

**77516**  
**Ilmenite Basalt**  
 103.7 grams

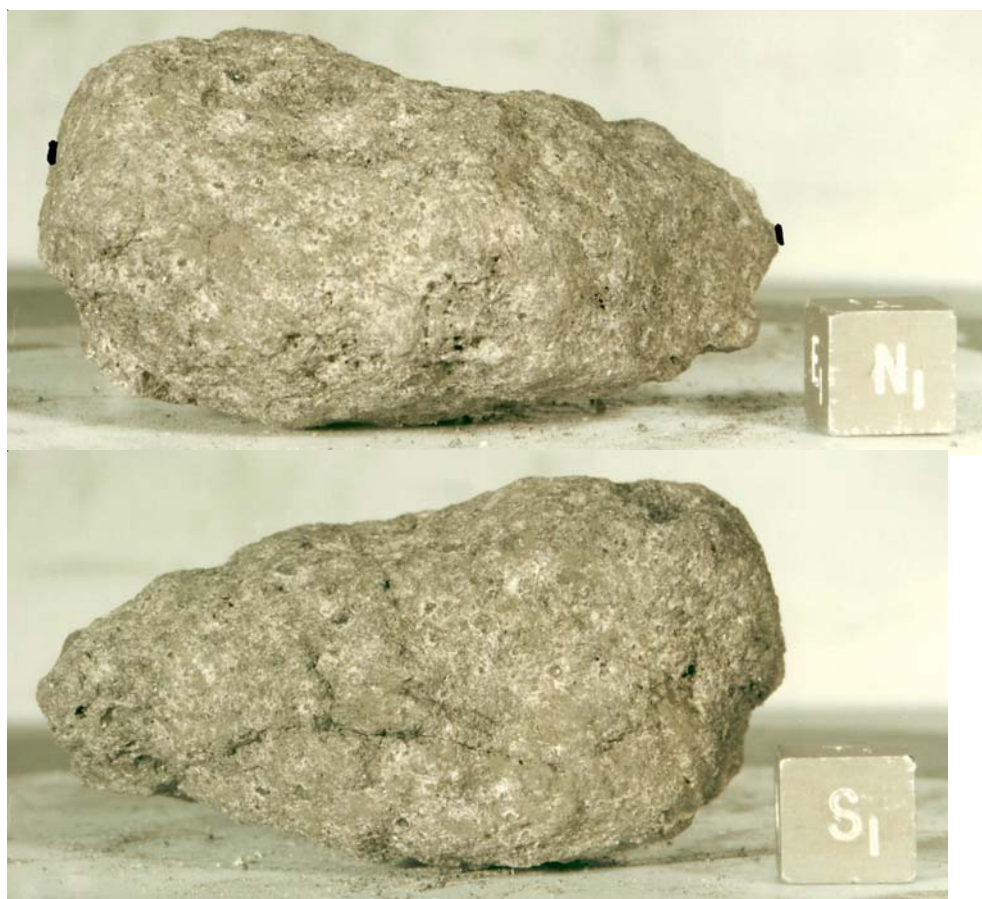


Figure 1: Two photos of 77516. Cube is 1 cm. S73-19411 and 413

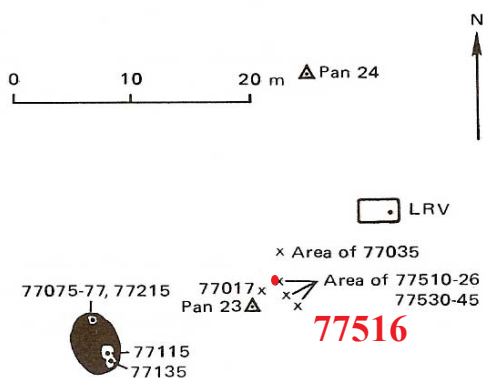


Figure 2: Map of station 7, Apollo 17 with location of rake sample.

**Introduction**

All sides of 77516 are rounded and pitted by micrometeorite bombardment (figure 1). It is a medium-grained, ilmenite-rich basalt with armalcolite and free silica.

77516 was collected as part of a rake sample from station 7 (figure 2). It has not been dated.

**Petrography**

77516 is an olivine-microporphyritic basalt similar to 71588 (Warner et al. 1975, 1978). Large ilmenite blades penetrate sheaves of alternating pyroxene-plagioclase intergrowth (figure 4). Phenocrystic olivine is overgrown (replaced?) with pyroxene. Pyroxene is sector zoned and also zone to high iron enrichment

### Mineralogical Mode

Olivine	5
Pyroxene	47.2
Plagioclase	24.3
Opaques	19.6
Silica	2.9
Meostasis	0.7

(pyroxferroite?)(figure 3). Silica is found in the interstices.

The composition of armalcolite is given in table 2 and the composition of pyroxferroite(?) is given in table 3 (Warner et al. 1976).

### Chemistry

Warner et al. (1975) determined the chemical composition of 77516 (table 1, figures 5 and 6).

### Radiogenic age dating

Paces et al. (1991) studied the Rb-Sr and Sm-Nd isotopes for “whole-rock” samples of 77516 and classify it as a Type B2 Apollo 17 basalt because the Sr and Nd isotopes do not fall on the whole-rock isochron defined by other Apollo 17 basalts. Generally, Apollo 17 basalts are all thought to be 3.73 b.y. old.

### Processing

There are 4 thin sections.

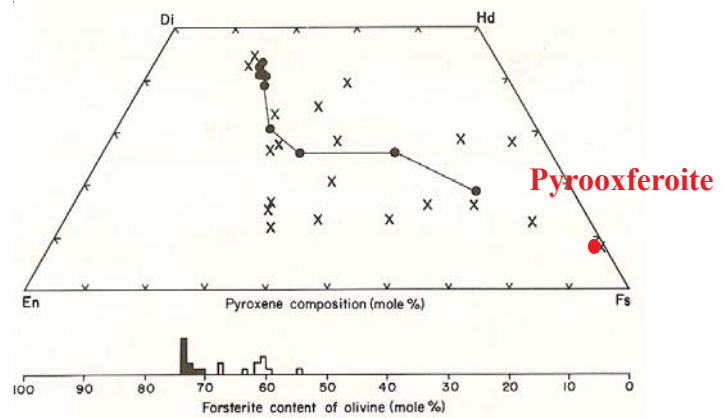


Figure 3: Pyroxene and olivine composition in 77516 (Warner et al. 1978).

Table 2: Armalcolite 77516.

(Warner et al. 1976)

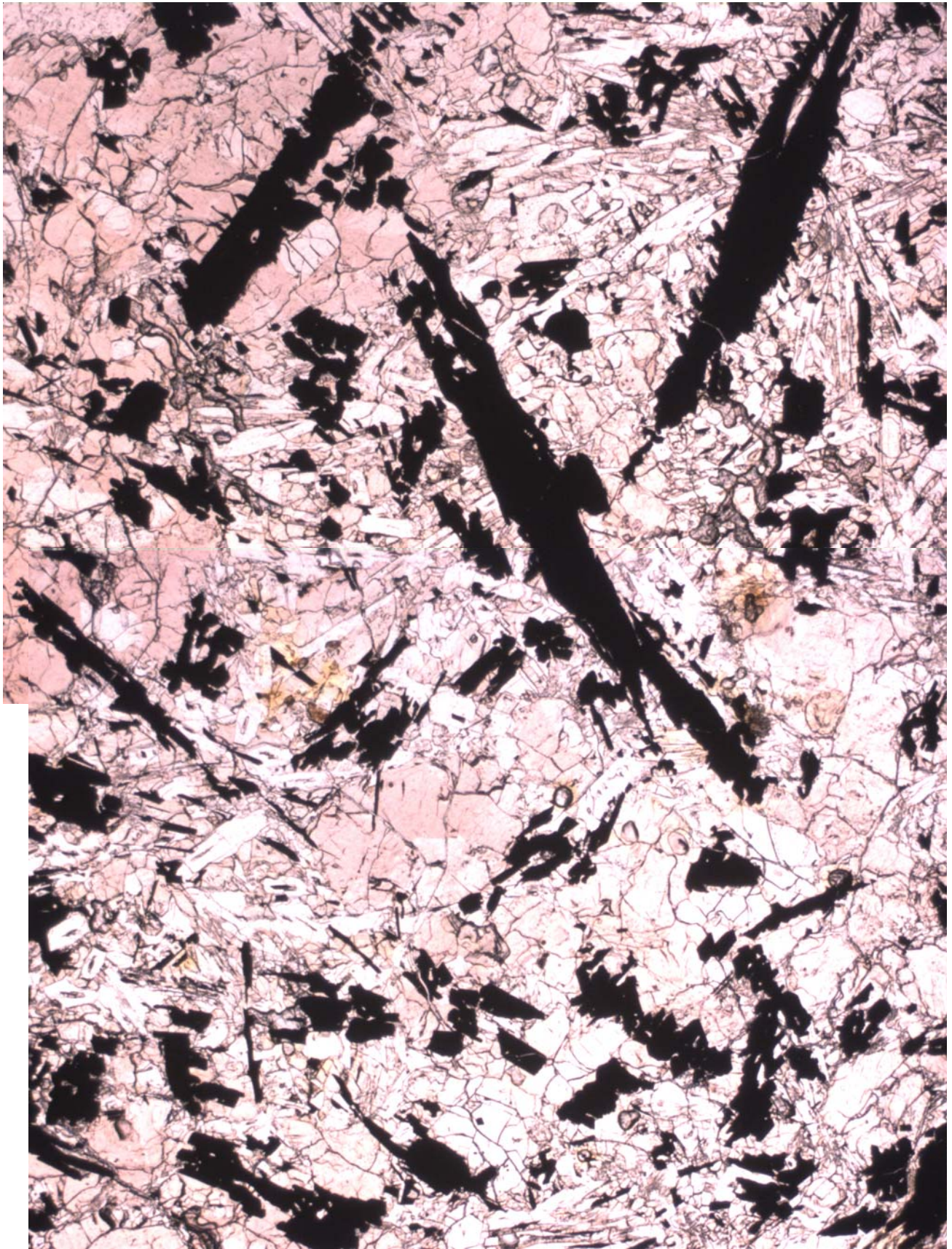
TiO <sub>2</sub>	71	71	71.4	70.9
Al <sub>2</sub> O <sub>3</sub>	1.95	1.95	1.95	1.95
Cr <sub>2</sub> O <sub>3</sub>	1.37	1.68	1.48	1.47
V <sub>2</sub> O <sub>3</sub>	0.33	0.26	0.28	0.37
FeO	15.6	16.2	16.9	17.1
MgO	6.9	6.7	6.1	6.4
CaO	0.31	0.27	0.27	0.19
ZrO <sub>2</sub>	0.08	0.12	0.08	0.08

Table 3: Pyroxferroite in 77516.

(Warner et al. 1976)

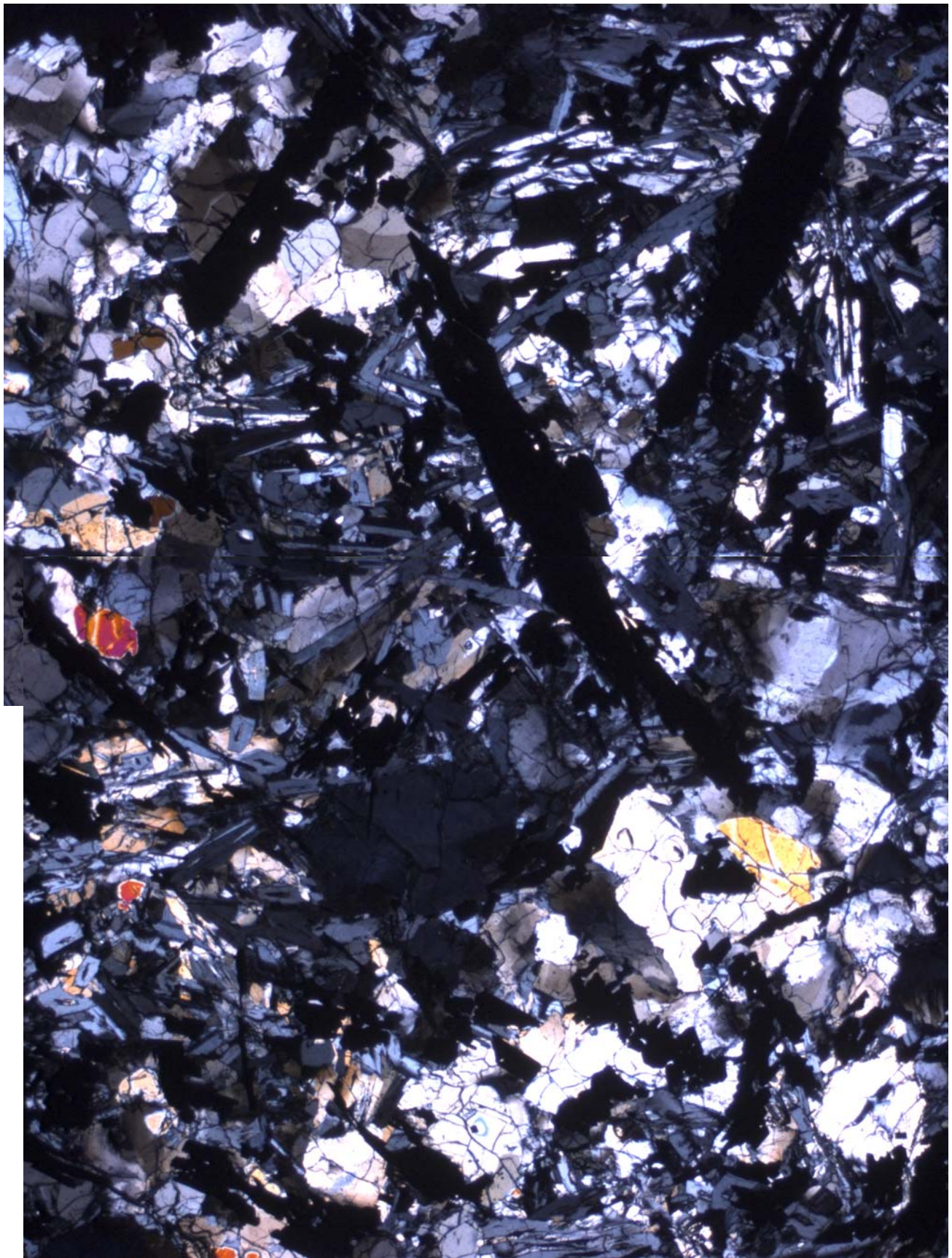
SiO <sub>2</sub>	45
TiO <sub>2</sub>	1.16
Al <sub>2</sub> O <sub>3</sub>	2.05
Cr <sub>2</sub> O <sub>3</sub>	0.04
FeO	48
MgO	0.27
CaO	3.3





*Figure 4a: Photomicrograph of thin section 77516,11. 2.8 mm across*





*Figure 4b: Photomicrograph of thin section 77516,11. Crossed Nicols. 2.8 mm across*

**Table 1. Chemical composition of 77516.**

reference weight	Warner75	Paces91
SiO <sub>2</sub> %		
TiO <sub>2</sub>	13.7	(a)
Al <sub>2</sub> O <sub>3</sub>	7.8	(a)
FeO	20.2	(a)
MnO	0.245	(a)
MgO	9.4	(a)
CaO	9.4	(a)
Na <sub>2</sub> O	0.33	(a)
K <sub>2</sub> O	0.04	(a)
P <sub>2</sub> O <sub>5</sub>		
S %		
sum		
Sc ppm	80	(a)
V	120	(a)
Cr		(a)
Co	24.6	(a)
Ni		
Cu		
Zn		
Ga		
Ge ppb		
As		
Se		
Rb		0.34 (b)
Sr		110 (b)
Y		
Zr		
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba		
La	4.7	(a)
Ce	18	(a)
Pr		
Nd	18	(a) 15.2 (b)
Sm	6	(a) 6.39 (b)
Eu	1.25	(a)
Gd		
Tb	1.6	(a)
Dy	10	(a)
Ho		
Er		
Tm		
Yb	6	(a)
Lu	0.91	(a)
Hf	6.2	(a)
Ta	1.4	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) INAA, (b) IDMS

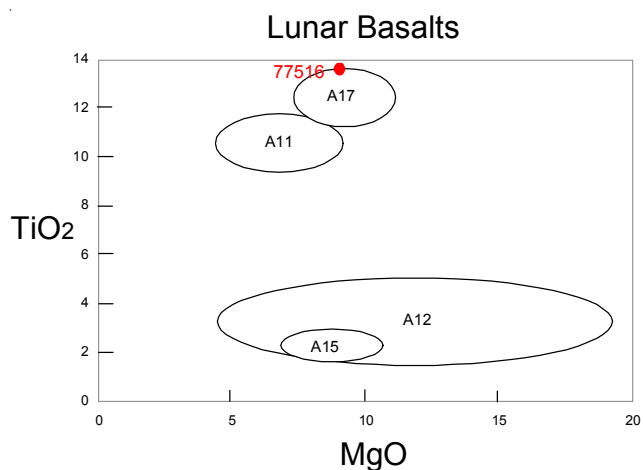


Figure 5: Composition of lunar basalts.

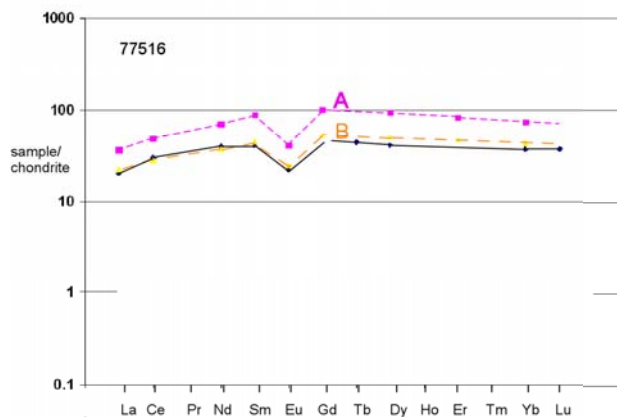
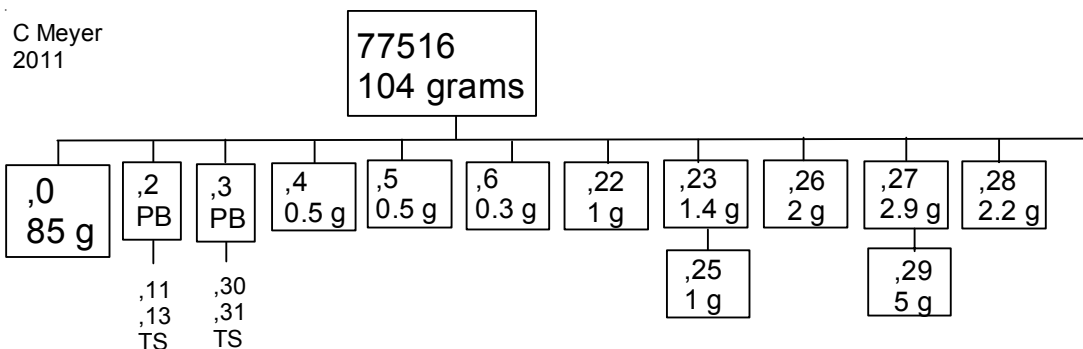


Figure 6: Normalized rare-earth-element diagram for 77516 compared with A and B types of Apollo 17 basalt.



### References for 77516

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