0% olivine' used in
pressure assemblages

1	2
0.8	1.3
5.0	8.3
6.6	11.0
6.8	11.3
15.8	26.4
62.5	37.5
1.3	2.2
0.7	1.1
0.6	1.0

or intersection of
of Fo + An (1 : 1
iro & Yoder 1966
e, but in the light
eding with pyrox-
e been metastable.
it a much smaller
rance of garnet in
used (Fo + An)
ed some runs with
olage is metastable
.e.:

mix)

Cpx_{ss} + Opx_{ss} +
(1966, Figs. 1 & 2,
n runs, seeded with
s at 1175°C, 18 kb,
se results were re-
nply a steeper slope
net.
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ween forsterite and
tter assemblage to
xperimental data in
l uncertainties and
no evidence either
experimental study,
gnificant conditions.

Fayalite + Anorthite (Table 2)

Melting occurs in the Fe-rich system at much lower temperatures than in the Mg-rich system so that experiments were run only at 1100°C, 1050°C, and 900°C. In the 1100°C runs there was minor melting at pressures above 8 kb and a large amount of melting at 7.2 kb. Using a mix of glass + 10% seed (garnet + fayalite), garnet increased in amount in the 8.1 kb run. In the unseeded mixes garnet crystallized from glass and from crystalline (An + Fa) mix at 9 kb, 1100°C, but was absent at 8.1 kb, 1100°C. Neither magnetite, pyroxene nor metallic iron was observed in any of the runs, and residual or excess fayalite was present in all runs.

At 1050°C the problems of minor melting were avoided, and garnet disappeared from the seeded mix in the run at 6.3 kb, formed a major phase at 8.1 kb, and a minor phase in both the 7.2 kb, 3 hr and 7.2 kb, 24 hr runs. The coarser grain size of the garnet in the 24 hr run compared with that in the 3 hr run is taken to indicate stability of this phase, but also run conditions very close to the reaction boundary.

At 900°C, run times were of 24 hrs, and in one case, of 88 hrs. Seeded mixes were used in all cases. The marked increase in garnet in the 7.2 kb and 8.1 kb runs contrasts with its decrease and corroded nature at 5.4 kb, and the decrease in the 88 hr run at 6.3 kb. Knowledge of the bulk composition and the observation that pyroxene or spinel do not occur amongst the products in any of the subsolidus runs, shows that the reaction occurring to yield garnet (assuming no significant larnite solid solution in fayalite) is as follows:

(4) $2Fe_2SiO_4 + CaAl_2Si_2O_8 \rightleftharpoons CaFe_2Al_2Si_3O_{12} + Fe_2SiO_4$
fayalite anorthite grossular-almandine fayalite $\Delta V = -28.5 cm^3$

The specific garnet composition was confirmed by determination of a_0 (11.64 ± .01 Å) and refractive index (1.800 ± .005).

Olivine + Labradorite

Unlike the end member anorthite, reaction between labradorite and olivine is controlled by coupled reactions involving changes in plagioclase solid solution and will occur over a range of pressures at a given temperature. Kushiro (1965a) has presented preliminary data in the system forsterite + nepheline + silica suggesting that forsterite + albite is stable up to approximately 11 kb at 1100°C, but is replaced by nepheline + enstatite and then by enstatite + jadeite at higher pressures (reactions (5) & (6)).

(5) $2Mg_2SiO_4 + NaAlSi_3O_8 \rightleftharpoons 4MgSiO_3 + NaAlSiO_4$
forsterite albite enstatite nepheline

(6) $Mg_2SiO_4 + NaAlSi_3O_8 \rightleftharpoons 2MgSiO_3 + NaAlSi_2O_6$
forsterite albite enstatite jadeite