for acmite composition (point Y in fig. 1). The results are shown in figure 2, and the limiting run data are given in tables 2 and 3.

Incongruent melting to hematite (+ magnetite) + liquid persists to at least 45 kb (for example, see table 2, A86). The fact that acmite continues to melt at high pressure to hematite (+ magnetite) + liquid suggested that excess hematite could be added to the charge as an oxygen reservoir without influencing the solidus. Accordingly, hematite was added to most charges when the acmite solidus was being investigated. Since both hematite and magnetite were products of the runs, the system was buffered with respect to oxygen fugacity.

The equation $T(°C) = 988 + 20.87P(kb) - 0.155P^2(kb)$ reproduces the melting curve over the range of data shown in figure 2. Both melting and crystallization appeared to be rapid, and most run times in table 2 are now thought to be needlessly long.

There appears to be a small melting interval over which acmite coexists with hematite + magnetite + liquid, similar to that found in the 1 atm melting. The width of the temperature interval of melting is not known precisely because either infinitesimal amounts of water (from

TABLE 2

Critical runs determining acmite melting

Run no.	T, °C	P, kb	Friction*	Duration, minutes	Starting material†	Results†
A36	1150	10	O (NSL)	30	Ac	Ac
A37	1200	10	I (NSL)	60	Ac + Hm	Hm + Mt + gl
A38	1225	15	O (NSL)	60	Ac + Hm	Ac + Hm + Mt
A40	1250	15	O (NSL)	60	Ac + Hm	Ac + Hm + Mt + tr gl
A39	1275	15	O (NSL)	60	Ac + Hm	Ac + Hm + Mt + gl
A41	1300	15	O (NSL)	60	Ac + Hm	Hm + Mt + gl
A22	1300	20	O (OC)	30	Ac	Ac
A42	1325	20	O (NSL)	30	Ac + Hm	Ac + Hm + Mt
A43	1350	20	O (NSL)	30	Ac + Hm	Ac + QAc + Hm + Mt
A3	1400	20	T at P (SL)	30	Ac	QAc + Hm + gl
A82	1350	25	I (MC)	30	Ac + Hm	Ac + QAc + Hm + Mt + tr LI
A57	1375	25	O (OSL)	30	Ac + Hm	Ac + QAc + Hm + Mt
A44	1425	25	O (NSL)	30	Ac + Hm	QAc + Hm + Mt + gl
A16	1400	30	T at P (SL)	30	Ac	Ac
A56	1425	30	O (OSL)	30	Ac + Hm	Ac + Hm + Mt
A55	1450	30	? (MSL)	30	Ac + Hm	QAc + Hm + Mt + gl
A49	1475	29.7	? (MSL)	30	Ac + Hm	QAc + Hm + Mt + tr LI
A17	1500	30	T at P (SL)	30	Ac	QAc + Hm + Mt + tr LI
A50	1500	35	? (MSL)	30	Ac + Hm	Ac + QAc + Mt + Hm + tr LI
A61	1525	40	? (C)	30	Ac + Hm	Ac + Hm + Mt
A63	1550	40	I (C)	20	Ac + Hm	Ac + Hm + Mt
A67	1575	40	O (MC)	23	Ac + Hm	Ac + QAc + Hm + Mt
A47	1600	40	? (MSL)	20	Ac	QAc + Mt + tr LI
A86	1650	45	I (MSL)	5	Ac	QAc + Hm + Mt

Charges were contained in $Pt_{70}Rh_{30}$ capsules.

*First symbol denotes piston travel during run as follows: O, piston-out run; I, piston-in run; ?, direction of piston motion not constant; T at P, to temperature at pressure (direction of piston motion not held constant during run).

Symbols in parentheses denote cylinder condition as follows: O, old, cracked; M, cracks beginning to show but no significant spalling; N, new, no cracks. The symbols also denote cylinder type: SL, steel liner; C, carbide.

†Symbols for phases are Ac, acmite; Q, quench phase; Hm, hematite; Mt, magnetite; gl, glass; LI, low refractive index phases; tr, trace.

TABLE 3

Liquidus runs for acmite composition

Run no.	T, °C	P, kb	Friction*	Duration, minutes	Starting material*	Results*
A45	1400	10	0 (NSL)	30	Ac	Hm + Mt + gl
A51	1425	10	0 (MSL)	15	Ac	Hm + Mt + gl
A52	1450	10	0 (MSL)	20	Ac	QHm + QMt + gl + LI
A53	1475	10	0 (MSL)	15	Ac	QHm + QMt + gl + LI
A54	1500	10	0 (MSL)	15	Ac	QHm + QMt + gl + LI
A60	1500	15	0 (C)	15	Ac	Hm + Mt + gl
A64	1525	15	0 (C)	15	Ac	QHm + QMt + gl
A65	1575	20	0 (MC)	1	Ac	Hm + Mt + gl
A70	1600	20	0 (MC)	18	Ac	tr QAc + QMt + gl

*See legend of table 2.

incomplete sample drying or from the dehydrating talc sleeve) or the reducing atmosphere of the furnace would tend to lower the beginning of melting. The incongruent melting curve shown in figure 2 is drawn on the disappearance of acmite.

Liquids just above the acmite solidus can easily be quenched to glass at pressures below 20 kb. At 20 kb and higher, however, liquids stable at the conditions of the run quench to acmite + glass. Above 30 kb only quench acmite is obtained above the solidus. Fortunately, there is no difficulty in distinguishing acmite held stably at the conditions of the run and that formed on quenching, as the quench pyroxene is, microscopically, in large sheaves with sweeping extinction.

A few of the runs in which melting occurred produced trace amounts of phases with low refractive index, presumably a Na-silicate and quartz. These phases apparently result from a fractional crystallization during the quench, in which crystalline hematite and magnetite fail to react with the liquid, causing the composition of the liquid to become enriched in soda and silica and thus quenching to acmite plus Na silicate and quartz (compare fig. 1). No phases with low refractive index were observed where crystalline acmite was held in its own stability field. Cell parameters of such an acmite from run A22 (table 2) are given in table 1 and are comparable to the starting material.

Determination of the liquidus for acmite composition poses some serious difficulties. First, hematite can no longer be added to help maintain a high oxygen potential, since the liquidus temperature obviously depends on bulk composition. Second, the liquid at high temperatures cannot be quenched. As expected, runs at successively higher temperatures in the region up to 150° to 200°C above the incongruent melting curve in the hematite + magnetite + liquid field show a decrease in the proportion of oxide crystals to glass. Above these temperatures, the quenched glasses contain abundant oxides (dominantly magnetite), commonly evenly distributed, which are interpreted as having been grown on the quench. The suggestion is made here that the development of this phenomenon approximately marks the true liquidus curve. The dashed