70148

High-Ti Mare Basalt
0.92 g, 1 x 1 x 0.7 cm

INTRODUCTION

70148 (see Fig. 1 of 70146) is a medium gray, subangular, high-Ti mare basalt with no cavities or zap pits (Apollo 17 Lunar Sample Information Catalog, 1973). This sample was collected from the "Geophone Rock", 50 m south of the ALSEP central station.

PETROGRAPHY AND MINERAL CHEMISTRY

70148 was described as a plagioclase-poikilitic basalt by Neal et al. (1989). This basalt contains interstitial, anhedral, and blocky ilmenite (0.1- 1.4 mm) set in plagioclase (0.5-2.4 mm) and pyroxene (0.1-1.8 mm). Rutile and chromite exsolution lamellae (< 0.005 mm) are present in ilmenite. Olivine is found as inclusions in plagioclase: Rare, discrete chromite-ulv6spinel grains (~0.1 mm) are present in pyroxene and ilmenite-free armalcolite (~0.1 mm) within plagioclase or pyroxene. Anhedral troilite, native Fe, and silica are interstitial phases. Point counting indicated 70148 is comprised of. 40.9% pyroxene; 30.5% plagioclase; 17.9% ilmenite; 4.3% silica; 4% native Fe and troilite; 1% olivine; 1% armalcolite; and 0.5% chromite-ulvospinel.

Olivine exhibits little chemical variation either within or between grains ($Fo_{63.66}$). Plagioclase exhibits moderate core-to-rim variation for Apollo 17 high-Ti basalts (An_{76-89}). Pyroxene compositions range from pigeonite to titan-augite, although there are no intermediate compositions between these "end members" (Fig. 1). Both compositions trend towards extreme Fe enrichment, exhibiting a decrease in both Mg and Ca (Fig. 1). Al/Ti ratios are constant at ~2, and Cr_2O_3 decreases with decreasing MG#. The spinel minerals exhibit little core-to-rim or inter-grain variations (Cr/(Cr+Al) = 69-70; MG# = 24-25). Armalcolite is essentially unzoned (MG# = 44-46), and ilmenite exhibits moderate inter-grain variation (MG# = 4-11).

WHOLE-ROCK CHEMISTRY

The whole rock chemistry of 70148,0 was defined by Neal et al. (1990) (Table 1) and was described as a Type B (classification of Rhodes et al., 1976; Warner et al., 1979) high-Ti Apollo 17 basalt. The REE pattern (Fig. 2) is slightly convex-upward and displaying the characteristic LREE depletion of Apollo 17 high-Ti basalts. The MREE contents attain ~30 times chondritic levels, and a negative Eu anomaly is present ($(Eu/Eu^*)_N$ = 0.70). Neal et al. (1990) used the whole-rock composition of 70148,0 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. 70148,0 is a Type B 1 Apollo 17 high-Ti basalt.

PROCESSING

Approximately 0.35 g of 70148,0 remains; 0.56 g was irradiated for INAA, and 0.01 g was used for thin section 70148,3.

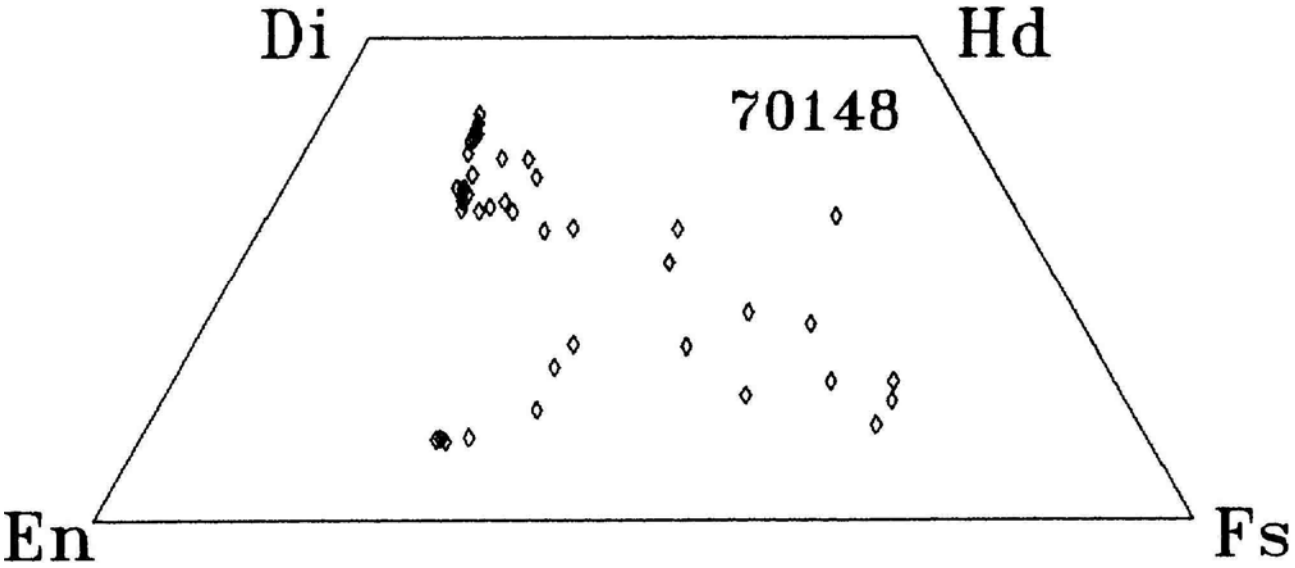

Figure 1: Pyroxene compositions of 70148 represented on a pyroxene quadrilateral.

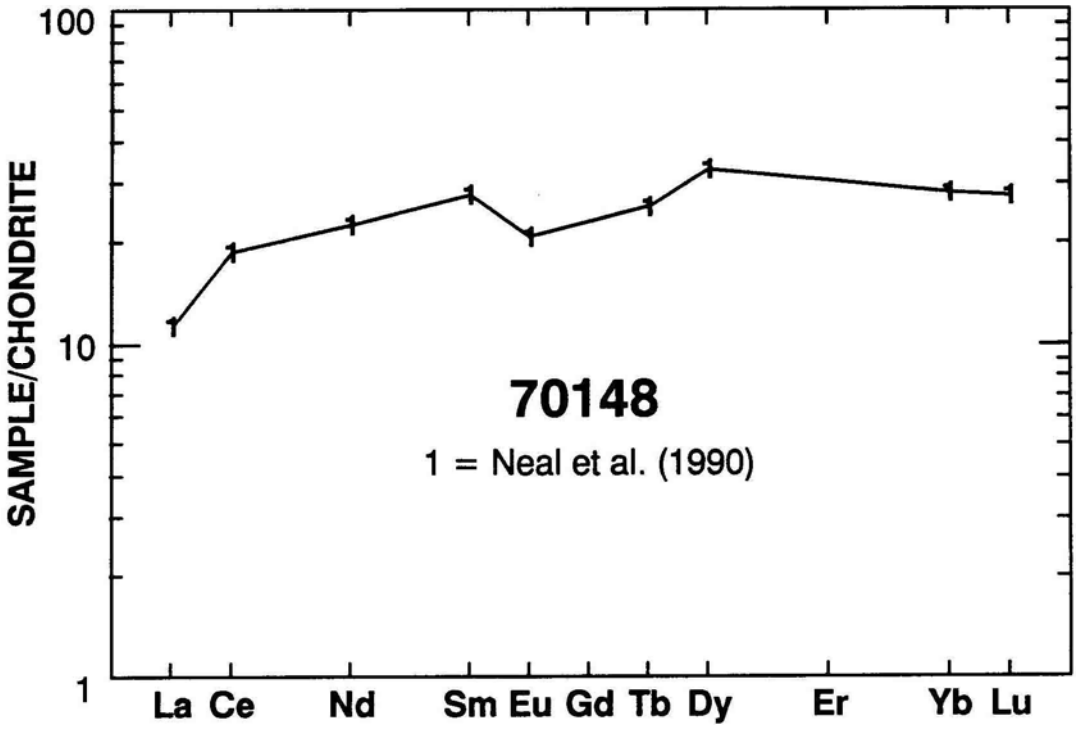

Figure 2: Chondrite-normalized rare-earth element profile of 70148.

Table 1: Whole-rock composition of 70148,0.
Data from Neal et al. (1990).

	70148,0		70148,0
SiO_2 (wt%)		Cu	
TiO_2	12.5	Ni	9
Al_2O_3	8.12	Co	21.6
Cr_2O_3	0.544	V	132
FeO	18.2	Sc	79
MnO	0.237	La	3.68
MgO	8.8	Ce	16
CaO	9.7	Nd	14
Na_2O	0.36	Sm	5.55
K_2O	0.05	Eu	1.58
P_2O_5		Gd	
S		Tb	1.46
Nb (ppm)		Dy	11.2
Zr	110	Er	
Hf	6.17	Yb	6.09
Ta	1.37	Lu	0.92
U	0.25	Ga	
Th	0.13	F	
W		Cl	
Y		C	
Sr	170	N	
Rb		H	
Li		He	
Ba	67	Ge (ppb)	
Cs	0.11	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

Analysis by INAA.