76235

Feldspathic Granulitic Impactite
26.56g, 5 x 3 x 2 cm

INTRODUCTION

Several fragments, all with the same unique lithology, were chipped from the same clast on Block 1 of the Station 6 Boulder (Fig. 1). They may have broken further in the sample bag. These include samples numbered 76230, 76235, 236, 237, 238, 239, 305, 306, and 307 (Heiken et al., 1973; Phinney, 1981). Most of these fragments have a thin brown patina with many micrometeorite craters. However, 76235 and 76305 lack patina or pitted surfaces.

This light-colored sample of dense, feldspathic, granulitic impactite (Fig. 2) appears to be uniform in texture and homogeneous in composition on a scale of 1 cm. On the moon, Schmitt called the texture "aplitic."

PETROGRAPHY

Sample 76235 is from a large (0.8 m) feldspathic clast in the Station 6 Boulder. All of the pieces have the same texture and lithology. The mineralogical mode of 76235 is 70% plagioclase (An_{94-95}), 20% pigeonite ($W0_4En_{74}Fs_{22}$), and 10% olivine ($F0_{73}$) (Simonds, 1975). The equant feldspar have seriate grain-size distribution ranging from 20 to 600 µm, but, according to Simonds (1975), lack the polygonal texture of a well-annealed rock (Fig. 3). Rounded mafic inclusions up to 30 µm across occur in the larger feldspars. The compositions of minerals are very homogeneous (Fig. 4). Necklaces of inclusions, indicating overgrowth, are missing in this rock. Opaques include minute iron, troilite, and chromite. Ilmenite only occurs as lamellae in chromite.

Warner et al. (1977) describe the texture of 76235 as poikoblastic and suggest that rounded plagioclase regions about 1 mm across are

Figure 1: Surface of Block 1 of the big boulder at Station 6, showing numerous large clasts (see section on boulder, page 5). Sample 76235 and related pieces were chipped from large class in boulder (see Wolfe and others, 1981). AS17-140 21443.

Figure 2: Light-colored, feldspathic, granulitic impactite 76235. Cube is 1 cm. 573-16733.

megacrysts of anorthosite. These regions of apparent anorthosite are the only evidence that the rock may be polymict in origin since the mineral composition has been homogenized (however, see siderophiles below). Warner et al. and others group this rock with feldspathic, granulitic impactites.

WHOLE-ROCK CHEMISTRY

The chemical analysis of 76230 (Table 1) reported by LSPET (1973) and Hubbard et al. (1974) is of the same rock material as 76235 (Fig. 5). Higuchi and Morgan (1975) report a very high meteoritic (5%) component in this clast (Table 2).

RADIOGENIC ISOTOPES

Cadogan and Turner (1976) determined the crystallization age of two samples of the 76235 clast by the ^{39}Ar-^{40}Ar plateau technique (Figs. 6 and 7). This feldspathic clast yielded plateau ages of 3.93 ± 0.06 b.y. and 3.95 ± 0.06 b.y. over 80% of the gas release curve. This is the same age as the breccia matrix surrounding this clast in the boulder.

Rb-Sr isotopic data (Table 3) by Nyquist et al. (1975) show that 76230 (same as 76235) is not equilibrated with the matrix of the Station 6 Boulder (Fig. 8).

COSMOGENIC RADIOISOTOPES AND EXPOSURE AGES

Bogard et al. (1974) (see unpublished data in Phinney, 1981) have determined the noble gas abundances in 76235.

MAGNETIC STUDIES

The magnetization of sample 76307 (same as 76235) has been studied by Gose et al. (1978).

There are only three thin sections of 76235.

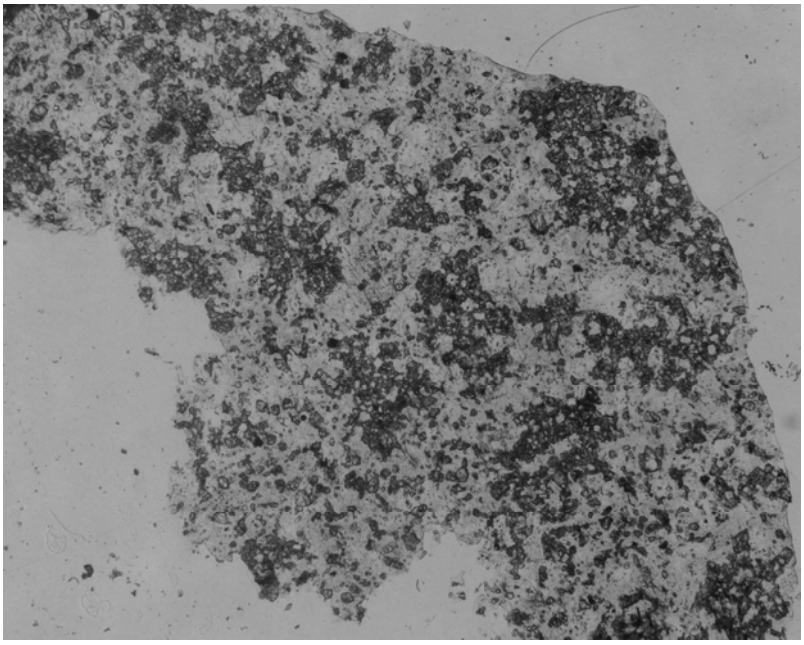

Figure 3: Photomicrograph of thin section 76235, 19. Relict clastic texture has been annealed. Poikilitic pyroxene includes plagioclase and olivine inclusions. Field of view is 4 x 5 mm.

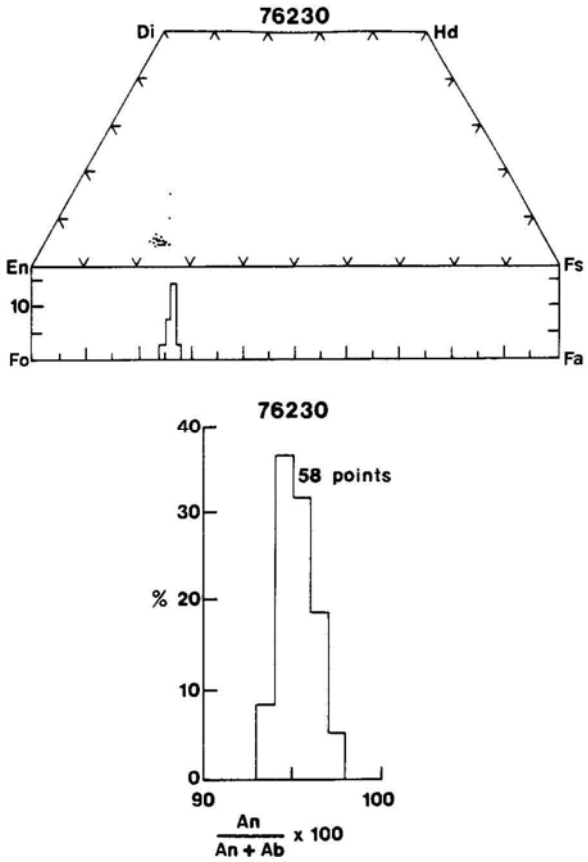

Figure 4: Pyroxene, olivine, and plagioclase composition diagram for 76230, which is a chip of 76235. The minerals are homogeneous in this rock (see Simonds, 1975).

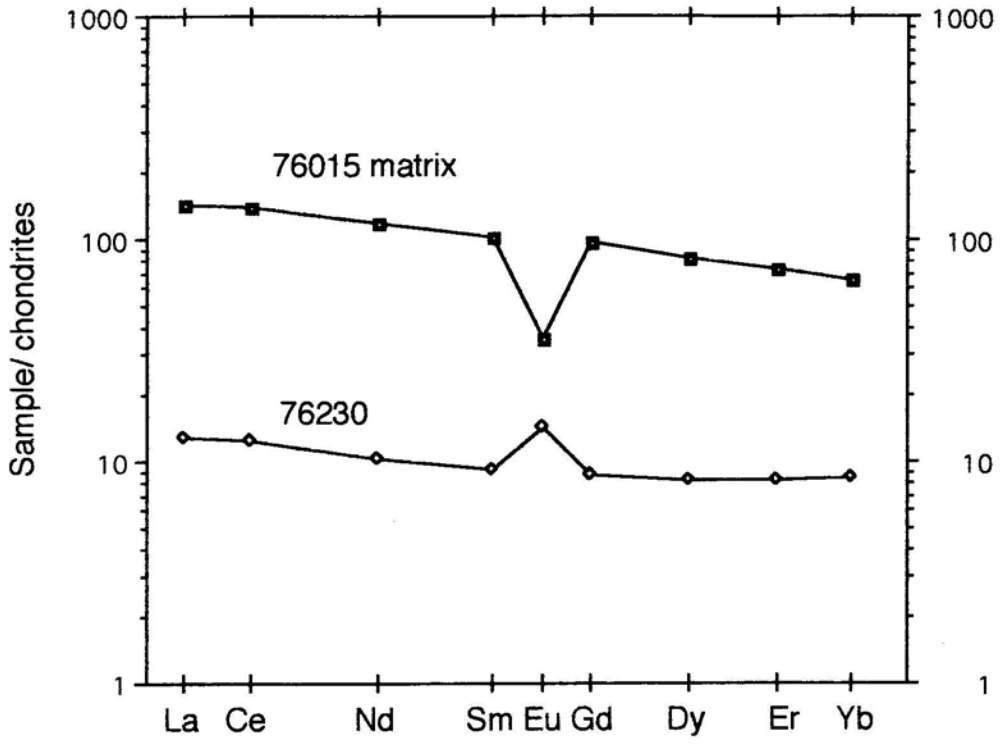

Figure 5: Normalized rare earth element abundances for 76230 (76235) compared to the boulder matrix (76015). Data are from Hubbard et al. (1975).

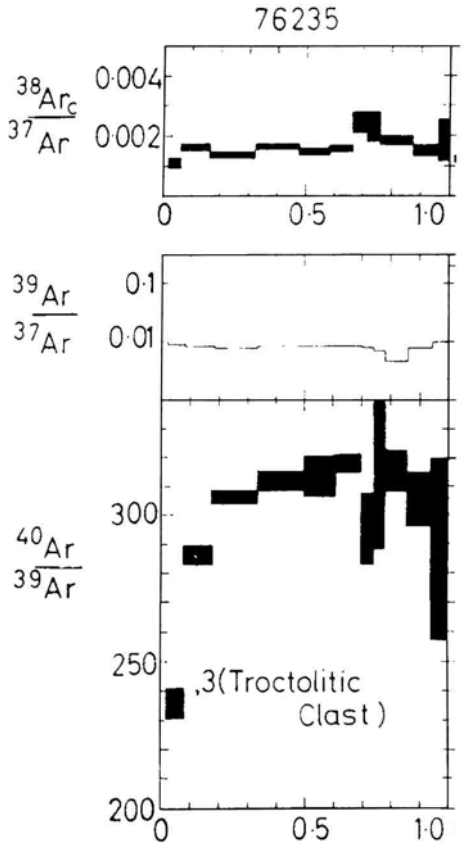

Figure 6: Ar-Ar release diagram for 76235. From Cadogan and Turner (1976).

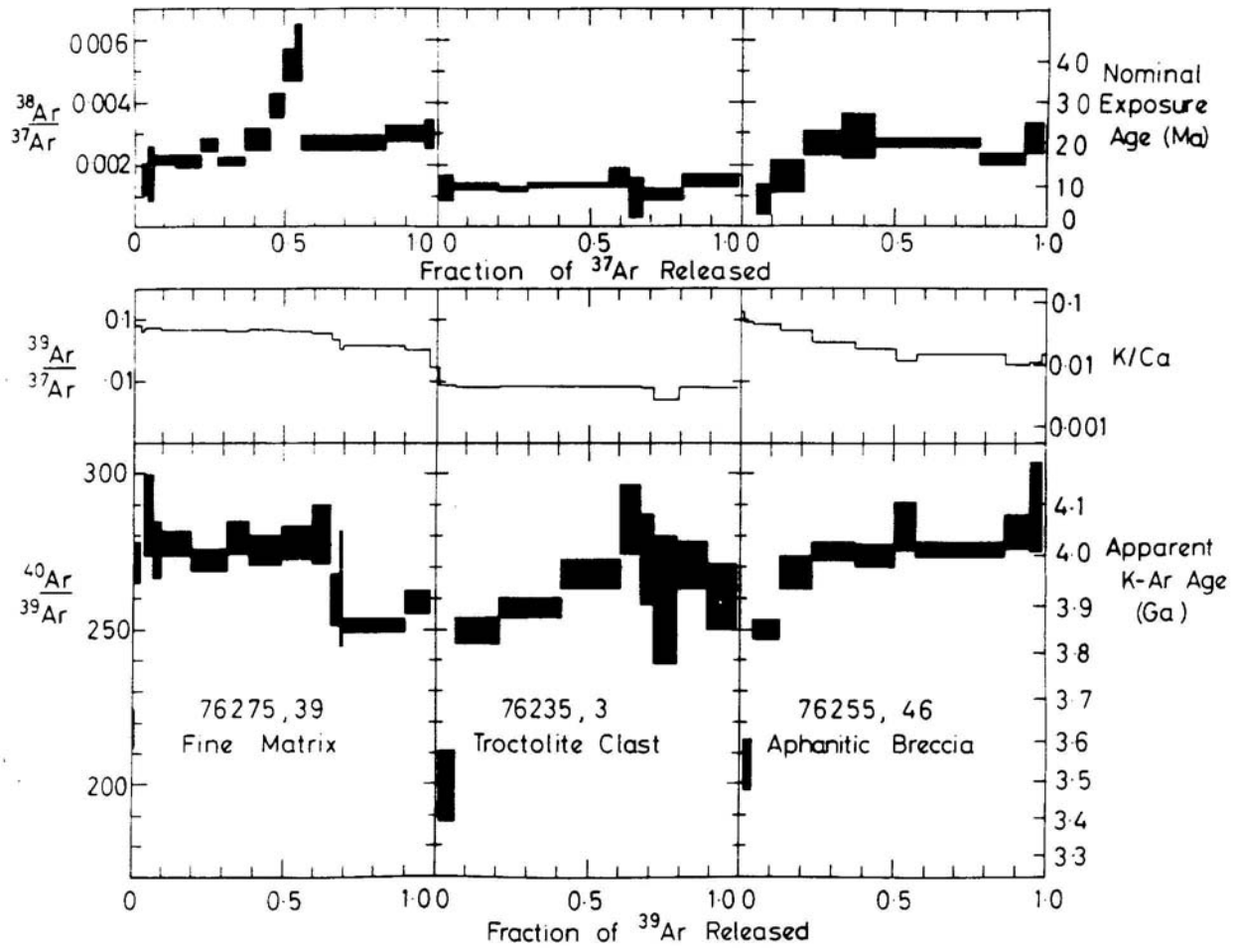

Figure 7: Ar-Ar release diagram for 76235. From Cadogan and Turner (1976).

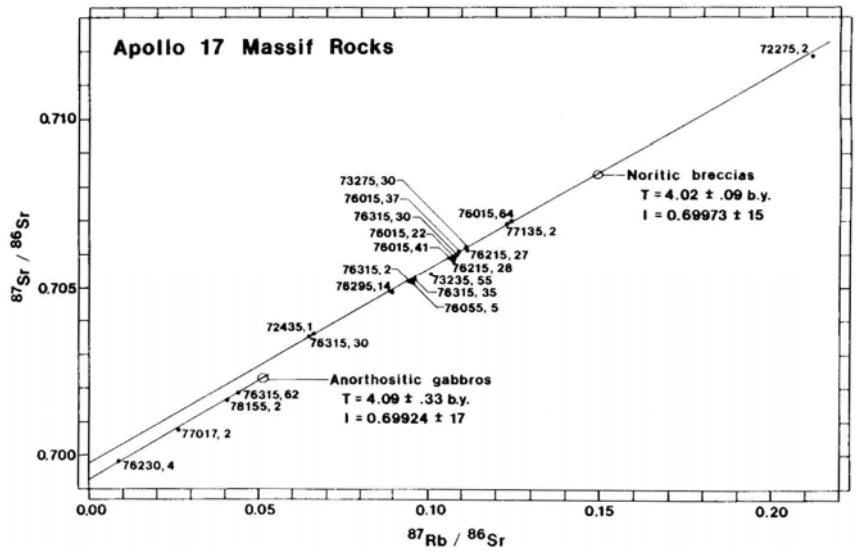

Figure 8: Rb-Sr whole-rock isochrons from Phinney consortium (1981). Clast 76230 is not equilibrated with the matrix of the boulder.

Table 1: Whole-rock chemistry of 76235.
a) LSPET (1973); b) Hubbard et al. (1974); c)Wiesmann and Hubbard (1975)

Split	76230,4 (a, b, c)
Technique	XRF, IDMS
SiO_2 (wt%)	44.52
TiO_2	0.20
Al_2O_3	27.01
Cr_2O_3	0.11
FeO	5.14
MnO	0.06
MgO	7.63
CaO	15.17
Na_2O	0.35
K_2O	0.06
P_2O_5	0.05
S	0.03
Nb (ppm)	3.2
Zr	42
U	0.20
Th	0.72
Sr	146
Rb	0.448
Li	11.0
Ba	50.2
Zn	2
Ni	166
La	3.04
Ce	7.54
Nd	4.64
Sm	1.34
Eu	0.805
Gd	1.70
Dy	2.02
Er	1.31
Yb	1.37
Lu	0.202
Ge (ppb)	
Ir	
Au	

Table 2: Trace element data for 76235. Concentrations in ppb.
From Higuchi and Morgan (1975).

	Sample 76235,9 clast		Sample 76235,9 clast
Ir	22.5	Ag	0.66
Os		Br	9.6
Re	1.69	In	
Au	6.66	Bi	0.15
Pd		Zn (ppm)	1.2
Ni (ppm)	379	Cd	0.63
Sb	1.47	Tl	0.097
Ge	328	Rb (ppm)	0.448
Se	38	Cs	29.5
Te	2.6	U	190

Table 3: Rb-Sr composition of 76230.
(same as 76235)
Data from Nyquist et al. (1974).

Sample	76230,4
wt (mg)	78.1
Rb (ppm)	0.448
Sr (ppm)	145.9
$^{87}Rb/^{86}Sr$	0.0089 ± 2
$^{87}Sr/^{86}Sr$	0.69982 ± 7
T_B	5.60 ± 0.65
T_L	6.12 ± 0.66

B = Model age assuming I = 0.69910 (BABI + JSC bias)
L = Model age assuming I = 0.69903
(Apollo 16 anorthosites for T = 4.6 b.y.)