

60635
Basaltic Impact Melt
15 grams



Figure 1: Photo of 60635. Scale in cm and mm. S73-20489

Introduction

60635 was collected as a rake sample near the LM (see section on 60600). It has a basaltic texture.

Petrography

Dowty et al. (1974), Warner et al. (1976) and Ryder and Norman (1980) describe 60635 as an igneous rock (figures 1 and 2). Deutsch and Stoffler (1987) found that there were two different regions, both with basaltic texture, but with different grain size. They show a picture of the contact, and found different ages for the two regions.

Deutsch and Stoffler describe 60635 as: “a coarse-grained subophitic impact melt rock with anorthite laths (An_{92-96}) and pyroxene (low- and high-Ca) as an interstitial phase; olivine is lacking (figure 2). Besides nearly pure ulvospinel, Fe-metal, troilite and a K-rich mesostasis are present”.

The relatively high Ni content of Fe-metal grains indicates that this rock is an impact melt (figure 4).

Dowty et al. (1974) give an analysis of ulvospinel.

Chemistry

Dowty et al. (1974) and Warner et al. (1976) determined the composition by broad beam electron probe analysis (table 1).

Radiogenic age dating

Deutsch and Stoffler (1987) found two ages for pieces of 60635 (figure 5).

Processing

There are only 2 thin sections, but enough material for more analyses.

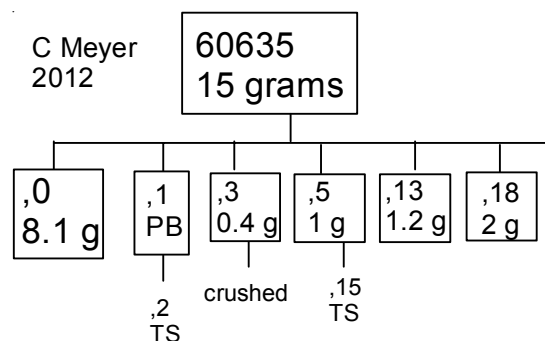




Figure 2: Photo micrograph of thin section of 60635 (Warner et al. 1976).

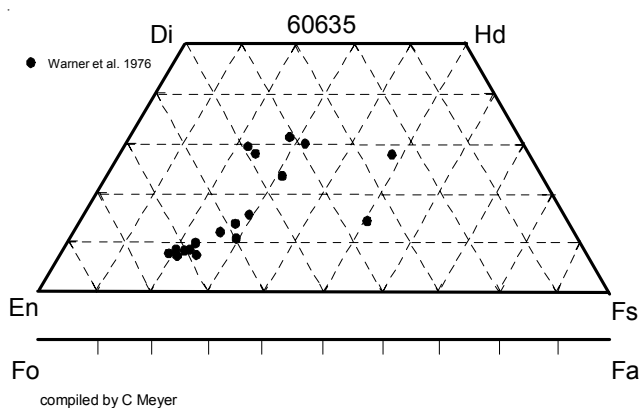


Figure 3: Composition of pyroxene in 60635 (Warner et al. 1976).

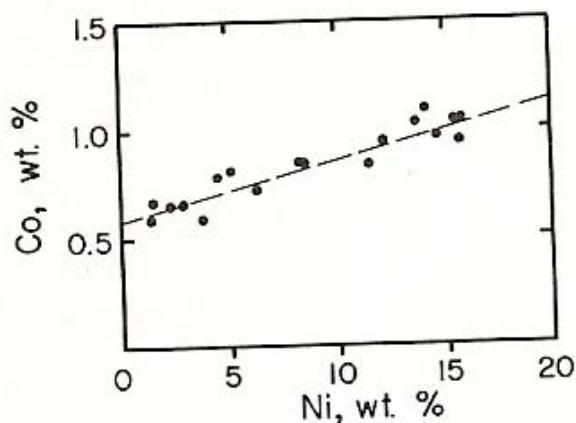


Figure 4: Composition of metallic iron grain in 60635 (Dowty et al. 1974).

Table 1. Chemical composition of 60635

reference weight	Warner76	Ryder82
SiO ₂ %	45.8	(a) 47.3 (b)
TiO ₂	0.34	(a)
Al ₂ O ₃	27.6	(a) 25.9 (b)
FeO	4.7	(a) 5.2 (b)
MnO	0.04	(a)
MgO	4.1	(a) 5.9 (b)
CaO	15.8	(a) 15.1 (b)
Na ₂ O	0.54	(a) 0.48 (b)
K ₂ O	0.09	(a) 0.1 (b)
P ₂ O ₅	0.09	(a)
S %		
sum		
Sc ppm		7 (b)
V		
Cr		
Co		29 (b)
Ni		
La		6.9 (b)
Ce		
Pr		
Nd		
Sm		3.2 (b)
Eu		1 (b)
Gd		
Lu		0.35 (b)
Hf		

technique: (a) e. probe, (b) prellim.

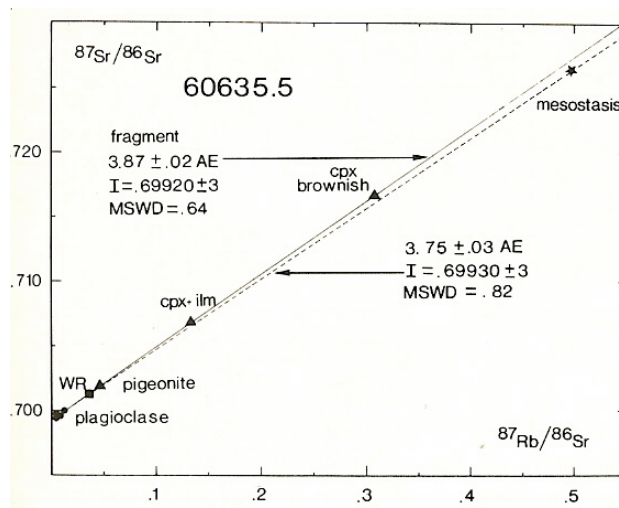


Figure 5: Rb-Sr isochron for two parts of 60635 (Deutsch and Stoffer 1984).

Summary of Age Data for 60635

	Rb/Sr
Deutsch and Stoffer 1987	3.87 ± 0.02 b.y.
	3.75 ± 0.03
Caution:	($\lambda^{87} = 1.42 \times 10^{-11} \text{ yr}^{-1}$)

References for 60635

Butler P. (1972a) Lunar Sample Information Catalog Apollo 16. Lunar Receiving Laboratory. MSC 03210 Curator's Catalog. pp. 370.

Deutsch A. and Stoffler D. (1987) Rb-Sr-analyses of Apollo 16 melt rocks and a new age estimate for the Imbrium basin: Lunar basin chronology and the early heavy bombardment of the moon. *Geochim. Cosmochim. Acta* **51**, 1951-1964.

Dowty E., Keil K. and Prinz M. (1974a) Igneous rocks from Apollo 16 rake samples. *Proc. 5th Lunar Sci. Conf.* 431-445.

Keil K., Dowty E., Prinz M. and Bunch T.E. (1972) Description, classification and inventory of 151 Apollo 16 rake samples from the LM area and station 5. Curator's Catalog, JSC.

LSPET (1973b) The Apollo 16 lunar samples: Petrographic and chemical description. *Science* **179**, 23-34.

LSPET (1972c) Preliminary examination of lunar samples. In Apollo 16 Preliminary Science Report. NASA SP-315, 7-1—7-58.

McKinley J.P., Taylor G.J., Keil K., Ma M.-S. and Schmitt R.A. (1984) Apollo 16: Impact sheets, contrasting nature of the Cayley Plains and Descartes Mountains, and geologic history. *Proc. 14th Lunar Planet. Sci. Conf.* in J. Geophys. Res. **89**, B513-B524.

Ryder G. and Norman M.D. (1980) Catalog of Apollo 16 rocks (3 vol.). Curator's Office pub. #52, JSC #16904

Ryder G. and Seymour R. (1982) Chemistry of Apollo 16 impact melts: Numerous melt sheets, lunar cratering history and the Cayley-Descartes distinction (abs). *Lunar Planet. Sci.* **XIII**, 673-674. Lunny Institute in Houston.

Sutton R.L. (1981) Documentation of Apollo 16 samples. In Geology of the Apollo 16 area, central lunar highlands. (Ulrich et al.) U.S.G.S. Prof. Paper 1048.

Warner R.D., Dowty E., Prinz M., Conrad G.H., Nehru C.E. and Keil K. (1976c) Catalog of Apollo 16 rake samples from the LM area and station 5. Spec. Publ. #13, UNM Institute of Meteoritics, Albuquerque. 87 pp.