DIAMOND-BEARING ECLOGITES

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Data are presented from a study of garnet and clinopyroxene separates from diamond-bearing eclogites that occur as xenoliths in African kimberlites. Ten garnet-pyroxene pairs, five garnets, and one clinopyroxene have been analyzed by electron microprobe techniques for Si, Ti, Al, Cr, Mn, Fe, Mg, Ca, and Na. A literature survey has also been made to allow comparison with garnet and clinopyroxene compositions in kimberlite eclogites that do not contain diamond.

The scarcity of mineral analyses from diamond-bearing eclogites has not allowed a clear determination of whether diamond-bearing eclogites comprise a chemically or mineralogically unique group. The results reported in this study confirm the conclusion reached by Rickwood and Mathias (1970) that diamond occurs in a wide range of eclogite types. The range of garnet compositions found is comparable to the range reported for kimberlite eclogites with some exceptions. No garnets analyzed in this study have very high Mg contents (Mg/Mg+Fe > .75), very high Fe contents (Mg/Mg+Fe < .6, as in the Arizona eclogites [Watson, 1967]), or very high Ca contents (grossular > 50 mol. percent as in the grospydites). High Ca values are common, however, as 11 of the 15 garnets analyzed have between 20 and 40 mol. percent grossular.

The omphacitic pyroxenes also encompass a range in compositions. The range in jadeite substitution is particularly wide with Na_2O contents from under two to over seven weight percent and Al_2O_3 from two to eighteen weight percent.

It is apparent that diamonds are not restricted in occurrence to a single eclogite type and that rocks of varied chemistry must be present in the source region of the African kimberlites, at depths within the stability field of diamond.