

REPORT OF: Chemical Composition Analysis

REPORT TO:

DATE APPROVED: July 5, 2019

IDENTIFICATION: 1 ea. Vial of Red-Brown Powder

**PROCEDURES:**

X-Ray Fluorescence (XRF) was performed on a portion of the sample per ASTM E1621-13 using a Thermo Electron Niton XL3t analyzer, S/N: 87413, verified prior to use.

A portion of the as-received sample from one of the vials was deposited onto an aluminum sample holder and analyzed via x-ray diffraction (XRD). A Rigaku Ultima III detector, S/N: D03659N (calibration due 1/29/20) x-ray diffractometer with a high precision theta-theta goniometer was used to qualitatively identify the crystalline phases. X-ray intensity counts versus diffraction angle data were collected and processed. The x-ray diffraction pattern was analyzed using automated search/match methods based on compounds in the International Centre for Diffraction Data (ICDD) PDF-2 databases. Weight % values for listed compounds were considered semi-quantitative.

**RESULTS:**

***Semi-quantitative Chemical Composition by XRF –***

Element	Brown Powder, Weight %
Zirconium	0.275
Iron	29.193
Chromium	0.330
Vanadium	0.389
Titanium	2.926
Aluminum	9.705
Silicon	57.110

Note: Some metallic elements including Ca, K are not detectable by XRF. Oxygen is also not measurable by XRF.

Lab No. 36981

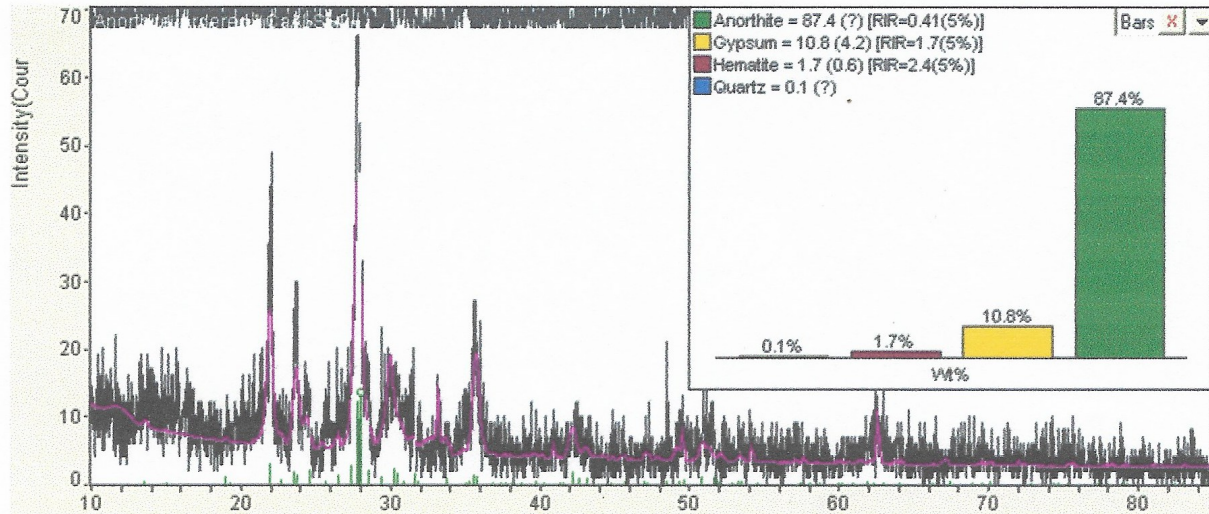
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Chemical Composition Analysis  
The Martian Garden  
July 10, 2019

**X-ray Diffraction (XRD) Analysis –**

The submitted sample was characterized as a good match for several inorganic minerals including: Anorthite:  $\text{CaAl}_2\text{Si}_2\text{O}_8$ , Gypsum:  $\text{Ca}(\text{SO}_4)\cdot 2\text{H}_2\text{O}$ , Hematite:  $\text{Fe}_2\text{O}_3$ , and Quartz:  $\text{SiO}_2$ . Analysis by XRD revealed several signals, mainly in the range of 21-37 and from 42-64 two-theta (degrees).



*These results are based on the tests performed and are subject to change upon the receipt of new or additional information.*

Respectfully submitted,

METALLURGICAL ENGINEERING SERVICES, INC.  
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