Orthoclase

Orthoclase is a mineral with the chemical formula $\text{KAlSi}_3\text{O}_8$. It is a common feldspar found in granites, granite pegmatites, and syenites. In cavities in basalts; in high-grade metamorphic rocks and as a result of potassic hydrothermal alteration; also authigenic and detrital.

**Physical Properties:**
- **Cleavage:** Perfect on {001} and {100}; partings on {110}, {110}, and {010}.
- **Fracture:** Conchoidal to uneven.
- **Tenacity:** Brittle.
- **Hardness:** 6–6.5
- **D(meas.) = 2.55–2.63**
- **D(calc.) = 2.563**

**Optical Properties:**
- **Color:** Colorless, white, gray, pale yellow, flesh-red, green; colorless in thin section; may exhibit opalescence or schiller iridescence.
- **Streak:** White.
- **Luster:** Vitreous, pearly on cleavages.
- **Optical Class:** Biaxial (−).
- **Orientation:** $\alpha = 1.518–1.520$, $\beta = 1.522–1.524$, $\gamma = 1.522–1.525$.
- **Dispersion:** $r > v$; distinct.
- **$\varepsilon = 1.518–1.520$, $\delta = 1.522–1.524$, $\varepsilon = 1.522–1.525$**

**Cell Data:**
- **Space Group:** C2/m.
- **a = 8.5632(11)**
- **b = 12.963(14)**
- **c = 7.299(11)**
- **$\beta = 116.073(9)^\circ$**
- **Z = 4**

**X-ray Powder Pattern:**
- Selklingen, Switzerland. (ICDD 19-931).
- 3.31 (100), 3.77 (80), 4.22 (70), 3.24 (65), 3.29 (60), 2.992 (50), 3.47 (45)

**Chemistry:**
- $\text{SiO}_3$: 65.39, 64.76
- $\text{Al}_2\text{O}_3$: 18.45, 18.32
- $\text{BaO}$: 0.02, 0.49

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(1)</th>
<th>(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{SiO}_3$</td>
<td>65.39</td>
<td>64.76</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{Al}_2\text{O}_3$</td>
<td>18.45</td>
<td>18.32</td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\text{BaO}$</td>
<td>0.02</td>
<td>0.49</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100.19</td>
<td>100.00</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(1) Himalaya mine, Mesa Grande district, California, USA; by electron microprobe, corresponds to (K$_{0.96}$Na$_{0.10}$)$_{3-\Sigma}$=0.96Al$_{1.00}$Si$_{3.00}$O$_8$. (2) KAlSi$_3$O$_8$.

**Polymorphism & Series:** Dimorphous with microcline; forms a series with celsian.

**Mineral Group:** Feldspar (alkali) group; (Al,Si) commonly only partially ordered.

**Occurrence:** The common feldspar of granites, granite pegmatites, and syenites. In cavities in basalts; in high-grade metamorphic rocks and as a result of potassic hydrothermal alteration; also authigenic and detrital.

**Association:** Albite, muscovite, biotite, “hornblende,” schoen, beryl.


**Name:** From the Greek for straight and fracture, in allusion to the cleavage angle.

**References:**