

15666

Porphyritic Pigeonite Basalt

10.1 grams



Figure 1: Photo of 15666. Cube is 1 cm. S71-49757.

Introduction

15666 was collected as part of the large rake sample from station 9a, on the rim of Hadley Rille. It is a pyroxene-phyric basalt with a variolitic groundmass (figure 2). It also includes some olivine.

Petrography

Dowty et al. (1973, 1974) and Nehru et al. (1974) studied the pyroxene phenocrysts (figure 3). They are euhedral, elongate and chemically zoned, with distinct boundaries. Vesicles and metallic iron grains are present. The groundmass is finely crystalline.

15666 was rapidly cooled. Using controlled experiments, Lofgren et al. (1974, 1975) and Grove and Walker (1977) determined the cooling rate and concluded that the rock formed about 15 cm from a “conductive boundary”.

Chemistry

Ma et al. (1976) give an analysis.

Processing

There are two thin sections of 15666.

Mineralogical Mode

Olivine	2 %
Pyroxene	40
Plagioclase	
Opagues	5
Silica	
Meostasis	53
Dowty et al. 1973	

References for 15666

Butler P. (1971) Lunar Sample Catalog, Apollo 15. Curators' Office, MSC 03209

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Dowty E., Prinz M. and Keil K. (1973b) Composition, mineralogy, and petrology of 28 mare basalts from Apollo 15 rake samples. *Proc. 4th Lunar Sci. Conf.* 423-444.

Grove T.L. and Walker D. (1977) Cooling histories of Apollo 15 quartz-normative basalts. *Proc. 8th Lunar Sci. Conf.* 1501-1520.

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LSPET (1972a) The Apollo 15 lunar samples: A preliminary description. *Science* **175**, 363-375.

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Ma M.-S., Murali A.V. and Schmitt R.A. (1976) Chemical constraints for mare basalt genesis. *Proc. 7th Lunar Sci. Conf.* 1673-1695.

Nehru C.E., Prinz M., Dowty E. and Keil K. (1974) Spinel-group minerals and ilmenite in Apollo 15 rake samples. *Am. Mineral.* **59**, 1220-1235.

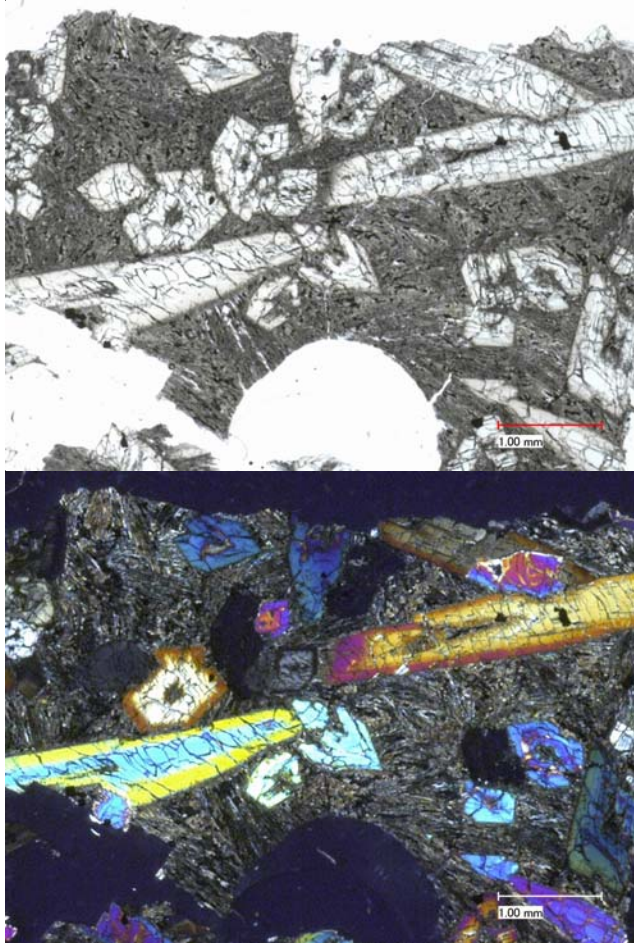


Figure 2: Photomicrographs of thin section 15666,8 by C Meyer @50x.

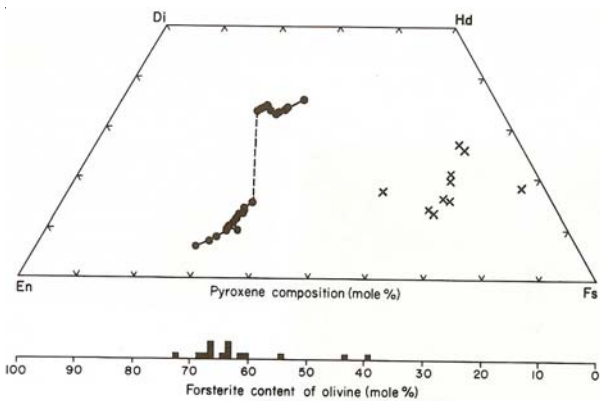


Figure 3 : Pyroxene and olivine composition of 15666 (Dowty et al. 1973)

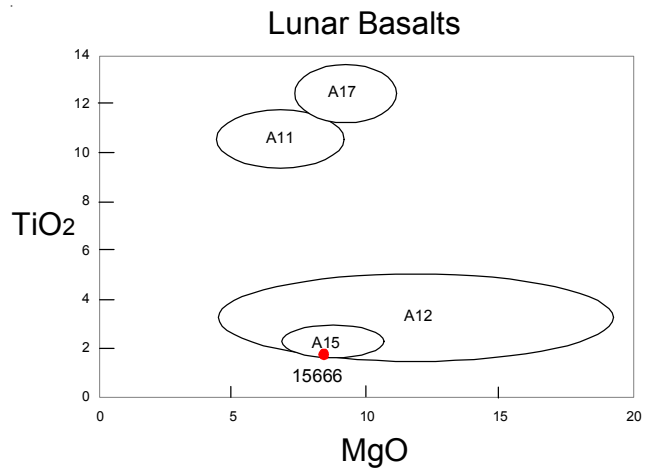


Figure 4: Chemical composition of 15666 compared with other Apollo basalts.

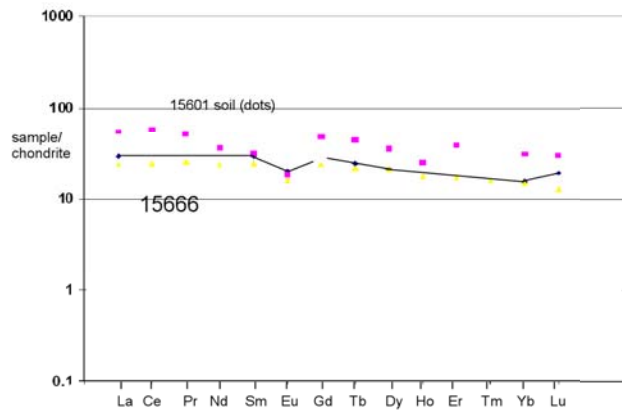


Figure 5: Normalized rare-earth-element diagram for 15666, with 15601 soil for comparison.

Ryder G. (1985) Catalog of Apollo 15 Rocks (three volumes). Curatorial Branch Pub. # 72, JSC#20787

Swann G.A., Hait M.H., Schaber G.C., Freeman V.L., Ulrich G.E., Wolfe E.W., Reed V.S. and Sutton R.L. (1971b) Preliminary description of Apollo 15 sample environments. U.S.G.S. Interagency report: 36. pp219 with maps

Swann G.A., Bailey N.G., Batson R.M., Freeman V.L., Hait M.H., Head J.W., Holt H.E., Howard K.A., Irwin J.B., Larson K.B., Muehlberger W.R., Reed V.S., Rennison J.J., Schaber G.G., Scott D.R., Silver L.T., Sutton R.L., Ulrich G.E., Wilshire H.G. and Wolfe E.W. (1972) 5. Preliminary Geologic Investigation of the Apollo 15 landing site. In Apollo 15 Preliminary Science Rpt. NASA SP-289. pages 5-1-112.

Table 1. Chemical composition of 15666.

reference weight	Ma76	Dowty73	
SiO ₂ %		46.9	(b)
TiO ₂	2.3	(a) 1.97	(b)
Al ₂ O ₃	10.3	(a) 9.2	(b)
FeO	21.3	(a) 21.3	(b)
MnO	0.265	(a)	(b)
MgO	7.2	(a) 9.5	(b)
CaO	10.2	(a) 9.7	(b)
Na ₂ O	0.372	(a) 0.37	(b)
K ₂ O	0.063	(a) 0.02	(b)
P ₂ O ₅		0.08	(b)
S %			
sum			
Sc ppm	42	(a)	
V	176	(a)	
Cr	3320	(a) 3015	(b)
Co	37	(a)	
Ni	49	(a)	
Cu			
Zn			
Ga			
Ge ppb			
As			
Se			
Rb			
Sr			
Y			
Zr			
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba	40	(a)	
La	6.8	(a)	
Ce			
Pr			
Nd			
Sm	4.3	(a)	
Eu	1.12	(a)	
Gd			
Tb	0.88	(a)	
Dy	5.1	(a)	
Ho			
Er			
Tm			
Yb	2.5	(a)	
Lu	0.47	(a)	
Hf	3.2	(a)	
Ta			
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm	0.41	(a)	
U ppm			

technique (a) INAA, AA (b) broad-beam e-probe

