

**71546** – 150.7 grams

**71555** – 4.5 grams

Ilmenite Basalt

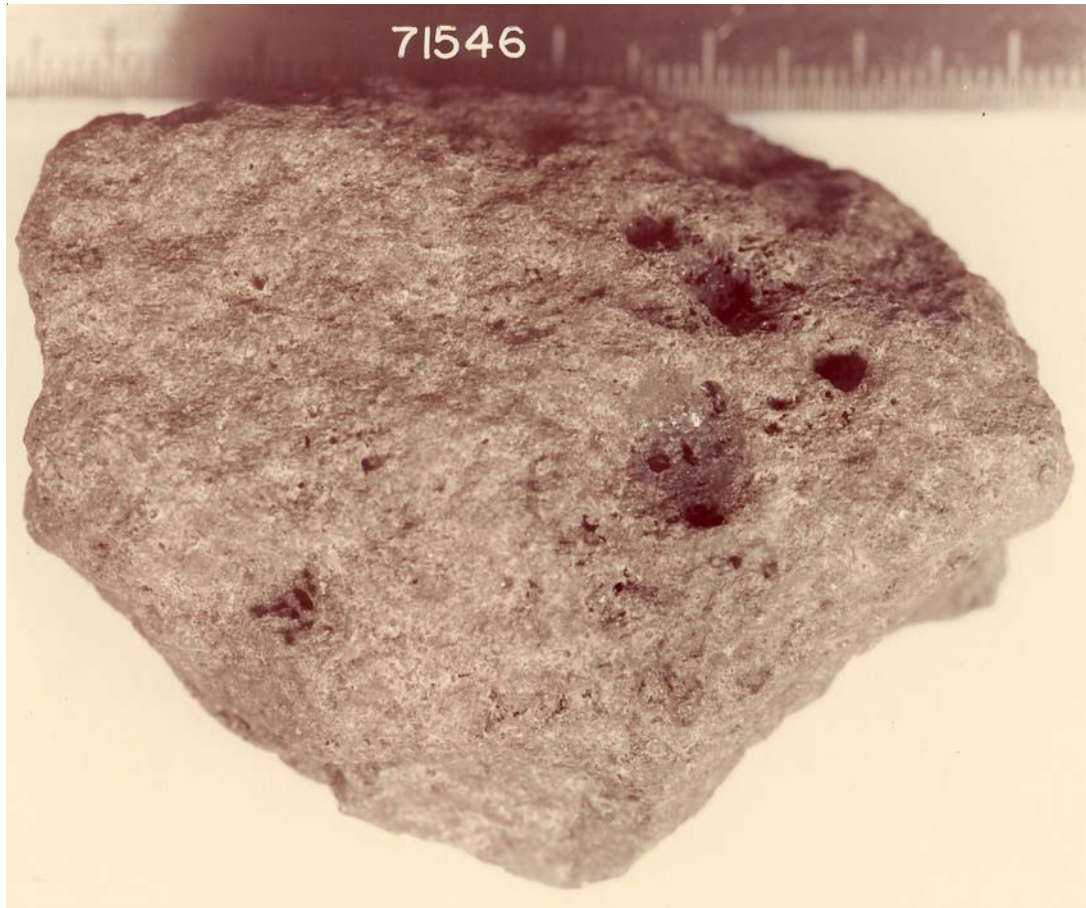


Figure 1: Photo of 71546: Scale is in cm. S73-31334

### **Introduction**

71546 is an olivine-microporphritic ilmenite basalt similar to 71555 (Warner et al. 1978).

### **Mineralogical Mode**

	<b>71546</b>	<b>71555</b>
Olivine	2.7	3.5
Pyroxene	47.8	47.3
Plagioclase	27.7	28.9
Opaques	17	16.4
Silica	3.9	3.2
Meostasis	0.8	0.6

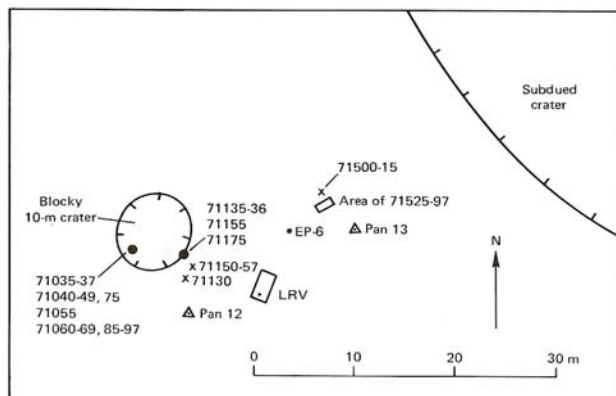


Figure 2: Map of station 1, Apollo 17.

71525 - 71596 etc. are rake samples collected as part of a comprehensive sample at station 1, taken near Steno Crater, Apollo 17 (figure 2). They include numerous small ilmenite basalts.

### **Petrography**

The texture of 71546 is variable, from fine-grained variolitic areas to coarser granular areas (figure 4).

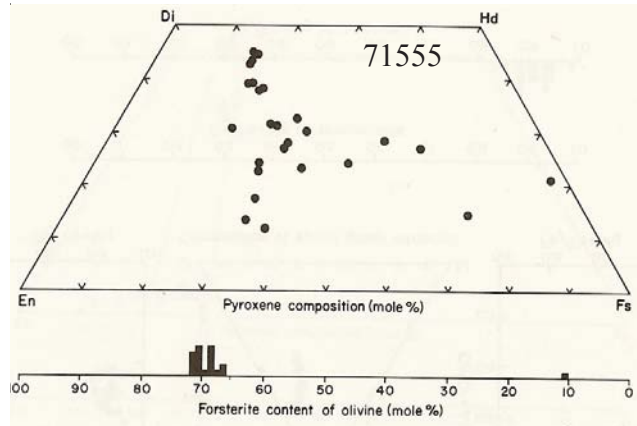
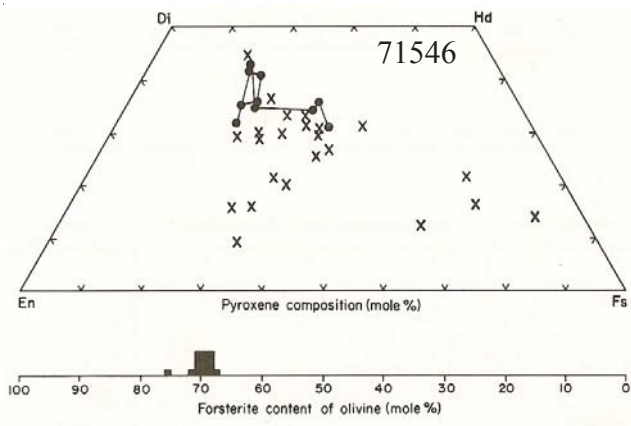


Figure 3: Composition of pyroxene and olivine in 71546 and 71555 (Warner et al. 1978).

Some areas are locally microporphyritic. Pyroxene grains are largest and enclose ilmenite and plagioclase. Olivine is not abundant. See Neal and Taylor (1993) for details.

**Chemistry**

Eldridge et al. (1975), Warner et al. (1975) and Rhodes et al. (1976) reported the composition of 71546 and 71555 (nearly identical). These samples appear to be intermediate to type A and type B basalts.

**Radiogenic age dating**

Nyquist et al. (1976) determined Rb, Sr and Sr<sup>87/86</sup>.

**Cosmogenic isotopes and exposure ages**

Eldridge et al. (1975) determined the cosmic-ray-induced activity of <sup>22</sup>Na = 94 dpm/kg/, <sup>26</sup>Al = 70 dpm/kg and <sup>54</sup>Mn = 165 dpm/kg.

**Processing**

There are 5 thin sections for 71546, but only one for 71555.

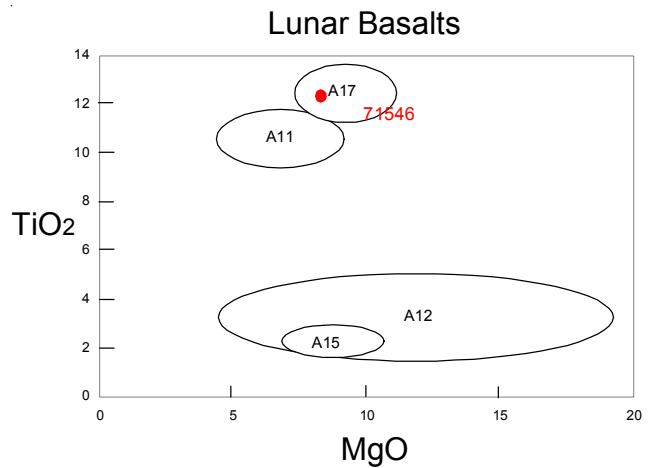


Figure 5: Composition of Apollo basalts.

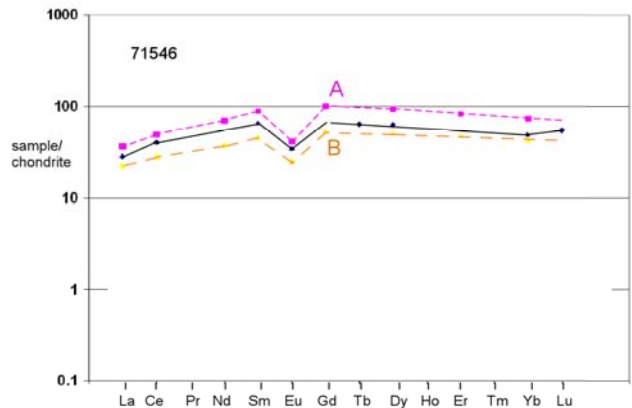
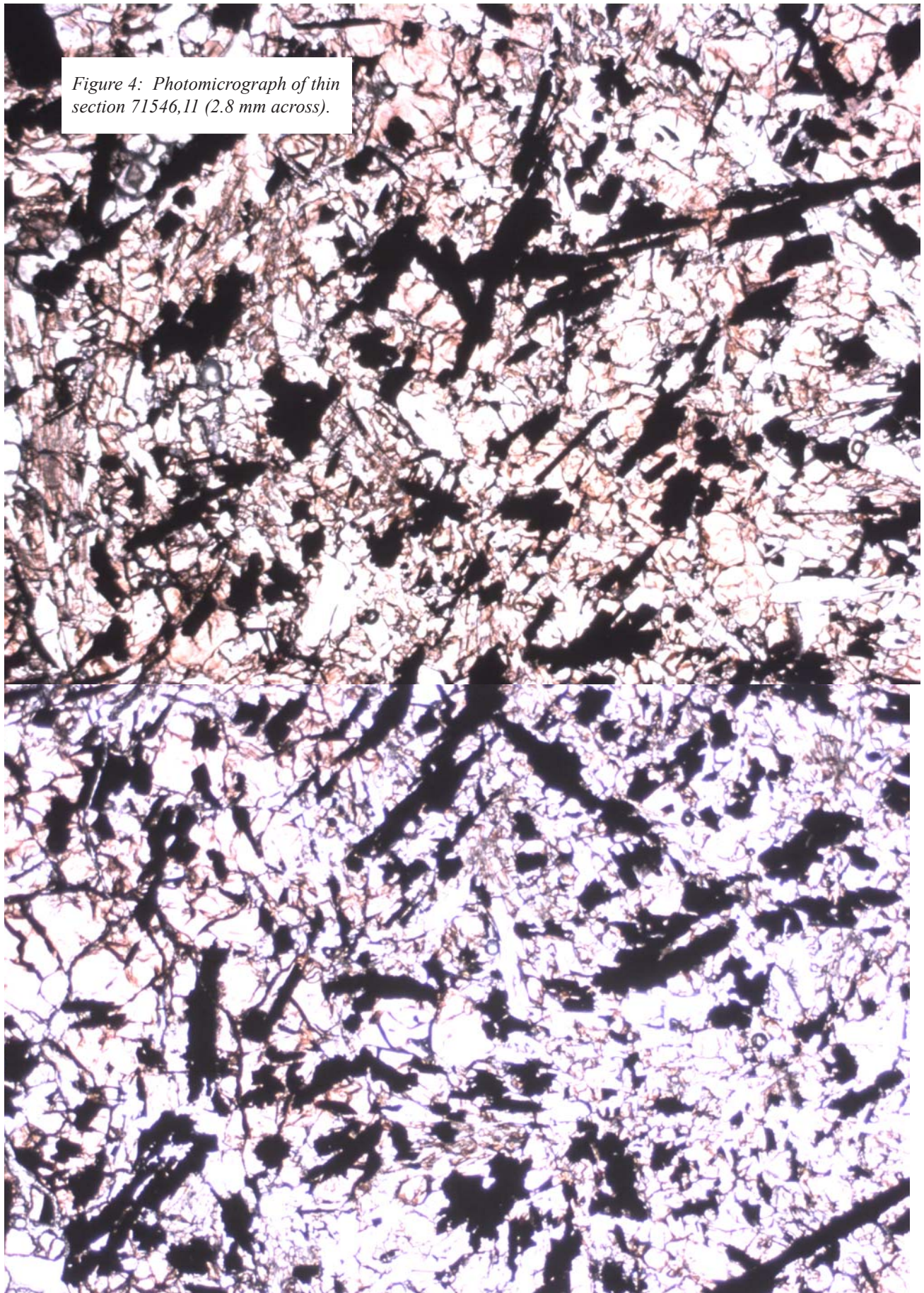
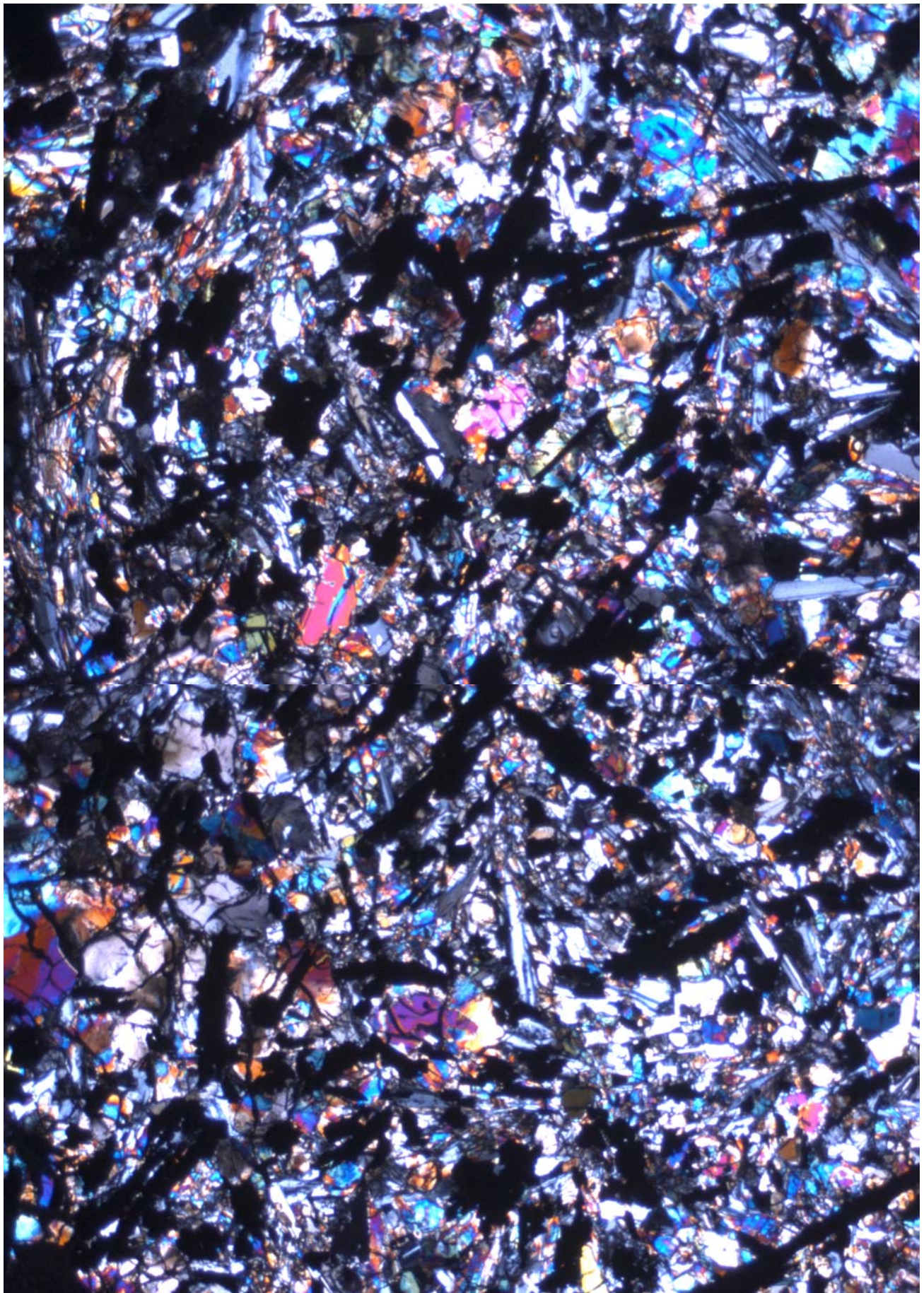


Figure 6: Normalized rare-earth-element diagram for 71546 and type A and B basalts.



*Figure 4: Photomicrograph of thin section 71546,11 (2.8 mm across).*



**Table 1. Chemical composition of 71546.**

reference weight	Warner78		Rhodes76	
SiO <sub>2</sub> %			39.14	(b)
TiO <sub>2</sub>	12.1	(a)	12.33	(b)
Al <sub>2</sub> O <sub>3</sub>	9.2	(a)	8.91	(b)
FeO	17.7	(a)	19.11	(b)
MnO	0.24	(a)	0.28	(b)
MgO	7.5	(a)	8.34	(b)
CaO	11	(a)	10.79	(b)
Na <sub>2</sub> O	0.38	(a)	0.4	(b)
K <sub>2</sub> O	0.07	(a)	0.05	(b)
P <sub>2</sub> O <sub>5</sub>			0.05	(b)
S %			0.19	(b)
sum				
Sc ppm	77	(a)		
V	120	(a)		
Cr	2805	(a)	2805	(b)
Co	18	(a)		
Ni				
Cu				
Zn				
Ga				
Ge ppb				
As				
Se				
Rb				
Sr				
Y				
Zr				
Nb				
Mo				
Ru				
Rh				
Pd ppb				
Ag ppb				
Cd ppb				
In ppb				
Sn ppb				
Sb ppb				
Te ppb				
Cs ppm				
Ba				
La	6.5	(a)		
Ce	24	(a)		
Pr				
Nd				
Sm	9.5	(a)		
Eu	1.89	(a)		
Gd				
Tb	2.3	(a)		
Dy	15	(a)		
Ho				
Er				
Tm				
Yb	7.8	(a)		
Lu	1.3	(a)		
Hf	9	(a)		
Ta	2.1	(a)		
W ppb				
Re ppb				
Os ppb				
Ir ppb				
Pt ppb				
Au ppb				
Th ppm				
U ppm				

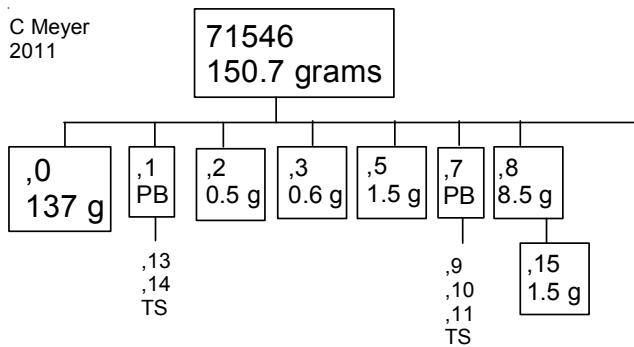
technique: (a) INAA, (b) XRF

**Table 2. Chemical composition of 71555.**

reference weight	Murali77	
SiO <sub>2</sub> %		
TiO <sub>2</sub>	13	(a)
Al <sub>2</sub> O <sub>3</sub>	8.9	(a)
FeO	19.6	(a)
MnO	0.243	(a)
MgO	9.5	(a)
CaO	10	(a)
Na <sub>2</sub> O	0.42	(a)
K <sub>2</sub> O	0.066	(a)
P <sub>2</sub> O <sub>5</sub>		
S %		
sum		
Sc ppm	78	(a)
V	119	(a)
Cr	3010	(a)
Co	18	(a)
Ni		
Cu		
Zn		
Ga		
Ge ppb		
As		
Se		
Rb		
Sr		
Y		
Zr		
Nb		
Mo		
Ru		
Rh		
Pd ppb		
Ag ppb		
Cd ppb		
In ppb		
Sn ppb		
Sb ppb		
Te ppb		
Cs ppm		
Ba		
La	6.6	(a)
Ce	40	(a)
Pr		
Nd		
Sm	9.6	(a)
Eu	2.06	(a)
Gd		
Tb	2.6	(a)
Dy	16	(a)
Ho		
Er		
Tm		
Yb	10.3	(a)
Lu	1.46	(a)
Hf	9.4	(a)
Ta	1.8	(a)
W ppb		
Re ppb		
Os ppb		
Ir ppb		
Pt ppb		
Au ppb		
Th ppm		
U ppm		

technique: (a) INAA

C Meyer  
2011



## References for 71546

Butler P. (1973) **Lunar Sample Information Catalog Apollo 17**. Lunar Receiving Laboratory. MSC 03211 Curator's Catalog. pp. 447.

Eldridge J.S., O'Kelley G.D. and Northcutt K.J. (1975a) Primordial and cosmogenic radionuclides in Descartes and Taurus-Littrow materials: extension of studies by nondestructive x-my spectrometry. *Proc. 6<sup>th</sup> Lunar Sci. Conf.* 1407-1418.

LSPET (1973) Apollo 17 lunar samples: Chemical and petrographic description. *Science* **182**, 659-672.

LSPET (1973) Preliminary Examination of lunar samples. Apollo 17 Preliminary Science Rpt. NASA SP-330. 7-1 – 7-46.

Muehlberger et al. (1973) Documentation and environment of the Apollo 17 samples: A preliminary report. *Astrogeology* 71 322 pp superceeded by *Astrogeology* 73 (1975) and by Wolfe et al. (1981)

Muehlberger W.R. and many others (1973) Preliminary Geological Investigation of the Apollo 17 Landing Site. *In Apollo 17 Preliminary Science Report*. NASA SP-330.

Neal C.R. and Taylor L.A. (1993) Catalog of Apollo 17 rocks. Vol. 2 Basalts

Nyquist L.E., Bansal B.M. and Wiesmann H. (1976a) Sr isotopic constraints on the petrogenesis of Apollo 17 mare basalts. *Proc. 7<sup>th</sup> Lunar Sci. Conf.* 1507-1528.

Rhodes J.M., Hubbard N.J., Wiesmann H., Rodgers K.V., Brannon J.C. and Bansal B.M. (1976a) Chemistry, classification, and petrogenesis of Apollo 17 mare basalts. *Proc. 7<sup>th</sup> Lunar Sci. Conf.* 1467-1489.

Warner R.D., Keil K., Prinz M., Laul J.C., Murali A.V. and Schmitt R.A. (1975b) Mineralogy, petrology, and chemistry of mare basalts from Apollo 17 rake samples. *Proc. 6<sup>th</sup> Lunar Sci. Conf.* 193-220.

Warner R.D., Warren R.G., Mansker W.L., Berkley J.L. and Keil K. (1976a) Electron microprobe analyses of olivine, pyroxene and plagioclase from Apollo 17 rake sample mare basalts. Spec. Publ. # 15, UNM Institute of Meteoritics, Albuquerque. 158 pp.

Warner R.D., Berkley J.L., Mansker W.L., Warren R.G. and Keil K. (1976b) Electron microprobe analyses of spinel, Fe-Ti oxides and metal from Apollo 17 rake sample mare basalts. Spec. Publ. #16, UNM Institute of Meteoritics, Albuquerque. 114 pp.

Warner R.D., Keil K., Nehru C.E. and Taylor G.J. (1978) Catalogue of Apollo 17 rake samples from Stations 1a, 2, 7, and 8. Spec. Publ. #18, UNM Institute of Meteoritics, Albuquerque. 88 pp.

Warner R.D., Nehru C.E. and Keil K. (1978g) Opaque oxide mineral crystallization in lunar high-titanium basalts. *Am. Mineral.* **68**, 1209-1224.

Wolfe E.W., Bailey N.G., Lucchitta B.K., Muehlberger W.R., Scott D.H., Sutton R.L and Wilshire H.G. (1981) The geologic investigation of the Taurus-Littrow Valley: Apollo 17 Landing Site. US Geol. Survey Prof. Paper, 1080, pp. 280.