71089

High-Ti Mare Basalt
1.733 g, 1 x 1 x 0.5 cm

INTRODUCTION

71089 (Fig. 1) was described as a brownish-gray, medium- to coarse-grained, homogeneous basalt (Apollo 17 Lunar Sample Information Catalog, 1973). This basalt contains one vug-riddled surface. Dust adheres to one surface. This sample was collected from Station 1A.

PETROGRAPHY AND MINERAL CHEMISTRY

Neal et al. (1989) described 71089 as a plagioclase poikilitic basalt, with plagioclase up to 2mm. Pyroxene (up to 1.1mm) and blocky ilmenite (up to 1.4mm) are also dominant. Chromite and rutile exsolution lamellae (< 0.005mm) are abundant in the ilmenite. Occasional pyroxenes contain small (~0.06mm) olivine cores. Relatively large (up to 0.4mm) areas of silica are conspicuous. No armalcolite or discrete Cr-ulvospinel is present. Native Fe, troilite, and silica form interstitial phases. Point counting reveals that this specimen is comprised of. 45.1% pyroxene; 24.9% ilmenite; 23.3% plagioclase; 3.9% native Fe and troilite; 2.5% silica; and 0.31% olivine.

Olivine exhibits little core-torim variation, the range in composition being between grains (Fo_{55-67}) Plagioclase exhibits moderate variation, both between and within grains (An_{49-91}). Two distinct pyroxene compositions are identified in Figure 2: pigeonite and titanaugite. Both of these zone towards more Fe-rich compositions. Al/Ti ratios are constant at ~2 and Cr_2O_3 decreases with decreasing pyroxene MG#. Ilmenite exhibits moderate compositional variation (MG# = 9-21), primarily between grains.

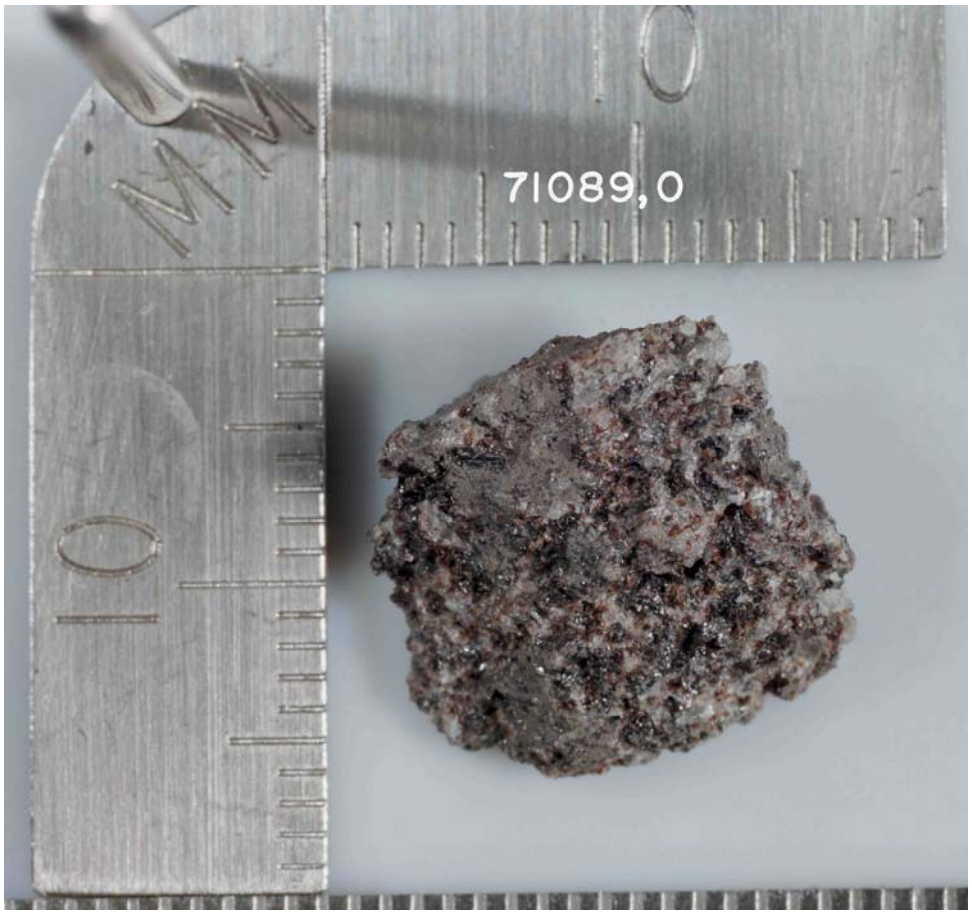

Figure 1: Hand specimen photograph of 71089,0.

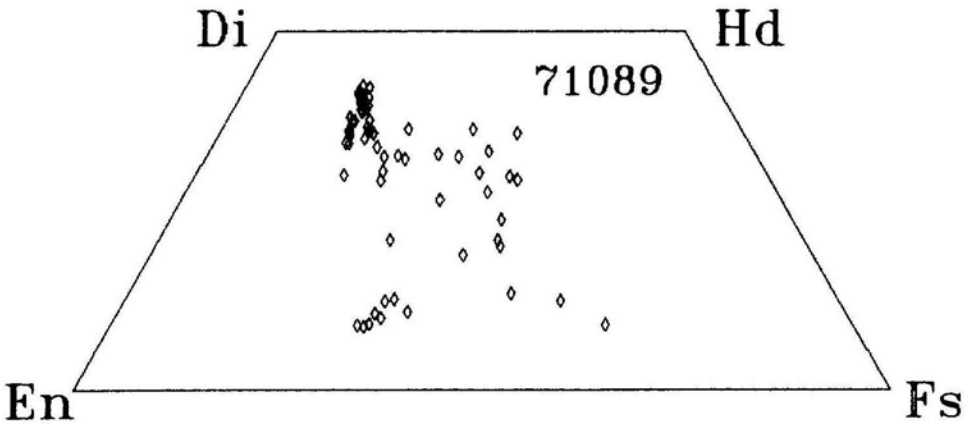

Figure 2: Pyroxene compositions of 71089 represented on a pyroxene quadrilateral.

WHOLE-ROCK CHEMISTRY

Neal et al. (1990) described 71089 as a Type B1 Apollo 17 high-Ti basalt (using the classification of Rhodes et al., 1976 and Warner et al., 1979)

71089 contains 11.3 wt% TiO_2 with a MG# of 39.4 (Table 1). The REE profile (Fig. 3) is LREE-depleted, but with an overall convex-upward appearance. A negative Eu anomaly is present ($[Eu/Eu^*]_N = 0.62$).

PROCESSING

Of the original 1.733g of 71089,0, approximately 0.8g remains. The remainder was irradiated for INAA and then used for thin section 71089,4.

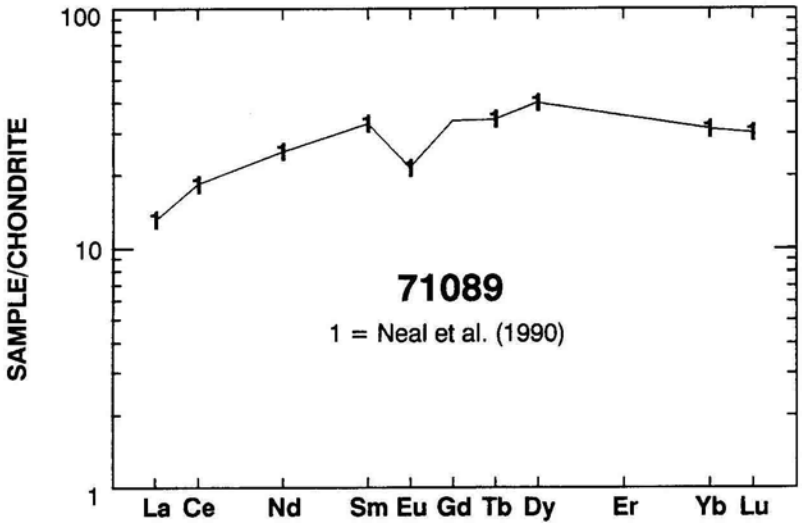

Figure 3: Chondrite -normalized rare-earth element profile of 71089.

Table 1: Whole-rock chemistry of 71089.
Data from Neal et al. (1990).

	71089,0 I		71089,0 I
SiO_2 (wt %)		Cu	
TiO_2	11.3	Ni	32
Al_2O_3	9.18	Co	18
Cr_2O_3	0.163	V	65
FeO	17.6	Sc	76
MnO	0.245	La	4.34
MgO	6.5	Ce	16
CaO	10.7	Nd	16
Na_2O	0.43	Sm	6.74
K_2O	0.06	Eu	1.67
P_2O_5		Gd	
S		Tb	2.01
Nb (ppm)		Dy	13.9
Zr	74	Er	
Hf	6.43	Yb	6.93
Ta	1.41	Lu	1.03
U	0.24	Ga	
Th	0.21	F	
W		Cl	
Y		C	
Sr	210	N	
Rb		H	
Li		He	
Ba	76	Ge (ppb)	
Cs	0.19	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

I = analysis by INAA.