

15683 FINE-GRAINED OLIVINE-NORMATIVE ST. 9A 22.00 g
MARE BASALT

INTRODUCTION: 15683 is a fine-grained, olivine porphyritic mare basalt which is vuggy (Fig. 1). In chemistry it is an average-to-evolved Apollo 15 olivine-normative mare basalt. It has an ^{40}Ar - ^{39}Ar plateau age of 3.27 ± 0.06 b.y. The sample is coherent but with a few non-penetrative fractures. 15683 was collected as part of the rake sample from Station 9A.

PETROLOGY: 15683 is a fine-grained, olivine-phyric mare basalt (Fig. 2). The olivines are less than 1 mm across. Pyroxenes and small olivines are granular and partly enclosed by plagioclase, which are generally irregular laths up to 1 mm long. Cristobalite, fayalite, chromite, ulvospinel, and ilmenite are also present. Steele et al. (1980) reported analyses for minor elements made with the ion probe: 14 ppm Li, 1330 ppm Mg, 380 ppm K, 325 ppm Ti, 290 ppm Sr, and 20 ppm Ba for a composition of $\text{An}_{90.5}$. The data are similar to those of other mare basalts.



Figure 1. Pre-chip view of 15683. S-71-49887

CHEMISTRY: Bulk analyses are listed in Table 1 and the rare earths shown in Figure 3. The sample is an Apollo 15 olivine-normative basalt; the high Ti, the rare earths, and the low MgO indicate that it is a rather evolved variety.

RADIOGENIC ISOTOPES AND GEOCHRONOLOGY: Husain et al. (1972) reported an ^{40}Ar - ^{39}Ar plateau age of 3.27 ± 0.06 b.y., and a K-Ar age of 2.86 b.y. Husain (1974) presented the Ar stepwise-heating release isotopic data and revised the plateau age to 3.36 ± 0.03 b.y. Only 29% of the argon is released in the plateau region. 23% of the $^{40}\text{Ar}^*$ had been lost and the K-Ar age was 2.95 ± 0.07 b.y.

RARE GAS AND EXPOSURE: Husain et al. (1972) reported a ^{38}Ar -Ca exposure age of 290 ± 19 m.y., revised to 310 ± 14 m.y. by Husain (1974) in which the Ar stepwise heating release isotopic data are tabulated.

PROCESSING AND SUBDIVISIONS: Chipping produced pieces ,1 to ,4. ,2 was used to produce thin sections ,2 and ,8. Other chips were used for chemical and isotopic analyses. ,0 is now 19.25 g.

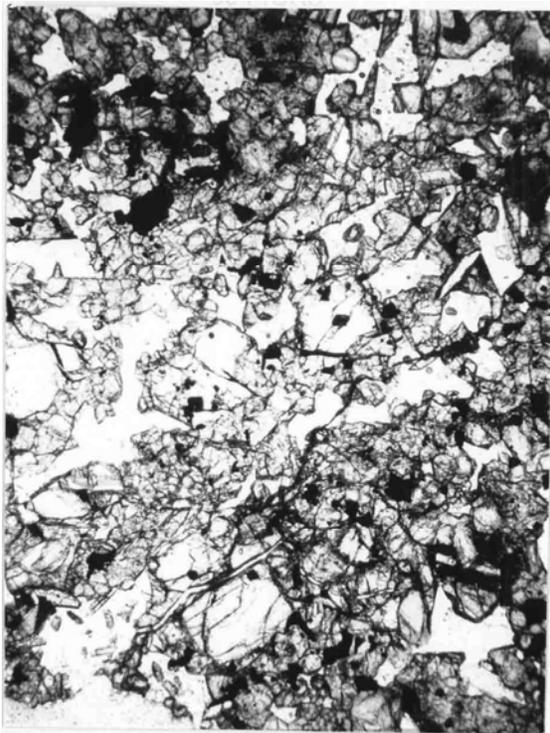


Fig. 2a



Fig. 2b

Figure 2. Photomicrographs of 15683,8. Widths about 3 mm.
a) transmitted light; b) crossed polarizers.

TABLE 15683-1. Bulk rock chemical analyses

		,4	,3	
Wt %	SiO ₂	45.8		
	TiO ₂	2.91		
	Al ₂ O ₃	8.04		
	FeO	22.8		
	MgO	9.60		
	CaO	9.37	9.2	
	Na ₂ O	0.297		
	K ₂ O	0.053	0.041	
	P ₂ O ₅			
	(ppm)	Sc	40.5	
		V		
Cr		3970		
Mn		2130		
Co		49		
Ni				
Rb		0.8		
Sr				
Y				
Zr				
Nb				
Hf		2.5		
Ba				
Th				
U				
Pb				
La		5.26		
Ce		14.6		
Pr				
Nd		11.1		
Sm		4.20		
Eu		0.98		
Gd		5.6		
Tb		0.93		
Dy		5.96		
Ho		1.06		
Er		2.9		
Tm				
Yb		2.44		
Lu		0.362		
Li				
Be				
B				
C				
N				
S				
F				
Cl				
Br				
Cu				
Zn	3(a)			
(ppb)	I			
	At			
	Ga	4100		
	Ge			
	As			
	Se			
	Mo			
	Tc			
	Ru			
	Rh			
	Pd			
	Ag			
	Cd			
	In			
	Sn			
	Sb			
	Te			
	Cs	38		
	Ta			
	W			
	Re			
	Os			
	Ir			
	Pt			
Au				
Hg				
Tl				
Bi				

References and methods:

- (1) Helmke *et al.* (1973); INAA, RNAA, AAS.
- (2) Husain (1974); Ar-isotopes, irradiation.

Notes:

(a) ± 1 ppm

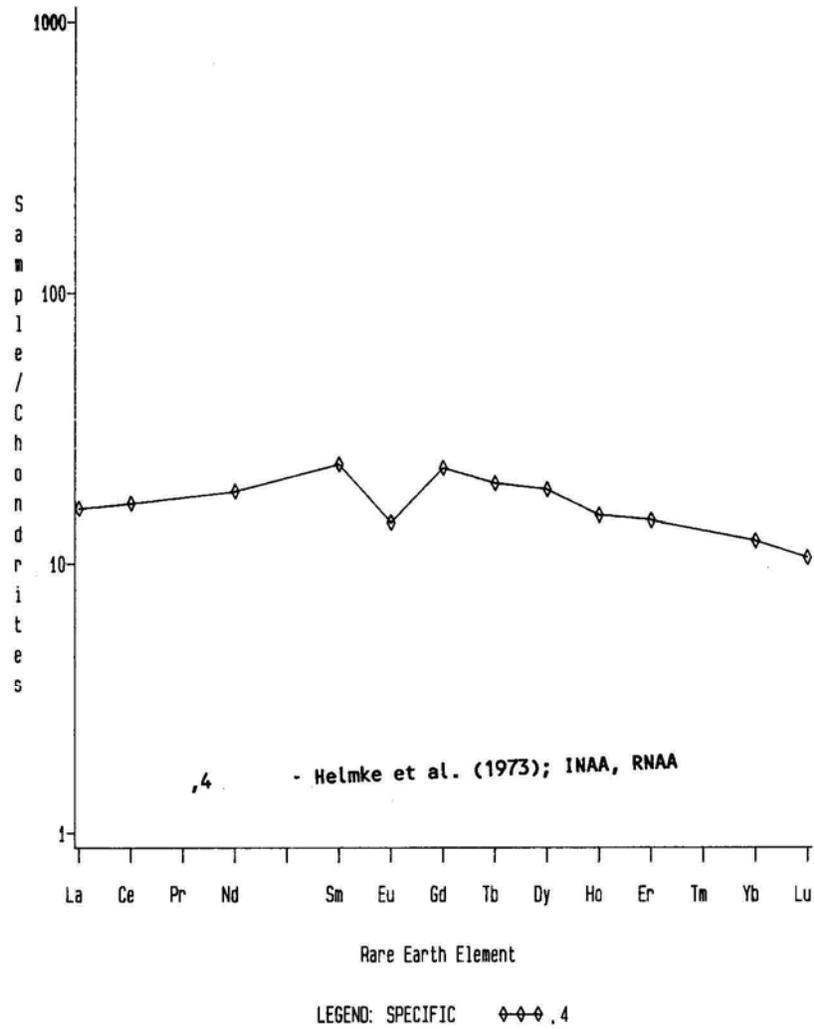


Figure 3. Rare earths in 15683.

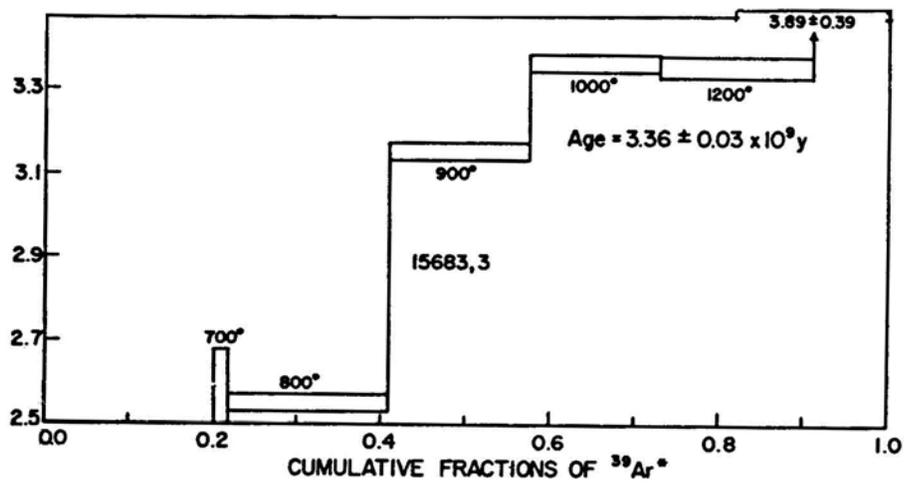


Figure 4. ^{40}Ar - ^{39}Ar plateau age for 15683 (Husain, 19741).