

60639 FRAGMENTAL POLYMICT BRECCIA, GLASS-COATED 175.1 g

**INTRODUCTION:** 60639 is a fragmental polymict breccia with a low porosity. A wide variety of clasts is present, a mare basalt and a pristine anorthosite (Fig. 1a) being of particular significance. One side of the subangular rock is covered with a smooth dark glass (Fig. 1b).

The sample was a rake sample from an area 70 m west-southwest of the Lunar Module, hence its orientation is unknown. Zap pits occur in a few areas.

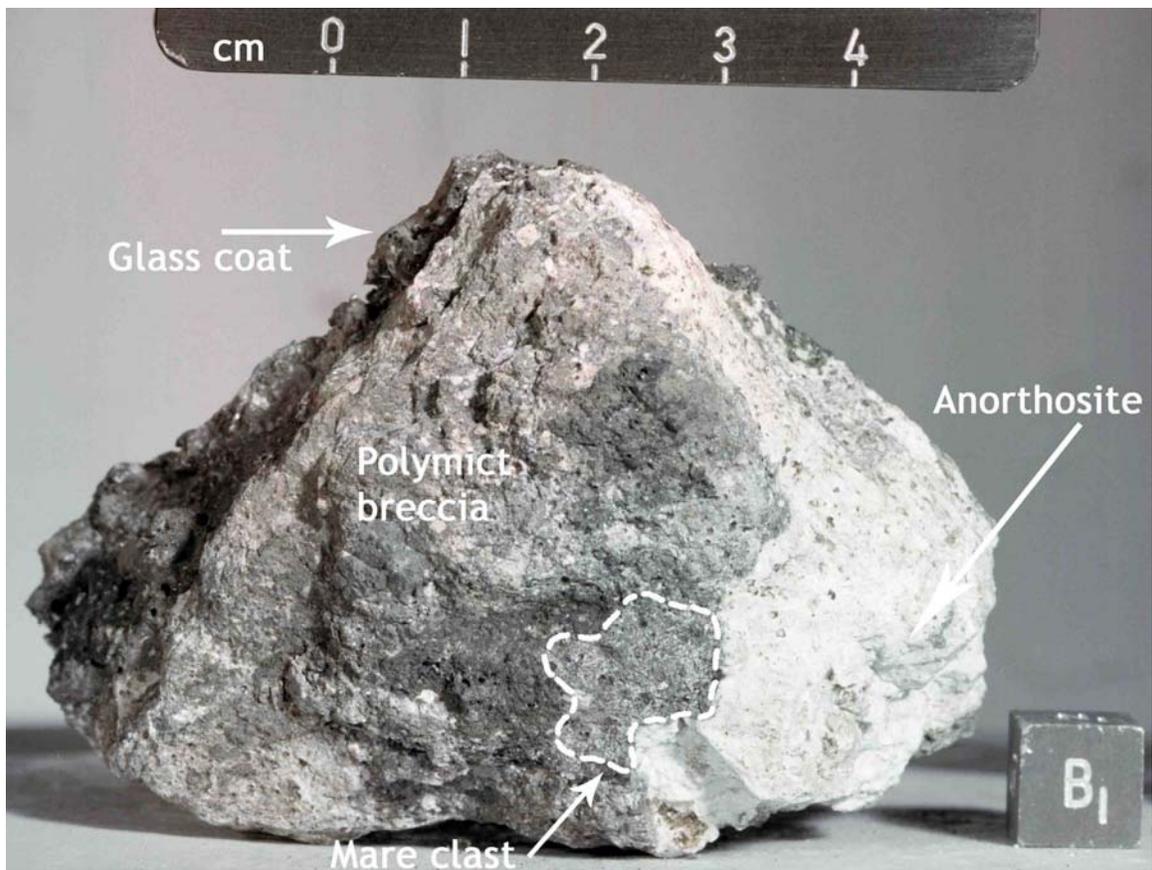


FIGURE 1a. S-72-44887.



FIGURE 1b. S-72-43462.

**PETROLOGY:** The matrix is briefly described by Warner et al. (1976b). The mare basalt clast is described, with mineral analyses, by Dowty et al. (1974b), Delano (1975) and Warner et al. (1976b). The pristine anorthosite is briefly described, with mineral analyses, by Warren and Wasson (1978).

The matrix is fragmental (Fig. 2) with a low porosity. Apart from the mare basalt and pristine anorthosite, lithic clasts include poikilitic, aphanitic, and glassy breccias.

The mare basalt is subophitic, with plagioclase needles 300-500  $\mu\text{m}$  long enclosed in clinopyroxene grains (Fig. 2). It contains ~5% olivine, ~35% plagioclase, ~50% pyroxene, ~5-10% ilmenite, and accessory spinels (Delano, 1975). Mineral data are shown in Figure 3. Modal mineralogy, zoning trends, and chemistry (below) are very similar to the intermediate-TiO<sub>2</sub> Luna 16 basalts.

The anorthosite is intensely cataclasized (Fig. 2), and consists almost entirely of plagioclase with a few tiny pyroxene grains. Mineral compositions have very narrow ranges (Warren and Wasson, 1978): plagioclases An<sub>96.0-96.8</sub>; pyroxenes En<sub>64-66</sub>Wo<sub>1-2</sub> and ~En<sub>42</sub>Wo<sub>43</sub>. Some other pyroxenes are incompletely exsolved pigeonites. These mineral compositions are typical of ferroan anorthosites.

CHEMISTRY: No matrix analyses are available. Data for the mare basalt (Murali et al., 1976; DBA in Warner et al., 1976b) and the anorthosite (Warren and Wasson, 1978) are summarized in Table 1.

The mare basalt is an intermediate-TiO<sub>2</sub>, high-alumina basalt very similar to the Luna 16 mare basalts. The anorthosite is chemically pristine as shown by its low siderophiles, and is extremely low in mafic components and incompatible elements.

PROCESSING AND SUBDIVISIONS: No saw cuts have been made in 60639. All splits have been made by chipping and prying. Most of the original bulk of the rock (175 g) remains as ,0 (163 g).

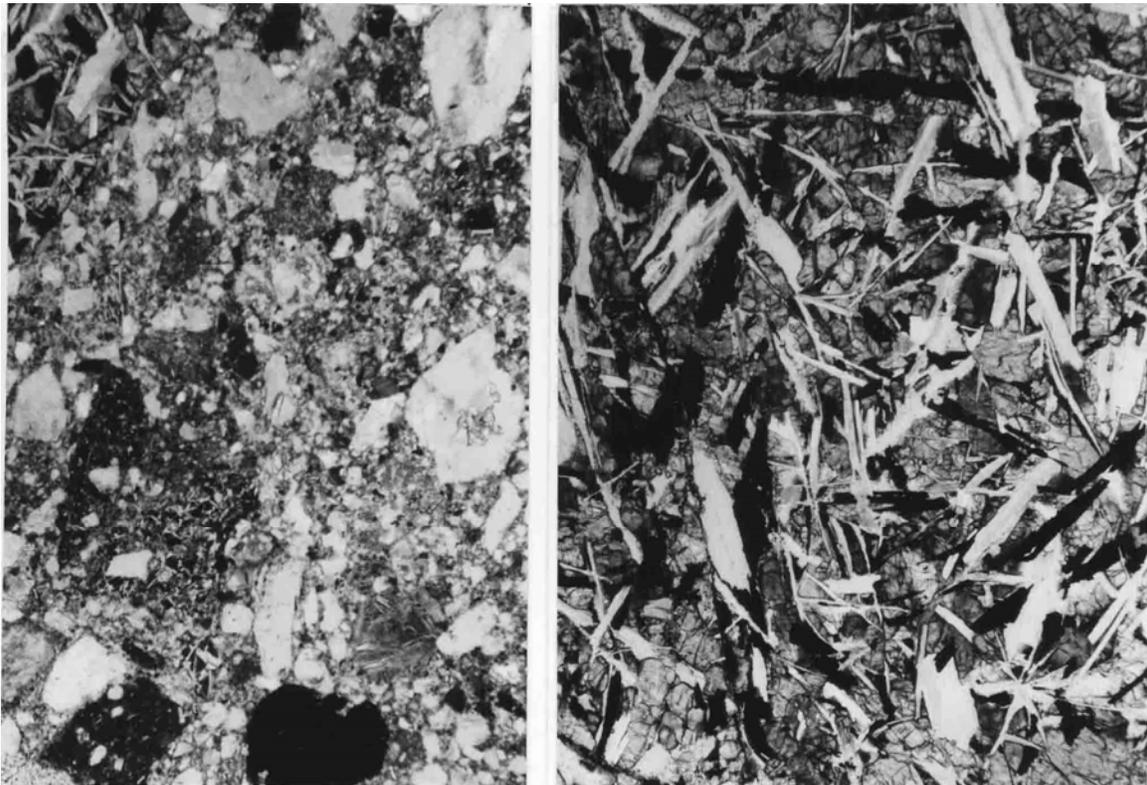


FIGURE 2. 60639,2.  
a) General view, partly ppl. Width 2 mm.  
b) Mare basalt clast, partly ppl. Width 2 mm.

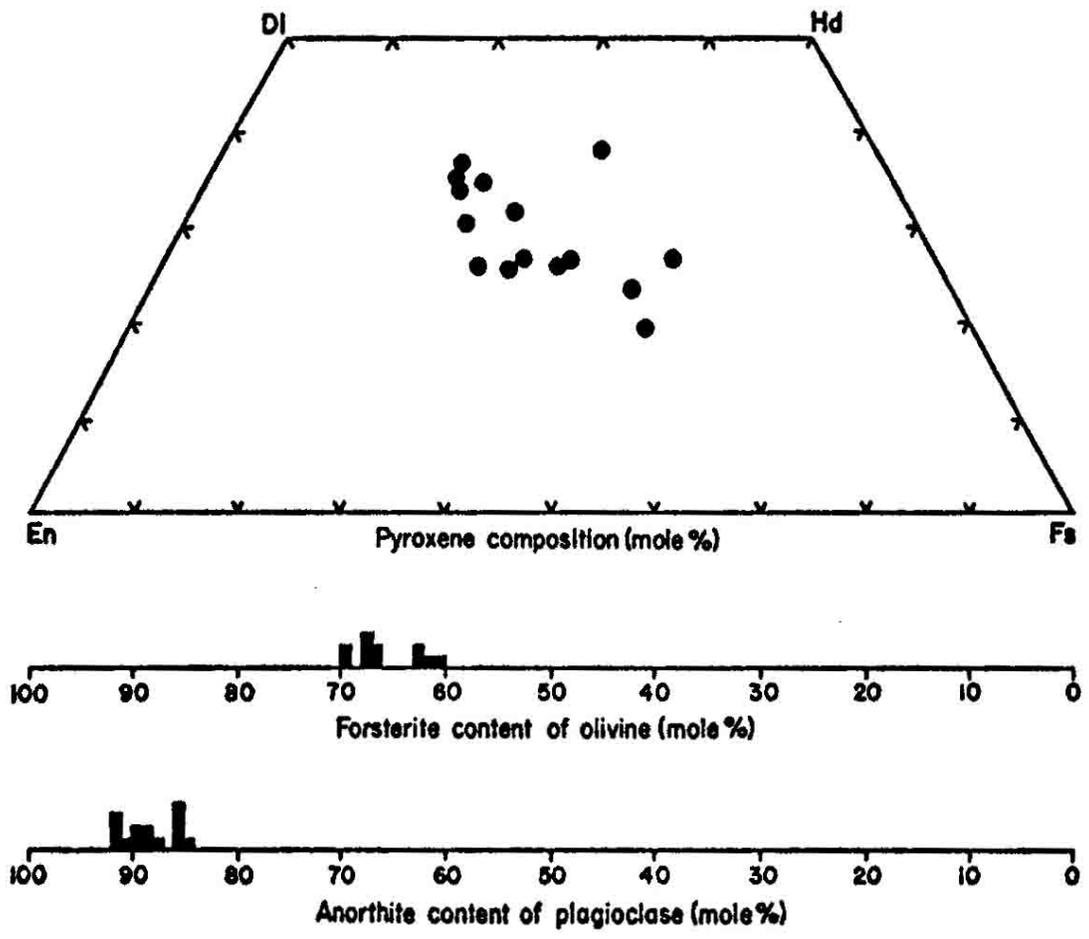


FIGURE 3a. Minerals in mare basalt clast;  
from R. Warner et al. (1976b).

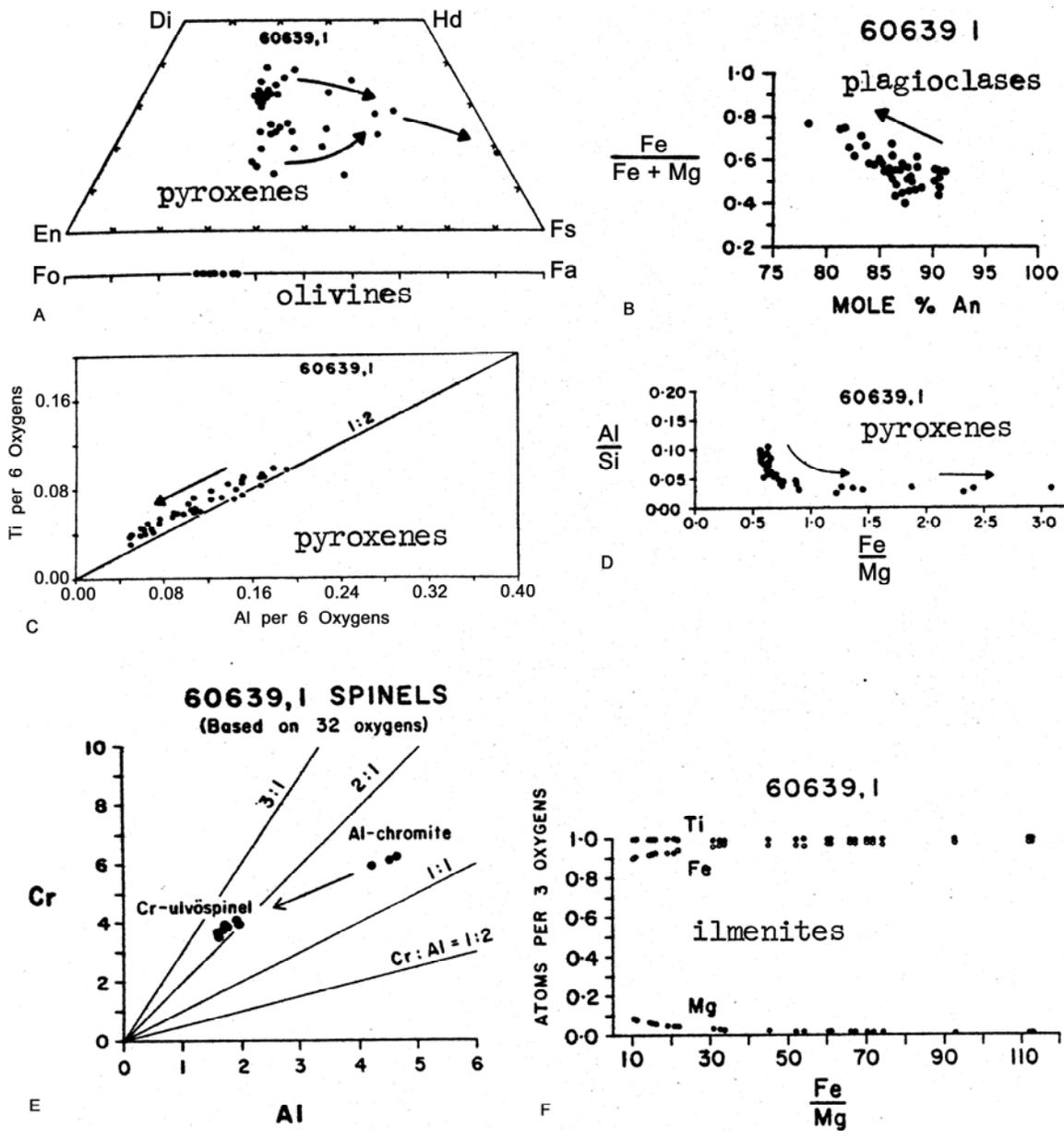


FIGURE 3b. Minerals in mare basalt clast; from Delano (1975).

TABLE 1. Summary chemistry of 60639 mare basalt and anorthosite clasts.

	<u>mare basalt</u>	<u>anorthosite</u>
SiO <sub>2</sub>	(42)	44.5
TiO <sub>2</sub>	7.4	
Al <sub>2</sub> O <sub>3</sub>	12.4	35.1
Cr <sub>2</sub> O <sub>3</sub>	0.30	0.006
FeO	20.0	0.34
MnO	0.25	0.01
MgO	6.5	0.35
CaO	10.6	19.4
Na <sub>2</sub> O	0.58	0.379
K <sub>2</sub> O	0.13	
P <sub>2</sub> O <sub>5</sub>		
Sr		
La	15.5	0.11
Lu	1.8	
Rb		
Sc	73	0.59
Ni		0.72
Co	20	1.0
Ir ppb		~0.02
Au ppb	~16	0.019
C		
N		
S		
Zn		2
Cu		

mare basalt: Murali *et al.* (1976). anorthosite: Warren and Wasson (1978). Oxides in wt.%; others in ppm except as noted.