

15117

Pigeonite Basalt

23.3 grams



Figure 1: Photo of 15117. Scale in cm.
NASA S71-48765.

Introduction

According to Swann et al. (1972), lunar sample 15117 was collected by rake as part of a comprehensive sample taken at station 2, Apollo 15 (near St. George Crater and the Hadley Rille). 15117 is a coarse-grained pigeonite basalt similar to 15115 and 15116. It has been dated at 3.35 ± 0.04 b.y.

Petrography

Steele et al. (1972) noted the lack of olivine in 15117, but gave no further description. No one appears to have studied the pyroxene zoning (figure 2), although it is presumably like that reported for 15116.

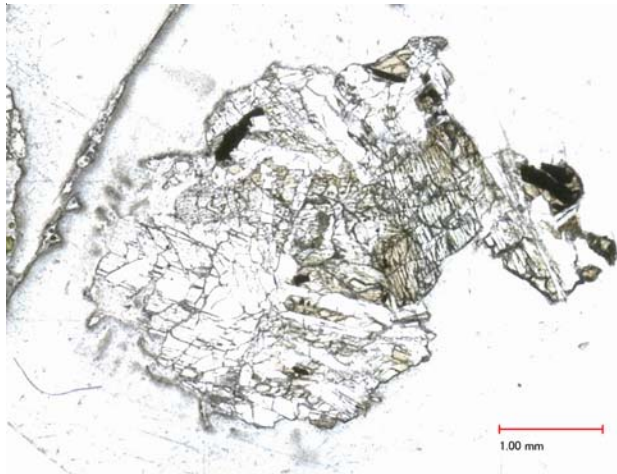


Figure 2a: Photomicrograph of 15117,2 by C Meyer @ 50x.

Mineralogical Mode for 15117

	Sample Catalog Butler 1971
Olivine	
Pyroxene	55-65
Plagioclase	45
Silica	
Opaques	1

Papanastassiou and Wasserburg (1973) referred to it as a “coarse basalt or gabbro with ilmenite”.

Chemistry

Fruchter et al. (1973) and Cuttitta et al. (1973) analyzed the chemical composition (figures 3, 4 and 6). Chemically, these fragments belong to the quartz-normative clan of Apollo 15 basalts.

Radiogenic age dating

Papanastassiou and Wasserburg (1973) were able to obtain a two point Rb/Sr isochron for 15117 (figure 5) with age of 3.35 ± 0.04 b.y.

Processing

There are two thin sections of 15117.

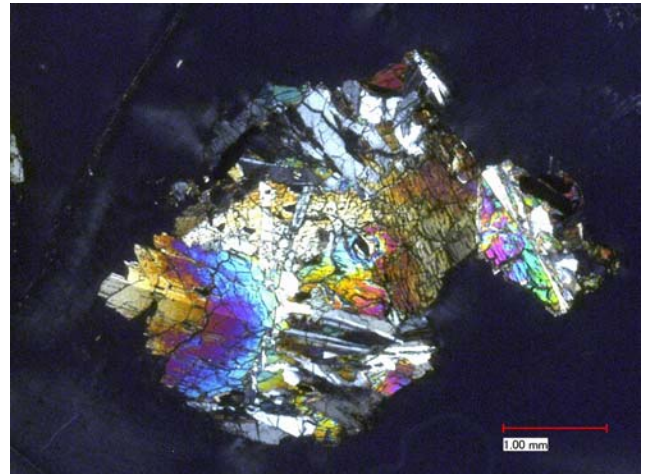


Figure 2b: Photomicrograph of 15117,2 by C Meyer @ 50x (crossed polarizers).

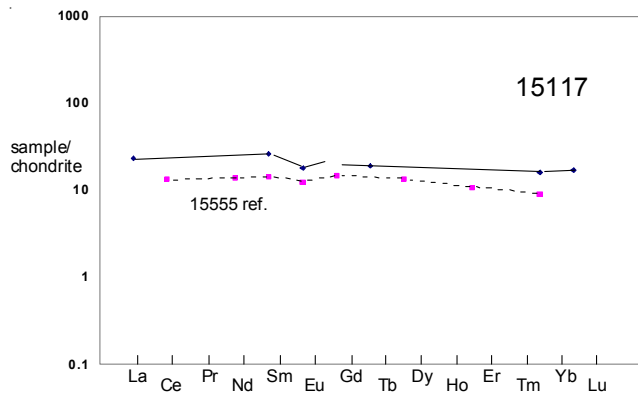


Figure 3: Normalized rare-earth-element diagram for 15117 (data from Fruchter et al. 1973).

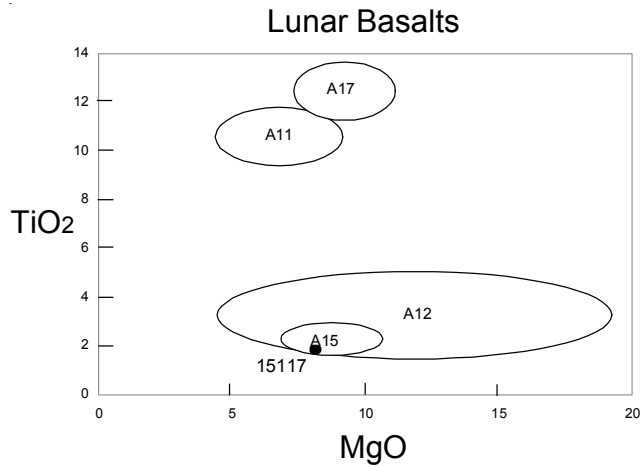


Figure 4: Chemical composition of 15117 compared with other lunar basalts.

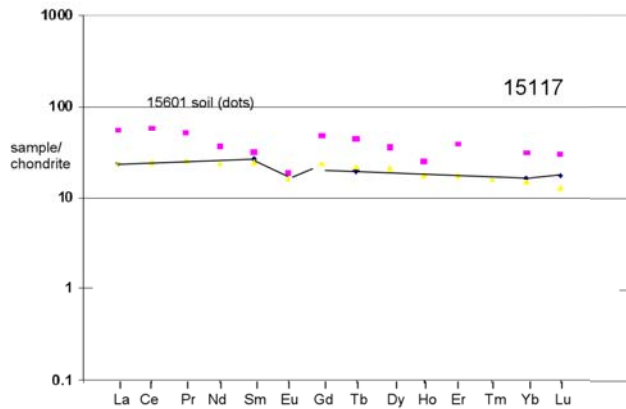


Figure 6: Normalized rare-earth-element diagram for 15117.

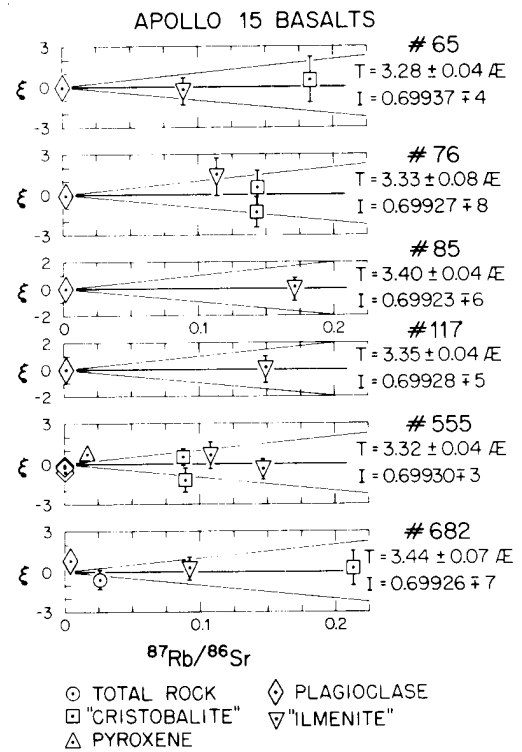


Figure 5: Rb/Sr isochrons for Apollo 15 basalts including 15117 (from Papanastassiou and Wasserburg 1973).

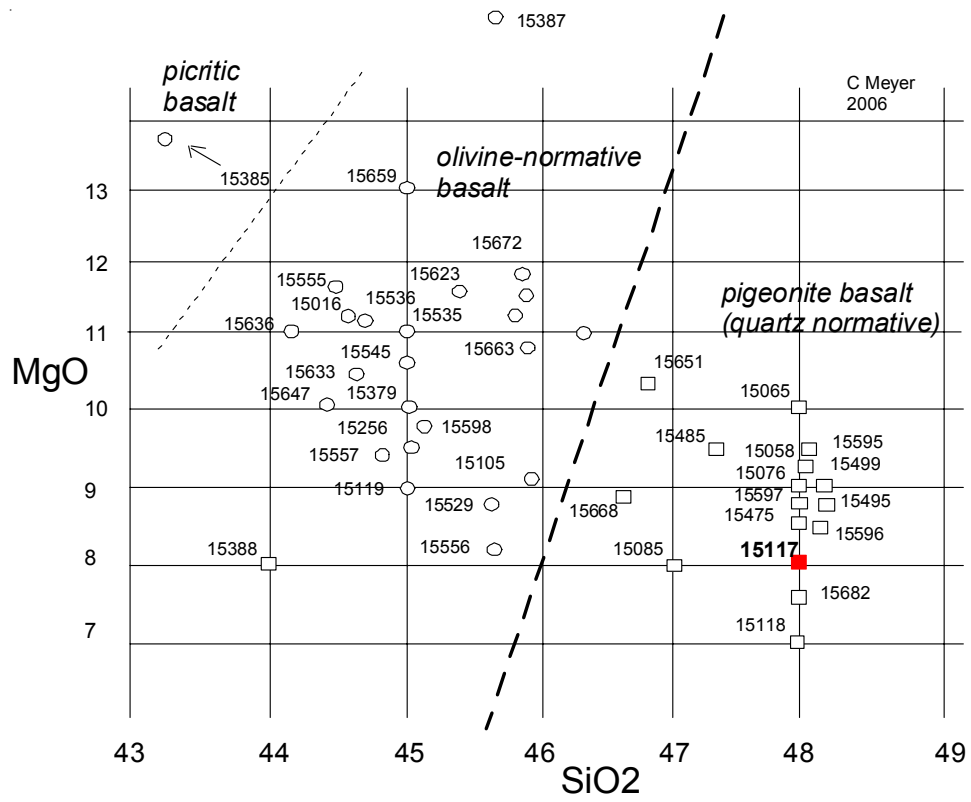
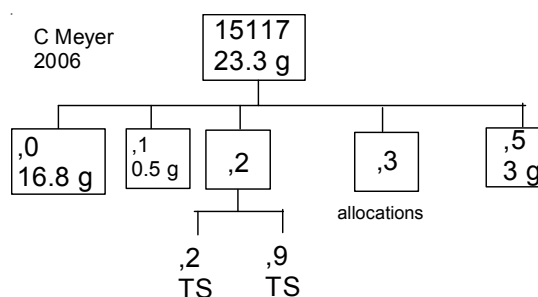


Figure 7: Composition of Apollo 15 basalts showing two main types: a) olivine-normative basalts and b) pigeonite basalts. Sample 15117 is highlighted.

Table 1. Chemical composition of 15117.

reference weight	Fruchter73	Christian72 Cuttitta 73	
SiO ₂ %		47.8	(b)
TiO ₂	2.02	(a) 2.09	(b)
Al ₂ O ₃	8.79	(a) 9.89	(b)
FeO	20.97	(a) 20.41	(b)
MnO		0.29	(b)
MgO		8.02	(b)
CaO		10.98	(b)
Na ₂ O	0.31	(a) 0.33	(b)
K ₂ O		0.07	(b)
P ₂ O ₅		0.11	(b)
S %			
sum			
Sc ppm	46	(a) 43	(b)
V		188	(b)
Cr	4450	(a) 1916	(b)
Co	53	(a) 38	(b)
Ni		30	(b)
Cu		12	(b)
Zn			
Ga		3.8	(b)
Ge ppb			
As			
Se			
Rb		1	(b)
Sr		150	(b)
Y		26	(b)
Zr		90	(b)
Nb			
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba		100	(b)
La	5.5	(a) 12	(b)
Ce			
Pr			
Nd			
Sm	3.9	(a)	
Eu	1.01	(a)	
Gd			
Tb	0.7	(a)	
Dy			
Ho			
Er			
Tm			
Yb	2.6	(a) 4.3	(b)
Lu	0.42	(a)	
Hf	2.5	(a)	
Ta	0.44	(a)	
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm			
U ppm			
technique:		(a) INAA, (b) mixed	



References for 15117

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