

67636
Anorthosite
3.23 grams

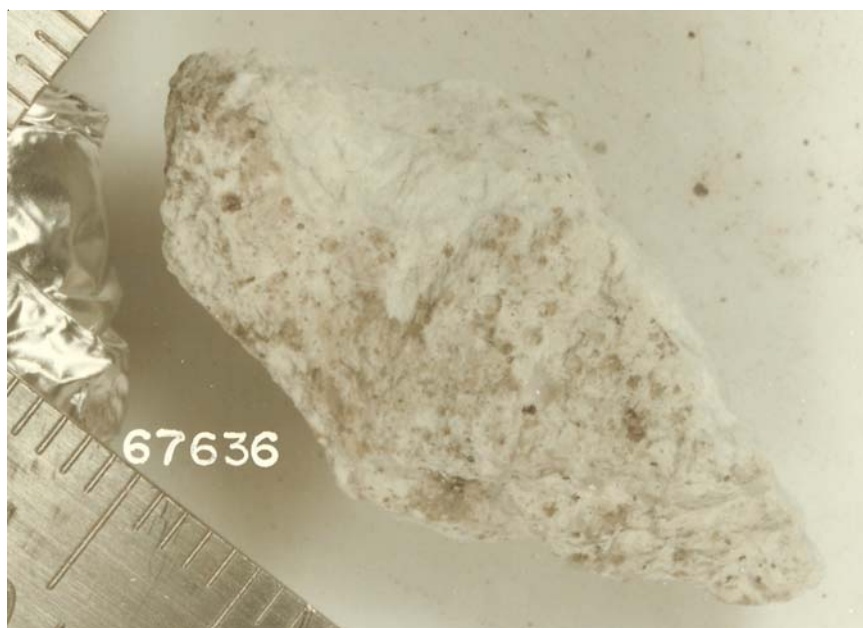


Figure 1: Photo of 67636. Scale in mm. S72-49551.

Introduction

67636 was collected as a rake sample from the SE rim of North Ray Crater in the vicinity of the White Breccia Boulders (67415 etc). It appears to be a piece of 67635.

Petrography

Warren and Wasson (1980) describe 67635, 67636 and 67637 as mildly-shocked “monomict breccia, perhaps slightly less cataclastic than is typical for ferroan anorthosite”. On side of 67636 has patina and numerous zap pits (Ryder and Norman 1980).

Mineralogical Mode for 67636

Olivine + Pyroxene	3.3 %
Plagioclase	96.4
Opakes	0.2

Mineralogy

The composition of pyroxene and olivine has been reported in Bersch et al. (1991) and Warren and Wasson (1980).

Plagioclase (An₉₅) in 67636 is up to 2 mm in size and mildly shocked.

Chemistry

Warren and Wasson (1980) found that 67635, 67636 and 67637 were “chemically pristine” with relatively low content of Ir and Au (figure 4).

Radiogenic age dating

None

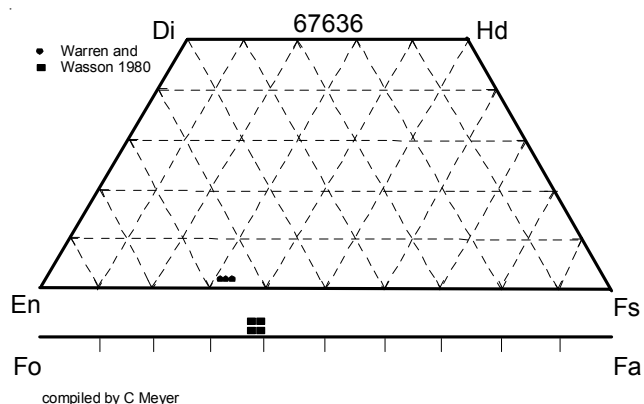


Figure 2: Pyroxene and olivine composition of 67636 (from Warren and Wasson 1980).

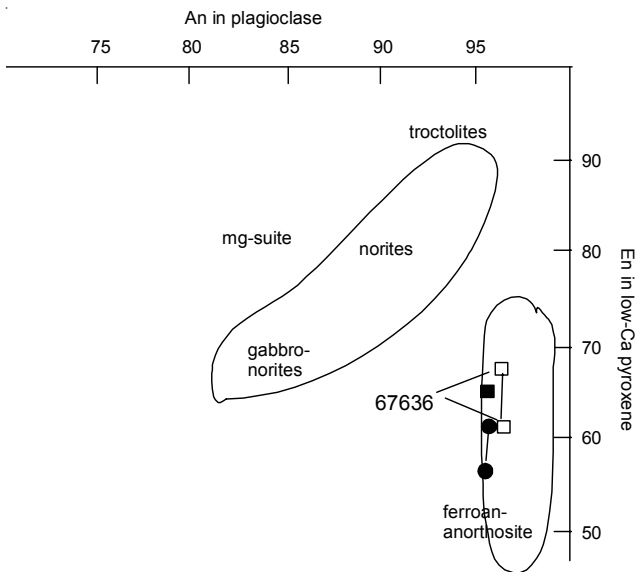


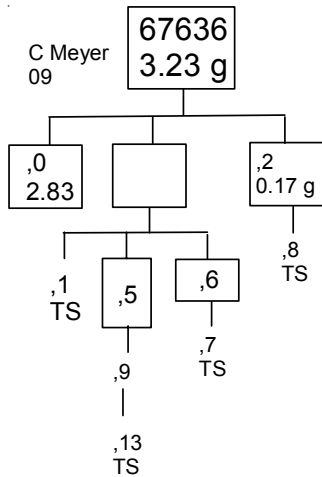
Figure 3: Plagioclase and pyroxene composition of 67635, 67636 and 67637 showing classification as “ferroan anorthosite”.

Other Studies

The samples of North Ray Crater were the subject of a consortium led by Dieter Stoffler.

Processing

There are seven thin sections of 67636.



References for 67636

Bersch M.G., Taylor G.J., Keil K. and Norman M.D. (1991) Mineral compositions in pristine lunar highland rocks and the diversity of highland magmatism. *Geophys. Res. Letters* 18, 2085-2088.

Butler P. (1972) Lunar Sample Information Catalog Apollo 16. Lunar Receiving Laboratory. MSC 03210 Curator’s Catalog. pp. 370.

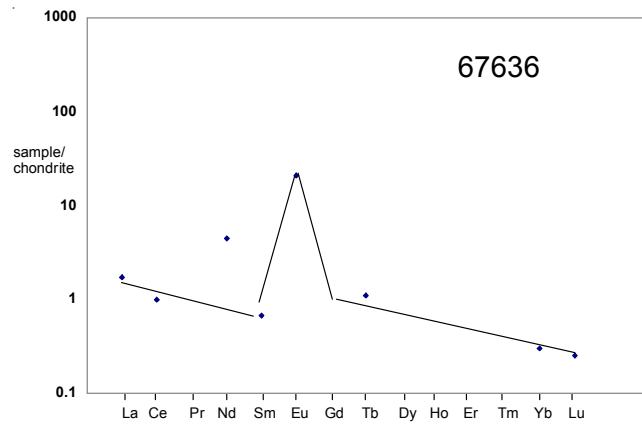


Figure 4: Normalized rare-earth-element diagram for 67636 (data from Warren and Wasson 1980).

Ryder G. and Norman M.D. (1980) Catalog of Apollo 16 rocks (3 vol.). Curator’s Office pub. #52, JSC #16904.

Stöffler D., Bischoff A., Borchardt R., Burghele A., Deutsch A., Jessberger E.K., Ostertag R., Palme H., Spettel B., Reimold W.U., Wacker K. and Wanke H. (1985) Composition and evolution of the lunar crust in the Decartes highlands. *Proc. 15th Lunar Planet. Sci. Conf in J. Geophys. Res.* 90, C449-C506.

Stöffler D., Ostertag R., Reimold W.U., Borchardt R., Malley J. and Rehfeldt A. (1981) Distribution and provenance of lunar highland rock types at North Ray Crater, Apollo 16. *Proc. 12th Lunar Planet. Sci. Conf.* 185-207.

Sutton R.L. (1981) Documentation of Apollo 16 samples. In *Geology of the Apollo 16 area, central lunar highlands.* (Ulrich et al.) U.S.G.S. Prof. Paper 1048.

Warren P.H. (1993) A concise compilation of petrologic information on possibly pristine nonmare Moon rocks. *Am. Mineral.* 78, 360-376.

Warren P.H. and Wasson J.T. (1980a) Further foraging of pristine nonmare rocks: Correlations between geochemistry and longitude. *Proc. 11th Lunar Planet. Sci. Conf.* 431-470.

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Table 1. Chemical composition of 67636.

<i>reference</i>	Warren80	
<i>weight</i>		
SiO ₂ %	44.5	(a)
TiO ₂	0.036	(a)
Al ₂ O ₃	32.88	(a)
FeO	1.93	(a)
MnO	0.006	(a)
MgO	1.76	(a)
CaO	17.6	(a)
Na ₂ O	0.52	(a)
K ₂ O	0.017	(a)
P ₂ O ₅		
S %		
<i>sum</i>		
Sc ppm	1	(a)
V		
Cr	60	(a)
Co	5	(a)
Ni	3.6	(a)
Cu		
Zn	2.17	(a)
Ga	4.5	(a)
Ge ppb	5.4	(a)
As		
Se		
Rb		
Sr	190	
Y		
Zr	40	(a)
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb	2.8	(a)
In ppb	0.37	(a)
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba	15	(a)
La	0.4	(a)
Ce	0.6	(a)
Pr		
Nd	2	(a)
Sm	0.099	(a)
Eu	1.17	(a)
Gd		
Tb	0.04	(a)
Dy		
Ho		
Er		
Tm		
Yb	0.049	(a)
Lu	0.0061	(a)
Hf	0.15	(a)
Ta	0.11	(a)
W ppb		
Re ppb	0.018	(a)
Os ppb		
Ir ppb	0.17	(a)
Pt ppb		
Au ppb	0.022	(a)
Th ppm	0.11	(a)
U ppm	0.2	(a)
<i>technique:</i>	(a) INAA	