71135

High-Ti Mare Basalt
36.85 g, 6 x 4.5 x 1.5 cm

INTRODUCTION

71135 (Fig. 1) was described as a intergranular, gray, homogeneous basalt (Apollo 17 Lunar Sample Information Catalog, 1973). This basalt contains many zap pits on T (few with glass linings), with 1% vesicles (2mm) and 5-10% vugs (up to 5mm). Some vugs are connected by vesicles and these vesicles contain glass linings. Vugs contain mainly plagioclase with rare ilmenite plates and needles. A few plagioclase crystals in some vugs are columnar with stubby-ends. This basalt has an angular shape and was collected from Station 1 A.

PETROGRAPHY AND MINERAL CHEMISTRY

71135 was described petrographically by Brown et al. (1975ab) as a Type 1B Apollo 17 basalt, containing 24.8% opaques, 20.0% plagioclase, 49.7% pyroxene, 1.2% silica, 4.3% mesostasis, and trace olivine. Brown et al. (1975ab) described both the petrography and mineral chemistry of 71135 within the general confines of their petrographic classification, and as such, 71135 was not specifically mentioned. However, during the preparation of this catalog, we examined thin sections 71135,17 and,25. This basalt is medium-grained (0.8-1.3mm), containing pyroxene and plagioclase intergrown into "bowtie" structures. Massive pink pyroxene (up to 0.8mm) is present, probably due to olivine resorption, especially as some of these pyroxene masses contain olivine cores. Occasionally, chromite inclusions (< 0.01 mm) are present in the olivine. Ilmenite laths (up to 0.8mm) are present with "sawtooth"

Figure 1: Hand specimen photograph of 71135,0. Cubic scale = 1 cm^3.

margins. Interstitial SiO_2 (~0.15mm) is conspicuous, and this, along with native Fe and troilite, form interstitial phases

Roedder and Weiblen (1977), Weiblen and Roedder (1976), and Weiblen (1977) studied the melt inclusions in the various mineral phases of 71135. These authors concluded that the liquid line of descent of this basalt was complicated by late-stage silicate-liquid immiscibility of the residual melt. These authors also noted the presence of anomalous "low-K" melt inclusions in ilmenite.

WHOLE-ROCK CHEMISTRY

The whole-rock major and trace element chemistry of 71135 (Table 1) was reported by Rhodes et al. (1976 - majors) and Shih et al. (1975 - traces). Rhodes et al. (1976) classified 71135 as a Type B Apollo 17 high-Ti basalt; 71135 is further classified as an Apollo 17 Bl basalt using the criteria of Neal et al. (1990). 71135 contains 10.74 wt% TiO_2 with a MG# of 41.2. The REE profile (Fig. 2) is LREE-depleted, but with an overall convex-upward appearance. A negative Eu anomaly is present ([Eu/Eu*]N = 0.50). Gibson et al. (1976a,b) reported sulfur abundances for 71135 (Table 1). The sulfur abundance was determined as 1925 ± 20 ug S/g.

ISOTOPES

Nyquist et al. (1975) determined the whole-rock Rb/Sr and $^{87}Sr/^{86}Sr$ ratios for 71135 (Table 2). These authors noted that the extreme requirements on analytical precision prevented any definitive conclusions being made on the Sr isotope evolution of this sample. No Sm-Nd or U/Th-Pb work has been undertaken on 71135. All other isotope work carried out on this sample has been concerned with the cosmogenic radionuclide abundances (Eldridge et al., 1974ab; O'Kelley et al.,1974ab; Yokoyama et al., 1974 - Table 3) and exposure ages (Arvidson et al., 1976; Niemeyer,1977ab). Arvidson et al. (1976).reported that 71135 possessed an exposure age of 102 Ma and Niemeyer (1977) reported an exposure age ranging from 58-167 Ma, depending upon the method used.

EXPERIMENTAL

Usselman et al. (1975) reported cooling rates and experimentally produced textures for Apollo 17 high-Ti mare basalts. Using these experimental studies, a cooling rate of 2-5°C/hr was deduced for 71135.

PROCESSING

71135,0 has been entirely subdivided, with the largest samples remaining being 71135,2 (13.12g) and 71135,15 (16.938): 71135,5 was irradiated for INAA. Six thin sections have been cut from 71135, these being ,17 and ,25-,29.

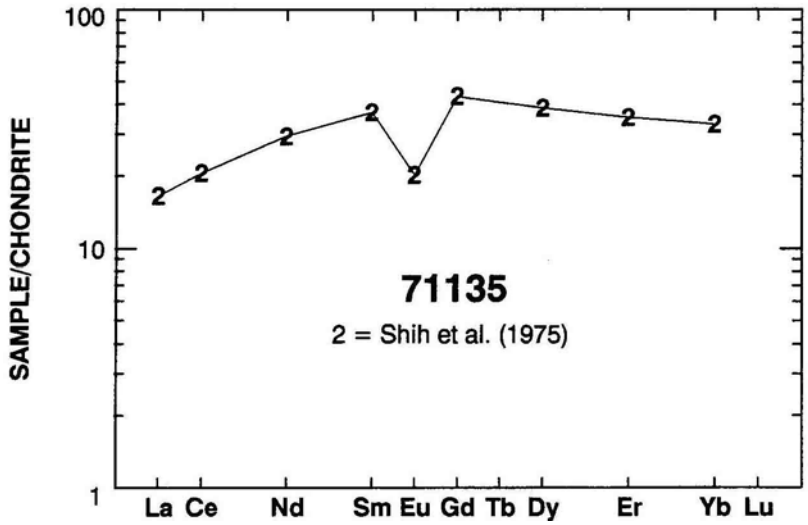

Figure 2: Chondrite-normalized rare-earth element profile of 71135. Data from Shih et al. (1975).

Table 1: Whole-rock chemistry of 71135.

	Sample 71135,5 Reference 1 Method X	Sample 71135,5 Reference 2 Method N,I		Sample 71135,5 Reference 1 Method X	Sample 71135,5 Reference 2 Method N,I
SiO_2 (wt %)	39.71		Cu		
TiO_2	10.74		Ni		
Al_2O_3	10.10		Co		17.5
Cr_2O_3	0.31		V		
FeO	18.57		Sc		82.1
MnO	0.28		La		5.43
MgO	7.31		Ce		17.8
CaO	11.62		Nd		18.6
Na_2O	0.38		Sm		7.55
K_2O	0.05	0.031	Eu		1.56
P_2O_5	0.06		Gd		12.0
S	0.11		Tb		
K (ppm)			Dy		13.3
Nb			Er		7.95
Zr		185	Yb		7.28
Hf			Lu		
Ta			Ga		
U		0.109	F		
Th			Cl		
W			C		
Y			N		
Sr		143	H		
Rb		0.354	He		
Li		8.8	Ge (ppb)		
Ba		61.4	Ir		
Cs			Au		
Be			Ru		
Zn			Os		
Pb					

Analysis by: X = XFR; I = Isotope dilution; N = INAA.

References: 1 = Rhodes et al. (1976); 2 = Shih et al. (1975).

Table 2: Rb-Sr isotope date from 71135.
Data from Nyquist et al. (1975).

	Sample 71135,5
wt (mg)	50
Rb (ppm)	0.354
Sr (ppm)	143
$^{87}Rb/^{86}Sr$	0.0072 ± 3
$^{87}Sr/^{86}Sr^{b}$	0.69953 ± 5
T_B	4.2 ± 0.6
T_L	4.8 ± 0.6

B = Model age assuming I = 0.69910 (BABI + JSC bias); C = Model age assuming I = 0.69903 (Apollo 16 anorthosites at 4.6 Ga).

Table 3: Concentrations of Primordial Radioelements (Eldridge et al., 1974) and Cosmogenic Radionuclides (O'Kelley et al., 1974) in 71135.
Cosmogenic Radionuclide Decay corrected to 2300 GMT, Dec. 14, 1972.

	Sample 71135,5
K (ppm)	350 ± 40
Th (ppm)	0.60 ± 0.05
U (ppm)	0.14 ± 0.03
Th/U	4.3
K/U	2214
^{26}Al (dpm/Kg)	80 ± 6
^{22}Na	95 ± 7
^{54}Mn	140 ± 15
^{56}Co	290 ± 50
^{46}Sc	70 ± 30