

REPORT OF: Chemical Composition Analysis

REPORT TO:

DATE APPROVED: June 25, 2019

IDENTIFICATION: 2 ea. Vials of Basalt Brown Powder (considered as one)

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	Basalt Brown Powder, Weight %
Zirconium	0.106
Iron	32.389
Manganese	0.130
Chromium	0.105
Vanadium	0.117
Titanium	1.121
Aluminum	9.969
Silicon	50.875
Magnesium	5.158

Note: Some metallic elements including Ca, K are not detectable by XRF

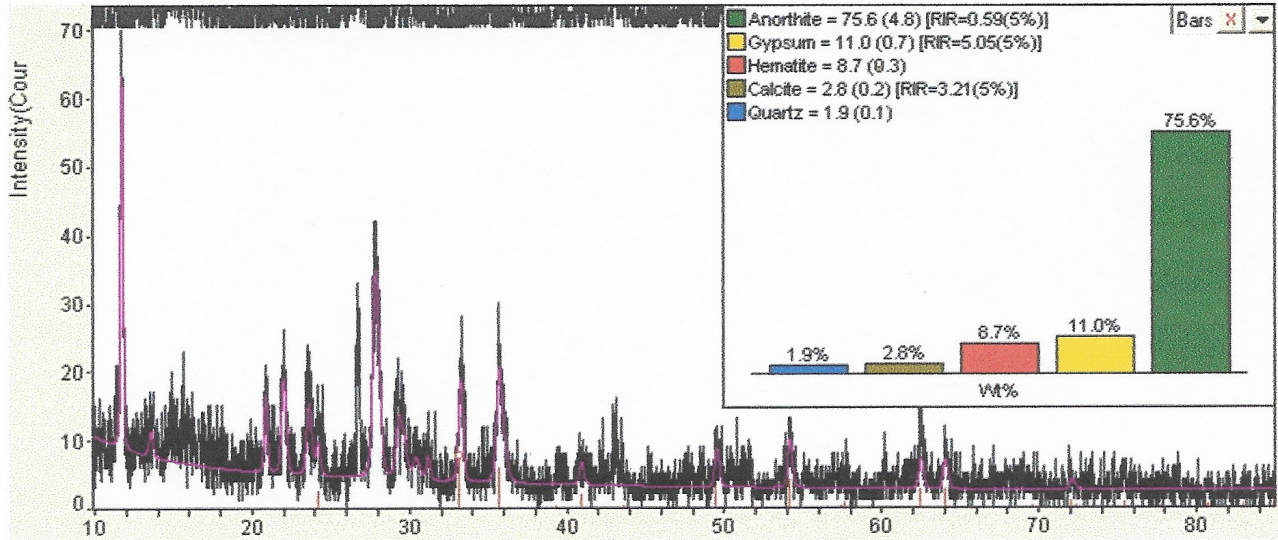
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X-ray Diffraction (XRD) Analysis –

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: Fe_2O_3 , Calcite: CaCO_3 , and Quartz: SiO_2 . Analysis by XRD revealed several signals, mainly in the range of 11-37 and from 39-65 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,

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