

assemblage. The clinopyroxene solid solution formed at the highest pressures in the pyrolite mix would thus have a lower jadeite/diopside ratio than that of the olivine + labradorite mix. Consideration of the experimental data and comparison with the Fo + An and olivine + labradorite mixes leads to the conclusion that plagioclase persists to 11–12 kb at 1200°C, but the interval 8–11 kb is one in which plagioclase decreases in amount with increasing pressure. The decrease in plagioclase is accompanied by increase in spinel and pyroxene.

At higher pressures the olivine + pyroxenes + spinel assemblage gives way to olivine + pyroxenes + garnet \pm spinel assemblage (Green & Ringwood 1967c, 1969).

Effect of Fe/Mg variation in olivine

The extrapolation, assuming positive dT/dP , of the boundaries between high and low pressure assemblages in both the Fa + An and Fo + An systems suggests that there is little pressure difference at a given temperature between the high pressure stability limit of iron-rich olivine and anorthite and magnesian olivine and anorthite. There is, however, a very large difference in the pressure required to form garnet — the almandine-grossular garnet (Alm₆₇Gross₃₃) appearing directly from olivine + anorthite reaction at 7 kb, 1000°C, whereas the pyrope-grossular garnet would appear at 13–15 kb, 1000°C from the olivine + pyroxenes + spinel assemblage in the magnesian composition (Kushiro & Yoder 1966). Reconnaissance studies on reactions between anorthite and olivine of various Fe/Mg values confirm the general conclusion that at temperatures near 1000°C the high pressure stability limit of plagioclase + olivine is relatively insensitive to Fe/Mg, but the nature of the reaction products is very sensitive. For olivines of intermediate Fe/Mg ratio, the olivine + anorthite assemblage gives way at higher pressures to olivine + spinel + Fe-rich garnet + pyroxenes. The spinel decreases whereas garnet increases in amount and becomes more magnesian with increasing pressure.

Applications of experimental data

The experimental data presented have their main application in evaluating the near-solidus stability of plagioclase in olivine-rich, peridotitic compositions. In the olivine-normative basaltic compositions studied previously (Green & Ringwood 1967a), reaction between olivine and plagioclase occurred mainly between 8 kb and 11 kb, resulting in elimination of olivine, but persistence of plagioclase in px + pl + sp or px + pl + ga \pm qz assemblages to higher pressures. In the ultramafic composition it is plagioclase which is eliminated, and olivine persists to higher pressures with spinel and aluminous pyroxenes. At high temperatures (>1000°C) the olivine + orthopyr-