

Simulant Name: MGS-1C Clay ISRU
Simulant Type: Water extraction applications
Reference Material: M-WIP Reference Case C
Publication: Cannon et al. 2019. Icarus 317, 470-478



Mineralogy

As mixed.

Component	Wt.%
Smectite	40.0
Anorthosite	16.4
Glass-rich basalt	13.7
Pyroxene	12.2
Olivine	8.2
Mg-sulfate	2.4
Ferrihydrite	2.1
Hydrated silica	1.8
Magnetite	1.1
Anhydrite	1.0
Fe-carbonate	0.8
Hematite	0.3

Safety

See SDS for details. Primary hazard is dust inhalation; wear a respirator in dusty conditions.

Photo credit Matthew Villegas.

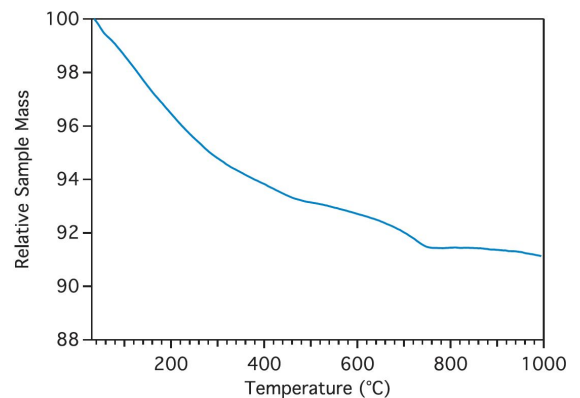
Bulk Chemistry

Measured by XRF.

Oxide	Wt.%
SiO ₂	44.8
Al ₂ O ₃	9.8
CaO	15.3
Fe ₂ O ₃	12
K ₂ O	3.4
MgO	9.9
MnO	0.1
P ₂ O ₅	1.0
TiO ₂	0.4
SO ₃	2.3
Cl	0.5
Cr ₂ O ₃	0.1
NiO	0.1
SrO	0.2
Total	100.0

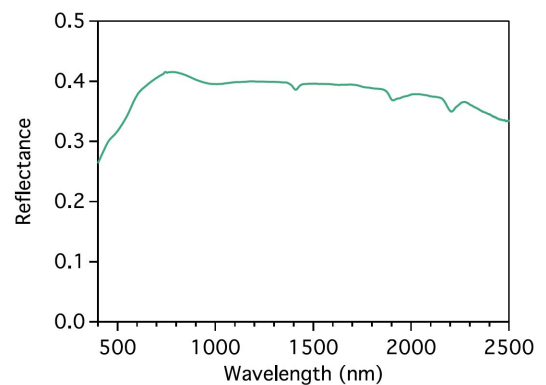
Volatile Release Pattern

As measured on a SAM-analog TG/EGA instrument at JSC. Total evolved water at 200° C is 3.5 wt.%.



Reflectance Spectrum

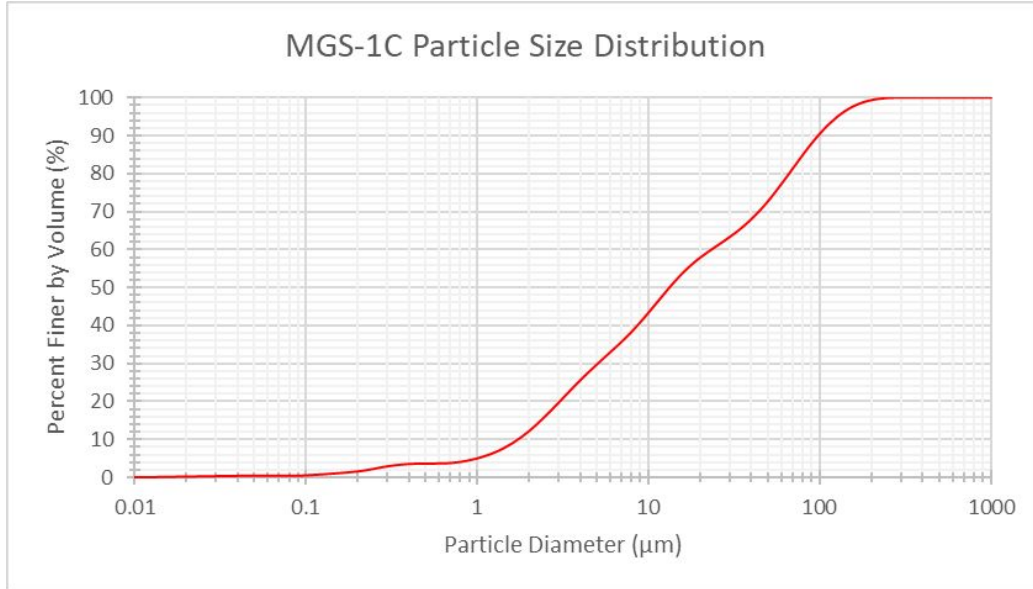
As measured on an ASD Fieldspec at 30° incidence and 0° emergence angles.





Volumetric Particle Size Distribution

From CILAS 1190 laser diffraction particle size analyzer



Sieve Analysis

Following ASTM Standard E11 using RO-TAP RX-30 sieve shaker

Sieve Number	Diameter (µm)	Mass of Soil Retained on Each Sieve (g)	Percent Retained by Mass (%)	Cumulative Retained by Mass(%)	Percent Finer by Mass(%)
18	1000.000	0.0000	0.0%	0.0%	100.0%
25	710.000	59.3333	6.0%	6.0%	94.0%
35	500.000	44.3333	4.4%	10.4%	89.6%
45	355.000	44.6667	4.5%	14.9%	85.1%
70	212.000	65.6667	6.6%	21.5%	78.5%
140	106.000	422.6667	42.4%	63.9%	36.1%
200	75.000	250.6667	25.2%	89.1%	10.9%
270	53.000	83.3333	8.4%	97.4%	2.6%
PAN		25.6667	2.6%	100.0%	0.0%

*Sieve analysis skews particle size larger, as many of the fines cling to the larger pieces of regolith. This is measured by mass percent rather than volume

