

## Introduction

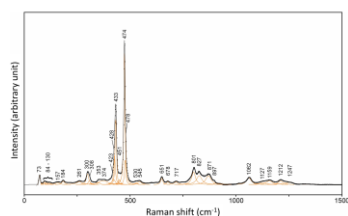
- The new mineral species touretite was found in the Ambalabe granitic pegmatite, Madagascar.
- Borate of the rhodizite-londonite group.
- Ideal chemical formula  $\text{LiAl}_4\text{Be}_4(\text{B}_{11}\text{Be})\text{O}_{28}$ .
- Accepted by the Commission on New Minerals, Nomenclature and Classification of the International Mineralogical Association (CNMNC-IMA) under number IMA-2023-003a.
- Named to honor the French mineralogists Jacques and Lydie Touret, for their huge contributions in the field of mineralogical sciences.

## Physical properties

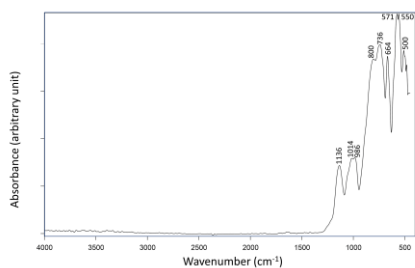


- Pinkish rhombic-dodecahedral crystals.
- Associated with tourmaline, feldspars, danburite and spodumene.
- Mohs hardness 8, density 3.06(1), refraction index  $n = 1.6952(5)$

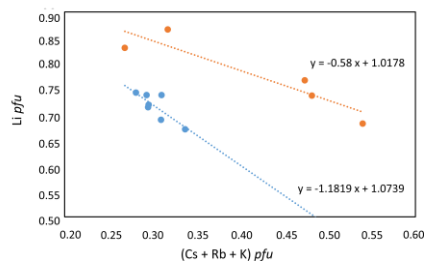
## Infrared and Raman spectra



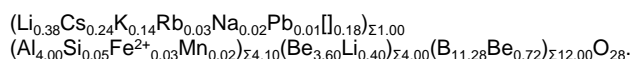
Absence of water in the mineral



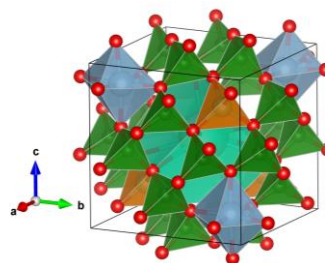
## Chemical composition



### Substitution mechanism



## Crystal structure description



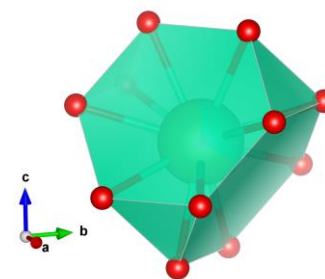
$a = 7.31202(15) \text{ \AA}$   
SG:  $P-43m$   
 $R_1 = 0.0444$

- Be [4], B [4], Al [6], Li [12]
- $\langle \text{Be-O} \rangle = 1.623 \text{ \AA}$
- $\langle \text{B-O} \rangle = 1.483 \text{ \AA}$
- $\langle \text{Al-O} \rangle = 1.913 \text{ \AA}$
- $\langle \text{Li-O} \rangle = 3.251 \text{ \AA}$

• Clusters of four edge-sharing  $\text{AlO}_6$  octahedra.

• Linked to  $\text{BeO}_4$  and  $\text{BO}_4$  tetrahedra by corner sharing.

• Alkali cations occupy the Li/Cs site in a large cavity at the center of the unit-cell, and have a coordination number of 12.



## Conclusions

- In the rhodizite group, homovalent substitutions mechanisms occur between rhodizite (K end-member), londonite (Cs end-member), and touretite (Li end-member).
- The occurrence of Li in a so large cavity is uncommon in inorganic crystal structures.
- Other possible end-members are the vacancy-dominant and the Rb-dominant species, not yet found in Nature.
- The presence of touretite in the Ambalabe pegmatite deposit indicates a relatively moderated fractionation degree.

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