Chayesite $K(Mg,Fe^{2+})_4Fe^{3+}Si_{12}O_{30}$

Crystal Data: Hexagonal. *Point Group:* $6/m\ 2/m\ 2/m$. As tabular, euhedral to subhedral crystals, to 0.1 mm; dominant forms are {0001}, $\{10\bar{1}0\}$, $\{11\bar{2}0\}$, and $\{10\bar{1}2\}$.

Physical Properties: *Tenacity:* Brittle. Hardness = n.d. D(meas.) = n.d. D(calc.) = 2.68

Optical Properties: Transparent. *Color:* Deep blue; in transmitted light, light blue to colorless. *Streak:* White. *Luster:* Vitreous.
Optical Class: Uniaxial (+). *Pleochroism:* O = sky-blue; E = colorless. $\omega = 1.575(1)$
$\epsilon = 1.578(1)$

Cell Data: *Space Group:* $[P6/mcc]$ (by analogy to the milarite group). $a = 10.153(4)$
$c = 14.388(6)$ $Z = 2$

X-ray Powder Pattern: Moon Canyon, Utah, USA; close similarity to other milarite group minerals may require chemical analysis for identification.
5.076 (vs), 3.751 (vs), 3.238 (vs), 7.194 (s), 2.7840 (s), 4.148 (m), 2.9350 (m)

Chemistry:

	(1)	(2)
SiO_2	69.95	70.29
TiO_2	0.21	0.02
Al_2O_3	0.24	0.00
Fe_2O_3	5.28	
FeO	5.40	12.60
MnO	0.23	0.23
MgO	13.64	11.44
Na_2O	0.45	0.04
K_2O	5.24	4.48
Total	100.64	99.10

(1) Moon Canyon, Utah, USA; by electron microprobe, Fe^{2+}:Fe^{3+} calculated from stoichiometry; corresponds to $(K_{1.14}Na_{0.15})_{\Sigma=1.29}(Mg_{3.48}Fe^{2+}_{0.77}Fe^{3+}_{0.68}Mn_{0.03}Ti_{0.03}Al_{0.01})_{\Sigma=5.00}(Si_{11.96}Al_{0.04})_{\Sigma=12.00}O_{30}$. (2) Cancarix, Spain; by electron microprobe, total Fe as FeO, Fe^{2+}:Fe^{3+} in empirical formula calculated from stoichiometry; corresponds to $(K_{0.99}Na_{0.01})_{\Sigma=1.00}(Mg_{2.96}Fe^{2+}_{1.20}Fe^{3+}_{0.63}Mn_{0.03})_{\Sigma=4.82}Si_{12.18}O_{30}$.

Mineral Group: Milarite group.

Occurrence: A late-crystallizing mineral, nonuniformly distributed in the groundmass of lamproites.

Association: Potassian richterite, diopside, potassic feldspar.

Distribution: From Moon Canyon, east of Francis, Summit Co., Utah, USA. In Spain, at Cancarix, Albacete Province.

Name: In honor of Dr. Felix Chayes (1916–1993) of the Geophysical Laboratory, Carnegie Institute, Washington, D.C., USA.

Type Material: Institute for Mineralogy, Ruhr University, Bochum, Germany; National Museum of Natural History, Washington, D.C., USA, 165807.

References: (1) Velde, D., O. Medenbach, C. Wagner, and W. Schreyer (1989) Chayesite, $K(Mg,Fe^{2+})_4Fe^{3+}[Si_{12}O_{30}]$: a new rock-forming silicate mineral of the osumilite group from the Moon Canyon (Utah) lamproite. Amer. Mineral., 74, 1368–1373.