

15598
Olivine-normative Basalt
135.7 grams



Figure 1: Photo of 15598,0. NASA S87-45216. Sample is 1.5 inches across.

Introduction

Lunar sample 15598 was collected from the soil near the edge of Hadley Rille in an area called The Terrace. The sample is very similar to 15535, from a boulder nearby. It has not been dated.

Petrography

Shervais et al. (1990) give a description of 15598. It is a “fine-grained, olivine-phyric basalt consisting of scattered olivine phenocrysts 0.6 to 1.3 mm across, set in an intergranular matrix of plagioclase, pyroxene, and opaques (see also figures 2 and 3). The olivine phenocrysts are subhedral to anhedral

in outline, with embayed rims and ragged or fritted grain boundaries. The groundmass consists of subhedral plagioclase laths 0.1 to 0.8 mm long

Mineralogical Mode for 15598

	Sample Catalog Butler 1971	Shervais et al. 1990
Olivine	5	14
Pyroxene	50	43
Plagioclase	45	33
Silica		0.1
Opaques	2	6.5
Mesostasis		1.7
Fayalite		1.2

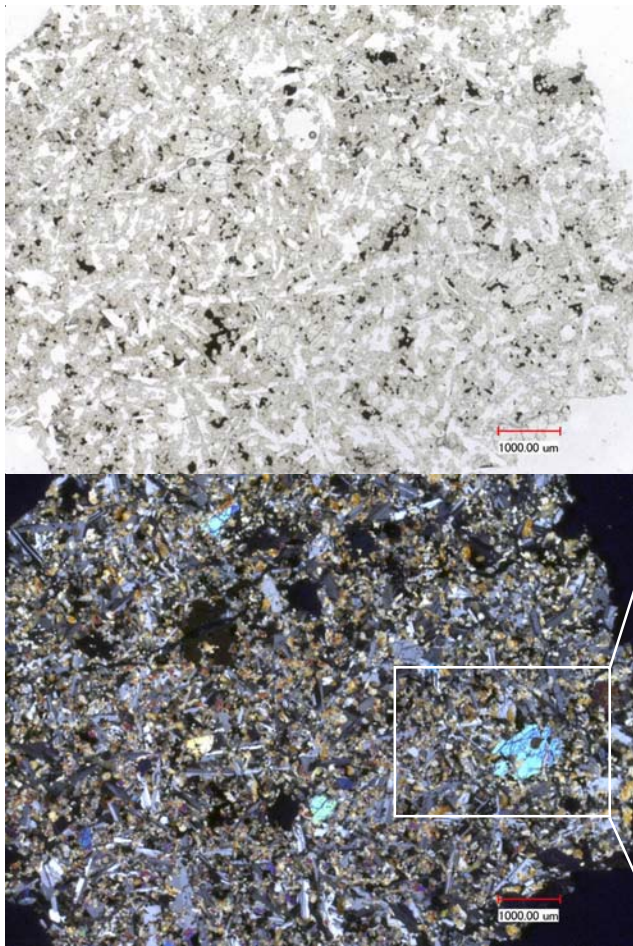


Figure 2: Photomicrographs of thin section 15598,12 by C Meyer @ 30x.

separated by a fine granular aggregate of pyroxene, ilmenite, and ulvospinel. Cristobalite, fayalite and residual glass are distributed in residual patches, but these are generally small and evenly distributed throughout the sample. The groundmass pyroxene is generally only 0.1 mm to 0.4 mm in diameter and forms a granular mosaic that fills in between plagioclase laths”.

Shervais et al. (1990) determined plagioclase, pyroxene and olivine composition. The mineral are chemically zoned (figure 4). Roedder and Weiblen (1972) studied melt inclusions and Bell (1975) reported symplectite.

Chemistry

Rhodes and Blanchard (1983) reported that they analyzed 15598, but gave no data. Shervais et al. (1990) analyzed several pieces to get the spread. Ryder and Schuraytz (1991) and Neal (2001) give superior

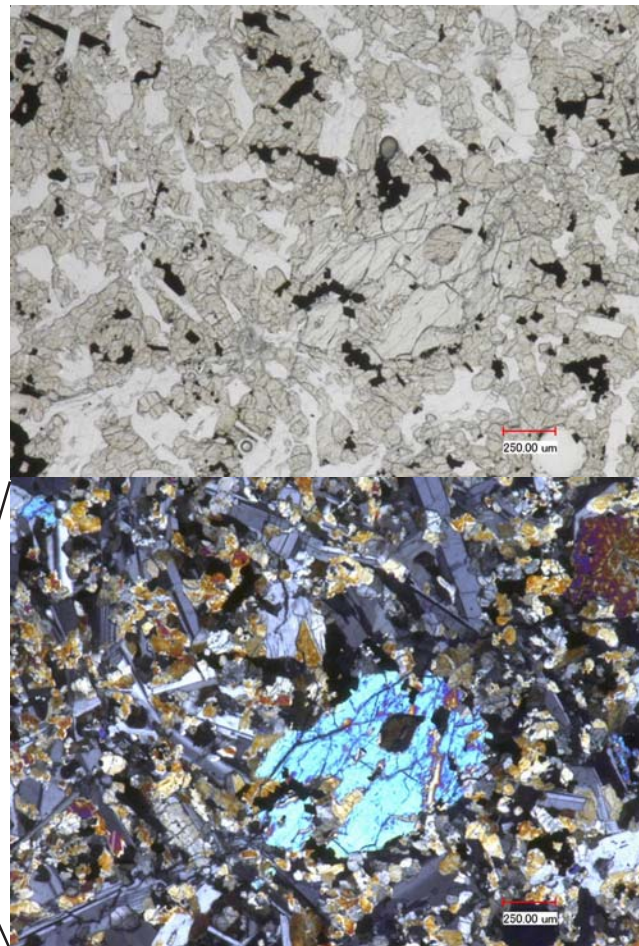


Figure 3: Photomicrographs of thin section 15598,12 by C Meyer @ 100x (bottom is with crossed polarizers).

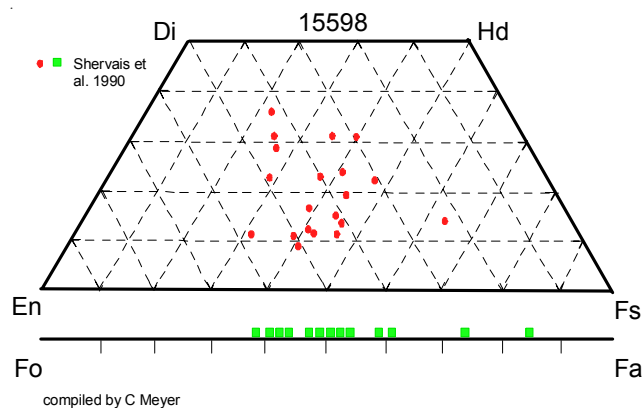


Figure 4: Composition of pyroxene and olivine in 15598.

analyses (figures 5, 6 and 7). Sure enough, it’s just like the rest of the Apollo 15 basalt samples!

Radiogenic age dating

No data.

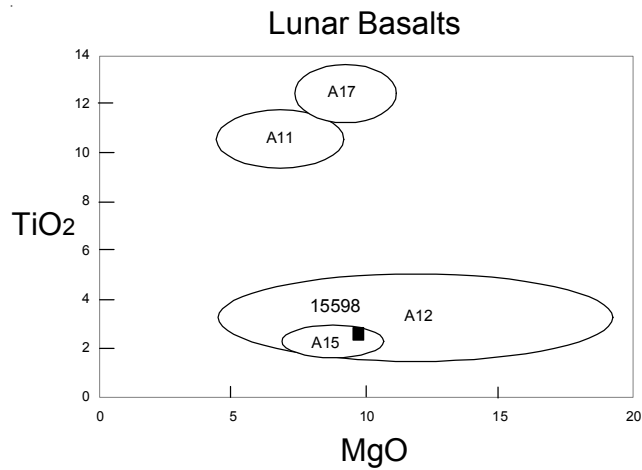


Figure 5: Composition of 15598 compared with other Apollo samples.

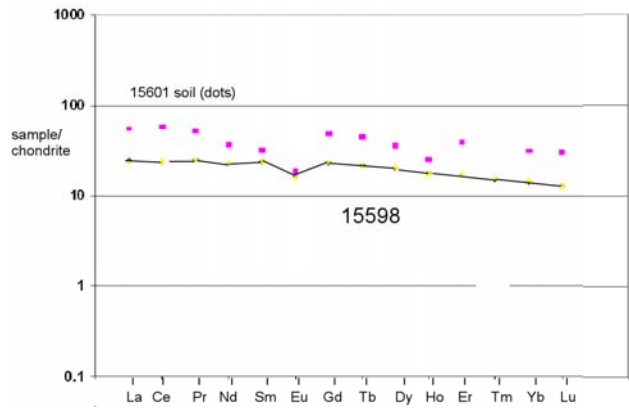


Figure 6: Normalized rare-earth-element diagram for 15598 (data by Neal 2001).

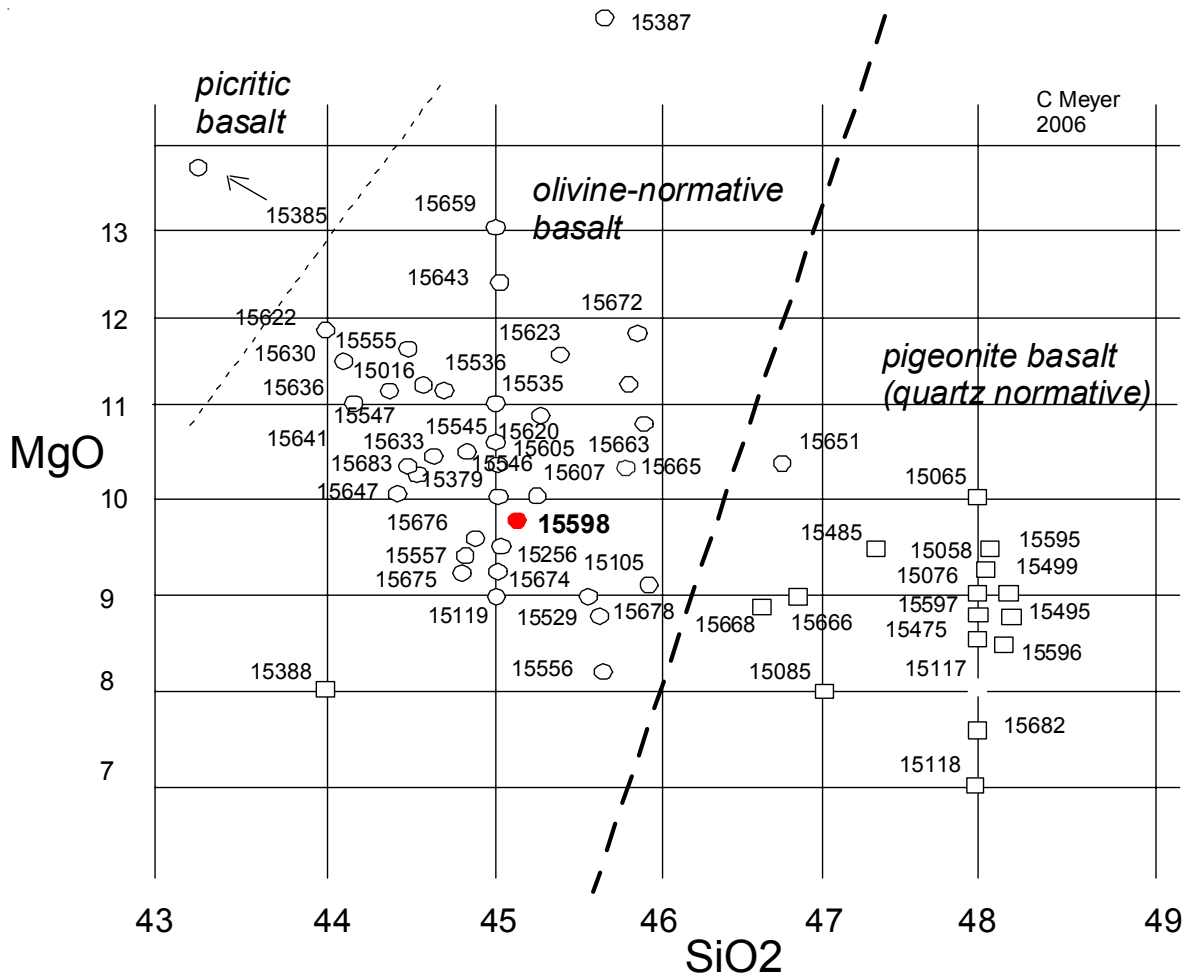
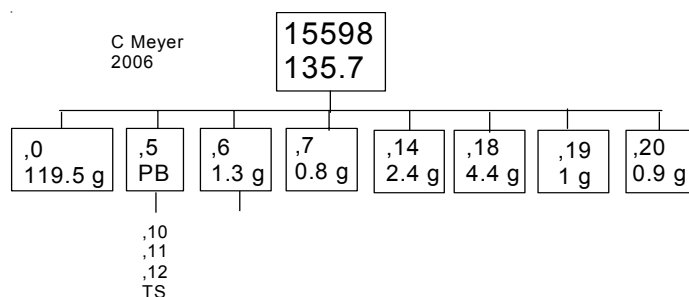


Figure 7: The big picture.

Table 1. Chemical composition of 15598.

reference weight	Ryder2001		Shervais90		Rhodes and Blanchard unpublished	Neal2001	
SiO ₂ %	45.2	(a)	45	(c)			
TiO ₂	2.55	(a)	2.57	(c)			
Al ₂ O ₃	8.82	(a)	8.05	(c)			
FeO	22.38	(a)	22.2	(b)	23.08	(c)	22.3 (b)
MnO	0.28	(a)	0.31	(c)			
MgO	9.7	(a)	9.87	(c)			
CaO	9.89	(a)	9.94	(c)			
Na ₂ O	0.22	(a)	0.26	(b)	0.25	(c)	0.267 (b)
K ₂ O	0.043	(a)	0.03	(c)			
P ₂ O ₅	0.063	(a)	0.05	(c)			
S %							
<i>sum</i>							
Sc ppm			43.5	(b)	44.9	(b)	47.5 (d)
V							204 (d)
Cr	4090	(a)	3960	(b)	3967	(c)	4085 (b)
Co			50.5	(b)	50.4	(b)	56.6 (d)
Ni	50	(a)	54	(b)	<100	(b)	57.4 (d)
Cu	16	(a)					19.6 (d)
Zn							24.5 (d)
Ga							2.41 (d)
Ge ppb							
As							
Se							
Rb	6	(a)					0.98 (d)
Sr	95	(a)	134	(b)	150	(b)	117 (d)
Y	23	(a)					30.4 (d)
Zr	86	(a)			135	(b)	108 (d)
Nb	10	(a)					7.23 (d)
Mo							0.03 (d)
Ru							
Rh							
Pd ppb							
Ag ppb							
Cd ppb							
In ppb							
Sn ppb							
Sb ppb							
Te ppb							
Cs ppm							0.04 (d)
Ba			52	(b)	52	(b)	56.4 (d)
La			4.95	(b)	4.71	(b)	5.64 (d)
Ce			13.5	(b)	14.1	(b)	14 (d)
Pr							2.22 (d)
Nd			11	(b)			10.2 (d)
Sm			3.57	(b)	3.46	(b)	3.46 (d)
Eu			0.89	(b)	0.875	(b)	0.89 (d)
Gd							4.5 (d)
Tb			0.77	(b)	0.78	(b)	0.78 (d)
Dy							4.92 (d)
Ho							0.98 (d)
Er							2.65 (d)
Tm							0.36 (d)
Yb			2.23	(b)	2.21	(b)	2.3 (d)
Lu			0.3	(b)	0.306	(b)	0.31 (d)
Hf			2.65	(b)	2.62	(b)	2.79 (d)
Ta			0.4	(b)	0.36	(b)	0.41 (d)
W ppb							
Re ppb							
Os ppb							
Ir ppb							
Pt ppb							
Au ppb							
Th ppm			0.36	(b)	0.41	(b)	0.52 (d)
U ppm					<0.3	(b)	0.13 (d)

technique: (a) XRF, (b) INAA, (c) fused bead, electron microprobe, (d) ICP-MS



There are three thin sections.

References for 15598

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