Zussmanite $K(Fe^{2+},Mg,Mn^{2+})_{13}(Si,Al)_{18}O_{42}(OH)_{14}$

Crystal Data: Hexagonal. *Point Group:* 3 or $\overline{3}$. As tabular crystals, to about 1 mm.

Physical Properties: *Cleavage:* {0001}, perfect. Hardness = n.d. D(meas.) = 3.146 D(calc.) = [3.14]

Optical Properties: Translucent. *Color:* Pale green in thin section. *Luster:* Vitreous. *Optical Class:* Uniaxial (–). *Pleochroism:* Weak; O = pale green; E = colorless. $\omega = 1.643$ $\epsilon = 1.623$

Cell Data: *Space Group:* $R3$ or $R\overline{3}$. $a = 11.66(2)$ $c = 28.69(2)$ Z = 3

X-ray Powder Pattern: Laytonville district, California, USA. (ICDD 19-1500). 9.60 (100), 4.78 (45), 3.19 (25), 2.51 (16), 3.78 (10), 2.74 (10), 2.20 (10)

Chemistry: (1) No chemical analysis appears to have been published; the type description, however, gives the empirical formula $(K_{0.92}Na_{0.07})_{\Sigma=0.99}(Fe^{2+}_{10.85}Mg_{1.33}Mn_{0.46}Al_{0.34}Fe^{3+}_{0.11}Ti_{0.01})_{\Sigma=13.10}(Si_{16.6}Al_{1.4})_{\Sigma=18.0}O_{42.2}(OH)_{13.8}$.

Occurrence: In an exotic block of metamorphosed shales, siliceous ironstones, and impure limestones, probably representing deep ocean sediments subjected to blueschist facies metamorphism.

Association: Deerite, howieite, stilpnomelane, spessartine, riebeckite, quartz, aegirine, grunerite, aragonite, manganoan siderite, ferroan kutnohorite, graphite.

Distribution: In the Laytonville quarry, Mendocino Co., California, USA.

Name: For Jack Zussman (1924–), mineralogist-crystallographer, Manchester University, Manchester, England.

Type Material: National Museum of Natural History, Washington, D.C., USA, 109454; The Natural History Museum, London, England, 1964,545.

References: (1) Agrell, S.O., M.G. Bown, and D. McKie (1965) Deerite, howieite and zussmanite, three new minerals from the Franciscan of the Laytonville District, Mendocino Co., California. MSA meeting, Bozeman, Montana, July 26–31, 1964. Amer. Mineral., 50, 278 (abs.). (2) Lopes-Vieira, A. and J. Zussman (1969) Further detail on the crystal structure of zussmanite. Mineral. Mag., 37, 49–60. (3) Muir Wood, R. (1980) The iron-rich blueschist-facies minerals: 3. Zussmanite and related minerals. Mineral. Mag., 43, 605–614. 5/9/91