

15105

Olivine-phyric Basalt

5.6 grams



Figure 1: Photo of 15105 with 1 inch cube for scale. S71-43408.

Introduction

According to Swann et al. (1972), lunar basalt 15105 was a small rock (peanut) collected with soil from station 2 at Apollo 15 (figure 1). It is a fine-grained, olivine-normative mare basalt with relic olivine phenocrysts (figure 2).

Petrography

Dowty et al. (1973) determined the composition of minerals in 15105. Plagioclase is An₉₀, relic resorbed olivine phenocrysts are Fo₆₀₋₇₀, while fayalite is found in mesostasis, pyroxene is highly zoned (figure 3). Metallic Ni-Fe grains have 1.5-2.3% Co and 4.4-8.2% Ni. Opaques include ilmenite, chromite and ulvospinel.

Chemistry

Ma et al. (1976) determined the chemical composition of 15105 (table). It is similar to other Apollo 15 mare basalt samples (figures 4 and 5).

References for 15105

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

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.

Dowty E., Keil K. and Prinz M. (1974c) Lunar pyroxene-phyric basalts: Crystallization under supercooled conditions. *J. Petrology* **15**, 419-453.

Dowty E., Conrad G.H., Green J.A., Hlava P.F., Keil K., Moore R.B., Nehru C.E. and Prinz M. (1973a) Catalog of

Mineralogical Mode

Olivine	4
Pyroxene	63
Plagioclase	24
Opaques	8
Silica	0.4
Mesostasis	0.6

Apollo 15 rake samples from stations 2 (St. George), 7 (Spur Crater) and 9a (Hadley Rille). *Inst. Meteoritics Spec. Publ. No 11*, 51-73. Univ. New Mex. ABQ.

Lofgren G.E., Donaldson C.H. and Usselman T.M. (1975) Geology, petrology and crystallization of Apollo 15 quartz-normative basalts. *Proc. 6th Lunar Sci. Conf.* 79-99.

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

LSPET (1972b) Preliminary examination of lunar samples. Apollo 15 Preliminary Science Report. NASA SP-289, 6-1—6-28.

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.

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., Rennilson 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.

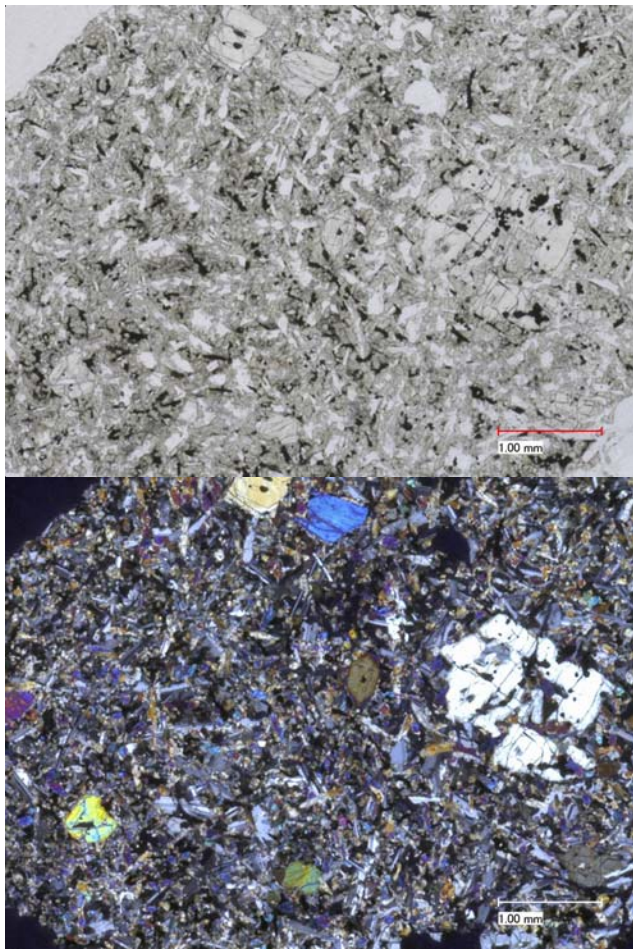


Figure 2: Photomicrographs of thin section 15105,6 by C Meyer @50x. Note ragged olivine phenocryst.

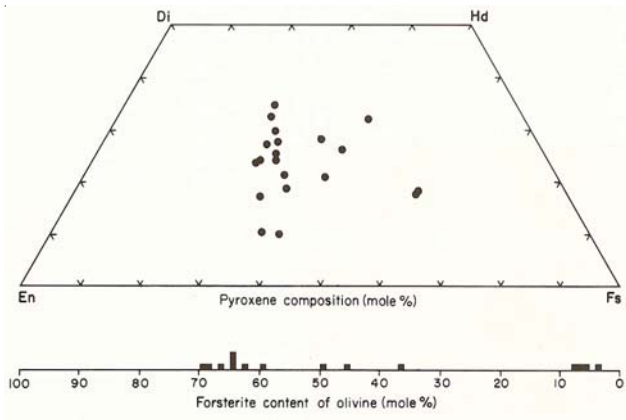


Figure 3: Pyroxene and olivine in 15105 (Dowty et al. 1973).

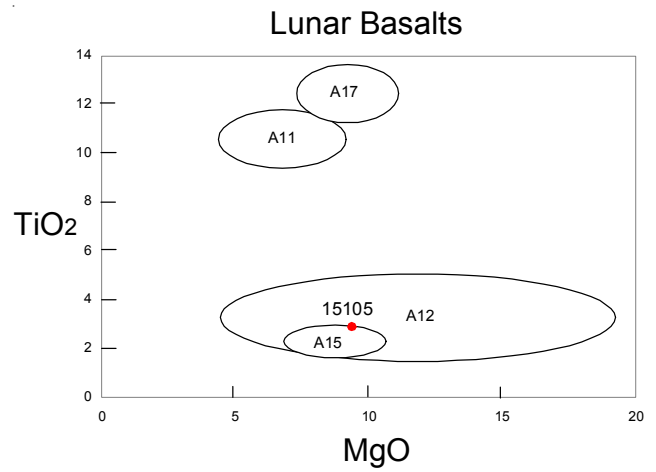


Figure 4: Composition of 15105 compared with other Apollo basalts.

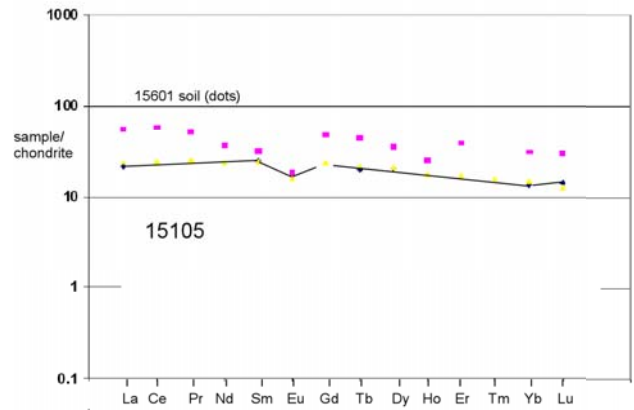


Figure 5: Normalized rare-earth-element diagram for 15105, with 15601 soil for comparison.

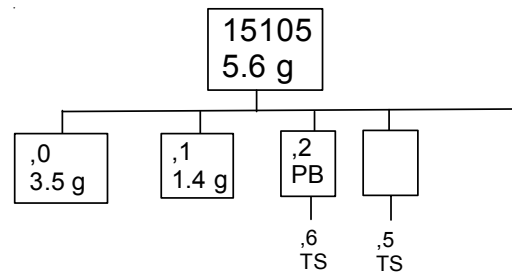


Table 1. Chemical composition of 15105.

reference	Dowty73	Ma76	
<i>weight</i>			
SiO ₂ %	45.9	(b)	
TiO ₂	2.97	(b) 3	(a)
Al ₂ O ₃	8.2	(b) 8.5	(a)
FeO	21.7	(b) 21.8	(a)
MnO	0.24	(b) 0.28	(a)
MgO	9	(b) 9.3	(a)
CaO	10.2	(b) 8.9	(a)
Na ₂ O	0.32	(b) 0.358	(a)
K ₂ O	0.03	(b) 0.047	(a)
P ₂ O ₅	0.09	(b)	
<i>S %</i>			
<i>sum</i>			

Sc ppm	42	(a)
V	204	(a)
Cr	4037	(a)
Co	44	(a)
Ni	<66	(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	80	(a)
La	5	(a)
Ce		
Pr		
Nd		
Sm	3.6	(a)
Eu	0.97	(a)
Gd		
Tb	0.71	(a)
Dy	4.9	(a)
Ho		
Er		
Tm		
Yb	2.2	(a)
Lu	0.34	(a)
Hf	3.1	(a)
Ta	0.45	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) INAA

