TABLE 1. Compositions of Garnets Studied

	1		2		3		4		5		6	
					Weight percent oxides							
SiO_2	37.77		38.25		43.04		42.30		36.43		39.23	
TiO_2	0.00		0.00		0.38		0.14		0.00		0.19	
Al_2O_3	21.11		21.55		22.94		22.19		20.64		21.80	
Cr_2O_3	0.00		0.04		0.18		1.89		0.00		0.00	
FeO	35.11		26.09		10.17		8.84		18.65		1.84	
MnO	2.24		2.32		0.30		0.35		24.29		0.45	
MgO	4.53		9.47		19.02		19.03		0.00		0.00	
CaO	0.39		1.92		4.87		5.16		0.32		34.76	
Total	101.15		99.64		100.90		99.90		100.33		98.27	
					Number of ions on the basis of 12 oxygens							
Si	3.00		2.97		3.04		3.02		3.00		3.01	
Al	1.97		1.97		1.91		1.87		2.00		1.97	
Cr	0.00		0.00		0.01		0.11		0.00		0.00	
Ti	0.00		0.00		0.02		0.01		0.00		0.01	
Mg	0.54		1.10		2.00		2.03		0.00		0.00	
Fe^{2+}	2.33	3.05	1.69	3.10	0.60	2.99	0.53	2.98	1.28	3.00	0.12	3.01
Mn	0.15		0.15		0.02		0.02		1.69		0.03	
Ca	0.03		0.16		0.37		0.40		0.03		2.86	
					Mol. percent components							
$Fe_3Al_2Si_3O_{12}$	76.39		54.52		20.23		19.16		42.67		3.99	
$Ca_3Al_2Si_3O_{12}$	0.98		5.16		11.40		2.71		1.00		95.02	
$Mg_3Al_2Si_3O_{12}$	17.70		35.48		67.43		73.49		0.00		0.00	
$Mn_3Al_2Si_3O_{12}$	4.92		4.84		0.60		0.77		56.33		1.00	
$Ca_3Cr_2Si_3O_{12}$	0.00		0.00		0.34		3.87		0.00		0.00	

1. Almandine -- Source : F. Birch; locality unknown
2. Pyropic Almandine -- U.S.N.M. #120315, Fort Defiance, Arizona
3. Pyrope -- U.S.N.M. #107062, Alice Springs, Australia
4. Cr-Pyrope -- UCLA Museum 3227D, Arizona
5. Spessartitic Almandine -- Verma #1 (Verma, 1960)
6. Grossular -- Asbestos, Quebec (J. Arem, Collector).

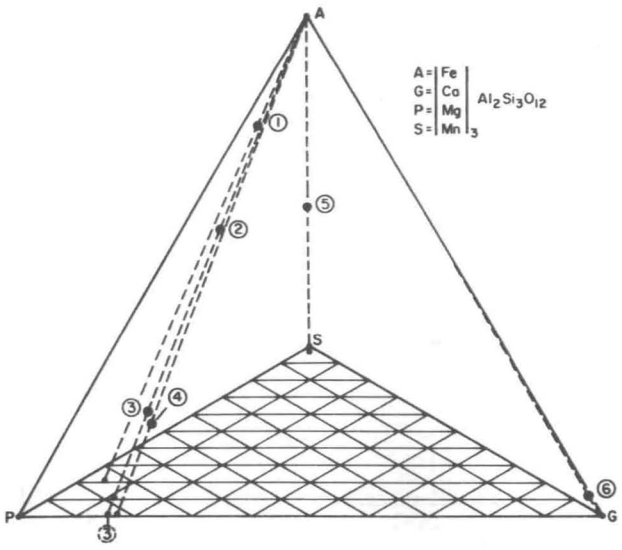

FIG. 1. Compositional tetrahedron for garnets used in comparison dilatometry. Numbers correspond to chemical analyses listed in Table 1.

the axis of the rod and the $\perp$ to c (*i.e.*, for quartz $\perp c$ $\sin^2\theta = 0$). It is easily seen that, in applying these results to thin sections, θ is the same angle as θ in the comparison dilatometry (see footnote 5).

Results for Pairs: Quartz and Pyropic, Spessartitic, and Grossularitic Garnet

Figures 5, 6, and 7 show data points for isomekes of quartz in the two principal orientations relative to pyropic (Table 1, #3), spessartitic (#5), and grossularitic (#6) garnets. Similar determinations, not illustrated because they are concordant, were made for garnets #2 and #4 of Figure 1 and Table 1. The solid curves in Figures 5, 6, and 7 are derived from interpolation equations presented below for isomekes of quartz–almandine-type garnet and are placed in the figures for purposes of comparison.

Discussion and Synthesis

The most useful results to petrology that stem from this comparison dilatometry are: (1) experimentally-

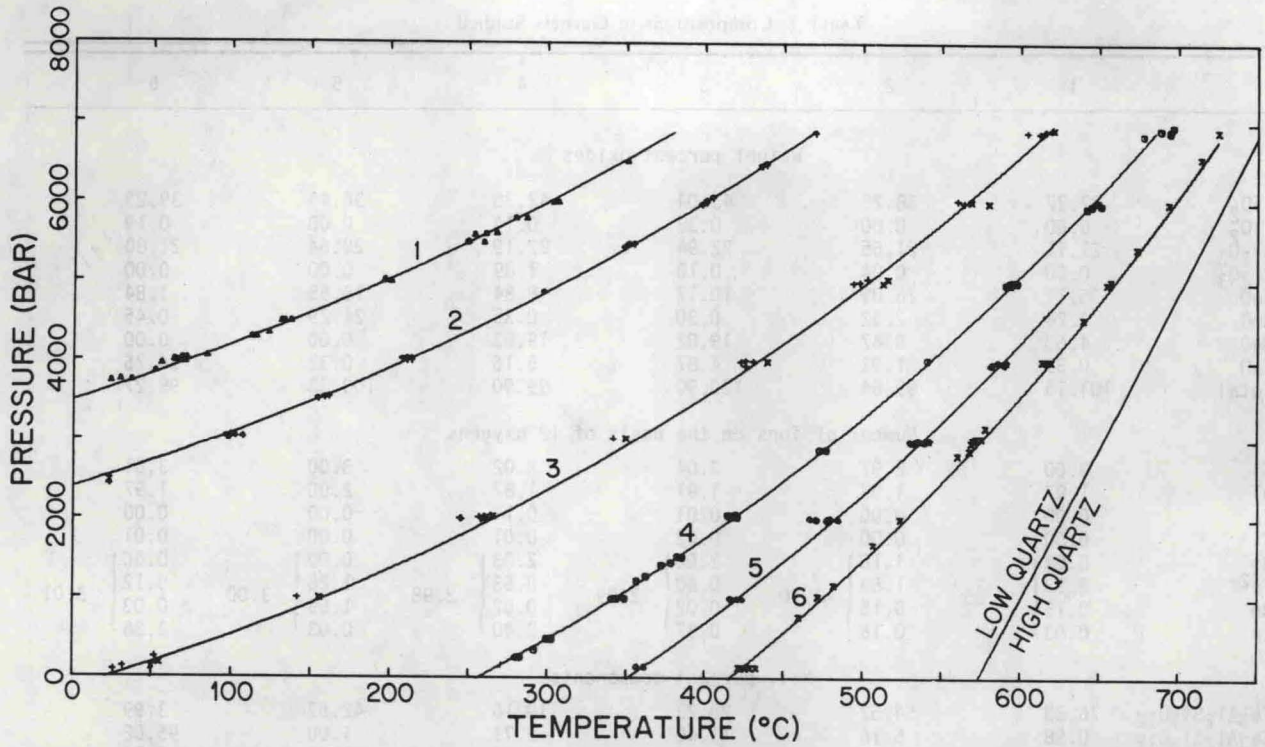

FIG. 2. Data for isomekes between almandine-type garnet (No. 1 in Table 1) and quartz in a direction $\perp c$. Solid lines based on numerical analysis discussed in text. Type of dilatometer (see Part I) used: 1, 2, 4, 5-"gate" (antimony-doped silicon gate); 3-"gate" (gate of chrome-coated synthetic sapphire); 6-"gate" (WC gate).

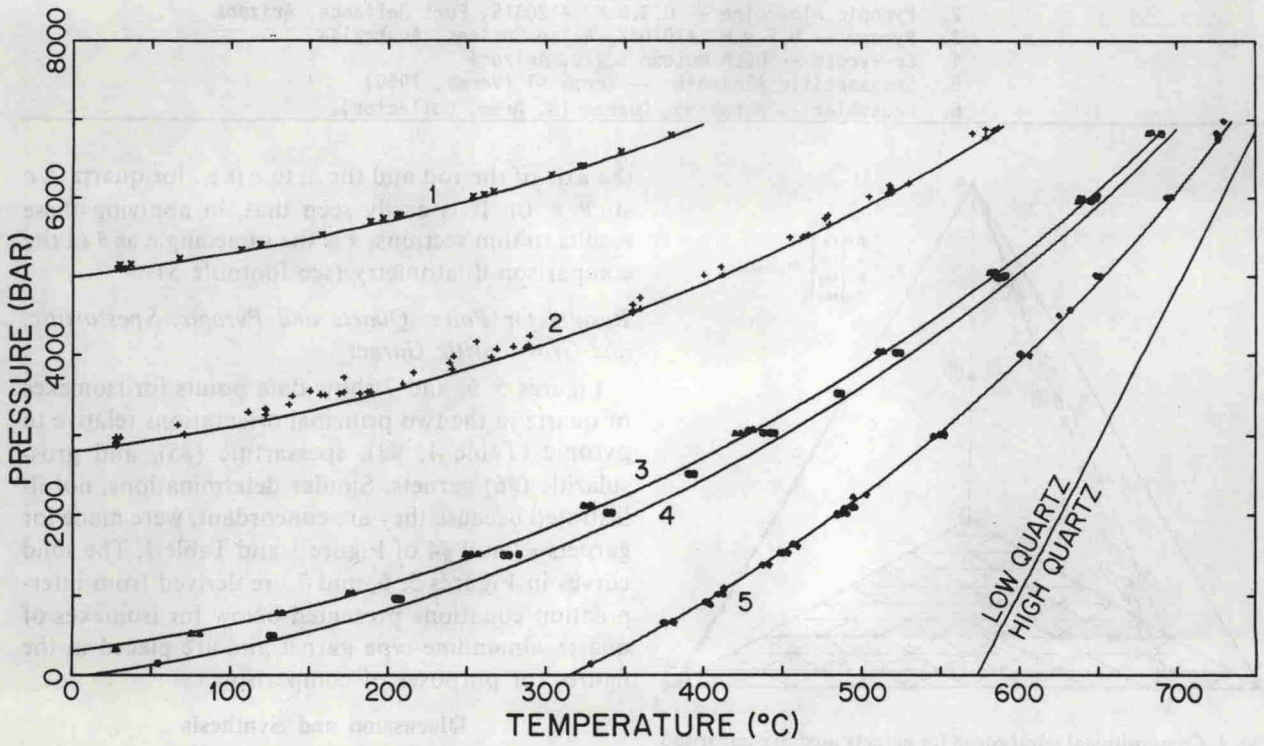

FIG. 3. Data for isomekes between almandine-type garnet (No. 1 in Table 1) and quartz in a direction 45° from c. Solid lines based on numerical analysis discussed in text. Type of dilatometer used: 1, 2, 5-"gate" (WC gate); 3, 4-"J".