**Syngenite**

\[ \text{K}_2\text{Ca(SO}_4\text{)}_2 \cdot \text{H}_2\text{O} \]

**Crystal Data:** Monoclinic. **Point Group:** 2/m. As crystals, tabular on \{100\} to prismatic along [001], with many forms recorded, to 14 cm; forms lamellar aggregates and crystalline crusts. **Twinning:** Contact twins on \{100\} common.

**Physical Properties:** **Cleavage:** On \{110\} and \{100\}, perfect; on \{010\}, distinct. **Fracture:** Conchoidal. Hardness = 2.5  D(meas.) = 2.579–2.603  D(calc.) = 2.575  Soluble in H\textsubscript{2}O, with separation of gypsum.

**Optical Properties:** Transparent to translucent. **Color:** Colorless, milky white, faintly yellow due to inclusions; colorless in transmitted light. **Luster:** Vitreous. **Optical Class:** Biaxial (−). **Orientation:** \( Z = b; X \wedge c = -2^\circ17' \). **Dispersion:** \( r < v \), very strong. \( \alpha = 1.501 \quad \beta = 1.517 \quad \gamma = 1.518 \quad 2V(\text{meas.}) = 28^\circ \)

**Cell Data:** **Space Group:** \( P2_1/m \). \( a = 9.77 \quad b = 7.15 \quad c = 6.25 \quad \beta = 104.0^\circ \quad Z = 2 \)

**X-ray Powder Pattern:** Synthetic.

\[ 2.855 (100), 3.165 (75), 5.71 (55), 2.741 (55), 2.827 (50), 9.49 (40), 4.624 (40) \]

**Chemistry:**

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
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</thead>
<tbody>
<tr>
<td>( \text{SO}_3 )</td>
<td>49.04</td>
<td>48.75</td>
</tr>
<tr>
<td>( \text{MgO} )</td>
<td>0.64</td>
<td></td>
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<tr>
<td>( \text{CaO} )</td>
<td>16.97</td>
<td>17.08</td>
</tr>
<tr>
<td>( \text{K}_2\text{O} )</td>
<td>28.03</td>
<td>28.68</td>
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<tr>
<td>( \text{H}_2\text{O} )</td>
<td>5.81</td>
<td>5.49</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>100.49</strong></td>
<td><strong>100.00</strong></td>
</tr>
</tbody>
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(1) Kalush, Ukraine; corresponds to \( \text{K}_{1.97}\text{Ca}_{1.00}(\text{SO}_4)_{2.03} \cdot 1.07\text{H}_2\text{O} \). (2) \( \text{K}_2\text{Ca(SO}_4\text{)}_2 \cdot \text{H}_2\text{O} \).

**Occurrence:** An uncommon diagenetic component of marine salt deposits; a volcanic sublimate or pneumatolytic reaction product; a hydrothermal vein filling in a geothermal field; derived from bat guano in caves.

**Association:** Halite, arcanite (salt deposits); biphosphammite, aplithitalite, monetite, whitlockite, uricite, brushite, gypsum (caves).

**Distribution:** In Ukraine, large crystals from the Kalush salt deposit (Kalusz, Poland), and at Stebnyk. In Germany, from Thuringia, in the Glückauf mine, near Sondershausen, from Bischofferode, and at Volkenroda-Pöther, near Mühlhausen; from the Stassfurt salt district, Saxony-Anhalt; in the Sigmundshall mine, Bokeloh, and at the Kalkberg, near Lüneburg, Lower Saxony. On Vesuvius, Campania, and in the Cesano geothermal field, Latium, Italy. From Haleakala volcano, Mani, Hawaii, USA. In Murra-el-elevyn, Dingo Dongo, and Petrogale Caves, Western Australia. From Gewiwha Cave, 280 km west of Maun, northwestern Botswana. On volcanoes on the Kamchatka Peninsula, Russia. Around Mt. Erebus, Victoria Land, Antarctica. From the “Q” Basin [Jianghan Plain] potash deposits, Hubei Province, China. Around Mt. Erebus, Victoria Land, Antarctica. From the “Q” Basin [Jianghan Plain] potash deposits, Hubei Province, China.

**Name:** From the Greek for related, for the chemical resemblance to polyhalite.

**References:**

2. Corazza, E. and C. Sabeli (1967) The crystal structure of syngenite, \( \text{K}_3\text{Ca(SO}_4\text{)}_2 \cdot \text{H}_2\text{O} \). Zeits. Krist., 124, 398–408.