PETROLOGY OF APOLLO 12 CRYSSTALLINE ROCKS


The textural and modal variations of five Apollo 12 crystalline rocks extend beyond those of the Apollo 11 crystalline rocks. They include porphyritic and microporphyritic variolitic basalts with pigeonite and olivine phenocrysts, subophitic microgabbros and cumulates in which olivine and possibly clinopyroxene are the main cumulus phases.

The major minerals are olivine, pyroxene, calcic plagioclase, ilmenite and a series of Fe-Ti-Cr spinels. Minor phases include native iron, with varying nickel content, which in contrast to Apollo 11 samples occurs associated with olivine, pyroxene and spinel and infrequently with troilite. Other minor minerals are cristobalite, tridymite, pyroxferroite, fayalite, apatite, potassium feldspar, garnet (Alm$_{70,7}$ Gro$_{25,2}$ Sp$_{2,7}$ Pyr$_{1,6}$), amphibole, and zirconium and rare-earths bearing minerals. The garnet and amphibole occur in sample 12021, 22. The strong elemental zoning in the major minerals and the minor mineral assemblage is evidence for fractionation along similar lines to but even more fully developed than in Apollo 11 crystalline rocks.

The porphyritic basalts with their range in mineral compositions are indicative of either an early partial crystallization at depth or an initial relatively slow crystallization to undercooling followed by rapid congealing of residual liquids. Phenocryst compositions and the presence of cumulate varieties support the former interpretation.