

Simulant Name: Highlands Agglutinates, Anorthosite Agglutinates

Simulant Type: Agglutinate

Intended uses: This agglutinate simulant was created by sintering anorthosite and metallic iron. The particles are granular anorthosite welded by anorthosite glass and iron matrix. Suggested for use where glass fidelity and magnetic properties are important, e.g., ISRU studies.

Mineralogy

As mixed.

Component	Wt.%
Anorthosite	99.0%
Metallic iron	1.0%

Safety

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

Bulk Chemistry

Relative abundances. Measured by XRF.

Oxide	Wt.%
SiO₂	50.1
TiO₂	0.1
Al₂O₃	30.1
FeO	1.9
MnO	0.0
MgO	0.2
CaO	14.4
Na₂O	2.5
K₂O	0.2
P₂O₅	0.0
LOI*	0.1
Total**	99.6

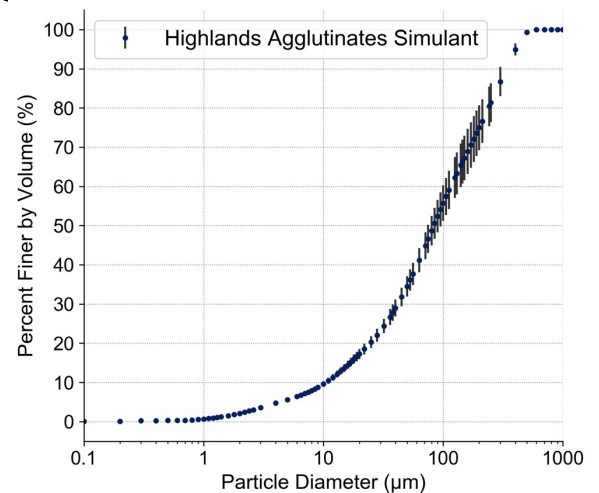
* Loss on ignition

** Excluding volatiles and trace elements



Particle Size Distribution

From CILAS 1190 laser diffraction particle size analyzer



Reflectance Spectrum

Incidence angle 30°, emission angle 0°

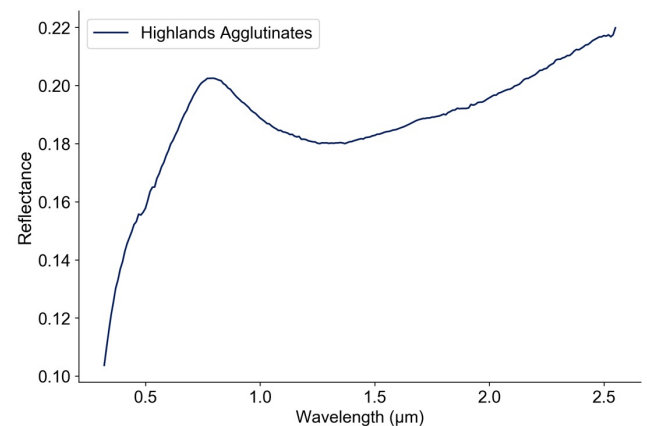
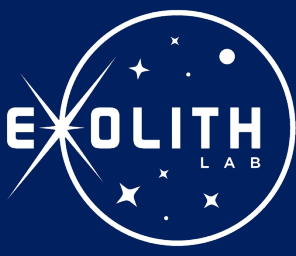


Photo credit Matthew Villegas. XRF data obtained by Hamilton Analytical Lab using fused bead sample preparation. Reflectance spectrum courtesy of Dr. Takahiro Hiroi, NASA RELAB, Brown University.



Trace Elements

Measured by XRF

Element	ppm
Ni	7
Cr	14
V	9
Sc	0.0
Cu	7
Zn	12
Ga	18
Ba	135
Rb	4
Cs	1
Sr	264
Y	0
Zr	21
Hf	1.0
Nb	2.0
Ta	1
Mo	3
La	3
Ce	4
Nd	2
Sm	0.0
Dy	0.8
Yb	0.0
Th	0
U	0
Tl	0
Pb	2
Sn	3
Bi	0
Sb	0

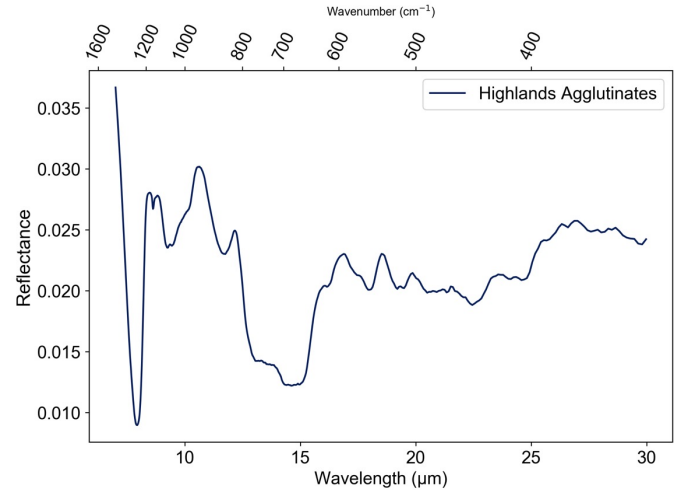
Volatiles

Measured by XRF

Compound	Wt%
F	≥0.04
Cl	≥0
SO ₃	≥0

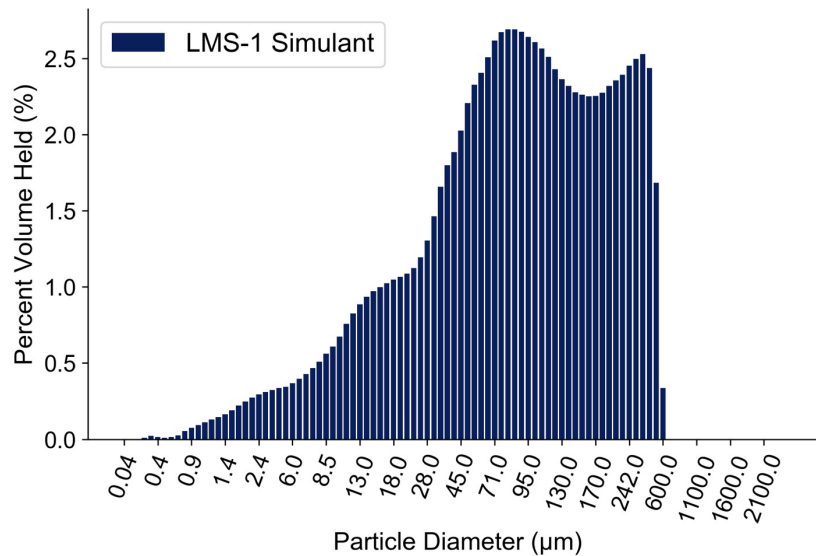
Compound	ppm
Br	≥0
As	≥0

Mid-Infrared FTIR Spectrum



Additional Particle Size Data

From CILAS 1190 laser diffraction particle size analyzer



Particle Diameter	Percentage finer
1 mm	100.0%
250 μm	81.4%
125 μm	62.2%
75 μm	46.6%
45 μm	31.8%
10 μm	9.6%

XRF data obtained by Hamilton Analytical Lab using fused bead sample preparation. FTIR spectrum courtesy of Dr. Takahiro Hiroi, NASA RELAB, Brown University.