71495

High-Ti Mare Basalt
1.483 g, 1.5 x 1 x 1 cm

INTRODUCTION

71095 (Fig. 1) was described as a brownish gray, medium-grained, homogeneous basalt (Apollo 17 Lunar Sample Information Catalog, 1973). No vugs or zap pits are present. Three surfaces are dust coated (after two dustings). This basalt has a narrow wedge shape and was collected from Station 1A.

PETROGRAPHY AND MINERAL CHEMISTRY

Neal et al. (1989) described 71095 as a subophitic basalt containing no olivine. Plagioclase grains are up to 1.1mm and pyroxene up to 0.7mm. Blocky ilmenite (up to 1.5mm) is interstitial, and exhibits no exsolution features. Silica, troilite, and native Fe form interstitial phases. Point counting reveals that 71095 is comprised of 44.0% pyroxene; 37.6% plagioclase; 11.7% ilmenite; 3.4% native Fe and troilite; and 3.3% silica.

Plagioclase exhibits both core-to-rim and intergrain compositional variations (An72_88). The cores possess higher An contents. It is the pyroxenes which are most definitive for this sample. No pigeonite is present (Fig. 2), and titan-augite zones towards pyroxferroite. This compositional range classifies 71095 as an Apollo 11 low-K type Apollo 17 high-Ti basalt (Papike et al., 1974), or Type II (Brown et al., 1975). Al/Ti ratios are constant at ~2, and Cr_2O_3 decreases with decreasing pyroxene MG#. Iimenite is relatively depleted in MgO, and the major compositional variation is between grains (MG# = 1-10).

WHOLE ROCK CHEMISTRY

Neal et al. (1990) described 71095 as a Type A Apollo 17

Figure 1: Hand specimen photograph of 71095,0.

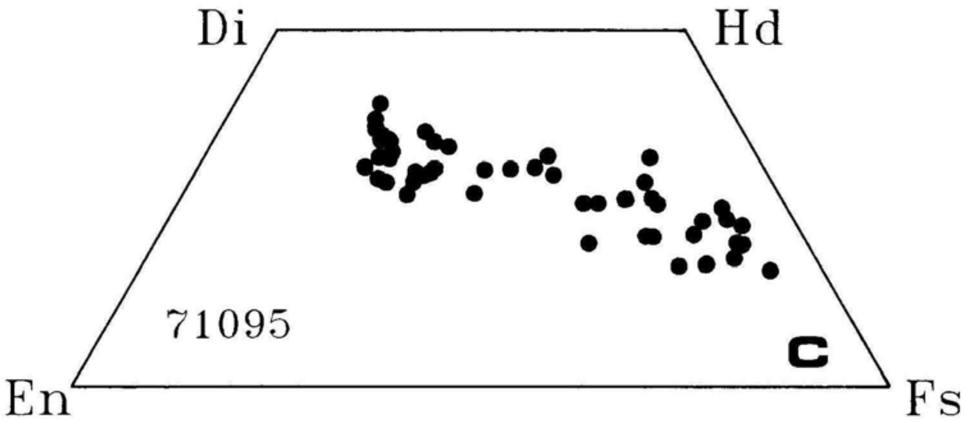

Figure 2: Pyroxene compositions of 71095 represented on a pyroxene quadrilateral.

high-Ti basalt. This basalt contains only 7.7 wt% TiO_2 with a MG# of 29.7 (Table 1). The REE profile (Fig. 3) is LREE-depleted, but with an overall convex-upward shape. 71095 contains the highest abundances of the REE of any analyzed Apollo 17 high-Ti basalt. A negative Eu anomaly is present ($[Eu]Eu^*]_N = 0.50$).

ISOTOPES

Paces et al. (1991) reported Rb-Sr (Table 2) and Sin-Nd (Table 3) data for 71095,6. These analyses were part of a larger study characterizing the basalts at the Apollo 17 site.

PROCESSING

Of the original 1.4838 of 71095,0, approximately 0.7g remains. 0.788 was irradiated for INAA, forming sample number 71095,0. The thin section number for this sample is 71095,4.

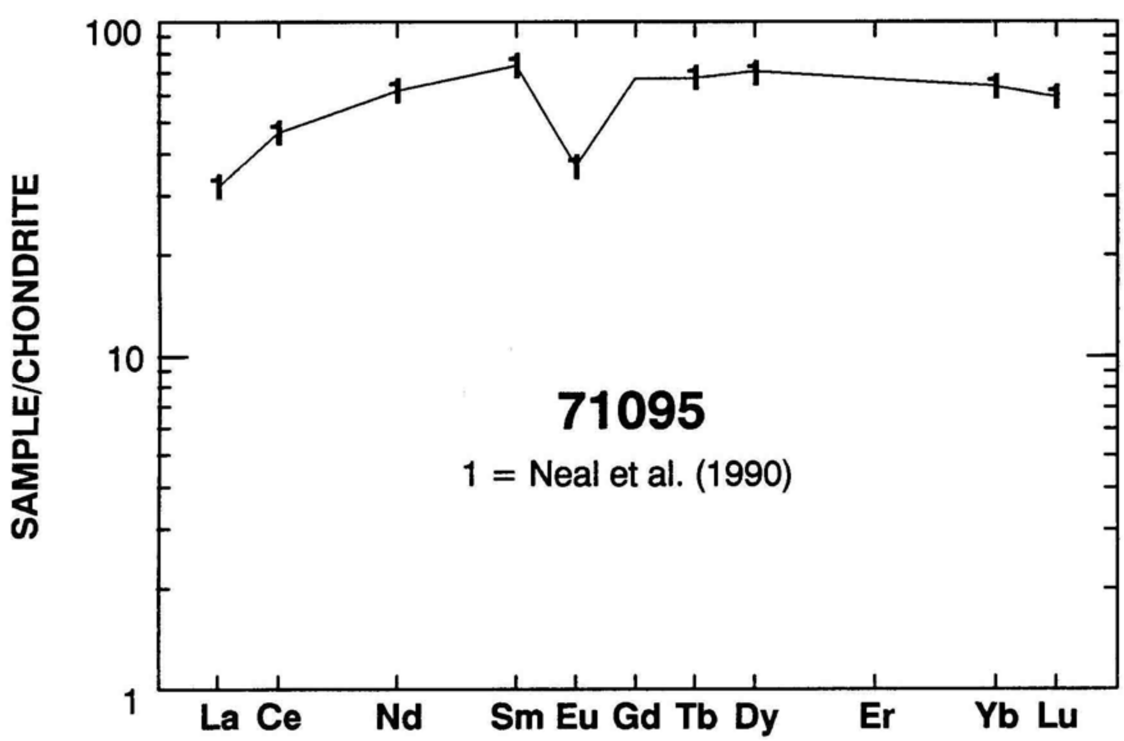

Figure 3: Chondrite -normalized rare-earth element profile of 71095.

Table 1: Whole-rock chemistry of 71095.
Data from Neal et al. (1990).

	71095,0 N		71095,0 N
SiO_2 (wt %)		Cu	
TiO_2	7.7	Ni	36
Al_2O_3	9.76	Co	13
Cr_2O_3	0.061	V	18
FeO	18.9	Sc	70
MnO	0.257	La	10.73
MgO	4.5	Ce	41
CaO	10.8	Nd	40
Na_2O	0.51	Sm	15.26
K_2O	0.12	Eu	2.88
P_2O_5		Gd	
S		Tb	4.01
Nb (ppm)		Dy	28.1
Zr	94	Er	
Hf	13.18	Yb	14.28
Ta	2.47	Lu	2.06
U	0.37	Ga	
Th	0.63	F	
W		Cl	
Y		C	
Sr	240	N	
Rb		H	
Li		He	
Ba	160	Ge (ppb)	
Cs	0.10	Ir	
Be		Au	
Zn		Ru	
Pb		Os	

Analyis by: N = INAA.

Table 2: Rb-Sr isotopic data for 71095,6.
Data from Paces et al. (1991).

Rb (ppm)	1.44
Sr (ppm)	319
$^{87}Rb/^{86}Sr$	0.001300 ± 13
$^{87}Sr/^{86}Sr$	0.699951 ± 13
I(Sr)[a]	0.699240 ± 20
T_{LUNI}[b] (Ga)	4.9

[a]Initial Sr isotopic ratios calculated at 3.75 Ga using ^{87}Rb decay constant = $1.42x10^{-11}$ yr^{-1}.

[b]Model age realtive to I(Sr) = LUNI = 0.69903 (Nyquist et al., 1974; Shih et al., 1986).
$T_{LUNI} = 1/l*ln[((^{87}Sr/^{86}Sr - 0.69903)/^{87}Rb/^{86}Sr) + 1]$.

Table 3: Sm-Nd isotopic data for 71095,6.
Data from Paces et al. (1991).

Sm (ppm)	25.2
Nd (ppm)	62.3
$^{147}Sm/^{144}Nd$	0.24471 ± 49
$^{143}Nd/^{144}Nd$	0.514164 ± 12
I(Nd)[a]	0.508088 ± 24
$\varepsilon_{Nd}(t)$[b]	6.6 ± 0.5
T_{CHUR}[c] (Ga)	4.8

[a]Initial Nd isotopic ratios calculated at 3.75 Ga using ^{147}Sm decay constant = $6.54x10^{-12}yr^{-1}$.

[b]Initial ε_{Nd} calculated at 3.75 Ga using present-day chondritic values of $^{143}Nd/^{144}Nd$ = 0.512638 and $^{147}Sm/^{144}Nd$ = 0.1967.

[c]Model age relative to CHUR reservoir using present-day chondritic values listed above.
$T_{CHUR} = 1/l*ln[((^{143}Nd/^{144}Nd - 0.512638)/(^{147}Sm/^{144}Nd - 0.1967) + 1]$.