Esseneite $CaFe^{3+}AlSiO_6$

Crystal Data: Monoclinic. *Point Group:* $2/m$. As prismatic crystals, up to 8 mm.

Physical Properties: *Cleavage:* Perfect on {110}. Hardness = 6 D(meas.) = n.d. D(calc.) = 3.54

Optical Properties: Transparent in thin crystals. *Color:* Reddish brown, becoming darker with increasing Fe content. *Streak:* White. *Luster:* Vitreous. *Optical Class:* Biaxial (–). *Pleochroism:* X = lemon-yellow; Y = greenish yellow; Z = apple-green. *Orientation:* $Y = b$; $Z \wedge c = 9°$. *Dispersion:* $r < v$, strong. $\alpha = 1.795(5)$ $\beta = 1.815(5)$ $\gamma = 1.825(5)$ 2V(meas.) = 77(5)°

Cell Data: *Space Group:* $C2/c$. a = 9.79(1) $b = 8.822(9)$ $c = 5.37(1)$ $\beta = 105.81(9)°$ Z = 4

X-ray Powder Pattern: Durham ranch, Wyoming, USA.
3.000 (100), 2.526 (70), 2.960 (60), 2.554 (40), 2.576 (30), 1.545 (30), 1.430 (25)

Chemistry:

	(1)
SiO_2	29.51
TiO_2	0.99
Al_2O_3	17.95
Fe_2O_3	23.89
FeO	0.69
MnO	0.11
MgO	2.68
CaO	23.40
Na_2O	0.14
Total	99.36

(1) Durham ranch, Wyoming, USA; by electron microprobe, average of 43 analyses on several grains, Fe^{2+}:Fe^{3+} calculated from normalized formula; corresponds to $(Ca_{1.01}Na_{0.01})_{\Sigma=1.02}(Fe^{3+}_{0.72}Mg_{0.16}Al_{0.04}Ti_{0.03}Fe^{2+}_{0.02})_{\Sigma=0.97}(Si_{1.19}Al_{0.81})_{\Sigma=2.00}O_6$.

Mineral Group: Pyroxene group.

Occurrence: A high-temperature, low-pressure, oxidized and quenched crystallization product derived from fused sediments contiguous to naturally combusted coal seams.

Association: Anorthite, melilite, magnetite-hercynite, glass.

Distribution: At Durham ranch, in the Powder River basin, 13 km northeast of Reno Junction and 25 km south of Gillette, Campbell Co., Wyoming, USA.

Name: For Dr. Eric J. Essene, Professor at the University of Michigan, Ann Arbor, Michigan, USA, and discoverer of the first specimens.

Type Material: National Museum of Natural History, Washington, D.C., USA, 163357.

References: (1) Cosca, M.A. and D.R. Peacor (1987) Chemistry and structure of esseneite ($CaFe^{3+}AlSiO_6$), a new pyroxene produced by pyrometamorphism. Amer. Mineral., 72, 148–156.