

Northwest Africa 4819

Anorthositic (polymict) regolith breccia

234 g



Figure 1: Slice through NWA 4819 with 1 mm scale bars below (photo courtesy of R. Korotev).

Introduction

Northwest Africa 4819 was found in 2007, and consists of a 234 g stone with some fusion crust. Weathering products are visible along a network of thin fractures. In general, though, the stone is dark and fine grained with only a few clasts that exceed 1 mm in diameter (Connolly et al., 2008).

Petrography, mineralogy, and chemistry

The lithic clasts present in NWA 4819 include anorthosites, anorthositic norites (orthopyroxene = $\text{Fs}_{35.4}\text{Wo}_{4.3}$ and plagioclase = $\text{An}_{96.5}$), gabbros, and troctolites (olivine = $\text{Fa}_{28.1}$; $\text{FeO}/\text{MnO} = 105$; pigeonite = $\text{Fs}_{26.9}\text{Wo}_{5.9}$; $\text{FeO}/\text{MnO} = 54$; and plagioclase = An_{97}). There are also shock melt clasts. Of particular interest is a large amount of homogeneously distributed FeNi metal (kamacite mean Ni = 6.2, Co = 0.77 wt% and taenite Ni - 8.2 - 23.6 wt%). and troilite, as well as a large amount of pyroxene (Connolly et al., 2008). INAA analyses of small (275 mg) chip yields FeO = 7.0%, Ni = 290 ppm, Sm = 3.4 ppm, Th = 1.5 ppm, Ir = 12 ppb. This composition resembles some Apollo 16 regolith soils (Korotev et al., 2008). Additionally, it represents one of a small group of lunar meteorite whose bulk composition falls outside of the range expected for a simple binary mixture of KREEP and feldspathic end members, indicating that there may be a major fourth chemical component that is being sampled by this group of meteorites (Figure 2; Korotev et al., 2009a).

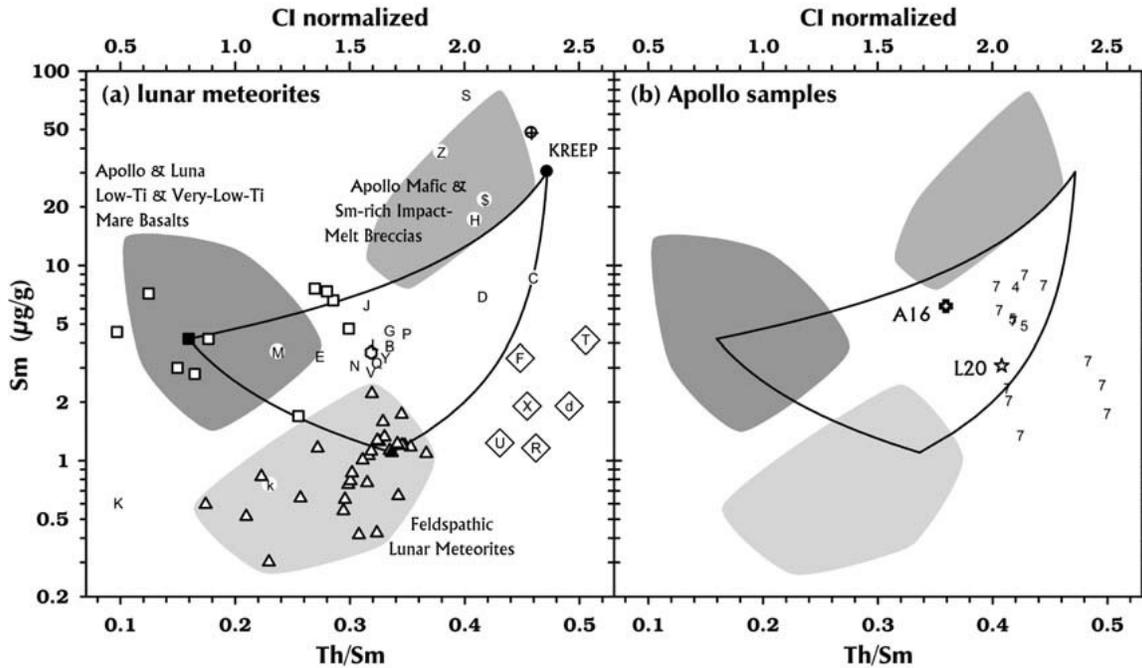


Figure 2: NWA 4819 (diamond symbol labeled F in figure) is among a small group of polymict brecciated lunar meteorites that falls outside a simple binary mixture of KREEP and feldspathic end members, indicating that there may be a major fourth chemical component that is being sampled by this group of meteorites (from Korotev et al., 2009b). [Dhofar 925[d], NWA 4819[F], NWA 4932[R], SaU 300[U], SaU 449[X], and Yamato 983885[T]]

Radiogenic age dating and Cosmogenic isotopes and exposure ages

None yet reported.

Table 2a: Chemical composition of NWA 4819

<i>reference</i>	1	1		
<i>weight</i>	20-60	275		
<i>technique</i>	a	c		
SiO ₂ %	46.4			
TiO ₂	0.35			
Al ₂ O ₃	22.1			
FeO	7.03	7.03		
MnO	0.1			
MgO	7.41			
CaO	16	14.9		
Na ₂ O	0.36	0.363		
K ₂ O	0.15	<0.5		
P ₂ O ₅	0.08			
S %				
sum	100.2			
Sc ppm		13		
V				
Cr		1420		
Co		27.8		
Ni		288		
Cu				
Zn				
Ga				
Ge				
As		<1		
Se		<1		
Rb		<6		
Sr		203		
Y				
Zr		103		
Nb				
Mo				
			Ru	
			Rh	
			Pd ppb	
			Ag ppb	
			Cd ppb	
			In ppb	
			Sn ppb	
			Sb ppb	
			Te ppb	
			Cs ppm	0.13
			Ba	158
			La	7.52
			Ce	19.5
			Pr	
			Nd	11.4
			Sm	3.36
			Eu	0.824
			Gd	
			Tb	0.71
			Dy	
			Ho	
			Er	
			Tm	
			Yb	2.65
			Lu	0.366
			Hf	2.76
			Ta	0.34
			W ppb	
			Re ppb	
			Os ppb	
			Ir ppb	11.9
			Pt ppb	
			Au ppb	4.1
			Th ppm	1.5
			U ppm	0.46

technique (a) EMPA, (b) ICP-MS, (c) INAA (d) XRF

Table 2b. Light and/or volatile elements for NWA 4819

Li ppm

Be

C

S

F ppm

Cl

Br

1.4

I

Pb ppm

Hg ppb

Tl

Bi

References: 1) Korotev et al. (2009b)

K. Righter – Lunar Meteorite Compendium - 2010