10021

Sample 10021 is a rounded, medium light grey breccia. This sample originally weighed 250gm, and was returned in the Contingency Sample bag.

BINOCULAR DESCRIPTION BY: Twedell DATE: 9-11-75

ROCK TYPE: Breccia SAMPLE: 10021,36 WEIGHT: 66gm

COLOR: Medium light grey DIMENSIONS: 7.5 x 6 x 3.5 cm.

SHAPE: Rounded to sub-rounded

COHERENCE: Intergranular – coherent
Fracturing – absent

FABRIC/TEXTURE: Anisotropic/Breccia

VARIABILITY: Homogeneous

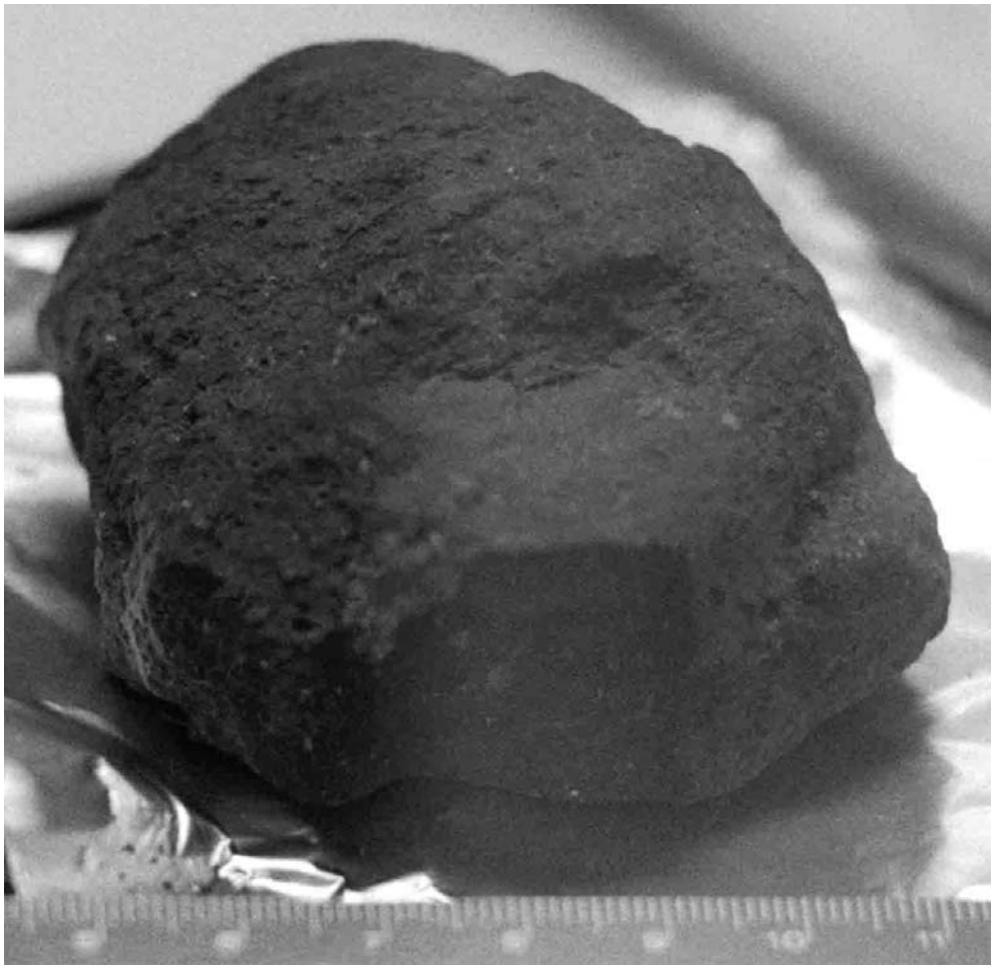
SURFACE: Rounded and relatively smooth on exposed surfaces. Surface is covered lightly with brown glassy spatter and opaque material. Glass cover is <1% on any one surface.

ZAP PITS: Many on E_1, few on T_1 and W_1, none on B_1, S_1, N_1. Pits are glass lined and range up to 1mm in diameter.

CAVITIES: Absent

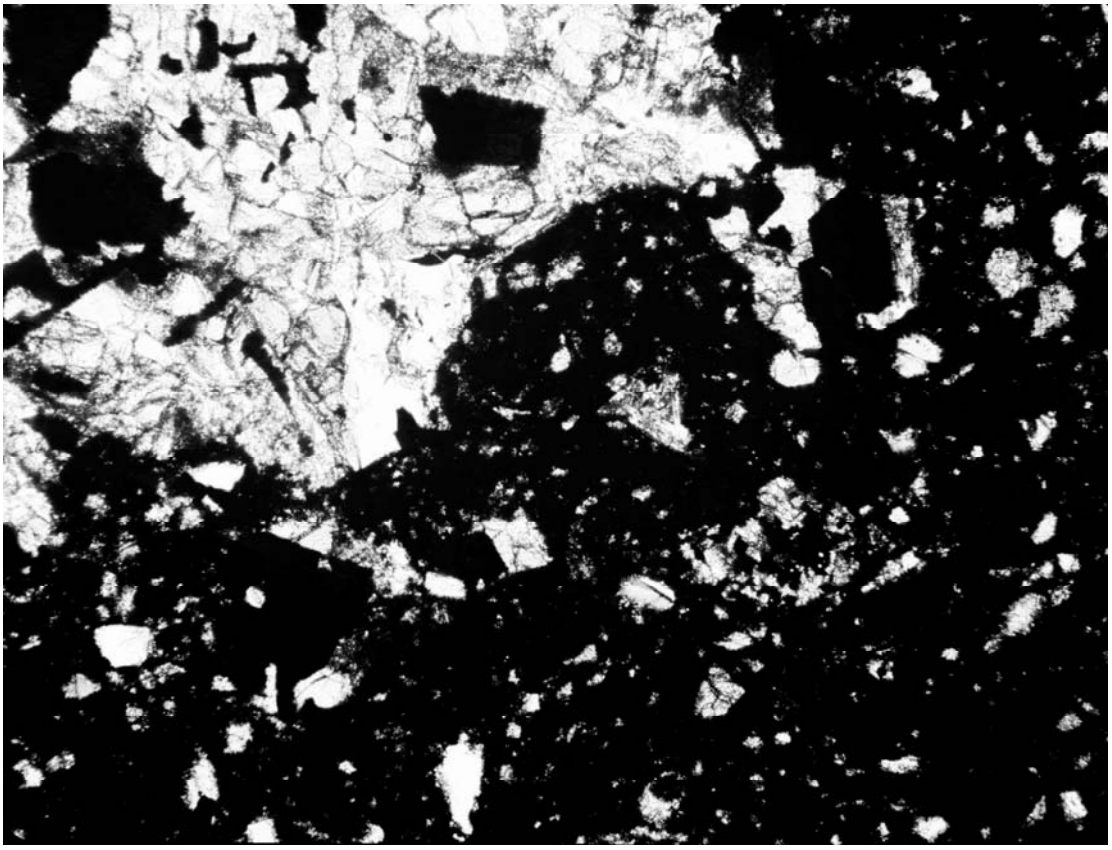
COMPONENT	COLOR	% OF ROCK	SHAPE	SIZE (MM) DOM.	RANGE
Matrix	Med.Dk.Grey	96%	Rounded	------	------
Basalt Clast	Hon.Brn Blk & Wh.	2-3%	Irregular to sub-rounded	2-3mm	<1-6mm
Salt & Pepper Clast	Blk. & White	1-2%	Rounded to sub-rounded	1.0mm	<1-3mm
White Clast	White	1%	Irregular	.5mm	<1mm

SPECIAL FEATURE: Although this rock resembles 10019, and 10023 mineralogically, it has one distinguishing feature. The surface has a light coat of brown glass which the other samples do not have. The glass is only on the exterior surfaces, and does not appear to be on any fresh surface. Glass covers less than 1% of any surface.



10021,0 Original PET Photo (S-69-45226)

10021.36 (S-75-31372)



S-76-26858- SECTION: 10021,29 Width of Field: 1.39mm plane light

THIN SECTION DESCRIPTION BY: Walton DATE: 6/22/76

SUMMARY: Partly devitrified typical breccia with a relatively low amount of glass fragments. All the lithic clasts are small and a majority of the mineral clasts are plagioclase.

Matrix 50% of Rock

Phase	% Section	Shape	Size (mm)	Comments
Dark Brown	100%	------	< 0.001	Glass-rich enclosing Small lithic clasts and abundant mineral clasts; partly devitrified.

Mineral Clasts 19% Rock

Phase	Relative Abundance	Shape	Size (mm)
Pyroxene[1]	Very abundant	Angular to irregular	0.001-0.2
Plagioclase[2]	Moderate	Blocky to irregular	0.001-0.1
Opaques[3]	Few	Blocky to Skeletal	0.001-0.2

1) Mostly very small, ill defined crystals.
2) Good twin planes; some with uneven extinctions.
3) Mostly in clasts; a few shards in matrix.

Lithic Clasts 19% of Rock

Type	Relative Abundance	Shape	Size (mm)
Small	Very abundant	Rounded to irregular	0.001-1.0
Large[4]	Six present	Rounded to irregular	>1.0

4). a. Coarse-grained basalt composed of pyroxene, plagioclase and ilmenite.
b. Glass-rich matrix hosting small crystallites of pyroxene, and plagioclase.
c. Fine-grained basalt composed of pyroxene, plagioclase and ilmenite.
d. Fine-grained basalt composed of pyroxene, plagioclase and ilmenite.
e. Coarse-grained basalt composed of pyroxene, plagioclase and ilmenite.
f. Crystal aggregation of pyroxene and plagioclase with some glass in the matrix.

Glass Clasts 19% of Rock

Type	Relative Abundance	Shape	Size(mm)
Yellow-orange[5]	Very abundant	Angular to Spherical	0.001-0.3
Colorless[6]	Few	Angular	0.001-0.5

1) Mostly angular fragments with a few spherical masses.
2) Partly devitrified; no spherical masses.

Selected references: Fredriksson et al. (1970)

HISTORY AND PRESENT STATUS OF SAMPLES – 10/13/76

10021 was removed from the Contingency Sample Container and processed in PCTL. A large piece was sent to RCL for gamma-ray counting. Pristine samples were re-examined in SSPL.

PRISTINE SAMPLES: (All PCTL-RCL-SSPL)

10	5.61	gm	Chips and fines.
37	1.37	gm	1-2mm fines.
38	2.29	gm	Less than 1mm fines.
39	2.05	gm	Less than 1mm fines.

41	34.52 gm	15-20 small chips. Few are pitted. Sample exposed to air; has some rust.
79	14.81 gm	Chip. One pitted surface.
80	7.87 gm	Chip. One pitted surface.
81	6.41 gm	Chip. Two pitted surface.
82	0.63 gm	Chips and fines from ,79 ,80 ,81.
83	1.73 gm	Chip. All surfaces fresh. One surface has large basaltic clast.

RETURNED SAMPLES: NONE

CHEMICAL ANALYSES

Element	Number of Analyses	Mean	Units	Range
SiO_2	2	43.26	PCT	2.67
Al_2O_3	3	12.83	PCT	0.63
TiO_2	4	7.72	PCT	3.00
FeO	3	16.08	PCT	1.15
MnO	5	.210	PCT	0.027
MgO	1	8.29	PCT	0
CaO	2	12.10	PCT	2.66
Na_2O	3	.466	PCT	0.005
K_2O	3	.196	PCT	0.020
Li	1	13	PPM	0
Rb	2	4.02	PPM	0.03
Be	1	2.0	PPM	0
Sr	2	147.5	PPM	35.0
Ba	4	292.75	PPM	139.0
Sc	4	66.9	PPM	10.2
V	3	64.0	PPM	14.0
Cr_2O_3	4	0.310	PCT	0.077
Co	4	30.4	PPM	6.0

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Element	Number of Analyses	Mean	Units	Range
Ni	1	184	PPM	0
Cu	1	12.0	PPM	0
Zn	1	24.0	PPM	0
Y	1	113.00	PPM	0
Zr	3	324.67	PPM	174.0
Nb	1	28.0	PPM	0
Mo	1	0.2	PPM	0
Ag	1	0.36	PPM	0
Ta	3	1.6	PPM	0.4
Hf	3	12.63	PPM	1.2
Ir	1	.008	PPM	0
Au	2	.003	PPM	.002
La	5	18.64	PPM	4.5
Ce	4	54.62	PPM	12.7
Nd	1	48.9	PPM	0
Sm	5	13.96	PPM	6.2
Eu	5	1.88	PPM	0.2
Tb	3	3.47	PPM	1.1
Dy	4	22.8	PPM	4.3
Ho	2	6.45	PPM	0.9
Er	1	13.0	PPM	0
Yb	4	12.38	PPM	4.6
Lu	4	2.11	PPM	0.26
Th	1	2.5	PPM	0
U	2	0.505	PPM	0.17
Ga	2	5.05	PPM	0.9
In	2	25.01	PPM	49.98
Ge	1	0.41	PPM	0
As	1	.050	PPM	0
O	1	41.8	PCT	0

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Element	Number of Analyses	Mean	Units	Range
Se	1	0.17	PPM	0

Analysts: Ehmann and Morgan (1970); Goles et al., (1970); Turekian & Kharkar, (1970); Kharkar & Turekian, (1971); Annell & Helz, (1970); O'Kelly et al., (1970); Philpotts & Schnetzler, (1970); Wasson & Baedecker, (1970).

Age References: Hintenberger (1971).