70155

High-Ti Mare Basalt
0.77g, 1 x 0.8 x 0.8 cm

INTRODUCTION

70155 was described as a medium gray, subangular basalt, containing no zap pits and 1% miarolitic (0.5 mm dia.) cavities (Fig. 1) with pyroxene, plagioclase, and ilmenite infillings (Apollo 17 Lunar Sample Information Catalog, 1973). This basalt was collected from the "Geophone Rock", 50 m south of the ALSEP central station.

PETROGRAPHY AND MINERAL CHEMISTRY

70155 was described as a plagioclase-poikilitic basalt, with interstitial, blocky, and anhedral ilmenites (0.1-0.8 mm) set in pyroxene (0.2-1 mm) and plagioclase (0.3-4.2 mm) (Neal et al., 1989). Plagioclase also contains pyroxene, olivine {~ 0.1 mm), and armalcolite (~ 0.1 mm) inclusions. Ilmenite exhibits both rutile and spinel exsolution lamellae (<0.05 mm) and rare, discrete spinels (~ 0.1 mm) occur, usually in pyroxene. Interstitial phases present are silica, native Fe, and troilite. Point counting reveals that this sample is composed of: 47% pyroxene; 29.6% plagioclase; 16.3% ilmenite; 2.8% native Fe and troilite; 1.9% olivine; 1.5% armalcolite; 0.6% spinel; and 0.3% silica.

70155 contains olivines which are usually unzoned, but exhibit moderate inter-grain variations (Fo_{58-67}). Plagioclases are moderately zoned, and also exhibit inter-grain variations (An_{72-90}). Pyroxene compositions range from titanaugite to pigeonite (Fig. 2), with pigeonite crystallizing only after significant olivine resorption. Both types of pyroxene exhibit Fe enrichment, although there are no compositional intermediates between the two (Fig. 2). Al/Ti ratios are constant at ~2, and Cr_2O_3 decreases with decreasing MG#. The spinel minerals are essentially unzoned (Cr/ (Cr+Al) = 77-78;

Figure 1: Hand specimen photograph of 70155.

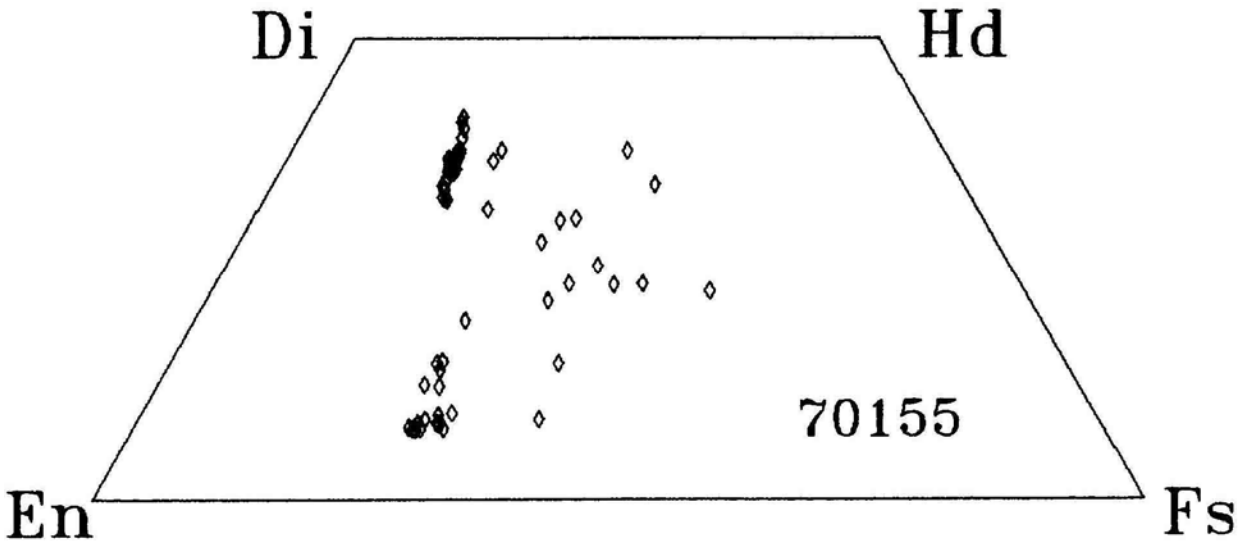

Figure 2: pyroxene compositions of 70155 represented on a pyroxene quadrilateral

MG# = 11-12). Armalcolite exhibits slight core-to-rim and inter-grain variations (MG# = 43-46), whereas ilmenite grains are essentially homogeneous, but inter-grain variations occur (MG# = 7-14)

WHOLE-ROCK CHEMISTRY

The whole-rock chemistry of 70155,0 was determined by Neal et al. (1990) (Table 1). 70155,0 falls into the Type B of Rhodes et al. (1976) and Warner et al. (1979). This basalt is LREE-depleted, with a steady decrease in chondrite-normalized values from the HREE (Fig. 3). The HREE reach 25 times chondritic values. A small negative Eu anomaly is present ($[Eu/Eu^*]_N = 0.92$). Neal et al. (1990) used the whole-rock composition of 70155,0 in a comprehensive study of Apollo 17 high-Ti basalt petrogenesis. These authors defined two groups of Type B basalts - Bl and B2, on the basis of whole-rock chemistry. Each group is generated by fractional crystallization of observed phenocryst phases. 70155,0 is a Type 131 Apollo 17 high-Ti basalt.

PROCESSING

Approximately 0.34g of 70155,0 remains out of the original 0.77g. 0.42g was irradiated for INAA, and 0.01g was used for thin section 70155,3

Table 1: Whole-rock compostition of 70155,0.
Data from Neal et al. (1990).

	70155,0		70155,0
SiO_2 (wt %)	---	Cu	
TiO_2	12.4	Ni	--
Al_2O_3	10.16	Co	21.3
Cr_2O_3	0.494	V	130
FeO	17.2	Sc	72
MnO	0.232	La	2.95
MgO	8.7	Ce	12
CaO	9.6	Nd	13
Na_2O	0.44	Sm	4.76
K_2O	0.03	Eu	1.67
P_2O_5		Gd	
S		Tb	1.66
Nb (ppm)		Dy	10.5
Zr	130	Er	
Hf	5.44	Yb	5.27
Ta	1.23	Lu	0.78
U	0.20	Ga	
Th	0.12	F	
W		Cl	
Y		C	
Sr	210	N	
Rb	--	H	
Li		He	
Ba	35	Ge (ppb)	
Cs	0.11	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

Analysis by INAA.