

Crystal Data: Tetragonal. *Point Group:* 4/m 2/m 2/m. As irregularly rounded grains to 60 μm .

Physical Properties: *Cleavage:* None. *Fracture:* n.d. *Tenacity:* Brittle. Hardness = n.d.
D(meas.) = n.d. D(calc.) = 4.783

Optical Properties: Opaque. *Color:* Gray. *Streak:* n.d. *Luster:* Submetallic.

Optical Class: Weak anisotropism and birefractance.

R_1 - R_2 : (470) 20.0-19.1, (546) 19.1-18.1, (589) 18.9-18.0, (650) 18.7-17.4

Cell Data: *Space Group:* $I4_1/acd$. $a = 9.4668(6)$ $c = 18.8701(14)$ $Z = 8$

X-ray Powder Pattern: Calculated pattern.

2.730 (100), 1.6707 (29), 1.4267 (16), 2.367 (12), 1.6735 (12), 1.4233 (10), 5.460 (6)

Chemistry:	(1)
SiO ₂	9.82
ZrO ₂	9.97
Al ₂ O ₃	0.05
Mn ₂ O ₃	[57.90]
MnO	[11.34]
Fe ₂ O ₃	7.81
Ce ₂ O ₃	0.28
MgO	3.20
CaO	0.16
ZnO	0.13
<u>Na₂O</u>	<u>0.01</u>
Total	100.68

(1) Långban, Värmland, Sweden; average of 4 electron microprobe analyses, MnO/Mn₂O₃ for charge balance, Mg assigned by structure analysis; corresponding to $(\text{Zr}^{4+}_{0.49}\text{Mn}^{2+}_{0.47}\text{Mg}_{0.07}\text{Ca}_{0.02}\text{Zn}_{0.01}\text{Ce}^{3+}_{0.01})_{\Sigma=1.00}(\text{Mn}^{3+}_{4.44}\text{Fe}^{3+}_{0.59}\text{Mn}^{2+}_{0.57}\text{Mg}_{0.41}\text{Al}_{0.01})_{\Sigma=6.02}\text{Si}_{0.99}\text{O}_{12}$.

Mineral Group: Braunite group.

Occurrence: In hausmannite-bearing skarn associated with a regionally-metamorphosed Mn-Fe deposit.

Association: Jacobsite, Mn-calcite, tephroite, Mn-phlogopite, långbanite, pinakiolite, oxyplumboroméite.

Distribution: From the dump near the New Shaft (Nya Schaktet), Långban, Värmland, Sweden.

Name: Honors amateur mineralogist Kjell Gatedal (b. 1947) from Nora, Örebro, Sweden, for his contributions to the mineralogy of Långban-type deposits.

Type Material: Swedish Museum of Natural History, Stockholm, Sweden (20130001).

References: (1) Hålenius, U. and F. Bosi (2015) Gatedalite, $\text{Zr}(\text{Mn}^{2+}_2\text{Mn}^{3+}_4)\text{SiO}_{12}$, a new mineral species of the braunite group from Långban, Sweden. *Mineral. Mag.*, 79(3), 625-634. (2) (2016) *Amer. Mineral.*, 101, 1714-1715 (abs. ref. 1).