

**70139**  
Ilmenite Basalt  
3.16 grams

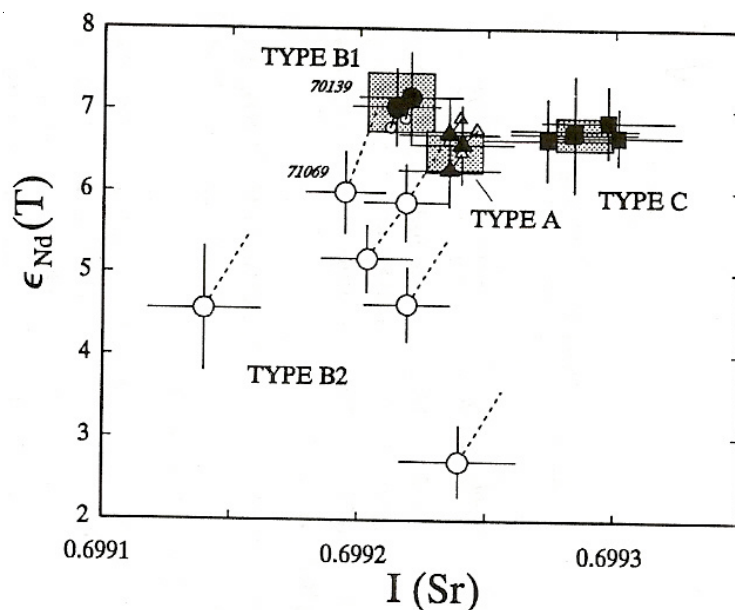


Figure 1: Diagram of initial Sr and Nd isotopes for 3.7 b.y. old high-Ti mare basalts at Apollo 17 (Paces et al. 1991).



Figure 2: Basalt chips from same bag as 70135. S73-17970

**Introduction**

This is a chip off of Geophone Rock – see section on 70135. It is a typical high-Ti mare basalt with an age of 3.71 b.y.

Geophone Rock is a basalt boulder located about 50 meters south of the ALSEP site.

**Petrography**

Rhodes et al. (1975) originally postulated that there were 3 lava flows of high Ti basalt at Apollo 17 (A, B and C) and this assumption seems to have held up with further analyses (figure 1). 70139 has the same mineralogy and texture as 70135.

**Mineralogical Mode**

	70135	Roedder	70139	70147
Olivine	2.8	3.8	2.5	--
Pyroxene	46.2	51.6	35.8	48.2
Plagioclase	28.4	23	41.6	29.4
Opauques	21.9	19.6	18.2	21
Silica	0.3	0.6	1.9	0.2
Meostasis	0.4	1.4		

**Chemistry**

70139 (and 70135) are high-Ti mare basalts (figure 3). The REE pattern is lower than that of most other Apollo 17 mare basalts (figure 4). Please compare with composition of 70135.

**Table 1. Chemical composition of 70139.**

reference weight	Neal90	Paces91		
SiO <sub>2</sub> %				
TiO <sub>2</sub>	13.1	(a)		
Al <sub>2</sub> O <sub>3</sub>	8.32	(a)		
FeO	17.6	(a)		
MnO	0.23	(a)		
MgO	9.6	(a)		
CaO	10	(a)		
Na <sub>2</sub> O	0.36	(a)		
K <sub>2</sub> O	0.04	(a)		
P <sub>2</sub> O <sub>5</sub>				
S %				
sum				
Sc ppm	80	(a)		
V	143	(a)		
Cr	3810	(a)		
Co	26.2	(a)		
Ni	31	(a)		
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb			0.281	0.282 (b)
Sr	180	(a)	146	146 (b)
Y				
Zr	160	(a)		
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm	0.02	(a)		
Ba	67	(a)		
La	3.1	(a)		
Ce	13	(a)		
Pr				
Nd	15	(a)	12.3	12.4 (b)
Sm	4.8	(a)	5.3	5.38 (b)
Eu	1.4	(a)		
Gd				
Tb	1.5	(a)		
Dy	9.7	(a)		
Ho				
Er				
Tm				
Yb	5.4	(a)		
Lu	0.81	(a)		
Hf	5.7	(a)		
Ta	1.2	(a)		
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm	0.3	(a)		
U ppm	0.1	(a)		
technique:		(a) INAA, (b) IDMS		

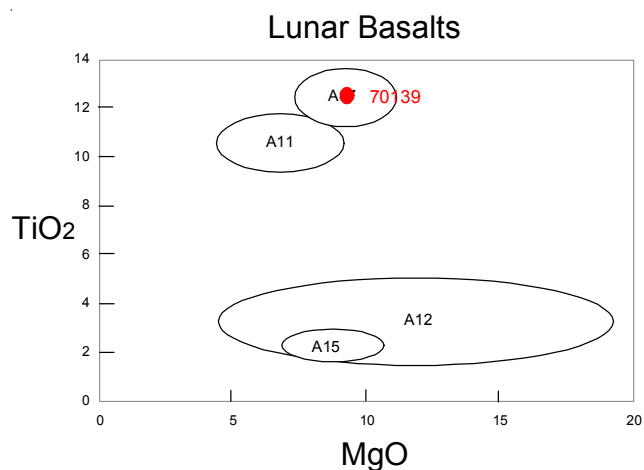


Figure 3: Composition of mare basalts collected from Apollo missions.

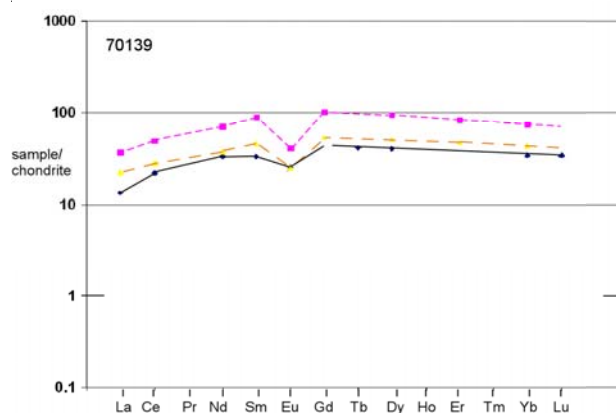


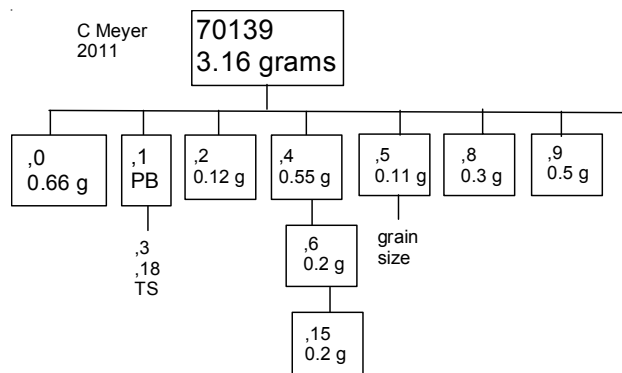
Figure 4: Normalized rare-earth-element diagram for 70139 compared with type A and type B basalts from Apollo 17 (dat by Neal et al. 1990).

### Radiogenic age dating

Paces et al. (1991) dated 70139 at  $3650 \pm 120$  m.y. by Rb/Sr internal isochron and  $3710 \pm 120$  m.y. by the more reliable Sm/Nd method. This is concordant with the age for 70135 as determined by Nyquist et al. (1975).

### Processing

70139 is a basalt chip from the bag (10E) used to return 70135 and is most certainly a chip of same (Butler 1973). There are two thin sections of 70139.



## References for 70139

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