DRAFT

10086

Bulk soil

823 grams

Introduction

10086 was split out of 10002 (or 10084) and designated as an "organic reserve". However, it was apparently mistakenly used for a magnetic monopol experiment and left open in the bio prep cabinet for 3 hrs, and thus thought to be possibly "contaminated" by all the activity in the bio prep cabinet. However, it is the sample most studied by "organic PIs". It is not clear which portions of it have been sieved.

Petrography

Keil et al. (1970) noted a tight compositional cluster of red-brown glass spherules in 10086. This cluster has the same composition as that observed by Essene et al. (1970) and others (table 1). These have since been shown to be volcanic glass, and Korotev has found that they may make up ~5% of the bulk soil.

Chemistry

Moore et al. (1970) reported 142 and 226 ppm carbon and 102 and 153 ppm nitrogen in 10086. Kaplan et al. (1970) reported 143 and 170 ppm carbon and 680 and 640 ppm sulfur in 10086 (similar to 10084). Norris et al. (1983) reported 121 and 144 ppm carbon and 63 ppm nitrogen. Cadogen et al. (1973) has argued that the carbon is in the form of carbide and that it comes from the solar wind.

The major element data reported by Oro et al. (1970), obtained by spark ionized mass spectrometry, make no sense at all.

Other Studies

A careful search for carbon and its compounds in 100 grams of 10086,3 was coordinated by Kvenvolden and Ponnapurama (1970). While they found 157 ± 14 ppm C, there was no evidence for complex organic material in their sample (at their limits of detection). Based on the negative results of this carefully run experiment, there should have been no further fuss about "quarantine" - yet it continued through Apollo 14!

The isotopic composition of carbon and nitrogen in 10086 was summarized by Norris et al. (1983).

A rather confusing set of reports on the search for organics and "evidence for life" are found at the end of volume 2, of the Proceeding of the Apollo 11 Lunar Science Conference and summarized in volume 3of Space and Life Sciences (1972). Included therein, is discussion of contamination etc. A key paper would appear to be Fox et al. (1973).

Processing

I can't find the evidence, but logic would indicate that 10086 was split out early from the bulk soil sample so as to avoid contamination. As of 2009, the sample is split into a confusing number of 50 g splits (see diagram).

References for 10086.

Beaty D.W. and Albee A.L. (1980) The geology and petrology of the Apollo 11 landing site. *Proc. 11th Lunar Planet. Sci. Conf.* 23-35.

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Essene E.J., Ringwood A.E. and Ware N.G. (1970) Petrology of the lunar rocks from Apollo 11 landing site. *Proc. Apollo 11 Lunar Sci. Conf.* 385-397.

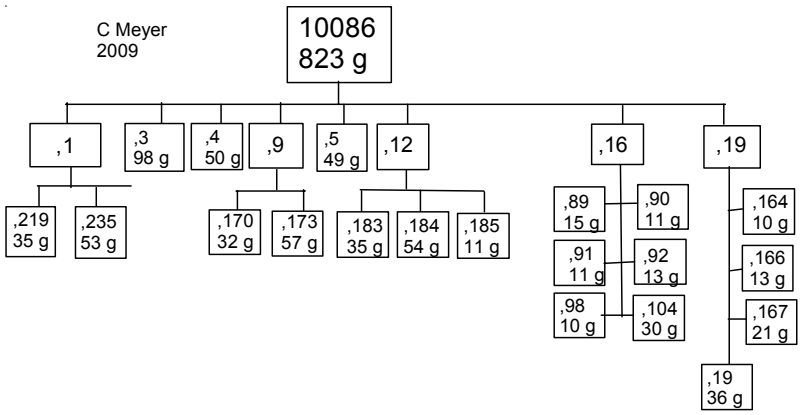
Fox S.W., Harada K. and Hare P.E. (1973) Accumulated analyses of amino acid precursors in returned lunar samples. *Proc. 4th Lunar Sci. Conf.* 2241-2248.

Kaplan I.R., Smith J.W. and Ruth E. (1970) Carbon and sulfur concentration and isotopic composition in Apollo 11 lunar samples. *Proc. Apollo 11 Lunar Sci. Conf.* 1317-1329.

Keil K., Bunch T.E. and Prinz M. (1970) Mineralogy and composition of Apollo 11 lunar samples. *Proc. Apollo 11 Lunar Sci. Conf.* 561-598.

Table 1: Red-brown glass sphere claster.

	Keil 70	Essene70	Reid 70		vonEngelhardt
SiO2	37.2	38.8	37.6	36.1	36
TiO2	10.7	10	10.04	9.8	10.2
Al2O3	5.2	5.24	6.49	7.08	5.6
FeO	24.7	23.4	24.3	24.29	24.5
MnO	0.3	0.33			0.22
MgO	13.1	13.84	14.3	14.54	12.6
CaO	7.7	7.41	7.65	7.36	7.6
Na2O	0.27	0.28	0.36	0.34	0.44
K2O	0.04	0.07	0.14	0.09	0.03
P2O5	0.05				
Cr2O3	0.61	0.53	0.54	0.53	
ZrO	0.06	0.02			



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Kvenvolden K.A. and Ponnamperuma C. (1970) A search of carbon and its compounds in lunar samples from Mare Tranquillitatis. NASA SP-257

LSPET (1969a) Preliminary examination of lunar samples. In Apollo 11 Prelim. Sci. Rpt. NASA SP-214. 123-142

LSPET (1969b) Preliminary examination of lunar samples from Apollo 11. *Science* **165**, 1211-1227.

Moore C.B., Gibson E.K., Larimer J.W., Lewis C.F. and Nichiporuk W. (1970) Total carbon and nitrogen abundances in Apollo 11 lunar samples. *Proc. Apollo 11 Lunar Sci. Conf.* 1375-1382.

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