

15648 and 15649

Shocked Basalt

9.1 and 6.2 grams



Figure 1: Photo of 15648. Cube is 1 cm. S71-49774.



Figure 2: Photo of 15649. Cube is 1 cm.. S71-49588.

Introduction

The large rake sample collected at station 9a, Apollo 15 included these two samples (see section on 15614). 15648 is brecciated and partially shock-melted and 15649 may also be shocked. They are members of the olivine-normative clan of Apollo 15 basalts.

Petrography

Ryder (1985) gives the only descriptions of 15648 and 15649. 15648 is brecciated and consists of crushed mineral debris surrounded by dark-brown glassy mesostasis. Remnants of the original microgabbroic texture are present (figure 3). Although 15649 is not brecciated, it appears to be “shock-fractured” (figure 4). Plagioclase has not been maskelytenized. Opaque phases include chromite, ulvospinel, ilmenite, Fe metal and troilite. Mg-rich olivine phenocrysts are fractured. Fayalite is present in mesostasis.

Chemistry

The chemical composition of 15648 and 15649 was determined by Ma et al. (1978) (figures 5 and 6). There is no evidence of contamination.

Other Studies

Gose et al. (1972) and Pearce et al. (1973) reported magnetic properties.

Processing

There is only one thin section of 15648, but three for 15649.

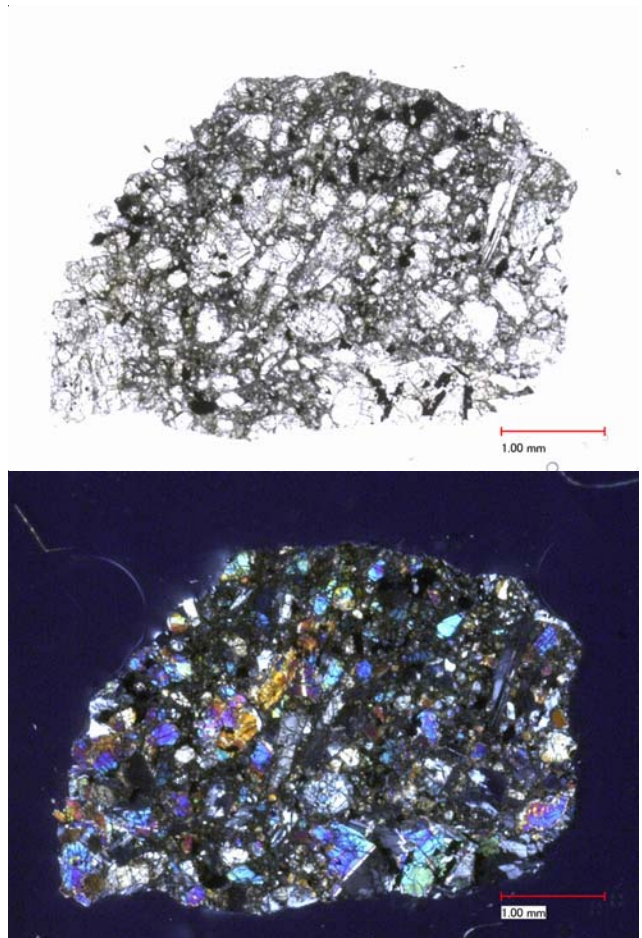


Figure 3: Photomicrograph of thin section 15648,5 by C Meyer @50x

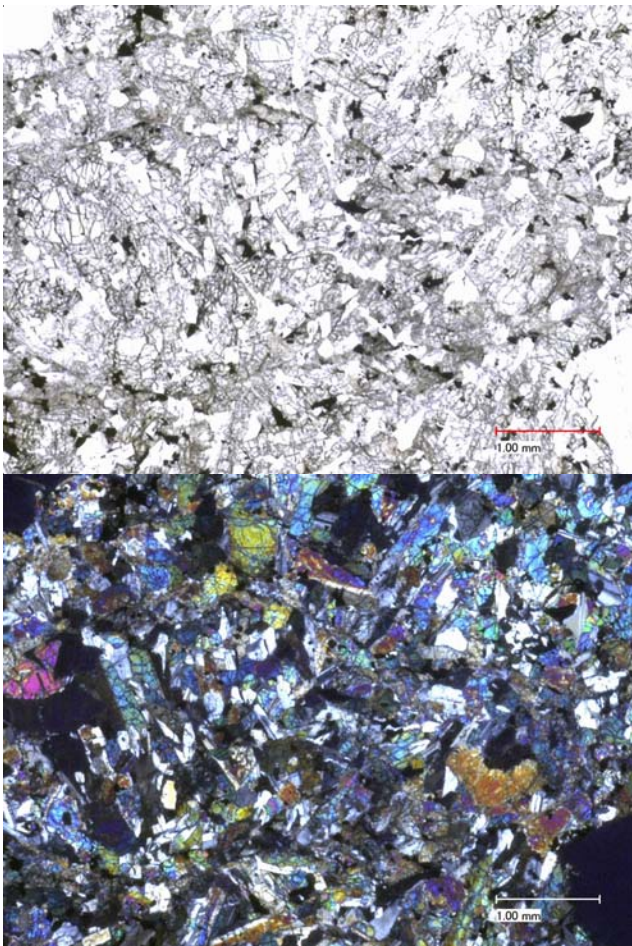


Figure 4: Photomicrograph of thin section 15649,4 by C Meyer @50x

References for 15648 and 15649.

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

Gose W.A., Pearce G.W., Strangway D.W. and Carnes J. (1972) Magnetism of Apollo 15 samples. In **The Apollo 15 Lunar Samples**, 415-417.

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., 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. 9th Lunar Sci. Conf.* 523-533.

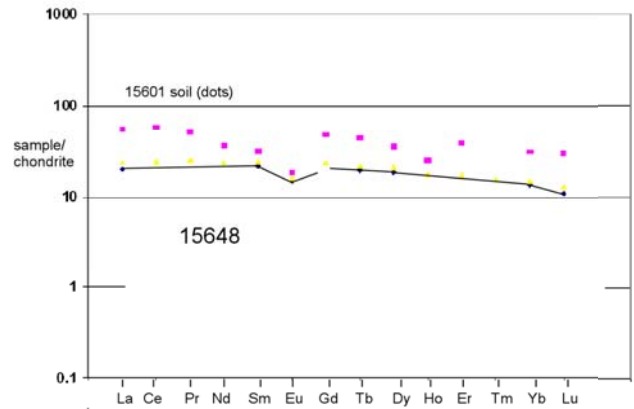


Figure 5: Normalized rare-earth-element diagram for 15648.

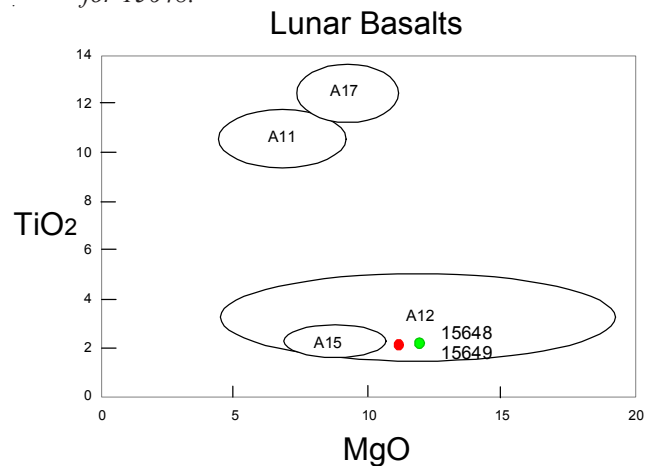


Figure 6: Chemical composition of 15648 and 15649 compared with other Apollo basalts.

Pearce G.W., Gose W.A. and Strangway D.W. (1973) Magnetic studies on Apollo 15 and 16 lunar samples. *Proc. 4th Lunar Sci. Conf.* 3045-3076.

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

Steele I.M., Smith J.V. and Grossman Larry (1972a) Mineralogy and petrology of Apollo 15 rake samples: I. Basalts. In **The Apollo 15 Lunar Samples** 158-160. Lunar Planetary Institute, Houston.

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

Table 1. Chemical composition of 15648 and 15649.

reference	15648		15649	
	Ma78		Ma78	
<i>weight</i>				
SiO ₂ %				
TiO ₂	2.2	(a)	2.2	(a)
Al ₂ O ₃	9.9	(a)	9.1	(a)
FeO	20.1	(a)	21.7	(a)
MnO	0.258	(a)	0.26	(a)
MgO	11	(a)	12	(a)
CaO	9.7	(a)	9.1	(a)
Na ₂ O	0.28	(a)	0.255	(a)
K ₂ O	0.041	(a)	0.042	(a)
P ₂ O ₅				
S %				
<i>sum</i>				
Sc ppm	44	(a)	38	(a)
V	196	(a)	174	(a)
Cr	3476	(a)	3585	(a)
Co	43	(a)	46	(a)
Ni	20	(a)	20	(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	4.7	(a)	6.1	(a)
Ce				
Pr				
Nd				
Sm	3.2	(a)	4.1	(a)
Eu	0.82	(a)	0.87	(a)
Gd				
Tb	0.7	(a)	0.8	(a)
Dy	4.5	(a)	5.1	(a)
Ho				
Er				
Tm				
Yb	2.2	(a)	2.5	(a)
Lu	0.26	(a)	0.37	(a)
Hf	2.1	(a)	2.8	(a)
Ta	0.39	(a)	0.48	(a)
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm				
U ppm				
<i>technique: (a) INAA</i>				

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.