Buddingtonite  
\[(\text{NH}_4)\text{AlSi}_3\text{O}_8\]

**Crystal Data:** Monoclinic.  **Point Group:** 2 or 2/\(\overline{m}\).  As crystals similar in habit and interfacial angle to orthoclase, with forms \{001\}, \{010\}, \{110\}, \{\overline{1}0\}, to 0.05 mm. In compact masses pseudomorphous after plagioclase.  **Twinning:** Noted.

**Physical Properties:**  **Cleavage:** Good on \{001\}, distinct on \{010\}.  **Tenacity:** Brittle.  **Hardness** = 5.5  \(D(\text{meas.}) = 2.32(1)\)  \(D(\text{calc.}) = 2.38\)

**Optical Properties:**  **Color:** Colorless.  **Streak:** Light grey, yellow when impure.  **Luster:** Vitreous.  **Optical Class:** Biaxial (+).  **Orientation:** \(Z = b\); \(X^a = 4^\circ\); \(Y^c = 19^\circ\).  \(\alpha = 1.530(2)\)  \(\beta = 1.531(2)\)  \(\gamma = 1.534(2)\)  \(2V(\text{meas.}) = \text{n.d.}\)

**Cell Data:**  **Space Group:** \(P2_1\) or \(P2_1/m\).  \(a = 8.571\)  \(b = 13.032\)  \(c = 7.187\)

**X-ray Powder Pattern:**  **Sulfur Bank mine, California, USA.**

\[
\begin{array}{ccc}
(1) & (2) & (1) \\
\text{SiO}_2 & 66.89 & 70.06 \\
\text{Al}_2\text{O}_3 & 20.09 & 19.82 \\
\text{MgO} & 0.22 & (\text{NH}_4)_2\text{O} \\
\text{CaO} & 0.04 & \text{K}_2\text{O} \\
\text{BaO} & 0.27 & \text{H}_2\text{O} \\
\end{array}
\]

\[
\text{Total [100.00]} \quad 100.00
\]

(1) Sulfur Bank mine, California, USA; probably contains a small amount of reversibly hydrated ammonium montmorillonite accounting for the remaining \(\text{H}_2\text{O}\) content; after deductions for TiO\(_2\), FeS\(_2\), and \(\text{H}_2\text{O}^- = 4\%\), recalculated to 100.00%.  (2) \((\text{NH}_4)\text{AlSi}_3\text{O}_8\).

**Mineral Group:** Feldspar group.

**Occurrence:** A low-temperature hydrothermal replacement of plagioclase in andesite altered by ammonia-bearing hot springs (Sulfur Bank mine, California, USA); in metasomatized rhyolitic ash-flow tuffs (Cedar Mountains, Nevada, USA); in the sedimentary Phosphoria Formation (Idaho, Wyoming, and Montana, USA).

**Association:** Plagioclase, sulfur, stibnite, pyrite, marcasite, ammoniojarosite, gypsum, barite, anatase, montmorillonite (Sulfur Bank mine, California, USA); illite, albite, montmorillonite, kaolinite (Phosphoria Formation, Idaho, Wyoming, and Montana, USA).

**Distribution:** In the USA, at the Sulfur Bank mercury mine, Lake Co., and on Sharon Heights, Menlo Park, Santa Clara Co., California; in the Cedar Mountains, 50 km northwest of Tonopah, Nye Co., Nevada; at a number of exposures of the Meade Peak Member of the Phosphoria Formation in Idaho, Wyoming, and Montana. In the Condor oilshale deposit, near Proserpine, Queensland, Australia. From the Toshichi Spa, Iwate Prefecture, Japan.

**Name:** To honor Emeritus Professor Arthur Francis Buddington (1890–1980), American geologist, Princeton University, Princeton, New Jersey, USA.

**Type Material:** National Museum of Natural History, Washington, D.C., USA, 116974, 132920, 147604.


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