Metasideronatrite  
Na$_2$Fe$^{3+}$(SO$_4$)$_2$(OH)·1·2H$_2$O

Crystal Data: Orthorhombic.  
Point Group: 2/m 2/m 2/m.  
Rare crystals are prismatic, elongated along [001], showing {010}, {110}, {011}; typically in radiating aggregates, to 2.5 cm, and in flat mats and crusts.

Physical Properties:  
Cleavage: On {100}, {010}, perfect; on {001}, nearly perfect.  
Fracture: Fibrous.  
Hardness = 2.5  
D(meas.) = 2.68  
D(calc.) = 2.68  
Reversibly alters from sideronatrite depending on relative humidity and exposure to sunlight; decomposes in boiling H$_2$O.

Optical Properties:  
Transparent.  
Color: Golden yellow, straw-yellow; yellow in transmitted light.  
Luster: Silky.  
Optical Class: Biaxial (+).  
Pleochroism: X = colorless; Y = pale yellow; Z = brownish yellow.  
Orientation: X = a; Y = b; Z = c.  
Dispersion: r > v, strong.  
$\alpha$ = 1.543  
$\beta$ = 1.575  
$\gamma$ = 1.634  
2V(meas.) = 60°

Cell Data: 
Space Group: Pbnm or Pb n$_2$.  
$a$ = 7.357(3)  
b = 16.002(4)  
c = 7.102(8)  
Z = 2

X-ray Powder Pattern: 
Chuquicamata, Chile.  
3.680 (100), 8.05 (90), 6.682 (70), 2.749 (50), 2.665 (50), 3.485 (40), 3.994 (30)

Chemistry:  
<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SO$_3$</td>
<td>48.66</td>
<td>48.68</td>
<td>46.15</td>
</tr>
<tr>
<td>Fe$_2$O$_3$</td>
<td>22.90</td>
<td>24.27</td>
<td>23.01</td>
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<tr>
<td>Na$_2$O</td>
<td>17.56</td>
<td>18.84</td>
<td>17.86</td>
</tr>
<tr>
<td>K$_2$O</td>
<td>0.26</td>
<td></td>
<td></td>
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<tr>
<td>H$_2$O</td>
<td>9.75</td>
<td>8.21</td>
<td>12.98</td>
</tr>
<tr>
<td>insol.</td>
<td>0.60</td>
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<tr>
<td>Total</td>
<td>99.73</td>
<td>100.00</td>
<td>100.00</td>
</tr>
</tbody>
</table>

(1) Chuquicamata, Chile; (OH)$^{1−}$ calculated for charge balance, corresponding to Na$_{2.02}$K$_{0.02}$Fe$_{1.02}$(SO$_4$)$_{2.17}$(OH)$_{0.76}$·1.55H$_2$O.  
(2) Na$_2$Fe(SO$_4$)$_2$(OH)·H$_2$O.  
(3) Na$_2$Fe(SO$_4$)$_2$(OH)·2H$_2$O.

Occurrence: 
An uncommon alteration product of pyrite, typically formed in arid climates but stably formed in sea-shore environments.

Association: 
Sideronatrite, metavoltine, ungemachite, ferrinatrite, alunogen, natrojarosite, pickeringite, sulfur, tamarugite, aluminocopiapatite, metavoltine, mendozite, kornelite, gypsum.

Distribution: 
From Chuquicamata and the Sierra Gorda district, southwest of Calama, Antofagasta, Chile. In the USA, in the Capitol Reef National Monument, Wayne Co., Utah; from the Yazzie No. 101 mine, near Cameron, Coconino Co., Arizona; large radiating crystals at the Hot Springs Point sulfur mine, eight km east-southeast of Crescent Valley, Eureka Co., Nevada. In the Sydney coalfield, Nova Scotia, Canada. From Trerubies Cove, near Delabole, Cornwall, and at Barton-on-Sea, Hampshire, England. From north of Ballybunion, Co. Kerry, Ireland. At the Lanjarón mineral springs, Granada, Spain. In the Grotto de Faraglione, Port di Levante, Vulcano, Lipari Islands, Italy.

Name: 
From the Greek meta, signifying a lower hydrate, and its relation to sideronatrite.

Type Material: 
n.d.

References: 

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