72738

Microsubophitic Impact Melt Breccia St. 2, 23.8 g

INTRODUCTION

72738 is a fine-grained clast-bearing impact melt with a subophitic groundmass texture. Its chemistry is similar to the common low-K Fra Mauro melts that dominate the Apollo 17 highlands samples.

72738 was the only blue-gray breccia (LSIC 17, 1973) collected in the second rake sample from Station 2. It is 3.8 x 2.9 x 2.5 cm and medium dark gray (N4) (Keil et al., 1974). It is subangular (Fig. 1) and coherent, with no fractures and a few vugs. There are no zap pits. Matrix material (less than 1 mm grain size) was estimated as 90% of the sample, with plagioclase and lithic clasts dominating the remainder. Splitting attempted to include a 6 mm clast, but the allocated material either has little of this clast or it is identical with the groundmass.

PETROGRAPHY

The groundmass of 72738 is a very fine-grained crystallized melt, with small clasts quite distinct from the groundmass (Fig. 2). It is generally homogeneous, and slightly finer-grained than 72535. Warner et al. (1977 b, c; 1978f) described 72738 as a microsubophitic matrix breccia. Their modal data (Table 1) shows a high proportion of melt groundmass (87%) and a clast population dominated by plagioclase, similar to many other impact melt samples at the Apollo 17 site. Warner et al. (1977 b, c; 1978f) described the dark porous groundmass as basaltic-textured, with plagioclase laths less than 30 microns long subophitically enclosed by irregular mafic crystals. Microprobe analyses (Warner et al., 1978f) are shown in Figure 3. The matrix olivines show a wider range of compositions than the other subophitic samples studied by Warner et al. (1978f) (17071-79). Engelhardt (1979) tabulated ilmenite paragenetic features, inferring that ilmenite crystallization started after plagioclase but before pyroxene.

Both mineral and lithic clasts tend to be subrounded to subangular. Calcic plagioclases dominate the mineral clasts, and most are smaller than 100 microns; mafic mineral clasts also tend to be more refractory than the groundmass counterparts but quite a few are less refractory (Fig. 3). The rare lithic

Figure 1: Sample 72738. S-73-33454. Smallest scale divisions in millimeters.

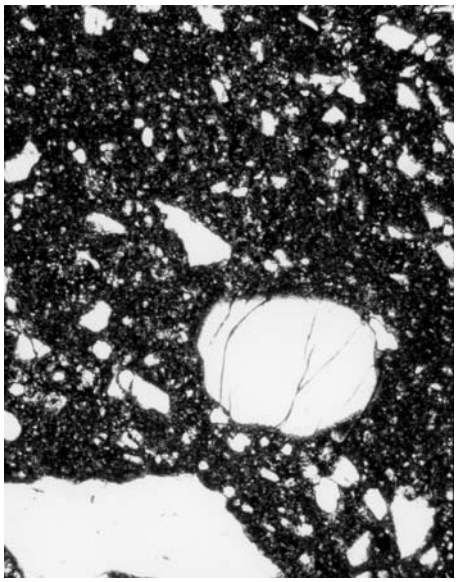

Figure 2: Photomicrograph of 72738,15, showing general groundmass White phases are plagioclase clasts and some vugs. Plane transmitted light; width of field about 1 mm.

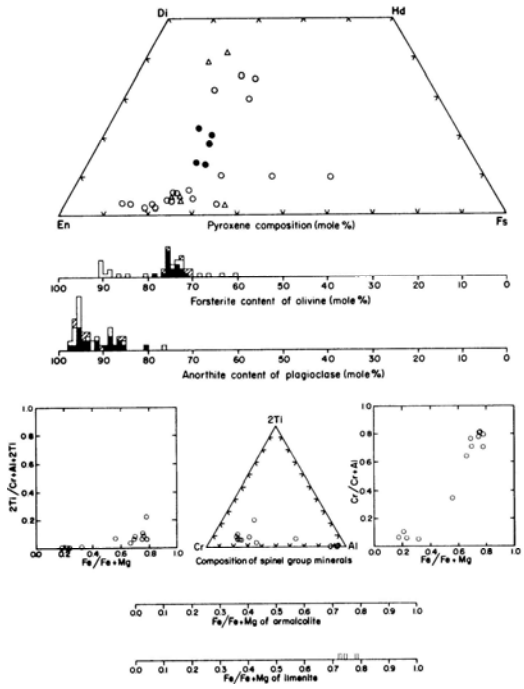

Figure 3: Microprobe analyses of minerals in 72738 (Warner et al., 1978). Filled symbols = matrix phases In histograms, open symbols = mineral clasts and cross-hatched = minerals in lithic clasts. In other diagrams, open circles = mineral clasts and open triangles = minerals in lithic clasts.

clasts are mainly fine-grained anorthositic materials. The sampling was intended to sample a 6 mm clast but such a clast is not apparent in the 5 serial slices that compose the thin section 05).

CHEMISTRY

A 413 mg sample was analyzed by Murali et al. (1977a) (Table 2; Fig. 4). The chemistry is fairly similar to that of other Apollo 17 impact melts, although it is a little lower in incompatible elements. A microprobe defocused beam analysis for the major elements (Table 3) agrees well with the neutron activation analysis except for being lower in FeO. If the sample included the 6 mm clast that was targeted, then the clast may have a composition similar to the bulk rock; alternatively, it may be responsible for the analysis having lower incompatible elements than the Boulder 2 groundmass.

PROCESSING

72738 was sawn to provide samples, and was entirely subdivided. The W end piece is 14 g, and the E end piece is 1.8 g. The slab produced was subdivided into several pieces, with ,5 remaining as 3.8 g. Piece ,9, described as having a 6 mm clast composing 15% of it, was allocated for chemical analysis and subsequent thin sectioning; but no hint of clast/groundmass differences was given in reports. Other pieces were not allocated.

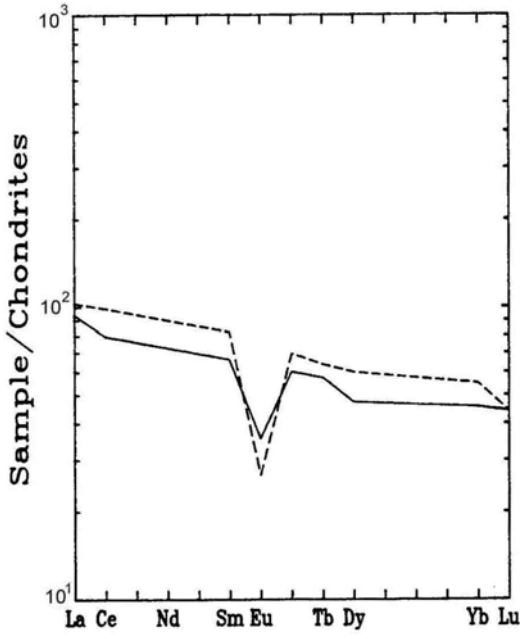

Figure 4: Chondrite-normalized rare earths in 72738,1 (solid line; Murali et al., 1977a) and average of Boulder 2 at Station 2 (dashed line, Laul and Schmitt, 1974a).

Table 1: Modal analysis of 72738,6
(Warner et at., 1977b).

	72738
Points counted	2561
Matrix	86.9
Mineral clasts	10.1
Lithic clasts	3.0
Mineral clasts	
Plagioclase	7.1
Olivine/pyroxene	2.9
Opaque oxide	tr
Metal/troilite	0.1
Other	tr
Total	10.1
Lithic clasts	
ANT	1.6
Devitrified anorthosite	0.4
Breccia	0.5
Other	0.5
Total	3.0
Percent of matrix (normalized to 100)	
Plagioclase	50.8
Olivine/pyroxene	43.9
Opaque oxide	2.4
Metal/troilite	0.2
Other	2.7

Table 2: Chemical analysis of bulk sample 72738.

Split	,9
wt %	
SiO_2	
TiO_2	1.3
Al_2O_3	18.5
Cr_2O_3	0.176
FeO	10.2
MnO	0.113
MgO	10
CaO	11.3
Na_2O	0.89
K_2O	0.25
P_2O_5	
ppm	
Sc	17
V	40
Co	28
Ni	220
Rb	
Sr	
Y	
Zr	380
Nb	
Hf	10.5
Ba	350
Th	3.1
U	
Cs	
Ta	11
Pb	
La	31.0
Ce	70
Pr	
Nd	
Sm	12.0
Eu	2.45
Gd	
Tb	2.7
Dy	15
Ho	
Er	
Tm	
Yb	9.1
Lu	1.5
ppb	
Au	2
Ir	6
	(1)

References and methods:
(1) Murali et al. (1977a); INAA

Table 3: Microprobe defocused beam analysis of matrix of 72738 (from Warner et al., 1977b).

wt %	
SiO_2	46.4
TiO_2	1.69
Al_2O_3	18.7
Cr_2O_3	0.16
FeO	8.0
MnO	0.11
MgO	10.1
CaO	11.8
Na_2O	0.82
K_2O	0.23
P2O5	0.27
Sum	98.3