Rouvilleite $Na_3(Ca, Mn^{2+})_2(CO_3)_3F$

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Crystal Data: Monoclinic. *Point Group:* $2/m$ or m. As crystals, prismatic, elongated along [001], showing {100}, {010},{110}, {001}, {10$\overline{1}$}, {023}, {03$\overline{2}$}, to 1 mm; commonly in granular masses.

Physical Properties: *Cleavage:* Good on {001}; imperfect on {010}. *Fracture:* Uneven to conchoidal. *Tenacity:* Brittle. Hardness = 3–4 D(meas.) = 2.67–2.73 D(calc.) = 2.69

Optical Properties: Transparent to translucent. *Color:* Pale tan, pale pink, yellow, colorless, may be reddish brown from inclusions. *Streak:* White. *Luster:* Vitreous to waxy. *Optical Class:* Biaxial (–). *Orientation:* $Y = b$; $X \wedge c = 6°$–$20°$. *Dispersion:* $r > v$, weak. $\alpha = 1.472$–1.473 $\beta = 1.562$–1.564 $\gamma = 1.569$–1.570 2V(meas.) = 25°–27° 2V(calc.) = 27.5°–30°

Cell Data: *Space Group:* $C2/c$ or Cc. $a = 8.012$–8.043 $b = 15.79$–15.812 $c = 7.019$–7.030 $\beta = 100.78°-101.16(3)°$ Z = 4

X-ray Powder Pattern: Mont Saint-Hilaire, Canada.
2.895 (100), 2.711 (90), 7.081 (80), 1.869 (75), 2.937 (70), 2.039 (70), 2.637 (60)

Chemistry:	(1)	(2)	(3)		(1)	(2)	(3)
CO_2	[37.21]	36.85	37.92	MnO	6.83	8.63	
Y_2O_3		1.06		MgO	0.01		
Gd_2O_3		0.03		CaO	26.47	21.16	32.22
Dy_2O_3		1.03		Na_2O	25.95	26.14	26.70
Er_2O_3		0.06		F	5.65	5.20	5.46
Yb_2O_3		0.08		$-O = F_2$	2.38	2.19	2.30
FeO	0.52	1.20		Total	[100.26]	99.25	100.00

(1) Mont Saint-Hilaire, Canada; by electron microprobe, average of three analyses, total Fe as FeO, total Mn as MnO, CO_2 calculated from stoichiometry, confirmed by IR; corresponds to $Na_{2.96}(Ca_{1.66}Mn_{0.34}Fe_{0.02})_{\Sigma=2.02}(CO_3)_3F_{1.06}$. (2) Mt. Alluaiv, Kola Peninsula, Russia; by electron microprobe, total Fe as FeO, total Mn as MnO, corresponds to $Na_{3.08}(Ca_{1.36}Mn_{0.44}Fe_{0.06}Y_{0.03}Dy_{0.02})_{\Sigma=1.91}(CO_3)_{3.02}F_{0.99}$. (3) $Na_3Ca_2(CO_3)_3F$.

Occurrence: In a sodalite xenolith in an intrusive alkalic gabbro-syenite complex (Mont Saint-Hilaire, Canada); in a differentiated alkalic massif (Lovozero massif, Kola Peninsula, Russia).

Association: Kupletskite, villiaumite, aegirine, microcline, cancrinite, analcime, shortite, vuonnemite, cryolite, kogarkoite (Mont Saint-Hilaire, Canada); manganotychite, mineevite, nahcolite, trona, pirssonite, sidorenkite, rhodochrosite (Lovozero massif, Kola Peninsula, Russia).

Distribution: From Mont Saint-Hilaire, Quebec, Canada. On Mt. Alluaiv, Lovozero massif, Kola Peninsula, Russia.

Name: For Rouville Co., within which the Mont Saint-Hilaire, Canada, locality is located.

Type Material: Canadian Museum of Nature, Ottawa, 54542; Royal Ontario Museum, Toronto, Canada, M44157, M44233.

References: (1) McDonald, A.M., G.Y. Chao, and R.A. Ramik (1991) Rouvilleite, a new sodium calcium fluorocarbonate mineral from Mont Saint-Hilaire, Quebec. Can. Mineral., 29, 107–111. (2) (1991) Amer. Mineral., 76, 2023 (abs. ref. 1). (3) Khomyakov, A.P., L.I. Polezhaeva, D.L. Rogachev, N.A. Yamnova, and D.Y. Pushcharovskiy (1991) A new natural fluorocarbonate, $Na_3Ca(Mn, Ca)(CO_3)_3F$, from the Lovozero alkaline massif. Vestnik Moscow University, Series 4, Geology, 1, 85–88 (in Russian). (4) Yamnova, N.A., D.Y. Pushcharovskiy, A.P. Khomyakov, and S.V. Vyatkin (1991) Crystal structure of a new natural fluorocarbonate, $Na_3Ca(Mn, Ca)(CO_3)_3F$. Kristallografiya (Sov. Phys. Crystal.), 36, 30–33.

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