

Natrodufrénite



©2001-2005 Mineral Data Publishing, version 1

Crystal Data: Monoclinic. *Point Group:* $[2/m]$ (by analogy to dufrénite). As radially fibrous spherulites, to 5 mm, may be in warty nodules.

Physical Properties: *Tenacity:* Brittle. Hardness = n.d. $D(\text{meas.}) = 3.20(5)$
 $D(\text{calc.}) = 3.23$

Optical Properties: Translucent. *Color:* Greenish brown. *Streak:* Green.
Optical Class: Biaxial (+). *Pleochroism:* X = pale yellow; Z = dark green. *Orientation:* Positive elongation. $\alpha = 1.765(5)$ (α') β = n.d. $\gamma = 1.775(5)$ (γ') $2V(\text{meas.}) = \text{n.d.}$

Cell Data: *Space Group:* $[C2/c]$ (by analogy to dufrénite). $a = 25.83(2)$ $b = 5.150(3)$
 $c = 13.772(9)$ $\beta = 111^\circ 32'$ $Z = 4$

X-ray Powder Pattern: Rochefort-en-Terre, France; close to dufrénite.
3.152 (100), 12.04 (80), 3.400 (80), 3.204 (80), 5.040 (60), 4.124 (50), 2.989 (50)

Chemistry:

	(1)
P_2O_5	32.67
Al_2O_3	5.51
Fe_2O_3	46.21
FeO	0.42
CaO	0.14
Na_2O	2.36
H_2O^+	13.04
Total	100.35

(1) Rochefort-en-Terre, France; Na, Al, Ca by AA, P, Fe by colorimetry, H_2O by the Penfield method; thought to correspond to $[\text{Na}_{0.63}(\text{H}_2\text{O})_{0.35}\text{Ca}_{0.02}]_{\Sigma=1.00}(\text{Fe}_{0.67}^{3+}\text{Fe}_{0.05}^{2+})_{\Sigma=0.72}(\text{Fe}_{4.11}^{3+}\text{Al}_{0.89})_{\Sigma=5.00}[(\text{PO}_4)_{3.80}(\text{H}_4\text{O}_4)_{0.20}]_{\Sigma=4.00}[(\text{OH})_{5.56}(\text{H}_2\text{O})_{0.44}]_{\Sigma=6.00} \cdot 2\text{H}_2\text{O}$.

Occurrence: A low-temperature secondary mineral.

Association: Cyrilovite, goethite.

Distribution: From Rochefort-en-Terre, Morbihan, France. At the Pinilla de Fermoselle pegmatite, Zamora, Spain. In Australia, at the Mt. Oxide mine, Mt. Isa district, Queensland; in the Lake Boga granite quarry, near Swan Hill, Victoria; and at Broken Hill, New South Wales. From the Lone Star copper deposit, Safford district, Graham Co., Arizona, USA.

Name: For essential sodium, *natrium*, and its relation to *dufrénite*.

Type Material: Natural History Museum, Paris, 106384, 106385; National School of Mines, Paris, France, 18329.

References: (1) Fontan, F., F. Pillard, and F. Permingeat (1982) La natrodufrénite (Na , $\square$) $(\text{Fe}^{+++}, \text{Fe}^{++})(\text{Fe}^{+++}, \text{Al})_5(\text{PO}_4)_4(\text{OH})_6 \cdot 2\text{H}_2\text{O}$, une nouvelle espèce minérale du groupe de la dufrénite. Bull. Minéral., 105, 321–326 (in French with English abs.). (2) (1983) Amer. Mineral., 68, 1039 (abs. ref. 1).