

12043
Pigeonite Basalt
60 grams



Figure 1: Lunar basalt 12043,0 showing zap pits and rounded surface. Sample is 4 cm. NASA # S94-035810.

Introduction

All sides of this little potato have numerous micrometeorite craters (figure 1). It has not been dated.

Plagioclase: The composition of plagioclase is An₇₈₋₈₈ (ave. An₈₄).

Petrography

The petrology of 12043 is discussed in Baldrige et al. (1979). 12043 is a medium-grained pigeonite basalt with 10% large (3 mm), prismatic phenocrysts of pyroxene and olivine set in a subophitic to variolitic groundmass of pyroxene, plagioclase, ilmenite, chromite, cristobalite, metallic iron and mesostasis. Olivine phenocrysts are embayed, and overgrown by pyroxene.

Metallic iron: Found attached to chromite.

Mineralogy

Olivine: The composition of olivine is Fo₇₀₋₆₅ (ave. Fo₆₆).

Pyroxene: The pyroxene composition of 12043 is given in Baldrige et al. (1979)(figure 2).

Mineralogical Mode for 12043

	Neal et al. 1994	Baldrige et al. 1979
Olivine	0.9	0.9
Pyroxene	57.7	57.7
Plagioclase	32.9	32.9
Ilmenite	3.5	3.5
Chromite +Usp	0.2	0.3
mesostasis	0.8	0.6
“silica”	3.7	3.7

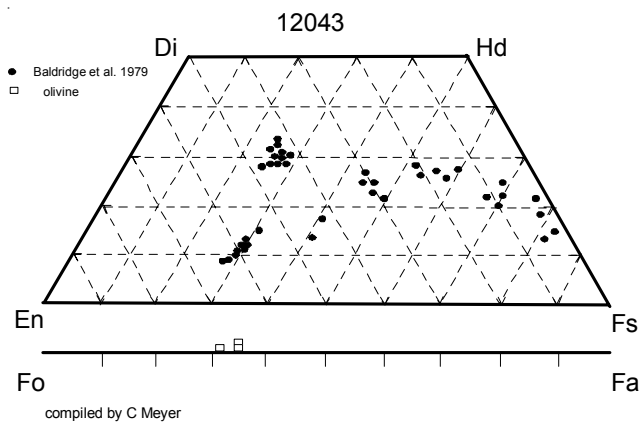


Figure 2: Composition of pyroxene in 12043 (from Baldrige et al. 1979).

Chemistry

Rhodes et al. (1977) and Snyder et al. (1997) determined the chemical composition of 12038 (table 1 and figures 3 and 4).

Radiogenic age dating

Not dated.

There are 4 thin sections.

List of Photo #s for 12043

S69-61562 – 61585
 S69-63823 – 63826
 S70-22460 – 22467
 S94-035810

B & W mug

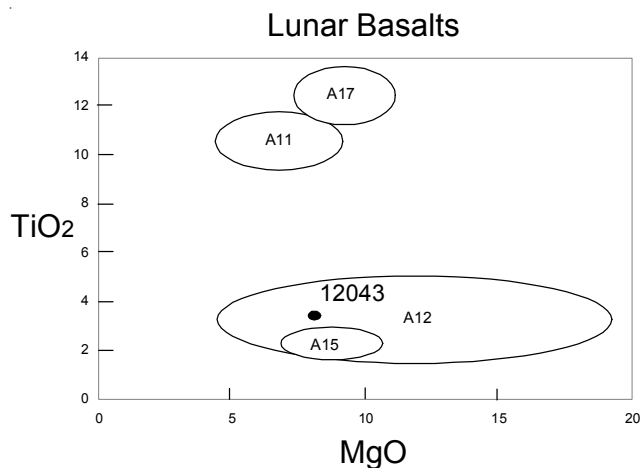


Figure 3: Composition of 12043 compared with that of other lunar basalts.

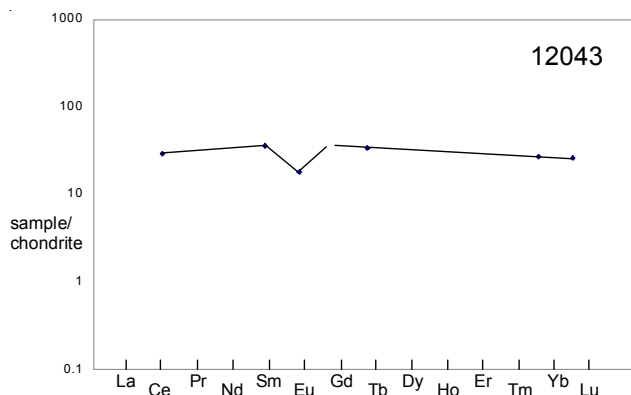


Figure 4: Normalized rare-earth-element pattern for 12043 (data from table).

Table 1. Chemical composition of 12043.

reference weight	Rhodes77	Baldrige79	Snyder97
SiO ₂ %	46.77	(c) 47.11	(d) 46.8
TiO ₂	3.38	(c) 3.39	3.38
Al ₂ O ₃	10.09	(c) 10.56	10.1
FeO	19.5	(c) 19.52	19.5
MnO	0.29	(c) 0.25	0.29
MgO	7.68	(c) 7.9	7.68
CaO	10.96	(c) 11.15	11
Na ₂ O	0.27	(a) 0.27	0.27
K ₂ O	0.06	(c) 0.02	0.06
P ₂ O ₅	0.06	(c) 0.06	0.06
S %	0.07	(c) 0.11	
sum			
Sc ppm	52.4	(a)	
V			
Cr	3300	(a)	2270 (e)
Co	37	(a)	36.4 (e)
Ni			18.2 (e)
Cu			10.1 (e)
Zn			9.02 (e)
Ga			3.15 (e)
Ge ppb			
As			
Se			
Rb			2.497 (e)
Sr	117	(c)	117.2 (e)
Y	40	(c)	42.1 (e)
Zr	123	(c)	125 (e)
Nb	7.5	(c)	6.85 (e)
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			150 (e)
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			0.159 (e)
Ba	73	(b)	69.2 (e)
La			6 (e)
Ce	17.7	(a)	16.2 (e)
Pr			2.58 (e)
Nd			13.6 (e)
Sm	5.25	(a)	5.15 (e)
Eu	1	(a)	0.93 (e)
Gd			5.47 (e)
Tb	1.25	(a)	1.03 (e)
Dy			6.65 (e)
Ho			1.42 (e)
Er			3.96 (e)
Tm			0.57 (e)
Yb	4.4	(a)	3.9 (e)
Lu	0.63	(a)	0.51 (e)
Hf	4	(a)	
Ta			0.355 (e)
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm			0.85 (e)
U ppm			0.258 (e)

technique: (a) INAA, (b) IDMS, (c) XRF, (d) from mode, (e) ICP-MS

References for 12043

Baldrige W.S., Beaty D.W., Hill S.M.R. and Albee A.L. (1979) The petrology of the Apollo 12 pigeonite basalt suite. *Proc. 10th Lunar Planet. Sci. Conf.* 141-179.

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Snyder G.A., Neal C.R., Taylor L.A. and Halliday A.N. (1997a) Anataxis of lunar cumulate mantle in time and space: Clues from trace-element, strontium and neodymium isotopic chemistry of parental Apollo 12 basalts. *Geochim. Cosmochim. Acta* **61**, 2731-2747.