	15.5380	15.6595	2.79
5	9	8.4170	8.88	7.14	-3	1	-4	27.7023	29.0328	2.64
5	9	38.0590	38.51	3.21	-3	1	-6	11.3225	5.1322	4.52
5	9	30.5132	28.20	3.06	-3	1	8	16.0203	14.4525	3.67
5	9	15.5999	16.41	4.48	-3	1	7	40.1712	38.8064	2.93
5	9	9.5119	10.26	6.05	-3	1	6	19.3932	18.3773	3.15
5	9	13.7950	21.41	5.44	-3	1	5	9.3999	11.3919	4.47
5	9	59.5093	58.25	3.51	-3	1	4	27.4952	29.3937	2.36
5	9	26.5606	26.04	2.94	-3	1	3	45.4550	46.3479	2.96
5	9	20.6326	20.78	3.29	-3	1	2	35.6735	33.3495	2.33
5	9	20.8544	22.18	3.67	-3	1	1	70.0529	65.1423	3.60
5	9	10.2976	11.01	5.23	-3	1	-1	34.6751	37.1452	2.35
5	9	10.1689	12.00	5.28	-3	1	-2	6.9862	7.6212	4.73
5	9	14.9797	15.38	3.66	-3	1	-4	12.3281	13.0161	3.99
5	9	6.8803	7.39	2.24	-3	1	-5	46.0634	46.9044	3.09
5	9	38.8947	38.52	2.90	-3	1	-6	13.6542	11.4320	5.14
5	9	54.0363	55.48	3.39	-3	1	6	25.9830	24.7593	2.87
5	9	17.0792	17.44	3.78	-3	1	5	74.9215	77.0179	4.01
5	9	13.7534	17.48	4.88	-3	1	4	10.7382	12.8854	3.68
5	9	32.7458	30.71	2.80	-3	1	3	74.7357	73.9086	3.87
5	9	25.6679	26.22	2.87	-3	1	3			



Table 5. Ribbe (1978). Structure factors for K-235 microcline.

Observed	Calculated	Sig(O)	Observed	Calculated	Sig(O)	Observed	Calculated	Sig(O)
14.0380	12.61	4.04	1	1	0	13.4948	17.44	2.17
14.4758	16.10	4.49	1	1	-1	27.9564	26.76	1.76
12.4062	12.73	4.51	1	1	-3	58.0162	52.70	3.10
59.7272	60.80	3.48	1	1	-4	34.8686	34.40	2.44
20.3709	20.62	2.93	1	1	-5	43.1889	38.17	2.75
12.1536	13.26	3.85	1	1	-6	33.2600	33.68	2.76
32.5205	34.16	2.82	1	1	-7	30.4049	28.81	2.84
24.4672	24.55	2.99	1	1	6	18.5809	16.58	3.19
6.7841	12.52	8.86	H	K	L	Y(OBS)	Y(CALC)	SIG(O)
24.6991	20.83	3.08	1	1	3	41.6255	43.27	2.77
21.0498	19.95	3.08	1	1	3	39.8054	39.08	2.54
22.7739	22.52	2.89	1	1	2	10.3589	12.00	3.29
43.0291	45.96	2.98	1	1	1	124.4005	123.40	6.04
20.6593	19.98	2.99	1	1	-1	60.8845	56.55	3.13
12.2523	11.19	4.47	1	1	-2	82.0183	76.43	4.12
14.0176	17.18	5.09	1	1	-3	19.8588	18.30	2.15
39.6270	38.63	3.20	1	1	-4	31.6014	30.97	2.42
28.6621	24.81	3.03	1	1	-5	97.9524	99.13	4.97
18.4491	11.69	3.63	1	1	-6	18.7055	18.42	2.96
37.4290	36.67	2.94	1	1	-7	31.9314	30.36	2.86
26.2485	29.20	3.15	1	1	5	76.3071	78.78	4.13
12.0936	18.82	4.97	1	1	4	7.3259	9.67	5.84
5.9785	1.74	11.21	1	1	3	31.1320	31.44	2.44
15.6340	12.61	4.29	1	1	2	35.3113	35.19	2.41
39.8891	36.00	3.08	1	1	1	41.8206	44.65	2.52
26.6570	26.63	3.52	1	1	-1	59.6608	60.50	3.19
41.2552	35.89	3.16	1	1	-3	3.5171	2.53	9.15
9.5111	11.78	6.43	1	1	-4	36.9998	34.58	2.54
49.5657	50.21	3.57	1	1	-5	34.7477	33.22	2.70
47.6459	47.36	3.17	1	1	-7	20.6058	20.75	3.35
47.6024	45.53	3.10	1	1	6	10.9617	10.67	5.32
54.1658	54.52	3.60	1	1	5	13.4830	15.66	4.34
13.5308	13.27	12.08	1	1	4	35.6967	36.42	2.76
11.5136	12.18	5.37	1	1	3	29.5379	29.18	2.52
16.9373	10.09	3.35	1	1	2	18.3328	19.77	2.59
60.0860	58.11	3.46	1	1	1	26.3770	24.73	2.30
10.7474	10.26	15.06	1	1	0	35.7027	18.37	2.46
Y(OBS)	Y(CALC)	SIG(O)	1	1	-1	12.8508	12.56	3.08
18.5316	20.92	3.56	1	1	-2	58.0707	56.83	3.22
91.2738	91.80	4.76	1	1	-3	58.5029	58.60	3.28
52.0176	53.90	3.18	1	1	-4	18.3920	17.68	2.77
59.1049	58.08	3.37	1	1	-5	5.2843	4.67	8.06
88.6725	92.34	4.71	1	1	-6	24.6090	23.83	2.79
25.6411	25.79	2.89	1	1	-7	7.4256	0.73	6.70
7.1087	0.67	7.45	1	1	5	24.0519	25.02	3.06
27.3666	26.16	2.95	1	1	4	28.7840	28.11	2.77
22.5140	20.63	2.81	1	1	3	12.2303	12.28	4.03
49.2334	50.43	3.04	1	1	1	12.0237	6.25	3.59
48.7543	50.08	3.06	1	1	-1	27.2539	25.05	2.60
89.8312	87.72	4.53	1	1	-2	106.7579	95.91	5.36
59.4780	54.52	3.21	1	1	-3	65.8376	68.36	3.68
98.0708	92.80	4.90	1	1	-4	13.9209	12.66	3.77
52.6293	54.45	3.17	1	1	-5	14.0684	14.87	4.46
26.4843	27.15	2.64	1	1	-6	13.0972	13.45	4.48
25.7424	23.76	2.82	1	1	4	23.0465	21.62	3.03
42.3349	40.69	3.03	1	1	2	47.5782	48.40	3.05
14.0464	12.84	3.79	1	1	1	21.0596	19.71	3.02
39.7549	40.30	2.77	1	1	0	15.2367	6.81	3.58
82.4536	84.68	4.21	1	1	-1	24.7603	24.96	2.83
85.8136	83.33	4.29	1	1	-2	28.1038	22.42	2.78
88.2610	88.84	4.47	1	1	-3	12.1761	10.20	4.65
33.98	35.05	2.67	1	1	-4	12.0788	5.65	4.16
15.	4.09	3.24	1	1	3	4.8057	9.69	12.21
38.	8.53	2.97	1	1	2	26.6123	27.40	5.12
30.	0.29	3.03	1	1	1	Y(OBS)	Y(CALC)	SIG(O)
35.61	33.69	2.75	1	1	0	29.6356	30.64	3.07
36.04	38.41	2.69	1	1	-1	17.0725	17.22	3.73
74.3922	76.37	3.89	1	1	-2	28.3778	27.39	3.03
51.0313	51.83	2.80	1	1	-3	41.4181	38.88	3.00
16.3187	15.04	1.81	1	1	-4	18.3730	19.34	3.58
11.6306	10.96	2.13	1	1	1	2.7826	1.72	22.25
52.7192	51.88	2.86	H	K	L	33.4501	34.40	3.24
8.1191	5.46	3.45	1	1	0	25.9715	27.42	3.57
78.3063	77.35	4.06	1	1	-1	40.8791	39.83	3.09
41.9070	42.34	2.79	1	1	-2	35.5395	38.08	3.13
31.4465	32.34	2.83	1	1	-3	49.5557	53.70	3.30
37.4783	36.82	2.91	1	1	3	47.9033	49.04	3.29
26.1269	28.93	4.34	1	1	2			
29.9677	28.92	3.83	1	1	1			
5.5665	2.56	9.14	2	2	0			
5.4016	5.98	8.36	2	2	0			
31.9260	32.03	2.67	2	2	-1			
72.1239	73.47	3.82	2	2	-2			
69.7669	72.03	3.65	2	2	-3			
55.6978	55.93	2.89	2	2	3			

Table 5. Ribbe (1978). Structure factors for K-235 microcline

27.5312	29.11	3.01	3	-1	73.2015	70.63	3.74
17.6218	16.84	3.71	3	-2	36.5202	34.18	2.34
34.8407	31.98	2.85	3	-3	49.4335	49.58	3.09
53.7727	54.43	3.30	3	-4	27.7850	27.38	2.33
3.1276	7.06	14.93	3	-5	17.1397	17.32	2.76
17.9445	17.52	3.61	3	-6	26.6362	26.03	2.70
8.7328	9.71	5.72	3	-7	39.4062	38.17	2.86
23.3118	28.26	2.95	3	-8	14.7219	15.76	4.25
7.1246	3.46	7.07	3	-9	5.5048	1.54	8.72
35.9644	37.05	2.79	3	-10	36.8037	39.93	3.38
2.6785	6.00	17.33	3	-11	51.2874	51.78	3.10
27.4090	28.01	2.73	3	-12	32.0011	33.97	2.60
48.0200	51.46	3.03	3	-13	82.6195	84.06	4.23
56.5853	56.42	3.34	3	-14	54.8181	51.84	3.03
35.0036	33.63	2.78	3	-15	18.2910	16.76	2.99
29.2902	32.33	3.07	3	-16	71.2376	72.20	3.31
10.4141	12.46	5.02	3	-17	10.8072	9.35	3.18
21.5838	21.89	2.72	3	-18	78.1779	81.32	4.14
130.9537	136.77	6.46	3	-19	20.7999	21.60	6.05
13.4676	14.20	8.25	3	-20	7.9888	10.17	3.69
170.4654	167.17	3.25	3	-21	14.4873	10.53	2.83
29.4674	28.68	2.45	3	-22	23.7983	21.71	2.65
42.8595	42.54	2.73	3	-23	25.8786	25.02	2.67
31.4419	32.05	2.51	3	-24	31.3110	30.25	2.59
23.4548	24.22	2.68	3	-25	33.9715	35.62	2.57
37.7956	37.50	2.80	3	-26	19.9494	18.96	2.76
4.3855	4.96	11.11	3	-27	16.0777	15.70	2.54
43.4414	41.62	3.12	3	-28	19.2111	19.20	2.36
4.6497	6.58	10.25	3	-29	26.2384	27.56	2.44
37.1168	35.99	2.78	3	-30	22.2314	22.11	2.53
38.9369	38.60	2.64	3	-31	6.6877	3.53	2.69
9.9415	10.71	3.54	3	-32	33.0486	34.68	2.27
15.5068	17.06	2.61	3	-33	53.1473	53.17	3.89
13.8170	15.08	3.88	3	-34	29.8405	27.00	3.16
48.6018	47.19	3.01	3	-35	45.2249	47.09	3.60
19.4901	20.48	3.17	3	-36	20.6032	22.14	2.78
39.5749	36.04	3.01	3	-37	30.1356	31.12	2.31
9.5078	10.72	3.72	3	-38	8.6892	9.43	3.70
28.4542	29.09	2.85	3	-39	67.4357	63.21	3.75
18.4082	17.11	2.94	3	-40	29.4649	26.55	4.44
102.6684	106.95	3.15	3	-41	9.4392	3.81	3.19
56.7501	57.43	3.12	3	-42	51.3648	53.41	3.95
75.9233	77.49	3.90	3	-43	44.7983	46.01	2.46
Y(OBS)	Y(CALC)	SIG(O)		-44	26.5876	27.94	2.96
45.3403	38.91	2.58		-45	32.5454	34.09	2.99
7.1390	6.48	4.09		-46	26.5644	24.60	4.22
6.3916	1.69	4.38		-47	48.3984	51.74	3.27
47.3979	47.09	2.93		-48	19.4524	20.27	3.06
5.7578	5.58	7.61		-49	47.2266	47.26	2.99
47.3580	46.10	3.15		-50	45.3391	46.33	4.42
9.2099	13.69	5.81		-51	10.4685	7.74	3.07
36.5757	37.82	2.52		-52	43.5825	46.03	4.01
29.9121	29.73	2.14		-53	17.4788	18.89	3.08
49.6373	46.41	2.66		-54	36.9262	36.64	3.05
47.8514	49.25	2.76		-55	27.4094	23.93	2.98
20.9904	22.83	2.17		-56	25.0574	23.20	3.17
9.9571	6.32	5.24		-57	45.1735	47.93	4.47
52.3773	49.40	3.29		-58	13.2884	13.20	3.01
35.1060	33.62	2.71		-59	22.6337	21.14	3.38
85.3908	84.59	4.41		-60	22.5620	23.20	3.13
34.6519	35.87	2.48		-61	38.7200	36.90	4.10
54.9965	56.53	3.04		-62	17.0549	19.85	3.28
13.6895	12.78	7.33		-63	21.6075	19.53	3.50
152.5380	150.82	2.94		-64	59.4958	57.00	3.64
9.6451	11.54	8.58		-65	18.8285	21.31	4.25
178.1591	182.11	3.32		-66	14.0917	14.34	3.98
57.7312	55.68	4.53		-67	16.2985	15.33	3.65
11.4508	12.22	4.32		-68	17.4553	14.22	3.29
28.4785	27.59	2.57		-69	51.7111	51.42	2.91
16.3540	18.08	2.83		-70	42.5525	41.87	10.77
19.9622	21.06	2.32		-71	4.1373	0.35	3.29
37.1568	37.38	2.44		-72	15.9826	14.47	3.18
20.9737	20.59	1.99		-73	19.1449	19.43	5.31
79.2090	84.13	4.00		-74	9.8861	13.66	3.86
15.0072	13.89	2.34		-75	14.2356	12.53	3.85
10.5955	10.77	3.12		-76	18.0307	19.27	4.84
26.4527	30.26	2.64		-77	30.9940	31.06	2.77
67.3741	66.48	3.70		-78	33.4405	33.45	3.42
11.9563	8.21	3.81		-79	19.3209	19.14	2.98
24.7646	22.40	3.08		-80	22.9845	20.80	
14.9331	9.87	4.49					
47.3731	45.97	3.09					
13.8619	15.13	3.91					
9.2248	10.15	3.87					

Table 5. Ribbe (1978). Structure factors for K-235 microcline

h	k	l	Y(OBS)	Y(CALC)	SIG(O)	h	k	l	Y(OBS)	Y(CALC)	SIG(O)
4	4	4	18.8380	18.57	3.04	6	6	6	38.5782	33.53	3.58
4	4	4	36.7274	36.60	2.70	6	6	6	89.7735	93.59	4.61
4	4	4	26.9400	25.59	2.55	6	6	6	59.9514	60.79	3.38
4	4	4	53.0303	51.58	3.08	6	6	6	22.0307	22.13	2.93
4	4	4	98.3003	96.99	4.95	6	6	6	25.8569	27.26	3.10
4	4	4	57.9909	57.29	3.27	6	6	6	12.0021	5.45	4.33
4	4	4	9.6572	8.61	4.57	6	6	6	17.6331	16.53	3.35
4	4	4	26.6607	27.55	2.62	6	6	6	9.7749	8.77	4.44
4	4	4	9.6734	5.52	4.46	6	6	6	63.5554	64.10	3.61
4	4	4	11.5145	16.30	5.22	6	6	6	25.1870	26.99	2.60
4	4	4	39.3525	37.39	3.03	6	6	6	20.3017	17.74	2.57
4	4	4	82.3749	81.75	4.34	6	6	6	37.6354	38.34	2.77
4	4	4	41.3785	43.77	2.29	6	6	6	Y(OBS)	Y(CALC)	SIG(O)
4	4	4	40.7297	41.54	2.68	7	7	7	10.8985	6.56	3.78
4	4	4	13.5223	12.41	2.62	7	7	7	29.9029	30.11	2.71
4	4	4	86.3079	88.01	4.38	7	7	7	15.7466	17.93	3.88
4	4	4	39.1961	37.67	2.49	7	7	7	32.3047	30.73	2.82
4	4	4	76.9637	77.81	4.00	7	7	7	10.9563	8.98	4.06
4	4	4	60.5226	62.15	3.38	7	7	7	49.6600	48.12	3.13
4	4	4	7.9905	11.15	5.30	7	7	7	28.6913	27.74	2.68
4	4	4	121.2924	120.64	4.63	7	7	7	46.7713	46.64	2.97
4	4	4	93.4137	85.73	3.98	7	7	7	61.9249	62.83	3.49
4	4	4	9.1912	7.69	2.89	7	7	7	27.7294	28.83	2.65
4	4	4	41.3285	39.85	3.00	7	7	7	25.0097	24.01	2.78
4	4	4	100.4601	95.56	5.00	7	7	7	7.2765	4.71	6.00
4	4	4	46.7261	46.04	2.96	7	7	7	50.1561	49.31	3.18
4	4	4	60.2397	59.98	3.36	7	7	7	16.2191	16.30	3.63
4	4	4	57.1756	56.93	3.22	7	7	7	26.9104	26.80	2.95
4	4	4	23.9476	23.67	2.73	7	7	7	10.5498	11.24	4.96
4	4	4	45.5526	45.40	2.93	7	7	7	40.4072	38.73	2.87
4	4	4	16.9662	17.23	2.81	7	7	7	7.2405	7.12	5.96
4	4	4	34.9227	35.19	2.66	7	7	7	79.6055	79.85	4.24
4	4	4	29.5827	29.20	2.72	7	7	7	24.2102	22.74	2.73
4	4	4	36.3673	36.40	2.92	7	7	7	20.0660	20.82	3.02
4	4	4	8.9088	8.48	5.75	7	7	7	19.2912	19.34	3.22
4	4	4	67.8785	67.86	3.80	7	7	7	17.6839	13.44	3.37
4	4	4	7.5327	12.14	6.35	7	7	7	12.3888	8.88	4.28
4	4	4	60.3120	62.58	3.47	7	7	7	26.0084	26.41	4.93
4	4	4	14.7449	13.15	3.30	7	7	7	6.0823	4.26	7.10
4	4	4	16.0712	15.95	3.63	7	7	7	22.6159	22.13	2.96
4	4	4	51.5480	51.70	3.35	7	7	7	30.3471	29.76	3.29
4	4	4	28.1807	27.17	3.22	7	7	7	1.9389	3.30	25.26
4	4	4	Y(OBS)	Y(CALC)	SIG(O)	7	7	7	17.6076	21.30	3.93
4	4	4	20.7655	20.21	3.37	7	7	7	8.8432	12.16	6.17
4	4	4	13.6682	12.27	4.56	7	7	7	24.6555	26.93	2.92
4	4	4	36.4055	36.15	2.85	7	7	7	56.3377	55.96	3.49
4	4	4	13.6737	13.26	4.07	7	7	7	12.3750	13.67	4.54
4	4	4	18.1346	17.29	3.53	7	7	7	13.3300	12.19	4.49
4	4	4	6.5757	8.52	8.68	7	7	7	51.7541	53.14	3.40
4	4	4	51.0448	51.68	3.35	7	7	7	22.9199	23.53	3.25
4	4	4	37.2653	33.70	2.91	7	7	7	36.8372	35.71	2.90
4	4	4	5.2388	8.53	10.36	7	7	7	30.6538	29.32	2.89
4	4	4	17.0778	15.90	3.56	7	7	7	19.2054	18.21	3.60
4	4	4	22.9565	24.55	3.14	7	7	7	38.4108	37.70	2.97
4	4	4	16.9114	19.51	4.01	7	7	7	3.0633	4.88	14.95
4	4	4	14.9998	11.17	3.75	7	7	7	17.8036	15.59	3.12
4	4	4	56.7606	57.78	3.40	7	7	7	5.9585	9.27	8.98
4	4	4	12.6579	11.76	2.85	7	7	7	56.4377	54.61	3.51
4	4	4	25.9313	23.62	3.91	7	7	7	22.3717	23.55	3.06
4	4	4	53.6003	55.35	3.46	7	7	7	21.3254	22.07	3.24
4	4	4	11.8460	11.44	4.49	7	7	7	19.8021	17.84	3.01
4	4	4	16.9920	22.69	3.69	7	7	7	38.0607	37.25	2.91
4	4	4	14.5195	15.73	3.51	7	7	7	7.5594	6.33	6.24
4	4	4	41.2657	42.91	3.12	7	7	7	18.6922	17.59	3.36
4	4	4	5.7908	5.98	3.81	7	7	7	10.2511	9.61	4.90
4	4	4	38.4349	47.84	3.81	7	7	7	30.1125	30.07	2.86
4	4	4	30.8845	31.04	3.40	7	7	7	38.5274	39.22	2.87
4	4	4	35.5571	35.57	2.89	7	7	7	11.1730	10.08	4.06
4	4	4	21.1581	20.70	2.96	7	7	7	45.6262	45.33	3.04
4	4	4	71.2978	72.79	3.83	7	7	7	19.0533	17.48	3.16
4	4	4	27.9496	28.32	2.55	7	7	7	16.0771	20.08	4.15
4	4	4	16.3659	15.51	3.15	7	7	7	9.7573	5.51	5.06
4	4	4	41.6354	42.01	3.15	7	7	7	33.1014	35.22	3.48
4	4	4	30.9063	31.83	2.66	7	7	7	32.3924	32.00	2.75
4	4	4	60.1861	64.23	2.49	7	7	7	49.9756	49.71	3.17
4	4	4	37.7116	37.48	2.62	7	7	7	38.8491	40.58	3.09
4	4	4	29.8751	29.29	2.65	7	7	7	27.0513	24.57	3.13
4	4	4	28.2453	28.63	2.85	7	7	7	11.4291	9.76	4.93
4	4	4	30.8728	34.04	2.97	7	7	7	10.9365	8.66	4.57
4	4	4	17.9145	17.12	3.62	7	7	7	13.3168	9.75	3.82
4	4	4	14.9597	12.13	3.81	7	7	7			
4	4	4	18.6679	20.34	2.11	7	7	7			
4	4	4	38.3916	37.85	2.71	7	7	7			
4	4	4	74.1252	81.78	4.76	7	7	7			
4	4	4	48.8542	51.07	3.02	7	7	7			
4	4	4	131.0964	133.79	6.44	7	7	7			