14006

Crystalline-matrix Breccia

12.13 grams

Figure 1: Photo of 14006. Sample is 3 cm acros NASA S71-25296.

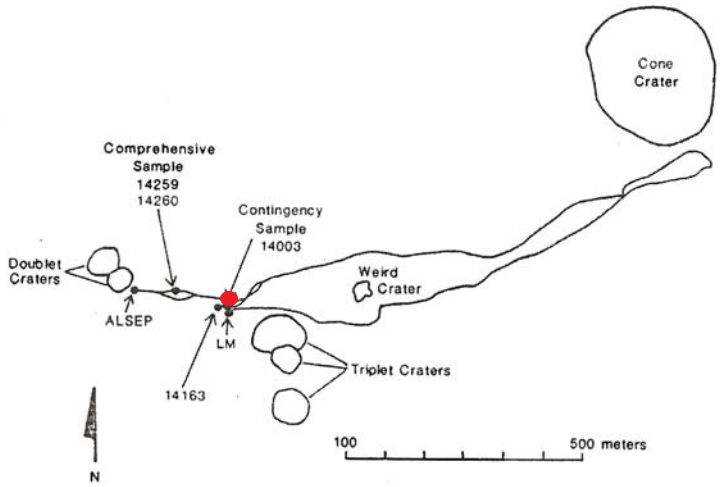


Figure 2: Map of Apollo 14 showing location of "contingency sample".

Introduction

14006 is a greater than 1 cm rock chip sieved from the contingency sample (figure 1). It is a breccia sample of the Fra Mauro type.

Records show that Larry Nyquist was the consortia chief for this rock.

Petrography

Phinney et al. (1976) described 14006 as a tough, crystalline breccia with 15-20% vugs and vesicles. The matrix is fine-grained with intergrown plagioclase, cliopyroxene and ilmenite. Carlson and Kramer (1978) note that not all thin sections are alike, and that there is at least some glass. Simonds et al. (1977) found that most clasts in 14006 were mineral clasts (figure 6).

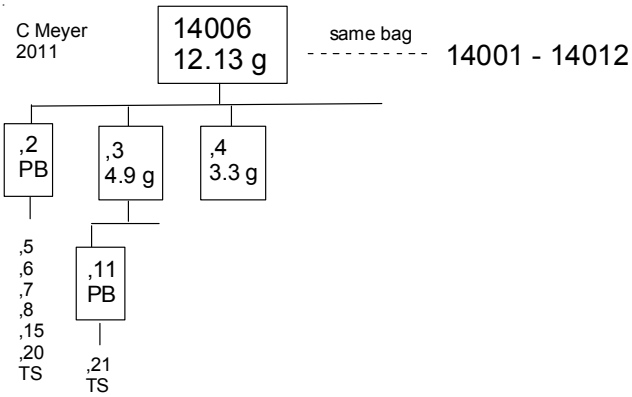
McKay et al. (1972) studied some of the vapor phase deposits in the vugs of 14006.

Chemistry

14006 has a composition typical of the crystalline-matrix breccias from Apollo 14 (figures 4 and 5).

Other Studies

Bogard and Nyquist (1972) determined the abundance and isotopic composition of rare gases in 14006. Dran et al. (1972) determined the density of cosmic ray tracks.



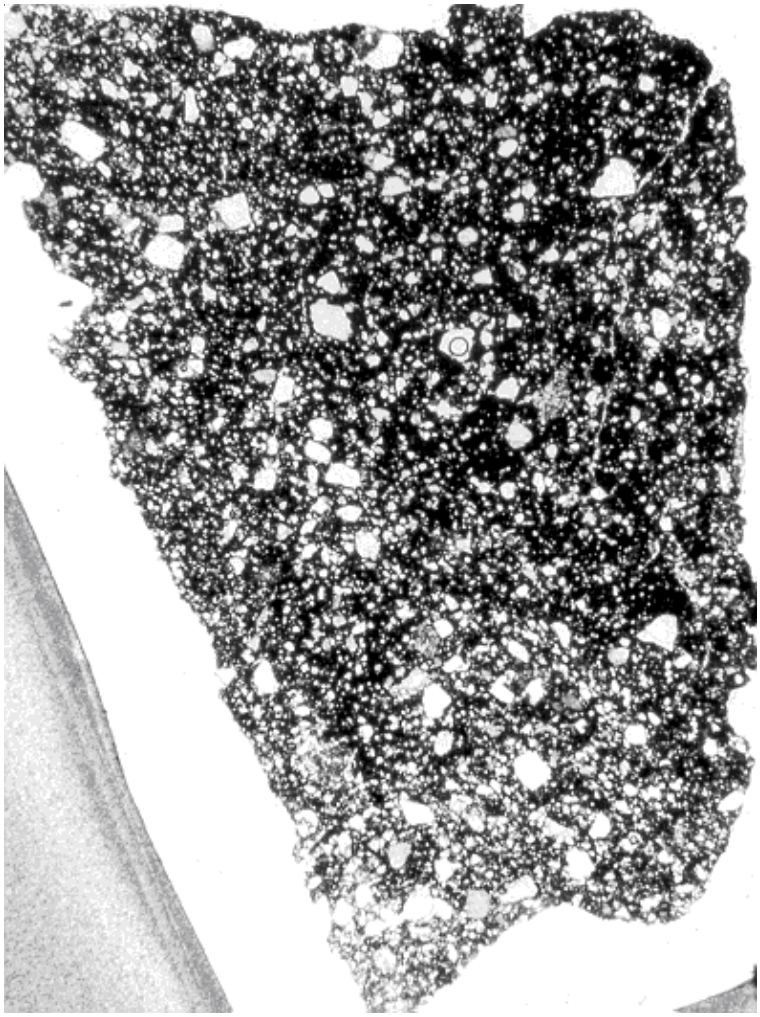


Figure 3: Photo of thin section 14006,6. 1 cm across. NASA S71-403995.

Mineralogical Mode for 14006

	Simonds et al 1977
Matrix	77 %
Clasts	
Plagioclase	11
Mafic	7
Breccia	0.5
Granulite	1
Mare basalt	0.5
Felds basalt	1
Pore space	2

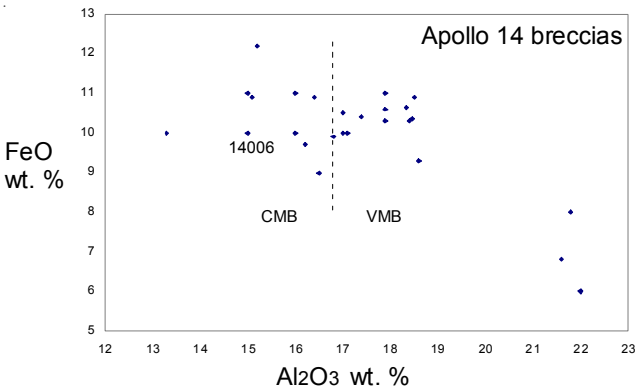


Figure 4: Two different types of Apollo 14 breccia.

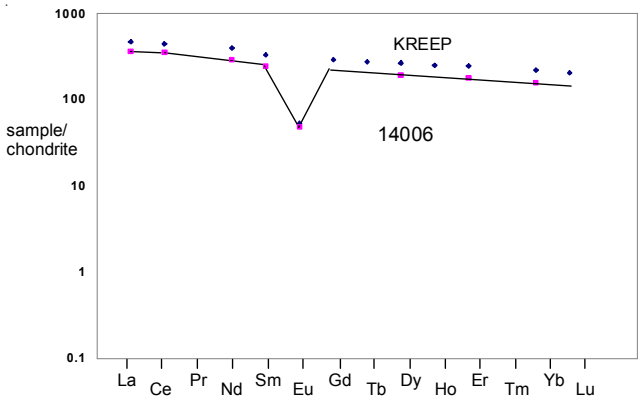
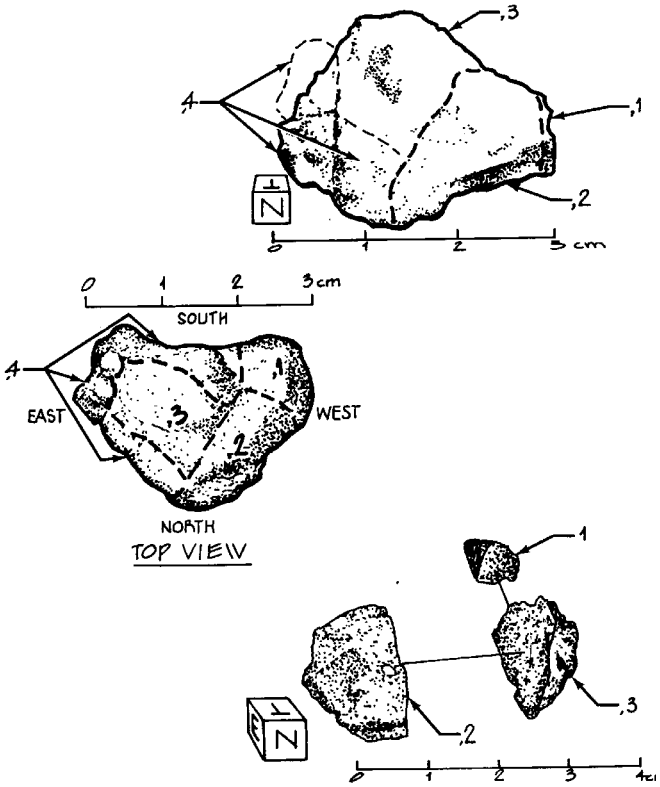


Figure 5: Normalized REE pattern for14006 compared with KREEP.

Table 1. Chemical composition of 14006.

reference	Hubbard72		Hubbard72	
weight			Wiesmann75	
SiO2 %	47	(a)		
TiO2	1.77	(a)		
Al2O3	16.4	(a)		
FeO	10.9	(a)		
MnO	0.14	(a)		
MgO	10.7	(a)	10.6	(b)
CaO	10.5	(a)	10.35	(b)
Na2O	0.79	(a)	0.68	(b)
K2O	0.35	(a)	0.325	(b)
P2O5	0.75	(a)		
S %	0.11	(a)		
sum				
Sc ppm				
V				
Cr				
Co				
Ni	263	(a)		
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb	6.5	(a)	6.07	(b)
Sr	191	(a)	180	(b)
Y	276	(a)		
Zr	1376	(a)		
Nb	81	(a)		
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba			781	(b)
La			84.7	(b)
Ce			214	(b)
Pr				
Nd			131	(b)
Sm			36	(b)
Eu			2.73	(b)
Gd				
Tb				
Dy			47.1	(b)
Ho				
Er			28.8	(b)
Tm				
Yb			25.8	(b)
Lu				
Hf				
Ta				
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm	18	(a)		
U ppm			4.07	(b)

technique: (a) XRF, (b) IDMS



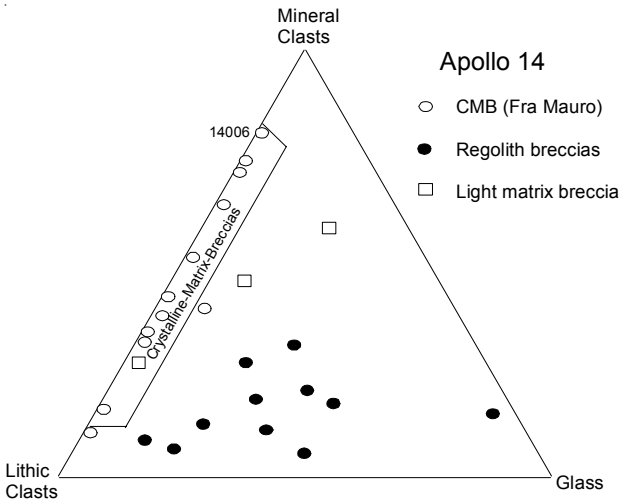


Figure 6: Classification of Apollo 14 breccias (Simonds et al. 1977).

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