



Fig. 4. Melting temperature of acmite versus compression at room temperature. Inset shows similar plots for other silicates. Compression data summarized in Birch (1966, table 7-10). Melting curves are Fo, forsterite, Mg_2SiO_4 (Davis and England, 1964); En, enstatite, $MgSiO_3$ (Boyd, England, and Davis, 1964); Di, diopside, $CaMgSi_2O_6$, and Ab, albite, $NaAlSi_3O_8$ (Boyd and England, 1963); Jd, jadeite, $NaAlSi_2O_6$ (Bell, 1964); Ac, acmite; Sa, sanidine, $KAlSi_3O_8$ (Lindsley, 1966); Fa, fayalite, Fe_2SiO_4 (Hsu, 1967).

linearity might be due to incongruent melting. For comparison, plots of melting temperature versus compressibility for other silicates are shown in the inset of figure 4. Fayalite (Fe_2SiO_4), which melts incongruently up to 40 kb (Hsu, 1967), and sanidine ($KAlSi_3O_8$), which melts incongruently up to 20 kb (Lindsley, 1966), show linear relationships over that region; thus, incongruent behavior cannot be used to explain curvature. In contrast, diopside, which melts congruently (Boyd and England, 1963), and sanidine, which melts congruently above 20 kb (Lindsley, 1966), do not show linear relations. On the whole, the relationships for silicates shown in figure 4 reflect the form of the fusion curves: linear fusion curves result in linear T_M versus $\Delta V/V_0$ curves; fusions with marked curvature result in curved T_M versus $\Delta V/V_0$ relations, with the exception of albite.

A pressure effect on the emf of thermocouples cannot be used to account for the nonlinear T_M - $\Delta V/V_0$ curves presented here, because all curves shown are plotted without this correction so that differences between curves are real. Nothing in the experimental techniques used to determine the melting curves can be appealed to since all these curves were determined with the same type of apparatus and technique. It is possible that the compressibility measurements at lower pressures for silicates may have larger uncertainties than expected and that extrapola-

tion to higher pressure of low-pressure measurements is unwarranted. As previously noted, difficulties in the simple temperature-compression relation are not limited to silicates. Whatever the reasons, the "new law of melting" does not seem to be substantiated by silicates over the pressure range thus far investigated.

In summary, the more significant features of the work are: (1) incongruent melting of acmite persists to 45 kb; (2) oxygen fugacity has a strong influence on acmite melting; (3) incongruency is maintained from high to low oxygen fugacity; (4) the initial slope of the incongruent melting curve is surprisingly steep—about 20°C/kb, one of the steepest of any silicate yet investigated. These observations clearly support the key role of acmite in the genesis of alkaline rocks.

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