## Joosteite $Mn^{2+}Mn^{3+}O(PO_4)$

**Crystal Data**: Monoclinic. *Point Group*: 2/*m*. As irregular aggregates to 3 mm.

**Physical Properties**: *Fracture*: n.d. *Tenacity*: Brittle. Hardness = 4 D(meas.) = n.d. D(calc.) = 4.13

**Optical Properties**: Opaque. *Color*: Black; opaque to dark brown in thin sections, gray with a brownish tint in reflected light. *Streak*: n.d. *Luster*: Metallic. Low to moderate bireflectivity; distinct anisotropy.
$R_1$-$R_2$: n.d.

**Cell Data**: *Space Group*: *I*2/*a*. $a$ = 11.888(2) $b$ = 6.409(1) $c$ = 9.804(2) $\beta$ = 106.17(3)° Z = 8

**X-ray Powder Pattern**: Helikon II pegmatite, Karibib, Namibia.
2.819 (10), 3.077 (8), 3.209 (6), 2.082 (5), 1.787 (5), 1.495 (5), 2.184 (4)

**Chemistry**:

| | (1) | (2) |
|---|---|---|
| $Na_2O$ | 0.22 | |
| MgO | 0.43 | |
| $Al_2O_3$ | 0.03 | |
| $P_2O_5$ | 29.97 | 32.14 |
| $K_2O$ | 0.15 | |
| CaO | 0.02 | |
| MnO | 31.14 | 32.12 |
| $Mn_2O_3$ | 22.80 | 35.74 |
| $Fe_2O_3$ | 12.86 | . |
| Total | 97.62 | 100.00 |

(1) Helikon II pegmatite, Karibib, Namibia; by electron microprobe, corresponding to $(Mn^{2+}_{1.00}Mn^{3+}_{0.64}Fe^{3+}_{0.36})_{\Sigma=2.00}(P_{0.98}O_4)O$. (2) $Mn^{2+}Mn^{3+}O(PO_4)$.

**Occurrence**: From the alteration of oxidized sicklerite in a granitic rare-element pegmatite.

**Association**: Lithiophilite, sicklerite, eosphorite, amblygonite, varulite, dickinsonite, hureaulite, apatite, unidentified Fe/Mn oxides.

**Distribution**: From the Helikon II pegmatite, Karibib, Namibia.

**Name**: Honors Mrs. Charlotte Jooste (1920-2009), Karibib, Namibia, for her support of pegmatite research in Central Namibia.

**Type Material**: University of Stuttgart, Germany; Museum of Natural History, Toulouse, France, and the Department de Mineralogy and Petrology, University of the Basque Country, Bilbao, Spain.

**References**: (1) Keller, P., F. Fontan, F. Velasco Roldán, and P. de Parseval (2007) Joosteite, $Mn^{2+}(Mn^{3+}, Fe^{3+})(PO_4)O$: a new phosphate mineral from the Helikon II Mine, Karibib, Namibia. Neues Jb. Mineral. Abh., 183, 197-201. (2) Keller, P., F. Lissner, and T. Schleid (2007) The crystal structure of joosteite, $(Mn^{2+},Mn^{3+},Fe^{3+})_2[PO_4]O$, from the Helikon II Mine, Karibib (Namibia), and its relationship to staněkite, $(Fe^{3+},Mn^{2+},Fe^{2+},Mg)_2[PO_4]O$. Neues Jb. Mineral. Abh., 184, 225-230. (3) (2008) Amer. Mineral., 93(11), 1945 (abs. ref. 1).