70275

High-Ti Mare Basalt
171.4 g, 6.5 x 5.0 x 3.5 cm

INTRODUCTION

70275 was described as a medium gray to light brownish gray, intergranular, and blocky to subrounded basalt (Fig. 1), containing many zap pits on all surfaces and 2-3% vugs up to 2-3mm diameter (Apollo 17 Lunar Sample Information Catalog, 1973). The fabric is intergranular to plumose with a variable texture. All surfaces are weathered and finely lumpy. 70275 was collected approximately 10m south-east of the SEP station, 120m east of the Lunar Module.

PETROGRAPHY AND MINERAL CHEMISTRY

70275 was described as a Type IA Apollo 17 high-Ti basalt by Brown et al. (1975ab), who described this basalt as being comprised of. 13.8% olivine; 25.7% opaque minerals; 17.2% plagioclase; 45% clinopyroxene; and 1.7% silica. 70275 is a fine-grained basalt with olivine phenocrysts up to 1.5mm in diameter. All olivines exhibit a reaction with the groundmass, being embayed and sometimes with pyroxene overgrowths. These olivine phenocrysts are set in a groundmass of plagioclase and pyroxene which are intergrown into "bow-tie" structures and ilmenite (all range from 0.1-0.3mm). Areas of coarser grain size are present where olivine is diminished in size and contains larger overgrowths of pyroxene. The pyroxenes and plagioclase in

Figure 1: Hand specimen photograph of 70275,0.

these coarser areas reach up to 0.5mm. Ilmenite occurs either as a groundmass or phenocryst phase. Ilmenite laths have "sawtooth" margins, indicative of rapid cooling. No chromite or rutile exsolution is observed in the ilmenites. Cr-spinel is also present (0.1-0.2mm), but armalcolite is rare. Native Fe, troilite, and silica form interstitial phases.

Bell et al. (1975) described an olivine-spinel intergrowth from 70275. These authors noted that the olivines in 70275 contained minute (1-2pm) high-Cr grains, having a high index of refraction, occurring in straight or curved subparallel rows. These high-Cr grains are considered to decorate existing dislocations within the olivine. This type of intergrowth was termed "Type F" by Bell et al. (1975). Brown et al. 1975a,b) described the mineral chemistry of 70275 within the context of their Type 1A basalts, not specifically mentioning this sample. From the general classification of Brown et al. (1975ab), olivines range from $FO_{70-80,}$ and pyroxenes are typically titanaugites containing up to 9.4 wt% $A1_2O_3$ and 8.5 wt% TiO_2. Little zonation is present within these clinopyroxenes. Cr-spinels, armalcolite, and ilmenite are generally homogeneous.

WHOLE-ROCK CHEMISTRY

Rhodes et al. (1976) reported the major element composition of 70275 (Table 1), noting that it contained 11.9 wt% TiO_2 and a MG# of 36.8. These authors described 70275 as a Type B Apollo 17 high-Ti basalt. This sample can be further classified as a Type B2 basalt using the criteria of Neal et al. (1990). Shih et al. (1975) reported the trace element contents of this basalt (Table 1). The REE profile (Fig. 2) is convex-upward with a negative Eu anomaly ($[Eu/Eu^*]_N$ = 0.47). The MREE reach approximately 45-50 times chondritic values. Gibson et al. (1976ab) reported the sulfur abundance in 70275 as being 1850 ± 30 lag S/g.

ISOTOPES

The present day $^{87}Sr/^{86}Sr$ ratio of 70275 has been reported by Nyquist et al. (1975) (see Table 2). No age dating or other radiogenic isotope determinations have been conducted on this sample. Also, no stable isotope work has been carried out on 70275. Much of the isotope work undertaken on this basalt was concerned with cosmic-ray induced radionuclide abundances (Drozd et al., 1977; Keith et al., 1974a,b; LSPET, 1973; Yokoyama et al., 1974) (Table 3). Drozd et al. (1977) reported an exposure age for 70275 of 109±2 Ma and Yokoyama et al. (1974)

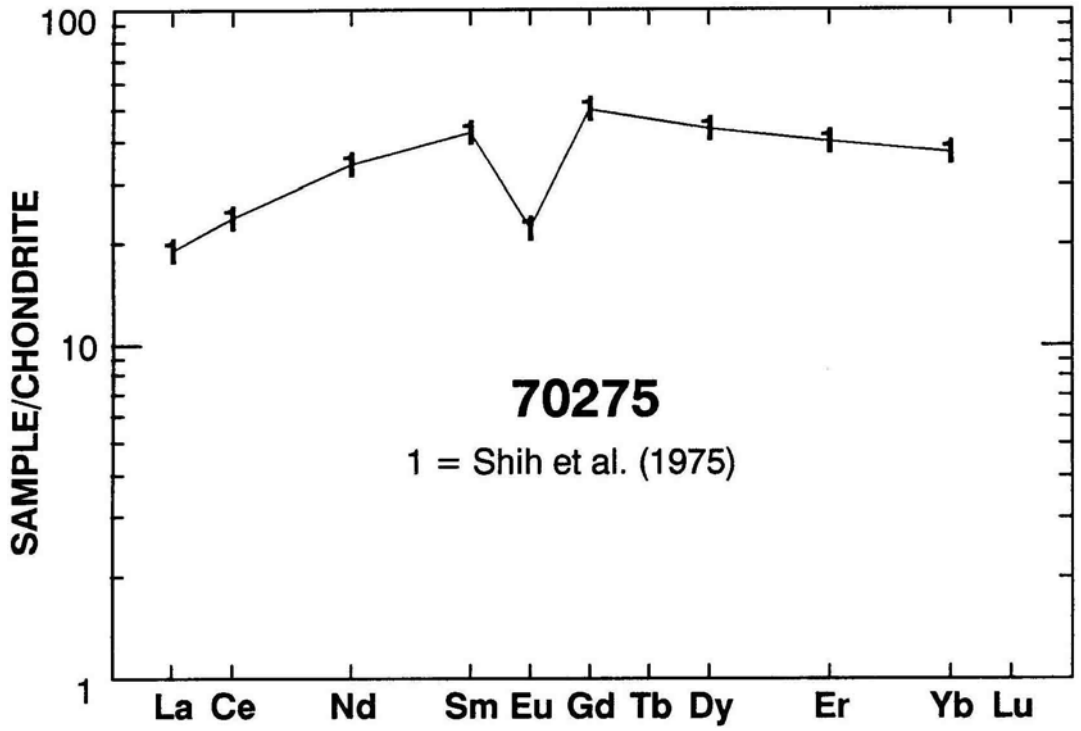

Figure 2: Chondrite -normalized rare-earth element profile of 70275.

Table 1: Whole-rock chemistry of 70275.

	,3 1 I,N	,3 2 X		,3 1 I,N	,3 2 X
SiO_2 (wt %)		39.37	Cu		
TiO_2		11.90	Ni		
Al_2O_3		10.23	Co	15.7	
Cr_2O_3		0.26	V		
FeO		18.61	Sc	85.0	
MnO		0.28	La	6.32	
MgO		6.09	Ce	20.8	
CaO		11.65	Nd	21.8	
Na_2O		0.38	Sm	8.75	
K_2O	0.04	0.06	Eu	1.73	
P_2O_5		0.08	Gd	14.0	
S		0.15	Tb		
Nb (ppm)			Dy	15.2	
Zr	219		Er	9.14	
Hf			Yb	8.3	
Ta			Lu		
U	0.14		Ga		
Th			F		
W			Cl		
Y			C		
Sr	153		N		
Rb	0.454		H		
Li	8.7		He		
Ba	73.5		Ge (ppb)		
Cs			Ir		
Be			Au		
Zn			Ru		
Pb			Os		

1 = Shih et al. (1975); 2 = Rhodes et al. (1976).

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

Table 2: Sr isotope composition of 70275. Data from Nyquist et al. (1975).

	70275,3
wt. (mg)	50
Rb (ppm)	0.454
Sr (ppm)	153
$^{87}Rb/^{86}Sr$	0.0086 ± 3
$^{87}Sr/^{86}Sr$	0.69955 ± 6
T_B	3.7 ± 0.6
T_L	4.2 ± 0.6

B = Model age relative to BABI
L = Model age relative to LUNI

Table 3: Cosmic ray abundances 70275.

	1	2
Th (ppm)	0.42 ± 0.04	0.43 ± 0.04
U (ppm)	0.107 ± 0.008	0.120 ± 0.013
K (%)	0.0421 ± 0.0018	0.043 ± 0.006
^{26}Al (dpm/kg)	92 ± 9	91 ± 5
^{22}Na (dpm/kg)	90 ± 16	84 ± 5
^{54}Mn (dpm/kg)	190 ± 50	180 ± 30
^{56}Co (dpm/kg)	200 ± 20	220 ± 20
^{46}Sc (dpm/kg)	35 ± 4	83 ± 20
^{48}V (dpm/kg)	32 ± 15	32 ± 15
^{60}Co (dpm/kg)	0.17 ± 0.08	
Th/U	3.9 ± 0.5	3.6
K/U	3900 ± 300	3600

1 = LSPET (1973); 2 = Keith et al. (1974).

Demonstrated that 70275 was saturated with respect to ^{26}Al

EXPERIMENTAL

O'Hara and Humphries (1975) conducted melting and crystallization experiments upon 70275 in order to determine the phase chemistry. They noted that this sample crystallized plagioclase At a higher temperature, and native Fe at higher oxygen fugacities than any other previously analyzed Apollo 17 high-Ti basalt

PROCESSING

Of the original 171 Ag of 70275, 125.1g remains of 70275,0 and 28.968 of 70275,1. Most of the subdivisions have been carried out on 70275,2_6 (entirely subdivided), and ,7 (entirely subdivided). Eight thin sections have been made, their numbers being 70275,18 ,32-38.