75015

High-Ti Mare Basalt
1006 g, 10 x 9 x 6 cm

INTRODUCTION

75015 was described as a brownish gray, ophiticintergranular basalt, containing a few penetrative fractures (Apollo 17 Lunar Sample Information Catalog, 1973). It was collected from Station 5, near Camelot Crater. Approximately 1001o of the surface was covered with vugs (< 1-3 mm: Fig. 1), which form clusters reaching 4-6 cm. These vugs contain plagioclase, opaques (ilmenite?), and pyroxene. The original sample had a angular/blocky appearance. A few zap pits are present on T, W, and S.

PETROGRAPHY AND MINERAL CHEMISTRY

Brown et al. (1975) described thin section 75015,27 as a Type IB Apollo 17 high-Ti basalt, although no detailed petrography of this specific sample was given. However, they did report the modal mineralogy of 75015,27 as: 0.2% olivine, 16.7% opaques, 28.6% plagioclase, 50.7% clinopyroxene, 3.4% silica, and 0.4% mesostasis. During the preparation of this catalog, we examined thin section 75015,10 and found it to be a coarse-grained (1-2mm) ophitic basalt (Fig. 2). Pink pyroxene (up to 1.5 mm), plagioclase (up to 1.5 mm), and ilmenite (up to 2 mm) are the most abundant minerals. No olivine or armalcolite was observed. Troilite and FeNi metal form interstitial phases (up to 0.02 mm), which is sometimes associated with ilmenite. Silica is the most abundant accessory phase, forming anhedral masses.

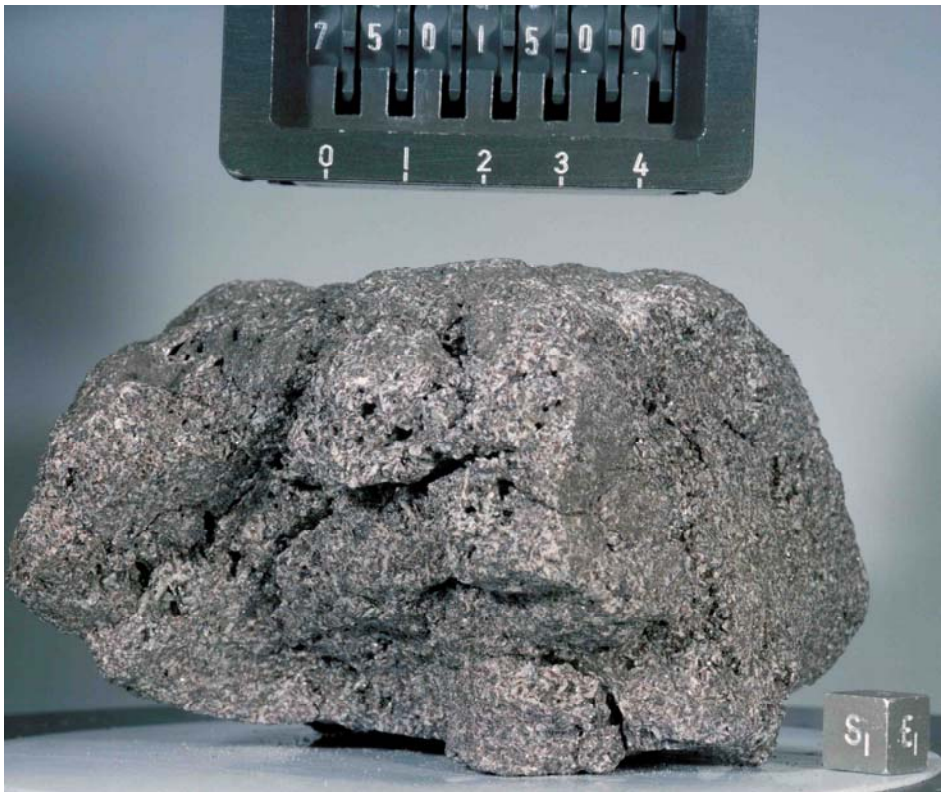

Figure 1: Hand specimen photograph of 75015, 0.

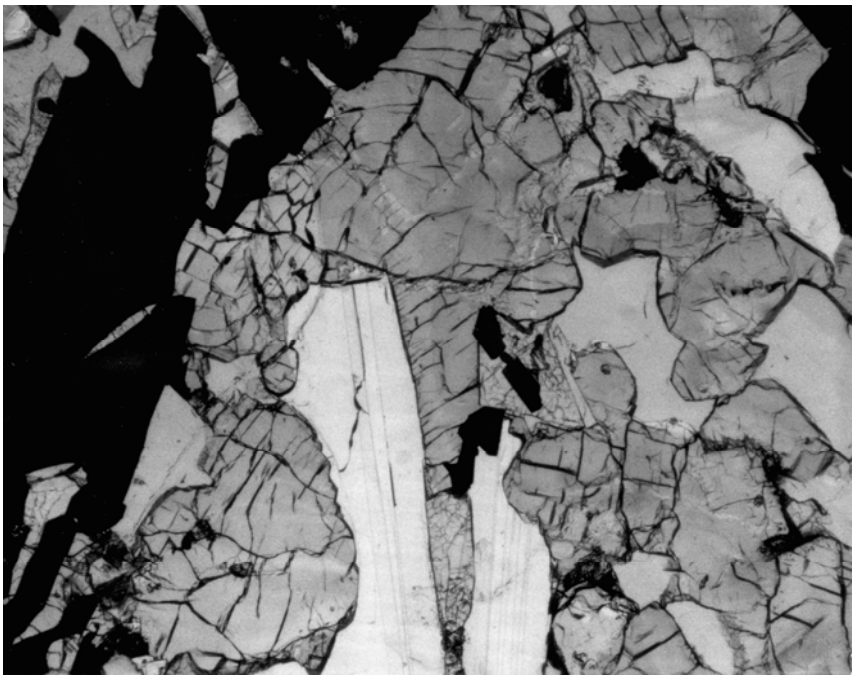

Figure 2: Photomicrograph of 75015. Field of view = 2.5 mm.

No detailed mineral chemistry has been reported for this sample.

WHOLE-ROCK CHEMISTRY

Whole-rock major- and trace-element data has been reported by Rhodes et al. (1976) for 75015,2, and by Warner et al. (1975) for 75015,7. Rhodes et al. (1976) classified 75015,2 as a Type A Apollo 17 high-Ti mare basalt. Although both studies report lower TiO_2 abundances for 75015 than in other Apollo 17 samples (Rhodes et al., 1976 = 9.56 wt% TiO_2; Warner et al., 1975 = 8.7 wt% Ti02 - Table 1), this basalt can still be classified as high-Ti. However, the two whole-rock analyses of the same basalt are dramatically different (Table 1). For example, MG# of the Rhodes et al. (1976) analysis is 37. 1, but the MG# of Warner et al. (1975) is 31.2. The REE are also different (Fig. 3), although the analysis of Warner et al. (1975) does not include an abundance for Gd or Tb, making delineation of the Eu anomaly inaccurate. The REE abundances reported by Rhodes et al. (1976) for 75015 are .lower than those of Warner et al. (1975) (Fig. 3), although the general shape of the pattern is the same. Both profiles exhibit a depletion of the LREE over the HREE, but the maximum is in the MREE. Both profiles exhibit a negative Eu anomaly - (Eu/Eu*) N = 0.51 (Rhodes et al., 1976) and 0.45-0.50 (estimated by extrapolation from the analysis of Warner et al., 1975). Gibson et al. (1976) analyzed 75015 for S and reported a concentration of 2205 ugS/g and an equivalent wt% Fe^o of 0.065.

RADIOGENIC ISOTOPE

Nyquist et al. (1979) reported the whole-rock Rb-Sr isotopic composition for 75015,2 (Table 2). This sample has an extremely low $^{87}Rb/^{86}Sr$ ratio (0.0087 ± 2), typical of Type A Apollo 17 high-Ti mare basalts. As such, present day $^{87}Sr/^{86}Sr$ ratios are also low (0.69974±4). Nyquist et al. (1976) calculated model ages relative to BABI (5.11 ± 0.58 Ga) and relative to Apollo 16 anorthosites (5.64± 0.58 Ga).

EXPOSURE AGE

Arvidson et al. (1976) have calculated a ^{81} Kr-Kr exposure age of 92± 4 Ma for 75015.

PROCESSING

75015,0 has been entirely subdivided. The largest sub samples remaining are 75015,30 (3358) and ,31 (540g). Four thin sections of this basalt are available - ,10; ,26; ,27; ,28.

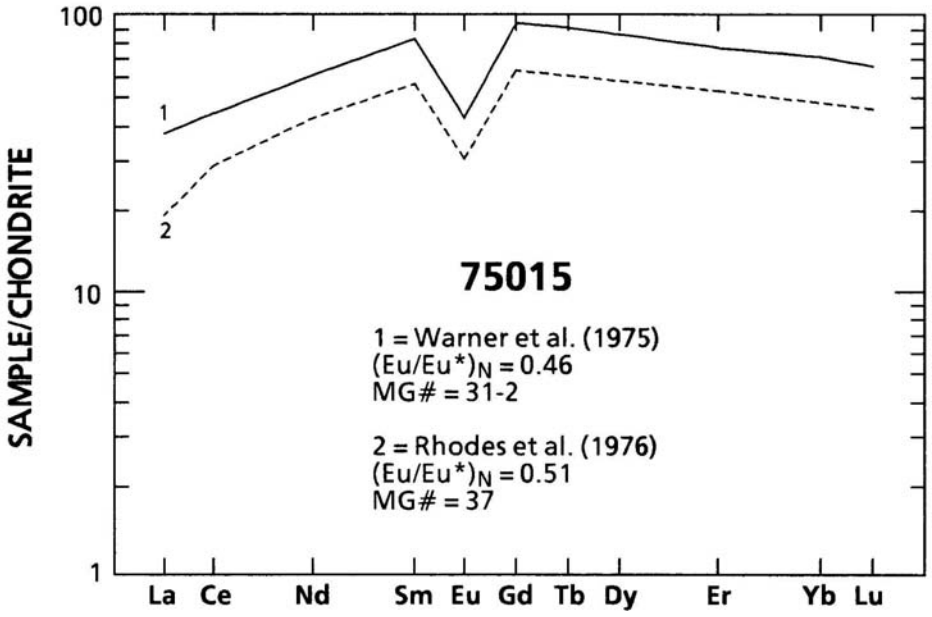

Figure 3: Chondrite -normalized rare-earth-element profiles of 75015.

Table 1: Whole-rock chemistry of 75015.

Sample	75015,2	75015,7	75015,2
Method	X,N,I	N	I
Rerence	1	2	3
SiO_2	41.92		
TiO_2	9.56	8.7	
Al_2O_3	10.06	9.9	
Cr_2O_3	0.17	0.162	
FeO	18.77	21.2	
MnO	0.29	0.264	
MgO	6.2	5.4	
CaO	12.15	11.6	
Na_2O	0.48	0.47	
K_2O	0.06	0.05	
P_2O_5	0.05		
S	0.20		
Nb (ppm)			
Zr			
Hf	9.6		
Ta			
U			
Th			
W			
Y			
Sr	215*		215*
Rb	0.65*		0.65*
Li	10.9		
Ba	87.5		
Cs			
Be			
Zn			
Pb			
Cu			
Ni			
Co	14.7	15.2	
V		24	
Sc	77	79	
La	6.74	12.2	
Ce	23.8		
Nd	26.5		
Sm	11.2	16.7	

Table 1: (Concluded).

Sample Method Rerence	75015,2 X,N,I 1	75015,7 N 2	75015,2 I 3
Eu	2.34	3.15	
Gd	17.7		
Tb			
Dy	20.1	29	
Er	12.2		
Yb	10.8	15.6	
Lu	1.62	2.2	
Ga			
F			
Cl			
C			
N			
H			
He			
Ge (ppb)			
Ir			
Au			
Ru			
Os			

Analysis by: N = INAA; X = XRF; I = Isotope Dilution.

1 = Rhodes et al. (1976); 2 = Warner et al. (1975); 3 = Nyquist et al. (1976).

* = same analysis.

Table 2: Rb-Sr isotopic composition of 75015

	75015,2
wt (mg)	55
Rb (ppm)	0.646
Sr (ppm)	215
$^{87}Rb/^{86}Sr$	0.0087 ± 2
$^{87}Sr/^{86}Sr$	0.69974 ± 6
T_B[a]	5.11 ± 0.58
T_L[b]	5.64 ± 0.58

a = Model age assuming I = 0.69910 (BABI + JSC bias);

b = Model age assuming I = 0.69903 (A-16 anorthosites for T = 4.6 Ga)