Beidellite

\[(\text{Ca}_{0.5}, \text{Na})_{0.3}\text{Al}_2(\text{Si}, \text{Al})_4\text{O}_{10}(\text{OH})_2 \cdot n\text{H}_2\text{O}\]

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Crystal Data: Monoclinic, pseudohexagonal. Point Group: 2/m. As thin plates, laths, and ribbons, to 30 \(\mu\)m; in veinlets filling fractures and as claylike masses.

Physical Properties: Cleavage: Perfect on \{001\}. Hardness = 1–2 D(meas.) = 2–3 depending on hydration. D(calc.) = n.d. Positive identification of minerals in the smectite group may need data from DTA curves, dehydration curves, and X-ray powder patterns before and after treatment by heating and with organic liquids.

Optical Properties: Translucent. Color: White, reddish brown, brownish gray. Luster: Waxy to vitreous. Optical Class: Biaxial (-). \(\alpha = 1.494\) \(\beta = 1.536\) \(\gamma = 1.536\) 2V(meas.) = 9°–16°

Cell Data: Space Group: \(\text{C}_2/m\). \(a = 5.179\) \(b = 8.970\) \(c = 17.57\) \(\beta = [\sim 90°]\)

X-ray Powder Pattern: Black Jack mine, Idaho, USA; glycolated, diffuse pattern.

Chemistry:

\[
\begin{array}{ccc}
\text{SiO}_2 & 45.32 & 45.83 \\
\text{TiO}_2 & 0.46 & \text{Na}_2\text{O} \\
\text{Al}_2\text{O}_3 & 27.84 & 22.79 \\
\text{Fe}_2\text{O}_3 & 0.70 & 5.71 \\
\text{FeO} & 0.28 & 12.55 \\
\text{MgO} & 0.16 & 9.79 \\
\text{CaO} & 2.76 & 14.48 \\
\text{K}_2\text{O} & 0.10 & 1.536 \\
\text{H}_2\text{O} & 14.48 & 14.48 \\
\text{H}_2\text{O} & 14.48 & 14.48 \\
\text{Total} & 99.64 & 99.93 \\
\end{array}
\]

(1) Black Jack mine, Idaho, USA; corresponds to \((\text{Ca}_{0.23}\text{Na}_{0.02}\text{K}_{0.01})\Sigma=0.26\)

\((\text{Al}_{1.96}\text{Fe}^{3+}_{0.04}\text{Mg}_{0.02})\Sigma=2.02(\text{Si}_{3.46}\text{Al}_{0.54})\Sigma=4.00\text{O}_{10}(\text{OH})_2\)

(2) Velka Kopan, Ukraine; corresponds to \((\text{Ca}_{0.12}\text{Na}_{0.02}\text{K}_{0.01})\Sigma=0.15\)

\((\text{Al}_{1.62}\text{Fe}^{3+}_{0.33}\text{Mg}_{0.10}\text{Ti}_{0.03}\text{Fe}^{2+}_{0.02})\Sigma=2.10(\text{Si}_{3.54}\text{Al}_{0.46})\Sigma=4.00\text{O}_{10}(\text{OH})_2\)

Mineral Group: Smectite group.

Occurrence: A constituent of bentonitic clays; an alteration product in hydrothermal mineral deposits, especially porphyry Cu-Mo systems; in soils derived from mafic rocks.

Association: Plagioclase, quartz, orthoclase, montmorillonite, kaolin, allophane, muscovite.


Name: For Beidell, Colorado, USA.

Type Material: National Museum of Natural History, Washington, D.C., USA, R4762 (Black Jack mine, Idaho, USA); R4761 (Beidell, Colorado, USA, material determined to be a mixture in part).


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