

**12045**  
Ilmenite Basalt  
63 grams



*Figure 1: Photo of 12045 showing rounded surface with many zap pits due to micrometeorite bombardment. NASA #S70-19002. Sample is 4.5 cm across.*

**Introduction**

12045 is a small flat rock with lots of micrometeorite craters.

of thin platelets. Thus 12045 appears to be a more crystalline, less glassy version of 12008.

**Petrography**

Dungan and Brown (1977) compare 12045 with olivine vitrophyre 12008. Like 12008, 12045 has glomerophytic aggregates of early-formed olivine phenocrysts, spinel grains and rare metal droplets. It also has elongate non-skeletal phenocrysts of titanomagnetite. These phenocryst assemblages are set in a variolitic groundmass of acicular pyroxene, plagioclase, silica, ilmenite, troilite and metal. The ilmenite is highly skeletal and occurs as parallel sets

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**Mineralogical Mode for 12045**

	Neal et al. 1994
Olivine	8.8
Pyroxene	57
Plagioclase	20.6
Ilmenite	
Chromite +Usp	
mesostasis	5.7
“silica”	0.6





*Figure 2: Faded photomicrograph of thin section 12045,6 showing olivine pheocrysts in groundmass cut by fine, parallel needles of ilmenite. NASA S70-50032. Plane polarized light. Scale about 3 mm.*



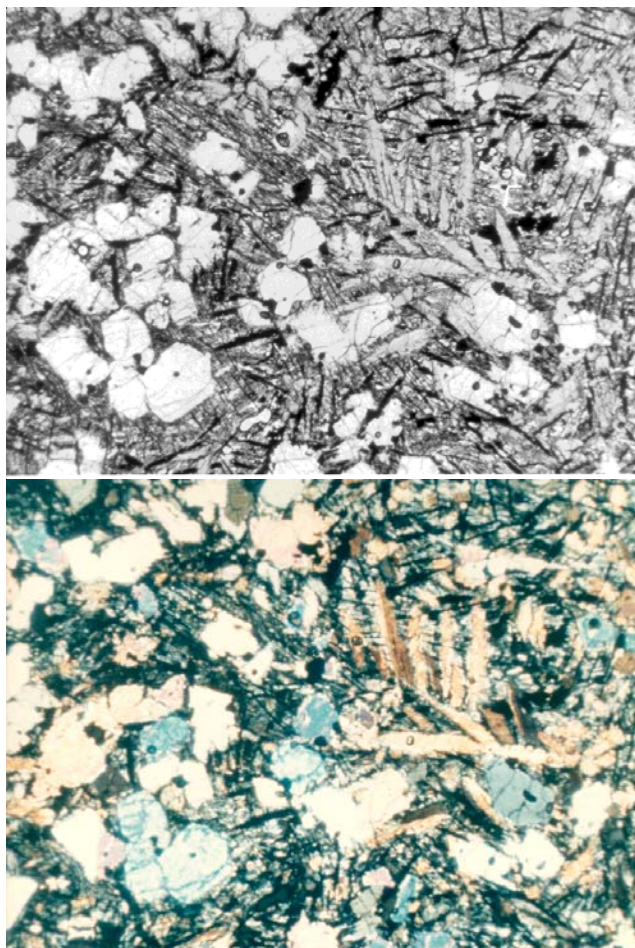


Figure 3: Photomicrograph of thin section 12045,7 (plane-polarized and cross-nicols). Note feathery pyroxene. NASA#S70-17968-969. 2.7 mm across.

### Mineralogy

**Olivine:** Dungan and Brown (1977) report that Fo<sub>74</sub> is the most magnesian olivine in 12045.

**Pyroxene:** Dungan and Brown (1977) present pyroxene compositions in 12045 in figure 3.

**Ilmenite:** The groundmass of 12045 is riddled with fine ilmenite needles in odd parallel alignment (figure 2).

### Chemistry

The chemical composition of 12045 has been determined by Rhodes et al. (1977), Nyquist et al. (1979) and Snyder et al. (1997).

### Radiogenic age dating

Snyder et al. (1997) reported the isotopic composition of Sr and Nd.

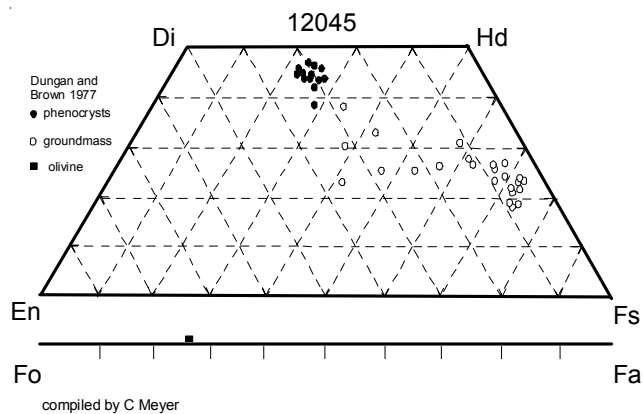


Figure 4: Pyroxene composition of 12045 (adapted from Dungan and Brown 1977).

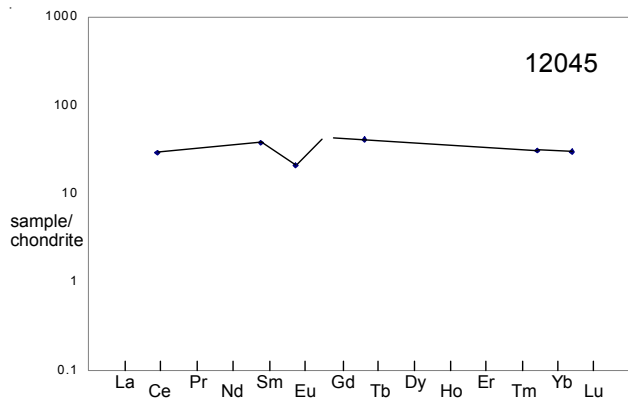


Figure 5: Normalized rare-earth-element diagram for 12045 (data from Nyquist et al. 1979).

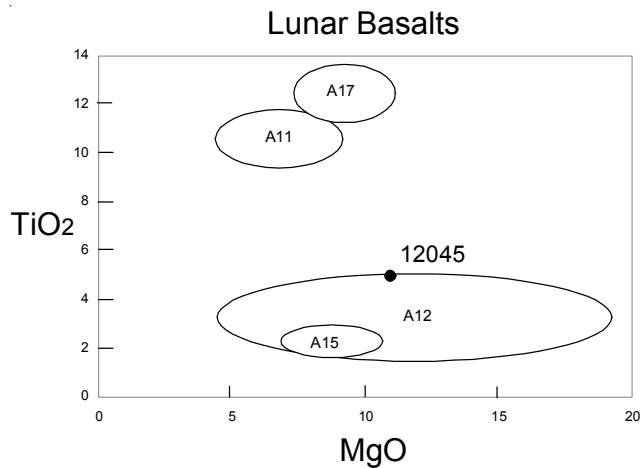


Figure 6: Composition of 12045 compared with other lunar basalts.

### List of Photo #s for 12045

- |                   |                 |
|-------------------|-----------------|
| S70-17966 – 17971 | TS              |
| S70-19002 – 19026 | B & W mug color |
| S70-48255 – 48264 | TS              |
| S70-50032 – 50035 |                 |

**Table 1. Chemical composition of 12045.**

reference weight	Rhodes77	Nyquist79 50 mg	Snyder97	Neal2001
SiO <sub>2</sub> %	42.3	(c)	42.3	
TiO <sub>2</sub>	4.78	(c)	4.78	
Al <sub>2</sub> O <sub>3</sub>	8.06	(c)	8.06	
FeO	22.09	(c)	22.09	
MnO	0.29	(c)	0.29	
MgO	11.63	(c)	11.63	
CaO	9.09	(c)	9.09	
Na <sub>2</sub> O	0.26	(a)	0.26	
K <sub>2</sub> O	0.07	(c) 0.062	(b) 0.07	
P <sub>2</sub> O <sub>5</sub>	0.09	(c)	0.09	
S %	0.09	(c)		
sum				
Sc ppm	54	(a)		60 (d)
V				162 (d)
Cr	4060	(a)	3800 (d)	3757 (d)
Co	52	(a)	55.9 (d)	53 (d)
Ni	40	(a)	56.1 (d)	51 (d)
Cu			16.4 (d)	20 (d)
Zn			9.98 (d)	29 (d)
Ga			3.83 (d)	3.37 (d)
Ge ppb				
As				
Se				
Rb		0.717	(b) 0.709 (d)	0.88 (d)
Sr	136	(c) 143	(b) 132.1 (d)	151 (d)
Y	50	(c)	49.7 (d)	57 (d)
Zr	112	(c)	109.9 (d)	125 (d)
Nb	5.3	(c)	5.17 (d)	6.8 (d)
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb			398 (d)	
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm			0.038 (d)	0.02 (d)
Ba	52	(b) 52.7	(b) 52.9 (d)	57 (d)
La			6.65 (d)	5.6 (d)
Ce	17.4	(a) 16.2	(b) 17.3 (d)	17 (d)
Pr			2.83 (d)	2.93 (d)
Nd		14.8	(b) 15.1 (d)	14.8 (d)
Sm	5.6	(a) 5.48	(b) 5.64 (d)	5.54 (d)
Eu	1.19	(a) 1.28	(b) 1.06 (d)	1.27 (d)
Gd		7.69	(b) 6.04 (d)	7.97 (d)
Tb	1.51	(a)	1.26 (d)	1.45 (d)
Dy		9.57	(b) 7.74 (d)	9.79 (d)
Ho			1.6 (d)	1.98 (d)
Er		5.66	(b) 4.41 (d)	5.74 (d)
Tm			0.63 (d)	0.8 (d)
Yb	5.1	(a) 4.94	(b) 4.25 (d)	5.44 (d)
Lu	0.73	(a) 0.721	(b) 0.58 (d)	0.68 (d)
Hf	4.5	(a)		4.17 (d)
Ta			0.274 (d)	0.38 (d)
W ppb				90 (d)
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm			0.679 (d)	0.64 (d)
U ppm			0.176 (d)	0.17 (d)
technique	(a) INAA,	(b) IDMS,	(c) XRF,	(d) ICP-MS

**References for 12045**

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