**Ferrotychite** $\mathbf{Na_6(Fe^{2+}, Mg, Mn^{2+})_2(SO_4)(CO_3)_4}$

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**Crystal Data:** Cubic. *Point Group:* $2/m\ \overline{3}$. As grains, to 1 mm.

**Physical Properties:** *Fracture:* Conchoidal. Hardness = 4 VHN = 214–247, 228 average. D(meas.) = 2.79 D(calc.) = 2.78 Strongly magnetic; soluble in $H_2O$ giving an alkaline solution.

**Optical Properties:** Semitransparent. *Color:* Colorless to bright yellow, surficially altered to golden brown. *Luster:* Vitreous.
*Optical Class:* Isotropic. $n = 1.550(2)$

**Cell Data:** *Space Group:* $Fd3$. $a = 13.962(5)$ Z = 8

**X-ray Powder Pattern:** Khibiny massif, Russia.
2.68 (10), 4.18 (9), 2.47 (8), 1.614 (6), 2.36 (4), 1.958 (4), 1.428 (3)

**Chemistry:**

| | (1) | (2) |
|---|---|---|
| $SO_3$ | 14.00 | 13.67 |
| $CO_2$ | [30.75] | 30.05 |
| FeO | 15.26 | 24.53 |
| MnO | 4.35 | |
| MgO | 2.77 | |
| $Na_2O$ | 32.30 | 31.75 |
| Total | [99.43] | 100.00 |

(1) Khibiny massif, Russia; by X-ray spectrographic analysis, $SO_4^{2-}$ and $CO_3^{2-}$ confirmed by IR spectroscopy, $CO_2$ calculated; corresponds to $Na_{6.01}(Fe_{1.23}Mg_{0.40}Mn_{0.35})_{\Sigma=1.98}(S_{0.98}O_4)(C_{1.01}O_3)_4$. (2) $Na_6Fe_2(SO_4)(CO_3)_4$.

**Polymorphism & Series:** Forms a series with tychite.

**Occurrence:** A rare constituent of a vein cutting ijolite-urtite in an alkaline igneous complex, from a drill core.

**Association:** Shortite, bonshtedtite, analcime.

**Distribution:** From along Olenii Ruchei (Reindeer's Stream), Khibiny massif, Kola Peninsula, Russia.

**Name:** For essential FERROus iron and the relation to *tychite*.

**Type Material:** Mining Institute, St. Petersburg, 1301/1; Geology Museum, Kola Branch, Academy of Sciences, Apatity, 5708/1; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 81590.

**References:** (1) Khomyakov, A.P., Y.A. Malinovskii, and S.M. Sandomirskaya (1981) Ferrotychite $Na_6Fe_2(SO_4)(CO_3)_4$ – a new mineral. Zap. Vses. Mineral. Obshch., 110, 600–603 (in Russian). (2) (1982) Amer. Mineral., 67, 622 (abs. ref. 1). (3) Malinovskii, Y.A., S.V. Baturin, and N.V. Belov (1979) Crystal structure of Fe-tychite [ferrotychite]. Doklady Acad. Nauk SSSR, 249, 1365–1368 (in Russian). (4) Pekov, I.V. (1998) Minerals first discovered on the territory of the former Soviet Union. Ocean Pictures, Moscow, 86.

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