74287

High-Ti Mare Basalt
1.568 g, 2.2 x 1.5 x 0.3 cm

INTRODUCTION

Sample 74287 was a brown/gray thin, angular chip, with a micro-diabasic fabric (Apollo 17 Lunar Sample Information Catalog, 1973). Cavities irregularly cover 35% of the surfaces, and contain euhedral groundmass minerals. Vugs occur in layers. No zap pits were observed. One large, penetrative fracture was observed.

PETROGRAPHY AND MINERAL CHEMISTRY

Neal et al. (1989) described 74287, 3 as a subophitic to variolitic, medium-grained, micro-porphyritic Apollo 17 high-Ti mare basalt. It is composed primarily of plagioclase (up to 1 mm), pale yellow pyroxene (up to 0.4 mm), and anhedral ilmenite (up to 0.9 mm). Olivine (up to 0.7 mm) and ilmenite (~ 0.9 mm) micro-phenocrysts are present. Accessory minerals include SiO_2 (cristobalite: < 0.15 mm), anhedral troilite (0.03-0.09 mm), FeNi metal (0.02-0.03 mm). Euhedral chromite-ulvospinel inclusions are present in olivine. Exsolution of FeNi metal from troilite is common. Rutile and spinel exsolution are present in ilmenite. Pyroxene contains minute (0.01-0.02 mm) inclusions of armalcolite. Thin section 74287, 3 contains: 49.4% pyroxene, 26.2% plagioclase, 19.6% ilmenite, 1.3% troilite, 1% FeNi metal, 1% olivine, and 0.9% armalcolite.

Mineral chemistry was also reported by Neal et al. (1989) and also Neal et al. (1990a). Olivine exhibits a range of compositions $_{(17061.78)}$ which is accounted for by both core-torim zonation and inter-grain variability. Plagioclase compositions range from An_{87} to An_{79} (Fig. 1), most of which is core-to-rim zonation. Likewise, pyroxenes exhibit zonation from augite to pigeonite because of olivine resorption, and a few grains contain some Fe enrichment (Fig. 2). Chromiteulvospinel is relatively restricted in composition compared to other samples [100*(Cr/ (Cr+AI)) = 64-70; MG# = 15-221. Ilmenite is more variable (MG# = 3-18), with the larger grains being more Mg-rich. The armalcolite inclusions in pyroxene exhibit inter-grain variation (MG# =33-45).

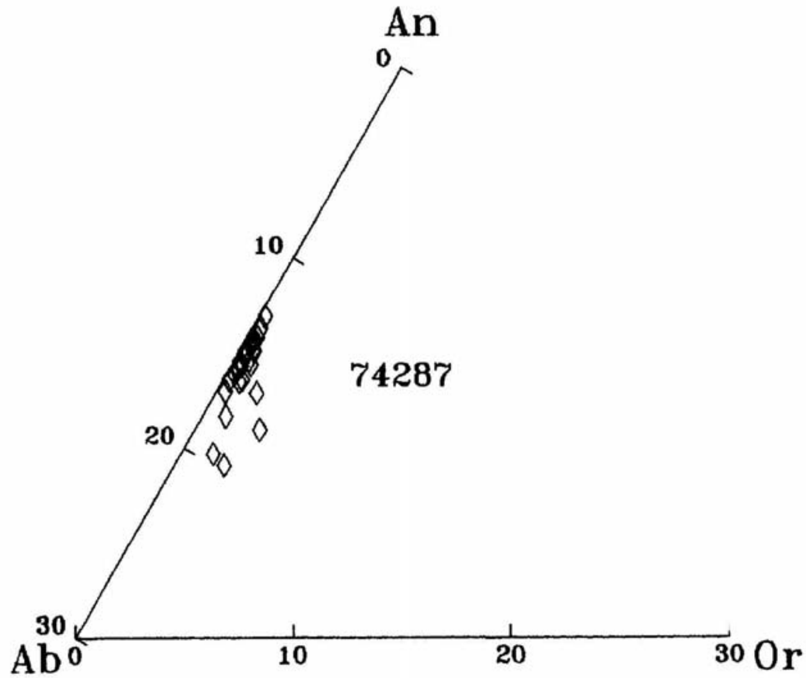

Figure 1: Plagioclase compositions from 74287, 3.

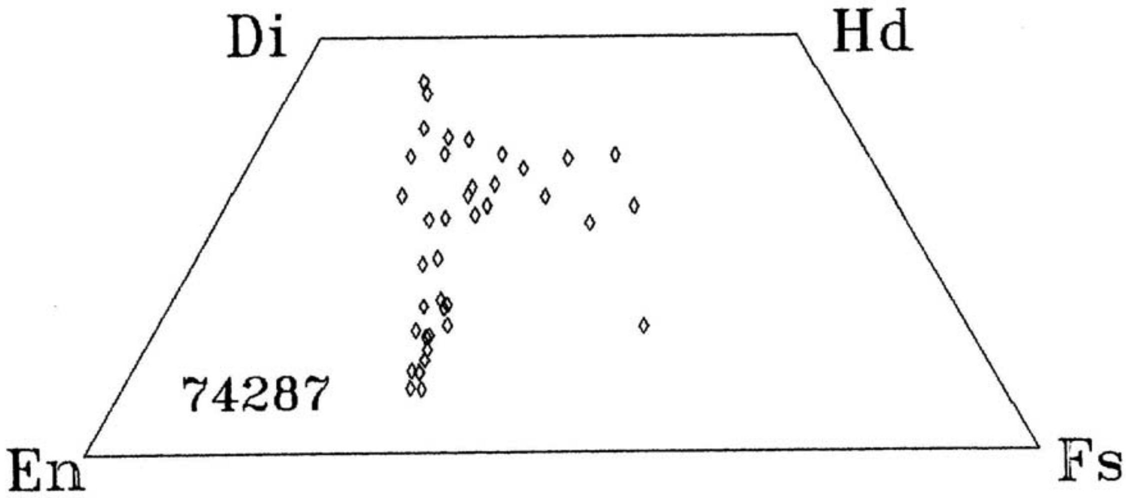

Figure 2: Pyroxene compositions of 74287, 3 represented on a pyroxene quadrilateral.

WHOLE-ROCK CHEMISTRY

Neal et al. (1990) described 74287,4 as a Type C Apollo 17 high-Ti mare basalt. It has a MG# of 48.8 and the elevated TiO_2 contents (12.7 wt% - Table 1) classifies this basalt as high-Ti. The REE profile is LREE-depleted, but with a maximum at Sm (Fig. 3). A negative Eu anomaly is evident [(Eu/EU*)N = 0.55] and there is a slight depletion of the HREE relative to the NIREE.

RADIOGENIC ISOTOPES

Paces et al. (1991) reported the Rb-Sr and Sm-Nd isotope compositions of 74287,5 (Table 2). This study supported the classification of 74287 as a Type C basalt in that it has an elevated Rb/Sr ratio relative to the Type A and B Apollo 17 basalts. Therefore, it has a. more radiogenic present day $^{87}Sr/^{86}Sr$ ratio. Sm-Nd data for this sample demonstrate that it has experienced an ancient tirne-integrated depletion (present day $^{143}Nd/^{144}Nd$ = 0.514278± 12), and the initial ^{3}Nd value (+ 6.8 ± 0.5) demonstrates a derivation from a source also exhibiting a time-integrated LREE-depletion.

PROCESSING

Of the original 1.568g of 74287,0, approximately 0.9g remains. 0.566g was used for INAA, and 0.07g was used in the isotope analyses. One thin section is available -74287,3.

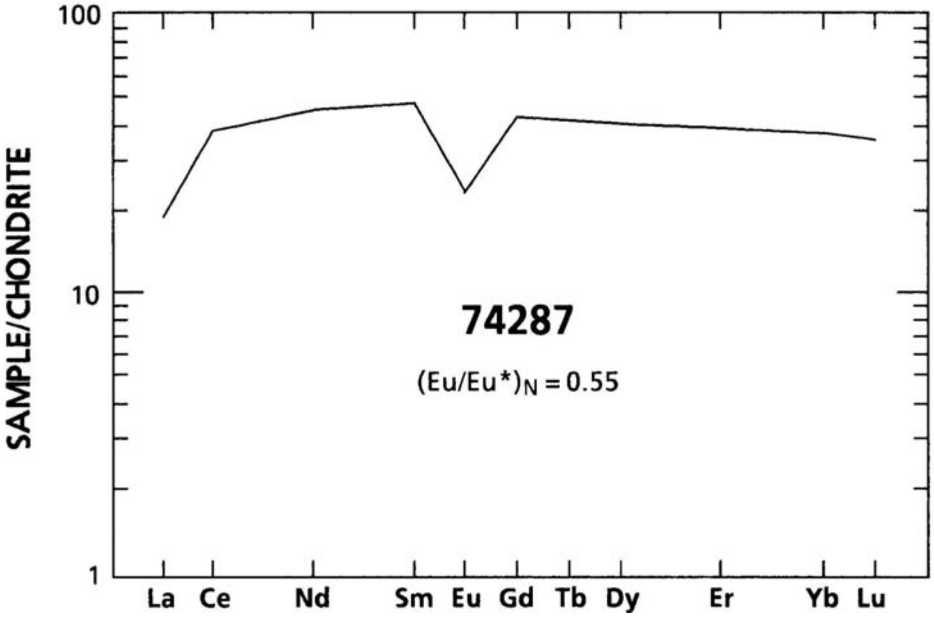

Figure 3: Chondrite-normalized rare-earth-element profile of 74287,4.

Table 1: Whole-rock chemistry of 74287.

Sample	74287,4	74287,5
Method	N	I
REF	1	2
SiO_2		
TiO_2	12.7	
Al_2O_3	8.54	
Cr_2O_3	0.6	
FeO	18.9	
MnO	0.255	
MgO	10.1	
CaO	10.7	
Na_2O	0.35	
K_2O	0.10	
P_2O_5		
S		
Nb (ppm)		
Zr	280	
Hf	8.58	
Ta	1.58	
U	0.17	
Th	0.46	
W		
Y		
Sr	150	148
Rb		1.12
Li		
Ba	109	
Cs	0.23	
Be		
Zn		
Pb		
Cu		
Ni	39	
Co	22.6	
V	142	
Sc	79.5	
La	6.41	
Ce	33	
Nd	28	22.8

Table 1: (Concluded).

Sample Method REF	74287,4 N 1	74287,5 I 2
Sm	9.33	9.38
Eu	1.85	
Gd		
Tb	2.37	
Dy		
Er		
Yb	8.41	
Lu	1.22	
Ga		
F		
Cl		
C		
N		
H		
He		
Ge (ppb)		
Ir		
Au		
Ru		
Os		

Analysis by: N = INAA, I = isotope dilution.

1 = Neal et al. (1990); 2 = Paces et al. (1991).

Table 2: Rb-Sr and Sm-Nd Isotope
Data for 74287. Data from Paces et al. (1991).

74287,5 Wt. = 67.25 mg			
Rb (ppm)	1.12	Sm (ppm)	9.38
Sr (ppm)	148	Nd (ppm)	22.8
$^{87}Rb/^{86}Sr$	0.02188 ± 22	$^{147}Sm/^{144}Nd$	0.24934 ± 50
$^{87}Sr/^{86}Sr$	0.700471 ± 13	$^{143}Nd/^{144}Nd$	0.514278 ± 12
I(Sr)[a]	0.699284 ± 25	I(Nd)[a]	0.508137 ± 24
T_{LUNI}[b] (Ga)	4.6	ε_{Nd} (t)[c]	6.8 ± 0.5
		T_{CHUR}[d] (Ga)	4.7

a = Initial Sr and Nd isotopic ratios calculated at 3.72 Ga, using ^{87}Rb decay constant of 1.42×10^{-11} yr^{-1} and ^{147}Sm decay constant of 6.54×10^{-12};

b = Model age relative to I(Sr) of LUNI;

c = Initial ε_{Nd} calculated at 3.72 Ga using present day chondritic values of $^{143}Nd/^{144}Nd = 0.512638$ and $^{147}Sm/^{144}Nd = 0.1967$.