70146

High-Ti Mare Basalt
1.71 g, 1.3 x 1.3 x 0.8 cm

INTRODUCTION

70146 was described as a medium gray, subangular, high-Ti mare basalt, containing ~5% miarolitic cavities lined with plagioclase, pyroxene, or ilmenite. N, T, and S are fracture surfaces. No zap pits are present. The glazed surface of the pyroxene is dark and finely hackly. It is possible that there is a thin skin of dark glass coating part of the surface (Apollo 17 Lunar Sample Information Catalog, 1973) (Fig. 1). This sample was taken from the "Geophone Rock", 50 m south of the ALSEP central station.

PETROGRAPHY AND MINERAL CHEMISTRY

Neal et al. (1989) described 70146 as a plagioclase-poikilitic or Type 1B Apollo 17 high-Ti basalt. Anhedral and blocky ilmenite (0.1-0.8 mm) forms an intersertal texture with plagioclase (0.2-3.7 mm) and pyroxene (0.1-1.5 mm). Chromite and rutile exsolution lamellae (< 0.005 mm wide) are present in the ilmenite. Olivine forms cores to the large pyroxenes. Armalcolite is found without ilmenite rims as inclusions in pyroxene and plagioclase. Native Fe and troilite form interstitial phases. Point counting indicated this sample is comprised of. 41.5% pyroxene; 33.3% plagioclase; 19.6% ilmenite; 3%a native Fe and troilite; 2.1% olivine; and 0.5% armalcolite.

Olivine exhibits little zonation either within or between grains (Fo_{66-68}). Plagioclase exhibits a somewhat larger range in composition (An_{72-88}), with the margins of grains being more sodic. Pyroxenes range in composition from pigeonite to titan-augite, with a continuum of compositions between the two (Fig. 2). All pyroxenes exhibit Fe enrichment towards the margins. Al/Ti ratios are constant at ~2, and Cr_2O_3 decreases as the MG# of the pyroxene decreases. Ilmenite exhibits a larger range in MG# (3-19) than does armalcolite (43-45).

WHOLE-ROCK CHEMISTRY

Neal et al. (1990) reported the composition of 70146 (Table 1) as a Type A variant of Apollo 17 high-Ti basalts, using the classification of Rhodes et al. (1976) and Warner et al. (1979). The REE pattern (Fig, 3) is LREE-depleted, with a general convex-upward appearance, with the MREE contents reaching ~55 times chondritic values. A negative Eu anomaly is present ($[Eu/Eu^*]_N$ = 0.42). Neal et al. (1990) have used the whole-rock composition of 70146,0 to refine previous petrogenetic models and formulate a new one for the Type A Apollo 17 high-Ti basalts.

PROCESSING

Approximately 1.29 g of 70146,0 remains; 0.41 g was irradiated for INAA, and 0.01 g was used to make thin section 70146,4.

Figure 1: Hand specimen photograph of 70145, 70146, 70147, and 70148.

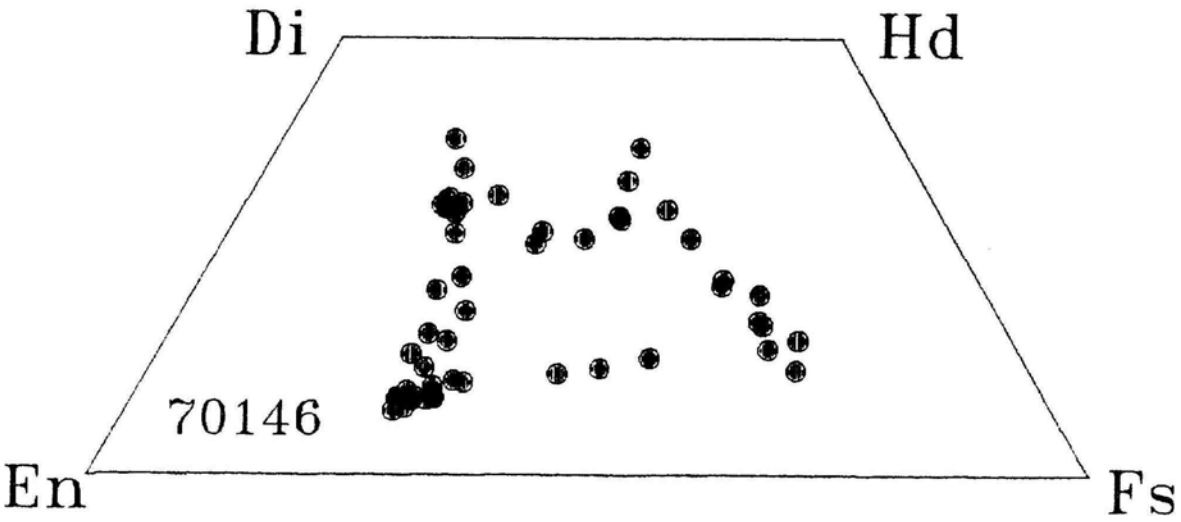

Figure 2: Pyroxene compositions of 70146 represented on a pyroxene quadrilateral.

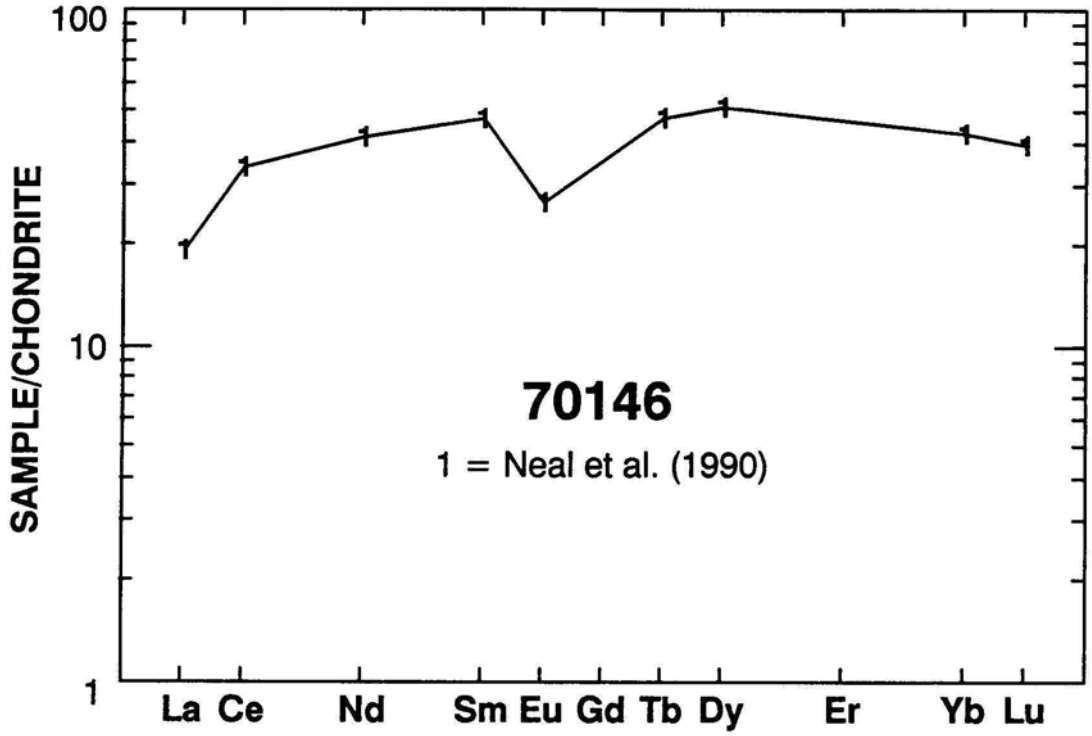

Figure 3: Chondrite -normalized rare-earth element profile of 70146.

Table 1: Whole-rock composition of 70146,0.
Data from Neal et al. (1990).

	70146,0		70146,0
SiO_2 (wt%)		Cu	
TiO_2	13.1	Ni	5
Al_2O_3	7.61	Co	21.6
Cr_2O_3	0.504	V	126
FeO	19.6	Sc	85
MnO	0.255	La	6.25
MgO	8.8	Ce	29
CaO	9.7	Nd	26
Na_2O	0.36	Sm	9.53
K_2O	0.05	Eu	2.04
P_2O_5		Gd	
S		Tb	2.73
Nb (ppm)		Dy	17.4
Zr	250	Er	
Hf	8.83	Yb	9.35
Ta	1.76	Lu	1.33
U	0.10	Ga	
Th	0.10	F	
W		Cl	
Y		C	
Sr		N	
Rb		H	
Li		He	
Ba	104	Ge (ppb)	
Cs	0.07	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

Analysis by INAA.