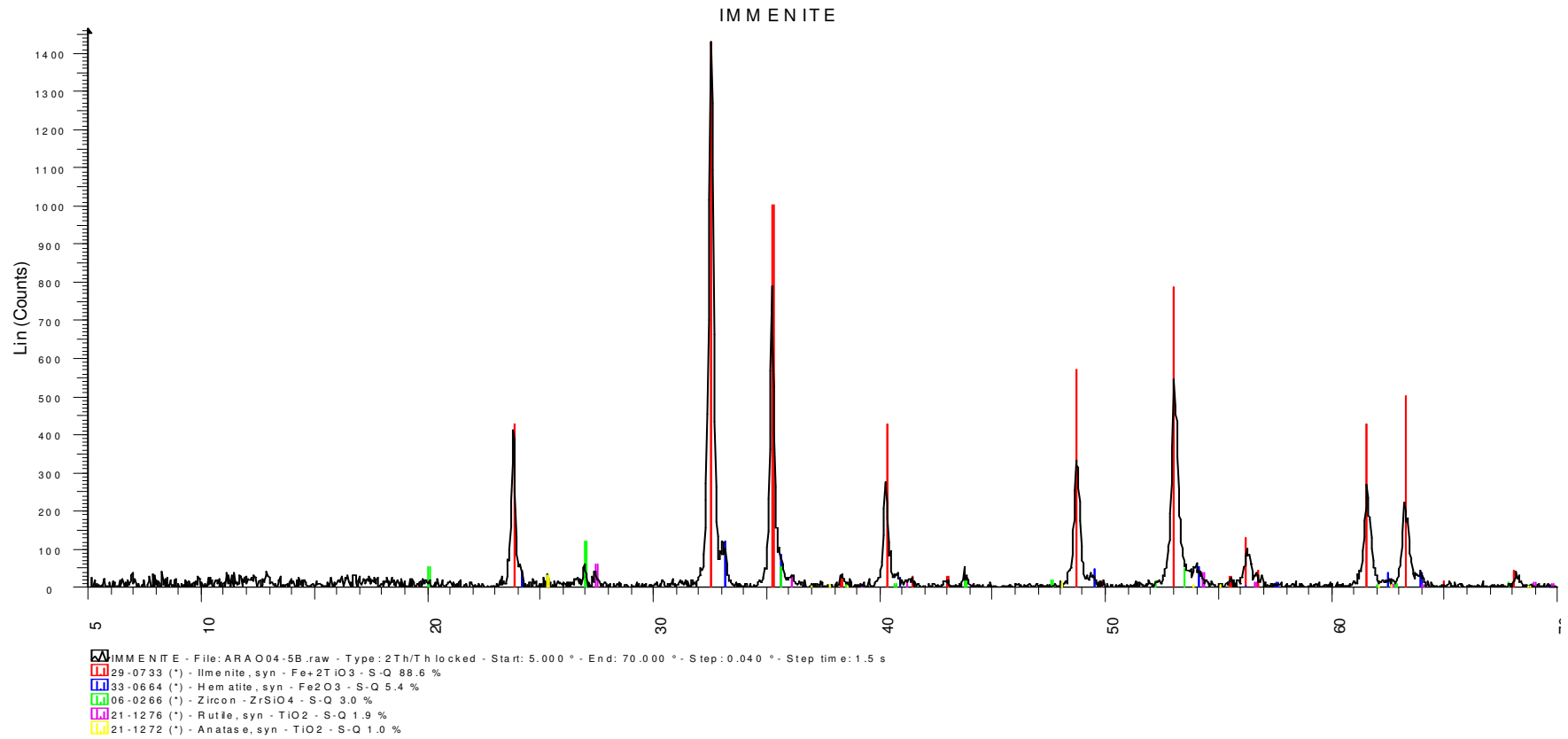
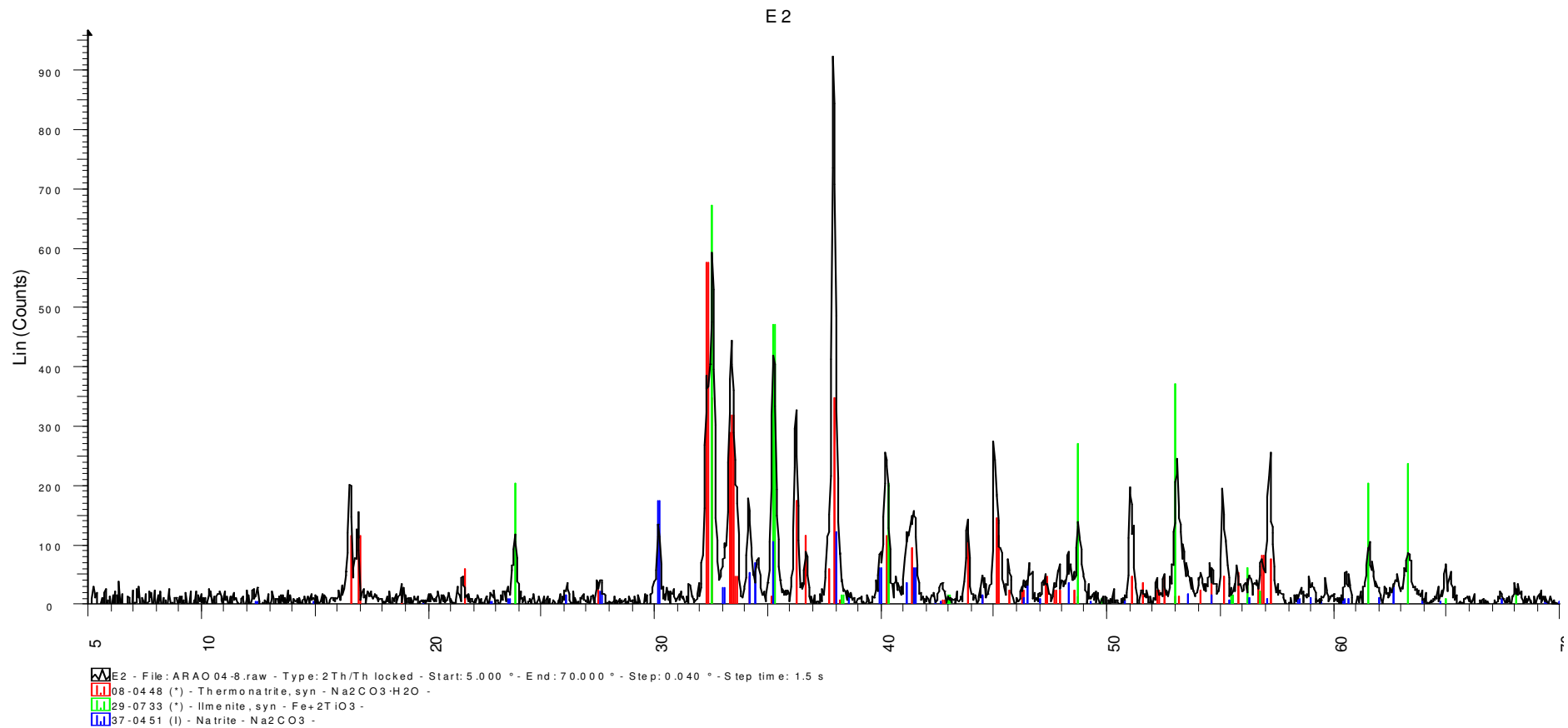


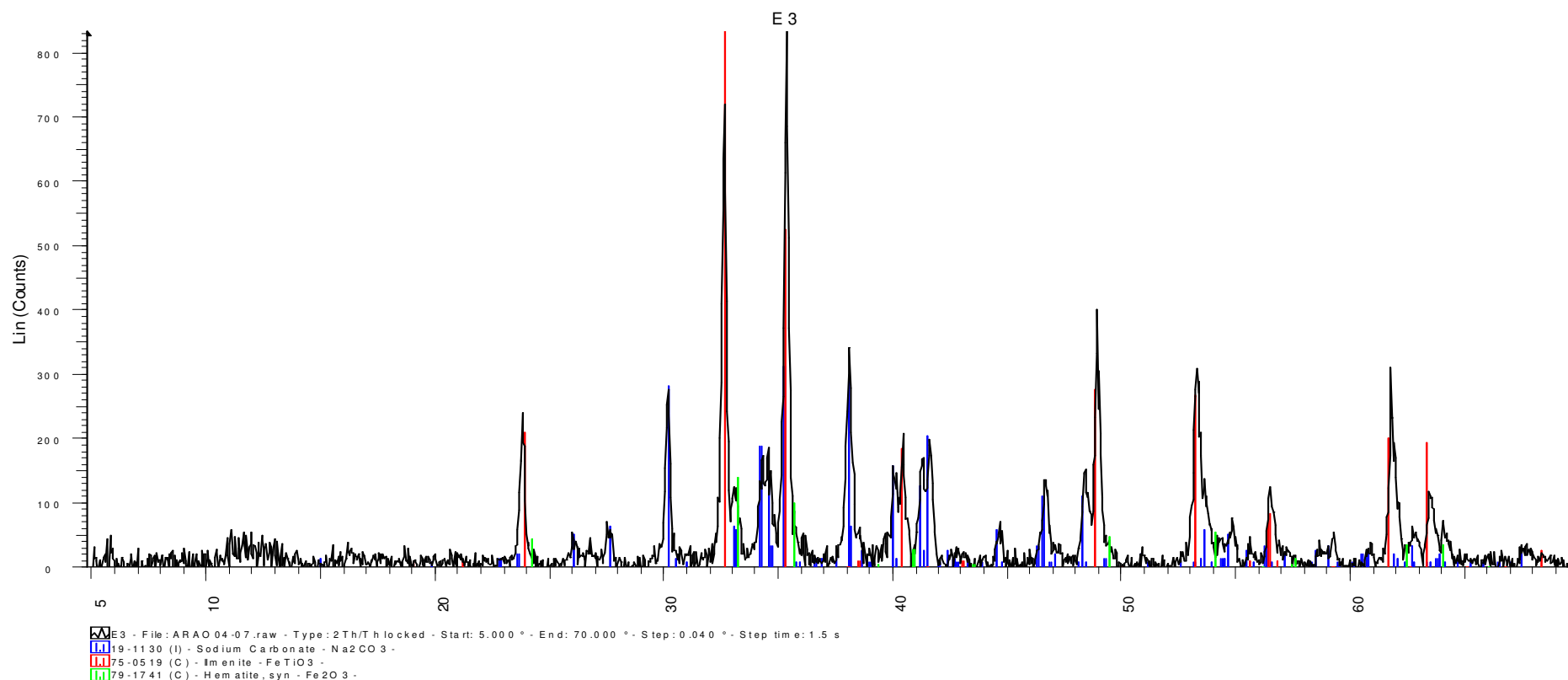
## Appendix A: X-ray diffraction diagrams



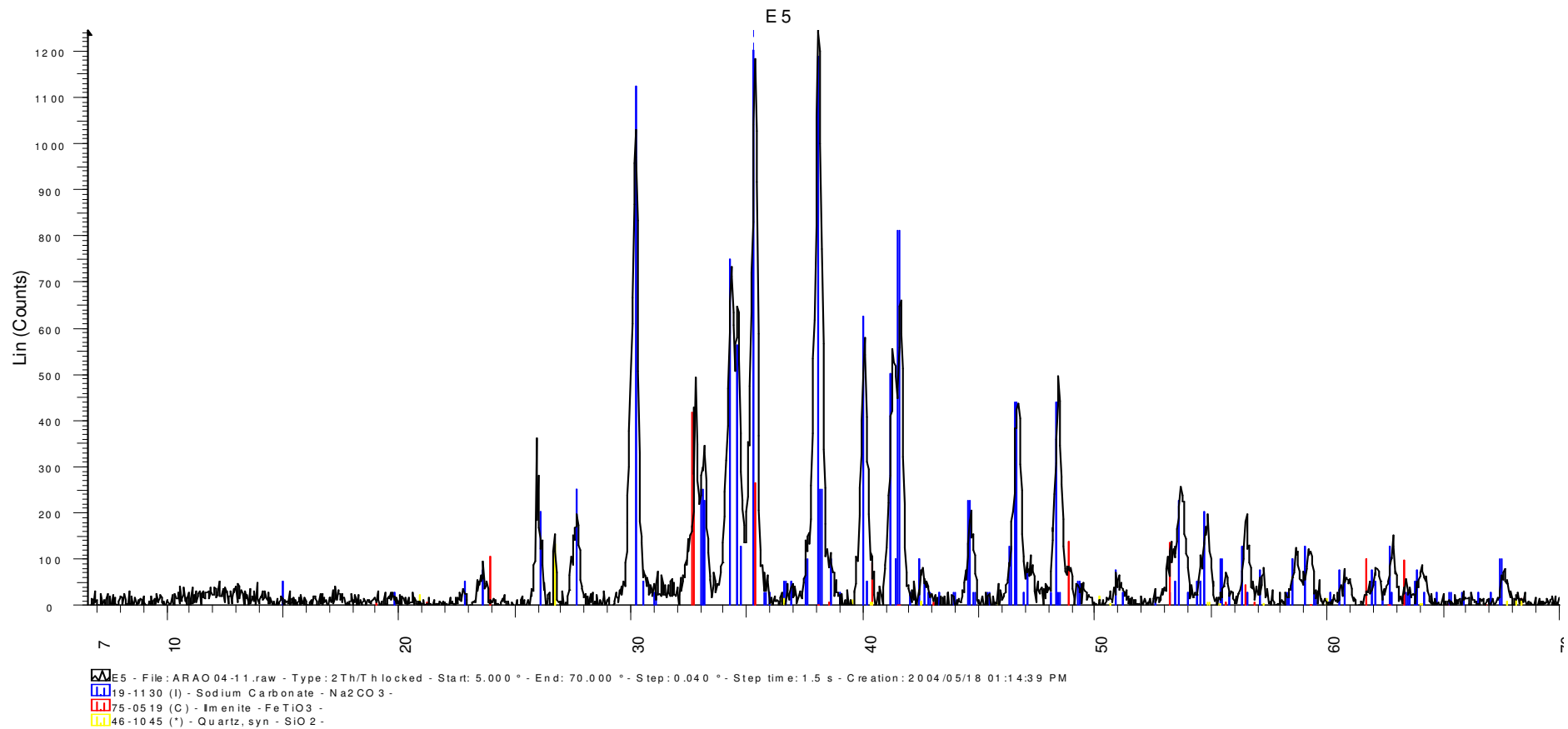
Appendix A- 1: XRD diagram of ilmenite raw material



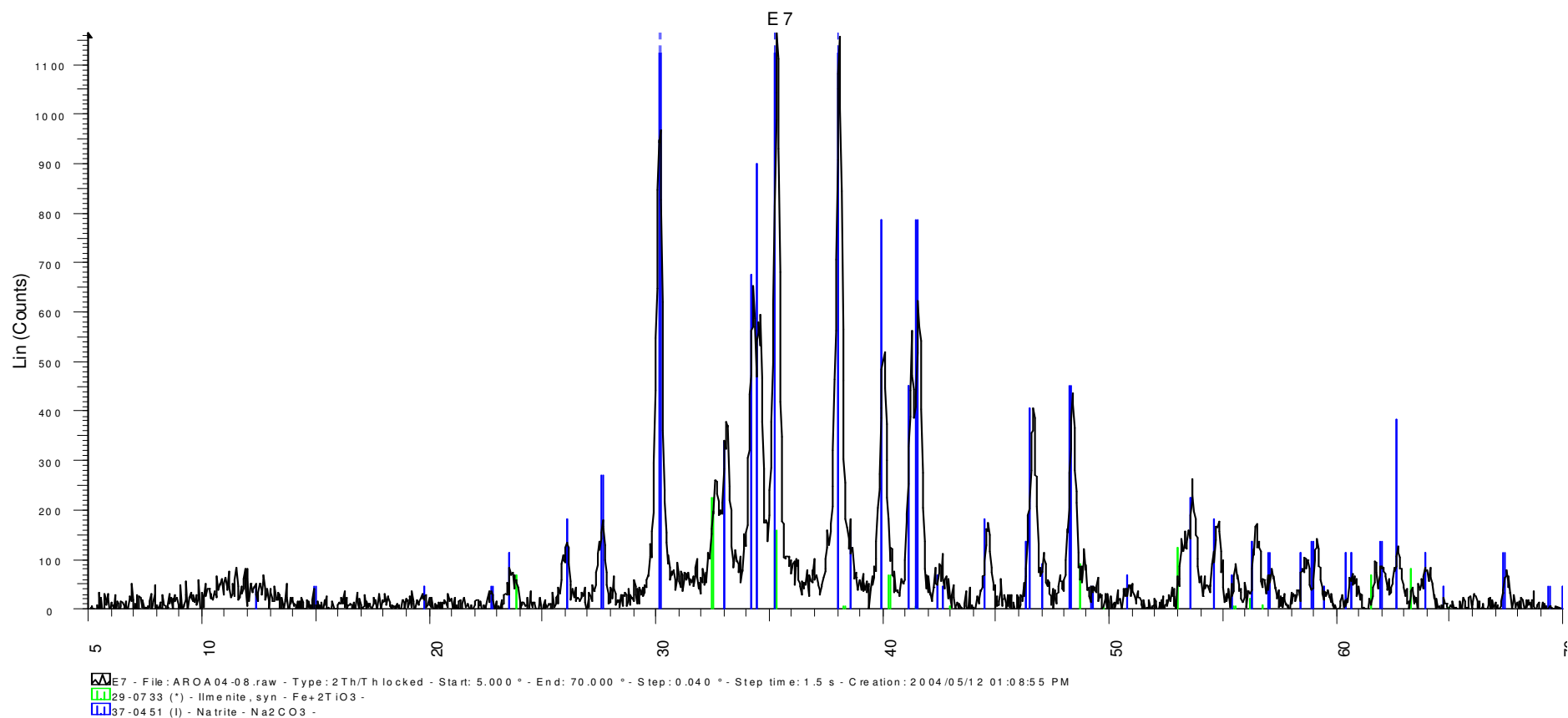
**Appendix A- 2:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with one mol of sodium hydroxide at 250 °C for 336 hours, with intermediate milling every 24 hours



**Appendix A- 3:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 250 °C for 336 hours, with intermediate milling every 24 hours

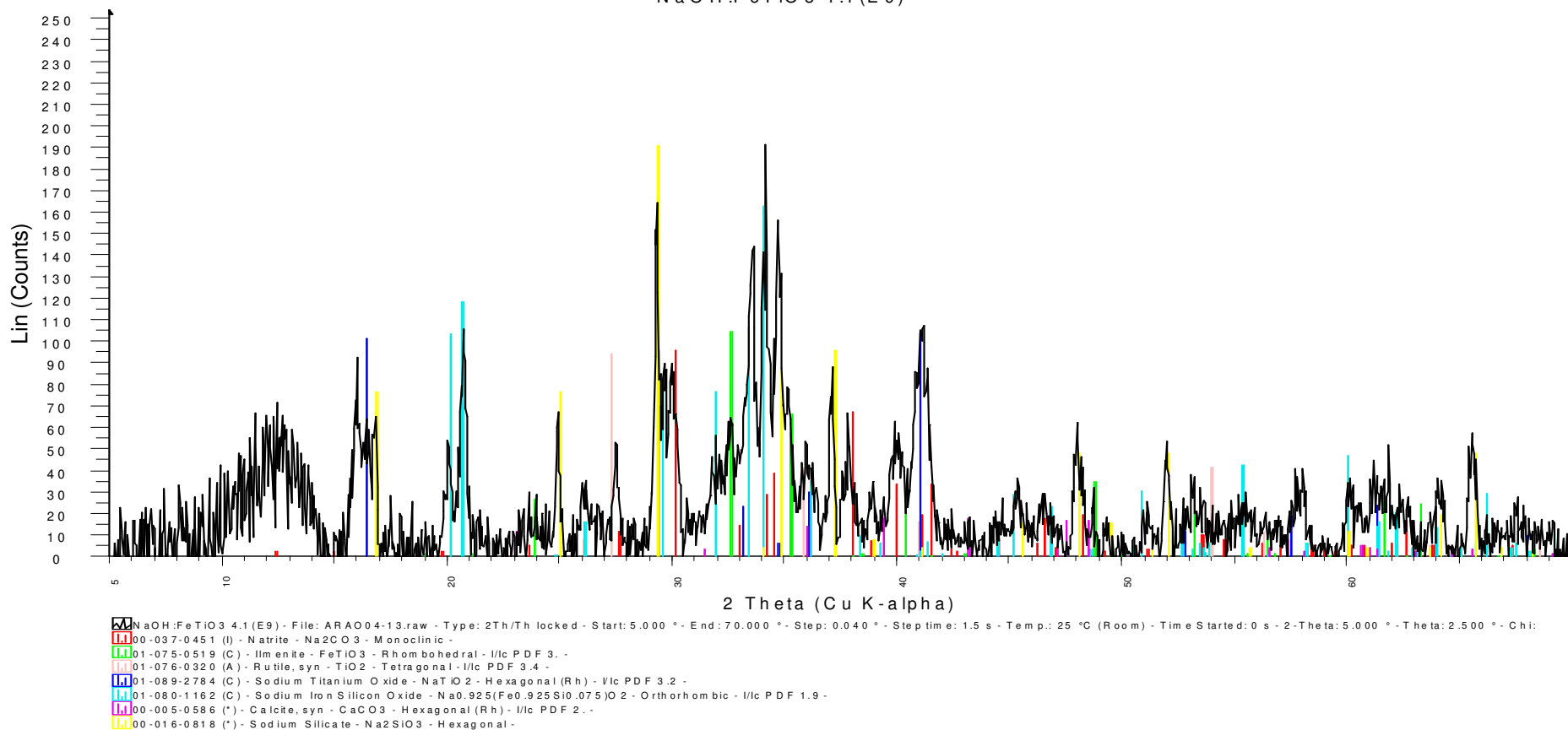


**Appendix A- 4:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with four mole of sodium hydroxide at 250 °C for 336 hours, with intermediate milling every 24 hours



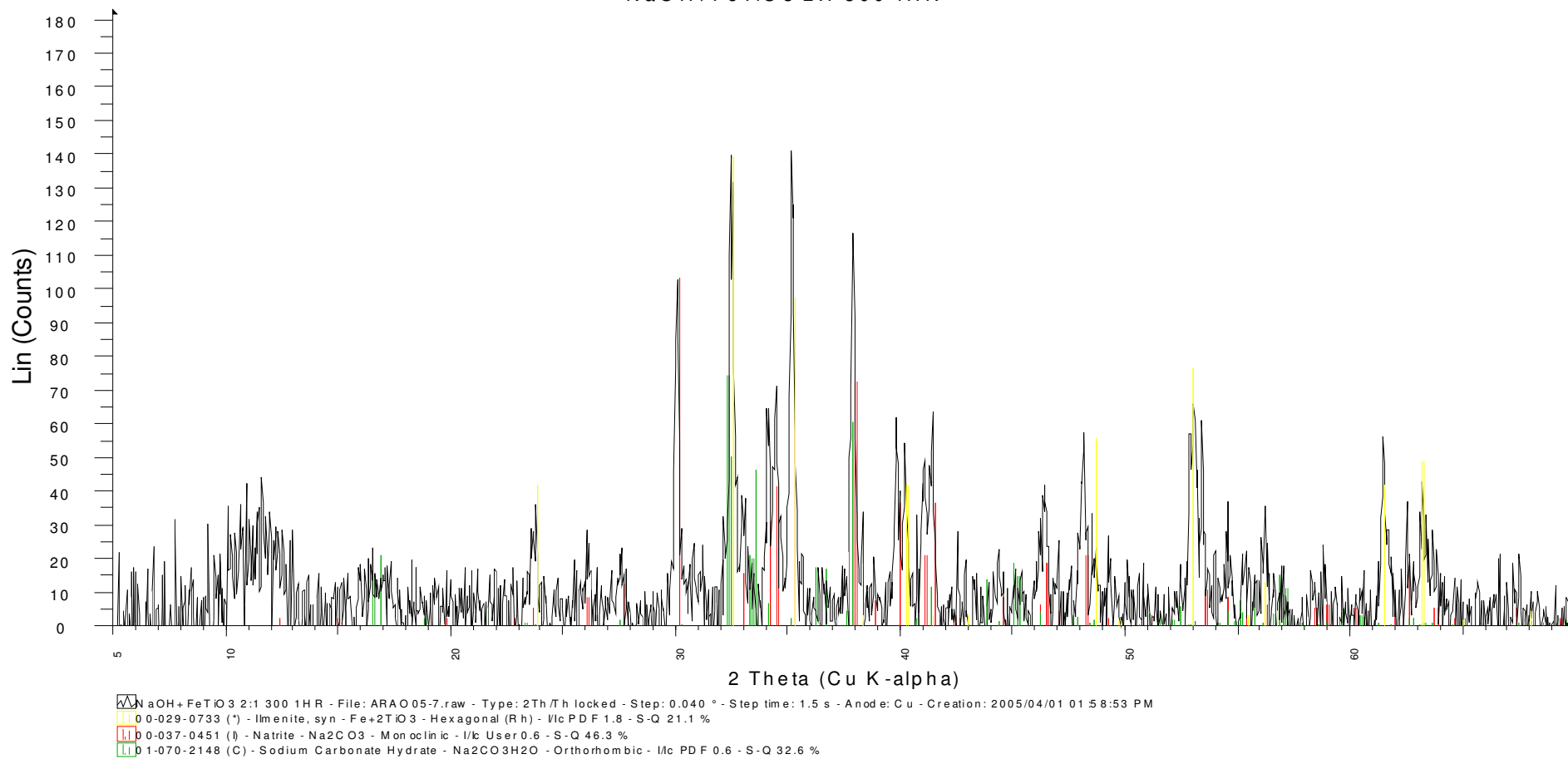
**Appendix A- 5:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with six mole of sodium hydroxide at 250 °C for 336 hours, with intermediate milling every 24 hours

NaOH:FeTiO<sub>3</sub> 4.1 (E9)



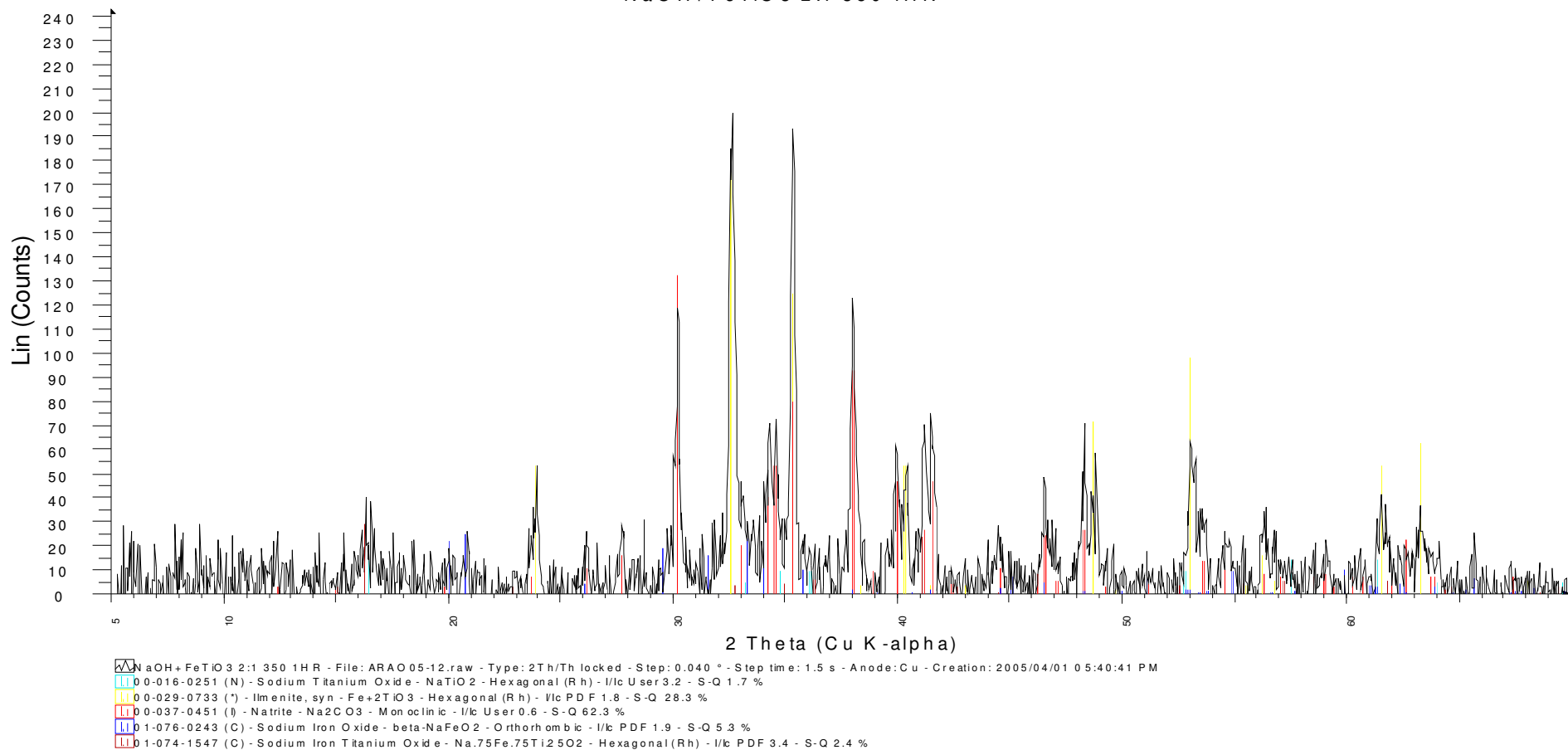
**Appendix A- 6:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with four mole of sodium hydroxide at 500 °C for 336 hours, with intermediate milling every 24 hours

NaOH+FeTiO<sub>3</sub> 2:1 300 1HR



**Appendix A- 7:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mol of sodium hydroxide at 300 °C for one hour

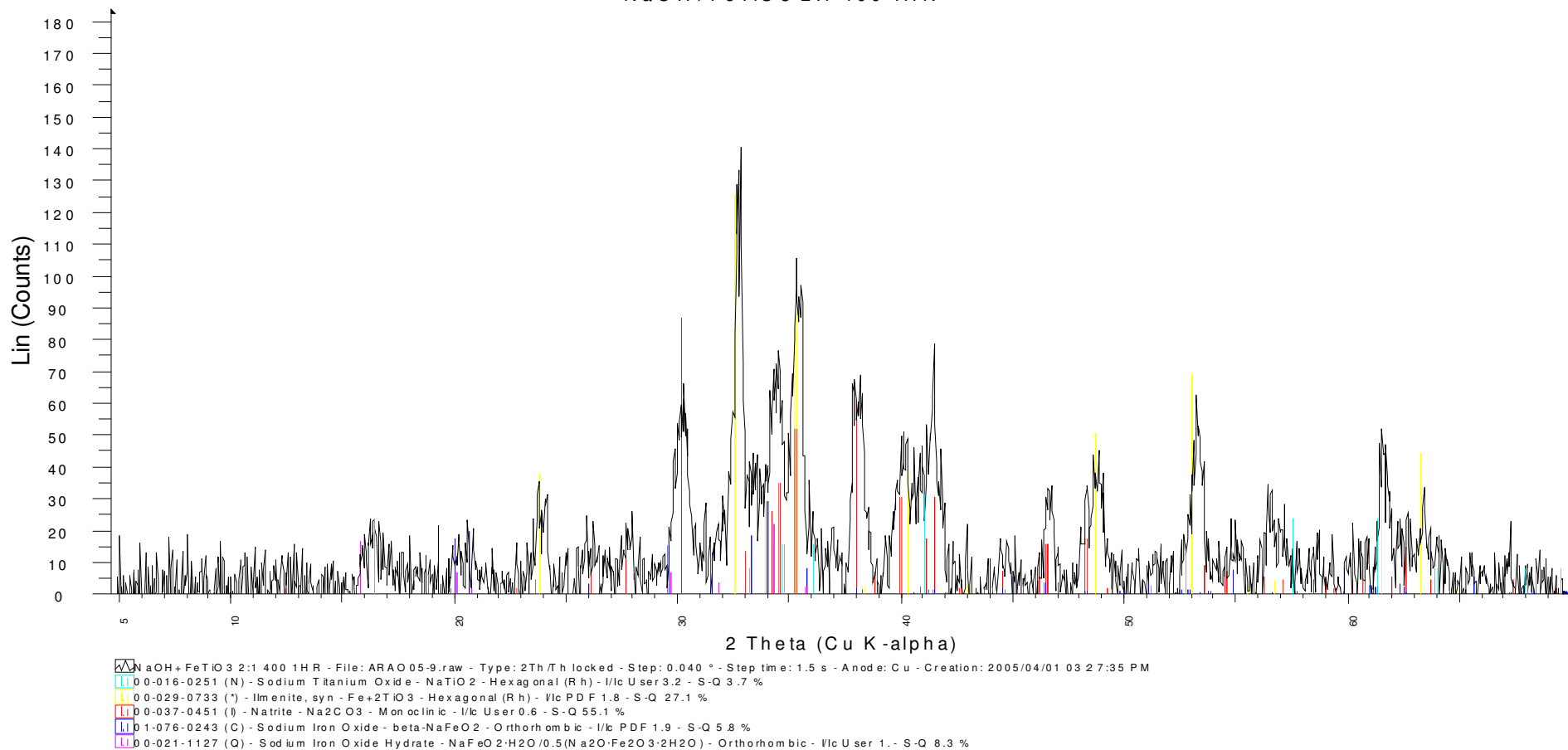
NaOH+FeTiO<sub>3</sub> 2:1 350 1HR



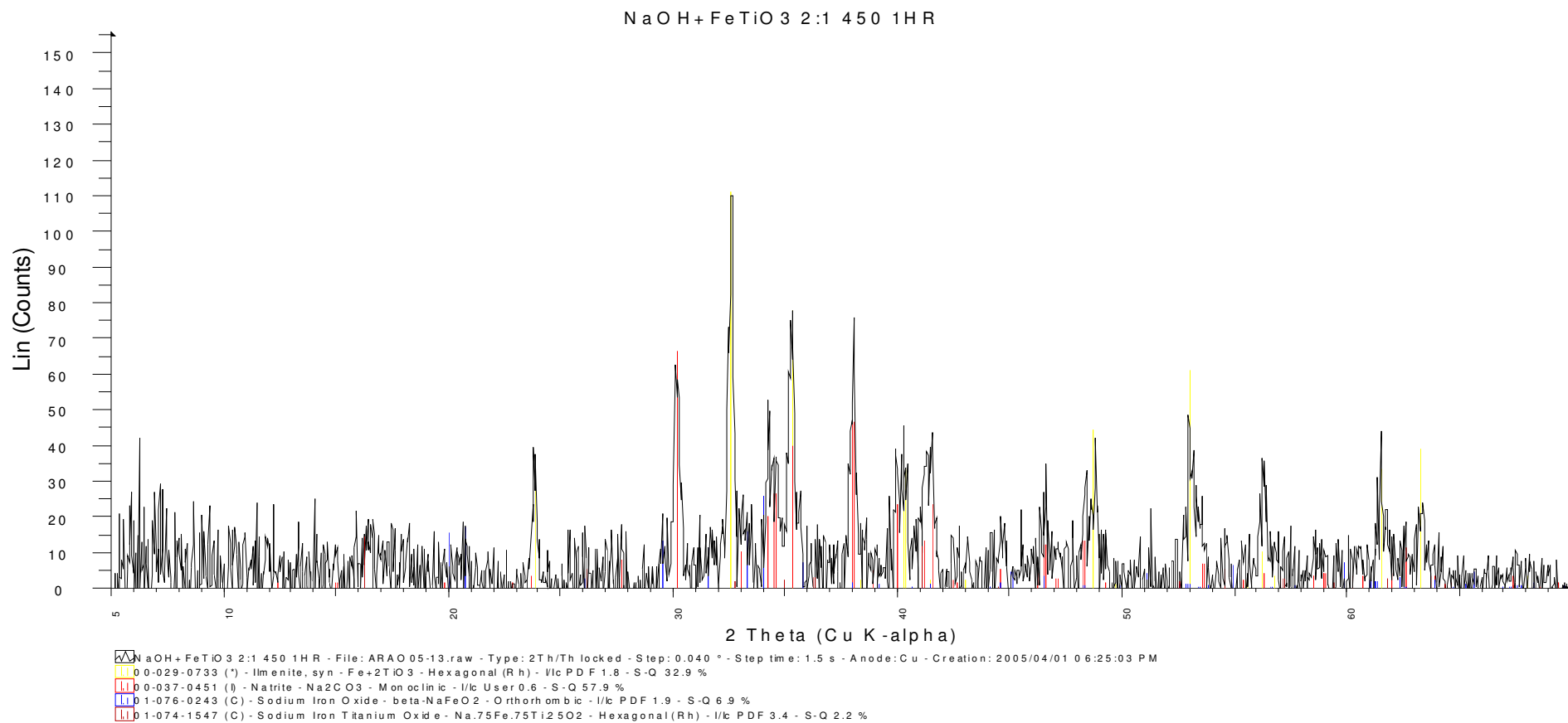
**Appendix A- 8:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 350 °C for one hour



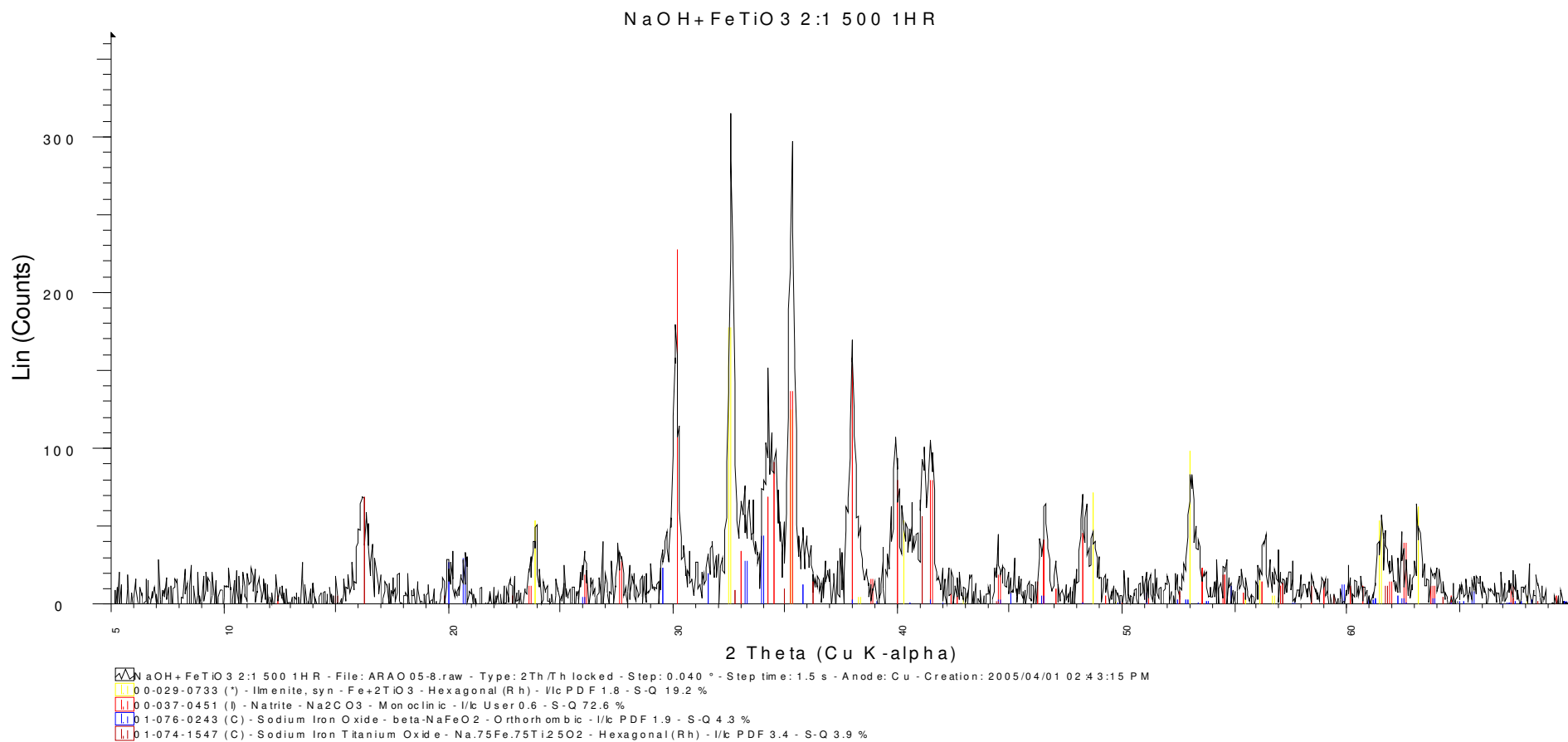
NaOH+FeTiO<sub>3</sub> 2:1 400 1HR



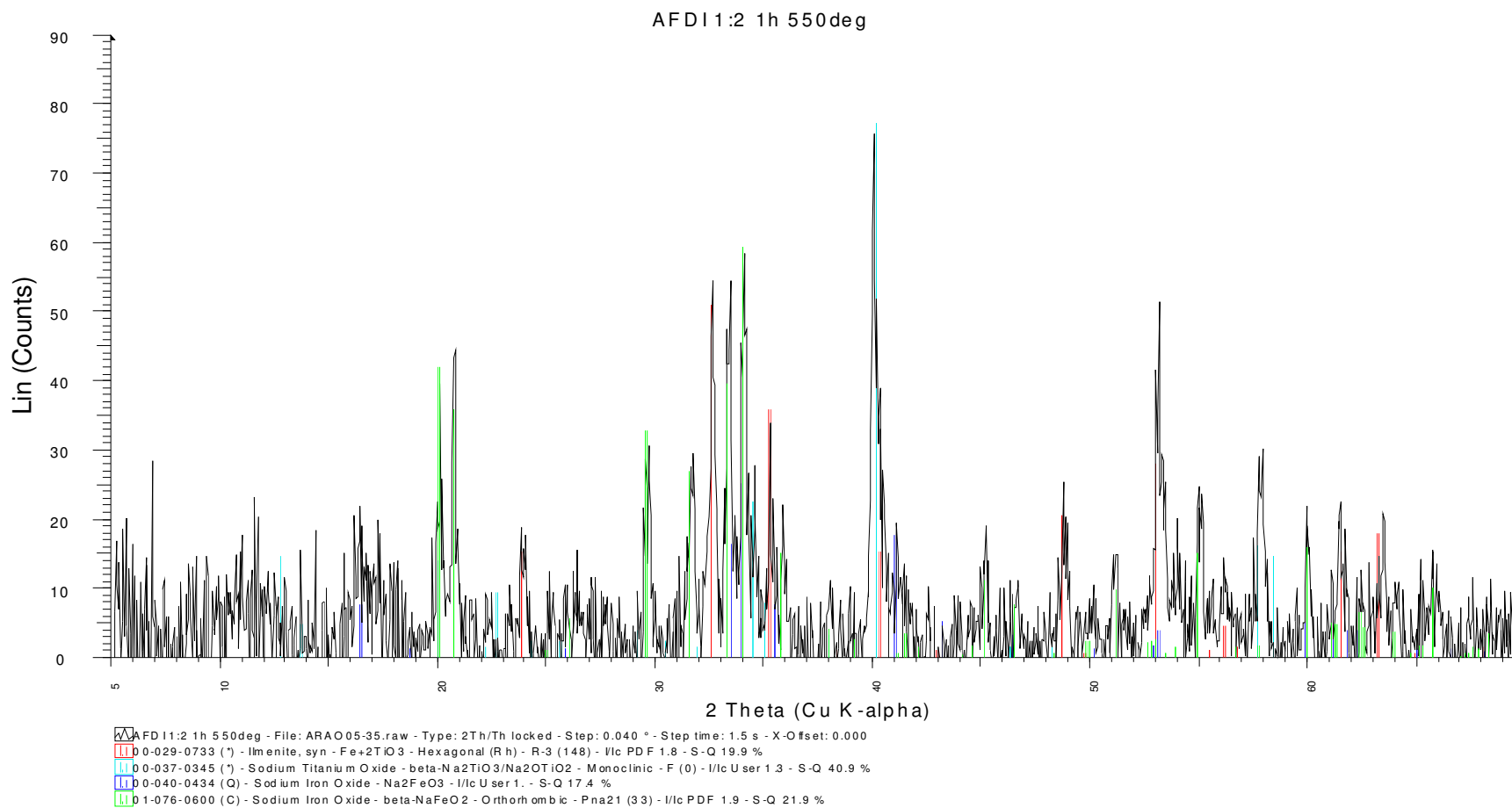
**Appendix A- 9:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 400 °C for one hour



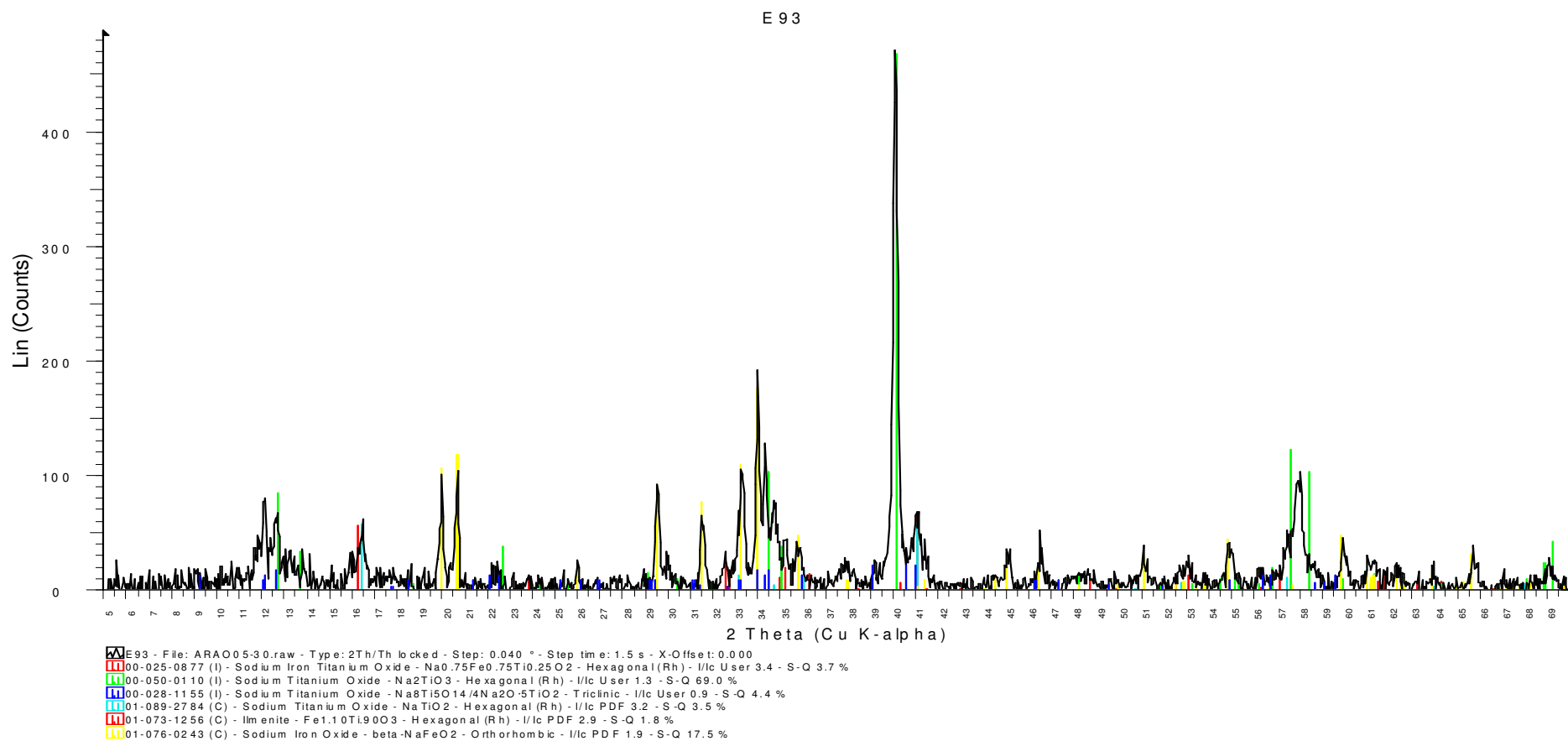
**Appendix A- 10:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 450 °C for one hour



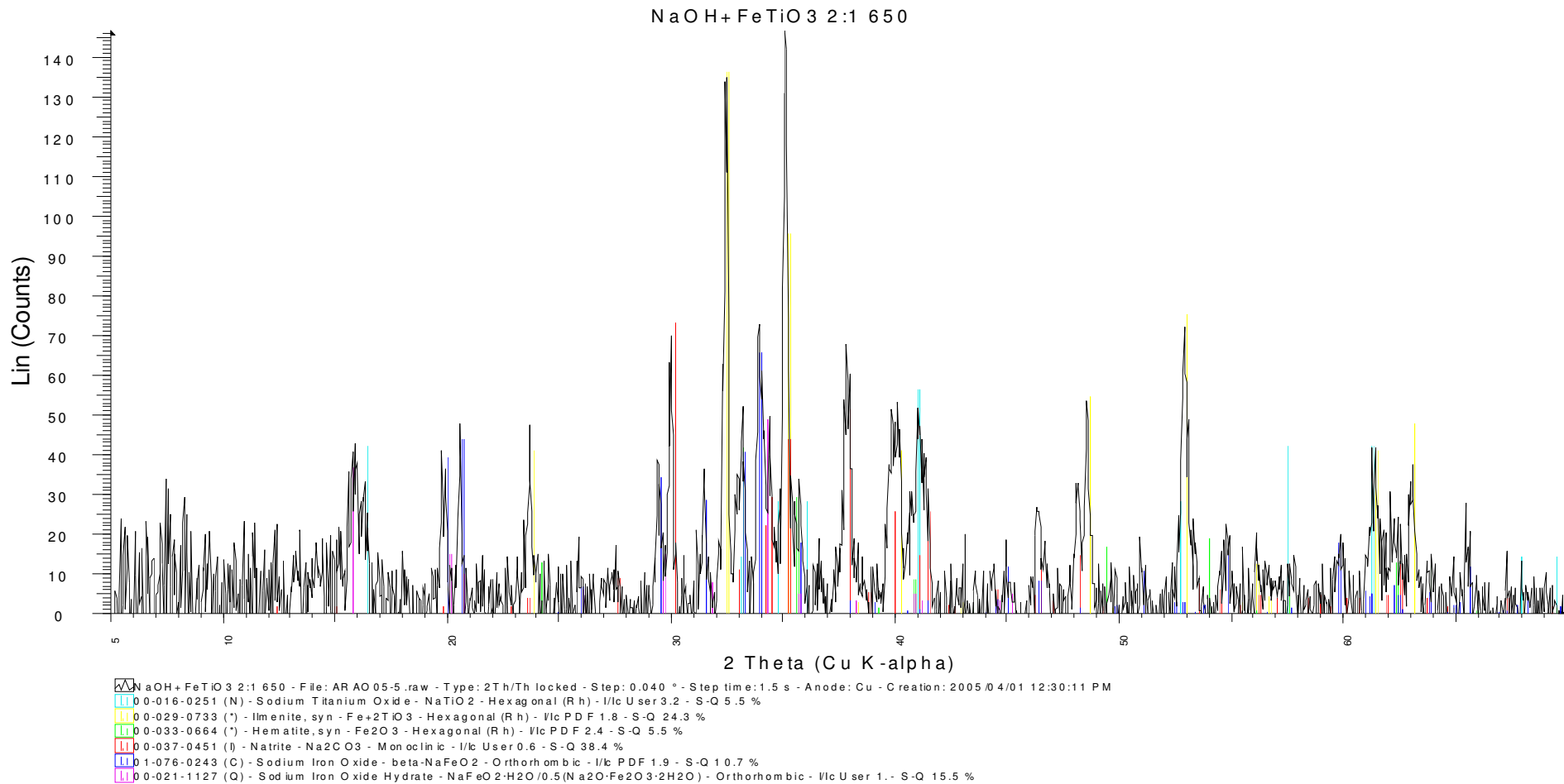
**Appendix A- 11:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 500 °C for one hour



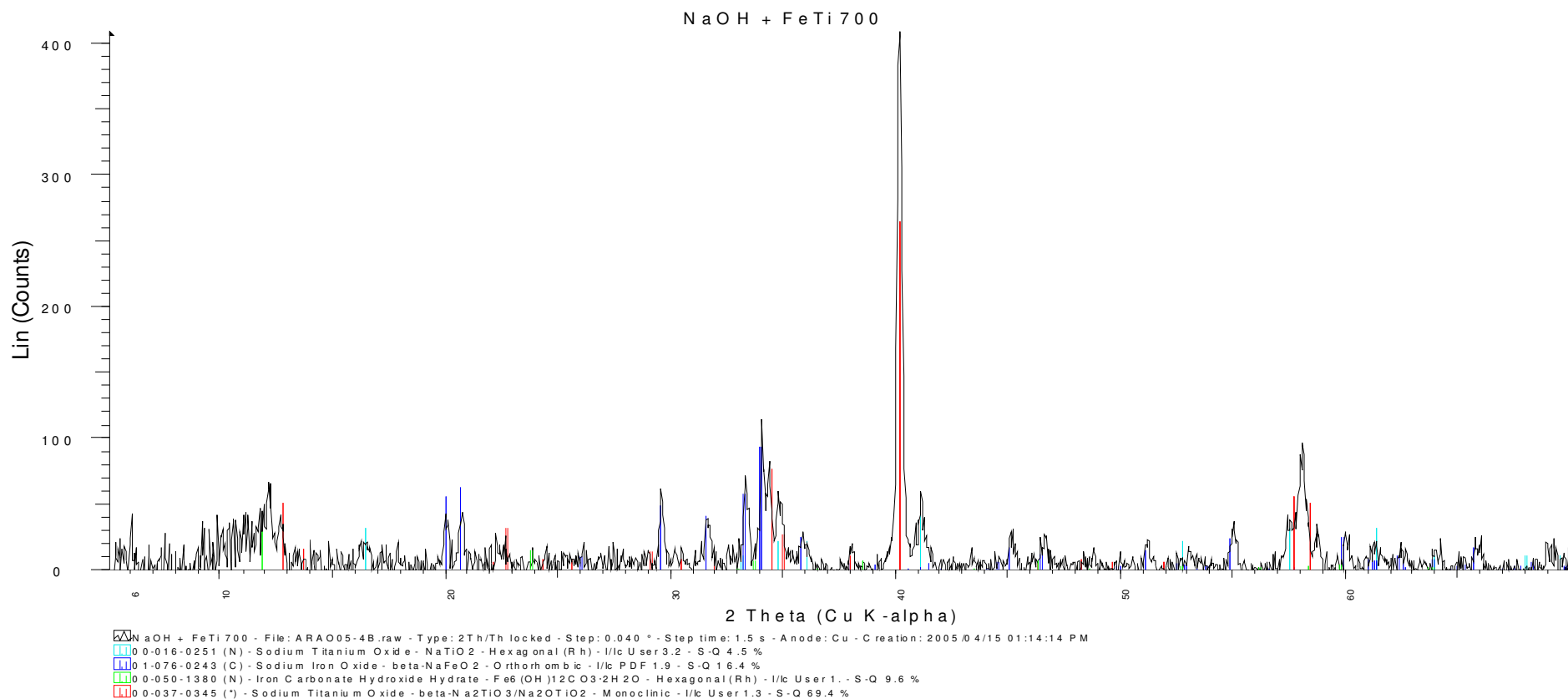
**Appendix A- 12:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 550 °C for one hour



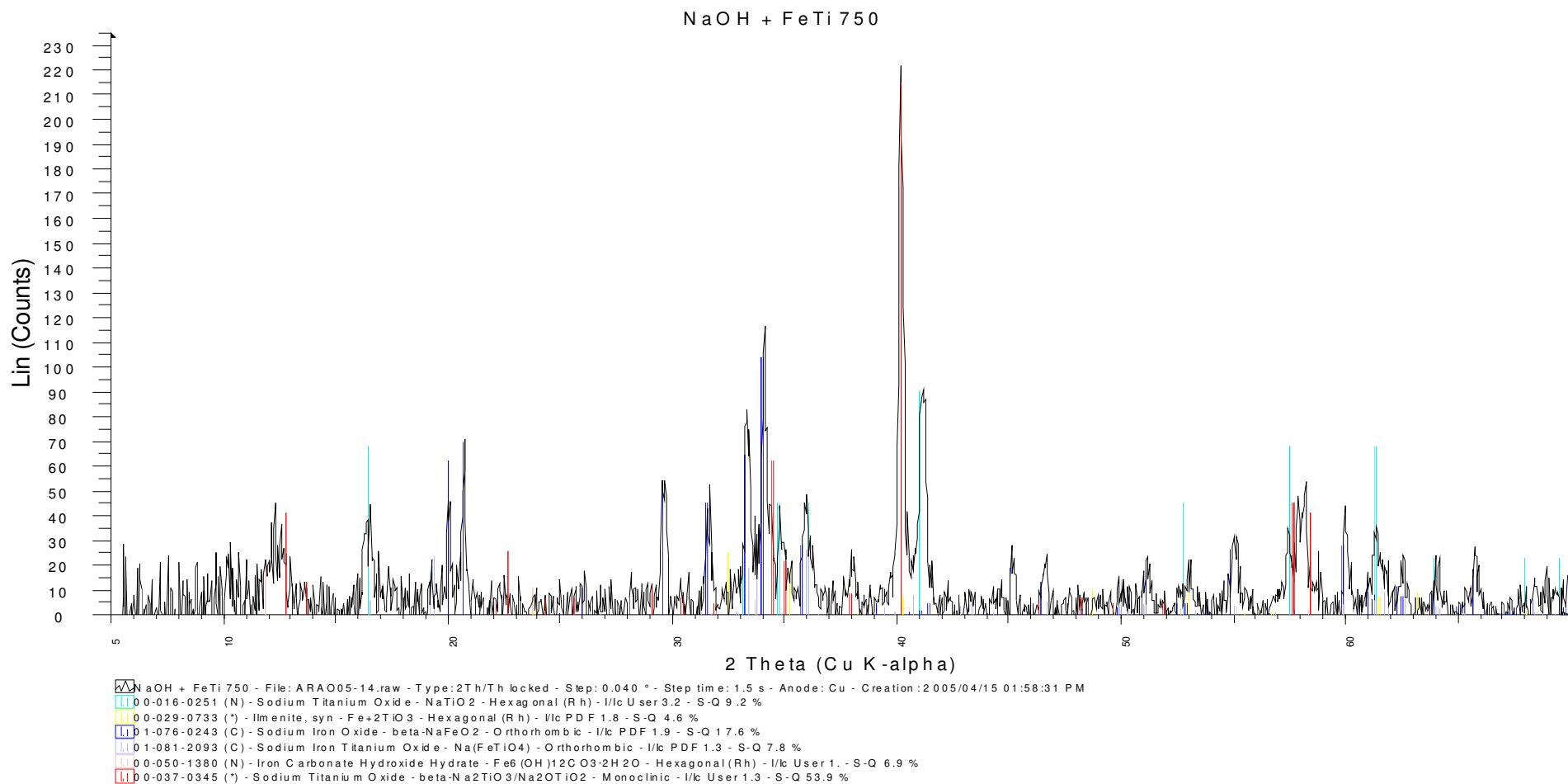
**Appendix A- 13:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 600 °C for one hour



**Appendix A- 14:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 650 °C for one hour

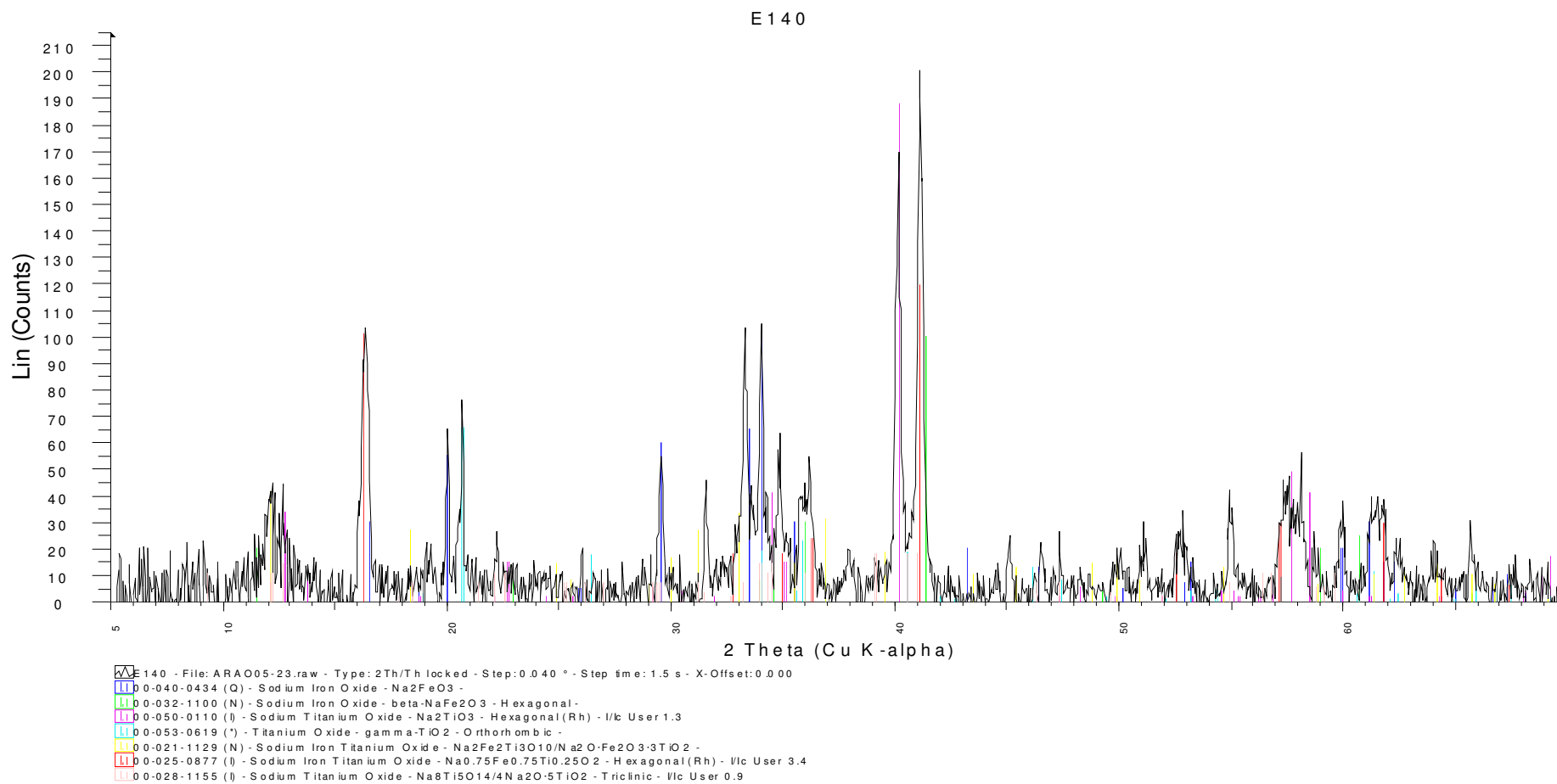


**Appendix A- 15:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 700 °C for one hour

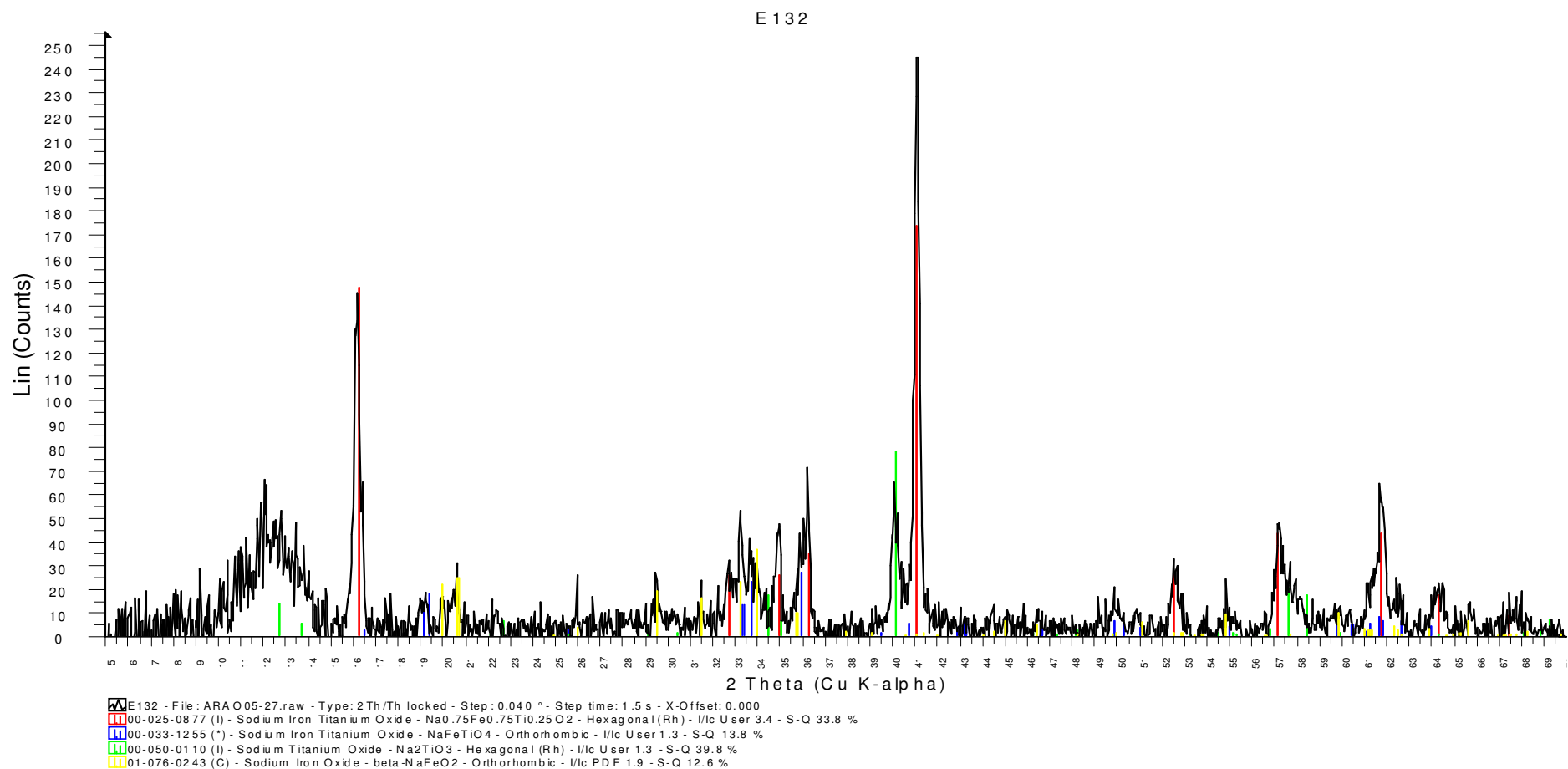


**Appendix A- 16:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 750 °C for one hour

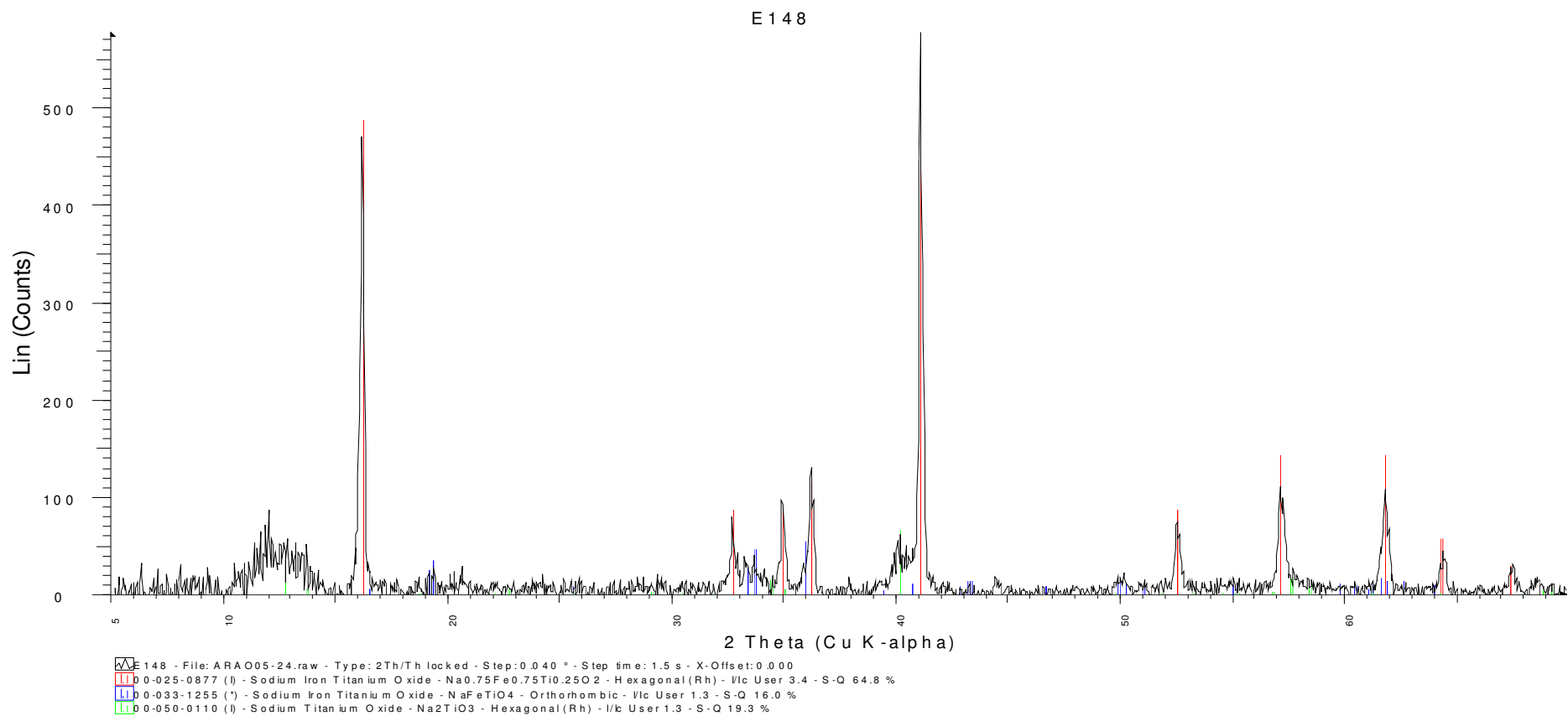




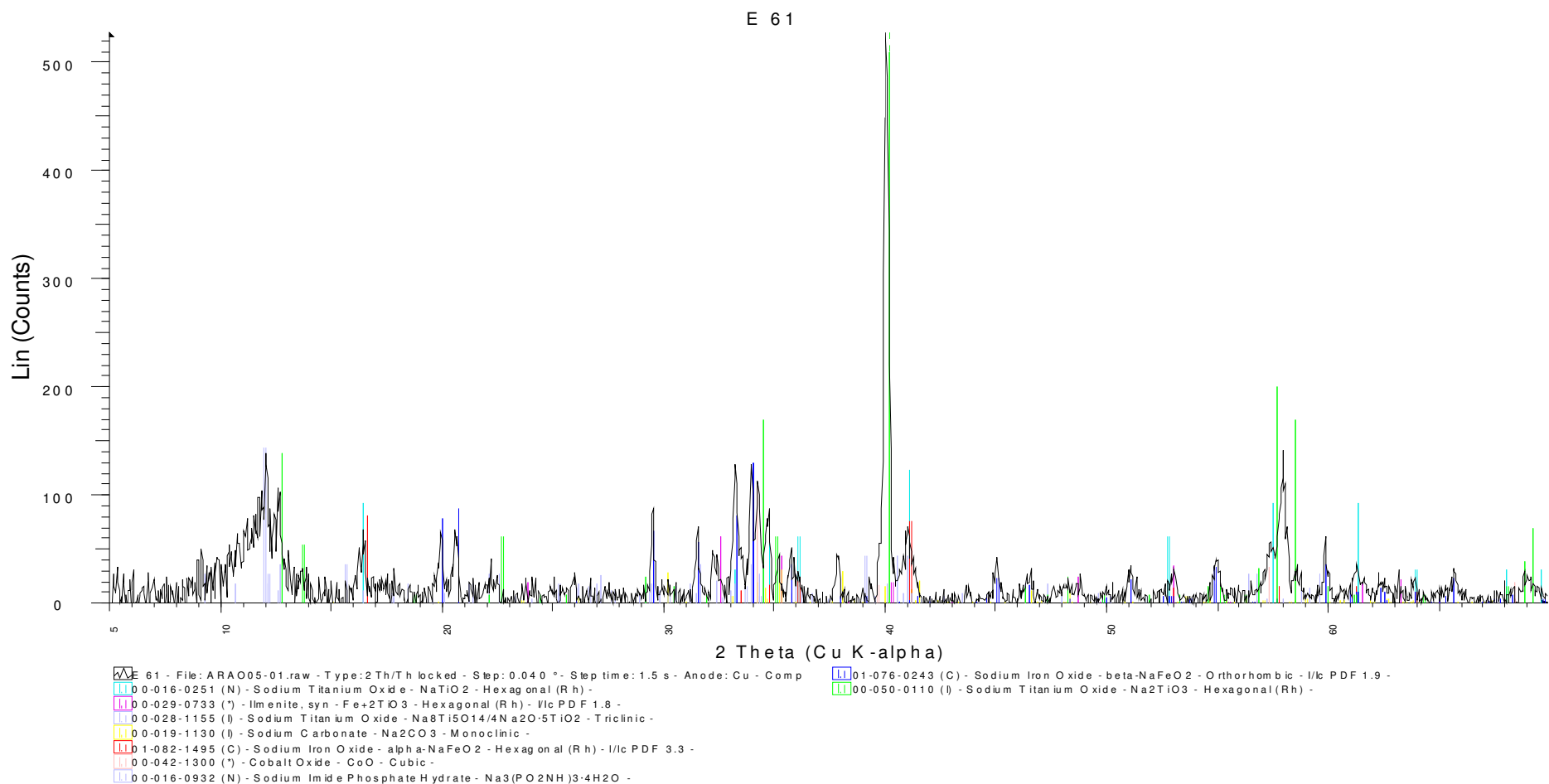
**Appendix A- 17:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 800 °C for one hour



**Appendix A- 18:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 850 °C for one hour

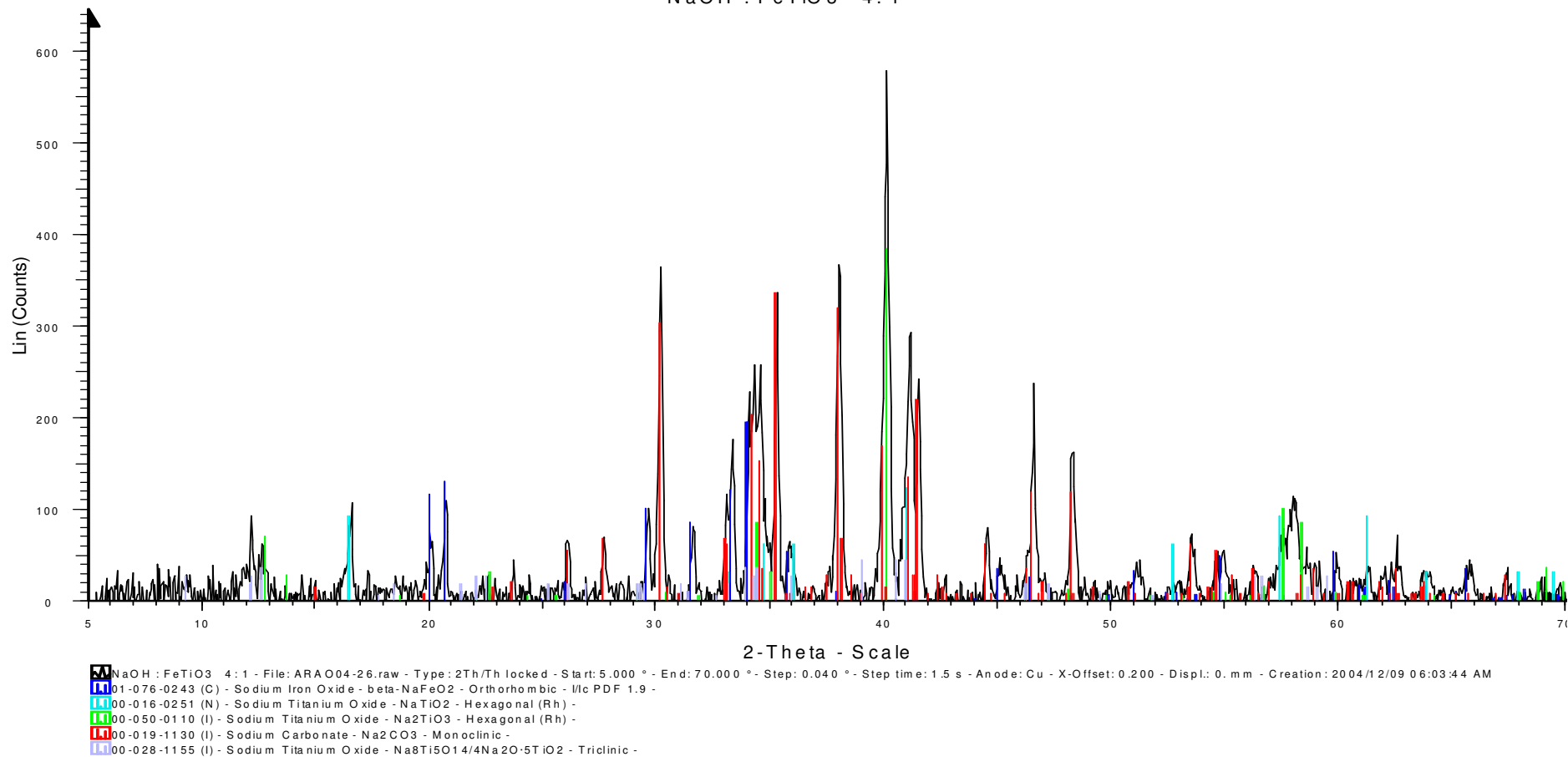


**Appendix A- 19:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 900 °C for one hour



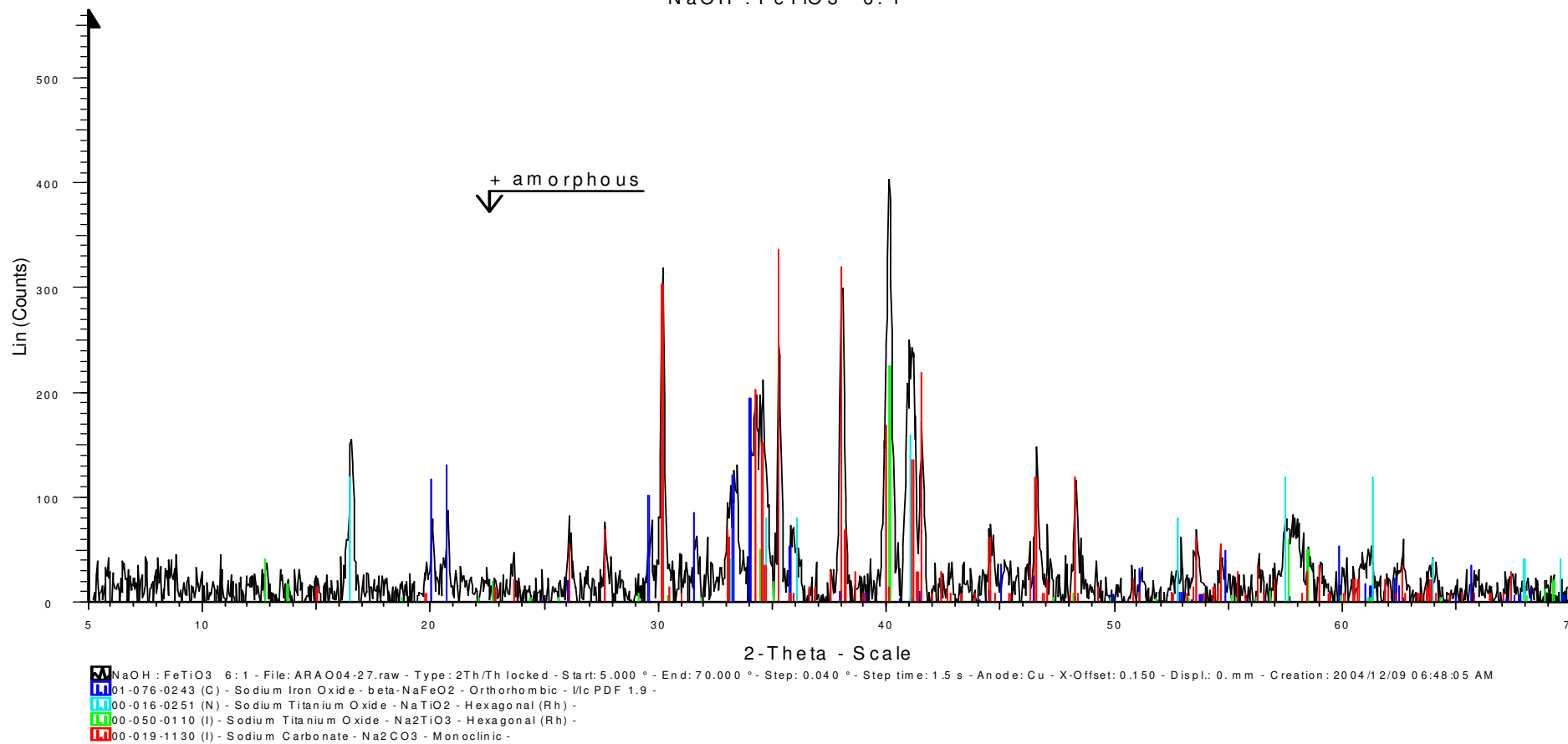
**Appendix A- 20:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 750 °C for thirty minutes

NaOH : FeTiO<sub>3</sub> 4 : 1

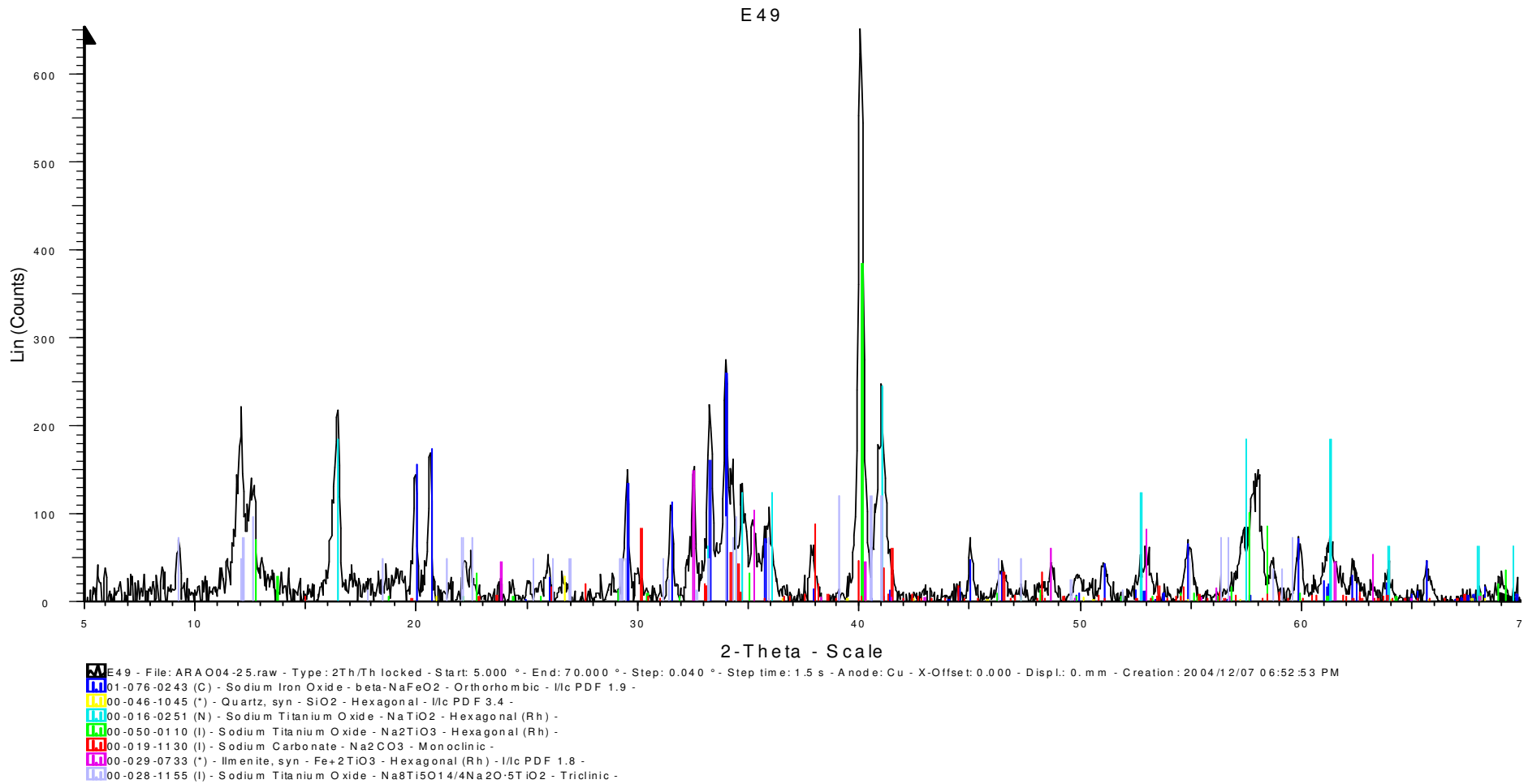


**Appendix A- 21:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with four mole of sodium hydroxide at 750 °C for thirty minutes

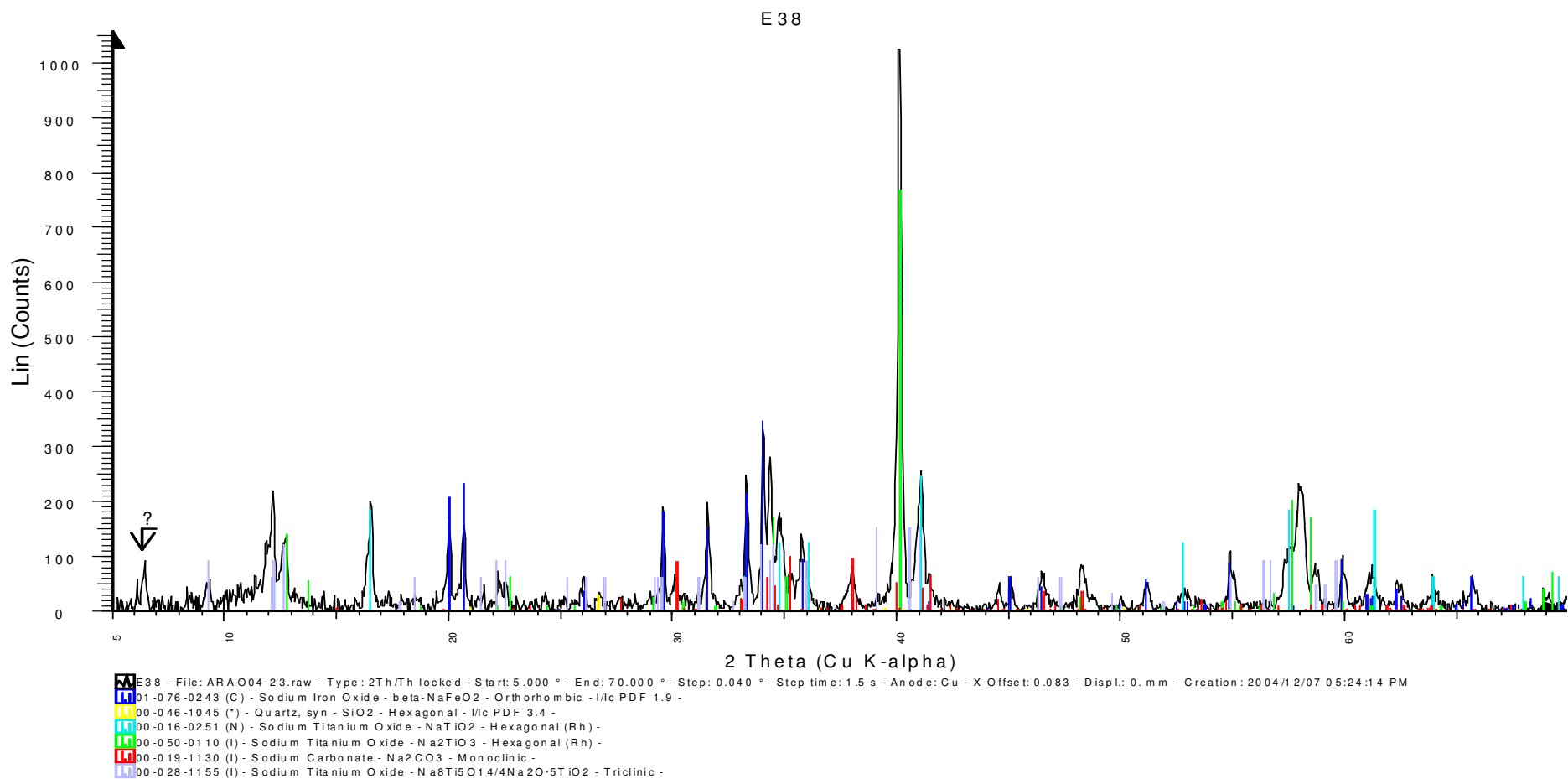
NaOH : FeTiO<sub>3</sub> 6 : 1



**Appendix A- 22:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with six mole of sodium hydroxide at 750 °C for thirty minutes

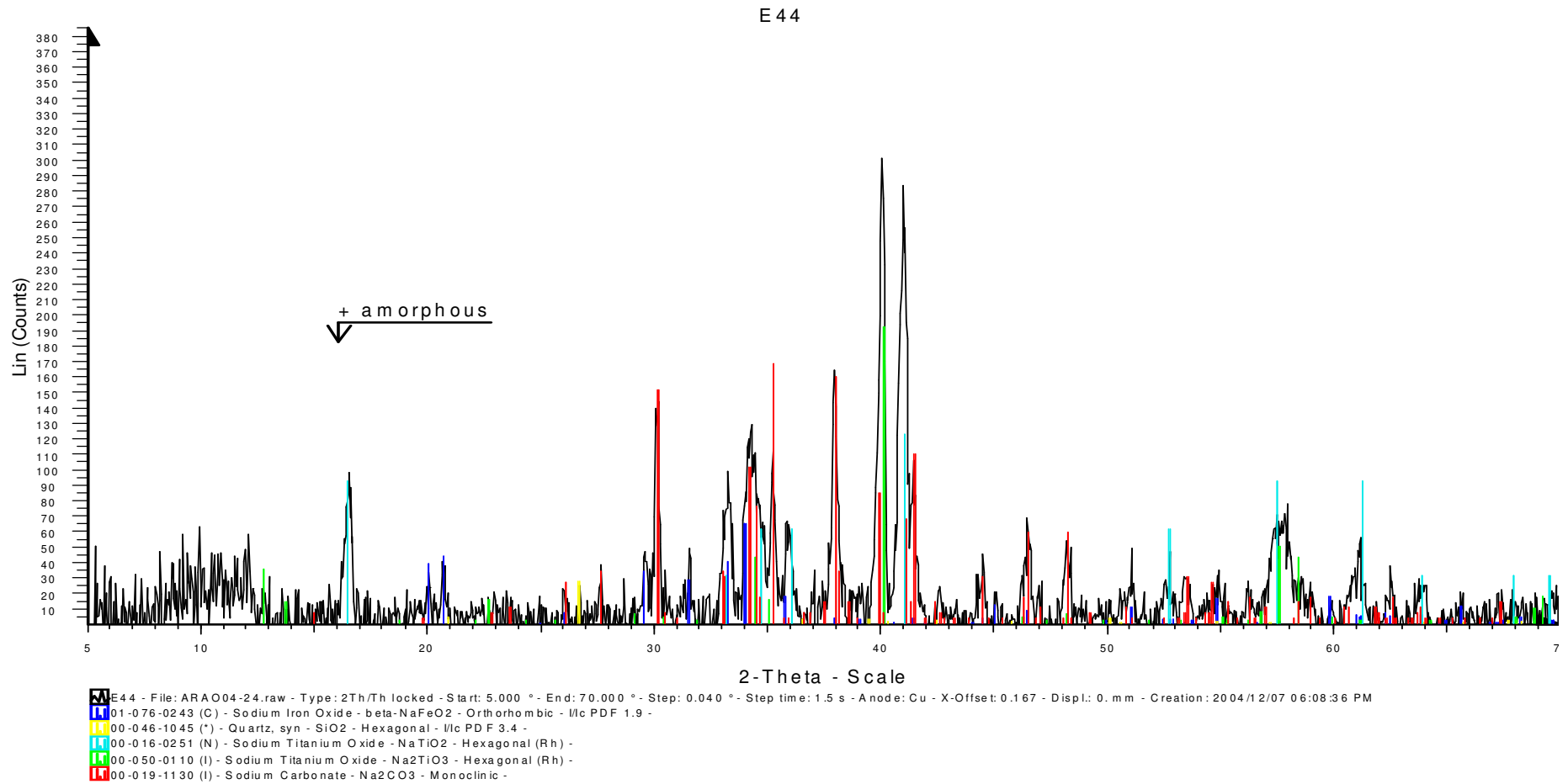


**Appendix A- 23:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 750 °C for an hour



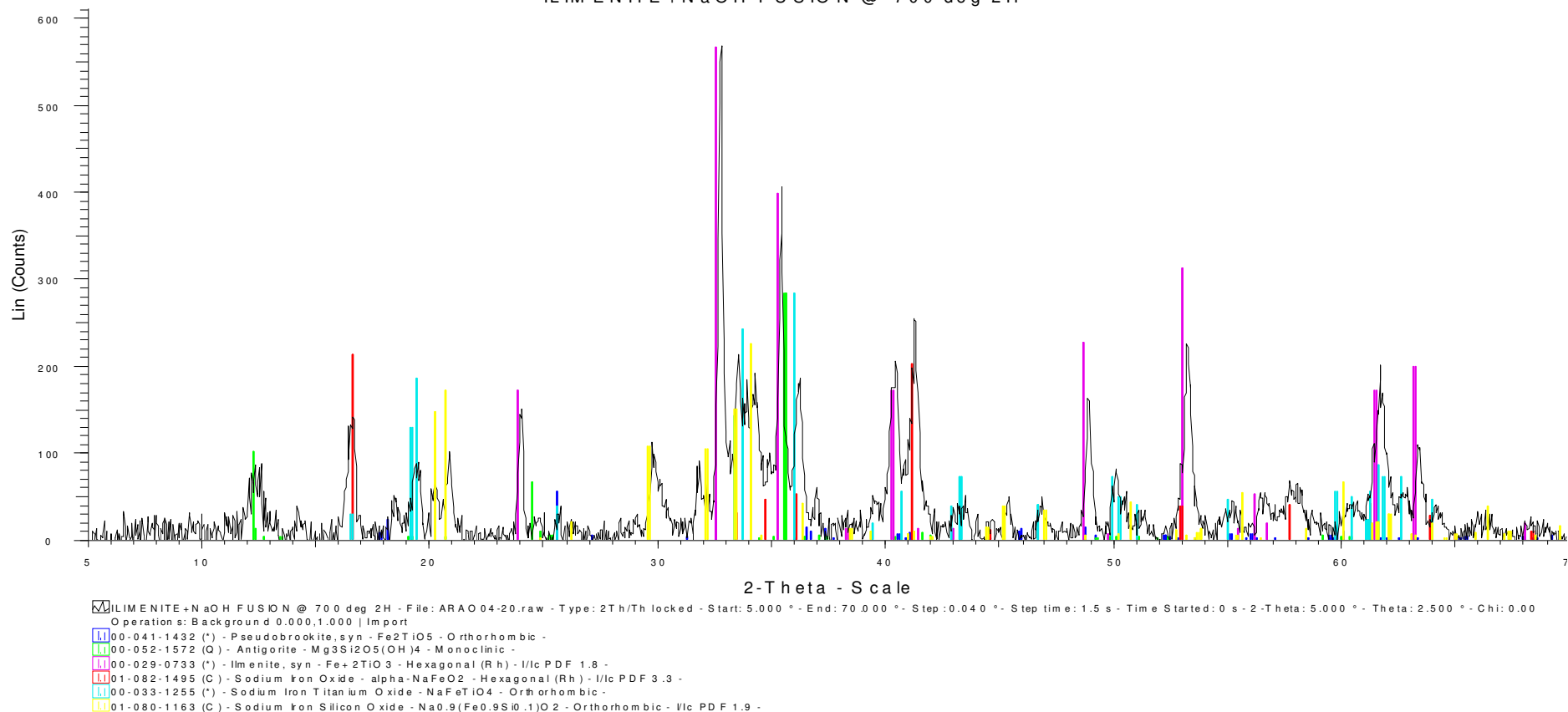
**Appendix A- 24:**XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with four mole of sodium hydroxide at 750 °C for an hour



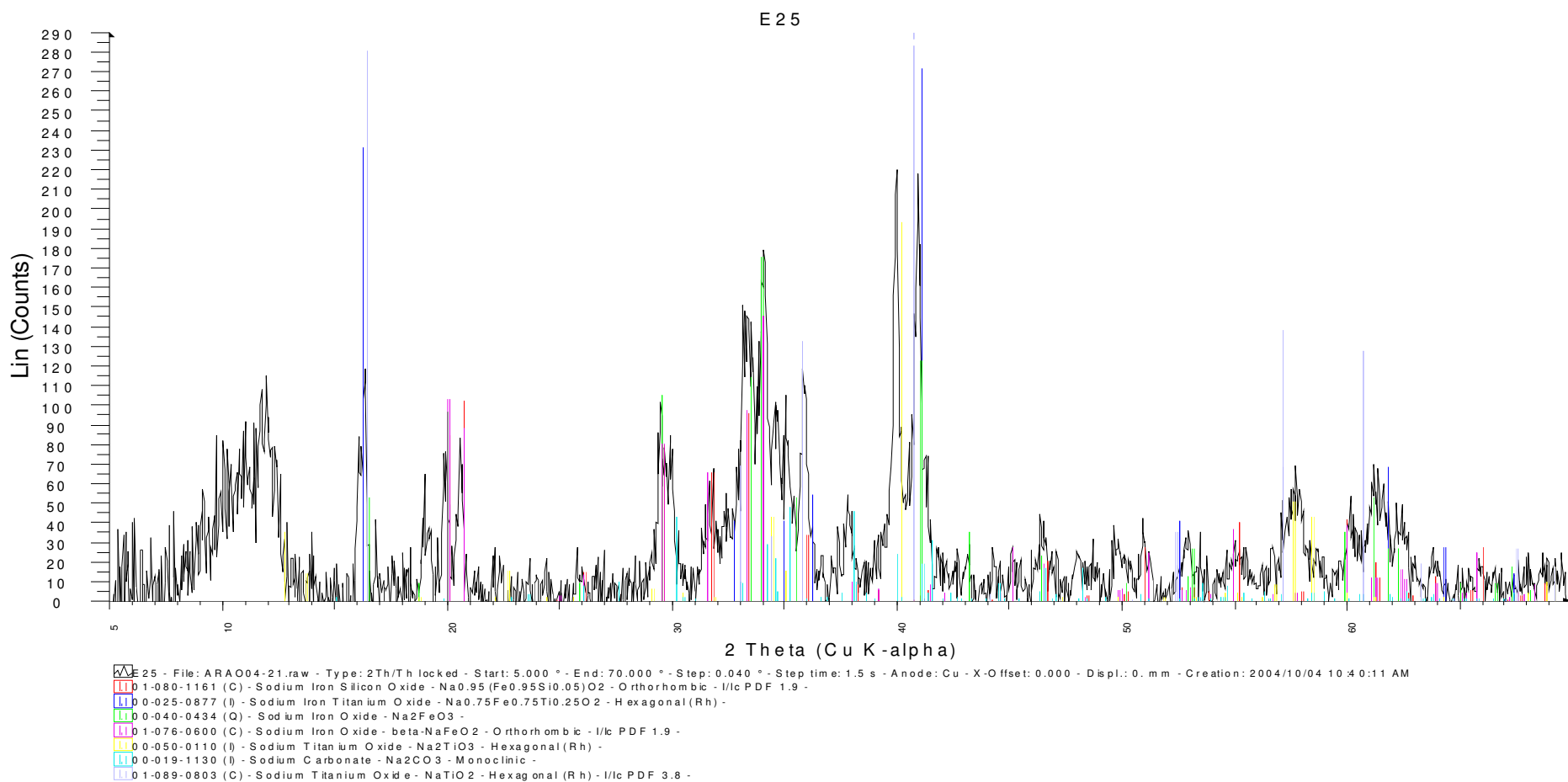


**Appendix A- 25:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with six mole of sodium hydroxide at 750 °C for an hour

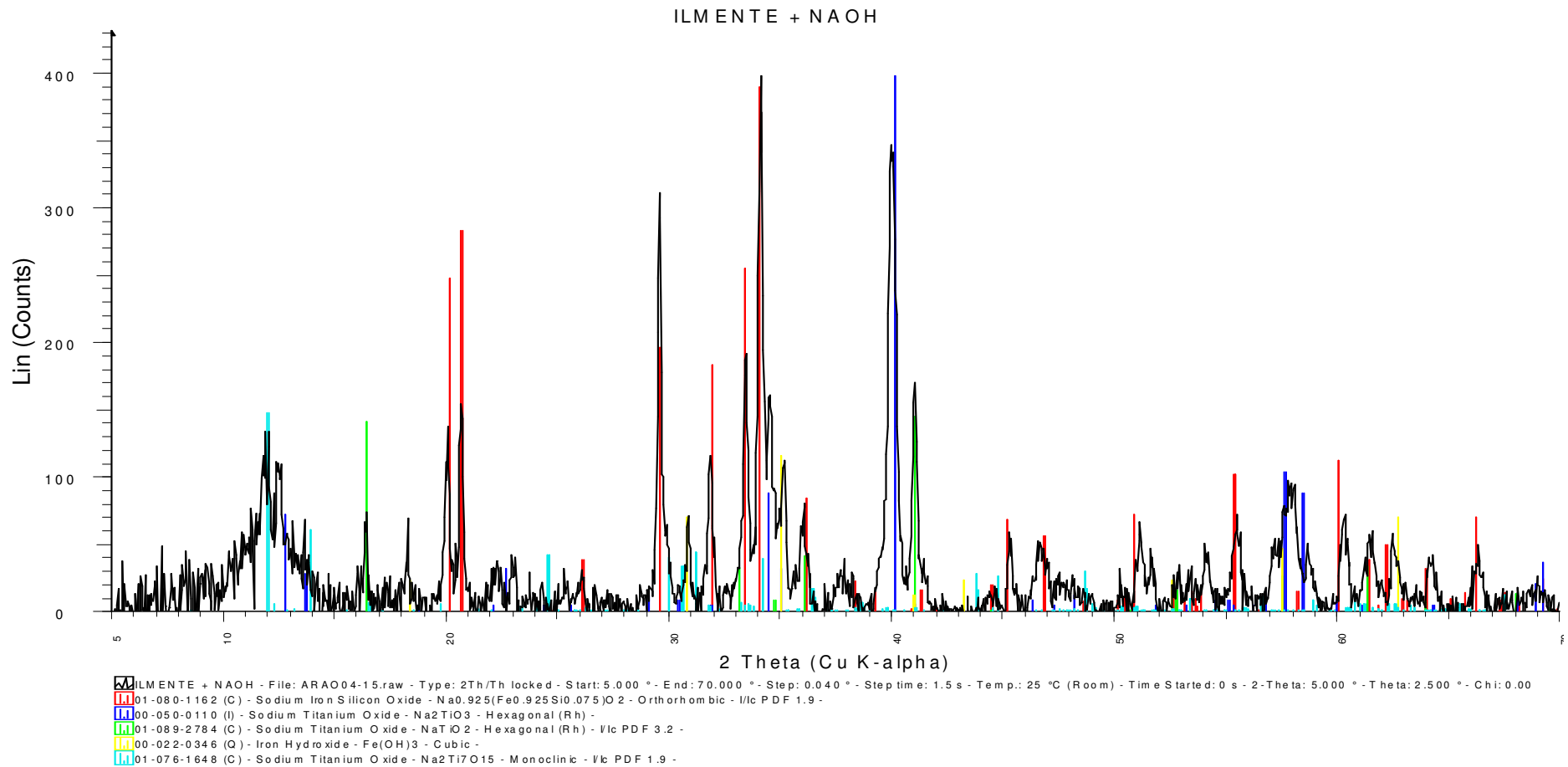
ILIMENITE + NaOH FUSION @ 700 deg 2H



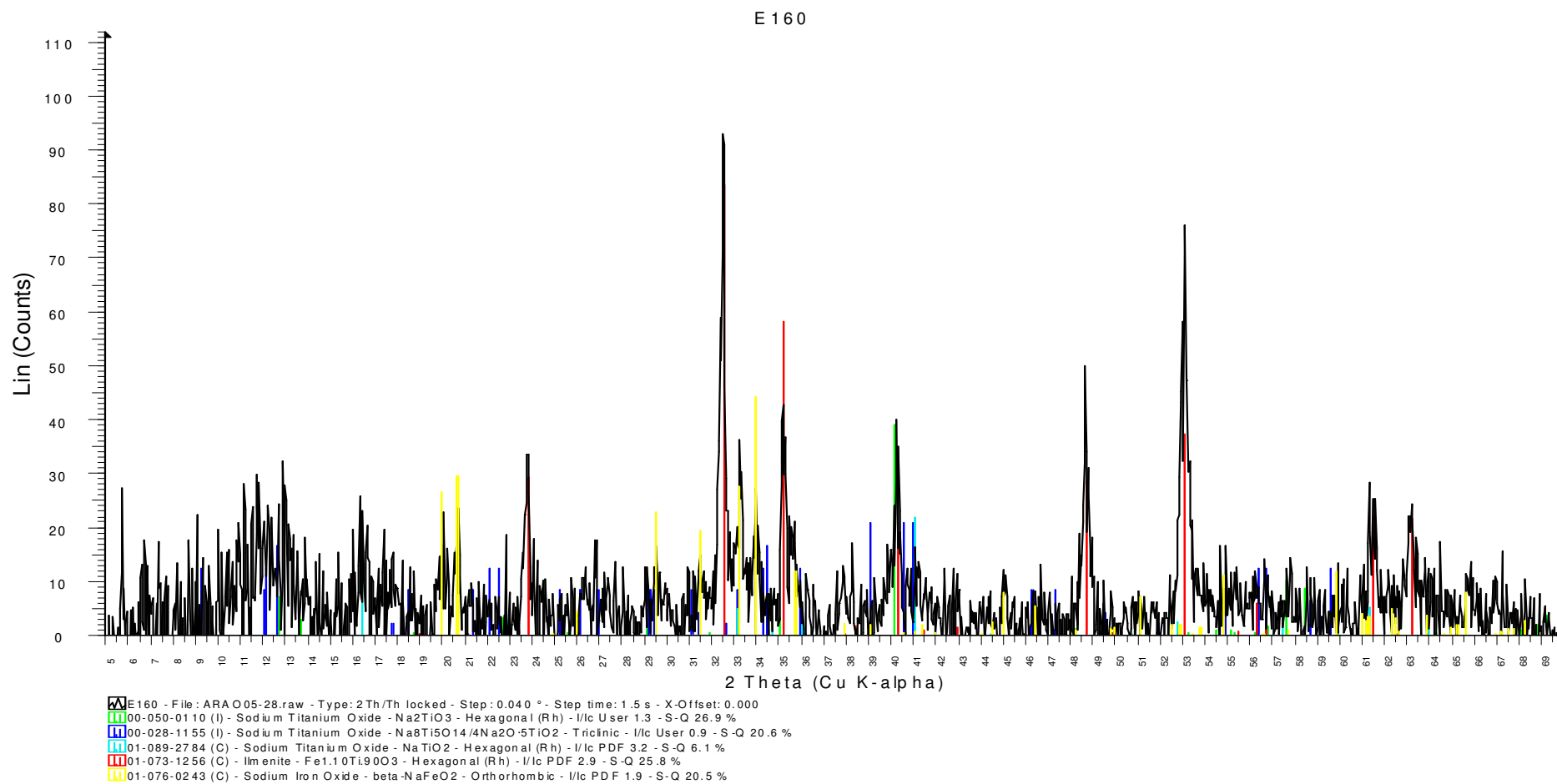
**Appendix A- 26:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with two mole of sodium hydroxide at 750 °C for two hours



**Appendix A- 27:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with four mole of sodium hydroxide at 750 °C for two hours

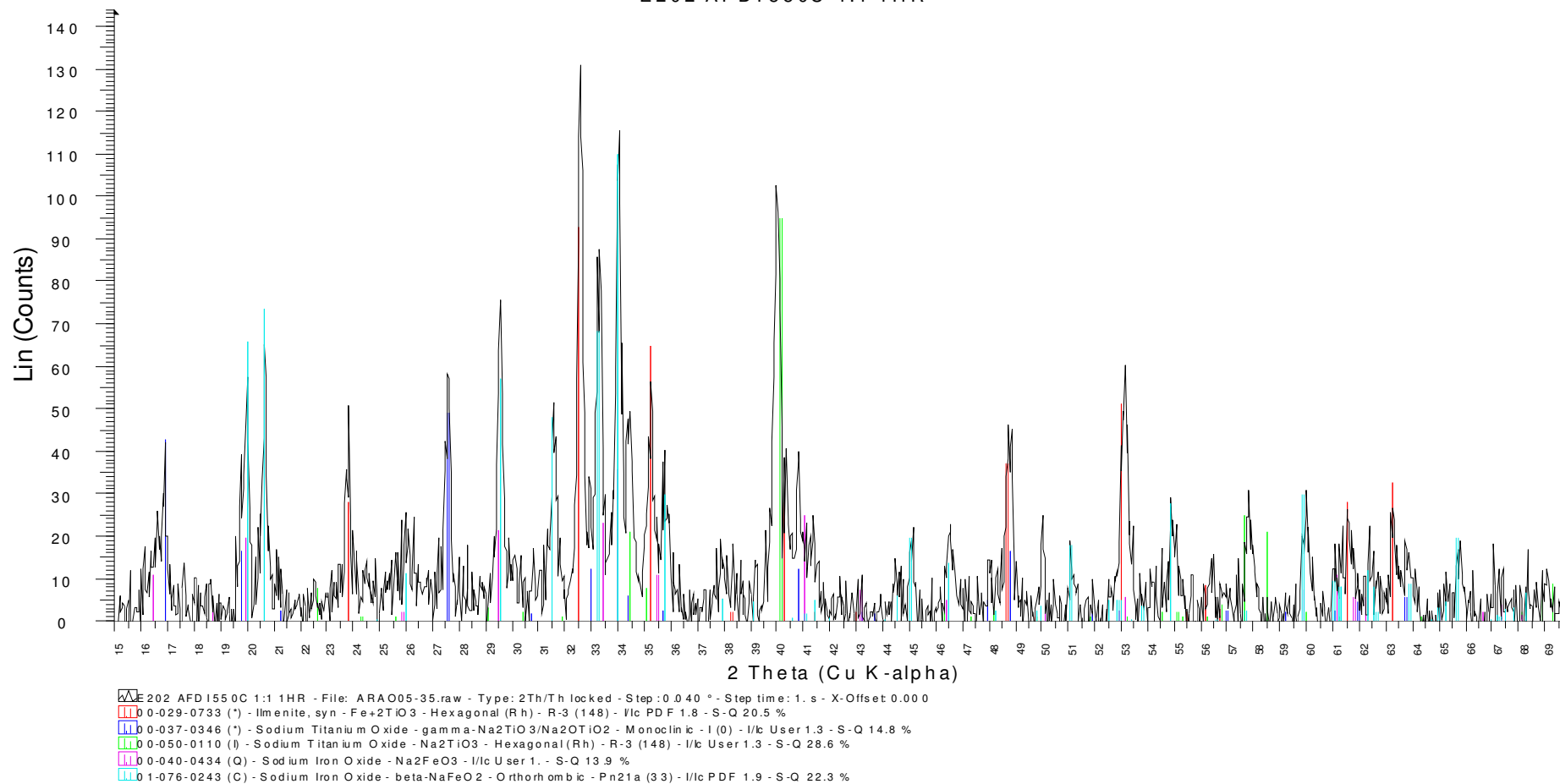


**Appendix A- 28:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with six mole of sodium hydroxide at 750 °C for two hours

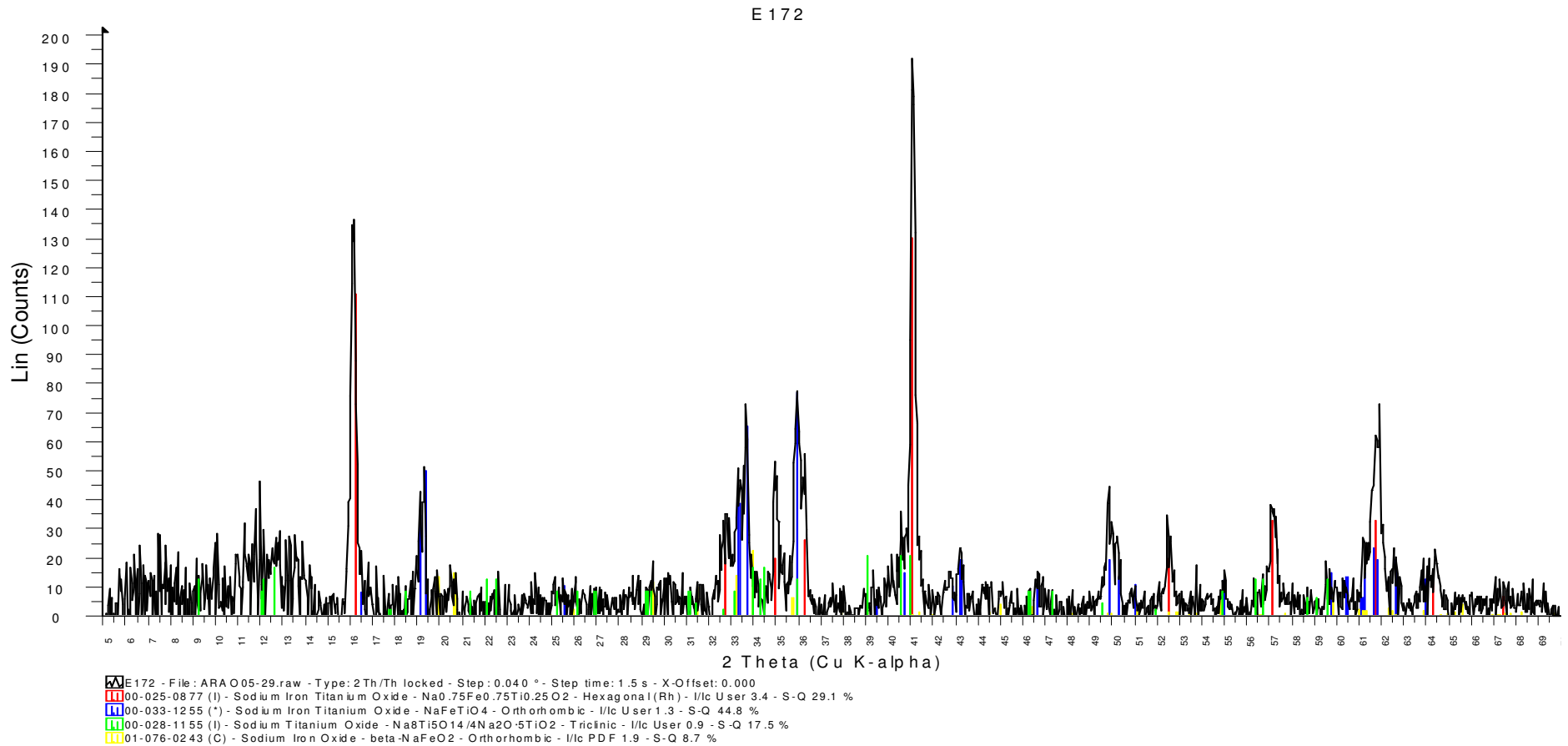


**Appendix A- 29:** XRD diagram of Alkali fused ilmenite. Four mole of ilmenite was fused with one mole of sodium hydroxide at 550 °C for two hours

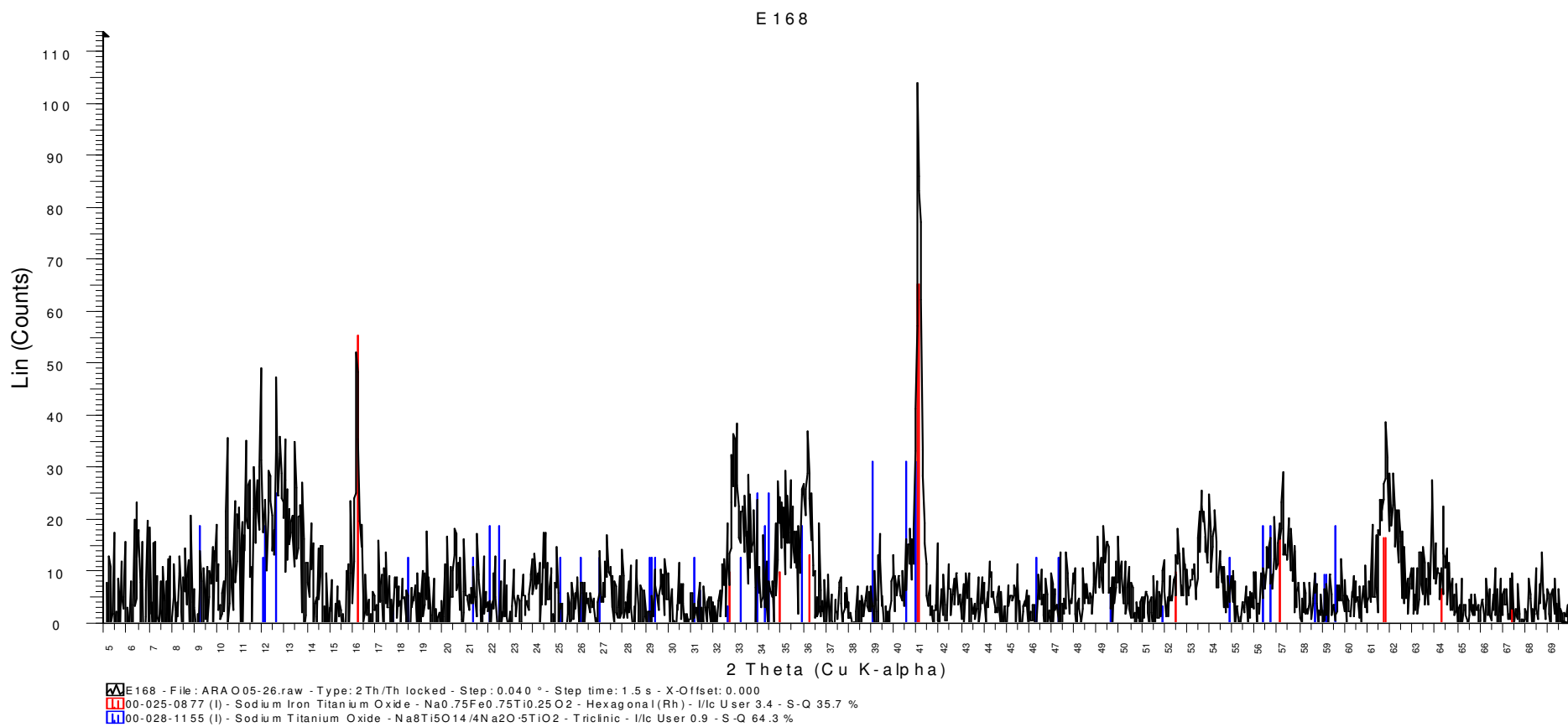
E202 AFDI550C 1:1 1HR



**Appendix A- 30:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with one mole of sodium hydroxide at 550 °C for two hours

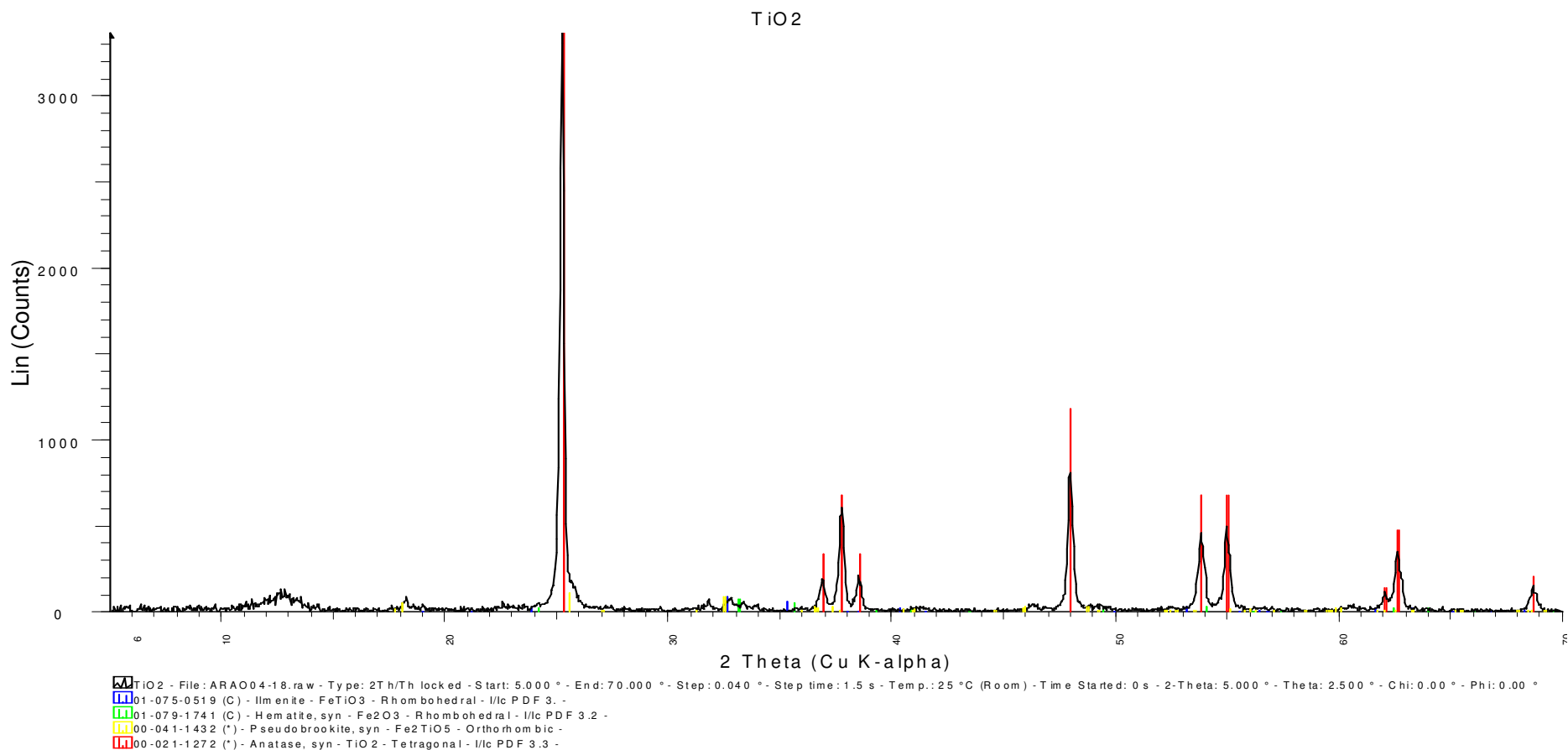


**Appendix A- 31:** XRD diagram of Alkali fused ilmenite. One mole of ilmenite was fused with one mole of sodium hydroxide at 850 °C for two hours

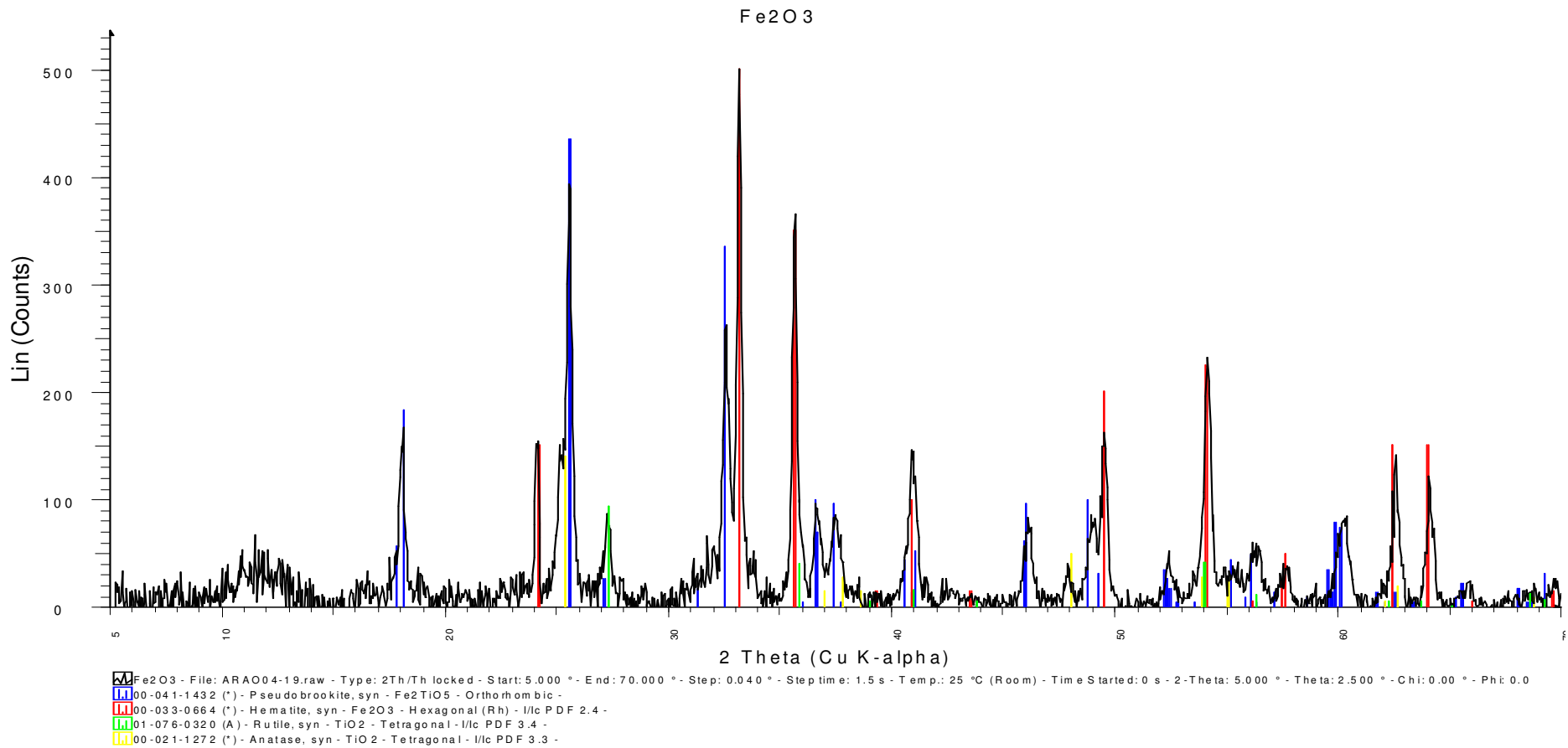


**Appendix A- 32:** XRD diagram of Alkali fused ilmenite. Four mole of ilmenite were fused with one mole of sodium hydroxide at 850 °C for two hours





**Appendix A- 33:** XRD diagram of titania produced in the new method (not purified)



**Appendix A- 34:** XRD diagram of the by-product produced in the new method

**Table A 1:** Identified phases by XRD in the AFDI diagrams obtained after roasting a mixture of a mole of ilmenite with two moles of sodium hydroxide for 1 h

| Phases                                                                  | Temperature, °C |       |       |       |       |       |       |       |       |       |       |       |       |       |
|-------------------------------------------------------------------------|-----------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                                                         | 300             | 350   | 400   | 450   | 500   | 550   | 600   | 650   | 700   | 750   | 800   | 850   | 900   | 950   |
| <b>FeTiO<sub>3</sub></b>                                                | major           | major | major | major | major | minor | trace | trace | trace | trace | trace | -     | -     | -     |
| <b>Na<sub>2</sub>Fe<sub>2</sub>Ti<sub>3</sub>O<sub>10</sub></b>         | -               | -     | -     | -     | -     | -     | -     | -     | -     | -     | minor | -     | -     | -     |
| <b>NaFeTiO<sub>4</sub></b>                                              | -               | -     | -     | -     | -     | minor | -     | -     | -     | minor | minor | major | minor | minor |
| <b>NaTiO<sub>2</sub></b>                                                | -               | trace | trace | -     | -     | -     | -     | -     | trace | minor | -     | -     | -     | -     |
| <b>Na<sub>8</sub>Ti<sub>5</sub>O<sub>14</sub></b>                       | -               | -     | -     | -     | -     | -     | trace | trace | minor | minor | minor | -     | -     | minor |
| <b>Na<sub>2</sub>TiO<sub>3</sub></b>                                    | -               | trace | trace | trace | -     | -     | major | major | trace | major | major | major | minor | minor |
| <b>Na<sub>0.75</sub>Fe<sub>0.75</sub>Ti<sub>0.25</sub>O<sub>2</sub></b> | -               | trace | trace | trace | trace | trace | trace | trace | trace | minor | major | major | major | major |
| <b>NaFeO<sub>2</sub></b>                                                | -               | minor | minor | minor | minor | minor | major | major | major | major | major | major | -     | -     |
| <b>Na<sub>2</sub>CO<sub>3</sub></b>                                     | major           | major | major | major | major | major | minor | minor | -     | -     | -     | -     | -     | -     |



## Appendix B: Particle size analysis



# MASTERSIZER



### Result Analysis Report

**Sample Name:**  
Sand 5/3035F+UltraSound

**Sample Source & type:**  
Works

**Sample bulk lot ref:**

**SOP Name:**

**Measured by:**  
ms

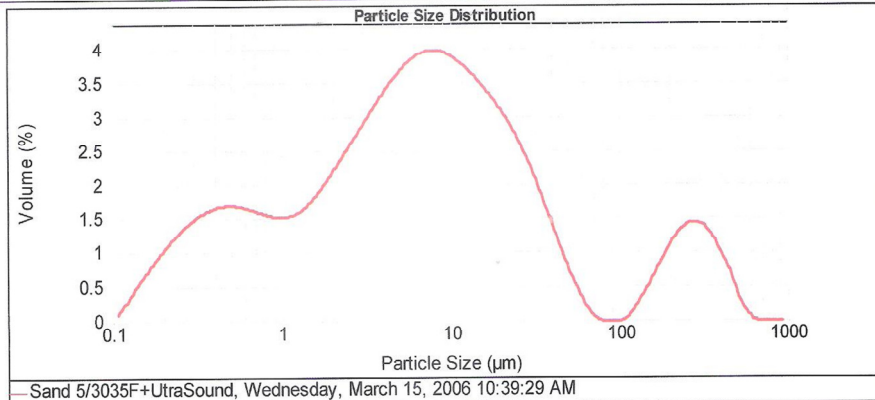
**Result Source:**  
Measurement

**Measured:**  
Wednesday, March 15, 2006 10:39:29 AM

**Analysed:**  
Wednesday, March 15, 2006 10:39:30 AM

|                                                         |                                                  |                                                |                                 |
|---------------------------------------------------------|--------------------------------------------------|------------------------------------------------|---------------------------------|
| <b>Particle Name:</b><br>Quartz                         | <b>Accessory Name:</b><br>Hydro 2000MU (A)       | <b>Analysis model:</b><br>General purpose      | <b>Sensitivity:</b><br>Enhanced |
| <b>Particle RI:</b><br>1.544                            | <b>Absorption:</b><br>0.1                        | <b>Size range:</b><br>0.100 to 1000.000 um     | <b>Obscuration:</b><br>11.55 %  |
| <b>Dispersant Name:</b><br>Water                        | <b>Dispersant RI:</b><br>1.330                   | <b>Weighted Residual:</b><br>0.300 %           | <b>Result Emulation:</b><br>Off |
| <b>Concentration:</b><br>0.0050 %Vol                    | <b>Span :</b><br>8.031                           | <b>Uniformity:</b><br>5.13                     | <b>Result units:</b><br>Volume  |
| <b>Specific Surface Area:</b><br>4.15 m <sup>2</sup> /g | <b>Surface Weighted Mean D[3,2]:</b><br>1.447 um | <b>Vol. Weighted Mean D[4,3]:</b><br>34.912 um |                                 |

d(0.1): 0.448 um      d(0.5): 6.363 um      d(0.9): 51.547 um



Sand 5/3035F+UltraSound, Wednesday, March 15, 2006 10:39:29 AM

| Size (um) | Volume In % | Size (um) | Volume In % | Size (um) | Volume In % | Size (um) | Volume In % | Size (um) | Volume In % | Size (um) | Volume In % |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 0.100     | 0.04        | 0.479     | 1.02        | 2.291     | 1.49        | 10.955    | 2.28        | 52.481    | 0.31        | 251.189   | 0.86        |
| 0.110     | 0.13        | 0.525     | 1.01        | 2.512     | 1.59        | 12.023    | 2.23        | 57.544    | 0.19        | 275.423   | 0.87        |
| 0.120     | 0.21        | 0.575     | 1.00        | 2.754     | 1.69        | 13.183    | 2.16        | 63.096    | 0.09        | 301.995   | 0.83        |
| 0.132     | 0.31        | 0.631     | 0.98        | 3.020     | 1.78        | 14.454    | 2.10        | 69.183    | 0.02        | 331.131   | 0.77        |
| 0.145     | 0.39        | 0.692     | 0.99        | 3.311     | 1.88        | 15.849    | 2.03        | 75.858    | 0.00        | 363.078   | 0.66        |
| 0.158     | 0.47        | 0.759     | 0.94        | 3.631     | 1.97        | 17.378    | 1.95        | 83.176    | 0.00        | 398.107   | 0.54        |
| 0.174     | 0.55        | 0.832     | 0.92        | 3.991     | 1.97        | 19.055    | 1.86        | 91.201    | 0.00        | 436.516   | 0.42        |
| 0.191     | 0.62        | 0.912     | 0.91        | 4.395     | 2.05        | 20.893    | 1.77        | 100.000   | 0.00        | 478.630   | 0.23        |
| 0.209     | 0.69        | 1.000     | 0.91        | 4.786     | 2.14        | 22.909    | 1.77        | 109.648   | 0.00        | 524.807   | 0.12        |
| 0.229     | 0.76        | 1.096     | 0.93        | 5.248     | 2.21        | 25.119    | 1.66        | 120.226   | 0.05        | 575.440   | 0.03        |
| 0.251     | 0.82        | 1.202     | 0.96        | 5.754     | 2.33        | 27.542    | 1.54        | 131.626   | 0.13        | 630.957   | 0.00        |
| 0.275     | 0.87        | 1.318     | 1.00        | 6.310     | 2.36        | 30.200    | 1.40        | 144.544   | 0.23        | 691.831   | 0.00        |
| 0.302     | 0.92        | 1.445     | 1.05        | 6.918     | 2.39        | 33.113    | 1.10        | 158.489   | 0.44        | 758.578   | 0.00        |
| 0.331     | 0.95        | 1.585     | 1.14        | 7.586     | 2.39        | 36.308    | 0.93        | 173.780   | 0.56        | 831.764   | 0.00        |
| 0.363     | 0.98        | 1.738     | 1.22        | 8.318     | 2.39        | 39.811    | 0.77        | 190.546   | 0.66        | 912.011   | 0.00        |
| 0.398     | 1.00        | 1.905     | 1.31        | 9.120     | 2.36        | 43.652    | 0.60        | 208.930   | 0.76        | 1000.000  | 0.00        |
| 0.437     | 1.01        | 2.089     | 1.40        | 10.000    | 2.33        | 47.863    | 0.45        | 229.087   | 0.83        |           |             |
| 0.479     |             | 2.291     |             | 10.955    |             | 52.481    |             | 251.189   |             |           |             |

Operator notes:



# MASTERSIZER

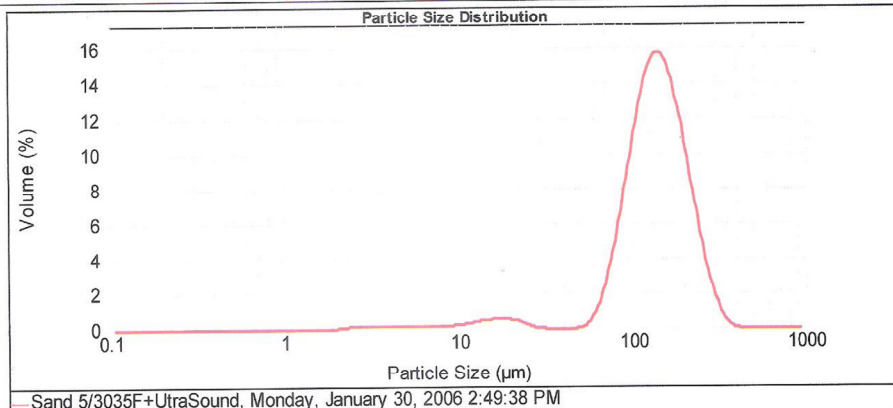


## Result Analysis Report

**Sample Name:** Sand 5/3035F+UltraSound  
**SOP Name:**  
**Measured:** Monday, January 30, 2006 2:49:38 PM  
**Sample Source & type:** Works  
**Measured by:** ms  
**Analysed:** Monday, January 30, 2006 2:49:39 PM  
**Sample bulk lot ref:**  
**Result Source:** Measurement

**Particle Name:** Quartz  
**Accessory Name:** Hydro 2000MU (A)  
**Analysis model:** General purpose  
**Sensitivity:** Enhanced  
**Particle RI:** 1.544  
**Absorption:** 0.1  
**Size range:** 0.100 to 1000.000 um  
**Obscuration:** 12.12 %  
**Dispersant Name:** Water  
**Dispersant RI:** 1.330  
**Weighted Residual:** 0.421 %  
**Result Emulation:** Off  
**Concentration:** 0.1518 %Vol  
**Span :** 1.007  
**Uniformity:** 0.325  
**Result units:** Volume  
**Specific Surface Area:** 0.0701 m<sup>2</sup>/g  
**Surface Weighted Mean D[3,2]:** 85.642 um  
**Vol. Weighted Mean D[4,3]:** 145.083 um

d(0.1): 82.627 um      d(0.5): 138.746 um      d(0.9): 222.281 um



| Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 0.100     | 0.00        | 0.479     | 0.00        | 2.291     | 0.06        | 10.955    | 0.18        | 52.481    | 0.12        | 251.189   | 2.41        |
| 0.110     | 0.00        | 0.525     | 0.00        | 2.512     | 0.07        | 12.023    | 0.23        | 57.544    | 0.43        | 276.423   | 1.44        |
| 0.120     | 0.00        | 0.575     | 0.00        | 2.754     | 0.08        | 13.183    | 0.27        | 63.096    | 1.02        | 301.995   | 0.73        |
| 0.132     | 0.00        | 0.631     | 0.00        | 3.020     | 0.09        | 14.454    | 0.31        | 69.183    | 1.86        | 331.131   | 0.29        |
| 0.145     | 0.00        | 0.692     | 0.00        | 3.311     | 0.09        | 15.849    | 0.33        | 75.858    | 2.96        | 363.078   | 0.03        |
| 0.158     | 0.00        | 0.759     | 0.00        | 3.631     | 0.09        | 17.378    | 0.33        | 83.176    | 4.30        | 398.107   | 0.00        |
| 0.174     | 0.00        | 0.832     | 0.00        | 3.981     | 0.08        | 19.055    | 0.31        | 91.201    | 5.71        | 439.516   | 0.00        |
| 0.191     | 0.00        | 0.912     | 0.00        | 4.365     | 0.08        | 20.893    | 0.27        | 100.000   | 7.09        | 478.630   | 0.00        |
| 0.209     | 0.00        | 1.000     | 0.00        | 4.786     | 0.07        | 22.909    | 0.18        | 109.648   | 8.29        | 524.807   | 0.00        |
| 0.229     | 0.00        | 1.096     | 0.00        | 5.248     | 0.06        | 25.119    | 0.08        | 120.226   | 9.11        | 575.440   | 0.00        |
| 0.251     | 0.00        | 1.202     | 0.00        | 5.754     | 0.06        | 27.542    | 0.08        | 131.826   | 9.50        | 630.957   | 0.00        |
| 0.275     | 0.00        | 1.318     | 0.00        | 6.310     | 0.05        | 30.200    | 0.01        | 144.544   | 9.36        | 691.831   | 0.00        |
| 0.302     | 0.00        | 1.445     | 0.00        | 6.918     | 0.05        | 33.113    | 0.00        | 158.489   | 8.75        | 758.578   | 0.00        |
| 0.331     | 0.00        | 1.585     | 0.00        | 7.586     | 0.05        | 36.308    | 0.00        | 173.780   | 7.71        | 831.764   | 0.00        |
| 0.363     | 0.00        | 1.738     | 0.00        | 8.318     | 0.08        | 39.811    | 0.00        | 190.546   | 6.41        | 912.011   | 0.00        |
| 0.398     | 0.00        | 1.905     | 0.00        | 9.120     | 0.11        | 43.652    | 0.00        | 208.930   | 5.00        | 1000.000  | 0.00        |
| 0.437     | 0.00        | 2.089     | 0.00        | 10.000    | 0.14        | 47.863    | 0.00        | 229.067   | 3.62        |           |             |
| 0.479     | 0.00        | 2.291     | 0.02        | 10.955    | 0.14        | 52.481    | 0.00        | 251.189   |             |           |             |

Operator notes:



# MASTERSIZER 2000

## Result Analysis Report

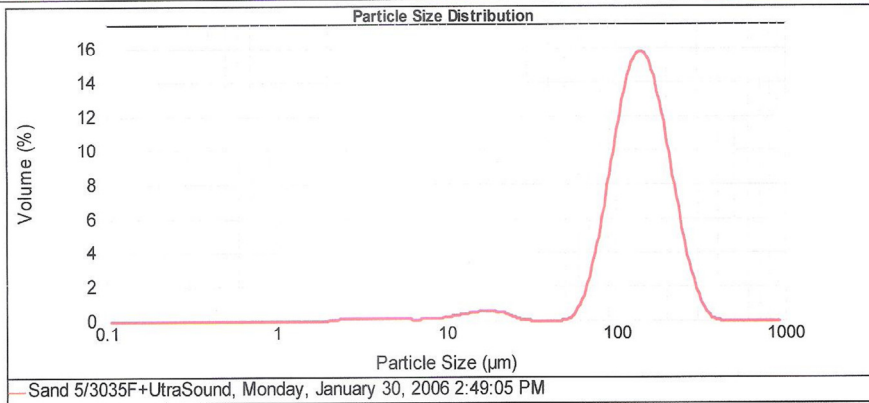
**Sample Name:** Sand 5/3035F+UltraSound  
**Sample Source & type:** Works  
**Sample bulk lot ref:**

**SOP Name:**  
**Measured by:** ms  
**Result Source:** Measurement

**Measured:** Monday, January 30, 2006 2:49:05 PM  
**Analysed:** Monday, January 30, 2006 2:49:07 PM

|                                                           |                                                   |                                                 |                                 |
|-----------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------|
| <b>Particle Name:</b><br>Quartz                           | <b>Accessory Name:</b><br>Hydro 2000MU (A)        | <b>Analysis model:</b><br>General purpose       | <b>Sensitivity:</b><br>Enhanced |
| <b>Particle RI:</b><br>1.544                              | <b>Absorption:</b><br>0.1                         | <b>Size range:</b><br>0.100 to 1000.000 um      | <b>Obscuration:</b><br>11.94 %  |
| <b>Dispersant Name:</b><br>Water                          | <b>Dispersant RI:</b><br>1.330                    | <b>Weighted Residual:</b><br>0.418 %            | <b>Result Emulation:</b><br>Off |
| <b>Concentration:</b><br>0.1498 %Vol                      | <b>Span :</b><br>1.004                            | <b>Uniformity:</b><br>0.324                     | <b>Result units:</b><br>Volume  |
| <b>Specific Surface Area:</b><br>0.0699 m <sup>2</sup> /g | <b>Surface Weighted Mean D[3,2]:</b><br>85.848 um | <b>Vol. Weighted Mean D[4,3]:</b><br>145.056 um |                                 |

d(0.1): 82.756 um                      d(0.5): 138.722 um                      d(0.9): 222.069 um



| Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 0.100     | 0.00        | 0.479     | 0.00        | 2.291     | 0.05        | 10.965    | 0.18        | 52.481    | 0.11        |
| 0.110     | 0.00        | 0.525     | 0.00        | 2.512     | 0.05        | 12.023    | 0.22        | 57.544    | 0.43        |
| 0.120     | 0.00        | 0.575     | 0.00        | 2.754     | 0.07        | 13.183    | 0.27        | 63.096    | 1.02        |
| 0.132     | 0.00        | 0.631     | 0.00        | 3.020     | 0.08        | 14.454    | 0.30        | 69.183    | 1.86        |
| 0.145     | 0.00        | 0.692     | 0.00        | 3.311     | 0.09        | 15.849    | 0.33        | 75.858    | 2.96        |
| 0.158     | 0.00        | 0.759     | 0.00        | 3.631     | 0.09        | 17.378    | 0.33        | 83.176    | 4.31        |
| 0.174     | 0.00        | 0.832     | 0.00        | 3.981     | 0.08        | 19.055    | 0.31        | 91.201    | 5.72        |
| 0.191     | 0.00        | 0.912     | 0.00        | 4.365     | 0.08        | 20.893    | 0.27        | 100.000   | 7.10        |
| 0.209     | 0.00        | 1.000     | 0.00        | 4.786     | 0.07        | 22.909    | 0.18        | 109.648   | 8.30        |
| 0.229     | 0.00        | 1.096     | 0.00        | 5.248     | 0.07        | 25.119    | 0.08        | 120.226   | 9.13        |
| 0.251     | 0.00        | 1.202     | 0.00        | 5.754     | 0.05        | 27.542    | 0.01        | 131.826   | 9.52        |
| 0.275     | 0.00        | 1.318     | 0.00        | 6.310     | 0.05        | 30.200    | 0.00        | 144.544   | 9.38        |
| 0.302     | 0.00        | 1.445     | 0.00        | 6.918     | 0.05        | 33.113    | 0.00        | 158.489   | 8.76        |
| 0.331     | 0.00        | 1.585     | 0.00        | 7.586     | 0.06        | 36.308    | 0.00        | 173.780   | 7.72        |
| 0.363     | 0.00        | 1.738     | 0.00        | 8.318     | 0.08        | 39.811    | 0.00        | 190.546   | 6.41        |
| 0.398     | 0.00        | 1.905     | 0.00        | 9.120     | 0.10        | 43.652    | 0.00        | 208.930   | 5.00        |
| 0.437     | 0.00        | 2.089     | 0.00        | 10.000    | 0.14        | 47.863    | 0.00        | 229.057   | 3.61        |
| 0.479     | 0.00        | 2.291     | 0.02        | 10.965    | 0.14        | 52.481    | 0.00        | 251.189   | 2.40        |
|           |             |           |             |           |             |           |             | 275.423   | 1.43        |
|           |             |           |             |           |             |           |             | 301.995   | 0.72        |
|           |             |           |             |           |             |           |             | 331.131   | 0.28        |
|           |             |           |             |           |             |           |             | 363.078   | 0.03        |
|           |             |           |             |           |             |           |             | 398.107   | 0.00        |
|           |             |           |             |           |             |           |             | 436.516   | 0.00        |
|           |             |           |             |           |             |           |             | 478.630   | 0.00        |
|           |             |           |             |           |             |           |             | 524.807   | 0.00        |
|           |             |           |             |           |             |           |             | 575.440   | 0.00        |
|           |             |           |             |           |             |           |             | 630.957   | 0.00        |
|           |             |           |             |           |             |           |             | 691.831   | 0.00        |
|           |             |           |             |           |             |           |             | 758.578   | 0.00        |
|           |             |           |             |           |             |           |             | 831.764   | 0.00        |
|           |             |           |             |           |             |           |             | 912.011   | 0.00        |
|           |             |           |             |           |             |           |             | 1000.000  | 0.00        |

Operator notes:





# MASTERSIZER



## Result Analysis Report

**Sample Name:**  
Sand 5/3035F+UltraSound

**Sample Source & type:**  
Works

**Sample bulk lot ref:**

**SOP Name:**

**Measured by:**  
ms

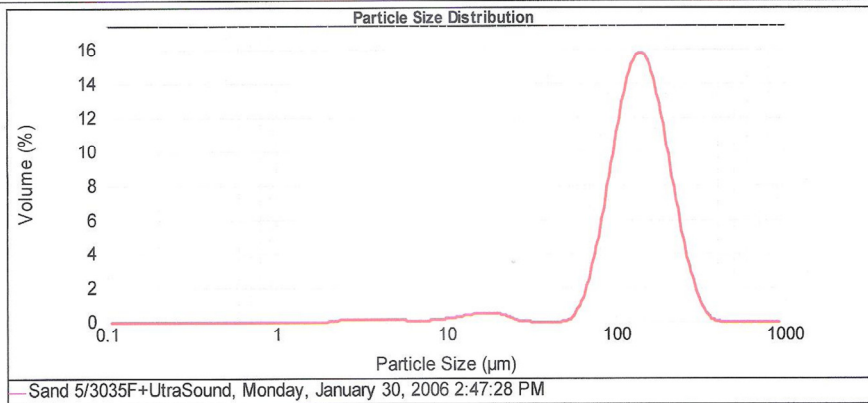
**Result Source:**  
Measurement

**Measured:**  
Monday, January 30, 2006 2:47:28 PM

**Analysed:**  
Monday, January 30, 2006 2:47:30 PM

|                                                           |                                                   |                                                 |                                 |
|-----------------------------------------------------------|---------------------------------------------------|-------------------------------------------------|---------------------------------|
| <b>Particle Name:</b><br>Quartz                           | <b>Accessory Name:</b><br>Hydro 2000MU (A)        | <b>Analysis model:</b><br>General purpose       | <b>Sensitivity:</b><br>Enhanced |
| <b>Particle RI:</b><br>1.544                              | <b>Absorption:</b><br>0.1                         | <b>Size range:</b><br>0.100 to 1000.000 um      | <b>Obscuration:</b><br>11.75 %  |
| <b>Dispersant Name:</b><br>Water                          | <b>Dispersant RI:</b><br>1.330                    | <b>Weighted Residual:</b><br>0.439 %            | <b>Result Emulation:</b><br>Off |
| <b>Concentration:</b><br>0.1506 %Vol                      | <b>Span :</b><br>0.999                            | <b>Uniformity:</b><br>0.321                     | <b>Result units:</b><br>Volume  |
| <b>Specific Surface Area:</b><br>0.0684 m <sup>2</sup> /g | <b>Surface Weighted Mean D[3,2]:</b><br>87.743 um | <b>Vol. Weighted Mean D[4,3]:</b><br>145.368 um |                                 |

d(0.1): 83.370 um                      d(0.5): 138.828 um                      d(0.9): 222.000 um



| Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 0.100     | 0.00        | 0.479     | 0.00        | 2.291     | 0.06        | 10.965    | 0.16        | 52.481    | 0.11        | 251.189   | 2.39        |
| 0.110     | 0.00        | 0.525     | 0.00        | 2.512     | 0.07        | 12.023    | 0.20        | 57.544    | 0.43        | 275.423   | 1.42        |
| 0.120     | 0.00        | 0.575     | 0.00        | 2.754     | 0.08        | 13.183    | 0.25        | 63.096    | 1.02        | 301.995   | 0.72        |
| 0.132     | 0.00        | 0.631     | 0.00        | 3.020     | 0.08        | 14.454    | 0.28        | 69.183    | 1.87        | 331.131   | 0.28        |
| 0.145     | 0.00        | 0.692     | 0.00        | 3.311     | 0.09        | 15.849    | 0.31        | 75.858    | 2.97        | 363.078   | 0.03        |
| 0.158     | 0.00        | 0.759     | 0.00        | 3.631     | 0.09        | 17.378    | 0.31        | 83.176    | 4.33        | 398.107   | 0.00        |
| 0.174     | 0.00        | 0.832     | 0.00        | 3.981     | 0.08        | 19.055    | 0.29        | 91.201    | 5.75        | 436.516   | 0.00        |
| 0.191     | 0.00        | 0.912     | 0.00        | 4.365     | 0.07        | 20.893    | 0.25        | 100.000   | 7.14        | 478.630   | 0.00        |
| 0.209     | 0.00        | 1.000     | 0.00        | 4.786     | 0.07        | 22.909    | 0.16        | 109.648   | 8.35        | 524.807   | 0.00        |
| 0.229     | 0.00        | 1.096     | 0.00        | 5.248     | 0.06        | 25.119    | 0.06        | 120.226   | 9.18        | 575.440   | 0.00        |
| 0.251     | 0.00        | 1.202     | 0.00        | 5.754     | 0.05        | 27.542    | 0.01        | 131.826   | 9.56        | 630.957   | 0.00        |
| 0.275     | 0.00        | 1.318     | 0.00        | 6.310     | 0.04        | 30.200    | 0.00        | 144.544   | 9.41        | 691.831   | 0.00        |
| 0.302     | 0.00        | 1.445     | 0.00        | 6.918     | 0.04        | 33.113    | 0.00        | 158.489   | 8.78        | 758.578   | 0.00        |
| 0.331     | 0.00        | 1.585     | 0.00        | 7.586     | 0.05        | 36.308    | 0.00        | 173.780   | 7.73        | 831.764   | 0.00        |
| 0.363     | 0.00        | 1.738     | 0.00        | 8.318     | 0.07        | 39.811    | 0.00        | 190.546   | 6.42        | 912.011   | 0.00        |
| 0.398     | 0.00        | 1.905     | 0.00        | 9.120     | 0.09        | 43.652    | 0.00        | 208.930   | 5.00        | 1000.000  | 0.00        |
| 0.437     | 0.00        | 2.089     | 0.00        | 10.000    | 0.12        | 47.863    | 0.00        | 229.087   | 3.61        |           |             |
| 0.479     | 0.00        | 2.291     | 0.02        | 10.965    | 0.12        | 52.481    | 0.00        | 251.189   |             |           |             |

Operator notes:



# MASTERSIZER 2000

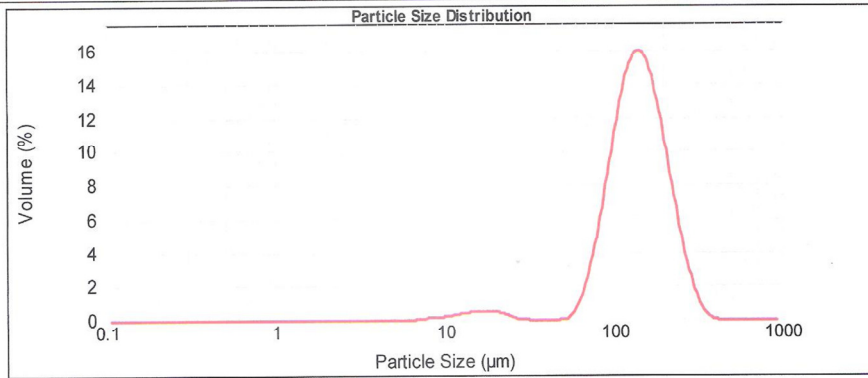
## Result Analysis Report

**Sample Name:** Sand 5/3035F+UltraSound  
**Sample Source & type:** Works  
**Sample bulk lot ref:**  
**SOP Name:**  
**Measured by:** ms  
**Result Source:** Measurement  
**Measured:** Monday, January 30, 2006 2:46:56 PM  
**Analysed:** Monday, January 30, 2006 2:46:57 PM

**Particle Name:** Quartz  
**Particle RI:** 1.544  
**Dispersant Name:** Water  
**Accessory Name:** Hydro 2000MU (A)  
**Absorption:** 0.1  
**Dispersant RI:** 1.330  
**Analysis model:** General purpose  
**Size range:** 0.100 to 1000.000 um  
**Weighted Residual:** 0.472 %  
**Sensitivity:** Enhanced  
**Obscuration:** 11.72 %  
**Result Emulation:** Off

**Concentration:** 0.1926 %Vol  
**Specific Surface Area:** 0.0545 m<sup>2</sup>/g  
**Span :** 0.985  
**Surface Weighted Mean D[3,2]:** 110.081 um  
**Uniformity:** 0.313  
**Vol. Weighted Mean D[4,3]:** 147.072 um  
**Result units:** Volume

d(0.1): 85.269 um      d(0.5): 139.871 um      d(0.9): 223.044 um



Sand 5/3035F+UltraSound, Monday, January 30, 2006 2:46:56 PM

| Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % | Size (µm) | Volume In % |
|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|-----------|-------------|
| 0.100     | 0.00        | 0.479     | 0.00        | 2.291     | 0.00        | 10.965    | 0.17        | 52.481    | 0.10        | 251.189   | 2.45        |
| 0.110     | 0.00        | 0.525     | 0.00        | 2.512     | 0.00        | 12.023    | 0.21        | 57.544    | 0.41        | 275.423   | 1.47        |
| 0.120     | 0.00        | 0.575     | 0.00        | 2.754     | 0.00        | 13.183    | 0.26        | 63.096    | 1.00        | 301.996   | 0.75        |
| 0.132     | 0.00        | 0.631     | 0.00        | 3.020     | 0.00        | 14.454    | 0.29        | 69.183    | 1.85        | 331.131   | 0.29        |
| 0.145     | 0.00        | 0.692     | 0.00        | 3.311     | 0.00        | 15.849    | 0.31        | 75.858    | 2.95        | 363.078   | 0.03        |
| 0.158     | 0.00        | 0.759     | 0.00        | 3.631     | 0.00        | 17.378    | 0.31        | 83.176    | 4.31        | 398.107   | 0.00        |
| 0.174     | 0.00        | 0.832     | 0.00        | 3.981     | 0.00        | 19.055    | 0.29        | 91.201    | 5.75        | 436.516   | 0.00        |
| 0.191     | 0.00        | 0.912     | 0.00        | 4.365     | 0.00        | 20.893    | 0.24        | 100.000   | 7.16        | 478.630   | 0.00        |
| 0.209     | 0.00        | 1.000     | 0.00        | 4.786     | 0.00        | 22.909    | 0.15        | 109.648   | 8.38        | 524.807   | 0.00        |
| 0.229     | 0.00        | 1.096     | 0.00        | 5.248     | 0.00        | 25.119    | 0.05        | 120.226   | 9.24        | 575.440   | 0.00        |
| 0.251     | 0.00        | 1.202     | 0.00        | 5.754     | 0.00        | 27.542    | 0.00        | 131.826   | 9.64        | 630.957   | 0.00        |
| 0.275     | 0.00        | 1.318     | 0.00        | 6.310     | 0.00        | 30.200    | 0.00        | 144.544   | 9.51        | 691.831   | 0.00        |
| 0.302     | 0.00        | 1.445     | 0.00        | 6.918     | 0.00        | 33.113    | 0.00        | 158.489   | 8.90        | 758.578   | 0.00        |
| 0.331     | 0.00        | 1.585     | 0.00        | 7.586     | 0.01        | 36.308    | 0.00        | 173.780   | 7.85        | 831.764   | 0.00        |
| 0.363     | 0.00        | 1.738     | 0.00        | 8.318     | 0.06        | 39.811    | 0.00        | 190.546   | 6.52        | 912.011   | 0.00        |
| 0.398     | 0.00        | 1.905     | 0.00        | 9.120     | 0.07        | 43.682    | 0.00        | 208.930   | 5.09        | 1000.000  | 0.00        |
| 0.437     | 0.00        | 2.089     | 0.00        | 10.000    | 0.09        | 47.863    | 0.00        | 229.067   | 3.69        |           |             |
| 0.479     | 0.00        | 2.291     | 0.00        | 10.965    | 0.13        | 52.481    | 0.00        | 251.189   |             |           |             |

Operator notes: