

Example Clay X-ray Diffraction Report

Introduction

- Brief introduction

Sample Preparation

- Standard method is grinding the sample to a powder using a ring mill or hand grinding using mortar and pestle. Other grinding techniques may be employed such as micronization to obtain a fine consistent particle size (approx. < 15 micron).
- For samples containing clay minerals, often clay separation and clay mounts are required for identification. In this process the -4 micron fraction of sample is separated from the bulk material and is then used to create oriented clay mounts required for identification and confirmation of clay minerals, i.e. smectites, chlorites, vermiculites, etc in the sample.
- Clay mounts may also be subject to glycolation, Ca-Na-K saturation, organic complexes and heat treatments to identify species of clay.

Analytical Method

- Conditions used to produce the diffraction pattern are reported. Our standard conditions are:

The XRD patterns were produced using a Bruker-AXS D4 XRD with copper radiation at 40 kV and 30 mA, over a range of 1.3 to 70°2θ, with a 0.02 degree step and a 2 second per step count time. A graphite monochromator is used in the diffracted beam.

- Depending on application or client needs we can adjust scan range and other parameters to ensure you get the data quality required for your task.

Identification

- Identification of crystalline materials is conducted using the Bruker Diffrac^{plus} Search/Match software and the ICDD PDF-2 database.

Quantification

- Calculation of each minerals concentration (wt%) is conducted using SIROQUANTTM Quantitative Minerals Analysis Software. SIROQUANTTM is a Rietveld based least squares regression software for accurate mineral and phase quantification.

Results

- Results are generally tabulated with diffraction patterns attached to the end of the report. Analyst comments on samples generally feature below each table. Custom reporting styles can be arranged.

SPL Ref: LS0000-01
Sample ID: Sample 1

Phase	Formula	Weight%
Quartz	SiO ₂	58
Illite	KAl ₃ Si ₃ O ₁₀ (OH) ₂	15
Plagioclase feldspar (albite)	Na(AlSi ₃ O ₈)	14
Kaolin	Al ₂ Si ₂ O ₅ (OH) ₄	11
Interlayered illite-vermiculite	-	2
Vermiculite	Mg ₃ Si ₄ O ₁₀ (OH) ₂	<1

SPL Ref: LS0000-02
Sample ID: Sample 2

Phase	Formula	Weight%
Quartz	SiO ₂	69
Kaolin	Al ₂ Si ₂ O ₅ (OH) ₄	21
Hematite	Fe ₂ O ₃	7
Vermiculite	Mg ₃ Si ₄ O ₁₀ (OH) ₂	2
Gibbsite	Al(OH) ₃	1

Discussion

- Analyst comments and discussion regarding nature of samples and techniques used.

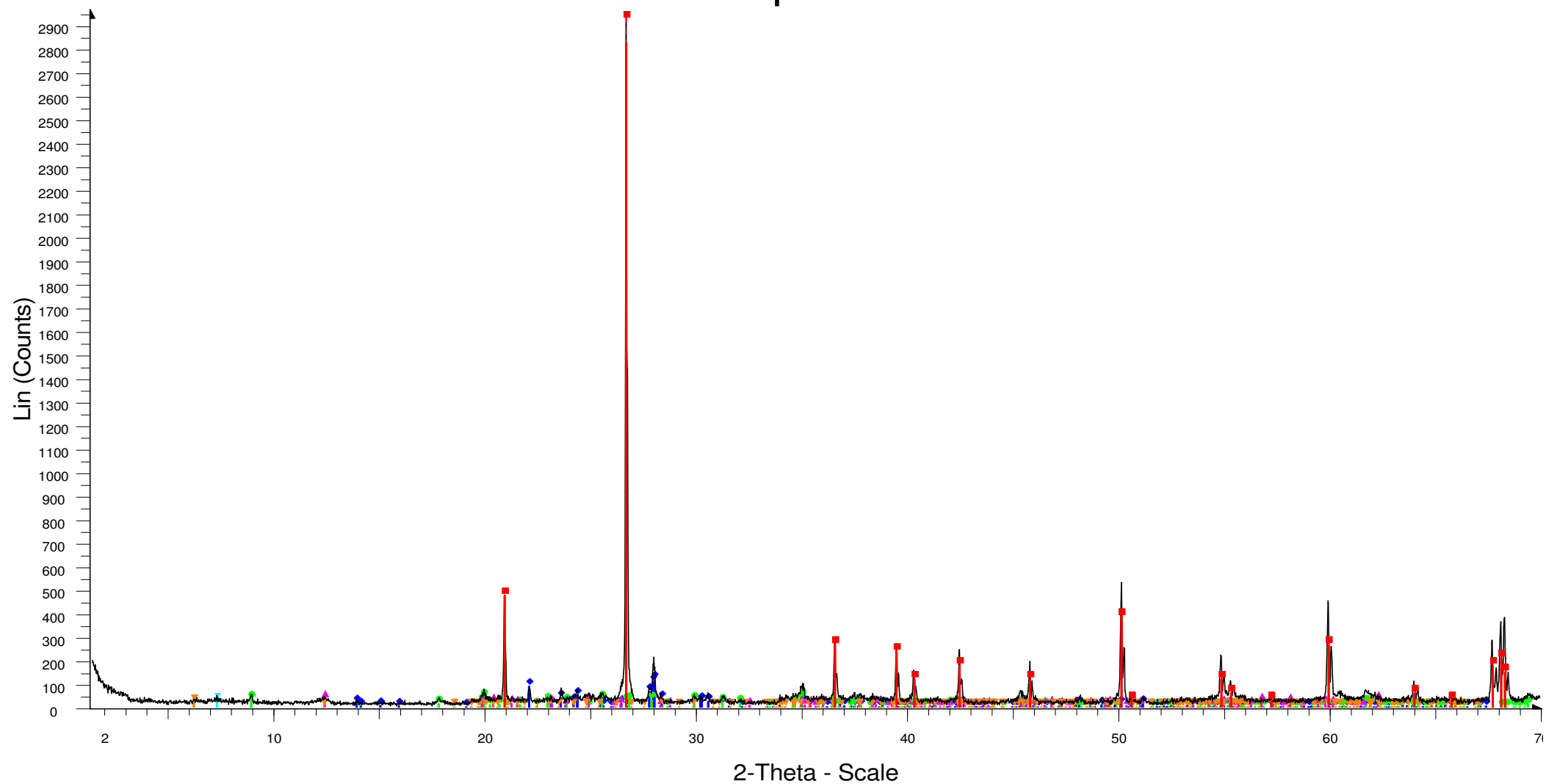
Sietronics Pty Limited

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E: lab@sietronics.com.au

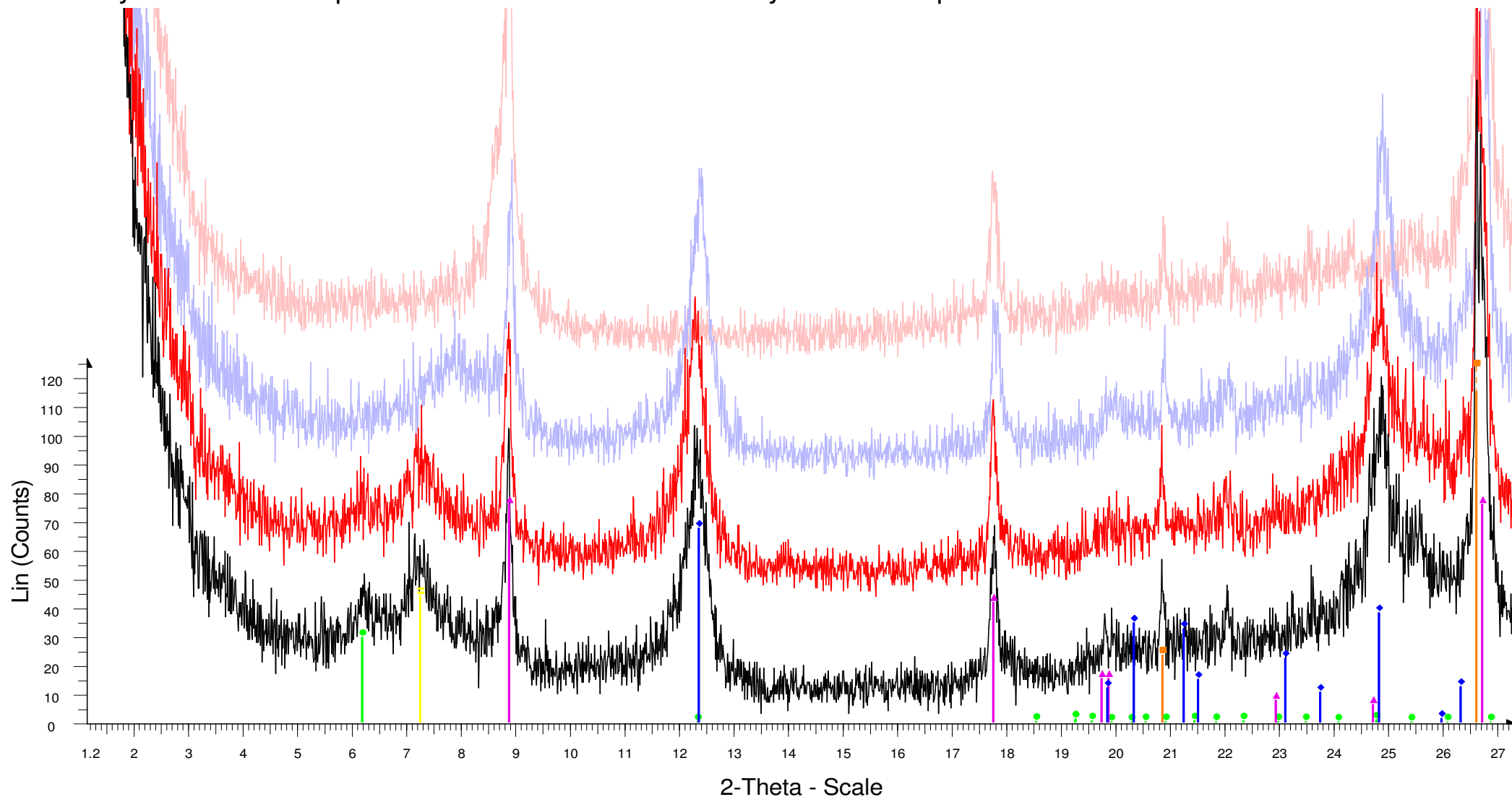
W: www.sietronicslabservices.com.au

Sample 1



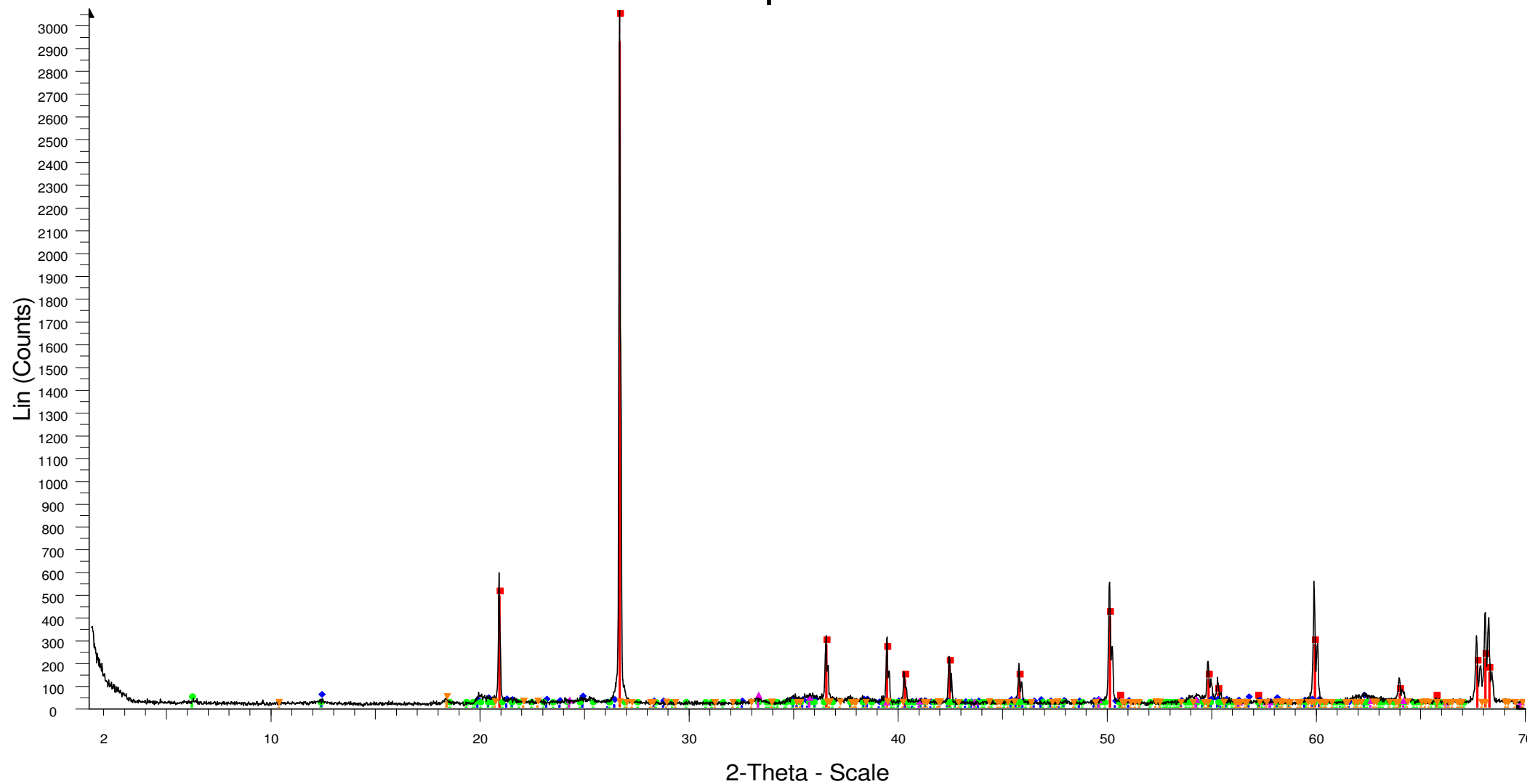
- Sample 1 - File: LS0000-01.raw
 Operations: X Offset 0.012 | Import
 Quartz, syn - SiO₂ - 00-046-1045 (*)
 Albite low - Na_{0.986}(Al_{1.005}Si_{2.995}O₈) - 01-083-1466 (C)
 Illite - KAl₃Si₃O₁₀(OH)₂ - 01-084-1302 (C)
 Kaolin - Al₂Si₂O₅(OH)₄ - 00-014-0164 (I)
 Vermiculite 2M - Mg₃Si₄O₁₀(OH)₂ - 01-074-1732 (C)
 Interstratified illite-vermiculite -

Clay Mounts of Sample 1. Black= Untreated. Red = Glycolated. Purple= Heated 350C. Pink= Heated 550C.



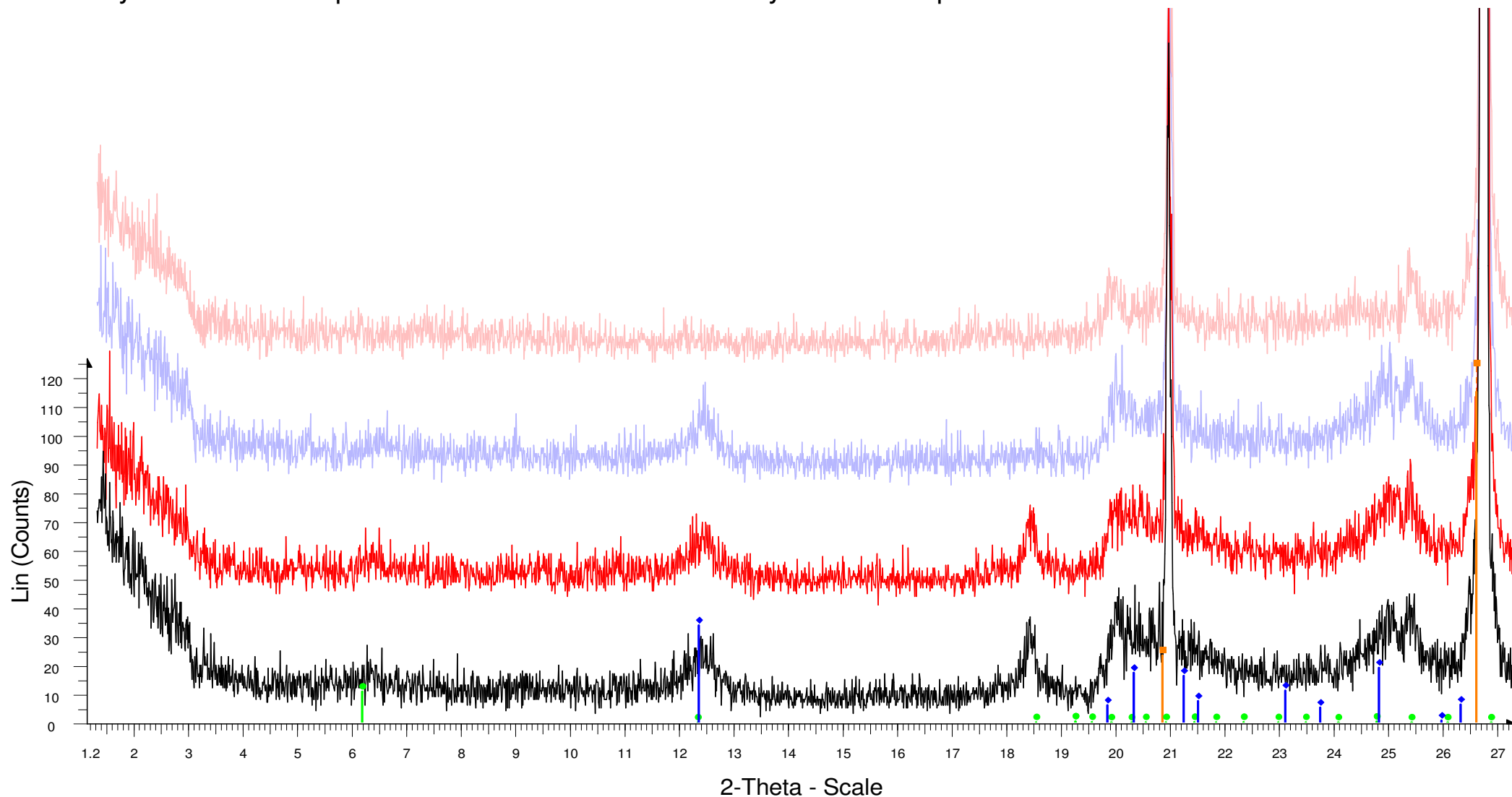
- | | |
|---|--|
| <ul style="list-style-type: none"> ▣ Sample 1- Untreated Clay Mount - File: LS0000-UT-01.raw
Operations: Import ▣ Y + 23.0 mm - Sample 1- Glycolated Clay Mount - File: LS0000-GT-01.raw
Operations: Import ▣ Y + 46.0 mm - Sample 1- Heat Treated 350 Clay Mount - File: LS0000-HT350-01.raw
Operations: Import ▣ Y + 69.0 mm - Sample 1- Heat Treated 550 Clay Mount - File: LS0000-HT550-01.raw
Operations: Import | <ul style="list-style-type: none"> ▣ Quartz, syn - SiO2 - 00-046-1045 (*) ▣ Kaolin - Al2(Si2O5)(OH)4 - 01-089-6538 (C) ▣ Vermiculite 2M - (Mg2.36Fe.48Al.16)(Al1.28Si2.72)O10(OH)2(H2O)4.32Mg0.32 - 01-077-0022 (C) ▣ Illite - (K,Na)(Al,Mg,Fe)2(Si3.1Al0.9)O10(OH)2 - 00-007-0042 (I) ▣ Interstratified illite-vermiculite - |
|---|--|

Sample 2



- Sample 2 - File: LS0000-02.raw
 Operations: X Offset 0.021 | Import
- Quartz, syn - SiO₂ - 00-046-1045 (*)
- ◆ Kaolin - Al₂Si₂O₅(OH)₄ - 00-014-0164 (I)
- Vermiculite 2M - Mg₃Si₄O₁₀(OH)₂ - 01-074-1732 (C)
- ▲ Hematite, syn - Fe₂O₃ - 01-089-8104 (C)
- ▼ Gibbsite - Al(OH)₃ - 01-076-1782 (C)

Clay Mounts of Sample 2. Black= Untreated. Red = Glycolated. Purple= Heated 350C. Pink= Heated 550C.



- ▣ Sample 2- Untreated Clay Mount - File: LS0000-UT-01.raw
 Operations: Import
- ▣ Y + 23.0 mm - Sample 2- Glycolated Clay Mount - File: LS0000-GT-02.raw
 Operations: Import
- ▣ Y + 46.0 mm - Sample 2- Heat Treated 350 Clay Mount - File: LS0000-HT350-02.raw
 Operations: Import
- ▣ Y + 69.0 mm - Sample 2- Heat Treated 550 Clay Mount - File: LS0000-HT550-02.raw
 Operations: Import
- ▣ Quartz, syn - SiO2 - 00-046-1045 (*)
- ◆ Kaolin - Al2(Si2O5)(OH)4 - 01-089-6538 (C)
- Vermiculite 2M - (Mg2.36Fe.48Al.16)(Al1.28Si2.72)O10(OH)2(H2O)4.32Mg0.32 - 01-077-0022 (C)