TABLE 3. Calculated Modal Compositions and Densities for Ideal Pyrolite Composition of Table 1

	Olivine + Amphibole Assemblage a	Olivine + Amphibole Assemblage b	Plagioclase Pyrolite	Pyroxene Pyrolite a	Pyroxene Pyrolite b	Garnet Pyrolite
Olivine	65.0	57.6	71.9	61.4	65.3	65.2
Enstatite, Normal Al_2O_3		17.6	6.5	16.8		7.8
Enstatite, High Al_2O_3					15.6	
Diopside			4.7			
Omphacite				(30% Jd, 70% Di) 15.3	(30% Jd, 70% Di) 16.8	(43% Jd, 57% Di) 11.4
Hornblende	31.8	21.9	13.6			
Plagioclase ($Ab_{46}AN_{54}$)						
Spinel (high $MgAl_2O_4$ content)				5.9		
Garnet (70% pyrope, 12% almandine, 6% grossular, 6% uvarovite, 6% andradite)						13.3
Rutile	0.6	0.5	0.6	0.6	0.6	0.6
Chromite-magnetite	2.6	2.3	2.6		1.7	1.7
Density, g/cm³	3.25	3.28	3.24	3.30	3.32	3.37
H_2O (wt %) in rock	0.7%	0.5%				

In Table 3 two olivine + amphibole assemblages are calculated, one on the basis that plagioclase, clinopyroxene, and enstatite have been completely replaced by an amphibole (composition in mole per cent of 12% soda-tremolite, 12% cummingtonite, 12% tschermakite, and 64% tremolite). The second assemblage is calculated using as a basic control the composition of an analyzed hornblende from the Lizard olivine + amphibole assemblage (high in edenite substitution, with some cummingtonite and tschermakite substitution) and the presence of enstatite as in some examples of the Lizard peridotite.

Two pyroxene pyrolite assemblages are possible, depending on whether the pyroxenes, particularly the enstatite, can accommodate a high Al_2O_3 content or whether this appears as spinel.

The calculated composition of the garnet compares well with that observed by Dawson in the garnet peridotite xenolith in kimberlite previously discussed.

According to the model, garnet pyrolite would occupy an extensive region in the upper mantle, directly underlying a zone of pyroxene pyrolite.

7. *Modal compositions and densities inferred for the ideal pyrolite composition.* In the first section of this paper we arrived at a preferred chemical composition for a primitive mantle material. In later sections we have drawn attention to a variety of natural mineral assemblages that apparently are stable under different *P-T* conditions and in rock compositions close to that suggested for the mantle. In Table 3 we give the calculated modal compositions (weight per cent) and rock densities for analogous assemblages in the chosen mantle composition of Table 1. The high content of Fe_2O_3 in the chosen composition (cf. footnote, Table 2) and its calculation as magnetite, together with the calculation of TiO_2 as rutile, introduce a bias toward slightly high values in the calculated densities. However, this is consistent for all the assemblages and does not affect the relative densities.

8. *Discussion.* The data we have collected show conclusively that rocks of peridotitic composition with low but essential Al_2O_3, CaO, and Na_2O crystallize in four distinct mineral assemblages, dependent upon the *P-T* conditions of crystallization.

1. Olivine + amphibole + accessory chromian spinel.
2. Olivine + plagioclase + enstatite + clinopyroxene + accessory chromian spinel.
3. Olivine + aluminous enstatite + aluminous clinopyroxene + spinel.
4. Olivine + pyrope garnet + pyroxene(s).

All these assemblages are dominated by olivine as the major mineral present.

The four mineral assemblages agree with those which were suggested in a model for the upper mantle proposed by *Ringwood* [1962*a*, *b*]. Furthermore, the inferred relative pressure and