

78598 – 224 grams
Vitrophyric Ilmenite Basalt



Figure 1: Two views of 78598. Cube is 1 cm. top is S73-21770; bottom is S73-21771.

Introduction

Although 78598 is a high-Ti basalt, it has lower Ti than most others and is somewhat like basalts from Apollo 11. It is a dense, light grey rock with a few large vugs (figure 1). This interesting rock has not received enough attention.

78598 is from a rake sample collected as part of a large comprehensive sample at station 8, Apollo 17.

Petrography

78598 has a very interesting texture (figure 4). Ilmenite and Ca-rich pyroxene form a fine net in a glassy matrix. Warner et al. (1978) termed 78598 a hypocrystalline ilmenite basalt and gave the composition of the fine-grained pyroxene (figure 3). Olivine and plagioclase failed to nucleate.

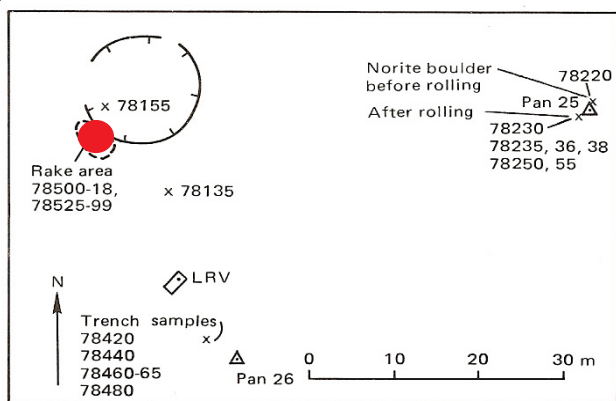


Figure 2: Location where 78598 was found.

Chemistry

Warner et al. (1975) and Neal (2001) have published analyses of 78598 (table 1). These analyses are not in agreement. Note the very low Cr and V content reported by Neal.

Processing

There are 4 thin sections.

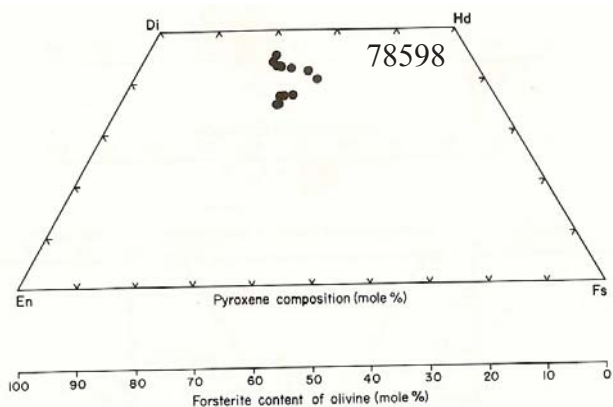
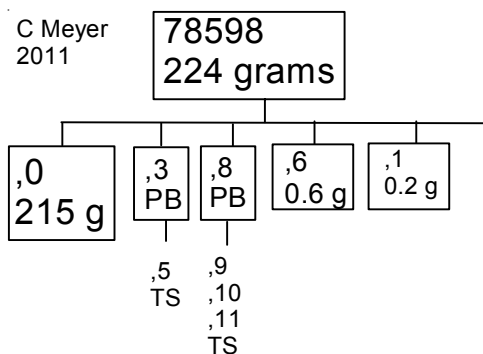


Figure 3: Composition of pyroxene in 78598 (Warner et al. 1978).

Mineralogical Mode

| | 78598 | 78586 | 78587 |
|-------------|-------|-------|-------|
| Olivine | -- | 4.6 | 8.1 |
| Pyroxene | 49.7 | 44 | 41.8 |
| Plagioclase | -- | -- | 27.6 |
| Opaques | 11.8 | 15.3 | 16.7 |
| Silica | -- | -- | 4.8 |
| Meostasis | 38 | 36.2 | 0.6 |



References for 78598

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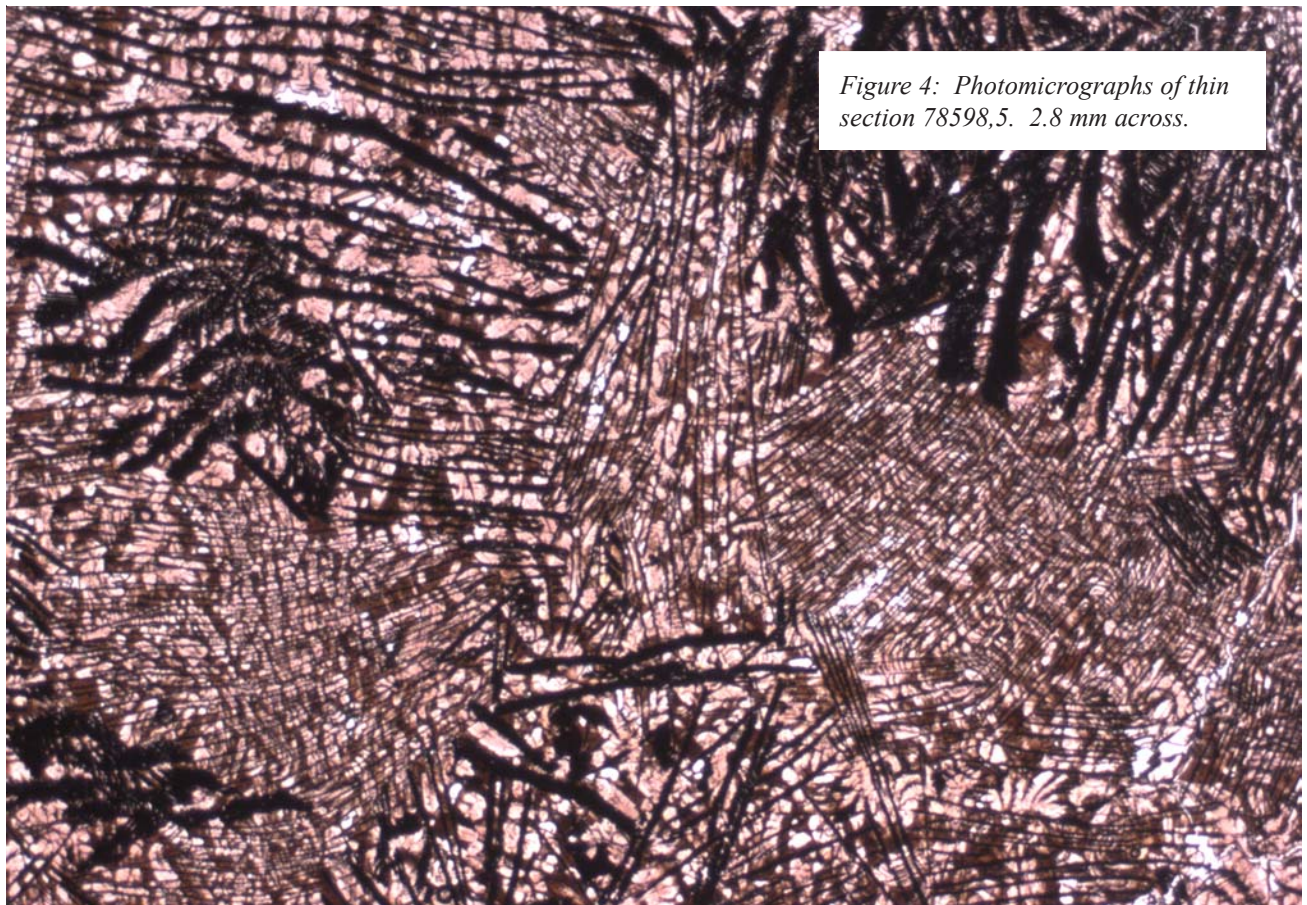
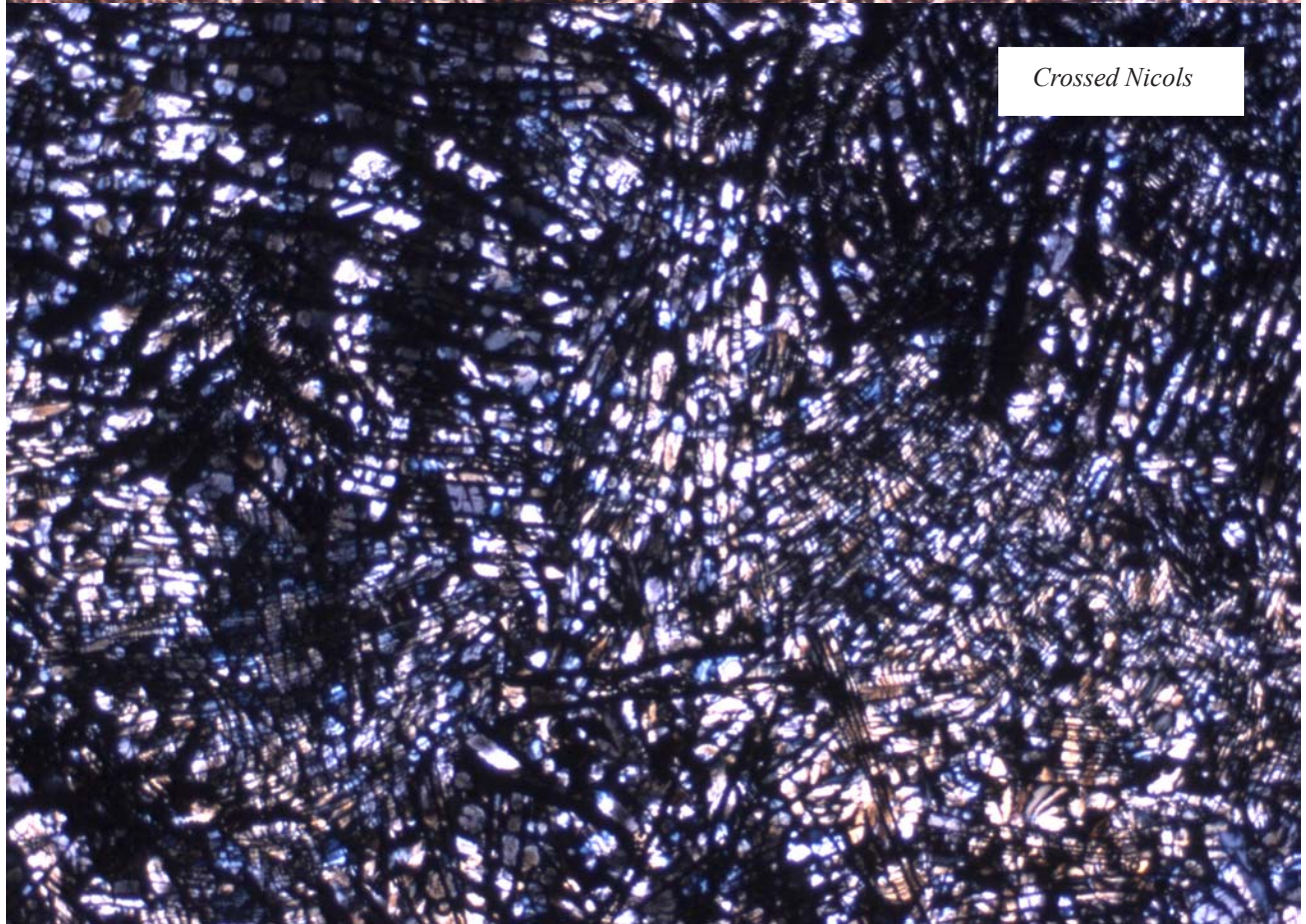


Figure 4: Photomicrographs of thin section 78598,5. 2.8 mm across.



Crossed Nicols

Table 1. Chemical composition of 78598.

| reference weight | Neal2001 | Warner78 | Warner75 |
|--------------------------------|----------|----------|----------|
| SiO ₂ % | | | |
| TiO ₂ | | 8.9 | (b) |
| Al ₂ O ₃ | | 10 | (b) |
| FeO | | 18.5 | (b) |
| MnO | | 0.25 | (b) |
| MgO | | 5.2 | (b) |
| CaO | | 11.5 | (b) |
| Na ₂ O | | 0.44 | (b) |
| K ₂ O | | 0.08 | (b) |
| P ₂ O ₅ | | | |
| S % | | | |
| sum | | | |
| Sc ppm | 81 | (a) 72 | (b) |
| V | 111 | (a) 20 | (b) |
| Cr | 3361 | (a) 1368 | (b) |
| Co | 20 | (a) 15 | (b) |
| Ni | 1.86 | (a) | |
| Cu | 43 | (a) | |
| Zn | 88 | (a) | |
| Ga | 3.77 | (a) | |
| Ge ppb | | | |
| As | | | |
| Se | | | |
| Rb | 0.65 | (a) | |
| Sr | 183 | (a) | |
| Y | 102 | (a) | |
| Zr | 230 | (a) | |
| Nb | 23 | (a) | |
| Mo | | | |
| Ru | | | |
| Rh | | | |
| Pd ppb | | | |
| Ag ppb | | | |
| Cd ppb | | | |
| In ppb | | | |
| Sn ppb | | | |
| Sb ppb | 30 | (a) | |
| Te ppb | | | |
| Cs ppm | 0.03 | (a) | |
| Ba | 81 | (a) | |
| La | 6.31 | (a) 7.8 | (b) |
| Ce | 23.7 | (a) 30 | (b) |
| Pr | 4.06 | (a) | |
| Nd | 23.2 | (a) 30 | (b) |
| Sm | 9.85 | (a) 11.6 | (b) |
| Eu | 1.96 | (a) 2.4 | (b) |
| Gd | 15.5 | (a) | |
| Tb | 2.67 | (a) 3 | (b) |
| Dy | 17.5 | (a) 19 | (b) |
| Ho | 3.42 | (a) | |
| Er | 9.84 | (a) | |
| Tm | 1.35 | (a) | |
| Yb | 9.42 | (a) 10.3 | (b) |
| Lu | 1.39 | (a) 1.5 | (b) |
| Hf | 8 | (a) 9.7 | (b) |
| Ta | 1.56 | (a) 1.8 | (b) |
| W ppb | 90 | (a) | |
| Re ppb | | | |
| Os ppb | | | |
| Ir ppb | | | |
| Pt ppb | | | |
| Au ppb | | | |
| Th ppm | 0.32 | (a) | |
| U ppm | 0.11 | (a) | |

technique: (a) ICP-MS, (b) INAA

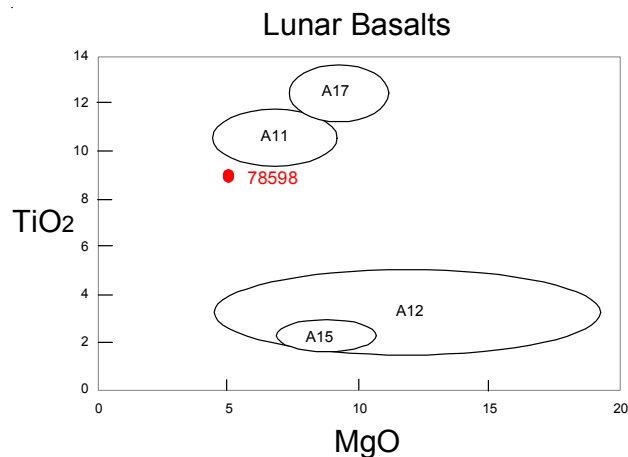


Figure 5: Composition of lunar basalts.

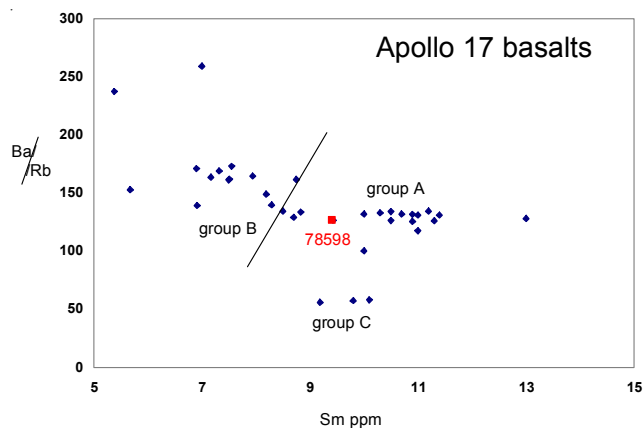


Figure 6: Trace element characteristics of Apollo 17 basalts.

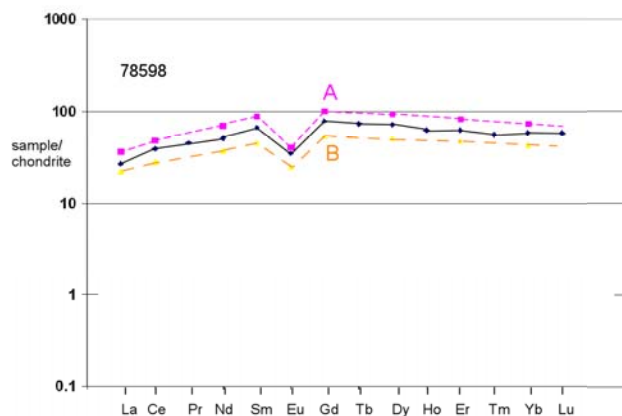


Figure 7: Normalized rare-earth-element diagram for 78598 compared with A and B types of Apollo 17 basalt.