12042

Soil

255 grams

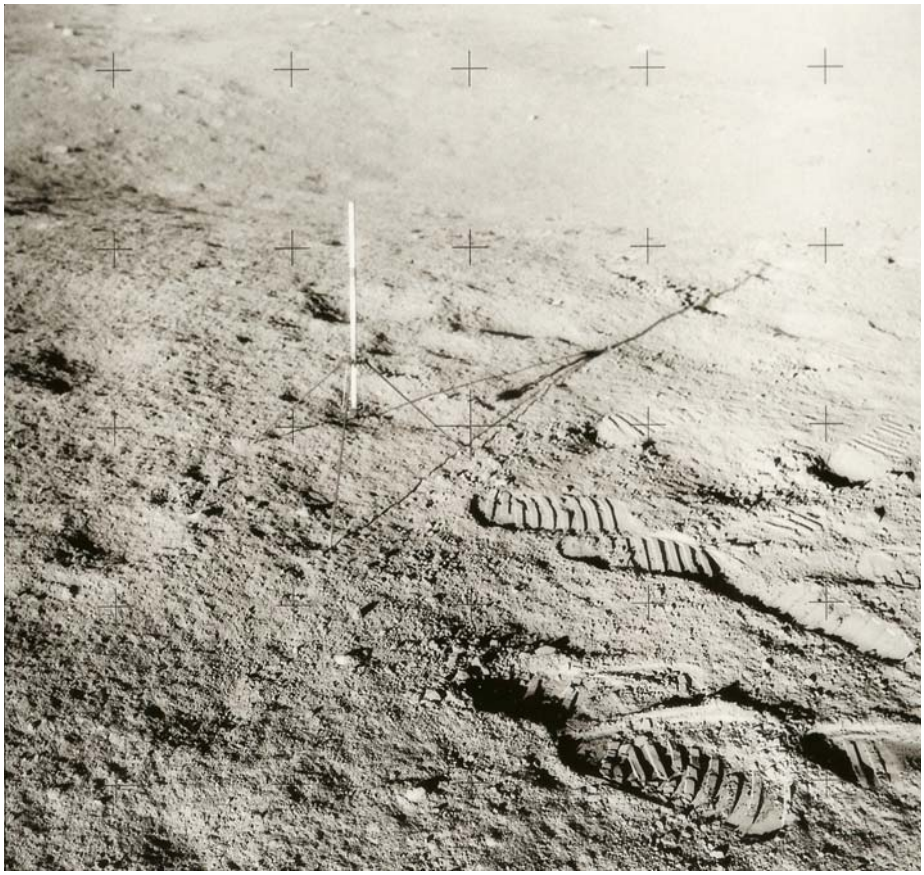


Figure 1: Photo of location of 12042 (Halo Crater). AS12-48-7072

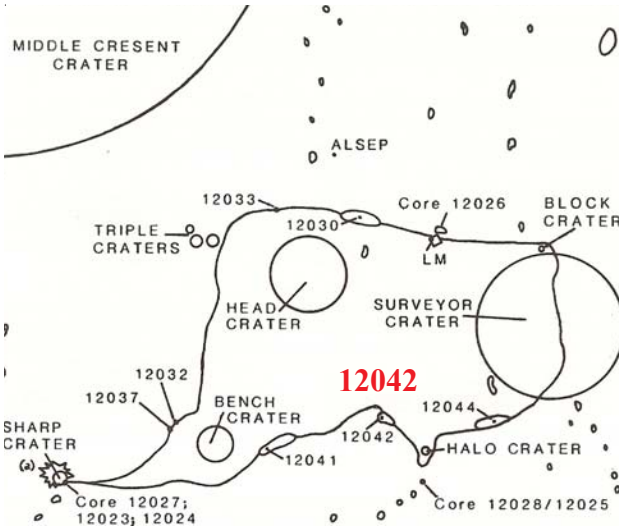


Figure 2: Location of 12042 on Apollo 12 map.

Introduction

12042 are fines collected in documented bag 12. They were from the outer flank of Surveyor Crater (figure 2).

Petrography

The maturity index for 12042 is I_s/FeO = 61 (Morris 1987). Frondel et al. (1971) determined the mineral mode, but did not specify agglutinates. The average grain size is 58 or 95 microns, depending on who sieved the sample (figure 5 a,b).

Marvin (1978) cataloged the coarse particles. Simon and Papike (1985) describe one particles from 12042.

Chemistry

The chemical composition is summarized in figures 3 and 6.

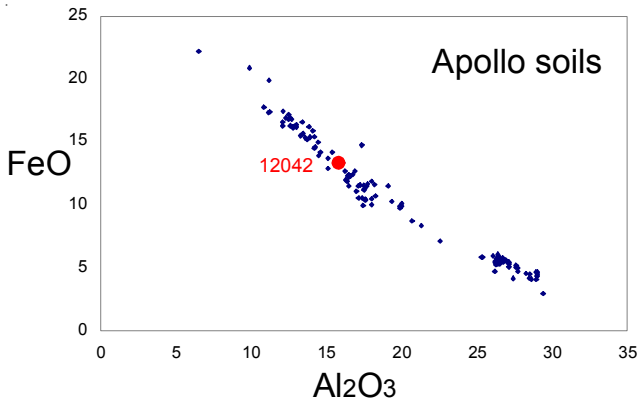


Figure 3: Composition of 12042 compared with that of other Apollo soils samples.

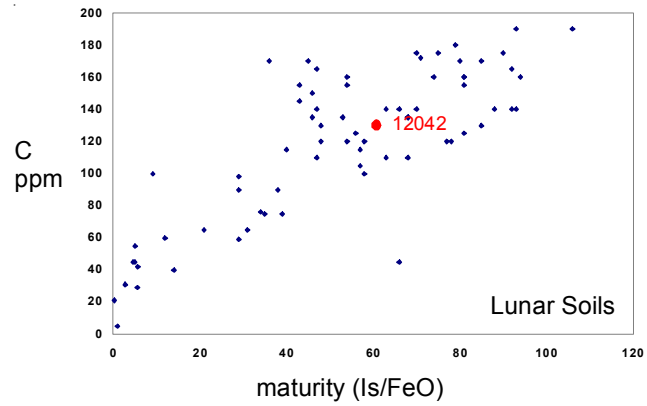


Figure 4: Carbon content and maturity index of 12042 compared with other Apollo soil samples.

The total carbon content of 12042 was reported by Epstein and Taylor (1971) as 125 ppm. Moore et al. (1971) determined 130 ppm C in two splits (figure 4). They also found 130 ppm nitrogen in 12042. Kaplan and Petrowski (1971) found 111 ppm C. Kerridge et al. (1978) found 121 ppm C and 74 ppm N, while

Other Studies

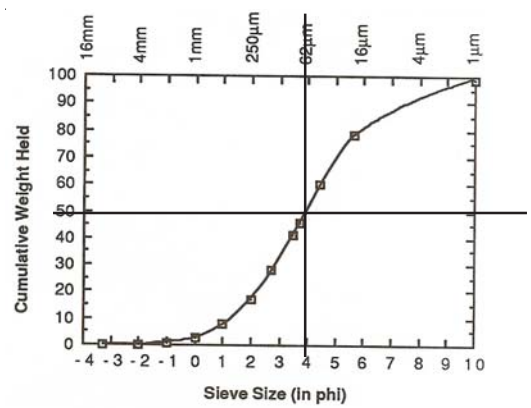
Heymann et al. (1972) reported rare gas content and isotopic rations of 12042.

Arrhenius et al. (1971) studied the frequency of grains with high fossil nuclear tracks in 12042 (and all other Apollo 12 soil and core samples)(see diagram in 12070).

Mineralogical Mode

Frondel et al. 1971

Olivine + Pyroxene	63.2 %
Plagioclase	11.6
Opaques	14.3
Glass, angular	8.2
Glass, rounded	1.6
Silica	1.1



average grain size = 58 microns

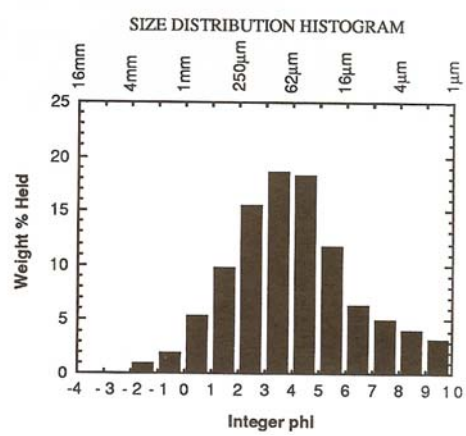


Figure 5a: Grain size distribution for 12042 (Graf 1993, from data by McKay et al. 1971).

Table 1. Chemical composition of 12042.

reference	Morrison71		Frondel71		Cuttitta71		Haskin71	
weight								
SiO2 %			46.1	(a)	45.7	(a)		
TiO2	2.33	(d)	3.2	(a)	2.71	(a)		
Al2O3	13.23	(d)	15.1	(a)	13	(a)		
FeO	17.6	(d)	14.1	(a)	16.2	(a)		
MnO	0.22	(d)	0.21	(a)	0.24	(a)		
MgO	8.23	(d)	9.8	(a)	10.4	(a)		
CaO	12.2	(d)	10.9	(a)	10.6	(a)		
Na2O	0.35	(d)	0.41	(a)	0.54	(a)		
K2O	0.17	(d)	0.26	(a)	0.25	(a)		
P2O5					0.33	(a)		
S %								
sum								
Sc ppm	34	(d)			38	(b)		
V	150	(d)			108	(b)		
Cr	2700	(d)	2258	(a)	2668	(a)		
Co	52	(d)			52	(b)		
Ni					235	(b)		
Cu	10	(d)			10	(b)		
Zn	8.5	(d)			7.5	(b)		
Ga	4	(d)			4.4	(b)		
Ge ppb								
As	0.03	(d)						
Se								
Rb	9.9	(d)			5.5	(b)		
Sr					110	(b)		
Y					128	(b)		
Zr	390	(d)			482	(b)		
Nb					26	(b)		
Mo								
Ru								
Rh								
Pd ppb								
Ag ppb								
Cd ppb								
In ppb								
Sn ppb								
Sb ppb	35	(d)						
Te ppb								
Cs ppm	0.2	(d)						
Ba	510	(d)			445	(b)		
La	42	(d)			48	(b)	36.8	(c)
Ce	110	(d)					111	(c)
Pr								
Nd	67	(d)					79	(c)
Sm	24	(d)					19.7	(c)
Eu	2.3	(d)					2.03	(c)
Gd	30	(d)					22.5	(c)
Tb	4.7	(d)					3.87	(c)
Dy							25.8	(c)
Ho	6.1	(d)					4.46	(c)
Er							14	(c)
Tm								
Yb	18	(d)			14	(b)	13.8	(c)
Lu	2.1	(d)					2.09	(c)
Hf	11	(d)						
Ta	1.4	(d)						
W ppb	970	(d)						
Re ppb								
Os ppb								
Ir ppb								
Pt ppb								
Au ppb								
Th ppm	6.1	(d)						
U ppm	1	(d)						

technique: (a) wet, (b) OES, (c) INAA, (d) various

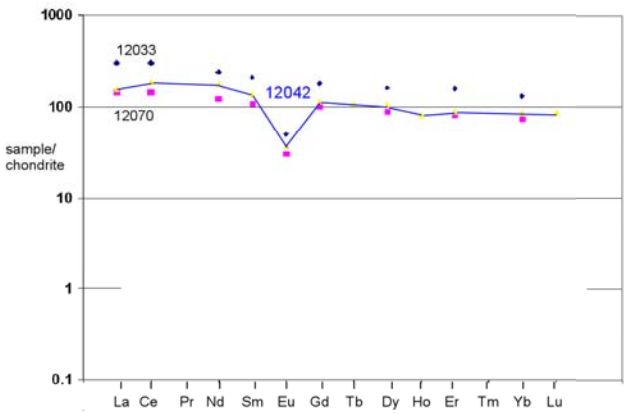


Figure 6: Normalized rare-earth-element diagram for 12042 (data by haskin et al. 1971).

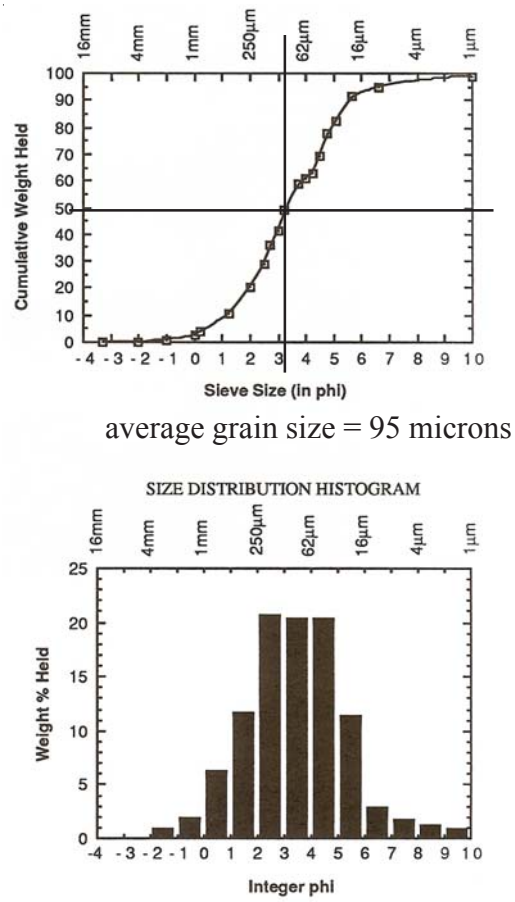
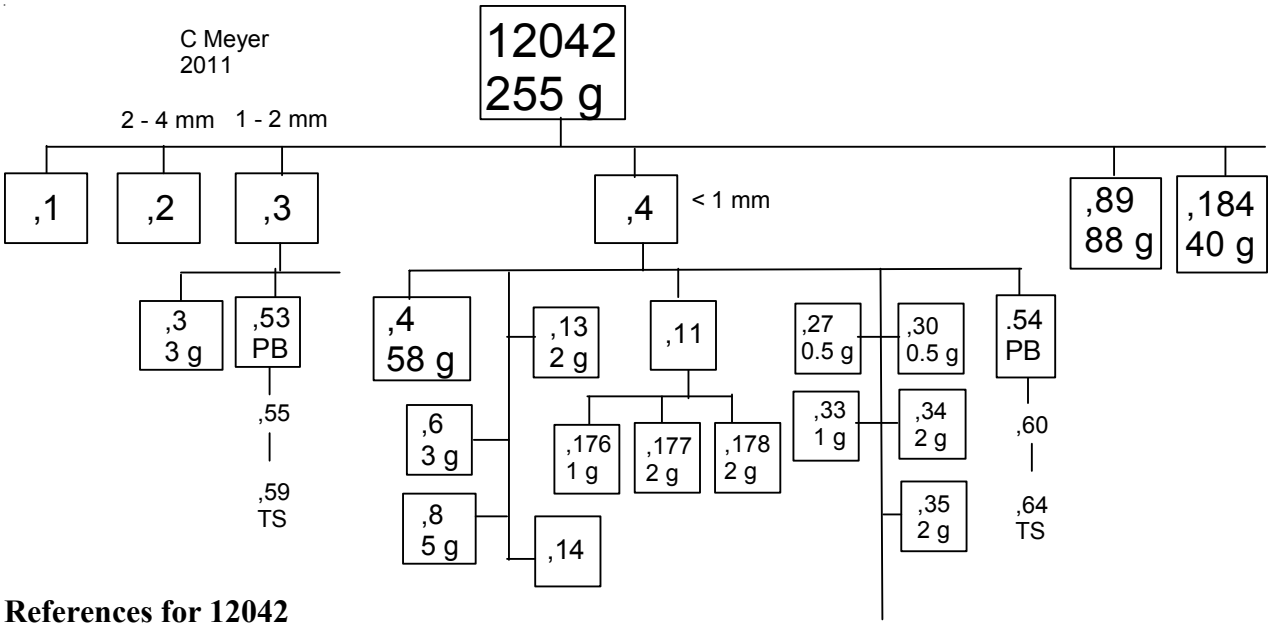


Figure 5b: Grain size distribution for 12042 (Graf 1993, from data by King et al. 1971).



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