Grattarolaite $Fe_3^{3+}O_3(PO_4)$

Crystal Data: Hexagonal. *Point Group:* 3*m*. In microcrystalline nodules, intimately mixed with rodolicoite, as crystallites to < 1000 Å.

Physical Properties: *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 4.08

Optical Properties: Opaque. *Color:* Reddish brown. *Streak:* Brown. *Luster:* Greasy. *Optical Class:* Uniaxial. ω = n.d. ε = n.d.

Cell Data: *Space Group:* [*R*3*m*] (by analogy to synthetic material). *a* = 7.994(4) *c* = 6.855(4) Z = 3

X-ray Powder Pattern: Synthetic.
3.09 (100), 1.623 (23), 2.078 (20), 2.446 (16), 1.440 (16), 1.997 (13), 1.545 (12)

Chemistry: (1) Due to the tiny particle sizes (average about 380 Å) only bulk composition of the mixture could be determined; this is compatible with a composition of $Fe_{2.99}P_{1.01}O_{7.00}$; the identity of the mineral rests also on its X-ray powder pattern.

Occurrence: Very rare, in microcrystalline nodules in lignite beds which appear to have burned naturally.

Association: Rodolicoite, heterosite.

Distribution: From the Castelnuovo mine, Santa Barbara lignite district, 30 km southeast of Florence, Florence, Italy.

Name: Honoring Giuseppe Grattarola (1844–1907), Professor of Mineralogy, Florence University, Florence, Italy.

Type Material: Museum of Natural History, Florence University, Florence, Italy, 2087/RI.

References: (1) Cipriani, C., M. Mellini, G. Pratesi, and C. Viti (1997) Rodolicoite and grattarolaite, two new phosphate minerals from Santa Barbara mine, Italy. Eur. J. Mineral., 9, 1101–1106. (2) (1998) Amer. Mineral., 83, 654 (abs. ref. 1). (3) Modaressi, A., A. Courtois, R. Gerardin, B. Malaman, and C. Gleitzer (1983) Fe_3PO_7, un cas de coordinence 5 du fer trivalent, étude structurale et magnétique. J. Solid State Chem., 47, 245–255 (in French with English abs.).