70156

High-Ti Mare Basalt
0.63 g, 1 x 0.7 x 0.5 cm

INTRODUCTION

70156 was described as a medium gray, subangular, and homogeneous basalt (Fig. 1), containing no zap pits or cavities (Apollo 17 Lunar Sample Information Catalog, 1973). The S surface was exposed and all other surfaces are fresh. This basalt was collected at the "Geophone Rock", 50 m south of the ALSEP central station.

PETROGRAPHY AND MINERAL CHEMISTRY

70156 was described as a poikilitic high-Ti mare basalt (Neal et al., 1989), containing interstitial, anhedral ilmenite (0.1-1.1 mm) set in pyroxene (0.4-2.7 mm) plagioclase (0.3-1 mm). Ilmenite contains both rutile and spinel exsolution lamellae (<0.005 mm). Ilmenite-free armalcolite inclusions (~ 0.1 mm) are found in pyroxene. Olivine is found only as ~0.15 mm cores to pyroxene grains. Native Fe and troilite form interstitial phases. Point counting reveals that 70156 is comprised of. 65.2% pyroxene; 19.7% ilmenite; 7.7% plagioclase; 2.9% armalcolite; 2.3% olivine; and 2.2% native Fe.

Olivine exhibits little compositional variation either within or between grains (Fo_{68-70}). Likewise, plagioclase exhibits little compositional variability (An_{44-81}). Unlike other Apollo 17 high-Ti basalts, 70156 does not contain an Mg-pigeonite (Fig. 2). Titan-augite predominates, zoning towards -ferrosilite and Fe pigeonite. Al/Ti ratios are constant at ~ 2, and Cr_2O_3 decreases with decreasing pyroxene MG#. Armalcolite exhibits greater compositional variability than ilmenite (MG# = 27-46 and 5-14, resp.).

WHOLE-ROCK CHEMISTRY

The whole-rock chemistry of 70156 has been reported in Neal et al. (1990) (Table 1). This basalt is a Type B Apollo 17 high-Ti basalt, using the classification of Rhodes et al_ (1976) and Warner et al. (1979). 70156 is a LREE-depleted

Figure 1: Hand specimen photograph of 70156.

Table 1: Whole-rock composition of 70156,0.
Data from Neal et al. (1990).

	70156,0		70156,0
SiO_2 (wt%)	---	Cu	
TiO_2	13.4	Ni	--
Al_2O_3	9.50	Co	21.6
Cr_2O_3	0.571	V	149
FeO	18.0	Sc	82
MnO	0.239	La	3.13
MgO	9.8	Ce	14
CaO	10.5	Nd	14
Na_2O	0.39	Sm	5.23
K_2O	0.05	Eu	1.52
P_2O_5		Gd	
S		Tb	1.55
Nb (ppm)		Dy	11.3
Zr	60	Er	
Hf	5.60	Yb	5.63
Ta	1.23	Lu	0.85
U	0.08	Ga	
Th	0.13	F	
W		Cl	
Y		C	
Sr	170	N	
Rb	--	H	
Li		He	
Ba	65	Ge (ppb)	
Cs	0.16	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

Analysis by INAA.

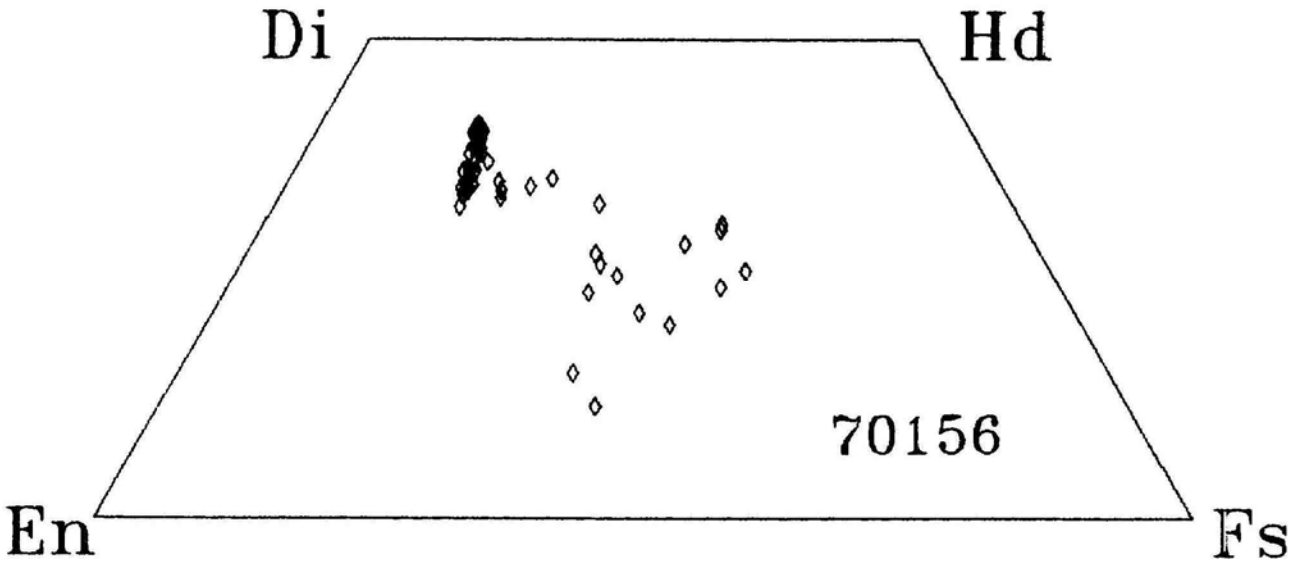

Figure 2: Pyroxene compositions of 70156 represented on a pyroxene quadrilateral.

basalt, with a convex-upward profile (Fig. 3). The MREE reach ~30 times chondritic values (Fig, 3) and a small, negative Eu anomaly is present ($[Eu/Eu^*]_N$ = 0.72). Neal et al. (1990) used the whole-rock composition of 70156,0 in a comprehensive study of Apollo 17 high-Ti basalt petrogenesis. These authors defined two groups of Type B basalts -B1 and B2, on the basis of whole-rock chemistry. Each group is generated by fractional crystallization of observed phenocryst phases. 70156,0 is a Type B1 Apollo 17 high-Ti basalt.

PROCESSING

Approximately 0.39g of 70156,0 remains of the original 0.638. 0.238 was irradiated for INAA, and 0.01g was used for thin section 70156

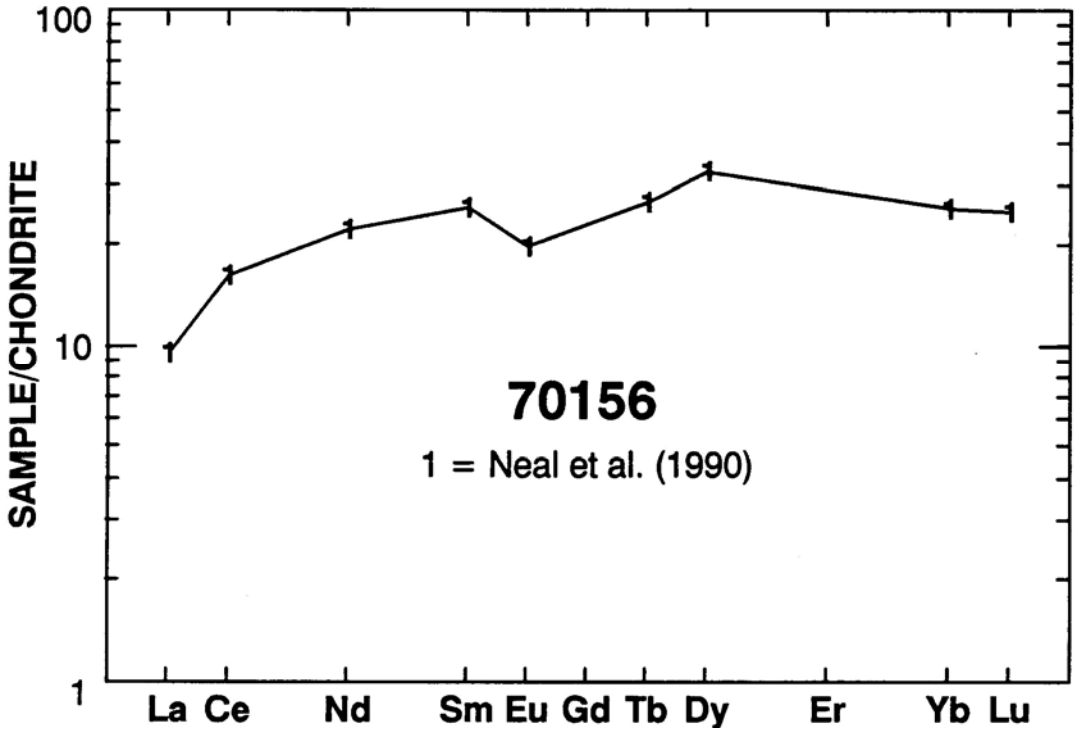

Figure 3: Chondrite -normalized rare-earth element prone of 70156.