15598

Olivine-normative Basalt

135.7 grams

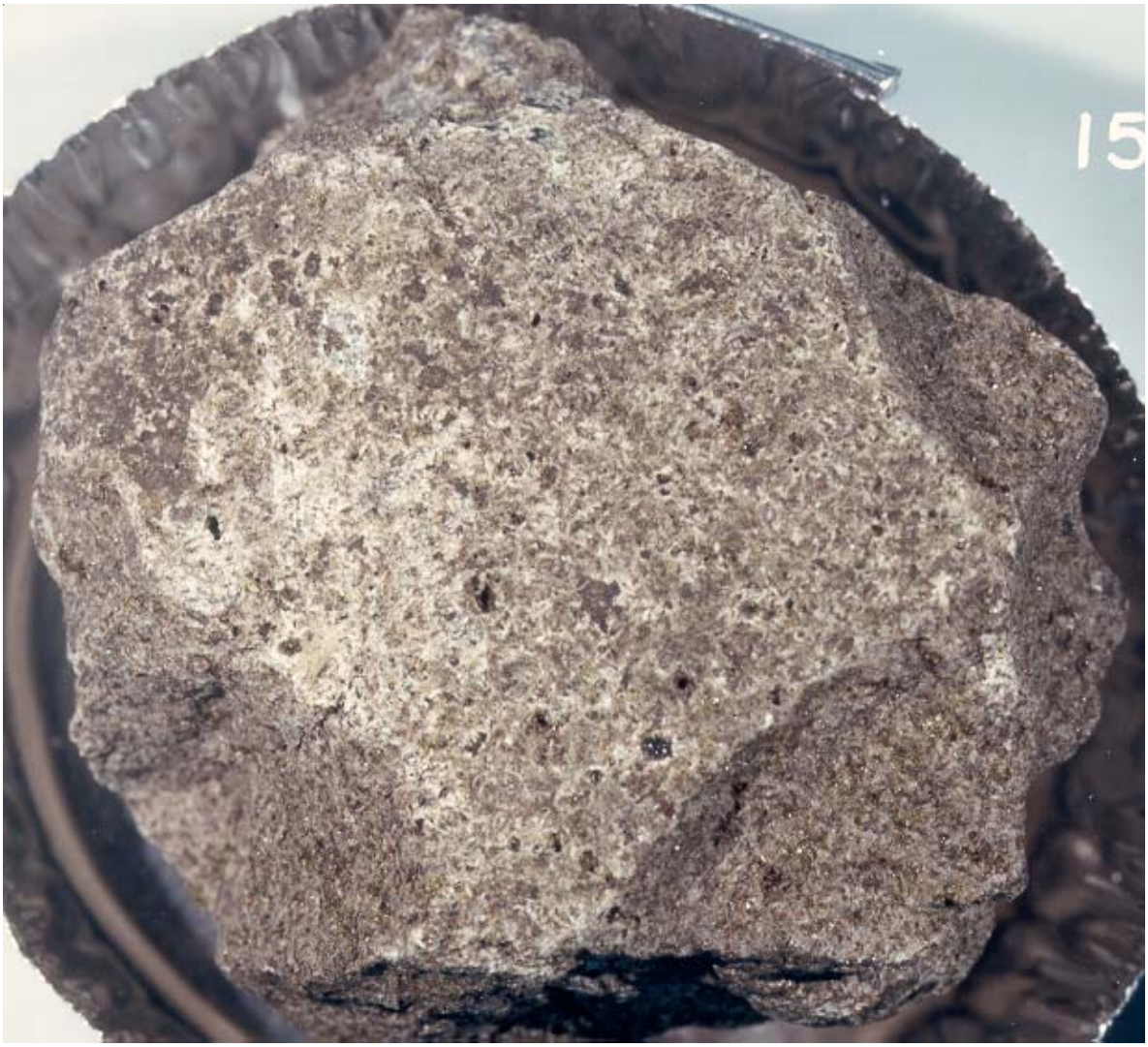


Figure 1: Photo of 15598,0. NASA S87-45216. Sample is 1.5 inches across.

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

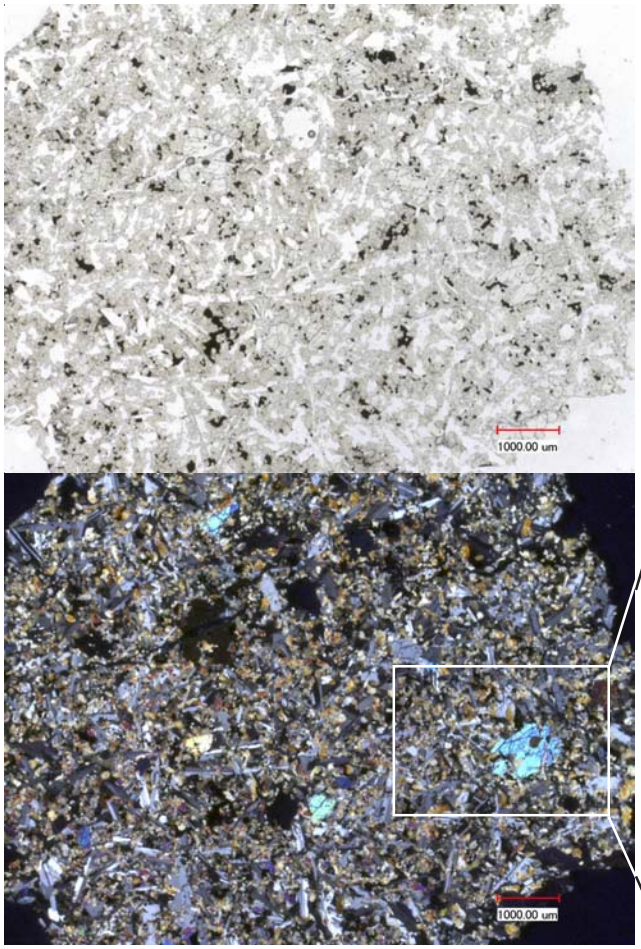


Figure 2: Photomicrographs of thin section 15598,12 by C Meyer @ 30x.

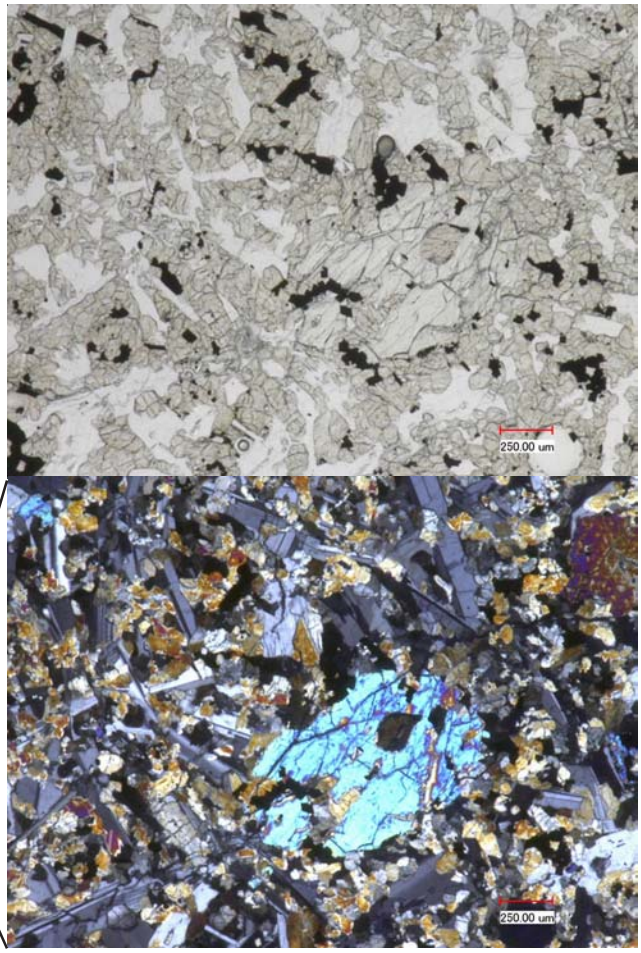


Figure 3: Photomicrographs of thin section 15598,12 by C Meyer @ 100x (bottom is with crossed polarizers).

separated by a fine granular aggregate of pyroxne, 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 pryroxene 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.

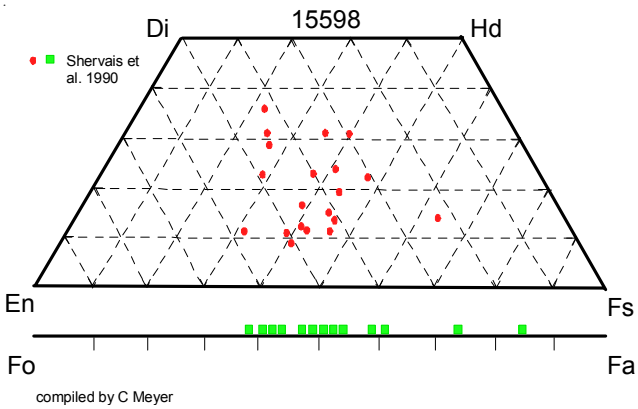


Figure 4: Composition of pyroxene and olivine in 15598.

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 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.

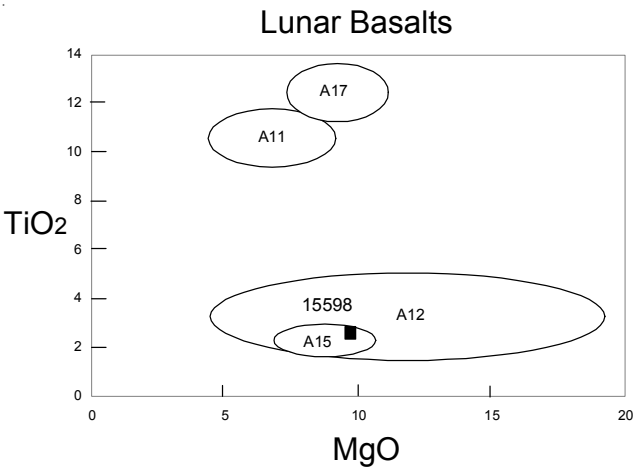


Figure 5: Composition of 15598 compared with other Apollo samples.

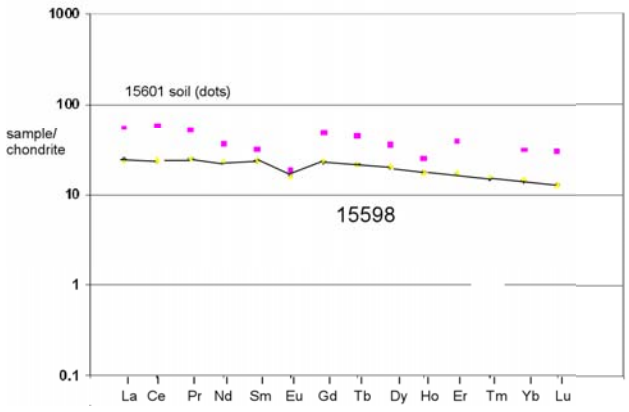


Figure6: Normalized rare-earth-element diagram for 15598 (data by Neal 2001).

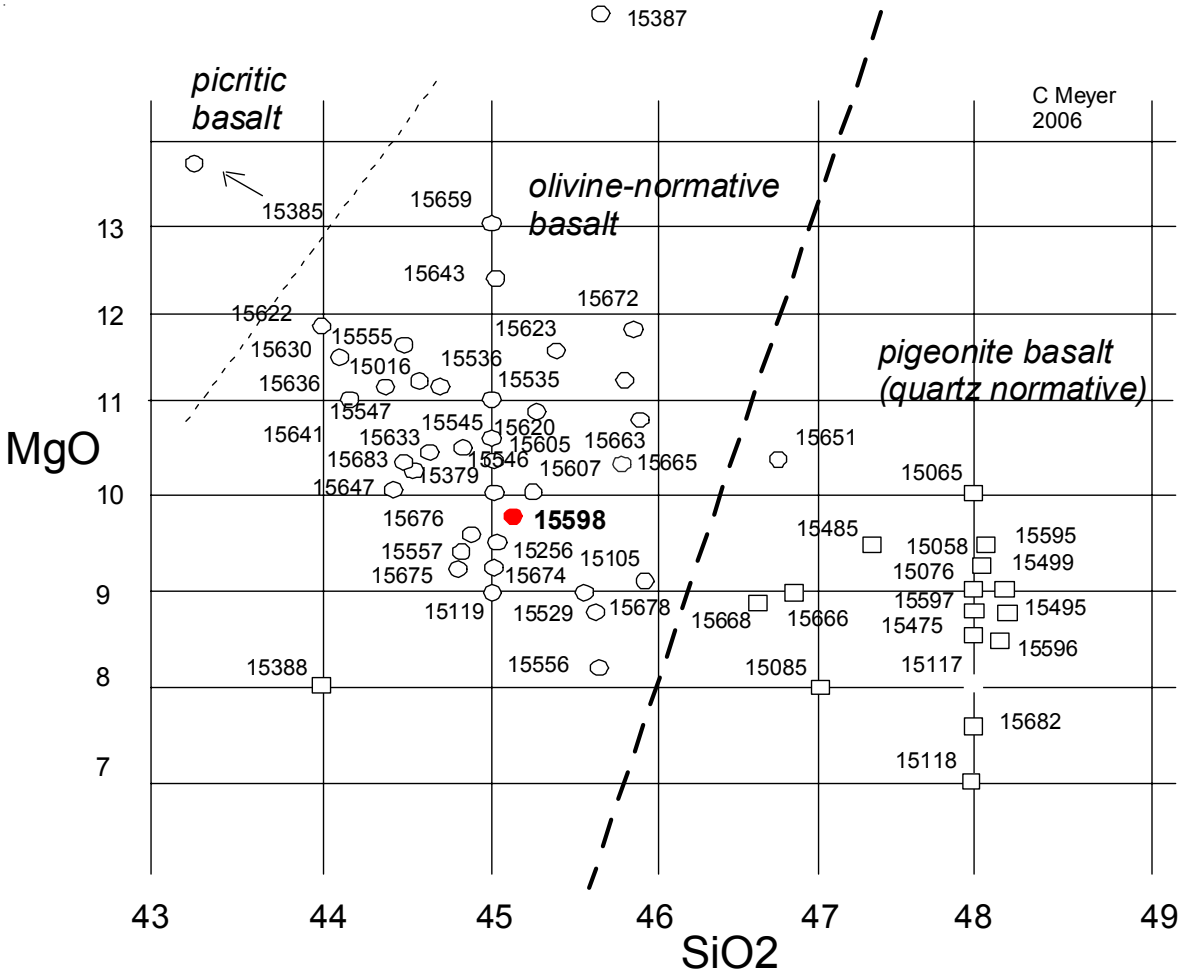
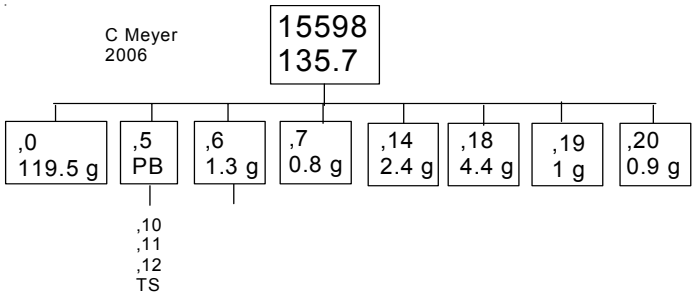


Figure 7: The big picture.

Table 1. Chemical composition of 15598.

reference	Ryder2001				Shervais90				Rhodes and Blanchard	Neal2001	
weight									unpublished		
SiO2 %	45.2	(a)			45	(c)					
TiO2	2.55	(a)			2.57	(c)					
Al2O3	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)					
Na2O	0.22	(a)	0.26	(b)	0.25	(c)	0.267	(b)			
K2O	0.043	(a)			0.03	(c)					
P2O5	0.063	(a)			0.05	(c)					
S %											
sum											
Sc ppm			43.5	(b)			44.9	(b)		47.5	(d)
V										204	(d)
Cr	4090	(a)	3960	(b)	3967	(c)	4085	(b)		3923	(d)
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.

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