Vuagnatite  

\[ \text{CaAlSiO}_4(\text{OH}) \]

\( \text{Crystal Data:} \)  
Orthorhombic.  
\( \text{Point Group:} \) 222.  
Highly modified prismatic crystals, to 3 mm, elongated along [001] or [100], rarely as disphenoidal euhedra.

\( \text{Physical Properties:} \)  
Fracture: Conchoidal.  
Tenacity: Brittle.  
Hardness = 6  
\( D(\text{meas.}) = 3.42(2) \quad D(\text{calc.}) = 3.41 \)

\( \text{Optical Properties:} \)  
Semitransparent.  
Color: White; colorless in thin section.  
Luster: Vitreous.  
Optical Class: Biaxial (−).  
Pleochroism: \( X = \) colorless or yellowish brown; \( Y = Z = \) colorless.  
Orientation: \( X = c; Y = b; Z = a. \)  
Dispersion: \( r < v, \) strong to very strong.  
Absorption: \( X \gg Y = Z. \)  
\( \alpha = 1.701(2) \quad \beta = 1.724(2) \quad \gamma = 1.727(2) \quad 2V(\text{meas.}) = 44(1)^\circ \)

\( \text{Cell Data:} \)  
Space Group: \( P2_12_12_1. \)  
\( a = 7.0538(4) \quad b = 8.5410(4) \quad c = 5.6839(3) \quad Z = 4 \)

\( \text{X-ray Powder Pattern:} \)  
Red Mountain, California, USA.  
2.518 (100), 2.997 (95), 2.640 (85), 2.215 (85), 2.453 (70), 2.142 (65), 2.395 (60)

\( \text{Chemistry:} \)  
\begin{align*}
\text{SiO}_2 & \quad 33.59 & 34.11 \\
\text{Al}_2\text{O}_3 & \quad 27.76 & 28.94 \\
\text{CaO} & \quad 31.52 & 31.84 \\
\text{H}_2\text{O} & \quad 5.11 & \\
\text{Total} & \quad 92.87 & 100.00
\end{align*}

(1) Taurus Mountains, Turkey; by electron microprobe, average of 25 partial analyses.  
(2) \( \text{CaAlSiO}_4(\text{OH}); \) \( \text{H}_2\text{O} \) inferred from structure determination.

\( \text{Occurrence:} \)  
In rodingitized dikes of pegmatitic anorthositic gabbro crosscutting harzburgite-serpentines in an ophiolite (Taurus Mountains, Turkey); in rodingitized metagabbro dikes in serpentinized peridotite (Red Mountain, California, USA); all occurrences suggest formation under conditions of relatively low temperature and high pressure.

\( \text{Association:} \)  
Chantalite, prehnite, hydrogrossular, vesuvianite, chlorite (Taurus Mountains, Turkey); hydrogrossular, vesuvianite, chlorite, copper, chalcocite (Red Mountain, California, USA).

\( \text{Distribution:} \)  
From Börgürtlen Tepe Hill, 10 km northeast of Doğanbaba, Taurus Mountains, Burdur Province, Turkey. At Red Mountain, Mendocino Co., California, USA. In the Livingstone Mountains, Southland, New Zealand. From Shiraki, Toba, Mie Prefecture, Japan. At the Wessels mine, near Kuruman, Cape Province, South Africa.

\( \text{Name:} \)  
For Professor Mark Bernard Vuagnat (1922– ), student of ophiolites, University of Geneva, Geneva, Switzerland.

\( \text{Type Material:} \)  

\( \text{References:} \)  
(2) McNear, E., M.G. Vincent, and E. Parthé (1976) The crystal structure of vuagnatite, \( \text{CaAl(OH)}\text{SiO}_4 \).  

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