**Kleberite**

**Fe$^{3+}$Ti$_6$O$_{11}$(OH)$_5$**

**Crystal Data:** Monoclinic. Point Group: $2/m$. As rounded grains to 0.3 mm, as pseudomorphs after ilmenite. **Twinning:** Observed in X-ray analysis.

**Physical Properties:** 
- **Cleavage:** n.d.  
- **Fracture:** Irregular.  
- **Tenacity:** Brittle.  
- Hardness = n.d.  
- $D(\text{meas.}) = 3.28$ [Low due to intragrain porosity.]  
- $D(\text{calc.}) = 3.91$

**Optical Properties:**  
- **Translucent.**  
- **Color:** Red-brown, orange; yellow, red-brown to deep red in transmitted light; dark blue-gray in reflected light.  
- **Streak:** Beige.  
- **Luster:** Waxy to vitreous.  
- **Optical Class:** Uniaxial (-). [Also biaxial (-) with $2V(\text{meas.}) = \sim 0^\circ$ in localized regions.]  
- $n(\text{calc.}) = 2.16(3)$

**Cell Data:** 
- **Space Group:** $P_2_1/c$.  
- $a = 7.537(1)$  
- $b = 4.5795(4)$  
- $c = 9.885(1)$  
- $\beta = 131.02(1)^\circ$  
- $Z = \text{n.d.}$

**X-ray Powder Pattern:** Königshain, Saxony, Germany.  
1.676 (100), 2.170 (82), 2.466 (27), 1.423 (22), 2.764 (9), 3.933 (8), 1.297 (6)

**Chemistry:**

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<table>
<thead>
<tr>
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<tbody>
<tr>
<td>TiO$_2$</td>
<td>65.9</td>
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<tr>
<td>Fe$_2$O$_3$</td>
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<td>Al$_2$O$_3$</td>
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<td>SiO$_2$</td>
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<td>P$_2$O$_5$</td>
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<td>V$_2$O$_5$</td>
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<td>MnO</td>
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<td>MgO</td>
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<td>H$_2$O</td>
<td>10.6</td>
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<tr>
<td>Total</td>
<td>95.9</td>
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</tbody>
</table>

(1) Königshain, Saxony, Germany; average of 15 electron microprobe analyses, H$_2$O by TGA; corresponding to Fe$^{3+}_{1.01}$Mg$_{0.06}$Ti$_6$O$_{11.2}$(OH)$_{4.8}$[Al$_{0.59}$Si$_{0.31}$P$_{0.04}$O$_{1.60}$]·1.8H$_2$O - the components in square brackets contributed by inclusions.

**Occurrence:** In the heavy mineral fractions of marine sand deposits.

**Association:** MgO-rich ferrian ilmenite, pseudorutile, “leucoxene,” tourmaline, spinel, kaolinite, quartz, diaspore.

**Distribution:** From Königshain, Saxony, northeast Germany; the Murray Basin, southeast Australia; and at Kalimantan, Indonesia.

**Name:** Honors Will Kleber (1906-1970), a former director of the Institute of Mineralogy and the Museum of Mineralogy, Humboldt University, Berlin, Germany.

**Type Material:** At the Natural History Museum, Humboldt University, Berlin, Germany (1980-0283) and the Museum Victoria, Melbourne, Victoria, Australia (M52010-M52011).

**References:**  