

12007
Pigeonite Basalt
 65.2 grams



Figure 1: Freshly-broken, hackly surface of 12007 showing elongate pyroxene crystal. NASA photo# S76-25877. Edge of cube at top is 1 cm.

Introduction

12007 is a coarse-grained pigeonite basalt (figure 1).

Petrography

Lunar basalt 12007 is a relatively coarse-grained pigeonite basalt (“microgabbro”) with about 15 % zoned pyroxene phenocrysts set in ophitic to variolitic groundmass of plagioclase, pyroxene, ilmenite and cristobalite with minor ulvöspinel, troilite, metallic iron, fayalite, tranquillityite, apatite and two immiscible glasses (Baldrige et al. 1979). The groundmass is relatively coarse-grained (~1 mm) in this rock (figure 2). Pyroxene phenocrysts range up to 3.2 mm in length and are extensively zoned. Ilmenite occurs as irregular plates about 1 mm in size.

Mineralogy

Pyroxene: The composition of pyroxene in 12007 is given in Baldrige et al. (1979)(figure 3).

Plagioclase: Baldrige et al. (1979) report plagioclase composition ranging An_{92-80} , with the average An_{84} .

Silica: Both tridymite (large laths) and cristobalite (interstitial) are present.

Mineralogical Mode for 12007

	Neal et al. 1994	Baldrige et al. 1979
Olivine	0	
Pyroxene	48.2	48.2
Plagioclase	39.8	39.8
Ilmenite	2.9	4
Chromite +Usp	0.6	0.2
mesostasis	0.4	0.1
“silica”	7.3	7.3

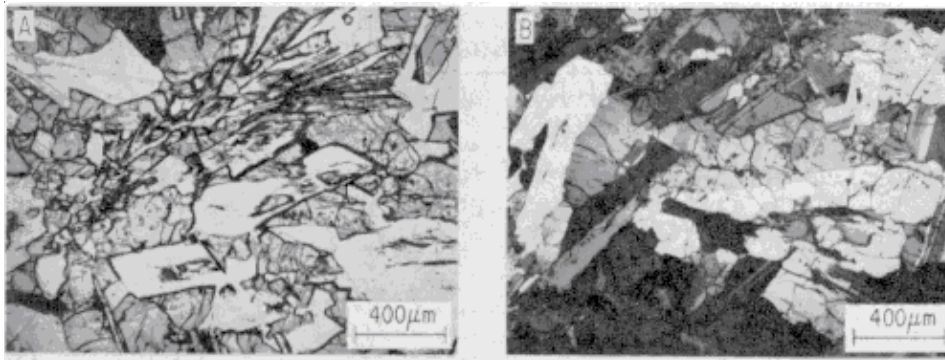


Figure 2: Photomicrographs of thin sections of 12007 (from Baldrige et al. 1979).

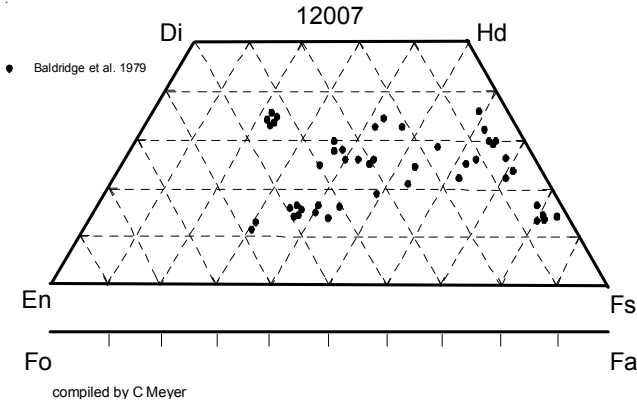


Figure 3: Pyroxene composition for 12007 (adapted from Baldrige et al. 1979).

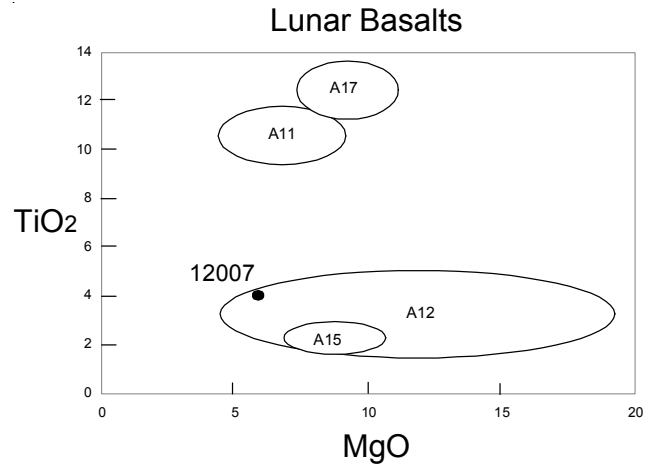


Figure 4: Composition of 12007 compared with that of other lunar basalts.

Fayalite: Fayalite occurs as intergrowths with cristobalite or high-K glass. The intergrowth with cristobalite may be due to breakdown of pyroxferroite (Baldrige et al. 1979).

Tranquillityite: Tranquillityite forms fine-grained, acicular aggregates < 1 micron in size.

Chemistry

Rhodes et al. (1977) determined the chemical composition (figures 4 and 5).

Radiogenic age dating

Not dated.

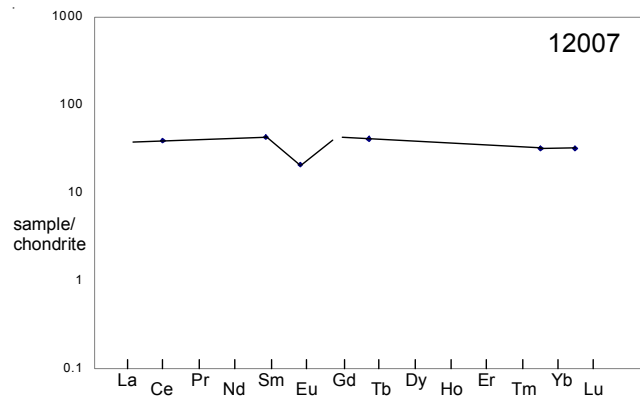


Figure 5: Normalized rare-earth-element diagram for 12007 (data from Rhodes et al. 1977).

List of Photo #s for 12007

- S69-61788 – 61810 B & W mug
- S69-63134 – 63157 color mug
- S70-37331 – 37336 B & W
- S76-25877 – 25878 color pic.

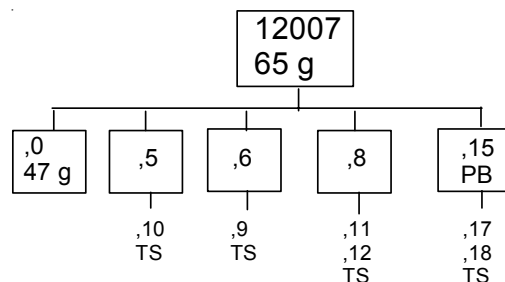


Table 1. Chemical composition of 12007.

reference weight	Rhodes77	Baldrige79	Neal2001	
SiO ₂ %	46.42	(c) 48.03	(d)	
TiO ₂	3.9	(c) 3.82	(d)	
Al ₂ O ₃	11.28	(c) 12.13	(d)	
FeO	19.05	(c) 17.85	(d)	
MnO	0.28	(c) 0.22	(d)	
MgO	5.86	(c) 5.67	(d)	
CaO	11.52	(c) 12.07	(d)	
Na ₂ O	0.32	(a) 0.4	(d)	
K ₂ O	0.08	(c) 0.04	(d)	
P ₂ O ₅	0.1	(c) 0.08	(d)	
S %	0.1	(c) 0.12	(d)	
sum				
Sc ppm	52.3	(a)	56	(e)
V			152	(e)
Cr	1980	(a)	2438	(e)
Co	26	(a)	31.6	(e)
Ni			4.4	(e)
Cu			18	(e)
Zn			26	(e)
Ga			3.65	(e)
Ge ppb				
As				
Se				
Rb			1.75	(e)
Sr	142	(c)	135	(e)
Y	51	(c)	54	(e)
Zr	156	(c)	146	(e)
Nb	10	(c)	10	(e)
Mo			0.51	(e)
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm			0.05	(e)
Ba	91	(b)	90	(e)
La			8.26	(e)
Ce	23.6	(a)	22.7	(e)
Pr			3.5	(e)
Nd			17	(e)
Sm	6.4	(a)	5.7	(e)
Eu	1.2	(a)	1.21	(e)
Gd			7.8	(e)
Tb	1.48	(a)	1.35	(e)
Dy			8.87	(e)
Ho			1.86	(e)
Er			5.44	(e)
Tm			0.72	(e)
Yb	5.3	(a)	4.75	(e)
Lu	0.77	(a)	0.63	(e)
Hf	6.4	(a)	4.24	(e)
Ta			0.54	(e)
W ppb			140	(e)
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm			1.2	(e)
U ppm			0.31	(e)

technique (a) INAA, (b) IDMS, (c) XRF, (d) e probe, (e) ICP-MS

References for 12007

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