

62237
Troctolitic Anorthosite
62.4 grams



Figure 1: Photo of 62237. NASA S72-41797 (B&W), NASA S72-38959 (color). Cube is 1 cm.

Introduction

62237 and 62236 are chalky white rocks that were collected together along with 62235 and incidental soil, from the rim of Buster Crater, station 2, Apollo 16 (figure 2), where they were found half buried in the regolith (Sutton 1981). The mineral chemistry of these rocks is similar and indicates that they belong to the suite of lunar plutonic rocks termed ferroan anorthosite (James 1980).

Petrography

Dymek et al. (1975) concluded that 62237 was a slowly cooled plutonic lunar rock (figure 1). The mineralogy of 62237 is that of a ferroan anorthosite with fairly abundant (~20%) mafic minerals (figure 5).

Warren and Wasson (1977) concluded that 62237 is “chemically pristine”, because it was lacking in meteoritic siderophiles.

62237 has been crushed to form a cataclastic texture, but, in places, the original coarse-grained igneous texture can be discerned by relic clasts (figure 3).

Mineralogy

Olivine: Olivine (Fo₅₉₋₆₁) crystals up to 3 mm in size are reported in 62237 by Dymek et al. (1975). Warren and Wasson (1977) and Bersch et al. (1991) also provided analyses of olivine in 62237. Dymek et al. noted that olivine in 62237 was extremely depleted in Ca.

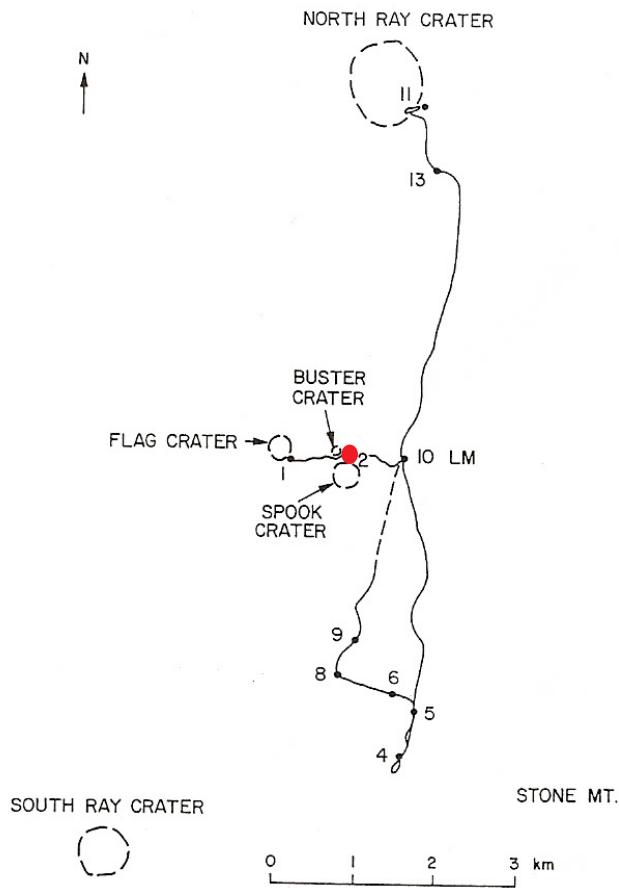


Figure 2: Location of 62237.

Pyroxene: Dymek et al. (1975) and Bersch et al. (1991) determined the composition of pyroxene in 62237 (figure 4).

Plagioclase: Plagioclase in 62237 is An_{95-99} and contains only small amount of minor elements (Dymek et al. 1975). In their study of 62237, Kempa and James (1982) described medium-grained mosaic-textured plagioclase anorthosite clasts in 62237. Some plagioclase in 62237 has been shocked to maskelynite (Nord and Wandless 1983). Meyer (1979) determined trace element contents of plagioclase.

Ilmenite: Dymek et al. (1975) analyzed ilmenite in 62237.

Chromite: Dymek et al. (1975) analyzed chromite in 62237.

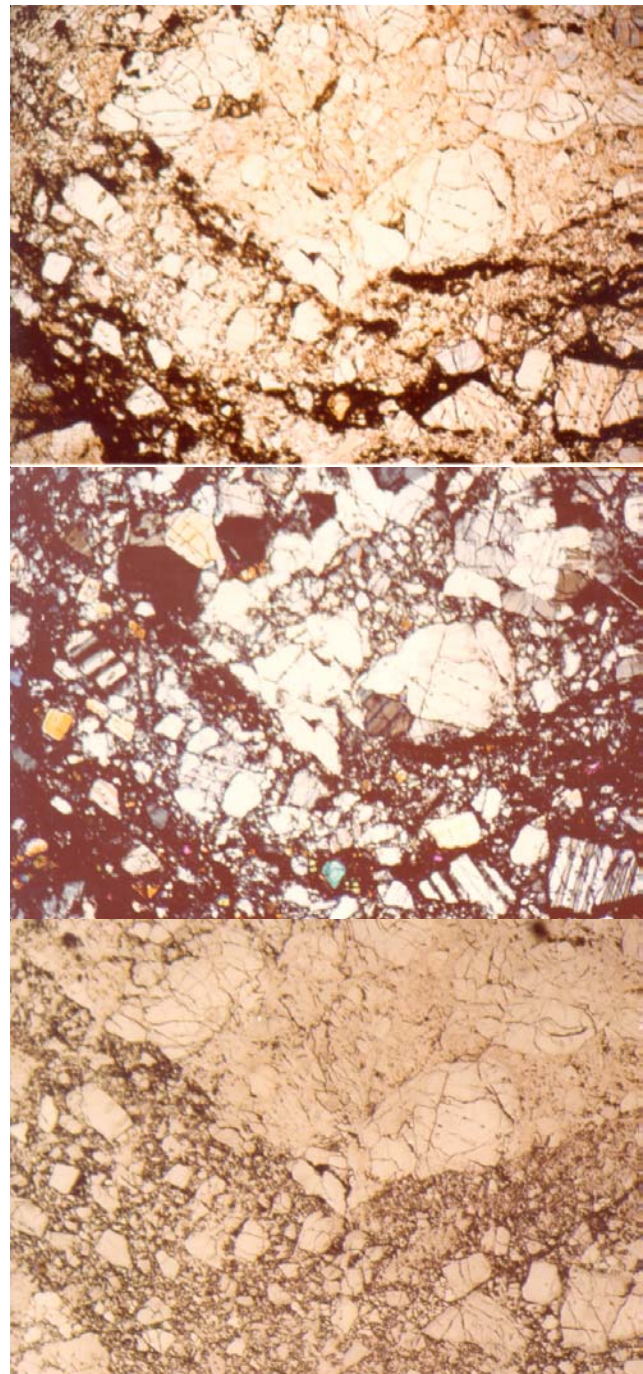


Figure 3: Photomicrographs of thin section 62237,23. a) plane polarized light, b) crossed nicols, c) reflected light. Width of field is 2.5 mm. NASA S79-27755-27757.

Mineralogical Mode of 62237

	Dymek et al. 1975	Warren and Wasson 1977
Olivine	16 vol. %	10
Pyroxene	minor	
Plagioclase	83	89
Opauques	tr.	

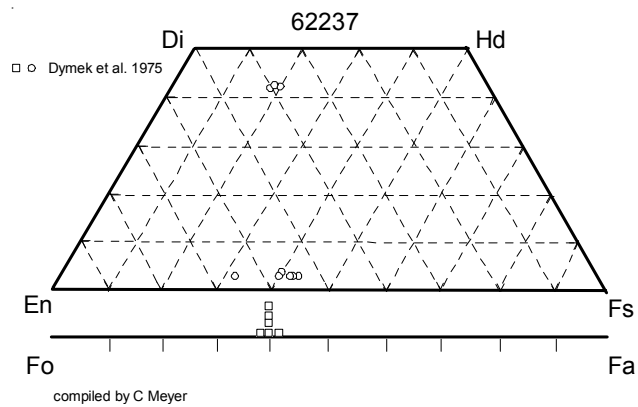


Figure 4: Pyroxene and olivine composition of 62237 (from Dymek et al. 1975).

Chemistry

Clark and Keith (1973), Warren and Wasson (1978) and Ebihara et al. (1992) determined the composition of 62237 (table 1, figure 6). The low Ni, Ir and Au indicate that 62237 is chemically pristine. Chemical analyses based on small splits of a coarse-grained rock are problematical. However, the bulk analyses of the whole rock (Clark and Keith 1973) are in reasonable agreement with those obtained by Warren and Wasson (1978) and Ebihara et al. (1992).

Radiogenic age dating

Schaeffer and Schaeffer (1977) could not obtain a plateau age for 62237. Snyder et al. (1994 abs), and Borg et al. (1999) discuss Rb-Sr data for 62237.

Cosmogenic isotopes and exposure ages

Schaeffer and Schaeffer (1977) calculated ~33 m.y. exposure to cosmic rays.

Processing

There are 10 thin sections of 62237. This sample should be compared with 62236 which was returned in same bag. The coarse fines from this bag should also be considered when looking for more pieces of it.

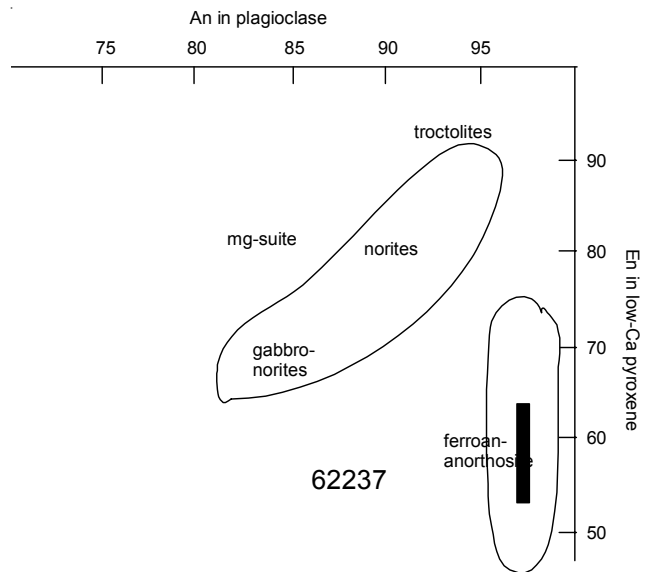


Figure 5: Plagioclase and pyroxene composition of 62237 showing relation to other lunar rock types.

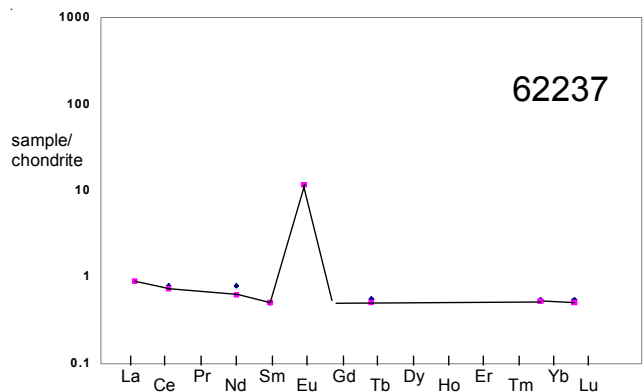


Figure 6: Normalized rare-earth-element diagram for 62237 (data from table 1).

Table 1. Chemical composition of 62237.

reference weight	Clarke73 48.6 g	Dymek 75 TS	Ebihara92	Warren 78	Snyder 94 Borg 99	Wiesmann76
SiO2 %		41.94 (e)				
TiO2		0.02 (e)				
Al2O3		28.23 (e)		32.1	30.22 (d)	
FeO		7.4 (e)		4.37	5.15 (d)	
MnO		0.09 (e)		0.05	0.07 (d)	
MgO		6.34 (e)		3.65	4.64 (d)	5.55 (c)
CaO		15.74 (e)		17.5	16.4 (d)	
Na2O		0.2 (e)		0.22	0.2 (d)	
K2O	0.014 (b)	0.01 (e)		0.13		0.01 (c)
P2O5						
S %						
sum						
Sc ppm				3.45	5.3 (d)	
V						
Cr		1095 (e)		330	510 (d)	
Co				10.8	11.4 (d)	
Ni			7.6 (a)	5.8	18 (d)	
Cu						
Zn			1.71 (a)	1.88	1.34 (d)	
Ga					2.85 (d)	
Ge ppb			4.68 (a)	3.4	3.2 (d)	
As						
Se			0.0862 (a)			
Rb			0.925 (a)		0.458 (c)	0.891 (c)
Sr					109 (c)	131 (c)
Y						
Zr						51 (c)
Nb						
Mo						
Ru						
Rh						
Pd ppb			0.37 (a)			
Ag ppb			0.91 (a)			
Cd ppb			1.6 (a)	4.1	3.6 (d)	
In ppb			1.23 (a)	1.2	1 (d)	
Sn ppb						
Sb ppb			1.15 (a)			
Te ppb			4.94 (a)			
Cs ppm			0.143 (a)			
Ba						6.21 (c)
La				0.21	0.17 (d)	0.146 (c)
Ce			0.48 (a)	0.44	(d)	0.395 (c)
Pr						
Nd			0.357 (a)	0.28	(d)	0.291 (c)
Sm				0.074	0.076 (d)	0.095 (c)
Eu			0.741 (a)	0.65	0.58 (d)	0.601 (c)
Gd						0.14 (c)
Tb			0.0201 (a)	0.018	(d)	
Dy						
Ho						
Er						
Tm						
Yb			0.087 (a)	0.084	0.12 (d)	
Lu			0.0132 (a)	0.012	0.017 (d)	
Hf						
Ta						
W ppb						
Re ppb			0.0028 (a)			
Os ppb			0.06 (a)			
Ir ppb			0.007 (a)	0.015	0.13 (d)	
Pt ppb						
Au ppb			0.005 (a)	0.146	0.017 (d)	
Th ppm						
U ppm	0.043 (b)		0.0027 (a)			

technique: (a) RNAA, (b) radiation counting, (c) IDMS, (d) INAA, (e) EMP

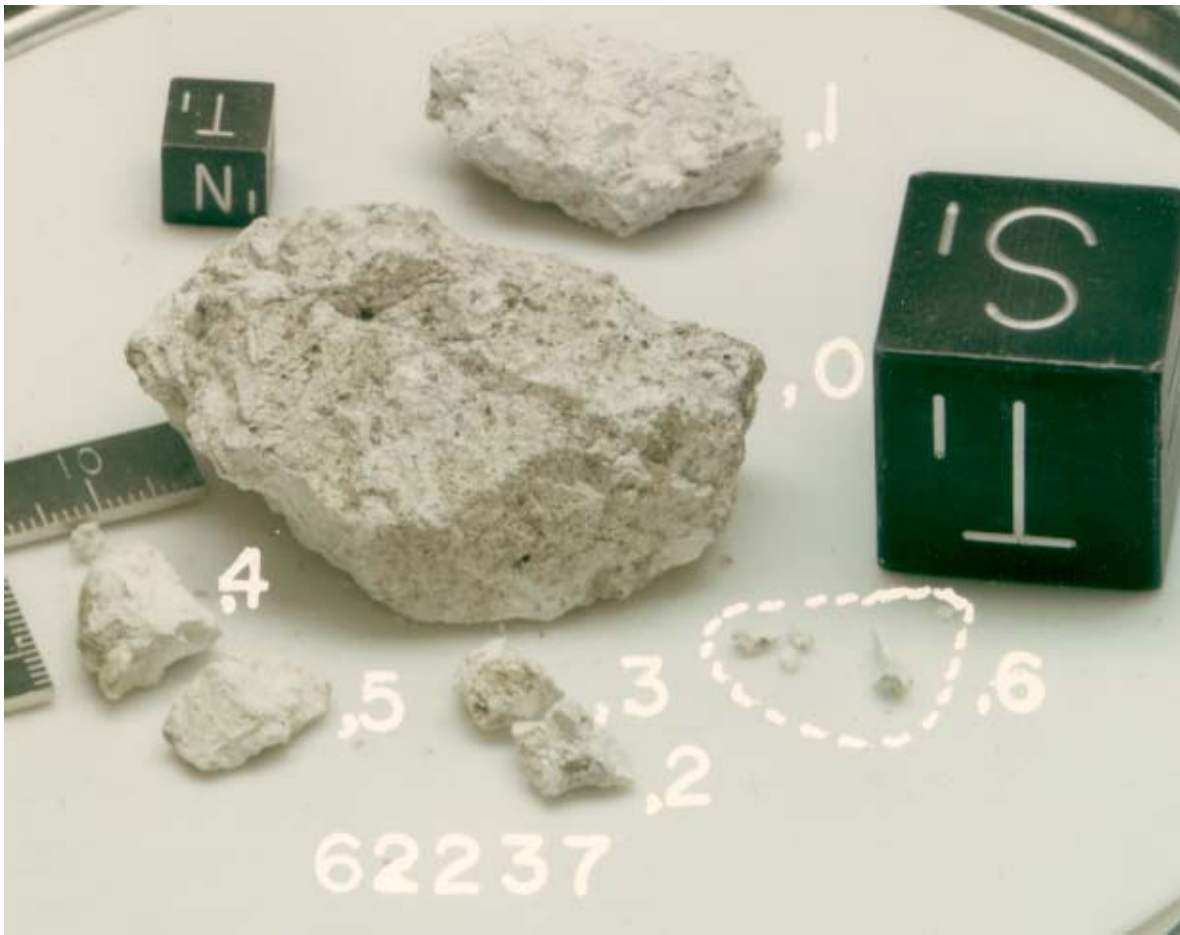
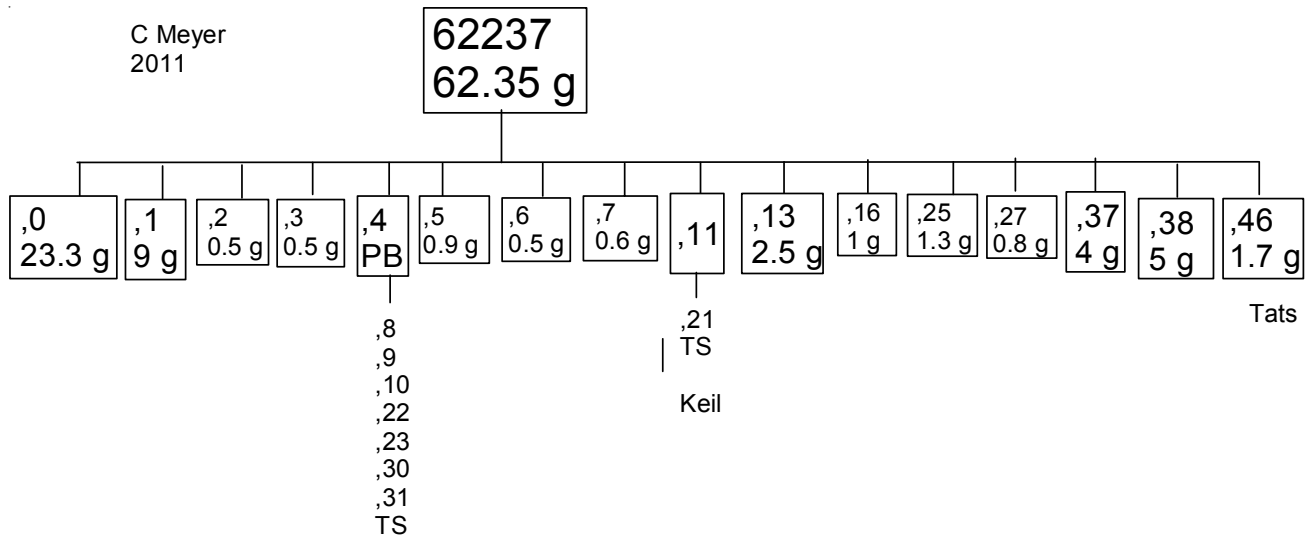


Figure 6: Processing photo of 62237. NASA S72-48426. Large cube is 1 inch, small is 1 cm.



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