741285

High-Ti Mare Basalt
2.212g, 2 x 1.5 x 0.5 cm

INTRODUCTION

74285 is medium gray in color with a brownish tinge (Apollo 17 Lunar Sample Information Catalog, 1973). It was an angular rhombic fragment, containing a few minor fractures, penetrative between the vuggy areas which cover ~40% of the two broadest surfaces (Apollo 17 Lunar Sample Information Catalog, 1973). Theses cavities (up to 2 rnm) have an irregular shape containing euhedral prisms of plagioclase and pyroxene. The fabric is micro-diabasic, and no zap pits were observed.

PETROGRAPHY AND MINERAL CHEMISTRY

Neal et al. (1989) described 74285 as a medium-grained, micro-porphyritic high-Ti mare basalt, subvariolitic in places, from thin section ,3. This thin section is composed primarily of anhedral plagioclase (up to 0.85 mm), pink pyroxene (up to 1 mm), and ilmenite (up to 0.85 mm). Accessories include armalcolite (< 0.2 mm and only partially mantled by ilmenite), cristobalite (< 0.2 mm), troilite (< 0.4 mm), and FeNi metal (< 0.19 mm). Spinel and rutile exsolution lamellae are evident in ilmenite. Olivine forms cores to pyroxene (0.07-0.23 mm) and contains chromite-ulvospinel inclusions. Armalcolite is found as inclusions (0.01-0,04 mm) in pyroxene and plagioclase. Some of the larger ilmenites exhibit 11 sawtooth" margins, indicative of rapid cooling. Thin section 74285,3 is composed of. 49.0% pyroxene, 21.7% plagioclase, 20.7% ilmenite, 2.1% olivine, 2.6% FeNi metal, 0.4% SiO_2, 2% armalcolite, and 1.5% chromite-ulvospinel.

Olivines exhibit much inter-grain variation (Fo_{59-72}), probably as a result of attempting to equilibrate with the melt. Plagioclase exhibits moderate core-to-rim zonation (An_{88-83}) and one rim analysis ofAn_{78} is recorded (Fig. 1). Pyroxenes also exhibit inter-and infra-grain variation from augite to pigeonite with a hint of Fe-enrichment (Fig. 2). The chromite-ulvospinel inclusions in olivine exhibit core-to-rim zonation - 100*(Cr/(Cr+Al)) _ 73-62 and MG# = 21-6. Ilmenite exhibits mainly inter-grain variation (MG# = 4-15) as does armalcolite (MG# 31-41).

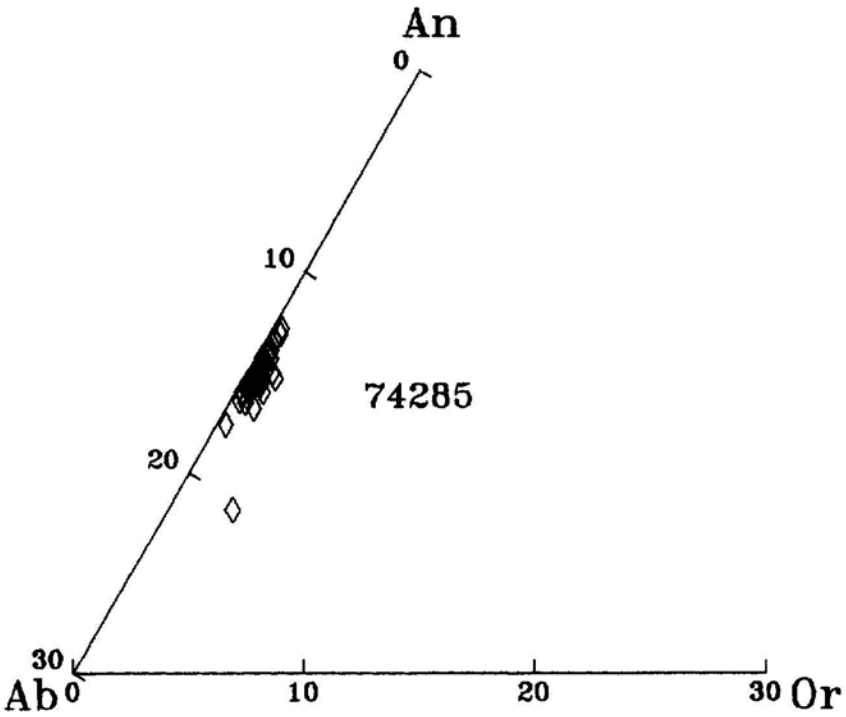

Figure 1: Plagioclase compositions from 74285,3.

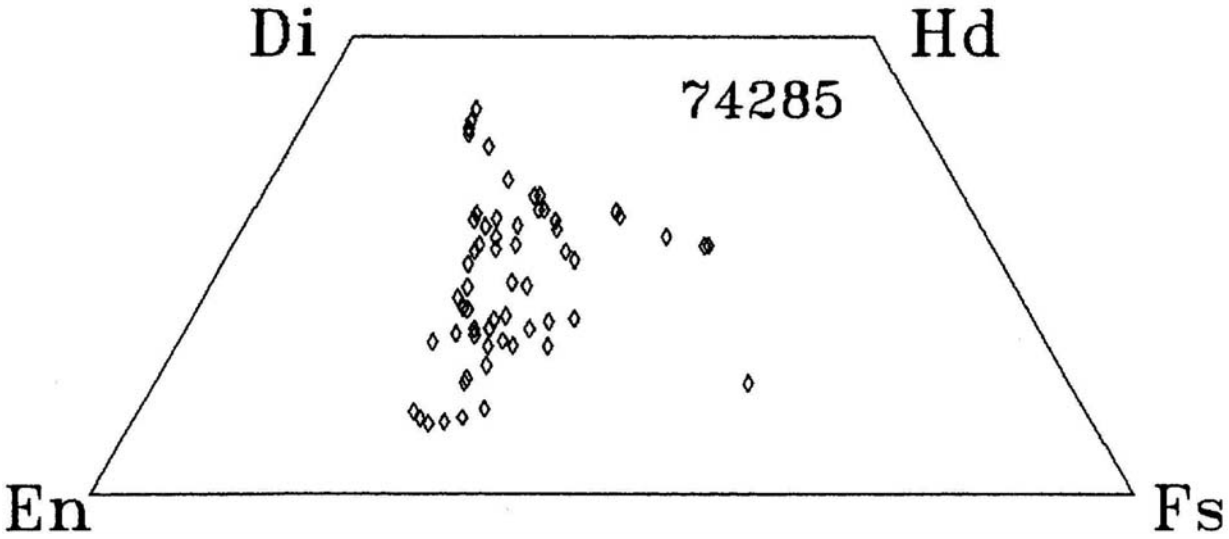

Figure 2: Pyroxene compositions of 74285,3 represented on a pyroxene quadrilateral.

WHOLE-ROCK CHEMISTRY

One whole-rock analysis by INA has been conducted on 74285. Neal et at. (1990) described 74285,4 as a Type C Apollo 17 high-Ti mare basalt. The whole-rock analysis exhibits a high MG# (52.5) as it contains relatively Fo-rich olivines. The high-Ti classification is demonstrated by 12.4 wt% TiO_2 in the analysis (Table 1). The REE profile is LREE-depleted (Fig. 3) with a maximum at Sm. A negative Eu anomaly is present [(EU/Eu*)N = 0.55].

RADIOGENIC ISOTOPES

Paces et al, (1991) have reported the Rb-Sr and Sm-Nd isotopic compositions of 74285,5. As is typical of Apollo 17 Type C high-Ti basalts, 74285,5 has an elevated $^{87}Rb/^{86}Sr$ ratio relative to the Type A and B varieties and a radiogenic $^{87}Sr/^{86}Sr$ ratio (Table 1), but a similar initial $^{87}Sr/^{86}Sr$ ratio to other Type A and B basalts. Sm-Nd data for Apollo 17 high-Ti basalts is sparse. Paces et al. (1991) reported the first substantial analysis of Apollo 17 high.-Ti basalts for Nd isotopes. 74285,5 has a highly radiogenic $^{143}Nd/^{144}Nd$ ratio (0.514204±24) demonstrating the ancient formation of this sample, and the initial ^{3}Nd value (+ 6.7 ± 0.7) demonstrates a derivation from a source also exhibiting a time-integrated LREE-depletion.

PROCESSING

Approximately 1.8g of 74285,0 remains. 0.054g was used in the isotope analysis, and 0.317g was used for INAA. One thin section has been made -74285, 3.

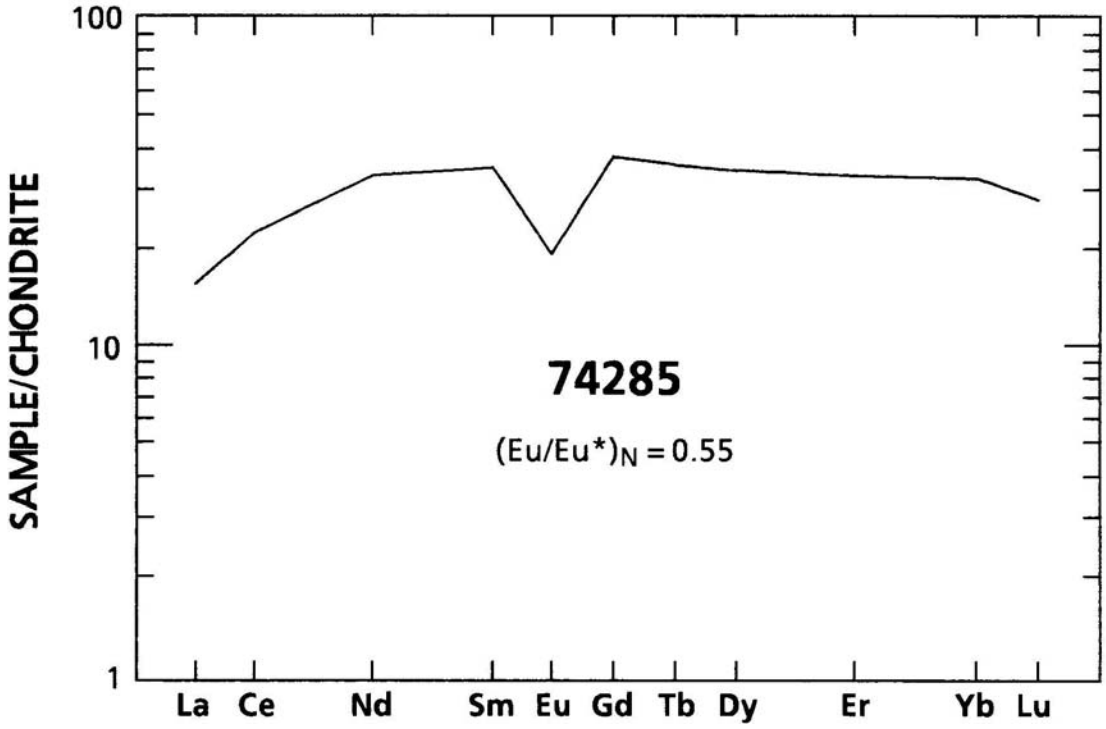

Figure 3: Chondrite-normalized rare-earth-element profile of 74285,4.

Table 1: Whole-rock chemistry of 74285.

Sample	74285,4	74285,5
Method	N	I
REF	1	2
SiO_2		
TiO_2	12.4	
Al_2O_3	7.99	
Cr_2O_3	0.66	
FeO	17.7	
MnO	0.238	
MgO	11.0	
CaO	10.7	
Na_2O	0.35	
K_2O	0.05	
P_2O_5		
S		
Nb (ppm)		
Zr	210	
Hf	7.09	
Ta	1.27	
U	0.19	
Th	0.28	
W		
Y		
Sr	60	164
Rb	5.6	1.22
Li		
Ba	123	
Cs	0.12	
Be		
Zn		
Pb		
Cu		
Ni	10	
Co	26.0	
V	154	
Sc	85.3	
La	5.13	
Ce	19	
Nd	21	24.4
Sm	7.26	9.96

Table 1: (Concluded).

Sample	74285,4	74285,5
Method	N	I
REF	1	2
Eu	1.50	
Gd		
Tb	2.00	
Dy		
Er		
Yb	6.95	
Lu	0.97	
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 74285. Data from Paces et al. (1991).

74285,5 Wt. = 54.43 mg			
Rb (ppm)	1.22	Sm (ppm)	9.36
Sr (ppm)	164	Nd (ppm)	24.4
$^{87}Rb/^{86}Sr$	0.02142 ± 21	$^{147}Sm/^{144}Nd$	0.24644 ± 49
$^{87}Sr/^{86}Sr$	0.700446 ± 13	$^{143}Nd/^{144}Nd$	0.514204 ± 24
I(Sr)[a]	0.699284 ± 25	I(Nd)[a]	0.508135 ± 36
T_{LUNI}[b] (Ga)	4.6	ε_{Nd} (t)[c]	6.7 ± 0.7
		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 $^{147}Sm/^{144}Nd = 0.1967$.