

Arrojadite-(KFe)**Crystal Data:** Monoclinic. *Point Group:* *m*. As cleavable masses to 15 cm.**Physical Properties:** *Cleavage:* On {001}. *Tenacity:* Brittle. *Fracture:* Uneven. Hardness = ~5
D(meas.) = 3.527 D(calc.) = 3.586 Nonfluorescent.**Optical Properties:** Transparent. *Color:* Dark yellowish green. *Streak:* White. *Luster:* Vitreous.
Optical Class: Biaxial (-). $\alpha = 1.662\text{-}1.664$ $\beta = 1.668\text{-}1.670$ $\gamma = 1.672\text{-}1.675$ $2V(\text{meas.}) = 80^\circ\text{-}86^\circ$
Pleochroism: X = colorless; Y = colorless to pale green; Z = pale yellow-green. *Orientation:* X = b;
Y \wedge c = 18°-21.5°. *Dispersion:* r < v, strong.**Cell Data:** *Space Group:* Cc. a = 16.453(2) b = 10.031(2) c = 24.692(4) $\beta = 105.72(9)^\circ$ Z = 4**X-Ray Diffraction Pattern:** South Dakota, USA. (ICDD 34-149)
3.042 (100), 2.714 (85), 3.222 (45), 2.774 (30), 2.852 (25), 2.751 (25), 2.550 (25)

Chemistry:	(1)		(1)
P ₂ O ₅	[40.70]	CaO	2.51
Al ₂ O ₃	2.42	SrO	0.06
FeO	28.48	BaO	0.12
MnO	14.56	PbO	0.20
ZnO	0.40	F	0.75
MgO	1.37	H ₂ O	[0.94]
Li ₂ O _{LAM}	0.26	<u>-O = F</u>	<u>0.32</u>
Na ₂ O	6.16	Total	100.40
K ₂ O	1.71		

(1) Nickel Plate mine, South Dakota, USA; average electron microprobe analysis, H₂O and P₂O₅ calculated, total includes SiO₂ = 0.03, TiO₂ = 0.05; corresponds to K_{0.76}Na_{4.15}(Ca_{0.94}Ba_{0.02}Pb_{0.02}Sr_{0.01}) $\Sigma=0.99$ (Fe²⁺_{8.28}Mn²⁺_{4.29}Mg_{0.71}Li_{0.37}Zn_{0.10}) $\Sigma=13.75$ (Al_{0.99}Ti_{0.01}) $\Sigma=1.00$ [(OH)_{2.18}F_{0.82}] $\Sigma=3.00$ [(P_{11.99}Si_{0.01})O₄₇(OH)_{1.00}].**Polymorphism & Series:** Forms a series with dickinsonite.**Mineral Group:** Arrojadite group. A₂B₂CaNa_{2+x}M₁₃Al(PO₄)₁₁(PO₃OH_{1-x})W₂.**Occurrence:** A high-temperature (≈ 800 °C) primary mineral in granite pegmatites.**Association:** Graftonite, cassiterite, spodumene, beryl, muscovite (Nickel Plate mine).**Distribution:** From the Nickel Plate mine, near Keystone, Pennington Co., South Dakota, USA [TL]. Chemically similar material from the Smith mine, Newport, and the Palermo No. 1 and Nancy mines, North Groton, New Hampshire, USA.**Name:** *Arrojadite* indicates a member of the group with Fe²⁺ dominant at the M site; two suffixes indicate the dominant cation of the dominant valence state at the A and B sites. Honors Miguel Arrojado Ribeiro Lisboa (1872-1932), Brazilian geologist. Formerly ‘arrojadite’.**Type Material:** Mineral Museum, School of Mines, Paris, France (38431).**References:** (1) Chopin, C., R. Oberti, and F. Cámara (2006) The arrojadite enigma: II. Compositional space, new members, and nomenclature of the group. *Amer. Mineral.*, 91, 1260-1270. (2) Cámara, F., R. Oberti, C. Chopin, and O. Medenbach (2006) The arrojadite enigma: I. A new formula and a new model for the arrojadite structure. *Amer. Mineral.*, 91, 1249-1259.