

14006

Sample 14006 was collected as part of the contingency sample during the first EVA in the vicinity of the lunar module. It was returned in weigh bag 1039 along with the rest of the contingency sample.

PHYSICAL CHARACTERISTICS

Mass

12.13 g

Dimensions

3.0 x 2.0 x 1.3 cm

This rock is a coherent, dark medium gray breccia with leucocratic clasts comprising less than one percent of the sample. Thin section examination reveals the sample to be inhomogeneous with respect to glass content.

SURFACE FEATURES

Sample 14006 is pitted with one fresh surface. The pits are glass lined and vary in size from 0.3 to 0.7 mm. Pit density is very low.

Vugs are present, covering less than 5% of the surface of the sample. They range in size from 0.1 to 0.5 mm and are spaced approximately 4 mm apart. They are irregular to subcircular in shape, and are homogeneous in distribution. Plagioclase crystals projecting from the walls are clear to gray, but were not observed in thin section. One non-planar fracture cuts the rock. The fracture surface texture appears typical of that of the rest of the sample.

PETROGRAPHIC DESCRIPTION

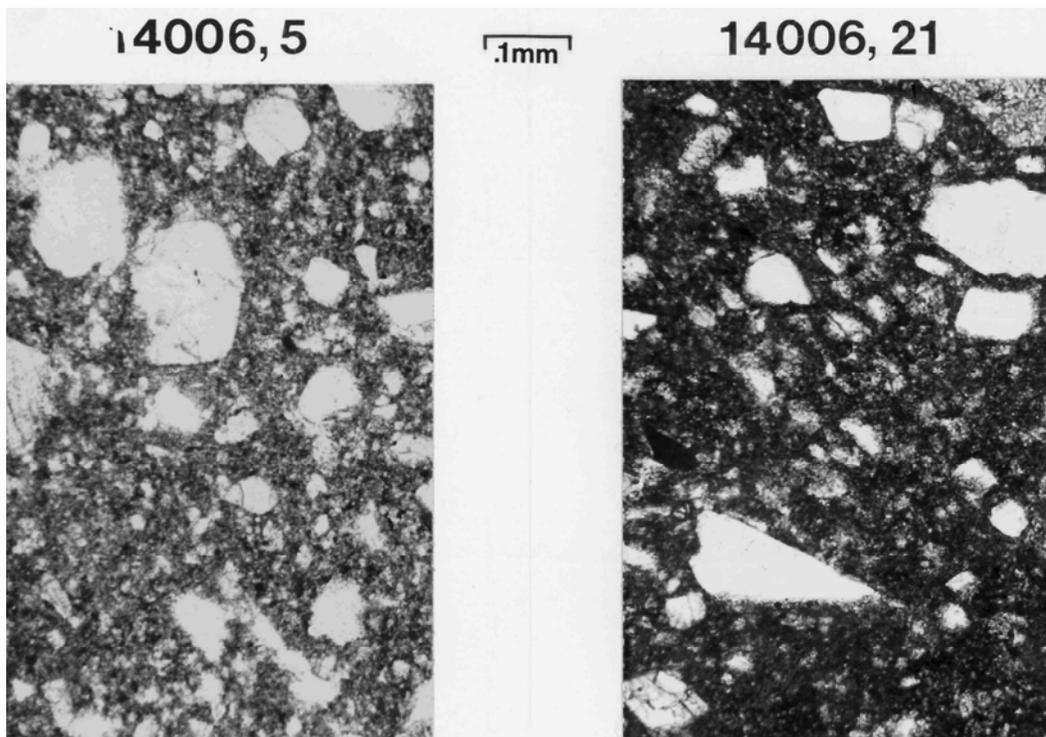
In thin section 14006 is a fine grained, texturally heterogeneous, fragmental rock. Less than one percent of the rock is composed of 1 mm clasts. These are composed of plagioclase cumulates with minor olivine (40%), pale yellow pyroxene (10%), gray pyroxene (50%), and scattered opaque minerals. The matrix is very fine grained with some glass. There are small masses of a reddish-orange glass present as distinct units in the matrix. The matrix is nearly opaque and shows gradation of size from very fine-grained up to rather coarse-grained. The grains that comprise the matrix material appear to be single crystal fragments to small lithic fragments.

Vugs are round to irregular and comprise approximately 5% of the sections. The size of the vugs vary from 0.1 mm up to 0.5 mm. There are no crystals projecting into any of the vugs.

The clasts (> 1 mm fragments) consist of a wide variety of lithic fragments as well as single mineral grains. Among the lithic clasts present are the following: plagioclase cumulates with olivine; fine-grained polymict breccias; and a few devitrified glass fragments. The remainder of the clasts consist of single crystal fragments of plagioclase and pyroxene. Many of the pyroxene grains show reaction rims. Most of the mineral grains show well developed cleavage patterns. Many of the larger plagioclase grains are multi-twinned.



Width of photograph is 3.5 cm; S-71-25297



Note: Variation in glass content.

The fragments throughout the sections show little to no shock effects. Some of the plagioclase forms radiating bundles which may be a devitrification feature. Several "ghost" clasts are present; blend in with the matrix in such a manner as to make their distinction very difficult. These clasts, however, are distinct in texture and composition as to distinguish them one from another. Localized pods of fine-grained matrix occur intermingled with stringers of coarser grained matrix surrounding it.

DISCUSSION

Sample 14006 is one of the rocks studied by Warner (1972), Wilshire and Jackson (1972), Chao et al. (1972), Quaide and Wrigley (1972), von Engelhardt et al. (1972), and Simonds et al. (1977). They agree that it is a glass poor breccia with a crystalline matrix. Chao et al. (1972) classify it as unshocked strongly annealed Fra Mauro breccia (2c). Warner (1972) and Chao et al. (1977) list it as having been thermally metamorphosed. Simonds et al. (1977) classify it as a CMB (see Table 4, p.). Simonds et al. (1977) studied sample 14006,5. Our group examined 14006,7 and 14006,21 and found the matrix to consist of 5 - 6% glass. These sections appear to be more like the LMS's of Simonds et al., or the glass-poor with a fragmental matrix rocks of von Engelhardt et al. (1972). They do not have enough glass to be classed as a VMB, but neither sample 14006,7 nor sample 14006,21 is a CMB. On the other hand, the thin sections show the clear cut difference from one thin section to another -- 14006,5 appears to have a crystalline matrix with little or no glass visible.

Phinney et al. (1976) studied sample 14006,6 and described it as a tough, crystalline breccia with 15 - 20% vugs and vesicles. The matrix is described as consisting of 10 - 20 μm plagioclase and clinopyroxene, with 5 μm ilmenite and smaller than 5 μm interstitial potassium feldspar. Grains are mostly equigranular and interlocking, but some are subhedral in shape.

Sample 14006 is said to have the typical major and trace element chemistry of Apollo 14 basaltic breccias of KREEP composition (Hubbard et. al., 1972) except that both have low K and Rb concentrations accompanied by increases in K/Rb ratios (Gibson and Hubbard, 1972).

Scanning electron microscope studies (McKay et al., 1972) reveal that 14006 has vapor phase deposited minerals lining cavities. A limit at 1050°C has been placed on the temperature to which this sample was heated, because the sample has been depleted in K and Rb but not Na, and because of the vapor phase deposition (Gibson and Hubbard, 1972).