Weight Percent

	V240	V634A	V436B	ave Littleton
SiO2	54.60	61.70	58.19	62.14
Al2O3	25.10	22.50	21.77	21.29
TiO2	0.93	1.09	1.06	1.08
FeO	8.64	7.51	7.72	6.98
MnO	0.12	0.13	0.17	0.07
MgO	1.76	1.00	1.78	1.99
CaO	0.65	0.43	0.55	0.54
Na2O	1.86	0.90	0.80	1.42
K2O	3.35	3.99	4.96	3.84
SUM	97.21	99.57	97.16	94.83

Molecular Percent

	V240	V634A	V 436B	ave Littleton
SiO2	63.95	69.83	67.35	69.37
Al2O3	17.32	15.01	14.85	14.01
TiO2	0.82	0.93	0.92	0.91
FeO	8.46	7.11	7.48	6.52
MnO	0.12	0.12	0.17	0.07
MgO	3.07	1.69	3.07	3.31
CaO	0.82	0.52	0.68	0.65
Na2O	2.11	0.99	0.90	1.54
K2O	2.50	2.88	3.66	2.73
SUM	100.00	100.00	100.00	100.00

Molecular Percent corrected for TiO2, Na2O, and CaO

	V240	V634A	V 436B	ave Littleton
SiO2	69.75	74.13	71.60	74.66
Al2O3	15.70	14.33	14.10	12.72
FeO	8.34	6.56	6.97	6.04
MnO	0.13	0.13	0.18	0.07
MgO	3.35	1.79	3.26	3.56
K2O	2.73	3.06	3.89	2.94
SUM	100.00	100.00	100.00	100.00
A/FM	0.391	0.382	0.192	0.289
Fe/Fe+Mg	0.713	0.786	0.681	0.629

Table 1. XRF results used for construction of pseudosections; also contains data for Shaw's (1956) average Littleton Formation at amphibolite grade for comparison. Molecular values corrected for Al2O3 by subtracting Al2O3 in proportion to Na2O and CaO. FeO is corrected by subtracted molecular proportion of TiO2. A/FM= (Al203-3K2O)/ (Al203-3K2O+FeO+K2O) for corrected values.

V634A

Garnet	Core					Rim
SiO2	37.62	36.98	36.93	37.46	37.75	37.66
Al2O3	20.28	20.11	20.28	20.65	20.61	20.54
TiO2	0.02	0.13	0.09	0.01	0.11	0.06
FeO	33.23	32.31	33.72	34.53	36.14	36.19
MnO	4.86	4.65	3.42	2.96	0.76	0.50
MgO	2.13	2.15	2.42	2.66	3.17	3.12
CaO	1.14	1.34	1.15	0.99	0.44	0.38
Total	99.3	97.7	98.0	99.3	99.0	98.4
Almandine	76.55	75.88	78.47	79.30	83.82	84.67
Grossular	3.37	4.04	3.42	2.90	1.30	1.13
Pyrope	8.74	9.01	10.05	10.90	13.09	13.02
Spessartine	11.33	11.07	8.06	6.89	1.79	1.19
Fe/(Fe+Mg)	0.90	0.89	0.89	0.88	0.86	0.87
Fe/(Fe+Mg+Mn)	0.79	0.79	0.81	0.82	0.85	0.86
Mn/(Fe+Mg+Mn)	0.12	0.12	0.08	0.07	0.02	0.01

	Chloritoid				**Staurolite**	
	Core (I)	(I)	(I)	Rim (I)	Early (I)	Late (M)
SiO2	25.18	25.55	25.62	25.70	27.87	28.19
Al2O3	39.51	39.57	40.08	39.96	52.28	52.53
TiO2	0.00	0.08	0.03	0.06	0.48	0.46
FeO	23.73	23.60	24.09	23.74	15.61	17.12
MnO	0.39	0.33	0.22	0.04	0.05	0.03
MgO	3.14	3.17	3.70	3.95	1.14	0.82
CaO	0.06	0.03	0.04	0.06	0.05	0.05
Total	92.01	92.35	93.78	93.51	97.48	99.20
Fe/(Fe+Mg)	0.809	0.807	0.785	0.771	0.88	0.92
Fe/(Fe+Mg+Mn)	0.798	0.797	0.779	0.770	0.88	0.92

	Biotite		**Muscovite**		**Chlorite**	
	Matrix		Matrix	S-Shadow (M)		Matrix
SiO2	36.18	SiO2	47.62	47.49	SiO2	24.42
Al2O3	18.48	Al2O3	34.01	33.21	Al2O3	22.33
TiO2	1.49	TiO2	0.51	0.63	TiO2	0.11
FeO	20.30	FeO	1.37	1.69	FeO	29.12
MnO	0.03	MnO	0.02	0.10	MnO	0.05
MgO	10.19	MgO	0.97	1.13	MgO	13.66
CaO	0.04	CaO	0.11	0.04	CaO	0.02
Na2O	0.14	Na2O	1.96	1.64	Na2O	0.00
K2O	8.29	K2O	8.54	8.55	K2O	0.00
Total	95.23	Total	95.16	94.55	Total	89.72
Fe/(Fe+Mg)	0.528	musc	0.736	0.771	Fe/(Fe+Mg)	0.545
Fe/(Fe+Mg+Mn)	0.527	para	0.256	0.225	Fe/(Fe+Mg+Mn)	0.544
East	0.140	cel	0.099	0.106		
		Fe/(Fe+Mg)	.486	0.481		

Table 2. V634A representative microprobe data for garnet, chloritoid, staurolite, chlorite biotite and muscovite. Garnet and chloritoid analyses are representative of the core to rim zoning. Biotite, muscovite and chlorite are average of all matrix analyses. (I) in the heading of an analysis denotes that the grain is an inclusion in garnet. (M) denotes that the mineral grain analyzed is in the matrix.

V240

Garnet	Core		Resorption		Rim
SiO2	38.37	38.18	38.14	38.38	39.12
Al2O3	19.81	19.94	19.32	19.71	19.62
TiO2	0.01	0.05	0.10	0.04	0.02
FeO	31.49	31.32	31.36	33.65	34.72
MnO	4.18	2.94	4.34	2.15	0.30
MgO	2.25	2.24	2.04	3.43	4.27
CaO	4.64	5.65	4.52	2.85	1.86
Total	100.7	100.3	99.8	100.2	99.9
Almandine	68.95	68.80	69.40	73.79	77.12
Grossular	13.02	15.89	12.82	8.01	5.30
Pyrope	8.77	8.77	8.06	13.42	16.91
Spessartine	9.26	6.54	9.72	4.78	0.67
Fe/(Fe+Mg)	0.89	0.89	0.90	0.85	0.82
Fe/(Fe+Mg+Mn)	0.79	0.82	0.80	0.80	0.81
Mn/(Fe+Mg+Mn)	0.11	0.08	0.11	0.05	0.01

Chloritoid	Core (I)	(I)	Resorption(I)	(I)	Rim (I)
SiO2	25.38	25.20	25.10	24.81	25.38
Al2O3	38.24	37.75	37.36	36.95	38.27
TiO2	0.06	0.00	0.00	0.03	0.00
FeO	26.60	23.06	23.09	21.97	21.64
MnO	0.46	0.38	0.31	0.13	0.19
MgO	3.98	3.95	3.68	4.40	4.24
CaO	0.00	0.05	0.08	0.10	0.00
Total	94.72	90.39	89.62	88.38	89.73
Fe/(Fe+Mg)	0.789	0.766	0.779	0.737	0.741
Fe/(Fe+Mg+Mn)	0.779	0.757	0.770	0.734	0.736

Staurolite	Core (I)	(I)	Resorption(I)	Rim (I)	Matrix (M)
SiO2	27.24	27.74	27.28	27.48	27.76
Al2O3	51.62	51.88	51.41	50.89	50.26
TiO2	0.25	0.33	0.39	0.37	0.68
FeO	14.69	14.43	14.26	14.62	14.83
MnO	0.17	0.18	0.24	0.07	0.02
MgO	2.13	1.98	2.20	2.48	2.12
ZnO	0.05	0.70	0.91	0.16	0.39
CaO	0.06	0.00	0.07	0.03	0.01
Total	96.21	97.24	96.76	96.09	96.08
Fe/(Fe+Mg)	0.794	0.803	0.785	0.737	0.797
Fe/(Fe+Mg+Mn)	0.787	0.795	0.774	0.734	0.796

Table 3

V240	**Muscovite**			**Paragonite**	**Margarite**
	Core (I)	Matrix (M)		Core/Rim (I)	Core/Rim (I)
SiO2	46.99	46.25	SiO2	43.68	33.40
Al2O3	33.08	34.17	Al2O3	37.44	44.42
TiO2	0.31	0.40	TiO2	0.13	0.00
FeO	3.44	1.63	FeO	1.30	1.59
MnO	0.14	0.12	MnO	0.06	0.09
MgO	1.19	0.13	MgO	0.28	0.36
CaO	0.09	0.02	CaO	1.58	9.41
Na2O	1.99	1.35	Na2O	7.00	2.21
K2O	8.90	9.00	K2O	0.23	0.09
Total	96.13	93.07	Total	91.70	91.57
musc	0.742	0.813	marg	0.109	0.697
para	0.252	0.186	para	0.872	0.295
cel	0.155	0.056	cel	0.050	0.052
Fe/(Fe+Mg)	0.619	0.879	Fe/(Fe+Mg)	0.699	0.684

Biotite	Matrix (M)	**Chlorite**	Rim (I)	Matrix (M)
SiO2	36.18	SiO2	25.06	25.19
Al2O3	18.48	Al2O3	23.05	20.81
TiO2	1.49	TiO2	0.00	0.01
FeO	20.30	FeO	23.07	19.45
MnO	0.03	MnO	0.00	0.08
MgO	10.19	MgO	16.99	18.08
CaO	0.04	K2O	0.00	0.02
Na2O	0.14			
K2O	8.29			
Total	95.23	Total	88.17	83.62
Fe/(Fe+Mg)	0.528	Fe/(Fe+Mg)	0.432	0.376
Fe/(Fe+Mg+Mn)	0.527	Fe/(Fe+Mg+Mn)	0.432	0.376
East	0.140			

Table 3. V240 representative microprobe data for garnet, chloritoid, staurolite, muscovite, paragonite, margarite, chlorite and biotite. Garnet, chloritoid and staurolite compositions are representative of zoning. Paragonite and margarite data are average compositions for inclusions. Muscovite, chlorite and biotite matrix compositions are average of matrix analyses. Muscovite core is analysis for single grain found in the core. Chlorite rim composition is taken from chlorite inclusion shown in figure 5e. (I) in the heading of an analysis denotes that the grain is an inclusion in garnet. (M) denotes that the mineral grain analyzed is in the matrix.

V634A

Position	FIA	End-members	Temperature	Pressure
Garnet core	2	Py, alm, spss mu, cel, mctd fctd, mnctd, clin, daph, ames,q , H2O	554 ± 27°C	9.5 ± 3.6 kb
Garnet core	2	Py, alm, spss mu, cel, mctd, fctd, mnctd, clin, daph, ames,q , H2O	576 ± 26°C	10.1 ± 3.7 kb
Garnet median	3	Py, alm, mu, cel, mst, fst, mctd fctd, q, H2O	595 ± 26°C	11.9 ± 2.9 kb
Garnet median	3	Py, alm, mu, cel, mst, fst, mctd, fctd, q, H2O	610 ± 25°C	13.6 ± 2.6 kb
Garnet rim/matrix	4	Py, alm, mu, cel, phl, ann, east clin, daph, ames, mst, fst, q, H2O	580 ± 16°C	5.6 ± 2.2 kb

V240

Position	FIA	End-members	Temperature	Pressure
Garnet core	2	Py, gr, alm, spss, mu, cel, ma, mctd, fctd, mnctd, mst, fst, ky, q, H2O	580 ± 11°C	11.2 ± 1.3 kb
Garnet resorption	2	Py, gr, alm, spss, mu, cel ma, mctd, fctd, mnctd, mst, fst, ky, q H2O	550 ± 15°C	9.8 ± 2.0 kb
Garnet rim1	3	Py, gr, alm, mu, cel, ma, mctd, fctd, mst, fst, clin, daph, ames, q, H2O	573 ± 12°C	12.0 ± 2.0 kb
Garnet rim2	3	Py, gr, alm, mu, cel, ma, mctd, fctd, mst, fst, clin, daph, ames, q, H2O	584 ± 12°C	12.8 ± 1.5 kb
Garnet rim/matrix	4	Py, alm, mu, cel, phl, ann, east, mst, fst, clin, daph, ames, q, H2O	593 ± 22°C	6.6 ± 2.6 kb

Table 4. Results from average P-T calculations of THERMOCLAC V3.21. showing temperature and pressure conditions along with associated errors and end-members used in calculations for samples V634A and V240. Compositions used in calculations are given in Tables 2 and 3.