

# 15661

## Porphyritic Olivine-normative Basalt

5.9 grams



Figure 1: Photo of 15661. Cube is 1 cm for scale. S71-49527.

### Introduction

15661 was collected as a rake sample from the Terrace on Hadley Rille (station 9a, Apollo 15). It has a rounded surface from micrometeorite bombardment (and is sort of shaped like a golf ball). However, it is vesicular, vuggy and has a few olivine phenocrysts; typical of olivine-normative basalts.

### Petrography

Ryder (1985) provided the only description; “15661 is a fine- to medium-grained microgabbroic mare basalt with about 60% pyroxene (figure 2). Rare olivine phenocrysts reach about 1.5 mm, are anhedral, and contain crystallized silicate melt inclusions. Most pyroxenes and olivines are less than 0.5 mm across. The pyroxenes and olivines tend to be granular and the plagioclases to be hollow laths which are not euhedral. A few variolitic areas are present. Chromite forms cores to some ulvospinel. Cristobalite, (sieved) fayalite, ilmenite, sulfide, and some glass is present.”

### Chemistry

Ma et al. (1978) provided the only analysis.

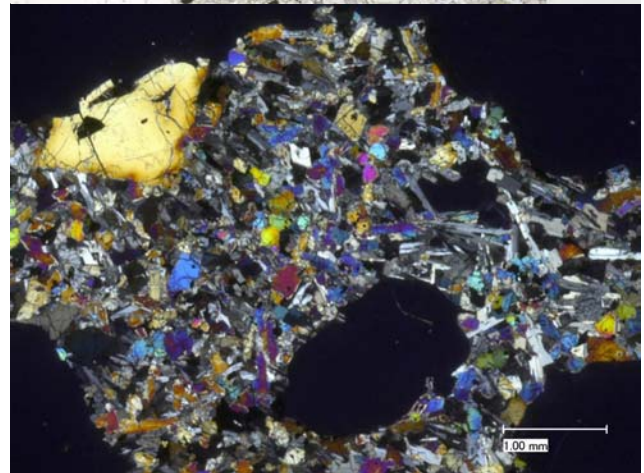
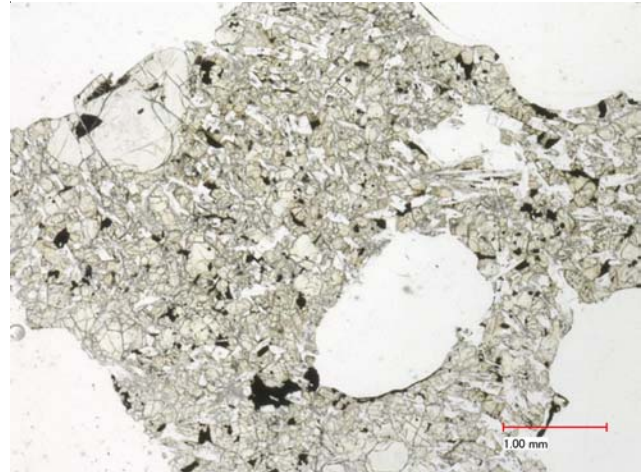


Figure 2: Photomicrographs of thin section 15661,13 by C Meyer @ 50x.

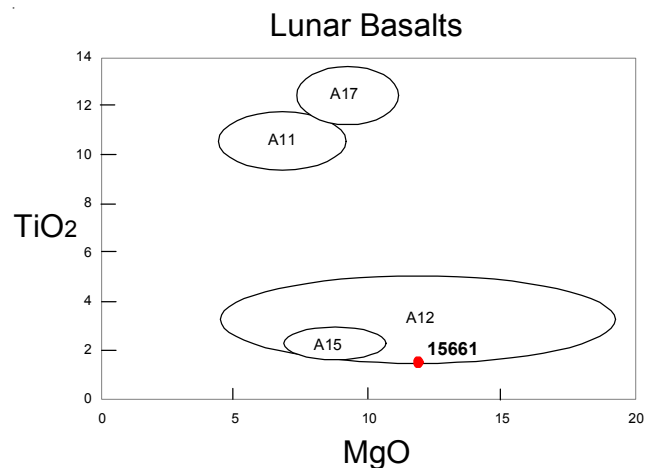


Figure 3: Chemical composition of 15661 compared with other Apollo basalts.

**Table 1. Chemical composition of 15661.**

reference	Ma78	
weight		
SiO <sub>2</sub> %		
TiO <sub>2</sub>	1.9	(a)
Al <sub>2</sub> O <sub>3</sub>	8.7	(a)
FeO	21.9	(a)
MnO	0.257	(a)
MgO	12	(a)
CaO	8.6	(a)
Na <sub>2</sub> O	0.25	(a)
K <sub>2</sub> O	0.036	(a)
P <sub>2</sub> O <sub>5</sub>		
S %		
sum		
Sc ppm	35	(a)
V	186	(a)
Cr	4468	(a)
Co	51	(a)
Ni	80	(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	70	(a)
La	5.1	
Ce		
Pr		
Nd		
Sm	3.3	(a)
Eu	0.78	(a)
Gd		
Tb	0.7	(a)
Dy	4.3	(a)
Ho		
Er		
Tm		
Yb	2	(a)
Lu	0.25	(a)
Hf	2.5	(a)
Ta	0.41	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		
technique:	(a) INAA	

**References for 15661.**

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

Lofgren G.E., Donaldson C.H. and Usselman T.M. (1975) Geology, petrology and crystallization of Apollo 15 quartz-normative basalts. *Proc. 6<sup>th</sup> 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., Schmitt R.A., Warner R.D., Taylor G.J. and Keil K. (1978) Genesis of Apollo 15 olivine normative mare basalts: Trace element correlations. *Proc. 9<sup>th</sup> Lunar Sci. Conf.* 523-533.

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.

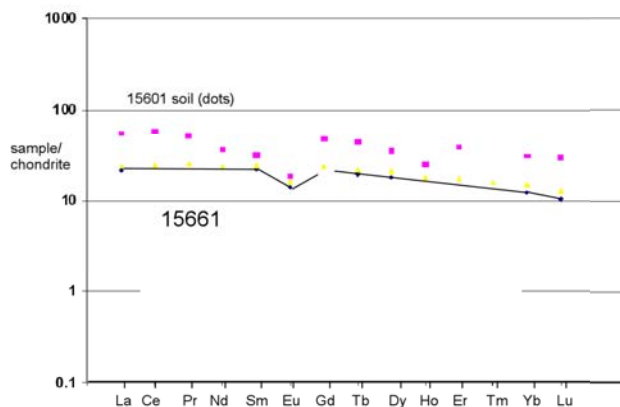


Figure 4; Normalized rare-earth-diagram for 15661, with soil 15601 for comparison.