14264

Vitric-matrix Breccia

117.8 grams

Figure 1: Photo of 14264. Sample is 5 cm. NASA S71-29217.

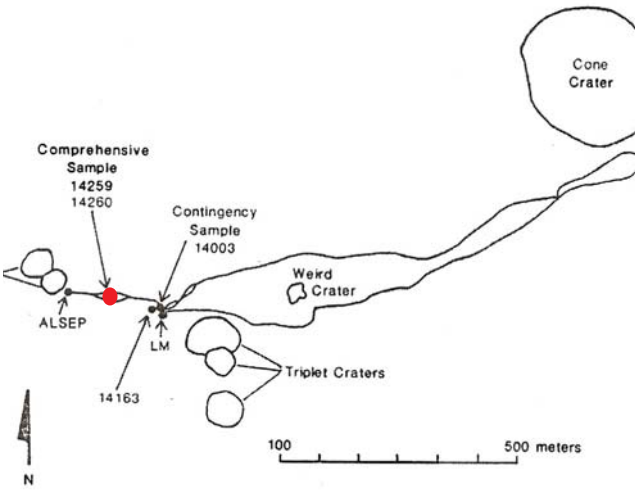


Figure 2: Location of comprehensive sample on Apollo 14 traverse map.

Introduction

14264 (figure 1) was collected as part of the "comprehensive sample" taken near the ALSEP station (figure 2). It is dark grey regolith breccia with large rounded lithic clasts. It has micrometeorite pits on all surfaces.

Petrography

Simonds et al. (1977) and Phinney et al. (1975) termed 14264 a vitric matrix breccia and reported a few percent agglutinate.

Warren and Wasson (1980) studied the large white clast – finding it non-pristine. They determined the composition of the pyroxenes, plagioclases and olivine (figure 3).

Figure 6 is a photomicrograph of one of the lithic clasts.

Processing

Sample 14264 is the largest sample from the comprehensive soil. It was returned in weigh bag 1039 along with the soil. 1039 may have been in ALSRC 1007. There are 7 thin sections.

Mineralogical Mode for 14264

	Simonds et al 1977
Matrix	83 %
Clasts	
Plagioclase	3
Mafic	
Breccia	5
Glass	4
Agglutinate	2
Granulite	3
Mare basalt	
Felds basalt	

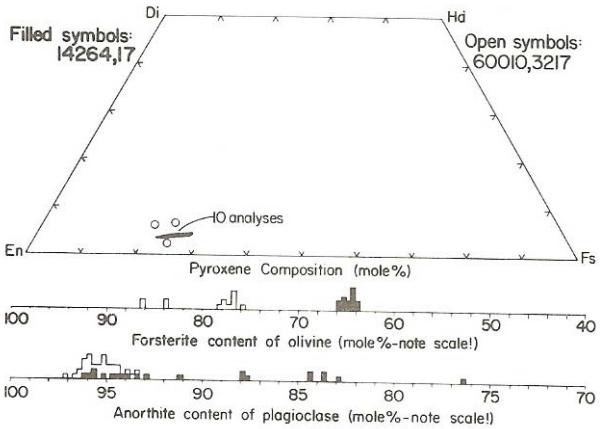


Figure 3: Pyroxene composition of 14264 and 60010 (Warren and Wasson 1980).

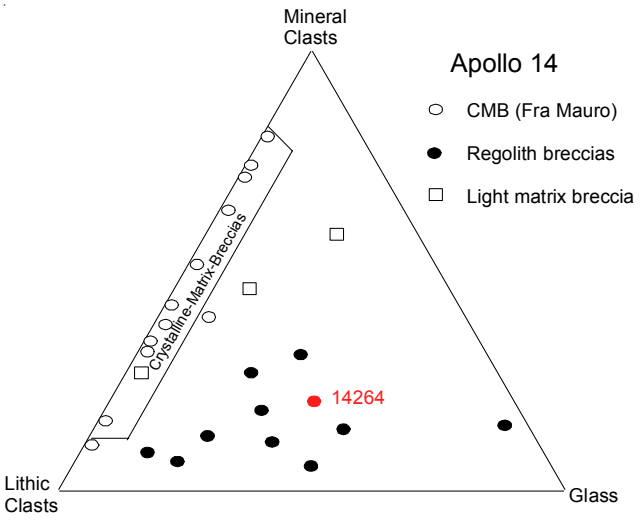


Figure 4: Simonds diagram for Apollo 14 breccias.

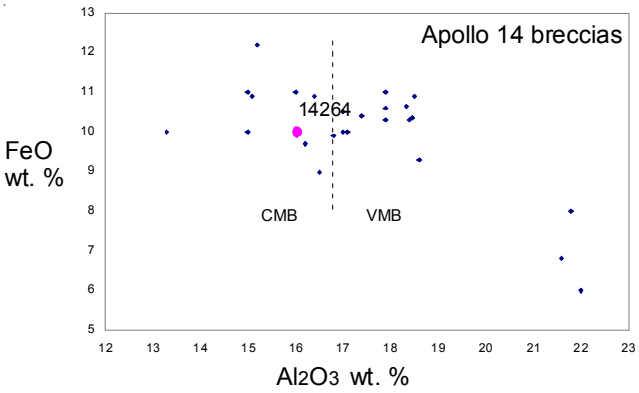
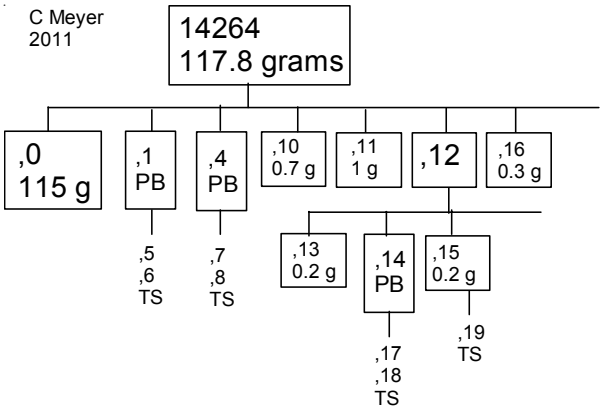


Figure 5: Composition of Apollo 14 breccias.



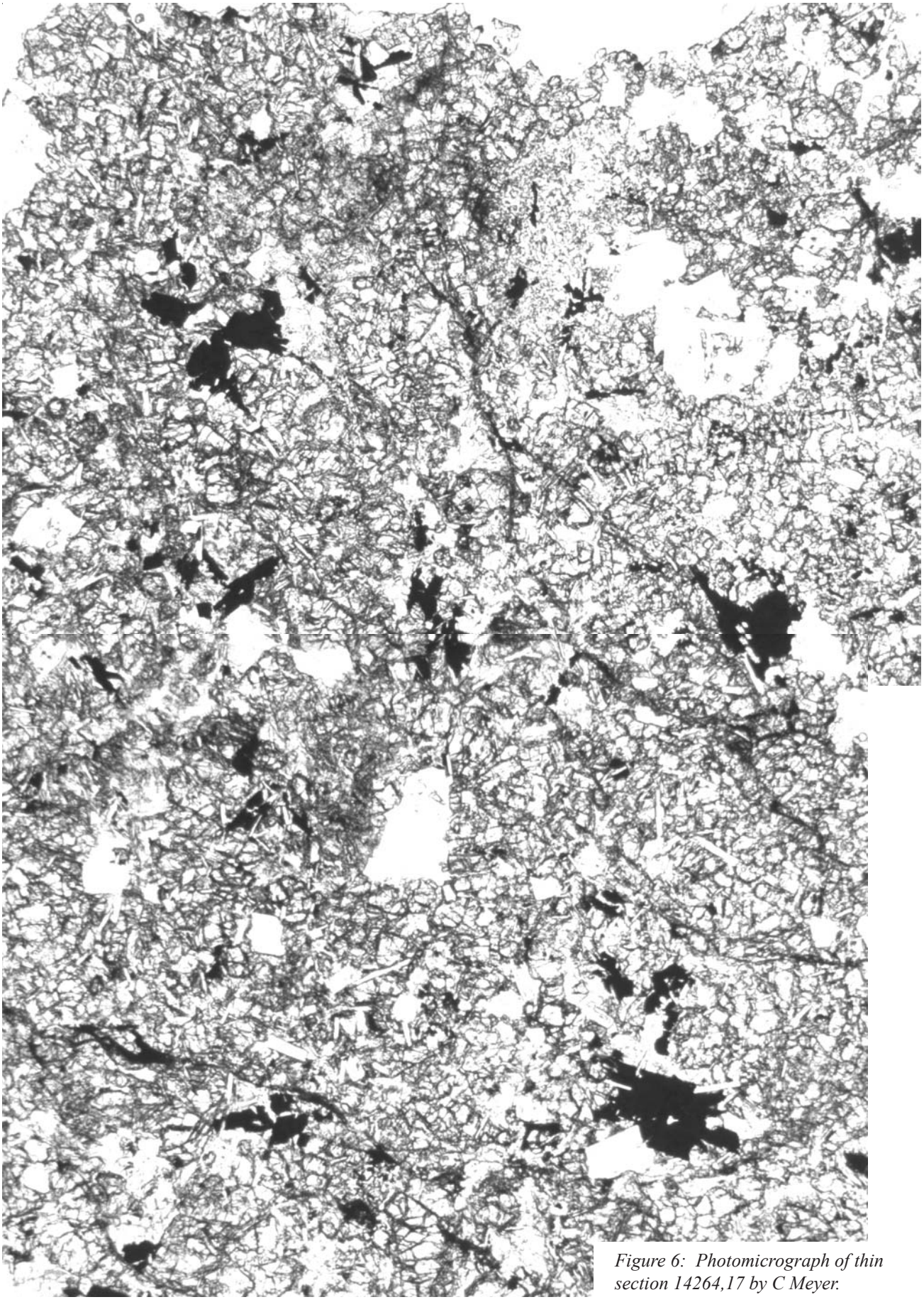


Figure 6: Photomicrograph of thin section 14264,17 by C Meyer.

Figure 7: Processing photo of 14264 showing clasts. NASA S75-24428. Large clast is 1 cm.

References for 14264

Carlson I.C. and Walton W.J.A. (1978) **Apollo 14 Rock Samples**. Curators Office. JSC 14240

Chao E.C.T., Minkin J.A. and Best J.B. (1972) Apollo 14 breccias: General characteristics and classification. *Proc. 3rd Lunar Sci. Conf.* 645-659.

LSPET (1971) Preliminary examination of lunar samples from Apollo 14. *Science* **173**, 681-693.

Phinney W.C., Simonds C.H. and Warner J. (1975) Description, Classification and Inventory of the Comprehensive sample from Apollo 14. Curator's Catalog, pp. 46.

Phinney W.C., McKay D.S., Simonds C.H. and Warner J.L. (1976a) Lithification of vitric- and elastic-matrix breccias: SEM photography. *Proc. 7th Lunar Sci. Conf.* 2469-2492.

Simonds C.H., Phinney W.C., Warner J.L., McGee P.E., Geeslin J., Brown R.W. and Rhodes J.M. (1977) Apollo 14

Table 1. Chemical composition of 14264.

reference	Warren80		Simonds77			
weight	clast		matrix		clast	
SiO2 %	48.8	(a)	49.28	(c)	46.19	(b)
TiO2	2	(a)	2.05	(c)	1.8	(b)
Al2O3	15.1	(a)	16.29	(c)	11.81	(b)
FeO	10.2	(a)	10.23	(c)	16.43	(b)
MnO	0.13	(a)	0.13	(c)		
MgO	12.4	(a)	9.08	(c)	11.36	(b)
CaO	9.2	(a)	10.12	(c)	10.26	(b)
Na2O	0.9	(a)	0.93	(c)	0.37	(b)
K2O	0.95	(a)	0.82	(c)	0.61	(b)
P2O5			0.66	(c)		
S %			0.09	(c)		
sum						
Sc ppm	22.4	(a)				
V						
Cr	1300	(a)			7900	(b)
Co	24.3	(a)				
Ni	220	(a)				
Cu						
Zn	4.1	(a)				
Ga	5	(a)				
Ge ppb	290	(a)				
As						
Se						
Rb						
Sr						
Y						
Zr	1480	(a)				
Nb						
Mo						
Ru						
Rh						
Pd ppb						
Ag ppb						
Cd ppb	15	(a)				
In ppb	18	(a)				
Sn ppb						
Sb ppb						
Te ppb						
Cs ppm						
Ba	1090	(a)				
La	99	(a)				
Ce	229	(a)				
Pr						
Nd	135	(a)				
Sm	39.8	(a)				
Eu	2.2	(a)				
Gd						
Tb	8.6	(a)				
Dy						
Ho						
Er						
Tm						
Yb	30.4	(a)				
Lu	4.26	(a)				
Hf	31	(a)				
Ta	3.56	(a)				
W ppb						
Re ppb	0.44	(a)				
Os ppb						
Ir ppb	6	(a)				
Pt ppb		(a)				
Au ppb	5.3	(a)				
Th ppm	18.6	(a)				
U ppm	5.4	(a)				

technique: (a) INAA, (b) e. probe, (c) XRF

revisited, or breccias aren't so bad after all. *Proc. 8th Lunar Sci. Conf.* 1869-1893.

Sutton R.L., Hait M.H. and Swann G.A. (1972) Geology of the Apollo 14 landing site. *Proc. 3rd Lunar Sci. Conf.* 27-38.

Swann G.A., Trask N.J., Hait M.H. and Sutton R.L. (1971a) Geologic setting of the Apollo 14 samples. *Science* **173**, 716-719.

Swann G.A., Bailey N.G., Batson R.M., Eggleton R.E., Hait M.H., Holt H.E., Larson K.B., Reed V.S., Schaber G.G., Sutton R.L., Trask N.J., Ulrich G.E. and Wilshire H.G. (1977) Geology of the Apollo 14 landing site in the Fra Mauro Highlands. U.S.G.S. Prof. Paper 880.

Swann G.A., Bailey N.G., Batson R.M., Eggleton R.E., Hait M.H., Holt H.E., Larson K.B., McEwen M.C., Mitchell E.D., Schaber G.G., Schafer J.P., Shepard A.B., Sutton R.L., Trask N.J., Ulrich G.E., Wilshire H.G. and Wolfe E.W. (1972) 3. Preliminary Geologic Investigation of the Apollo 14 landing site. *In* Apollo 14 Preliminary Science Rpt. NASA SP-272. pages 39-85.

Warner J.L. (1972) Metamophism of Apollo 14 breccias. *Proc. 3rd Lunar Sci. Conf.* 623-643.

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.

Williams R.J. (1972) The lithification of metamorphism of lunar breccias. *Earth Planet. Sci. Lett.* **16**, 250-256.

Wilshire H.G. and Jackson E.D. (1972) Petrology and stratigraphy of the Fra Mauro Formation at the Apollo 14 site. U.S. Geol. Survey Prof. Paper 785.