10045

Sample 10045 is an angular to sub-angular, medium dark grey, olivine basalt. This sample originally weighed 185gm and measured 4X3X2.5cm. Sample was returned in ALSRC #1003 (Bulk Sample Container)

BINOCULAR DESCRIPTION BY: Twedell DATE: 9-18-75

ROCK TYPE: Olivine Basalt SAMPLE: 10045,19 WEIGHT: 100.4 gm

COLOR: Medium dark grey DIMENSIONS: 4 x 2.5 x 2 cm

SHAPE: Angular to sub-angular

COHERENCE: Intergranular – coherent
Fracturing – few, non-penetrative, fairly wide in places, mostly in middle; numerous in middle of rock, vary in width. Some open to wide cavities (PET)

FABRIC/TEXTURE: Isotropic/Equigranular

VARIABILITY: Homogeneous

SURFACE: Surfaces are irregular on fresh, to smooth on exposed surfaces.

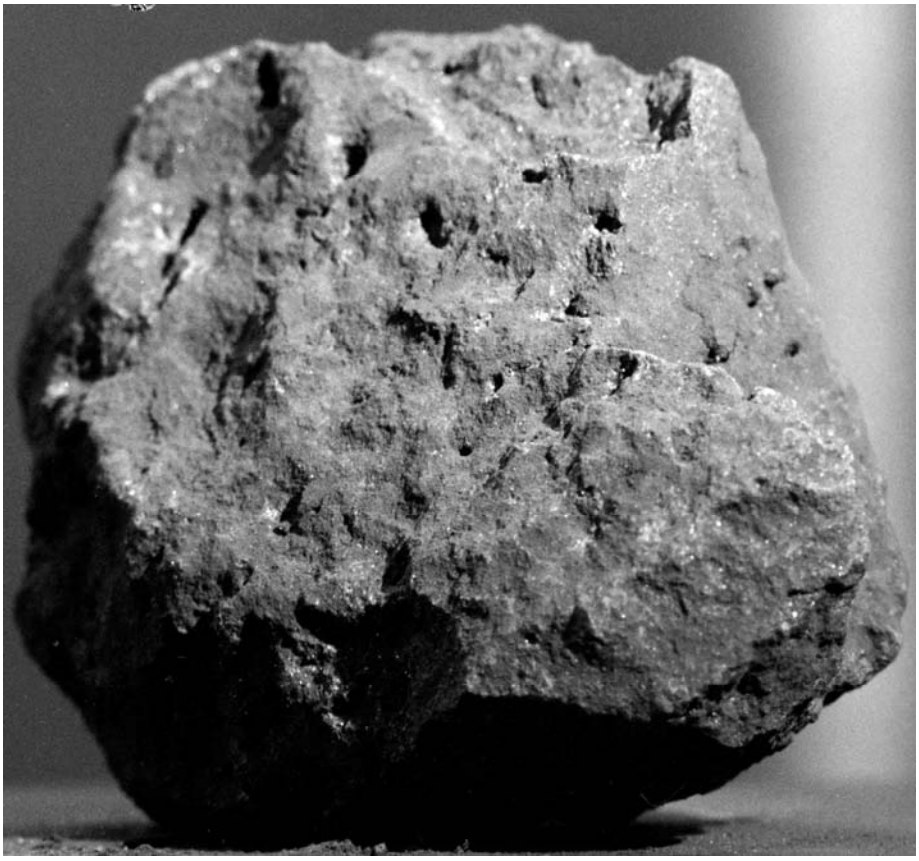
ZAP PITS: Many T_1, W_1, B_1, edge. None on E_1, S_1, N_1.

CAVITIES: 20% of surface covered by vugs. Half of vugs are glass lined. Average size is approximately 1.5 to 2mm; some vesicular cavities make up approximately 10% total surface area (PET).

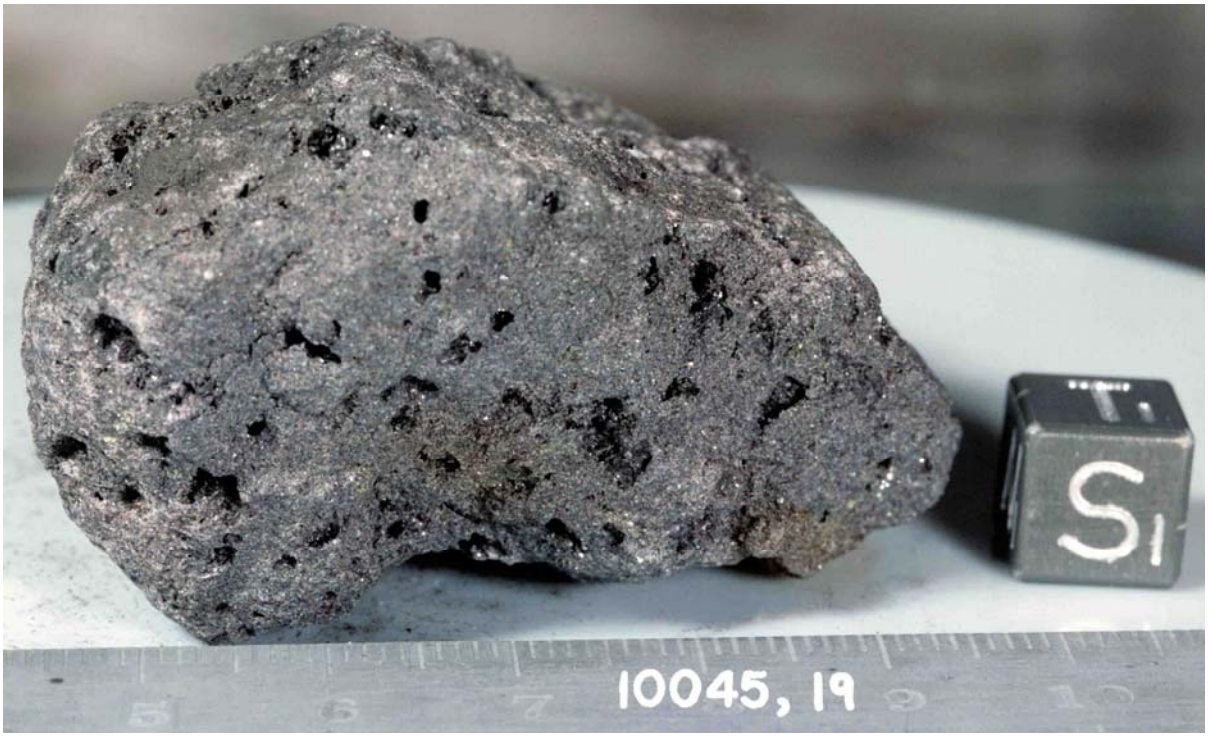
COMPONENT	COLOR	% OF ROCK	SHAPE	SIZE (MM) DOM.	RANGE
Plagioclase[1]	White	30-35	Lathy	0.1	<0.5-.2
Pyroxene	Dark Brown	35	Anhedral	0.3	0.2-0.4
Dark[2]	Black	20-22	Anhedral to amorphous	0.1	0.05-0.3
Olivine	Light Green	8	Euhedral	0.2	0.1-0.4

1) Clear chalky white
2) 10-12% opaque; 10-8% glass

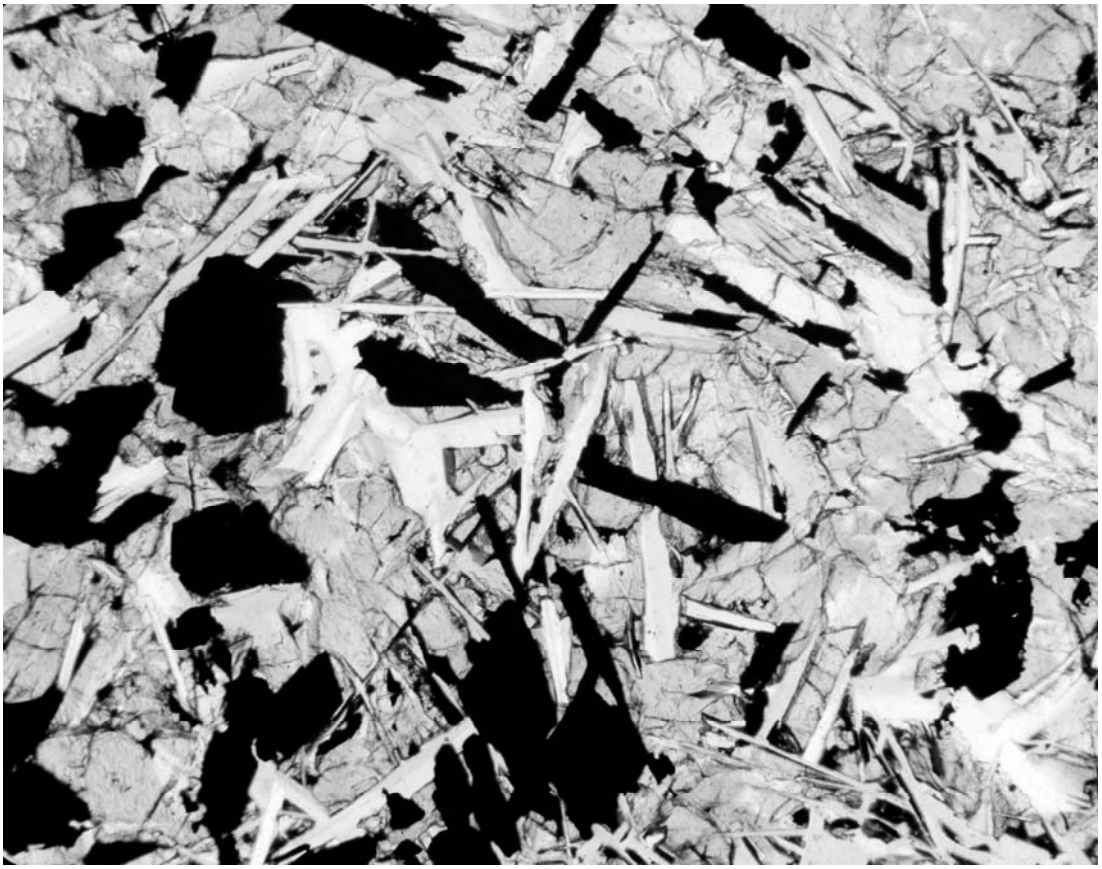
Special Features: High % of vugs plus fine grained texture as opposed to 10044. White powdery material adhering to outer surface, especially on W_1, T_1 surfaces. Sample also seems to have a higher percentage of dark minerals than 10044.



10045,0 Original PET Photo S-69-45601



10045,19 S-75-31797



SECTION: 10045,17 Width of Field: 1.39mm plane light S-76-26263

THIN SECTION DESCRIPTION BY: Walton DATE: 5/28/76

SUMMARY: Medium-grained ophitic basalt composed of clinopyroxene, two generations of plagioclase, two generations of ilmenite with subordinate chromian ulvospinel, troilite-iron nickel, olivine, cristobalite and mesostasis. The pyroxene forms large anhedral to irregular crystals with lath-like to anhedral ilmenite crystals in a continuous network. Interstitial to these phases are subhedral to anhedral crystals of plagioclase and cristobalite, with minor glass-rich mesostasis. Some of the plagioclase crystals are slightly bent and somewhat skeletal.

Phase	% Section	Shape	Size (mm)
Pyrox	52	Anhedral to irregular	0.05-0.4
Plag	22	Tabular to anhedral	0.1-0.3
Opaq	17	Lath-like to anhedral	0.05-0.4
Oliv	3	Subhedral to anhedral	0.05-0.4
Chr.Ulvo	2	Irregular to rounded	0.02-0.08
Cris	2	Anhedral, blocky	0.01-0.1
Meso	2	Irregular	0.01-0.2

COMMENTS:

Pyroxene – The pyroxene occurs as large pale brown anhedral crystal masses. In sharp contact with the pyroxene are subhedral to anhedral crystals of olivine. A few crystals exhibit a well defined cleavage pattern while most show only traces of cleavage with predominant fracture patterns. Crystals of plagioclase, ilmenite, and cristobalite occur within and between the pyroxene crystals.

Plagioclase – Large to small tabular crystals of plagioclase occur as groups and as isolated crystals within the pyroxene network. Larger anhedral crystals of plagioclase also occur as masses within the network. Some bending of the tabular crystals is present. Many of the larger crystals are somewhat skeletal in development. All crystals showed well developed twin planes, with the sharpest twins seen in the smaller crystals.

Olivine – Small to large blocky anhedral crystals of olivine are scattered throughout the section. The crystals are fresh except for small reaction rims of pyroxene. A few crystals clearly show residual crystal faces in sharp contact with the pyroxene.

Opaques – The phases comprising the opaques are ilmenite, troilite, troilite-iron nickel and chromian ulvospinel.

Two generations of ilmenite are present in this section. The crystal occur as small lath-like crystal sections and also as large somewhat skeletal anhedral crystals. The larger crystals are far more abundant.

Many of the large crystals of ilmenite have associated armalcolite and/or exsolved chromite. Many of the armalcolite lamellae are transected by exsolution of chromite which produce micro faults in the lamellae. Associated with the ilmenite are anhedral crystals of chromian ulvospinel. The crystals are grouped into small areas of the section where three or more masses are concentrated. In a few cases large isolated masses are seen in the silicate network. Many of the crystals have small borders of ilmenite and are completely encased by ilmenite.

Isolated masses of troilite and troilite with iron-nickel occur in the silicate network. Several cracks in the silicate minerals are filled by iron-nickel metal.

Cristobalite- Isolated small masses of cristobalite are found between adjacent pyroxene crystals. The masses appear to be randomly distributed throughout the section.

Small amounts of a light brown to colorless mesostasis occurs in the section. Some birefringence is present, but no phases were identified in the masses. Some mixing of the mesostasis with a silica phase may be present as the index of refraction varies within the masses.

TEXTURE: Interlocking anhedral crystals of pyroxene intergrown with two generations of ilmenite, two generations of plagioclase and subordinate other phases. Interstitial to this network are masses of plagioclase, cristobalite, and mesostasis.

Selected References: Agrell et al., (1970); Brown et al., (1970), Keil et al., (1970), Simpson and Bowie (1970).

HISTORY AND PRESENT STATUS OF SAMPLES – 10/12/76

10045 was removed from the Bulk Sample Container (ALSRC #1003) and processed in the Bio-Prep Lab. A 13gm chip was sent to PCTL for analysis. Remaining pristine samples were re-examined in SSPL. A large piece was sent to RCL.

PRISTINE SAMPLES

1	2.02 gm	This piece does not have the same lithological features as other 10045 subsamples. It is believed to be part of 10047 or 10044, but neither could be substantiated. It was assigned the number 10999,103.BP-PCTL-SSPL
3	0.159 gm	Small chips and fines. BP-PCTL-SSPL
18	5.91 gm	Small chips and fines. BP-SSPL
19	100.9 gm	Piece. Pitted on three surfaces. BP-SSPL-RCL-SSPL
74	6.02 gm	Piece. It was labeled 10047,1 but was matched with 10045 PET photos and assigned to 10045. No pitted surfaces. BP-PCTL-SSPL
77	14.68 gm	Piece. Split from ,18. One pitted surface. BP-SSPL

RETURNED SAMPLES:

47	9.74 gm	Piece with no pitted surfaces.

CHEMICAL ANALYSES

Element	Number of Analyses	Mean	Units	Range
SiO_2	4	40.99	PCT	4.28
Al_2O_3	4	10.53	PCT	3.49
TiO_2	3	11.39	PCT	0.66
FeO	6	16.02	PCT	3.67
MnO	4	0.272	PCT	0.020
MgO	3	8.32	PCT	1.39
CaO	3	11.32	PCT	0.023
Na_2O	3	.356	PCT	0.012
K_2O	5	.052	PCT	0.014
P_2O_5	2	.07	PCT	.06
Rb	5	1.03	PPM	1.28
Sr	4	133.92	PPM	36

Element	Number of Analyses	Mean	Units	Range
Ba	6	117.23	PPM	355
Sc	3	81.9	PPM	12.3
V	2	100.5	PPM	5
Cr_2O_3	5	.388	PCT	.131
Co	4	20.57	PPM	8.4
Ni	2	6.99	PPM	5.97
Cu	2	6.10	PPM	.200
Zn	3	6.63	PPM	11.1
Y	2	79	PPM	12
Zr	3	254.33	PPM	156
Nb	2	13	PPM	2
Ag	1	.005	PPM	0
Ta	2	1.9	PPM	0.2
Hf	3	7.73	PPM	2.5
Au	1	.2	PPB	0
La	4	9.1	PPM	9.3
Ce	3	27.17	PPM	9.5
Pr	1	6.0	PPM	0
Nd	2	19.05	PPM	4.1
Sm	3	9.19	PPM	1.43
Eu	3	1.5	PPM	0.09
Gd	1	13.2	PPM	0
Tb	2	2.02	PPM	0.23
Dy	2	14.95	PPM	0.9
Ho	1	2.8	PPM	0
Er	1	9.7	PPM	0
Yb	4	6.99	PPM	8.85
Lu	3	1.34	PPM	0.28
Th	3	1.00	PPM	1.45
U	1	0.17	PPM	0
Ga	2	3.5	PPM	1.0
In	1	0.014	PPM	0
Pb	1	0.482	PPM	0
As	1	0.073	PPM	0
Sb	1	0.007	PPM	0
S	2	0.145	PCT	0.01
Se	1	0.8	PPM	0
Cl	1	6.8	PPM	0
Br	1	0.056	PPM	0

Analysts: Agrell et al., (1970); Compston et al., (1970); Wakita et al., (1970); Goles et al., (1970); Haskin et al., (1970); Murthy et al., (1970); Brown et al., (1970); Silver, (1970).

Age References: Ekerhardt (1971); Silver (1970).