

10063
Regolith Breccia
148 grams



Figure 1: Photo of 10063,1 showing several rock clasts. Sample about 7 cm long. NASA S75-30490.

Introduction

Simon et al. (1984) included breccia 10063 in their comprehensive study of Apollo 11 regolith breccias – their mode is given in the table. The most abundant component is mare basalt (figure 3). Although Simon et al. found 22 small clasts of highland rock in 10063, they calculated that it has the least percentage of highland component (~15%). The large basalt clast (figure 2) has not been studied.

Petrography

10063 is a typical regolith breccia and contains glass. The large basalt clast (figure 2) has not been studied.

Chemistry

Goles et al. (1970) and Rhodes et al. (1981) reported analyses of 10063 (Table 1). The composition of the breccia is similar to the Apollo 11 soil 10084 (figure 4).

Summary of Age Data for 10063

None

Processing

Apollo 11 samples were originally described and cataloged in 1969 and “recataloged” by Kramer et al. (1977).

Simon’s Mode

	S	L
Mare Basalt	5.3	13.6
Highland Component	0.2	0.4
Regolith breccia	1	1.7
Agglutinate	1.7	1.5
Pyroxene	7.5	0.3
Olivine	0.5	
Plagioclase	3.7	
Ilmenite	3.6	
Orange glass	1.3	0.2
Other glass	2.7	0.3
Matrix	54.5 %	



Figure 2: Photo of bottom of 10063,1 showing large (2 cm) clast of basalt (with large zap pit). NASA S75-30489.

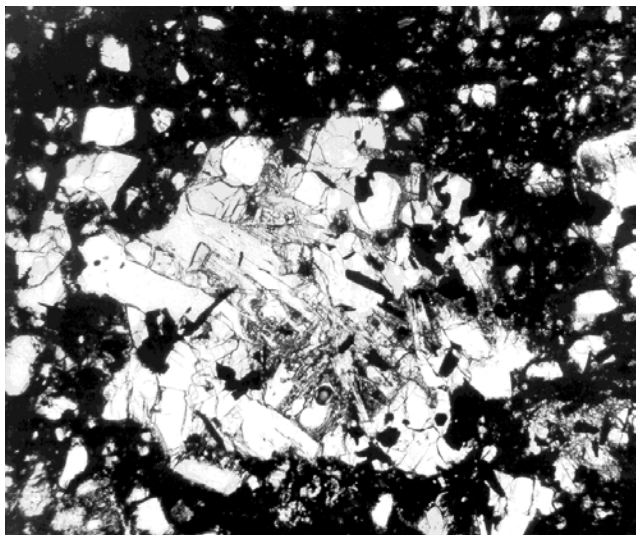


Figure 3: Thin section of small basalt clast in thin section 10063,17. NASA S76-26275.

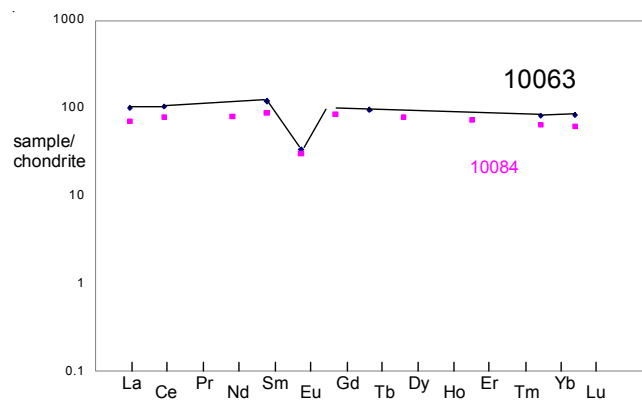
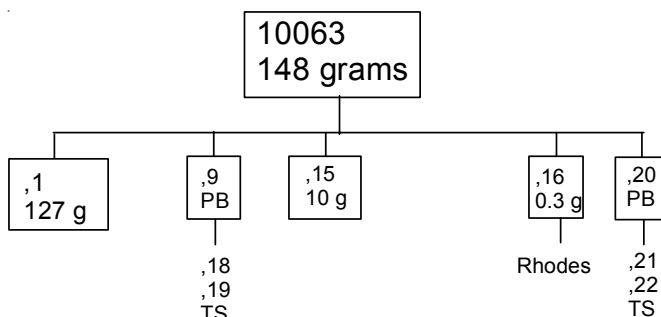


Figure 4: Normalized rare earth element diagram for breccia 10063 compared with soil 10084 (data from Rhodes et al. 1981).

Table 1. Chemical composition of 10063.

reference weight	Goles70	Rhodes81	
SiO ₂ %	43.4	41.4	(b)
TiO ₂	8.8	9.07	(b)
Al ₂ O ₃	13	11.47	(b)
FeO	16.8	17.18	(b)
MnO	0.21	(a) 0.26	(b)
MgO	7.8	7.83	(b)
CaO	13.6	11.42	(b)
Na ₂ O	0.46	(a) 0.48	(b)
K ₂ O		0.22	(b)
P ₂ O ₅		0.14	(b)
S %			
sum			
Sc ppm	62.2	(a) 69	
V	90	(a) 41	
Cr	1940	(a) 2240	
Co	35.2	(a) 28	
Ni		129	
Cu	16	(a)	
Zn		34	
Ga		8	
Ge ppb			
As			
Se			
Rb		4.6	
Sr		162	
Y		131	
Zr	490	(a) 387	
Nb		23	
Mo			
Ru			
Rh			
Pd ppb			
Ag ppb			
Cd ppb			
In ppb			
Sn ppb			
Sb ppb			
Te ppb			
Cs ppm			
Ba		275	(a)
La	16.7	(a) 23.8	(a)
Ce		63	(a)
Pr			
Nd			
Sm	12.9	(a) 17.6	(a)
Eu	1.83	(a) 1.9	(a)
Gd			
Tb		3.5	(a)
Dy			
Ho	4.7	(a)	
Er			
Tm			
Yb	11	(a) 13.4	(a)
Lu	1.76	(a) 2.05	(a)
Hf	13.1	(a) 13	(a)
Ta		1.8	(a)
W ppb			
Re ppb			
Os ppb			
Ir ppb			
Pt ppb			
Au ppb			
Th ppm		2.4	(a)
U ppm	0.51	(a)	
technique	(a) INAA, (b) XRF		



References for 10063.

Goles G., Randle K., Osawa M., Schmitt R.A., Wakita H., Ehmman W.D. and Morgan J.W. (1970) Elemental abundances by instrumental activation analyses in chips from 27 lunar rocks. *Proc. Apollo 11 Lunar Sci. Conf.* 1165-1176.

Kramer F.E., Twedell D.B. and Walton W.J.A. (1977) **Apollo 11 Lunar Sample Information Catalogue** (revised). Curator's Office, JSC 12522

Rhodes J.M. and Blanchard D.P. (1981) Apollo 11 breccias and soils: Aluminous mare basalts or multi-component mixtures? *Proc. 12th Lunar Planet. Sci. Conf.* 607-620.

Simon S.B., Papike J.J. and Shearer C.K. (1984) Petrology of Apollo 11 regolith breccias. *Proc. 15th Lunar Planet. Sci. Conf.* in *J. Geophys. Res.* **89**, C109-132.