

10032
Ilmenite Basalt
3.1 grams

DRAFT



Figure 1: Lunar basalt fragment 10032. NASA S75-31697. Cube is 1 cm.

Introduction

10032 was collected as part of the contingency sample from the regolith in front of the LM (Sutton and Schaber 1971). It is a fine grained ilmenite basalt (figure 1).

The age of 10032 has been determined as 3.6 b.y. with an exposure to cosmic rays of 140 m.y.

Petrography

Beaty and Albee (1978) studied the mineral chemistry in 10032 and group it other fine-grained vesicular specimen in the high K suite of Apollo 11 basalts. It is ilmenite rich and has a grain size about 100 micron. High K glass is found in the interstices.

Mineralogy

Olivine: The most magnesium olivine in 10032 is Fo₆₉ (Beaty and Albee 1978).

Pyroxene: Some of the large augite grains in 10032 have pigeonite cores (figure 2).

Plagioclase: Plagioclase in 10032 is An₇₈₋₇₀.

Ilmenite: Ilmenite has about 1 % MgO.

Mineralogical Mode of 10032

| | Beaty and Albee 1978 |
|-------------|-----------------------------|
| Olivine | 0.11 |
| Pyroxene | 52.61 |
| Plagioclase | 22.16 |
| Ilmenite | 16.45 |
| mesostasis | 6.66 |
| silica | 0.94 |
| troilite | 0.72 |
| phosphate | 0.24 |

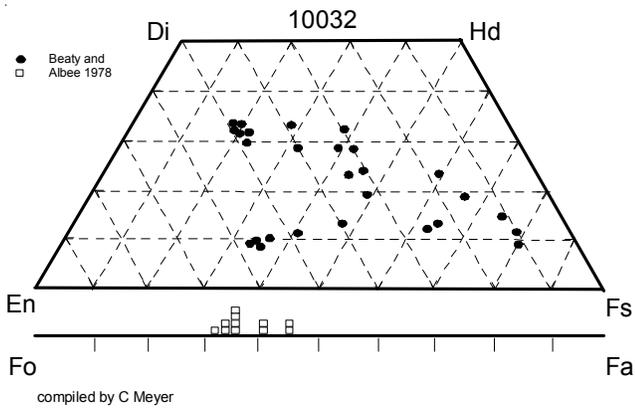


Figure 2: Pyroxene and olivine composition of 10032 (from Beatty and Albee 1978).

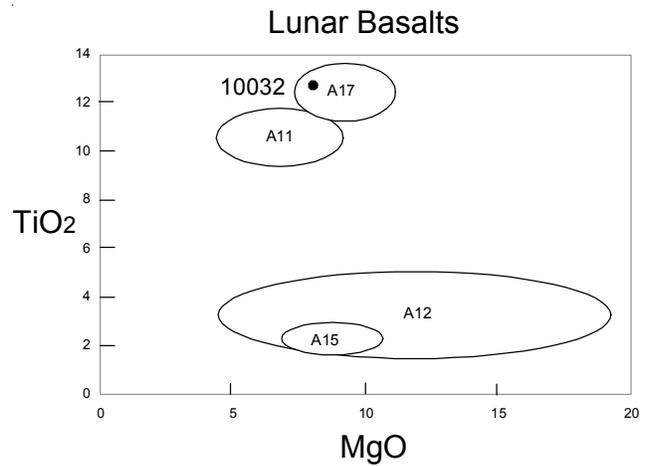


Figure 3: Composition of 10032.

Phosphate: The phosphate has 2.3 % fluorine.

Chemistry

The composition of 10032 has been determined by calculation based on mineral mode and mineral composition (table 1, figure 3).

Radiogenic age dating

The age of 10032 was determined about 3.6 b.y. by the Ar/Ar plateau technique (Guggisberg et al. 1979) (figure 4).

Cosmogenic isotopes and exposure ages

Guggisberg et al. (1979) determined and ³⁷Ar/³⁸Ar age of 139 b.y.

Other Studies

The total organic carbon content of 10032 was determined by hydrogen flame ionization pyrolysis (Ponnampertuma et al. 1970).

Funkhouser et al. (1970) and Bogard et al. (1971) reported the abundance and isotopic composition of rare gasses from 10032.

Processing

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

List of Photo #s for 10032

S75-31697

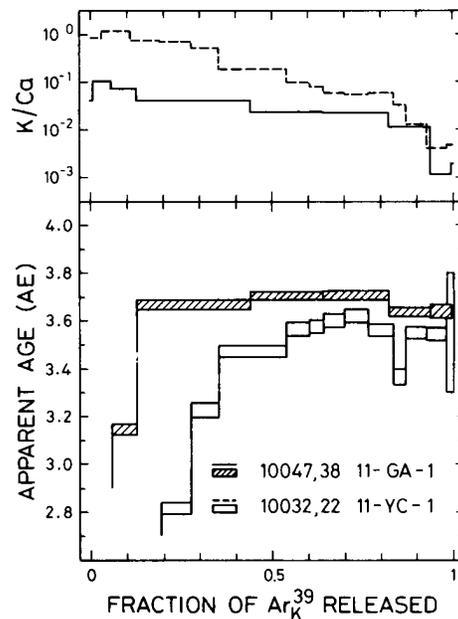


Figure 4: Argon release pattern (Guggisberg et al. 1979).

Summary of Age Data for 10032

| | |
|------------------------|-----------------------------------|
| | Ar/Ar plateau |
| Guggisberg et al. 1979 | 3.58 ± 0.06 b.y. (poorly defined) |

Table 1. Chemical composition of 10032.

| <i>reference</i> | Beaty 78 | |
|--------------------------------|----------|-----|
| <i>weight</i> | | |
| SiO ₂ % | 39.49 | (a) |
| TiO ₂ | 13.06 | (a) |
| Al ₂ O ₃ | 7.08 | (a) |
| FeO | 19.37 | (a) |
| MnO | 0.27 | (a) |
| MgO | 8.81 | (a) |
| CaO | 10.21 | (a) |
| Na ₂ O | 0.45 | (a) |
| K ₂ O | 0.28 | (a) |
| P ₂ O ₅ | 0.11 | (a) |
| S % | 0.36 | (a) |
| <i>sum</i> | | |

Sc ppm
V
Cr
Co
Ni
Cu
Zn
Ga
Ge ppb
As
Se
Rb
Sr
Y
Zr
Nb
Mo
Ru
Rh
Pd ppb
Ag ppb
Cd ppb
In ppb
Sn ppb
Sb ppb
Te ppb
Cs ppm
Ba
La
Ce
Pr
Nd
Sm
Eu
Gd
Tb
Dy
Ho
Er
Tm
Yb
Lu
Hf
Ta
W ppb
Re ppb
Os ppb
Ir ppb
Pt ppb
Au ppb
Th ppm
U ppm

technique: (a) elec. Probe + point count