

15017
Glass Sphere
9.8 grams

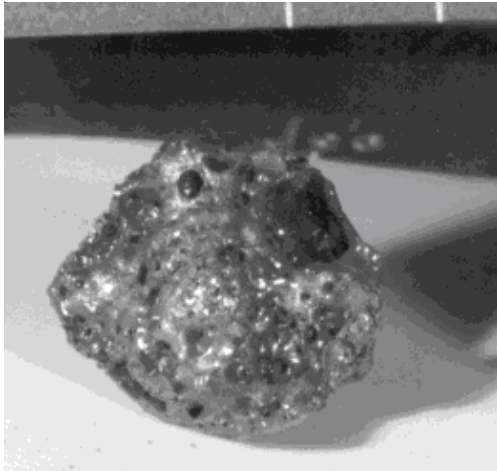


Figure 1: Sample 15017. NASA S71-43632. Scale is 1 cm.

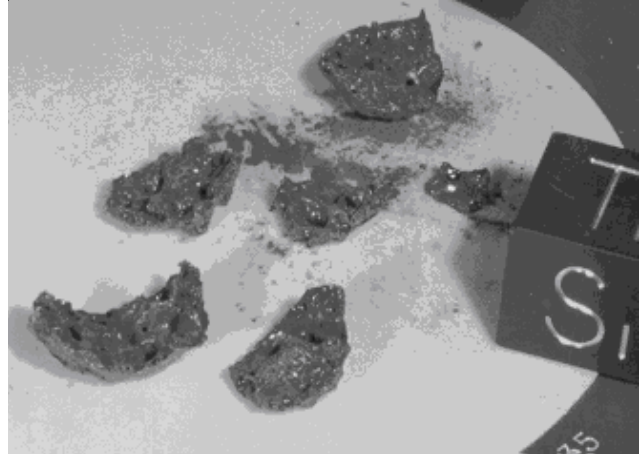


Figure 2: Sample 15017 after breaking. NASA S71-43662. Cube is 1 inch.



Figure 3: Photo of 15017. AS15-86-11604

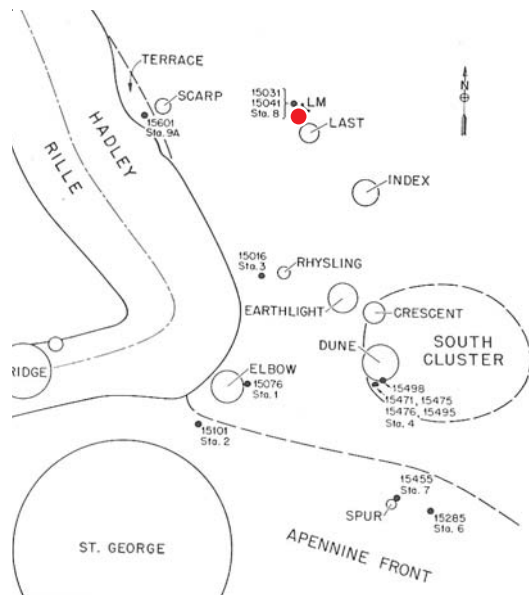


Figure 4: Location of 15017 on map of Apollo 15.

Introduction

15017 was seen from the Lunar Module and collected at beginning of second EVA. The astronauts called it a “little glass Aggie”. However, it was hollow and broke apart on the return to Earth (figure 1).

Petrography

Ryder (1985) gives a description of 15017. It is a very vesicular glass with numerous included mineral grains. Only the outside surface was smooth and shiny. Some interior vesicles were open to the outside. There were a few zap pit on some of the surface, but little accretionary material.

In thin section the glass is pale green and banded.

Chemistry

15017 appears to be heterogeneous. Fabel et al. (1972) reported analyses for glass in 15017 with a range of composition ($Al_2O_3 = 7.5 - 12.5$). Wanke et al. (1976) and Ganapathy et al. (1973) have also reported bulk analyses (table 1).

Other Studies

Fleischer et al. (1973) determined the density of nuclear tracks as a function of depth. Hartung et al. (1973) and Morrison et al. (1973) reported the flux of microcrater impacts on glass surfaces of 15017 (figure 5).

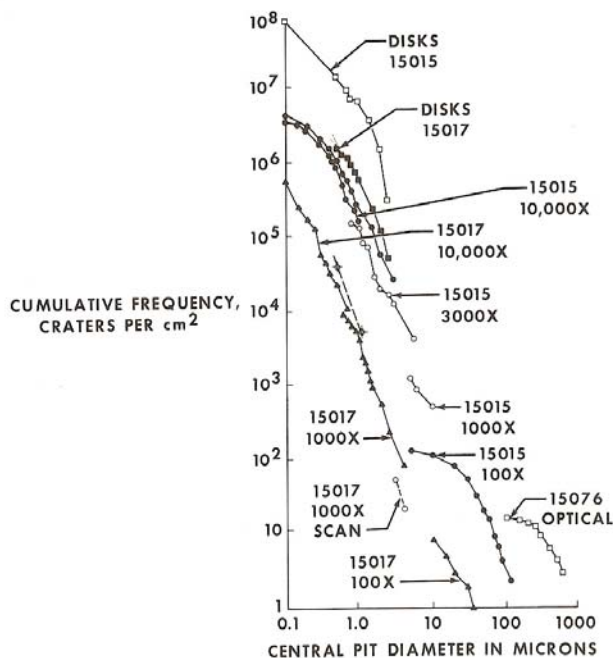


Figure 5: Density distribution of micrometeorite craters on fresh glass surface of 15017 (Morrison et al. 1973).

References for 15017

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

Fabel G.W., White W.B., White E.W. and Roy R. (1972) Structure of lunar glasses by Raman and soft x-ray spectroscopy. *Proc. 3rd Lunar Sci. Conf.* 939-951.

Fleischer R.L., Hart H.R. and Giard W.R. (1973) Particle track record of Apollo 15 shocked crystalline rocks. *Proc. 4th Lunar Sci. Conf.* 2307-2317.

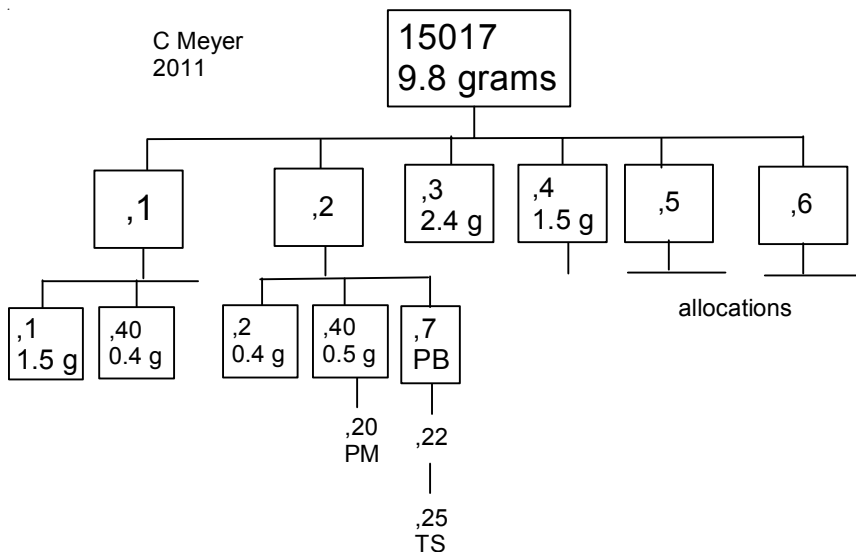


Table 1. Chemical composition of 15017.

reference weight	Ganapathy73	Wanke 76	
SiO2 %		49.9	(b)
TiO2			
Al2O3		14.9	(b)
FeO		14.3	(b)
MnO		0.2	(b)
MgO		10.7	(b)
CaO		9.74	(b)
Na2O		0.44	(b)
K2O		0.21	(b)
P2O5			
S %			
sum			
Sc ppm		29.9	(b)
V			
Cr		3000	(b)
Co	45	(a) 40.6	(b)
Ni		260	(b)
Cu			
Zn	5.8	(a)	
Ga			
Ge ppb	241	(a)	
As			
Se	363	(a)	
Rb	2.2	(a)	
Sr		135	(b)
Y			
Zr		437	(b)
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb	2.3	(a)	
Cd ppb	4.2	(a)	
In ppb	1.95	(a)	
Sn ppb			
Sb ppb	4.7	(a)	
Te ppb	20	(a)	
Cs ppm	0.273	(a)	
Ba		300	(b)
La		28.2	(b)
Ce		77.7	(b)
Pr			
Nd		56	(b)
Sm		12.7	(b)
Eu		1.42	(b)
Gd			
Tb		2.79	(b)
Dy		16.8	(b)
Ho		3.7	(b)
Er			
Tm			
Yb		9.49	(b)
Lu		1.32	(b)
Hf		10.3	(b)
Ta		1.26	(b)
W ppb			
Re ppb	0.87	(a)	
Os ppb			
Ir ppb	9.1	(a) 8	(b)
Pt ppb			
Au ppb	2.9	(a)	
Th ppm		3.93	(b)
U ppm	1.41	(a)	

technique: (a) RNAA, (b) various

Ganapathy R., Morgan J.W., Krahenbuhl U. and Anders E. (1973) Ancient meteoritic components in lunar highland rocks: Clues from trace elements in Apollo 15 and 16 samples. *Proc. 4th Lunar Sci. Conf.* 1239-1261.

Hartung J.B., Horz F., Aitken F.K., Gault D.E. and Brownlee D.E. (1973) The development of microcrater populations on lunar rocks. *Proc. 4th Lunar Sci. Conf.* 3213-3234.

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.

Morrison D.A., McKay D.S., Fruland R.M. and Moore H.J. (1973) Microcraters on Apollo 15 and 16 rocks. *Proc. 4th Lunar Sci. Conf.* 3235-3253.

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.

Wänke H., Palme H., Kruse H., Baddenhausen H., Cendales M., Dreibus G., Hofmeister H., Jagoutz E., Palme C., Spettel B. and Thacker R. (1976) Chemistry of lunar highland rocks: a refined evaluation of the composition of the primary matter. *Proc. 7th Lunar Sci. Conf.* 3479-3499.

Wänke H., Baddenhausen H., Blum K., Cendales M., Dreibus G., Hofmeister H., Kruse H., Jagoutz E., Palme C., Spettel B., Thacker R. and Vilcsek E. (1977a) On the chemistry of lunar samples and achondrites. Primary matter in the lunar highlands: A re-evaluation. *Proc. 8th Lunar Sci. Conf.* 2191-2213.