71069

High-Ti Mare Basalt
4.058 g, 2 x 1.7 x 1 cm

INTRODUCTION

71069 was described as a fine-grained equigranular, medium dark gray, homogeneous basalt (Apollo 17 Lunar Sample Information Catalog, 1973 and Fig. 1), containing no fresh zap pits. Three small vugs (<0.15mm) are present, inside of which are minute euhedral ilmenite crystals. Dust adheres to most surfaces and ~1% olivine is present. Rock resembles 71065 and 71066. This sample was collected from Station 1A.

PETROGRAPHY AND MINERAL CHEMISTRY

71069 was described by Warner et al. (1979), but only within the general confines of their Type B Apollo 17 high-Ti basalts. As such, 71069 was not specifically mentioned, although it contains microphenocrysts of olivine and ilmenite. During the preparation of this catalog, we examined thin section 71069,5. It is a fine-grained (average grain size - 0.3mm), containing large (~0.7mm) olivine and ilmenite phenocrysts. Some olivines contain a small rind of pyroxene, whereas others have been reduced to forming cores of pyroxene. Rutile and chromite exsolution lamellae (<0.005mm) are abundant in the ilmenite. Larger ilmenites

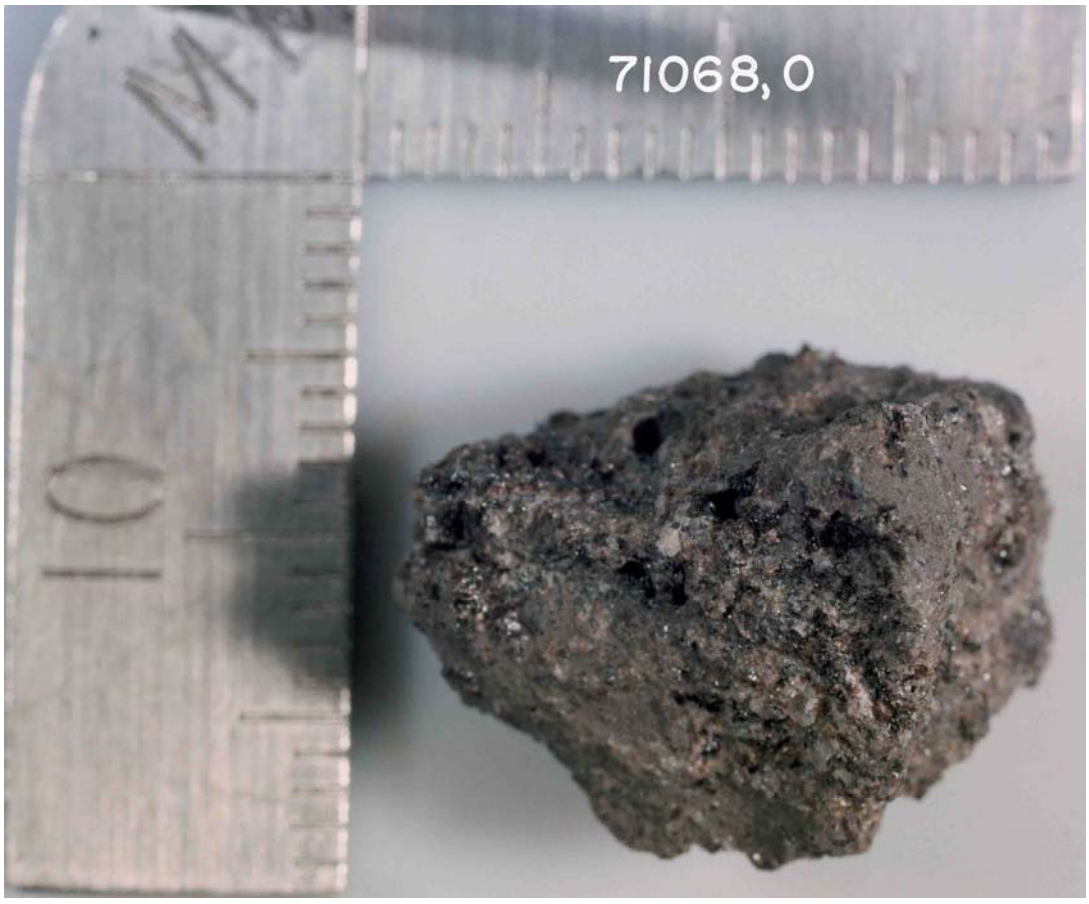

Figure 1: Hand specimen photograph of 71069,0.

Contain armalcolite cores. Plagioclase, pyroxene, and ilmenite form the main groundmass phases, with pyroxene and plagioclase occasionally forming "bow-tie" structures. Native Fe and troilite form interstitial phases.

WHOLE-ROCK CHEMISTRY

Ma et al. (1979) and Warner et al. (1979; both report the analysis of 71069,2 (Table 1). Warner et al. (1979) described this basalt as a Type B Apollo 17 high-Ti basalt. This sample is further classified as a Type B1 basalt using the criteria of Neal et al. (1990). 71069 contains 12.2 wt% TiO_2 with a MG# of 483. The REE profile (Fig. 2) is LREE-depleted with approximately constant middle and heavy REE abundances (30-35 times chondritic values). A negative Eu anomaly is present ($[Eu/Eu^*]_N = 0.59$).

ISOTOPES

Paces et al. (1991) reported Rb-Sr (Table 2) and Sm-Nd (Table 3) data for 71069,10. These analyses were part o£a larger study characterizing the basalts at the Apollo 17 site.

PROCESSING

Of the original 4.058g of 71069,0; a total of 3.768 remains. 71069,2 was irradiated for INAA, and thin section 71069,5 was taken from this irradiated sample.

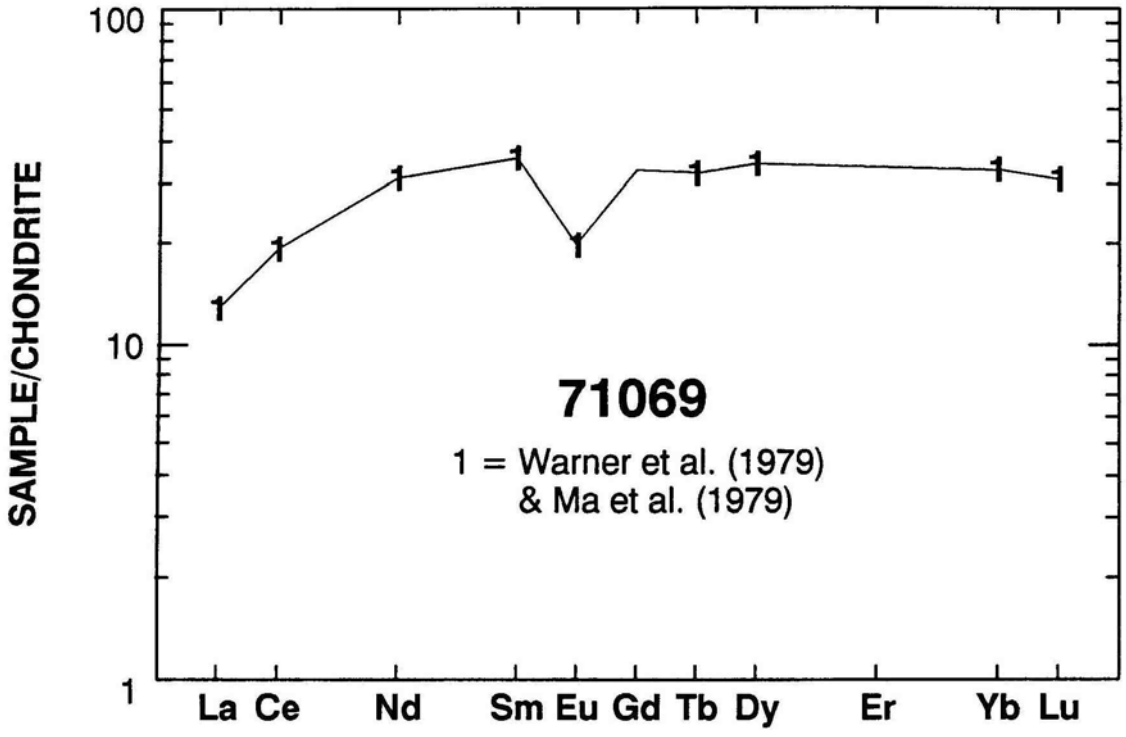

Figure 2: Chondrite -normalized rare-earth element profile of 71069.

Table 1: Whole-rock chemistry of 71069.
Data from Ma et al. (1979) and Warner et al. (1979) (same analysis).

	71069,2 I		71069,2 I
SiO_2 (wt %)		Cu	
TiO_2	12.2	Ni	
Al_2O_3	8.6	Co	21
Cr_2O_3	0.474	V	140
FeO	19.1	Sc	85
MnO	0.246	La	4.3
MgO	10	Ce	17
CaO	9.8	Nd	20
Na_2O	0.312	Sm	7.4
K_2O	0.032	Eu	1.55
P_2O_5		Gd	
S		Tb	1.9
Nb (ppm)		Dy	12
Zr		Er	
Hf	6.6	Yb	7.4
Ta	1.5	Lu	1.07
U		Ga	
Th		F	
W		Cl	
Y		C	
Sr		N	
Rb		H	
Li		He	
Ba		Ge (ppb)	
Cs		Ir	
Be		Au	
Zn		Ru	
Pb		Os	

I = analysis by INAA.

Table 2: Rb-Sr isotopic data for 71069,10.
Data from Paces et al. (1991).

Rb (ppm)	0.315
Sr (ppm)	146
$^{87}Rb/^{86}Sr$	0.006216 ± 62
$^{87}Sr/^{86}Sr$	0.699529 ± 12
I(Sr)[a]	0.699195 ± 15
T_{LUNI}[b] (Ga)	5.5

[a]Initial Sr isotopic ratios calculated at 3.69 Ga using ^{87}Rb decay constant = 1.42×10^{-11} yr^{-1}.

[b]Model age relative to I(Sr) = LUNI = 0.69903 (Nyquist et al., 1974; Shih et al., 1986).

$T_{LUNI} = 1/\lambda * \ln[((^{87}Sr/^{86}Sr - 0.69903)/^{87}Rb/^{86}Sr) + 1]$.

Table 3: Sm-Nd isotopic data for 71069,10.
Data from Paces et al. (1991).

Sm (ppm)	7.35
Nd (ppm)	17.3
$^{147}Sm/^{144}Nd$	0.25663 ± 51
$^{143}Nd/^{144}Nd$	0.514406 ± 13
I(Nd)[a]	0.508138 ± 26
$\varepsilon_{Nd}(t)$[b]	6.0 ± 0.5
T_{CHUR}[c] (Ga)	4.4

[a]Initial Nd isotopic ratios calculated at 3.69 Ga using ^{147}Sm decay constant = $6.54 \times 10^{-12} yr^{-1}$.

[b]Initial ε_{Nd} calculated at 3.69 Ga using present-day chondritic values of $^{143}Nd/^{144}Nd = 0.512638$ and $^{147}Sm/^{144}Nd = 0.1967$.

[c]Model age relative to CHUR reservoir using present-day chondritic values listed above.

$T_{CHUR} = 1/\lambda * \ln[((^{143}Nd/^{144}Nd - 0.512638)/(^{147}Sm/^{144}Nd - 0.1967) + 1]$.