63559 – 6 grams
63565 – 1 gram
63567 – 3.2 grams
63568 – 4 grams
63576 – 1.2 grams
Devitrified glass with inclusions

Figure 1: Photo of 63559. Sample is 2 cm across. S80-37416

Figure :2: Photo of 63565. Scale is in mm. S80-37435

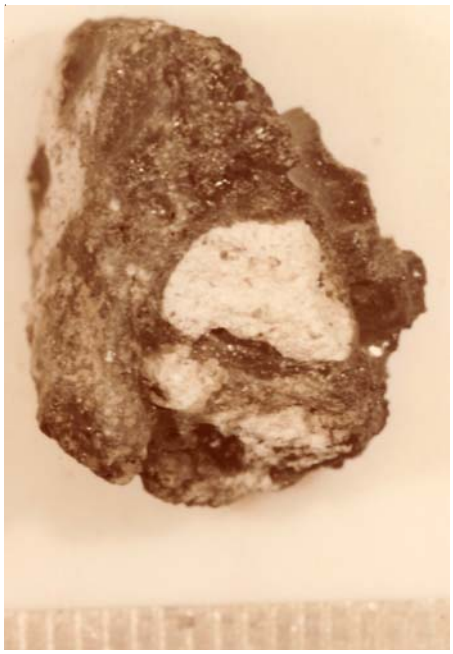


Figure 3: Photo of 63567. Scale is in mm. S80-37428.

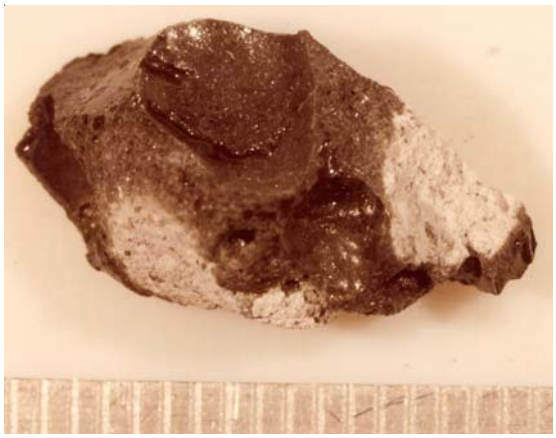


Figure 4: Photo of 63576. Scale is in mm. S80-37442.

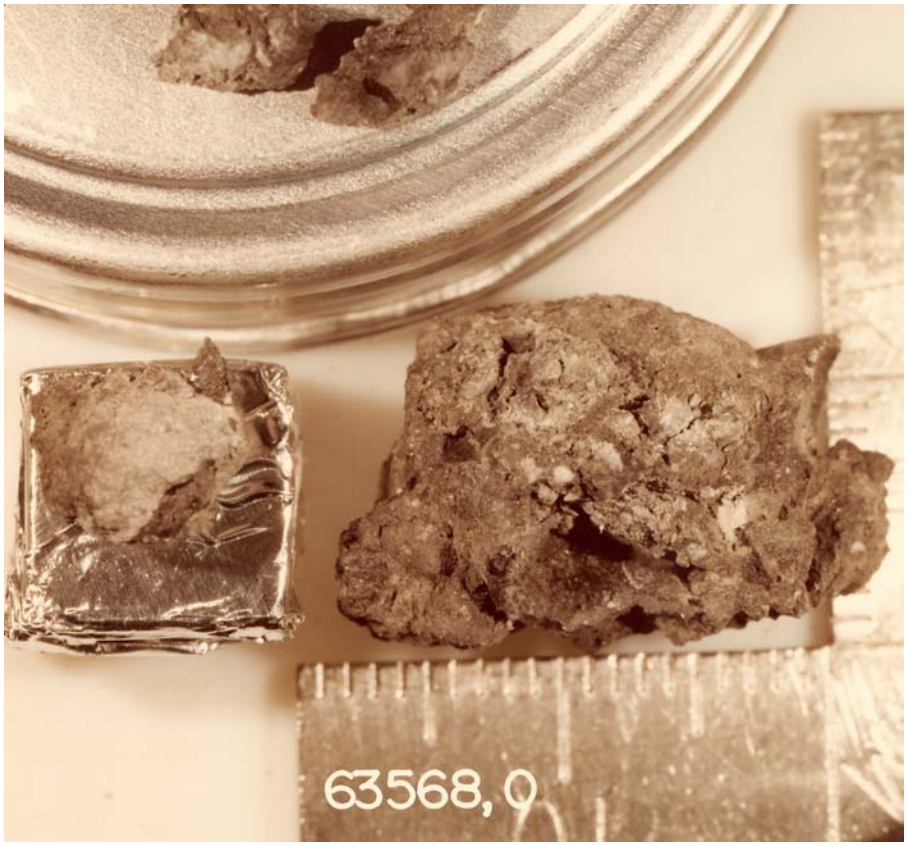


Figure 5: Photo of 63568, after chipping. Scale is in cm. S80-37422

Introduction

63559 and its cousins are rake samples from the regolith at station 13, on the flank of North Ray Crater (Apollo 16). They are chunks of dark, vesicular glass with white inclusions that have similar appearance (figures 1 – 5).

Petrography

Ryder and Norman (1980) give the only description. The glass is devitrified with various textures (figure 6). The white clasts are cataclastic anorthosite or plagioclase.

Chemistry

Morris et al. (1986), Stoffler et al. (1986) and Borchardt et al. (1986) analyzed some of these particles (table 1) and referred to them as glass "bombs" (or parts of a glass bomb). However, they could also just be "melted regolith".

See et al. (1986) give the analysis of some of the white inclusions (table 2).

Processing

There are two thin sections of the glass for each. There are also thin sections for some of the white clasts.

Table 2. Chemical composition of anorthosite.

	63565	63566	63575	
reference	See 86			
weight				
SiO2 %	44.67	44.51	44.69	(a)
TiO2	0.06	0.01	0.02	(a)
Al2O3	34.03	35.31	35.17	(a)
FeO	0.76	0.15	0.24	(a)
MnO				(a)
MgO	0.72	0.09	0.13	(a)
CaO	18.73	19.44	19.29	(a)
Na2O	0.52	0.42	0.5	(a)
K2O	0.03	0.01	0.02	(a)
P2O5				(a)
S %				
sum				

(a) broad beam e probe

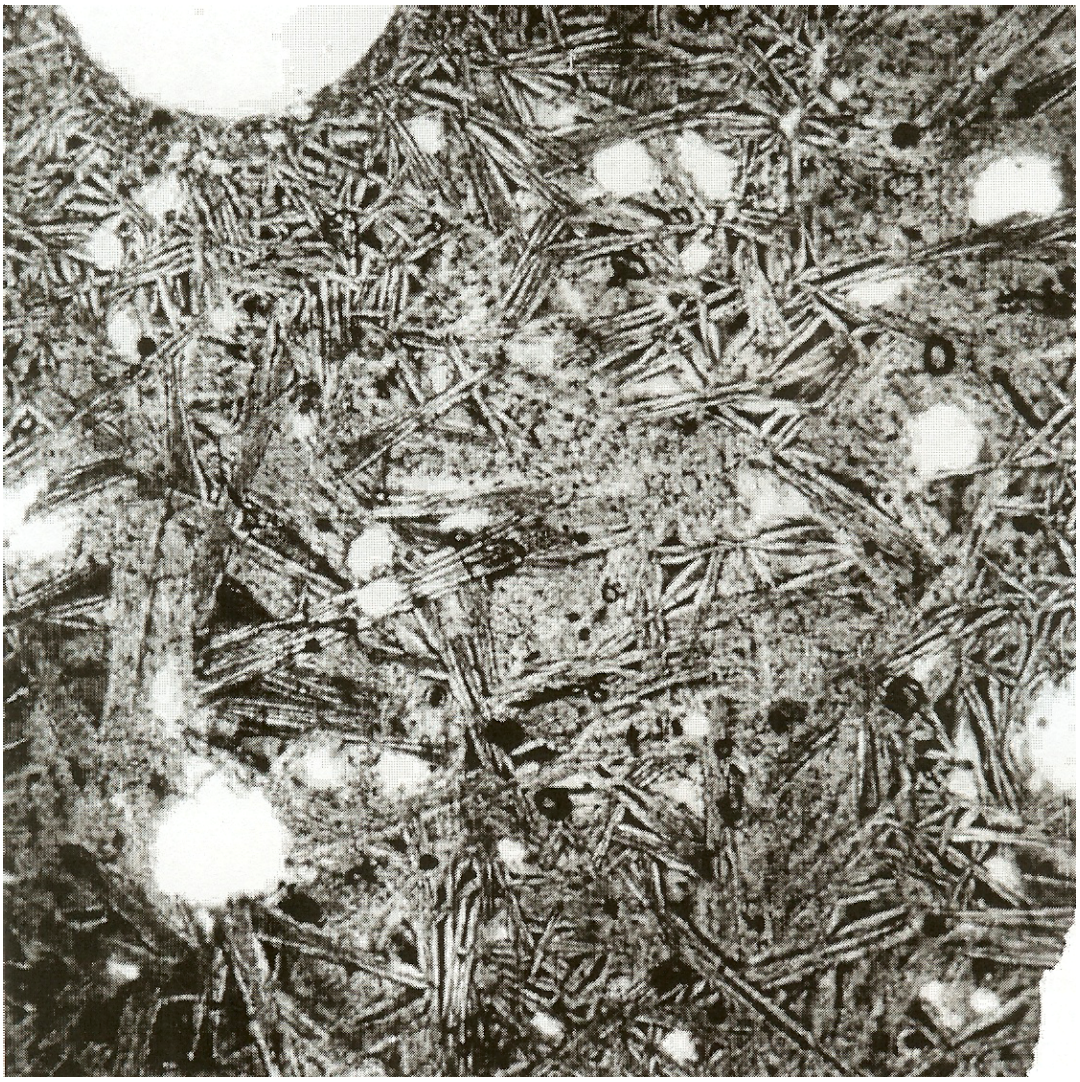


Figure 6: Photomicrograph of thin section 63567,7. Width of field is 2 mm (from Ryder and Norman 1980).

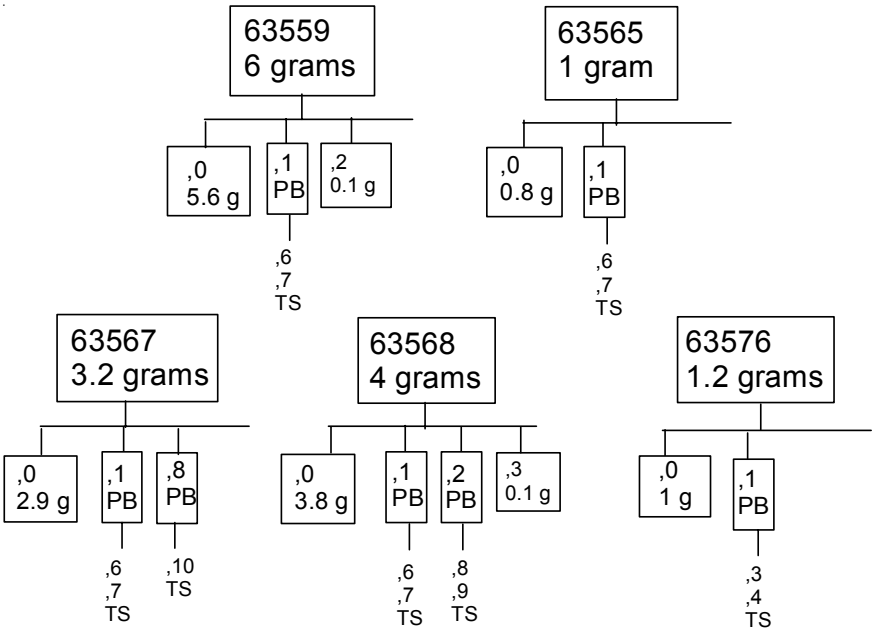
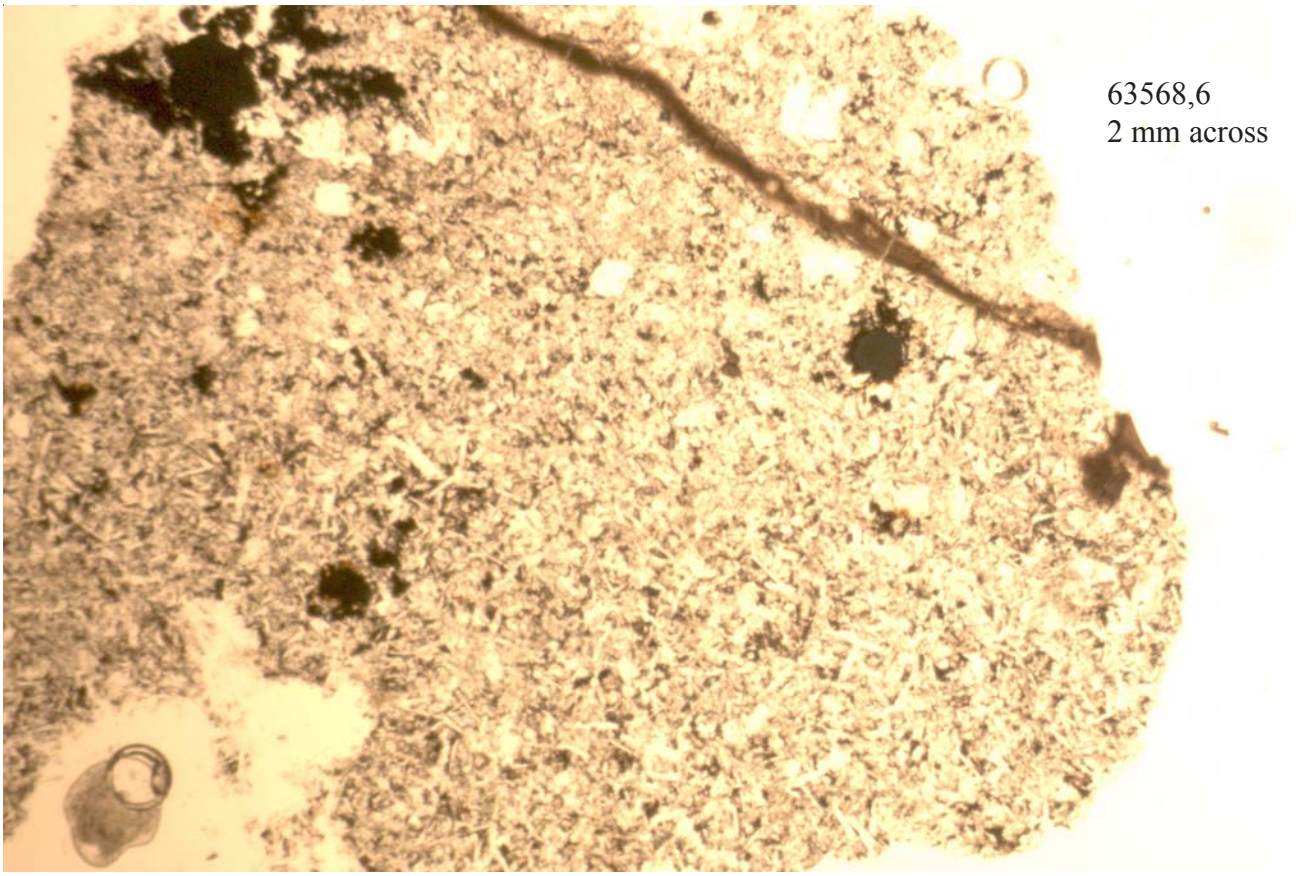


Table 1. Chemical composition of 63559, 63565, 63567, 63568 and 63576.

	63559	63565	63567	63568		63565	63567	63576	
reference	Stoffler85					Morris86			
weight	Borcherdt86								
SiO2 %	43.7	41.9	43.7	43	(a)	44.7	45	44.84	(a)
TiO2	0.35	0.23	0.22	0.7	(a)	0.26	0.25	0.26	(a)
Al2O3	26.9	28.4	27.9	27.2	(a)	26.13	26.33	26.25	(a)
FeO	6.8	5.8	5.8	5.1	(a)	6.13	6.06	6.1	(a)
MnO	0.07	0.1	0.06	0.02	(a)				
MgO	8.3	7	7.3	6.7	(a)	7.19	7.46	7.35	(a)
CaO	13.3	14.8	12.3	16.5	(a)	14.45	14.74	14.63	(a)
Na2O	0.51	0.75	0.52	0.49	(a)	0.56	0.54	0.55	(a)
K2O	0.1	0.1	0.09	0.16	(a)	0.07	0.08	0.09	(a)
P2O5	0.03	0.05	0.05	0.08	(a)				
S %									
sum									
a) broad beam e. probe									
Sc ppm						5.78	5.75	5.94	(b)
V									
Cr						962	987	935	(b)
Co						59	69	68	(b)
Ni						1052	1158	1130	(b)
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						101	89	125	(b)
La						8.94	8.17	7.98	(b)
Ce						25.5	23.4	18.7	(b)
Pr									
Nd									
Sm						4.13	3.74	3.8	(b)
Eu						0.91	1	1.01	(b)
Gd									
Tb						0.72	0.9	0.77	(b)
Dy									
Ho									
Er									
Tm									
Yb						2.71	2.52	2.4	(b)
Lu						0.38	0.37	0.38	(b)
Hf						2.65	2.67	2.78	(b)
Ta						0.37	0.36	0.41	(b)
W ppb									
Re ppb									
Os ppb									
Ir ppb									
Pt ppb									
Au ppb									
Th ppm						1.95	2.24	1.93	(b)
U ppm						0.6	0.39	0.6	(b)

technique: (a) broadbeam e. probe, (b) INAA+RNAA



References for 63559, 63568, 63576

Borchardt R., Stoffler D., Spettel B., Palme H., Wanke H., Wacker K. and Jessberger E.K. (1986) Composition, structure and age of the Apollo 16 subregolith basement as deduced from the chemistry of post-Imbrium melt bombs. *Proc. 17th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **90**, E43-E54.

LSPET (1973b) The Apollo 16 lunar samples: Petrographic and chemical description. *Science* **179**, 23-34.

LSPET (1972c) Preliminary examination of lunar samples. *In* Apollo 16 Preliminary Science Report. NASA SP-315, 7-1—7-58.

Morris R.V., See T.H. and Horz F. (1986) Composition of the Cayley Formation at Apollo 16 as inferred from impact melt splashes. *Proc. 17th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **90**, E21-E42.

Phinney W. and Lofgren G. (1973) Description, classification and inventory of Apollo 16 rake samples from stations 1, 4 and 13. Curators Office.

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

See T.H., Horz F. and Morris R.V. (1986) Apollo 16 impact-melt splashes: Petrography and major-element composition. *Proc. 17th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **91**, E3-E20.

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 Descartes highlands. *Proc. 15th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **90**, C449-C506.

Simonds C.H., Warner J.L. and Phinney W.C. (1973) Petrology of Apollo 16 poikilitic rocks. *Proc. 4th Lunar Sci. Conf.* 613-632.

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.

Warner J.L., Simonds C.H. and Phinney W.C. (1973b) Apollo 16 rocks: Classification and petrogenetic model. *Proc. 4th Lunar Sci. Conf.* 481-504.

Wasson J.T., Warren P.H., Kallemeyn G.W., McEwing C.E., Mittlefehldt D.W. and Boynton W.V. (1977) SCCRV, a major component of highlands rocks. *Proc. 8th Lunar Sci. Conf.* 2237-2252.