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**Crystal Data:** Orthorhombic. *Point Group:* mm2. Crystals are elongated along [010], showing prominent {110}, {101}, with {010}, {013}, {001}, to 5 cm; typically as cleavages.

Physical Properties: Cleavage: Perfect on  $\{010\}$ ; distinct on  $\{110\}$ , may be a parting. Hardness = 4 D(meas.) = 2.46-2.478 D(calc.) = 2.479 (synthetic). Turquoise-blue cathodoluminescence. Slightly soluble in hot  $H_2O$ .

**Optical Properties:** Transparent in thin flakes. *Color*: Colorless, white, may be pale rose or buff. *Luster*: Vitreous.

Optical Class: Biaxial (+). Orientation: X = c; Y = a; Z = b.  $\alpha = 1.550-1.553$   $\beta = 1.557-1.558$   $\gamma = 1.566-1.567$   $2V(\text{meas.}) = 69^{\circ} - 80^{\circ}$ 

Cell Data: Space Group:  $Pmn2_1$  (synthetic). a = 6.1155 b = 5.2340 c = 4.8452 Z = 2

**X-ray Powder Pattern:** Mt. Okhmyl'k, Russia. 3.965 (10), 2.635 (10), 3.794 (9), 2.420 (9), 2.311 (9), 1.513 (9), 3.552 (8)

Chemistry:

	(1)	(2)
$P_2O_5$	59.92	61.29
$SiO_2$	1.14	
$Al_2O_3$	0.62	
$\text{Fe}_2^{-}\text{O}_3^{-}$	0.04	
$\overline{\text{MnO}}$	0.01	
MgO	0.15	
CaO	0.88	
$Na_2O$	0.05	
${ m Li_2O}$	37.07	38.71
F	$\operatorname{trace}$	
$\mathrm{H_2O^+}$	0.33	
$\mathrm{H_2^-O^-}$	0.06	
Total	100.27	100.00

Total 100.27 100.00 (1) Mt. Okhmyl'k, Russia; after deduction of 1.04% quartz, 1.38% montebrasite, 1.33% apatite,

corresponds to Li<sub>3.00</sub>(PO<sub>4</sub>)<sub>1.00</sub>. (2) Li<sub>3</sub>PO<sub>4</sub>.

Occurrence: Formed by hydrothermal replacement of montebrasite in the core of a granite pegmatite in amphibolite (Mt. Okhmyl'k, Russia); in a lithium-rich granite pegmatite (Foote

mine, North Carolina, USA).

Association: Montebrasite, apatite, quartz, spodumene, lepidolite, beryl, elbaite, pollucite,

tantalite, cassiterite, microcline (Mt. Okhmyl'k, Russia); leucophosphite, huréaulite, switzerite, jahnsite, rockbridgeite (Tip Top mine, South Dakota, USA).

**Distribution:** On Mt. Okhmyl'k, Voron'i massif, Kola Peninsula, Russia. In the USA, from the Foote mine, near Kings Mountain, Cleveland Co., North Carolina; at the Tip Top mine, 8.5 km southwest of Custer, Custer Co., South Dakota. Large crystals in the Tanco pegmatite, Bernic Lake, Manitoba, Canada.

Name: For its content of lithium and phosphate.

**Type Material:** Geology Museum, Kola Branch, Academy of Sciences, Apatity, 3347; Vernadsky Geological Museum, Moscow, 48601; A.E. Fersman Mineralogical Museum, Academy of Sciences, Moscow, Russia, 58501.

**References:** (1) Matias, V.V. and A.M. Bondareva (1957) Lithiophosphate – a new mineral. Doklady Acad. Nauk SSSR, 112, 124–126 (in Russian). (2) (1957) Amer. Mineral., 42, 585 (abs. ref. 1). (3) White, J.S., Jr. (1969) A lithiophosphate occurrence in North Carolina. Amer. Mineral., 54, 1467–1469. (4) Bondareva, O.S., M.A. Simonov, and N.V. Belov (1978) Crystal structure of the synthetic analog of lithiophosphate,  $\gamma$ –LiPO<sub>4</sub>. Kristallografiya (Sov. Phys. Crystal.), 23, 287–288. (5) (1966) NBS Mono. 25(4), 21.

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