

AM-87-347

CRYSTAL STRUCTURE OF TIPTOPITE, A FRAMEWORK BERYLLOPHOSPHATE ISOTYPIC
WITH BASIC CANCRINITE

PEACOR ET AL.

TO BE DEPOSITED: TABLE 2

AMERICAN MINERALOGIST, 72, 7-8, 816-820

STRUCTURE FACTORS FOR TIPTOPITE

H	K	L	FO	FC	A	B	PHI	DEL(F)	SIG*(F)
-2	3	0	63.47	63.84	63.84	0.15	0.14	-0.37	0.12
-1	3	0	12.55	12.93	-12.92	-0.51	182.25	-0.38	0.18
0	3	0	75.48	73.55	73.55	0.52	0.40	1.94	0.13
-3	4	0	9.58	8.46	-8.45	-0.31	182.12	1.12	0.24
-2	4	0	5.00	2.01	2.00	0.24	6.76	2.99	0.52
-1	4	0	10.40	9.11	-9.10	-0.33	182.06	1.29	0.24
0	4	0	99.07	98.65	-98.65	-0.59	180.34	0.42	0.15
-4	5	0	26.47	26.46	26.45	0.55	1.19	0.01	0.18
-3	5	0	17.34	16.82	-16.82	-0.30	181.03	0.52	0.20
-2	5	0	31.98	35.01	35.01	0.30	0.49	-3.03	0.17
-1	5	0	27.74	28.19	28.18	0.55	1.12	-0.45	0.18
0	5	0	8.65	7.65	7.64	-0.33	357.54	0.99	0.32
-5	6	0	44.83	45.36	45.36	0.22	0.27	-0.54	0.18
-4	6	0	12.77	14.18	14.18	0.05	0.20	-1.41	0.24
-3	6	0	69.59	69.24	69.24	0.44	0.36	0.35	0.17
-2	6	0	7.93	10.20	10.20	0.01	0.06	-2.27	0.35
-1	6	0	4.44	0.94	-0.85	-0.41	205.67	3.49	0.59
0	6	0	4.31	0.92	-0.92	0.09	174.44	3.39	0.71
-6	7	0	36.10	37.40	-37.40	-0.46	180.70	-1.30	0.21
-5	7	0	5.34	6.32	-6.32	0.18	178.41	-0.99	0.61
-4	7	0	10.62	9.78	-9.78	-0.16	180.91	0.85	0.28
-3	7	0	8.92	8.56	-8.56	-0.15	180.98	0.36	0.32
-2	7	0	19.78	19.54	-19.54	0.12	179.65	0.24	0.23
-1	7	0	7.33	6.46	6.46	0.14	1.26	0.87	0.43
0	7	0	19.90	20.96	-20.96	-0.26	180.71	-1.06	0.24
-7	8	0	33.32	32.30	32.30	0.43	0.76	1.02	0.23
-6	8	0	15.44	15.43	15.43	-0.09	359.67	0.01	0.26
-5	8	0	17.38	19.11	-19.11	-0.27	180.82	-1.73	0.26
-4	8	0	104.28	104.39	104.39	0.89	0.49	-0.11	0.20
-3	8	0	10.75	11.30	-11.29	-0.24	181.24	-0.54	0.34
-2	8	0	16.72	14.66	14.66	-0.11	359.56	2.07	0.26
-1	8	0	41.55	40.87	40.87	0.49	0.69	0.69	0.22
0	8	0	36.26	36.04	-36.04	-0.33	180.52	0.21	0.23
-8	9	0	4.51	1.15	1.14	-0.14	353.23	3.36	0.88
-7	9	0	54.50	54.45	54.45	0.27	0.29	0.05	0.23
-6	9	0	13.04	13.05	-13.05	0.04	179.82	-0.01	0.34
-5	9	0	7.96	7.83	-7.82	-0.25	181.80	0.14	0.47
-4	9	0	4.18	3.61	-3.61	-0.23	183.72	0.57	0.88
-3	9	0	15.48	15.52	-15.52	0.02	179.92	-0.04	0.30
-2	9	0	9.23	9.61	9.61	-0.30	358.23	-0.38	0.43
-1	9	0	10.09	8.15	8.15	-0.10	359.27	1.93	0.43
0	9	0	30.54	30.62	30.61	0.53	1.00	-0.08	0.25
-9	10	0	10.49	10.64	-10.64	-0.25	181.37	-0.16	0.44
-8	10	0	8.63	10.17	-10.17	0.05	179.74	-1.54	0.52
-7	10	0	32.46	33.32	-33.32	-0.41	180.71	-0.86	0.25
-6	10	0	13.96	13.60	13.60	-0.05	359.78	0.36	0.33
-5	10	0	4.92	1.65	1.65	0.11	3.89	3.26	0.83
-4	10	0	12.73	12.43	12.43	-0.08	359.62	0.30	0.36
-3	10	0	5.77	5.47	5.47	0.18	1.85	0.29	0.72
-2	10	0	4.76	9.56	-9.56	0.06	179.63	-4.81	0.99
-1	10	0	25.43	24.18	24.18	0.31	0.73	1.24	0.28
0	10	0	10.19	5.89	5.89	0.07	0.70	4.30	0.51
-9	11	0	22.48	20.89	20.89	0.21	0.57	1.59	0.30
-8	11	0	5.45	6.89	-6.89	-0.20	181.68	-1.44	0.89
-7	11	0	31.19	31.38	31.38	0.37	0.68	-0.20	0.26

-3	7	1	15.95	17.05	0.49	-17.05	271.64	-1.10	0.24
-2	7	1	15.26	15.98	-1.33	-15.93	265.22	-0.72	0.25
-1	7	1	36.81	36.97	-35.23	11.19	162.38	-0.16	0.21
0	7	1	18.28	18.81	-9.48	-16.25	239.74	-0.53	0.23
-7	8	1	7.13	8.04	-6.92	4.09	149.40	-0.91	0.52
-6	8	1	29.39	29.46	-27.70	-10.02	199.89	-0.06	0.23
-5	8	1	18.65	19.40	-19.06	3.63	169.22	-0.75	0.25
-3	8	1	15.06	15.05	14.17	-5.06	340.34	0.01	0.27
-2	8	1	28.04	28.99	26.62	11.50	23.36	-0.95	0.23
-1	8	1	9.14	2.16	2.14	-0.30	351.95	6.98	0.60
0	8	1	28.93	29.37	29.36	0.62	1.22	-0.43	0.22
-8	9	1	10.80	10.50	6.21	-8.47	306.24	0.30	0.40
-7	9	1	8.85	7.26	6.71	2.78	22.49	1.59	0.45
-6	9	1	25.11	25.99	25.06	-6.87	344.67	-0.88	0.25
-5	9	1	19.45	18.90	13.46	-13.27	315.40	0.55	0.27
-4	9	1	13.03	12.49	-6.26	10.81	120.09	0.54	0.35
-3	9	1	18.75	20.24	18.46	8.30	24.20	-1.49	0.29
-2	9	1	26.24	27.46	-27.13	-4.22	188.84	-1.22	0.26
-1	9	1	11.37	12.38	-11.23	5.19	155.19	-1.01	0.41
0	9	1	8.02	6.24	5.89	-2.04	340.87	1.78	0.46
-9	10	1	26.89	28.01	27.99	1.09	2.23	-1.12	0.28
-8	10	1	14.28	13.56	13.28	-2.79	348.14	0.71	0.37
-7	10	1	61.93	62.32	-58.75	20.78	160.52	-0.39	0.23
-6	10	1	15.69	15.57	15.15	-3.61	346.60	0.11	0.32
-5	10	1	19.52	20.16	-20.04	-2.14	186.10	-0.63	0.29
-4	10	1	14.76	14.51	-13.87	4.28	162.86	0.25	0.34
-3	10	1	40.07	42.00	36.82	-20.20	331.25	-1.93	0.24
-2	10	1	8.53	8.62	-8.03	3.13	158.68	-0.09	0.54
-1	10	1	5.32	6.65	-6.60	-0.82	187.05	-1.33	0.85
0	10	1	15.30	14.64	11.87	-8.56	324.20	0.67	0.33
-10	11	1	15.53	16.60	-16.60	0.09	179.70	-1.07	0.41
-9	11	1	8.17	8.76	3.64	-7.96	294.58	-0.59	0.61
-8	11	1	6.47	4.71	-3.72	-2.89	217.90	1.76	0.71
-7	11	1	4.28	2.06	0.97	1.81	61.82	2.22	1.09
-6	11	1	12.53	12.32	-11.93	-3.08	194.47	0.22	0.41
-5	11	1	30.59	29.76	29.54	3.60	6.95	0.83	0.27
-3	11	1	6.57	3.04	-2.08	2.22	133.16	3.53	0.85
-2	11	1	15.56	16.40	11.47	11.72	45.63	-0.84	0.36
-1	11	1	18.19	16.13	-15.80	-3.25	191.64	2.07	0.37
0	11	1	9.14	9.57	7.55	5.88	37.90	-0.43	0.53
-11	12	1	6.73	5.56	4.29	-3.54	320.42	1.16	1.01
-10	12	1	16.58	16.58	14.77	7.52	26.99	-0.00	0.40
-9	12	1	7.17	5.13	4.29	-2.80	326.87	2.04	0.83
-8	12	1	31.37	31.12	31.00	-2.76	354.91	0.25	0.29
-6	12	1	6.85	3.08	-2.95	-0.87	196.50	3.78	0.86
-5	12	1	7.02	6.35	6.23	1.20	10.93	0.67	0.77
-4	12	1	29.65	29.49	-29.48	0.67	178.70	0.16	0.30
-3	12	1	9.56	4.54	-4.51	0.48	173.90	5.02	0.63
-2	12	1	10.15	10.60	-7.80	-7.18	222.62	-0.45	0.59
-1	12	1	7.30	5.90	-5.84	0.87	171.50	1.40	0.94
0	12	1	6.89	10.17	-6.82	7.55	132.08	-3.28	0.88
-12	13	1	10.15	5.02	-4.59	2.03	156.13	5.13	0.70
-11	13	1	8.33	8.84	7.33	4.94	33.97	-0.50	0.85
-10	13	1	15.61	17.43	-17.15	3.11	169.71	-1.83	0.47
-9	13	1	4.77	4.86	-4.55	1.68	159.71	-0.09	1.25
-8	13	1	8.75	3.78	-2.66	2.69	134.61	4.97	0.70
-7	13	1	14.32	16.41	-16.35	-1.42	184.96	-2.09	0.46
-2	13	1	20.15	18.05	17.73	-3.35	349.30	2.10	0.40
-1	13	1	15.27	11.58	10.97	-3.73	341.23	3.69	0.50
-11	14	1	19.84	20.19	16.72	-11.32	325.89	-0.35	0.44

Table 2.

-8	11	2	8.63	2.95	0.03	-2.95	270.61	5.68	0.75
-7	11	2	9.59	9.77	-8.21	5.29	147.20	-0.18	0.53
-6	11	2	27.30	26.51	-26.07	4.83	169.51	0.78	0.29
-5	11	2	8.81	8.74	8.62	-1.43	350.57	0.08	0.55
-4	11	2	8.65	9.14	-7.29	5.51	142.91	-0.50	0.57
-3	11	2	7.12	3.52	2.47	2.50	45.36	3.60	0.89
-2	11	2	9.19	11.42	10.94	-3.25	343.46	-2.22	0.59
-1	11	2	12.15	12.43	-0.64	12.41	92.97	-0.28	0.48
-10	12	2	6.90	7.34	4.47	-5.82	307.49	-0.43	1.05
-9	12	2	5.01	4.90	2.96	3.91	52.91	0.11	1.19
-8	12	2	23.01	21.34	-21.33	-0.61	181.65	1.67	0.34
-7	12	2	19.33	19.78	19.33	4.18	12.21	-0.45	0.38
-6	12	2	6.85	8.65	6.30	5.93	43.23	-1.80	0.83
-4	12	2	12.26	10.65	-7.60	-7.47	224.51	1.61	0.51
-3	12	2	23.06	22.43	20.24	9.67	25.54	0.63	0.34
-2	12	2	18.40	18.10	-17.99	-1.94	186.16	0.30	0.38
-1	12	2	5.11	5.25	-1.12	-5.13	257.72	-0.14	1.17
0	12	2	13.54	12.68	12.59	1.50	6.80	0.86	0.53
-11	13	2	35.53	36.69	-36.22	-5.85	189.18	-1.16	0.29
-9	13	2	9.85	8.46	7.68	-3.54	335.29	1.39	0.70
-8	13	2	11.93	9.04	9.02	0.69	4.36	2.88	0.58
-7	13	2	23.65	23.41	-22.54	-6.35	195.74	0.23	0.36
-6	13	2	6.75	5.70	4.22	-3.83	317.82	1.05	0.99
-5	13	2	20.91	18.76	-18.45	-3.40	190.43	2.16	0.37
-4	13	2	23.00	23.15	-21.82	-7.73	199.52	-0.15	0.35
-3	13	2	11.86	9.95	9.89	1.10	6.35	1.91	0.56
-2	13	2	23.93	22.79	-22.73	1.70	175.73	1.14	0.37
-1	13	2	11.05	12.60	-12.27	2.84	166.99	-1.54	0.66
-8	14	2	8.70	8.38	-5.86	-6.00	225.65	0.32	0.91
-7	14	2	20.92	20.93	3.51	20.63	80.34	-0.00	0.40
-6	14	2	5.31	2.88	-2.87	0.25	174.94	2.42	1.20
-2	3	3	33.61	34.18	33.94	-4.06	353.18	-0.57	0.20
-1	3	3	59.16	60.09	-59.72	6.62	173.68	-0.93	0.18
0	3	3	3.45	2.83	0.83	-2.71	286.98	0.62	0.75
-3	4	3	14.50	15.86	15.27	-4.30	344.25	-1.36	0.23
-2	4	3	13.69	7.65	3.90	6.58	59.32	6.04	0.32
-1	4	3	20.76	21.40	-21.03	3.98	169.28	-0.65	0.20
0	4	3	50.57	50.98	48.95	14.23	16.21	-0.41	0.14
-4	5	3	13.38	11.95	-8.61	8.29	136.07	1.43	0.28
-3	5	3	52.69	52.11	51.25	9.42	10.42	0.58	0.17
-2	5	3	31.50	30.68	-28.50	-11.37	201.75	0.82	0.19
-1	5	3	13.57	16.67	3.67	-16.26	282.71	-3.10	0.27
0	5	3	19.21	18.20	17.63	-4.52	345.61	1.01	0.22
-5	6	3	13.28	12.32	12.16	-1.94	350.94	0.96	0.30
-4	6	3	20.02	18.99	-18.99	0.46	178.62	1.03	0.24
-3	6	3	23.83	23.14	-23.01	-2.49	186.18	0.69	0.22
-2	6	3	25.44	25.63	25.51	2.44	5.46	-0.19	0.22
-1	6	3	33.46	33.63	-33.19	5.44	170.69	-0.17	0.21
0	6	3	4.78	3.83	3.02	2.34	37.78	0.95	0.78
-6	7	3	40.98	40.35	-40.35	-0.01	180.01	0.63	0.22
-5	7	3	23.26	22.33	20.06	-9.80	333.96	0.94	0.24
-4	7	3	30.89	32.16	-29.48	12.83	156.48	-1.26	0.22
-3	7	3	25.55	25.91	-23.83	-10.17	336.88	-0.36	0.23
-2	7	3	29.71	30.09	27.16	12.96	25.52	-0.38	0.23
-1	7	3	18.20	18.47	17.42	-6.15	340.56	-0.27	0.27
0	7	3	30.96	31.63	28.46	-13.80	334.13	-0.67	0.21
-7	8	3	5.62	1.66	-0.95	-1.35	234.87	3.97	0.70
-6	8	3	32.16	31.60	31.00	-6.15	348.78	0.56	0.23
-5	8	3	11.89	10.74	10.68	-1.15	353.88	1.14	0.38
-4	8	3	7.23	2.91	-2.86	-0.54	190.76	4.32	0.61

0	6	4	12.24	12.43	-10.47	6.70	147.37	-0.19	0.31
-6	7	4	10.21	9.67	-9.65	0.66	176.09	0.54	0.42
-5	7	4	8.05	7.20	4.45	-5.67	308.10	0.84	0.54
-4	7	4	13.10	13.79	-11.23	-8.01	215.48	-0.69	0.35
-3	7	4	11.26	9.00	-7.50	-4.97	213.57	2.26	0.39
-2	7	4	6.78	3.62	-0.06	-3.62	269.09	3.15	0.73
-1	7	4	19.62	18.83	17.46	7.07	22.05	0.79	0.29
0	7	4	16.67	14.45	2.15	-14.29	278.56	2.23	0.28
-7	8	4	13.47	13.40	13.01	3.22	13.88	0.07	0.39
-5	8	4	7.65	7.80	-7.80	0.01	179.93	-0.15	0.61
-4	8	4	47.54	45.69	45.69	-0.48	359.40	1.85	0.23
-3	8	4	8.89	9.25	-7.76	5.04	147.01	-0.36	0.48
-2	8	4	6.19	5.21	1.70	-4.93	289.08	0.97	0.82
-1	8	4	18.08	18.32	17.68	4.78	15.12	-0.24	0.33
0	8	4	13.10	14.05	-13.89	2.09	171.44	-0.95	0.35
-8	9	4	9.83	5.35	-5.29	0.78	171.65	4.48	0.76
-7	9	4	11.86	10.87	10.44	-3.03	343.83	0.98	0.47
-6	9	4	6.87	7.26	-7.00	1.94	164.46	-0.39	0.78
-5	9	4	11.50	11.34	-9.41	6.33	146.09	0.15	0.44
-4	9	4	14.34	17.44	-14.35	9.91	145.37	-3.09	0.38
-3	9	4	7.96	10.29	-9.88	2.91	163.61	-2.33	0.66
-2	9	4	17.25	17.00	-16.03	-5.64	199.38	0.26	0.35
-1	9	4	5.55	9.37	-8.96	2.75	162.96	-3.82	1.08
0	9	4	29.91	27.92	27.74	-3.15	353.51	1.99	0.26
-8	10	4	4.42	4.57	-3.64	2.78	142.64	-0.16	1.28
-7	10	4	12.32	9.83	-9.31	-3.16	198.77	2.48	0.50
-6	10	4	11.08	7.98	3.61	-7.12	296.92	3.10	0.50
-5	10	4	11.69	11.46	-10.85	-3.69	198.81	0.23	0.47
-4	10	4	12.31	11.74	4.64	-10.78	293.31	0.57	0.45
-3	10	4	18.96	17.14	16.83	3.29	11.07	1.81	0.36
-2	10	4	7.09	2.28	-0.99	-2.05	244.25	4.81	0.80
-1	10	4	20.61	17.79	17.71	1.67	5.39	2.82	0.37
-7	11	4	16.67	16.05	11.11	11.59	46.23	0.61	0.42
-6	11	4	16.99	13.35	12.87	3.56	15.47	3.63	0.39
-5	11	4	9.15	9.58	-9.56	-0.66	183.95	-0.43	0.65
-4	11	4	18.62	18.27	11.01	14.58	52.94	0.36	0.38
-1	2	5	14.33	14.31	-13.88	-3.48	194.07	0.02	0.31
-2	3	5	13.78	14.26	-12.68	6.52	152.80	-0.48	0.34
-1	3	5	27.83	29.09	28.66	-4.97	350.17	-1.26	0.24
0	3	5	8.67	7.82	-0.45	7.81	93.32	0.84	0.49
-3	4	5	6.73	5.53	-0.49	5.51	95.11	1.20	0.67
-2	4	5	6.74	2.99	-2.98	-0.24	184.51	3.74	0.76
-1	4	5	9.59	6.70	2.27	-6.30	289.80	2.89	0.48
0	4	5	19.22	20.11	-19.85	3.23	170.77	-0.89	0.28
-4	5	5	5.38	5.16	-1.60	-4.90	251.90	0.22	1.01
-3	5	5	24.92	24.90	-24.77	2.51	174.22	0.02	0.31
-2	5	5	12.92	12.58	11.62	-4.81	337.50	0.34	0.42
-1	5	5	7.19	5.44	4.32	3.31	37.50	1.75	0.66
0	5	5	7.67	7.81	3.34	7.06	64.68	-0.14	0.57
-4	6	5	10.67	10.89	10.12	4.02	21.67	-0.22	0.45
-3	6	5	14.45	15.39	15.08	3.04	11.41	-0.93	0.37
-2	6	5	12.51	13.84	-13.48	-3.13	193.08	-1.32	0.37
-1	6	5	13.05	13.33	12.71	-4.04	342.36	-0.28	0.38
0	6	5	6.74	6.13	-1.92	-5.82	251.78	0.61	0.80
-6	7	5	27.42	27.01	27.01	0.10	0.22	0.41	0.27
-5	7	5	9.27	8.95	-8.60	2.47	163.95	0.32	0.54
-4	7	5	15.15	18.71	-2.59	-18.53	262.05	-3.56	0.37
-3	7	5	15.55	15.09	3.28	14.73	77.43	0.46	0.36
-2	7	5	19.21	19.60	-19.58	-0.76	182.23	-0.39	0.32
-1	7	5	13.91	14.34	-14.07	2.80	168.73	-0.43	0.43