

Crystal Data: Monoclinic. *Point Group:* $2/m$. Massive in irregular veinlets or patches, 5 mm thick, in a nodule of beusite interlaminated with lithiophilite. Broken pieces of zhanghuifenite are blocky or tabular. Single crystals to 0.8 mm.

Physical Properties: *Cleavage:* Good on $\{010\}$. *Tenacity:* Brittle. *Fracture:* n.d. Hardness = ~ 5
D(meas.) = 3.63(2) D(calc.) = 3.62

Optical Properties: Transparent. *Color:* Deep jade-green. *Streak:* Pale green. *Luster:* Vitreous. *Optical Class:* Biaxial (+). $\alpha = 1.675(2)$ $\beta = 1.680(2)$ $\gamma = 1.690(2)$ $2V(\text{meas.}) = 74(2)^\circ$
 $2V(\text{calc.}) = 71^\circ$ *Orientation:* $\alpha \wedge X = 8^\circ$, $\beta = Y$. *Pleochroism:* $X = \text{deep blue green}$, $Y = \text{pale green}$,
 $Z = \text{yellowish-green}$. *Absorption:* $X > Y > Z$. *Dispersion:* Very strong, $r \gg v$.

Cell Data: *Space Group:* $P2_1/n$. $a = 12.8926(3)$ $b = 12.4658(3)$ $c = 10.9178(2)$
 $\beta = 97.9200(10)^\circ$ $Z = 4$

X-ray Powder Pattern: Santa Ana mine, San Luis province, Argentina. (similar to qingheite)
2.697 (100), 2.527 (34), 2.877 (25), 6.201 (21), 2.096 (14), 1.742 (14), 3.445 (13)

Chemistry:	(1)
P_2O_5	45.21
Al_2O_3	4.36
Fe_2O_3	1.58
MgO	7.14
MnO	23.15
FeO	8.84
CaO	0.66
<u>Na_2O</u>	<u>9.19</u>
Total	100.13

(1) Santa Ana mine, San Luis province, Argentina; electron microprobe analysis supplemented by Raman spectroscopy, $\text{Fe}^{2+}/\text{Fe}^{3+}$ ratio adjusted for electroneutrality; corresponding to $(\text{Na}_{2.80}\text{Ca}_{0.11})_{\Sigma=2.91}(\text{Mn}^{2+}_{3.09}\text{Fe}^{2+}_{0.47}\text{Mg}_{0.36})_{\Sigma=3.92}(\text{Mg}_{1.31}\text{Fe}^{2+}_{0.69})_{\Sigma=2.00}(\text{Al}_{0.81}\text{Fe}^{3+}_{0.19})(\text{PO}_4)_6$.

Mineral Group: Alluaudite supergroup.

Occurrence: Attributed to veining, produced possibly by a late-stage, fluid-rich peraluminous melt in a zoned granitic pegmatite.

Association: Beusite, lithiophilite.

Distribution: At the Santa Ana mine, San Luis province, Argentina [TL].

Name: Honors Chinese mineralogist, Professor *Huifen Zhang* (1934-2012), Institutes of Geochemistry in Guiyang and Guangzhou, China.

Type Material: University of Arizona Mineral Museum (21321) and the RRUFF Project (R160030), Tucson, Arizona, USA.

References: (1) Yang, H., A. Kobsch, X. Gu, R.T. Downs, and X. Xie (2021) Zhanghuifenite, $\text{Na}_3\text{Mn}^{2+}_4\text{Mg}_2\text{Al}(\text{PO}_4)_6$, a new mineral isostructural with bobfergusonite, from the Santa Ana mine, San Luis province, Argentina. *Amer. Mineral.*, 106, 1009-1015.