

15658 MEDIUM-GRAINED OLIVINE-NORMATIVE ST. 9A 11.60 g
MARE BASALT

INTRODUCTION: 15658 is an olivine-bearing, medium-grained, vesicular and vuggy mare basalt (Fig. 1). In chemistry, it is an average member of the Apollo 15 olivine-normative mare basalt group. The sample is rounded and one side has a moderate density of zap pits. It appears that the sample occupied only one position on the lunar surface. One side is a fresh fracture surface. 15658 was collected as part of the rake sample at Station 9A.



Figure 1. Pre-chip view of 15658. S-71-49532

PETROLOGY: 15658 is a medium-grained, olivine-bearing basalt (Fig. 2). Pigeonites range from 1 to 2 mm long and are twinned and zoned. Most plagioclases form stubby crystals up to about 1 mm, some of which are hollow. Some radial growth of plagioclase and pyroxene is present. Olivine forms scattered anhedral phenocrysts, and smaller grains are present, many as inclusions in pigeonite, cristobalite, fayalite, and a range of opaque phases including chromite, ulvospinel, and ilmenite are present.

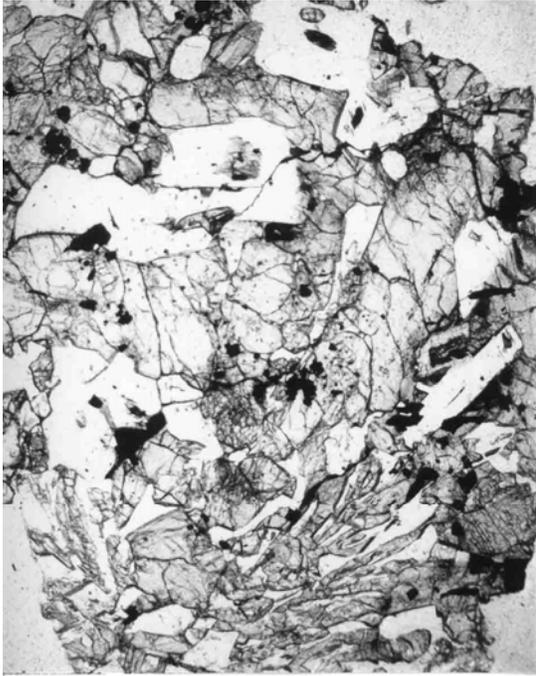


Fig. 2a



Fig. 2b

Figure 2. Photomicrographs of 15658,2.
Widths about 3 mm. a) transmitted light; b) crossed polarizers.

CHEMISTRY: Bulk chemical analyses (Table 1) are consistent with each other and demonstrate that 15658 is a fairly average member of the Apollo 15 olivine-normative mare basalt group. It has a typical rare earth pattern (Fig. 3). The consistency is perhaps surprising considering the grain-size and the small sample size (60 mg) used by Helmke et al. (1973). Chappell et al. (1973) on the basis of the similar chemistry suggested that 15658, 15668, and 15674 were chips of the same original rock, and for purposes of discussion averaged their analyses. However, both 15668 and 15674 are much finer-grained than 15658.

PHYSICAL PROPERTIES: Gose et al. (1972) and Pearce et al. (1973) measured a natural magnetic intensity (NRM) of 0.7×10^{-6} emu/g for the bulk sample. This is on the low end of the range for Apollo 15 mare basalts and more like anorthosite 15415.

PROCESSING AND SUBDIVISIONS: Chipping produced ,1 (two chips) and ,2 (one chip). ,2 was used to make thin sections ,2 and ,10. One of the chips of ,1 was split to make ,3 and ,4, used for chemical analyses. ,0 is now 6.51 g.

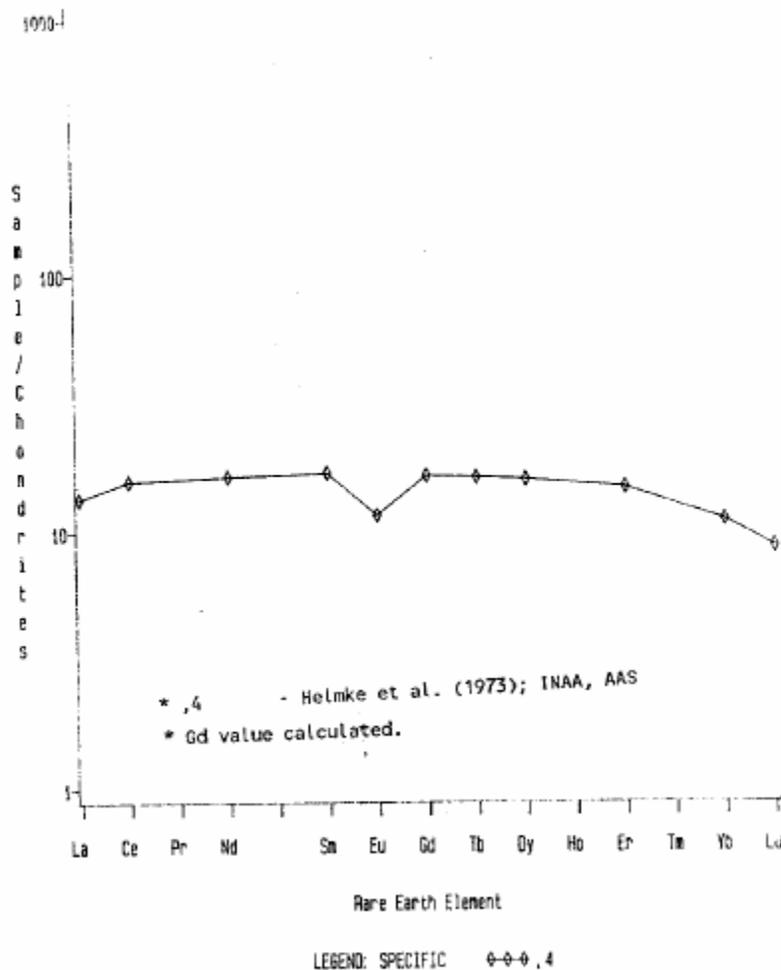


Figure 3. Rare earths in 15658

TABLE 15658-1. Bulk rock chemical analyses

		,3	,4
wt%	SiO ₂	45.09	46.5
	TiO ₂	2.50	2.69
	Al ₂ O ₃	9.02	9.11
	FeO	22.59	22.5
	MgO	9.73	10.0
	CaO	10.11	10.0
	Na ₂ O	0.28	0.257
	K ₂ O	0.04	0.049
	P ₂ O ₅	0.07	
	(ppm)	Sc	
V			
Cr		3630	
Mn		2405	2150
Co			50
Ni			
Rb			
Sr			
Y			
Zr			
Nb			
Hf			2.0
Ba			
Th			
U			
Pb			
La			4.5
Ce			14.0
Pr			
Nd			9.9
Sm			3.09
Eu			0.81
Gd			
Tb			0.77
Dy			5.1
Ho			
Er			3.0
Tm			
Yb		2.24	
Lu		0.30	
Li			
Be			
B			
C			
N			
S	500		
F			
Cl			
Br			
Cu			
Zn			
(ppb)	I		
	Ni		
	Ge		
	Se		
	As		
	Mo		
	Tc		
	Ru		
	Rh		
	Pd		
	Ag		
	Cd		
	In		
	Sn		
	Sb		
	Te		
	Cs		
	Ta		
	W		
	Re		
	Os		
	Ir		
	Pt		
	Au		
	Hg		
	Tl		
	Pb		

References and methods:

- (1) Chappell and Green (1973); XRF
- (2) Helmke et al. (1973); INAA, AAS

(1) (2)