

900406

XRD Analysis of Various Stream Sediment and Rock Samples

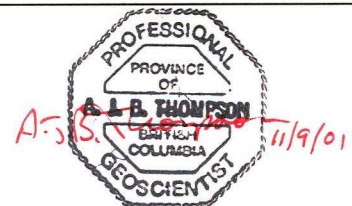
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Summary

Seven samples were received from Danièle Héon for mineral identification. The samples consist of stream sediments or precipitates and two altered rocks. The samples were first analyzed using the PIMA infrared spectrometer. Gypsum was identified in one sample (01 HR 19c) using PIMA, however the spectra of the other samples were inconclusive, suggesting amorphous material or hydrous sulfates. Subsequently, the samples were analyzed using the X-ray diffractometer at the Department of Earth and Ocean Sciences, University of British Columbia, Vancouver. The following table presents the results of the XRD analyses.

Sample	Minerals
01 DH 10c	amorphous, trace goethite
01 DH 11b	amorphous, trace gypsum, possible trace monetite (CaHPO ₄)
01 DH 33a	amorphous, possible trace monetite (CaHPO ₄)
01 DH 74b	amorphous, trace goethite and gypsum
01 DH 76	amorphous
01 HR 19c*	quartz, syngenite (K ₂ Ca(SO ₄) ₂ ·H ₂ O), gypsum
01 HR 19f**	calcite, thaumasite (Ca ₃ Si(CO ₃)(SO ₄)(OH) ₆ ·12H ₂ O) or jouravskite (Ca ₃ Mn(CO ₃)(SO ₄)(OH) ₆ ·12H ₂ O), gypsum yellow coating forms after contact with HCl (secondary mineral?), sample fizzes

*the material sampled was the pink host rock with green coating

**the material sampled was from the white nodules

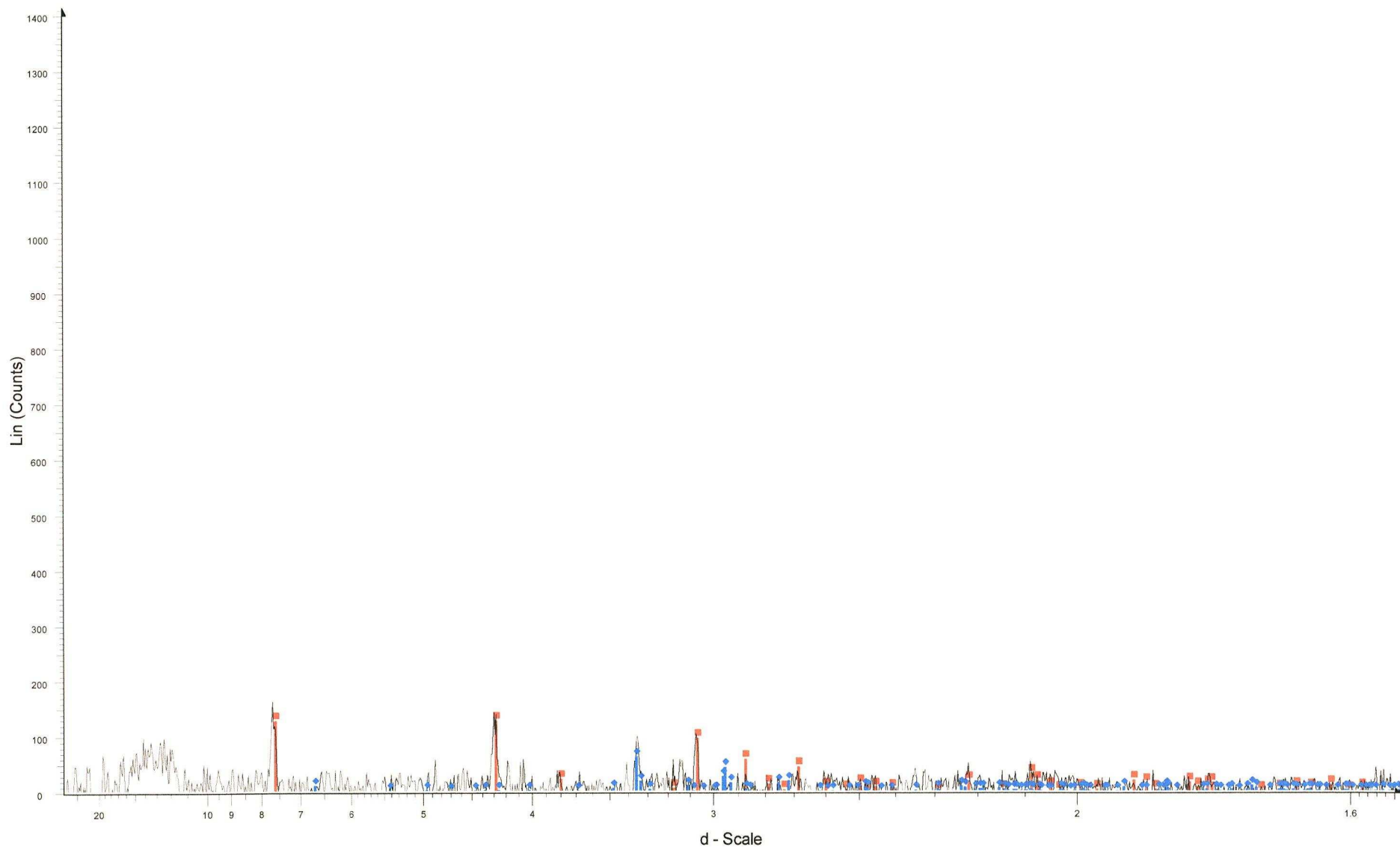
The minerals identified suggest that the samples are dominated by secondary minerals and amorphous precipitates that formed in the stream as a function of fluid chemistry. No indication of primary mineralogy is present. Metals may be present within these secondary phases, however, they are not present in crystalline minerals or in large enough amounts to be identified by XRD. The metals present may be easily remobilized into the stream.

C:\DIFFDAT1\XRD User\DH10c.RAW



C:\DIFFDAT1\XRD User\DH10c.RAW - File: DH10c.RAW - Type: 2Th/Th locked - Start: 3.000 ° - End: 60.000 ° - Step: 0.040 ° - Step time: 2. s - Temp.: 25 °C (Room) - Time Started: 2 s - 2-Theta: 3.000 ° -
Operations: Background 1.000,1.000 | Import
03-0249 (D) - Goethite, syn - FeO(OH) - Y: 29.55 % - d x by: 1. - WL: 1.54056 - Orthorhombic -

C:\DIFFDAT1\XRD User\DH11b.RAW



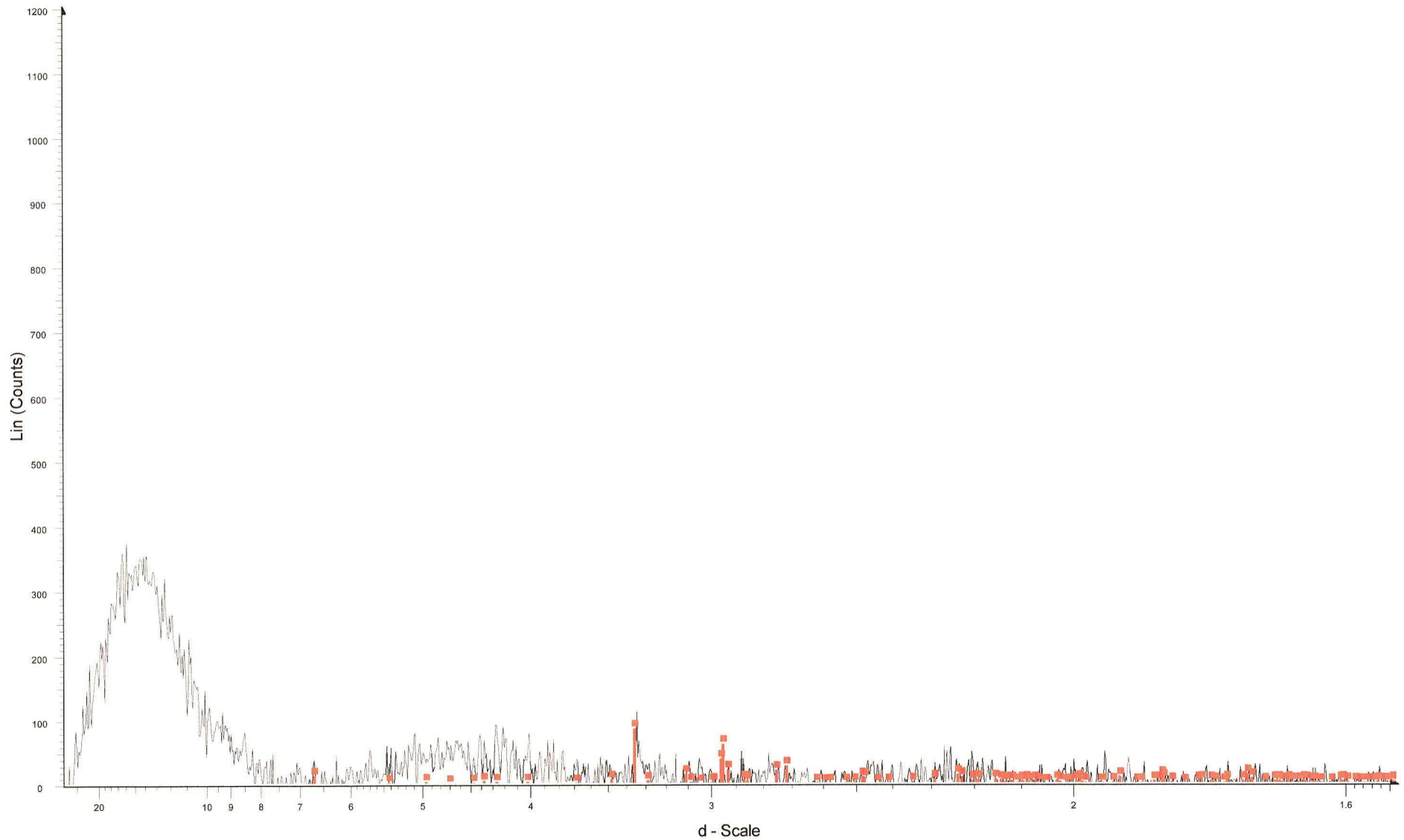
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Operations: Background 1.000,1.000 | Import

33-0311 (*) - Gypsum, syn - CaSO₄·2H₂O - Y: 78.18 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/Ic PDF 1.8 - S-Q 43.3 %

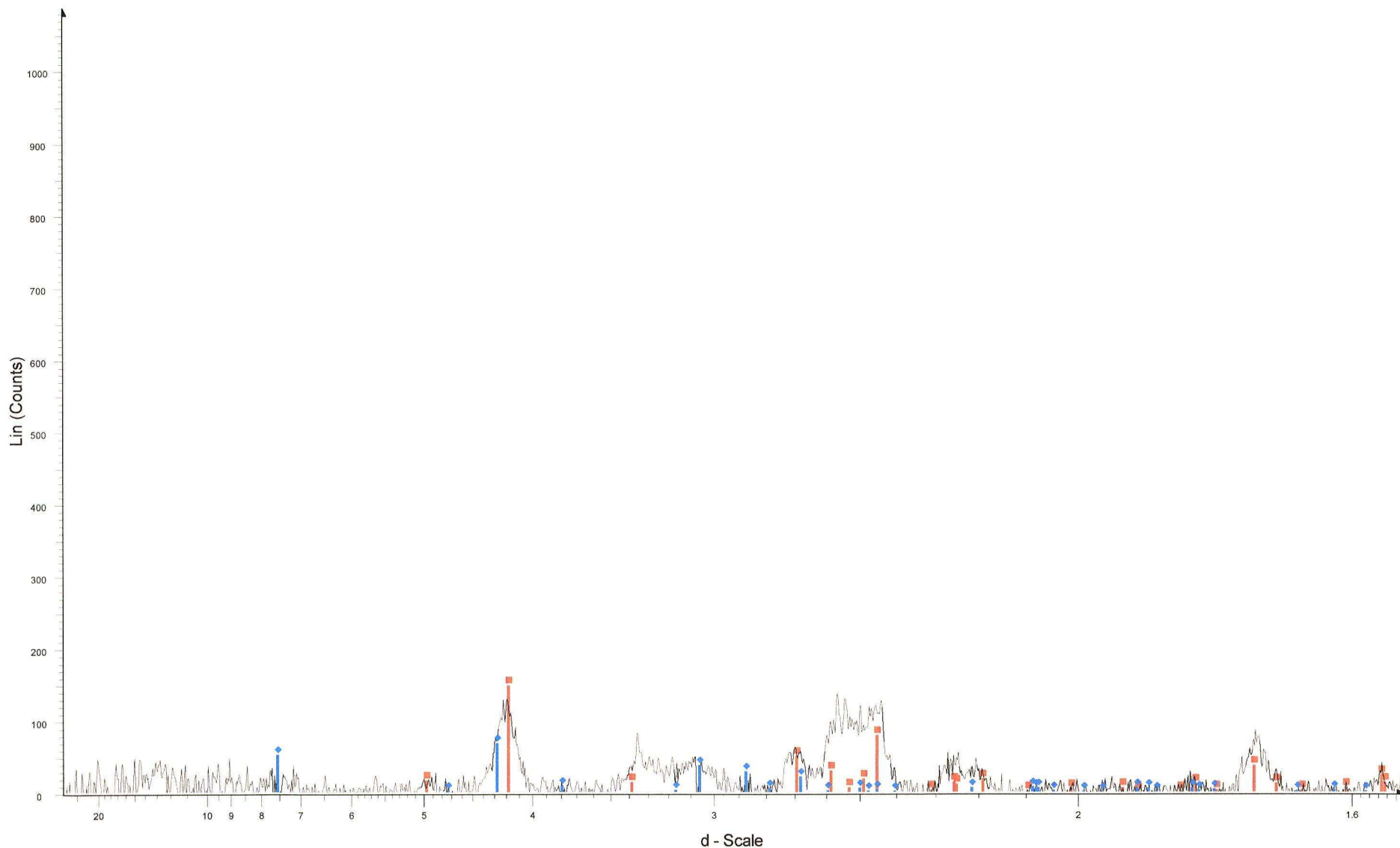
71-1759 (C) - Monetite - CaHPO₄ - Y: 38.04 % - d x by: 1. - WL: 1.54056 - Triclinic - I/Ic PDF 0.7 - S-Q 56.7 %

C:\DIFFDAT1\XRD User\DH33a.RAW



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Operations: Background 1,000,1,000 | Import
71-1760 (C) - Monetite - CaHPO4 - Y: 22.92 % - d x by: 1. - WL: 1.54056 - Triclinic - I/lc PDF 0.7 -

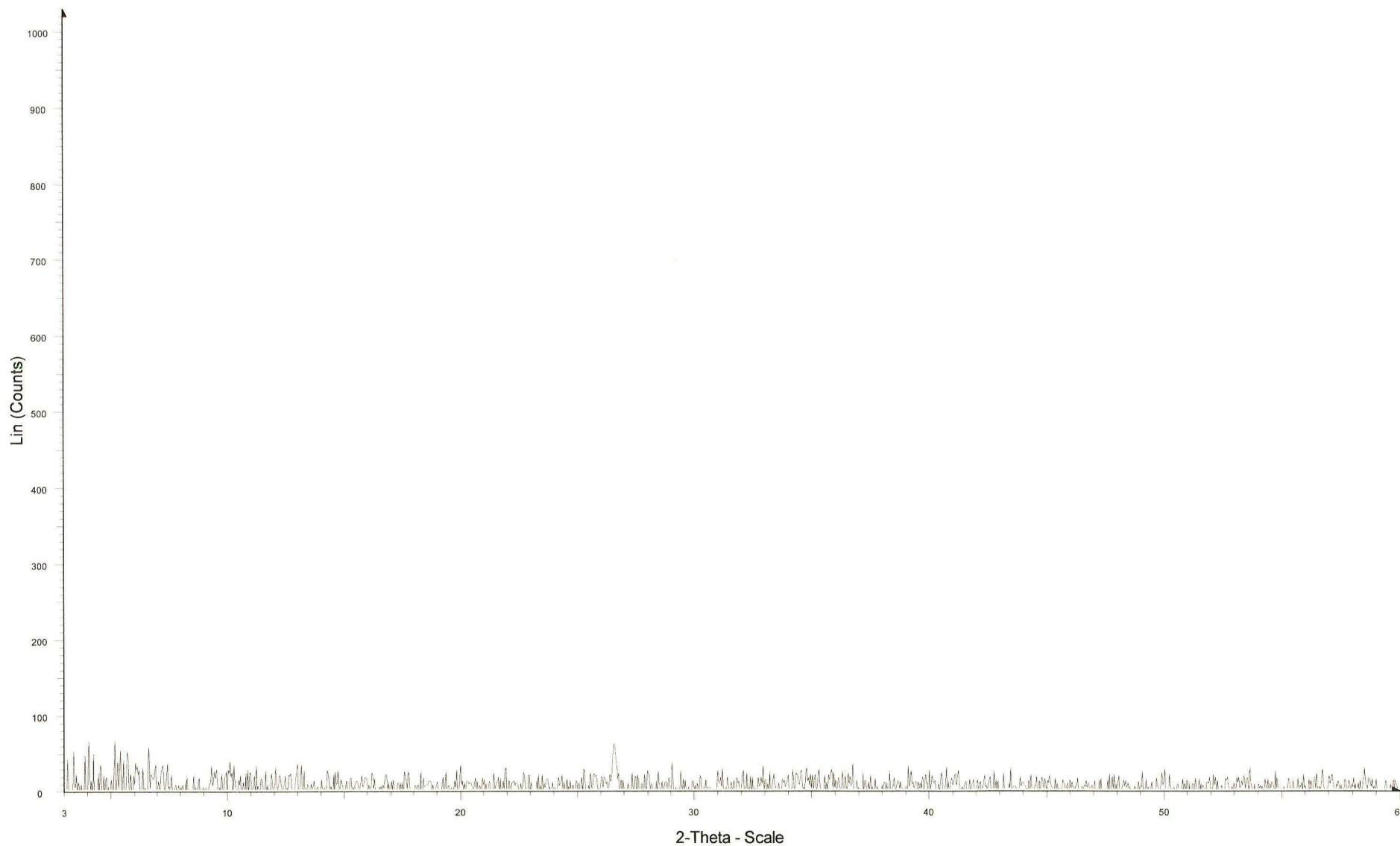
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Operations: Background 1.000,1.000 | Import

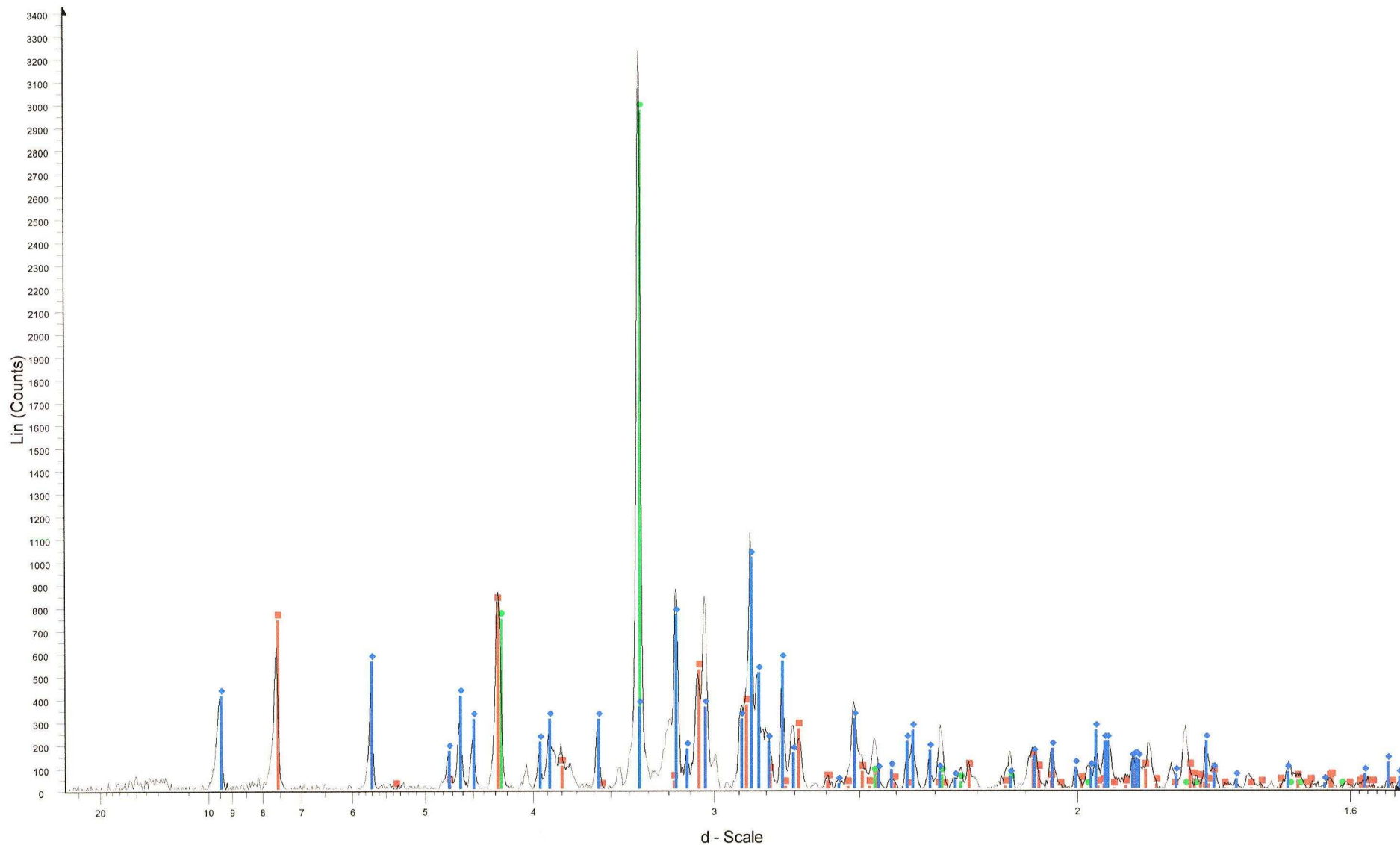
- 81-0462 (C) - Goethite, syn - FeO(OH) - Y: 108.37 % - d x by: 1. - WL: 1.54056 - Orthorhombic - I/Ic PDF 3. - S-Q 55.6 %
- 36-0432 (D) - Gypsum - CaSO4·2H2O - Y: 49.67 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/Ic PDF 1.7 - S-Q 44.4 %

C:\DIFFDAT1\XRD User\DH76.RAW



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C:\DIFFDAT1\XRD User\HR19c.RAW



C:\DIFFDAT1\XRD User\HR19c.RAW - File: HR19c.RAW - Type: 2Th/Th locked - Start: 3.000 ° - End: 60.000 ° - Step: 0.040 ° - Step time: 2. s - Temp.: 25 °C (Room) - Time Started: 2 s - 2-Theta: 3.000 ° -

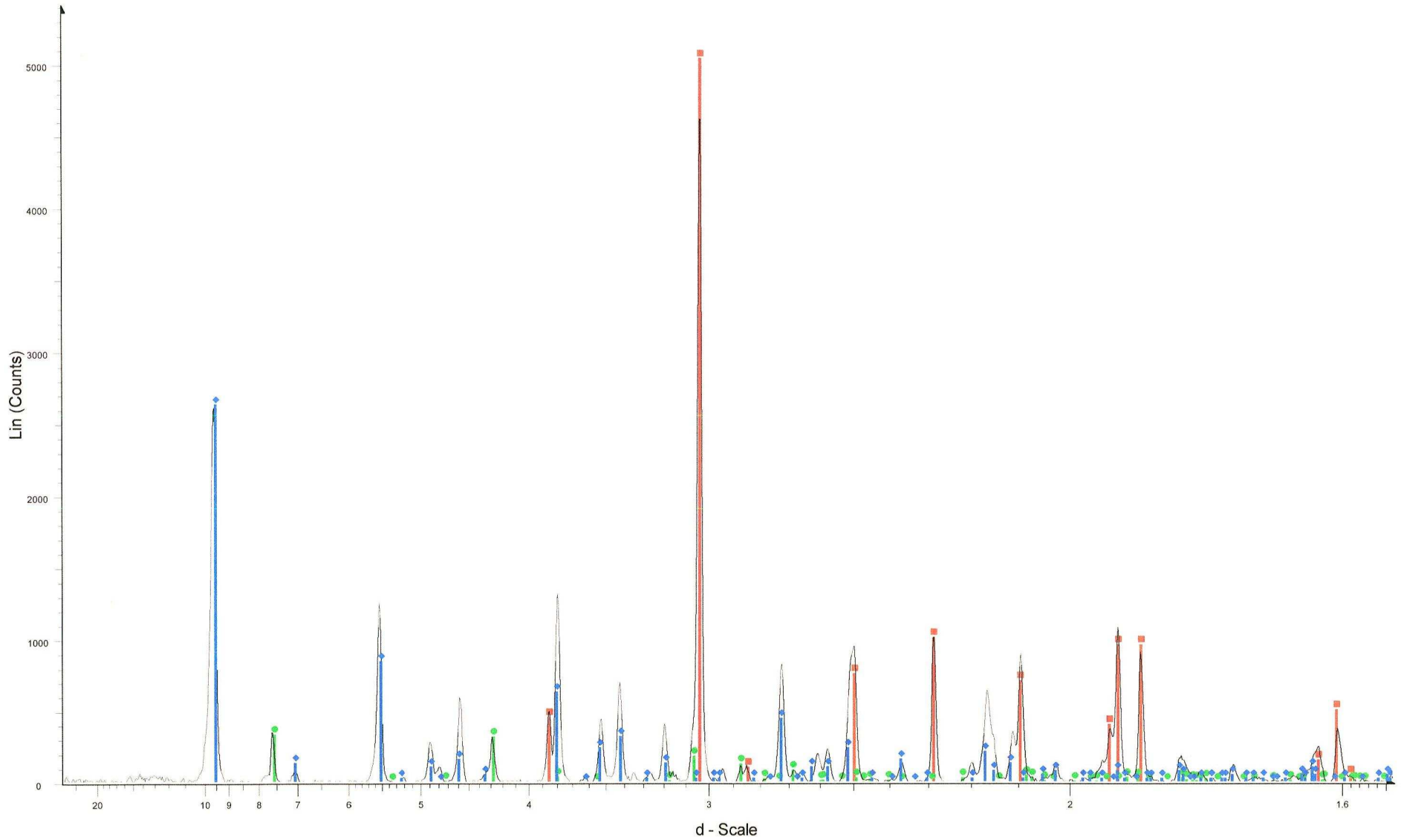
Operations: Background 1.000,1.000 | Import

70-0984 (C) - Gypsum - $\text{Ca}(\text{SO}_4)(\text{H}_2\text{O})_2$ - Y: 25.09 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/Ic PDF 1.7 - S-Q 2.1 %

85-0335 (C) - Quartz low - SiO_2 - Y: 92.00 % - d x by: 1. - WL: 1.54056 - Hexagonal - I/Ic PDF 0.1 - S-Q 93.8 %

28-0739 (*) - Syngenite, syn - $\text{K}_2\text{Ca}(\text{SO}_4)_2 \cdot \text{H}_2\text{O}$ - Y: 31.36 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/Ic PDF 1.1 - S-Q 4.1 %

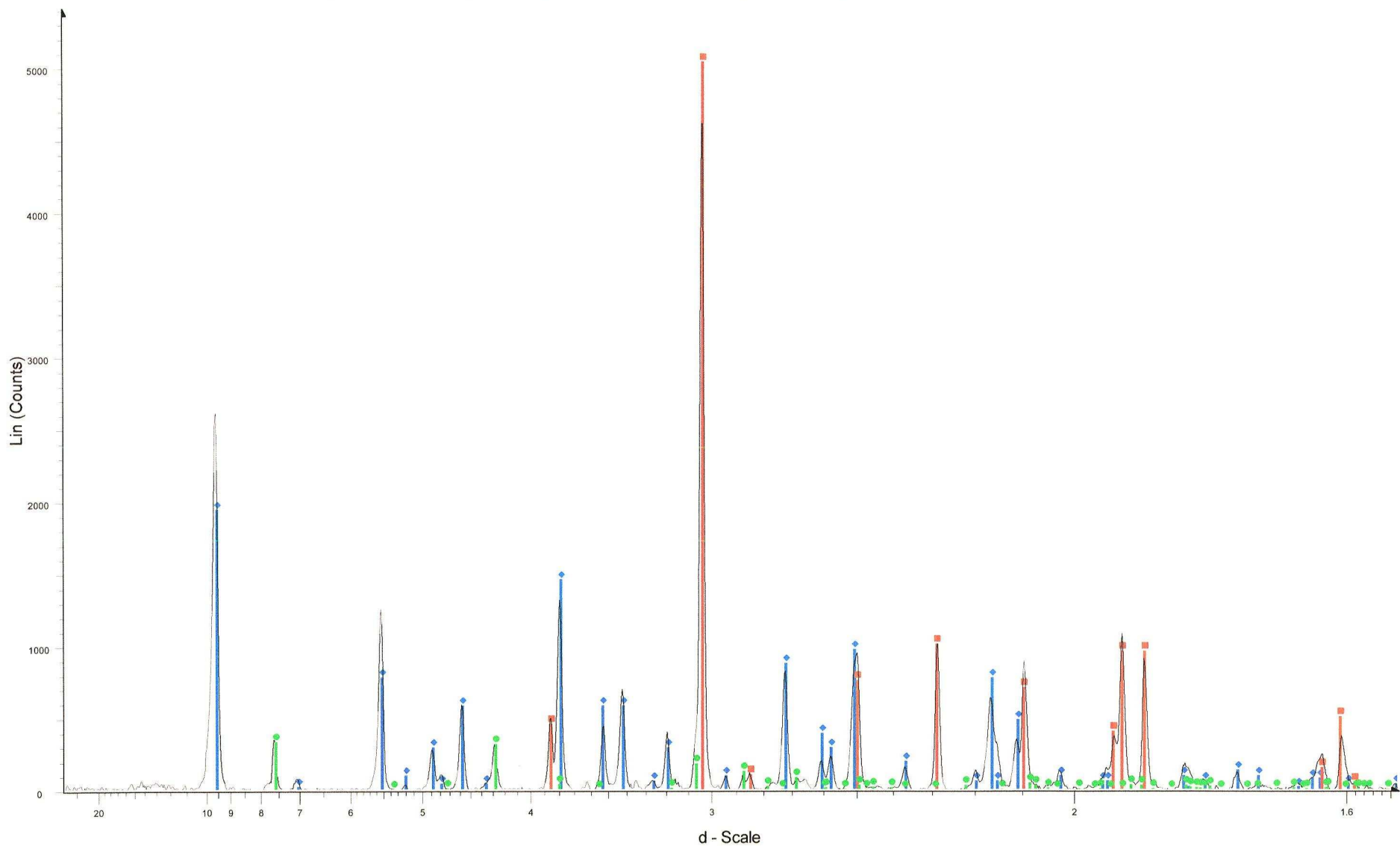
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C:\DIFFDAT1\XRD User\HR19f.RAW - File: HR19f.RAW - Type: 2Th/Th locked - Start: 3.000 ° - End: 60.000 ° - Step: 0.040 ° - Step time: 2. s - Temp.: 25 °C (Room) - Time Started: 2 s - 2-Theta: 3.000 ° - Operations: Background 1.000,1.000 | Import

- 72-1937 (C) - Calcite - CaCO_3 - Y: 109.17 % - d x by: 1. - WL: 1.54056 - Rhombohedral - I/Ic PDF 3.3 - S-Q 58.8 %
- 74-2365 (C) - Jouravskite - $\text{Ca}_3\text{MnCO}_3\text{SO}_4(\text{OH})_6(\text{H}_2\text{O})_{12}$ - Y: 56.96 % - d x by: 1. - WL: 1.54056 - Hexagonal - I/Ic PDF 2.9 - S-Q 34.6 %
- 70-0982 (C) - Gypsum - $\text{Ca}(\text{SO}_4)(\text{H}_2\text{O})_2$ - Y: 7.12 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/Ic PDF 1.9 - S-Q 6.6 %

C:\DIFFDAT1\XRD User\HR19f.RAW



C:\DIFFDAT1\XRD User\HR19f.RAW - File: HR19f.RAW - Type: 2Th/Th locked - Start: 3.000 ° - End: 60.000 ° - Step: 0.040 ° - Step time: 2. s - Temp.: 25 °C (Room) - Time Started: 2 s - 2-Theta: 3.000 ° -

Operations: Background 1.000,1.000 | Import

◆ 27-0070 (D) - Thaumasite, syn - $\text{Ca}_3\text{Si}(\text{CO}_3)(\text{SO}_4)(\text{OH})_6 \cdot 12\text{H}_2\text{O}$ - Y: 42.05 % - d x by: 1. - WL: 1.54056 - Hexagonal -

■ 72-1937 (C) - Calcite - CaCO_3 - Y: 109.17 % - d x by: 1. - WL: 1.54056 - Rhombohedral - I/lc PDF 3.3 -

● 70-0982 (C) - Gypsum - $\text{Ca}(\text{SO}_4)(\text{H}_2\text{O})_2$ - Y: 7.12 % - d x by: 1. - WL: 1.54056 - Monoclinic - I/lc PDF 1.9 -