Mascagnite $(NH_4)_2SO_4$

Crystal Data: Orthorhombic. *Point Group:* $2/m\ 2/m\ 2/m$. Rare in euhedral crystals; may be fibrous, to 5 mm; commonly in dendrites, stalactitic forms, and mealy crusts. *Twinning:* On {101}, common.

Physical Properties: *Cleavage:* {100}, good. *Fracture:* Uneven. *Tenacity:* Slightly sectile. Hardness = 2–2.5 D(meas.) = 1.768 D(calc.) = 1.769 Soluble in H_2O, taste sharp and bitter; slightly hygroscopic.

Optical Properties: Transparent to translucent. *Color:* Colorless, white, may be tinged gray, yellowish gray, lemon-yellow; colorless in transmitted light. *Luster:* Vitreous to dull. *Optical Class:* Biaxial (+). *Orientation:* $X = c$; $Y = b$; $Z = a$. *Dispersion:* $r > v$, weak. $\alpha = 1.521$ $\beta = 1.523$ $\gamma = 1.539$ 2V(meas.) = 52°

Cell Data: *Space Group: Pnma* (synthetic). $a = 7.782$ $b = 5.993$ $c = 10.636$ Z = 4

X-ray Powder Pattern: Synthetic.
4.33 (100), 4.39 (65), 3.055 (55), 3.890 (35), 5.22 (30), 3.139 (30), 3.122 (25)

Chemistry: (1) Natural material has never been analyzed; identification depends on correspondence of X-ray powder pattern and optical data with that of synthetic material.

Polymorphism & Series: Forms a series with arcanite.

Occurrence: A sublimation product in fumaroles and solfataras; formed by burning coal seams.

Association: Sal ammoniac, tschermigite, sylvite, halite, sassolite, boussingaultite, gypsum, sulfur, cinnabar.

Distribution: In Italy, on Vesuvius, Campania, and Etna, Sicily. In Russia, from volcanoes on the Kamchatka Peninsula. On Nyamuragira [Nyamlagira] volcano, Kivu Province, Congo. At The Geysers, Sonoma Co., California, USA. In Germany, from the Clara mine, near Oberwolfach, Black Forest, and on the dump of the Paul-Berndt mine, Freital, Saxony. From burning coal dumps at all of the following: Commentry, Allier, France. From Bradley, Staffordshire, England. At Arniston, Midlothian, Scotland. From Kladno and Radvanice, Czech Republic. Found near Ravat, Tien-Shan Mountains, Tajikistan. From near Chervonograd, Ukraine. In the USA, from Kehley's Run mine, near Shenandoah, Schuylkill Co., and Glen Lyon, Luzerne Co., Pennsylvania; at Bitter Creek, near Wamsutter, Sweetwater Co., Wyoming.

Name: Honoring Paolo Mascagni (1755–1815), Professor of Anatomy, University of Siena, Siena, Italy, who provided the original description.

References: (1) Palache, C., H. Berman, and C. Frondel (1951) Dana's system of mineralogy, (7th edition), v. II, 398–399. (2) (1960) NBS Circ. 539, 9, 8.