

**Crystal Data:** Monoclinic. *Point Group:* n.d. As crystals, to 80  $\mu\text{m}$ , in oval aggregates.

**Physical Properties:** *Cleavage:* On {110}, clearly observed under transmission electron microscopy. Hardness = 3 VHN = 123–357, average 252 (200 g load).  $D(\text{meas.}) = 3.8(1)$   $D(\text{calc.}) = 3.65$

**Optical Properties:** Opaque. *Color:* Yellow; in reflected light, yellow with a brassy hue. *Streak:* Black. *Luster:* Metallic. *Anisotropism:* Strong; orange, yellow-orange, greenish gray. *Birefractance:* Distinct; grayish brown to orange to yellow-orange.

$R_1$ – $R_2$ : (400) 18.1–29.6, (420) 17.1–29.1, (440) 17.9–30.0, (460) 18.9–31.3, (480) 20.2–32.9, (500) 21.5–34.5, (520) 22.8–35.9, (540) 23.5–36.5, (560) 24.2–37.3, (580) 24.5–37.4, (600) 24.7–37.4, (620) 25.0–37.4, (640) 25.1–37.3, (660) 25.2–37.3, (680) 25.2–37.0, (700) 25.1–36.7

**Cell Data:** *Space Group:* n.d.  $a = 9.717(8)$   $b = 7.280(6)$   $c = 6.559(7)$   $\beta = 95.00(3)^\circ$   
 $Z = 2$

**X-ray Powder Pattern:** Engis, Belgium.  
2.709 (10), 2.419 (8), 1.758 (8), 2.323 (7), 0.9576 (7), 1.925 (6), 0.9605 (6)

Chemistry:	(1)	(2)
Fe	42.37	45.04
Ni	0.20	
Zn	0.05	
Pb	4.02	
As	0.17	
S	49.74	51.73
O	3.69	3.23
Total	100.24	100.00

(1) Engis, Belgium; by electron microprobe, average of three analyses, corresponds to  $(\text{Fe}_{3.91}\text{Pb}_{0.10}\text{Ni}_{0.02})_{\Sigma=4.03}(\text{S}_{8.00}\text{As}_{0.01})_{\Sigma=8.01}\text{O}_{1.16}$ ; determination of sulfur valencies leads to  $(\text{Fe, Pb})_{12}(\text{S}_2^{2-})_{11}(\text{S}_2^{6+}\text{O}_3)$ . (2)  $\text{Fe}_4\text{S}_8\text{O}$ .

**Occurrence:** In a carbonate-hosted Pb–Zn deposit.

**Association:** Pyrite, melnikovite, marcasite, greigite, sphalerite, galena, goethite, zincian siderite, smithsonite, dolomite, quartz, cerussite, anglesite.

**Distribution:** From the Mallieue Pb–Zn deposit, Engis, about 40 km southwest of Liège, Belgium [TL].

**Name:** To honor Professor Willy A. Viaene (1940–), Catholic University, Louvain, Belgium, who has made important contributions to geological sciences in Belgium.

**Type Material:** Academy of Mining & Metallurgy, Kraków, Poland, EMP9; Catholic University, Louvain, KUR32, ONB2, ONB3; Museum of Natural History, Brussels, Belgium, RN 6380.

**References:** (1) Kucha, H., W. Osuch, and J. Elsen (1996) Viaeneite,  $(\text{Fe, Pb})_4\text{S}_8\text{O}$ , a new mineral with mixed sulfur valencies from Engis, Belgium. *Eur. J. Mineral.*, 8, 93–102. (2) (1996) *Amer. Mineral.*, 81, 1284 (abs. ref. 1).