63549

Basaltic Impact Melt

26.57 grams

Figure 1: Photo of 63549. Scale is 1 cm. S73-55388.

Introduction

63549 is a rake sample with numerous micrometeorite cratrers. It is coherent and appears to be a homogeneous impact melt rock. It has been dated at 3.84 b.y. (Imbrium age?).

Petrography

63549 was studied by Warner et al. (1973), Gooley et al. (1973) and Vaniman and Papike (1980). It has a fine grained basaltic texture (figure 2). The pyroxenes are highly zoned (figure 3). Olivine has not been reported. Metal grains are unusually high in Ni and Co (figure 4).

Chemistry

63549 is aluminous, with flat rare earth element pattern (figure 5). There are significant amounts of meteoritic siderophiles (hence impact melt, rather than endogenous volcanic origin).

Radiogenic age dating

Norman et al. (2006) reported an age of 3840 ± 11 m.y. by Ar/Ar (figure 7). Reimhold et al. (1985) reported the Sr isotopic ratio.

Other Studies

Magnetic properties of 63549 were reported by Pearce and Simonds (1974).

Processing

Chipped, not sawn. Three thin section.

Summary of Age Data for 63549

	Ar/Ar
Norman et al. 2006	3.840 ± 0.011 b.y.
Caution:	

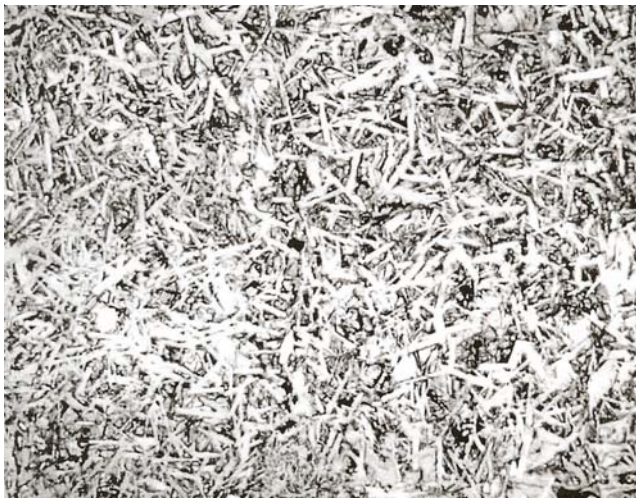


Figure 2: Photomicrograph of thin section 63549,8 by C Meyer @100x.

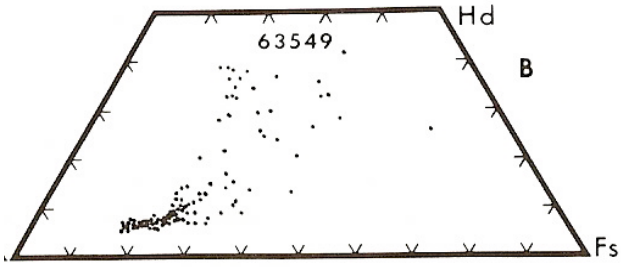


Figure 3: Pyroxene composition of 63549 (Warner et al. 1973).

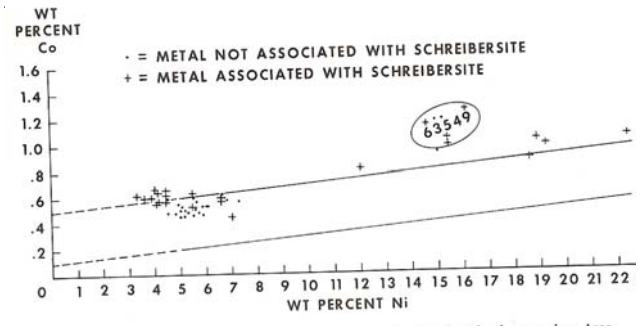
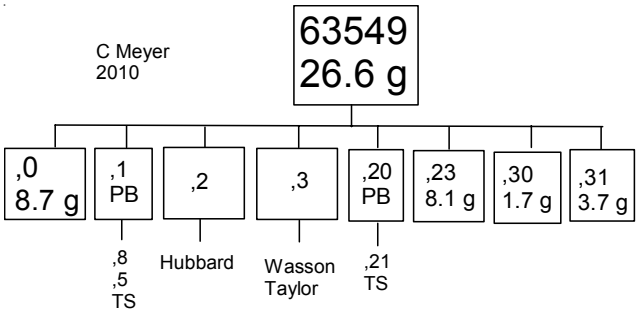


Figure 4: Composition of metal in Apollo 16 samples with 63549 (Gooley et al. 1973).



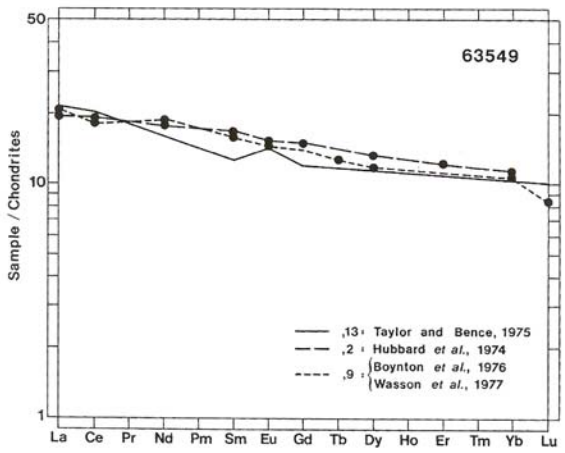


Figure 5: Normalized rare-earth-elent diagram for 63549 (from Ryder and Norman 1980).

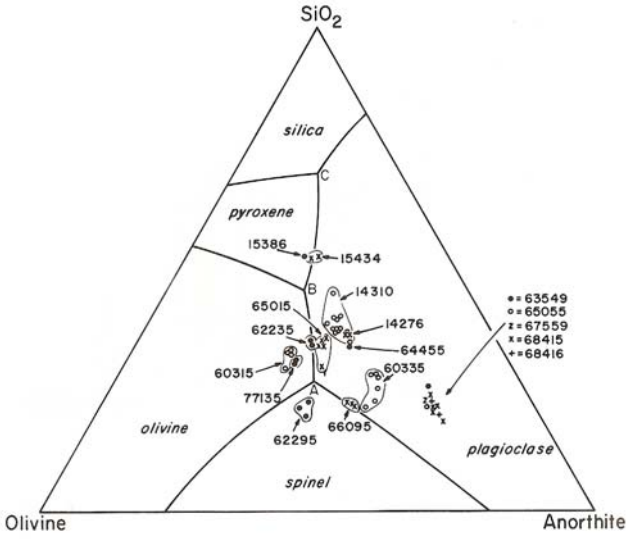


Figure 6: Composition of 63549 (Vaniman and Papike 1980).

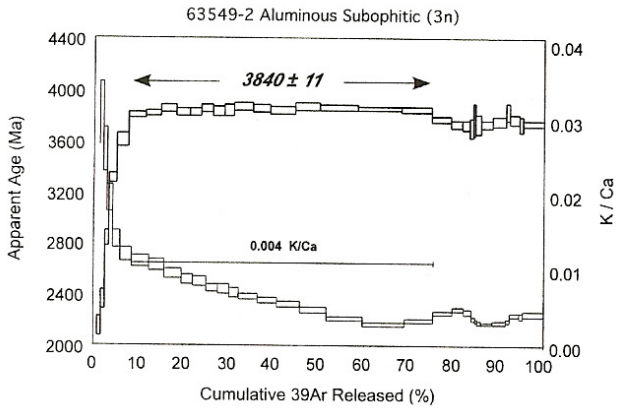


Figure 7: Ar/Ar plateau diagram for 63549 (Norman et al. 2006).

Table 1. Chemical composition of 63549.

reference	Boyton76		Hubbard74		Wiesmann75		Wasson76
weight			Rhodes		Hubbard74		
SiO2 %			45.68	(a)			
TiO2	0.43	(c)	0.3	(a)	0.3	(b)	0.37
Al2O3	26.5	(c)	28.59	(a)			29.8
FeO	4	(c)	4.27	(a)			4.5
MnO	0.05	(c)	0.05	(a)			0.06
MgO	4.64	(c)	4.33	(a)			4.3
CaO	15	(c)	15.2	(a)			16.9
Na2O	0.43	(c)					0.48
K2O	0.06	(c)	0.07	(a)	0.07	(b)	0.07
P2O5			0.07	(a)			
S %							
sum							
Sc ppm	6.8	(c)					7.8
V	13	(c)					22
Cr	580	(c)			625	(b)	640
Co	16.9	(c)					19.5
Ni	192	(c)					220
Cu							
Zn	1.12	(c)					4.1
Ga	2.54	(c)					2.6
Ge ppb	96	(c)					138
As							
Se							
Rb					1.764	(b)	
Sr					170	(b)	
Y							
Zr							
Nb							
Mo							
Ru							8
Rh							
Pd ppb							
Ag ppb							
Cd ppb	5.8	(c)					
In ppb	6.8	(c)					6.7
Sn ppb							
Sb ppb							
Te ppb							
Cs ppm							
Ba	80	(c)			74	(b)	83
La	6.3	(c)			6.39	(b)	6.8
Ce	16	(c)			16.6	(b)	16
Pr							
Nd					10.6	(b)	11
Sm	2.6	(c)			2.99	(b)	2.8
Eu	0.88	(c)			1.03	(b)	1.08
Gd					3.67	(b)	
Tb	0.58	(c)					0.6
Dy	2.9	(c)			3.9	(b)	3.8
Ho							
Er					2.4	(b)	
Tm							
Yb	1.96	(c)			2.23	(b)	2.2
Lu	0.26	(c)					0.31
Hf	1.8	(c)					2.2
Ta	0.3	(c)					0.24
W ppb							
Re ppb							
Os ppb							
Ir ppb	7.8	(c)					9
Pt ppb							
Au ppb	3.1	(c)					3.6
Th ppm	0.9	(c)					1.03
U ppm	0.39	(c)			0.33	(b)	0.37

technique: (a) XRF, (b) IDMS, (c) INAA

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