

12012
Olivine Basalt
176.2 grams



Figure 1: Photo of 12012,0, taken in 1991, after subdivision. NASA # S91-38939.

Introduction

Olivine basalt 12012 has not been well studied and no age is available.

Petrography

Rhodes et al. (1977) describe the texture of 12012 as “porphyritic-subophitic” with partially resorbed olivine phenocrysts in a subophitic groundmass (figure 2).

Mineralogy

Olivine: Average Fo₆₇ (Baldrige et al. 1979).

Plagioclase: Average An₈₇.

Chromite-Ulvöspinel: Figure 4 shows chrome spinel overgrown by ulvöspinel, with metallic iron attached.

Chemistry

The chemical composition of 12012 was determined by LSPET (1970), Rhodes et al. (1977) and Neal et al. (1994).

Mineralogical Mode for 12012

	Neal et al. 1994	Baldrige et al. 1979
Olivine	21.6	18
Pyroxene	53.5	52.7
Plagioclase	19	25
Ilmenite	1.9	2
Chromite +Usp	1.3	0.6
mesostasis	1.6	0.4
“silica”	0.2	0.8



Figure 2 : Photomicrograph of thin section of 12012. NASA # S69-24220. Length = 2 cm.

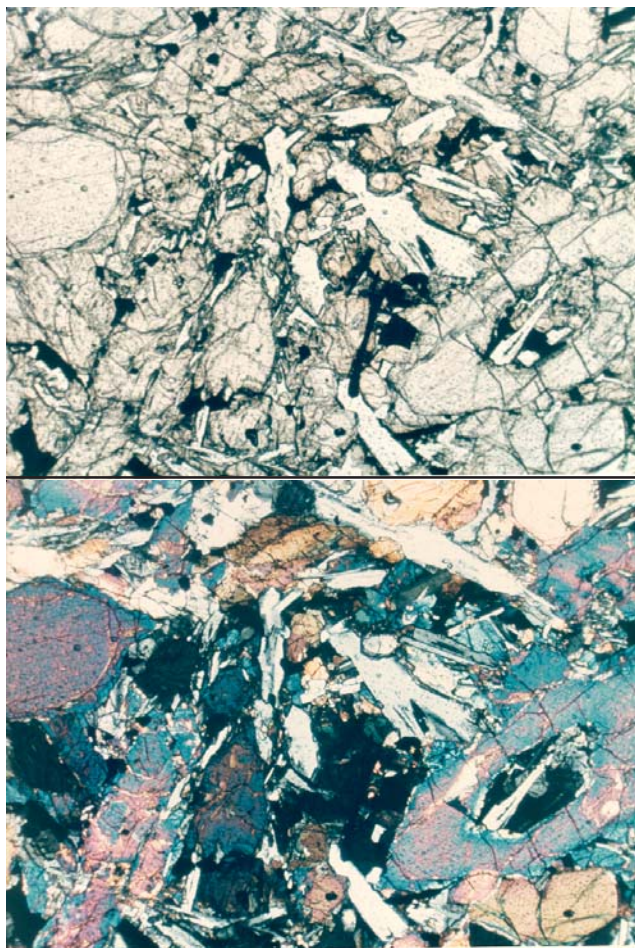


Figure 3: Photomicrographs of thin section 12012,7 in transmitted and cross-polarizing light showing large, corrod pyroxene in cross section. Field of view is 2.2 mm. NASA #S70-49552 and 553.

Radiogenic age dating

Not dated.

Other Studies

Bogard et al. (1971) reported the content and isotopic composition of rare gases in 12012.

There are 5 thin sections.

List of Photo #s for 12012

S69-63333-63341	B&W
S69-63417-63421	
S69-63396-63399	
S70-25405	TS
S70-20747	TS
S69-24220	TS
S70-49163-166	
S70-49553-554	
S91-38939	

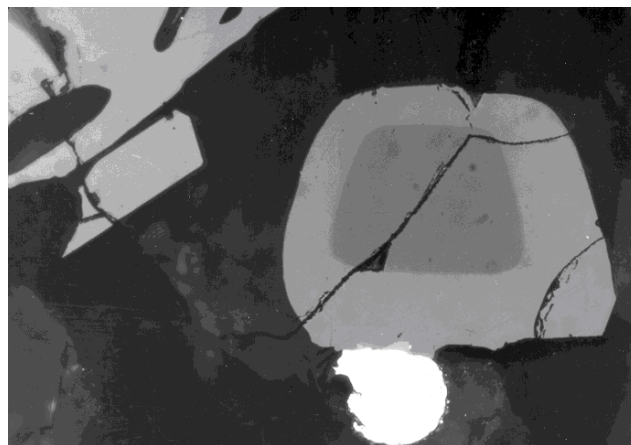


Figure 4: Reflected light photomicrograph of thin section 12012,8 showing chromite overgrown by ulvospinel with attached metallic iron grain. Also ilmenite in top corner. NASA #S70-25431. Chromite is 20 microns.

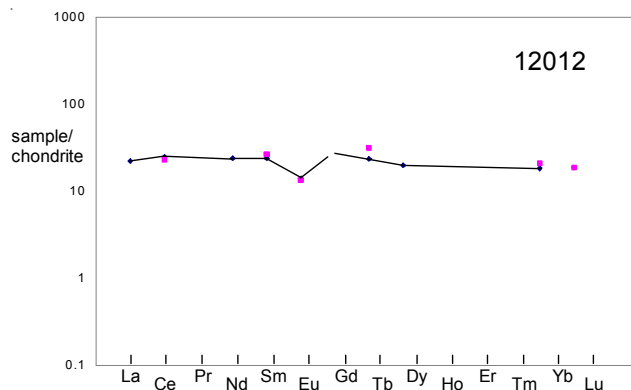


Figure 5: Normalized rare-earth-element diagram for 12012 (data from Rhodes et al. 1977).

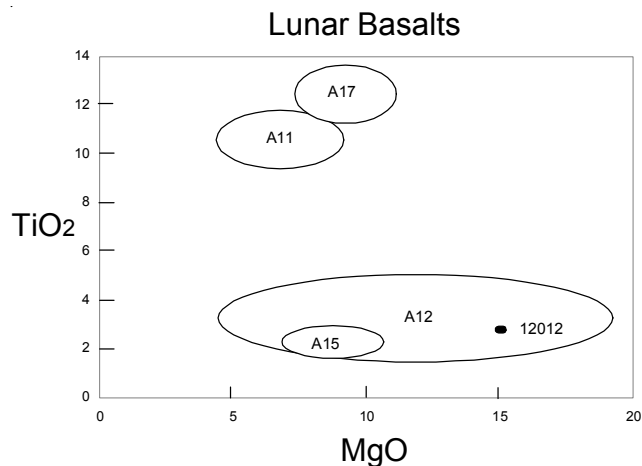
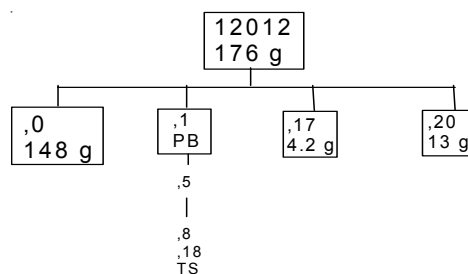


Figure 6: Composition of 12012 compared with that of other lunar basalts.

Table 1. Chemical composition of 12012.

reference	Neal 94	Rhodes77	LSPET70
weight	.0604 g		
SiO ₂ %		44.17	(c) 35
TiO ₂	2.7	(a) 2.64	(c) 3.1
Al ₂ O ₃	8.1	(a) 7.71	(c) 11
FeO	21.4	(a) 20.69	(c) 23
MnO	0.262	(a) 0.3	(c) 0.17
MgO	16	(a) 14.37	(c) 17.5
CaO	8	(a) 8.47	(c) 9.3
Na ₂ O	0.207	(a) 0.21	(a) 0.53
K ₂ O	0.052	(a) 0.06	(c) 0.055
P ₂ O ₅		0.09	(c)
S %		0.07	(c)
sum			
Sc ppm	44	(a) 41.9	(a) 38
V	186	(a)	65
Cr	4260	(a) 4780	(a) 3900
Co	57.7	(a) 56	(a) 48
Ni	43	(a) 60	(a) 135
Cu			
Zn			
Ga			
Ge ppb			
As			
Se			
Rb			0.64
Sr	143	(a) 89	(c) 110
Y		33	(c) 40
Zr		99	(c) 120
Nb		6.6	(c)
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba	104	(a) 56	(b) 38
La	5.3	(a)	
Ce	15.3	(a) 13.8	(a)
Pr			
Nd	10.8	(a)	
Sm	3.6	(a) 4.02	(a)
Eu	0.8	(a) 0.76	(a)
Gd			
Tb	0.86	(a) 1.17	(a)
Dy	4.9	(a)	
Ho			
Er			
Tm			
Yb	3	(a) 3.4	(a)
Lu	0.46	(a) 0.47	(a)
Hf	2.6	(a) 3.4	(a)
Ta	0.37	(a)	
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm	0.67	(a)	
U ppm			
technique	(a) INAA, (b) IDMS, (c) XRF		



References for 12012

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