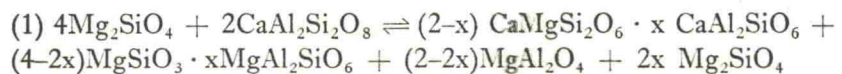


ture, olivine (Fo₉₀) and labradorite (An₅₉) were natural analyzed minerals, and the pyrolite mixture was prepared from reacted oxides. As with previously reported experiments on the pyrolite composition, the masking of minor phases by abundant olivine was avoided by using a composition (Table 1) equivalent to 'pyrolite less 40% olivine (Fo_{91.6})' (Green & Ringwood 1967c, p. 152).

Experimental data

Forsterite + Anorthite

Using glass seeded with 10% of the higher pressure assemblage of orthopyroxene_{ss} + clinopyroxene_{ss} + spinel + olivine, the experiments yielded forsterite + anorthite assemblage at 8.1 kb at 1250°C, but yielded the orthopyroxene_{ss} + clinopyroxene_{ss} + forsterite assemblage at 9 kb, 1250°C. In the experiments in which no seed of the spinel + pyroxenes assemblage was added, the forsterite + anorthite assemblage persisted at 9 kb, 1250°C, and yielded pyroxenes + spinel at 9.9 kb, 1250°C. A similar result was obtained using unseeded glass at 1300°C. The data demonstrate the unsuitability of using unseeded glass or low pressure assemblages in runs up to 3 hrs at T = 1250°C to establish the boundary between olivine + anorthite and pyroxenes + spinel assemblages. This is important in evaluating the data of Kushiro & Yoder (1966), who used glass or finely crystalline Fo + An in their studies on the forsterite + anorthite join, and only used the seeding technique (5% Ga + Cpx ± Fo added to the Fo + An crystalline mix) in runs near the garnet boundary. The present study, using solid media apparatus with a -10% pressure correction applied (Green, Ringwood & Major 1966), gives a reversal across the reaction boundary between 8.1 kb and 9.0 kb at 1250°C, i.e. consistent with Kushiro and Yoder's boundary. The reaction may be written as follows (Kushiro & Yoder 1966):



If further experiments in gas apparatus could demonstrate the stability relations suggested by Kushiro and Yoder's synthesis runs, then comparison with the solid media apparatus data would confirm the validity of the (-10%) pressure correction for the solid media apparatus (1/2" piston) at or near 10 kb.

The boundary between An + Fo and Cpx + Opx + Sp ± An or Fo, as drawn by Kushiro & Yoder (1966, Figs. 1 & 2), has a steep slope (dT/dP), and it has been suggested by Kushiro & Yoder (1966, p. 347-8) that this may intersect the boundary for the incoming of garnet at lower temperatures (estimated near 6 kb and 700°C) leading to an invariant point in the Fo + An system at which six phases (Fo, An, Sp, Ga, Opx_{ss}, Cpx_{ss}) may coexist. MacGregor (1967) also illustrated (Fig. 12.2) such an invariant point. This has important implications for metamorphic petrology, but it