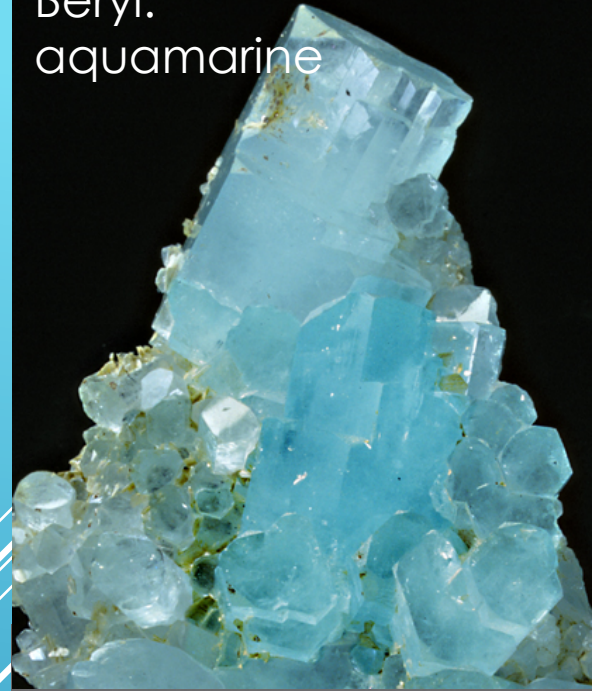


# PART 2 SOROSILICATES & CYCLOSILICATES

Beryl:  
aquamarine

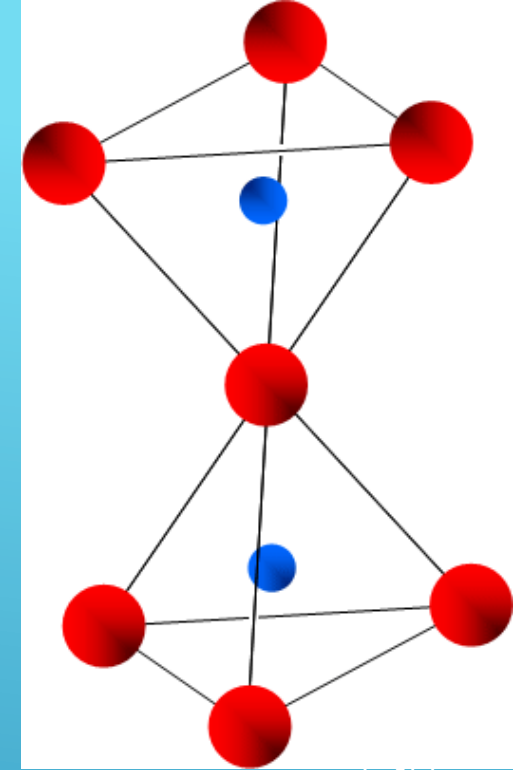


epidote



# SOROSILICATES


- ▶ **Double island silicates:** each tetrahedron shares one corner with another tetrahedron => basic structural unit:  $\text{Si}_2\text{O}_7^{6-}$ 
  - ▶ **Some sorosilicate:** combination of single and double island (ex.: Epidote)
- ▶ **Small group but widely distributed (common accessory minerals)**
- ▶ **Structure:** chain of edge sharing Al octahedra linked laterally through the double tetrahedral islands



# SOROSILICATES

- ▶ **One important group: epidote group** (zoizite, clinsoizite, epidote, allanite) – same structure
- ▶ **Important sorosilicates:**
  - ▶ **Epidote:** rich in Ca – LT/LP metamorphic rocks (Greenschist facies) ex.: hydrothermal alteration at mid-ocean ridges
  - ▶ **Allanite:** accessory mineral in granitoid, lanthanide-rich
  - ▶ **Lawsonite:** LT/HP metamorphism (blueschist facies) in basic rocks

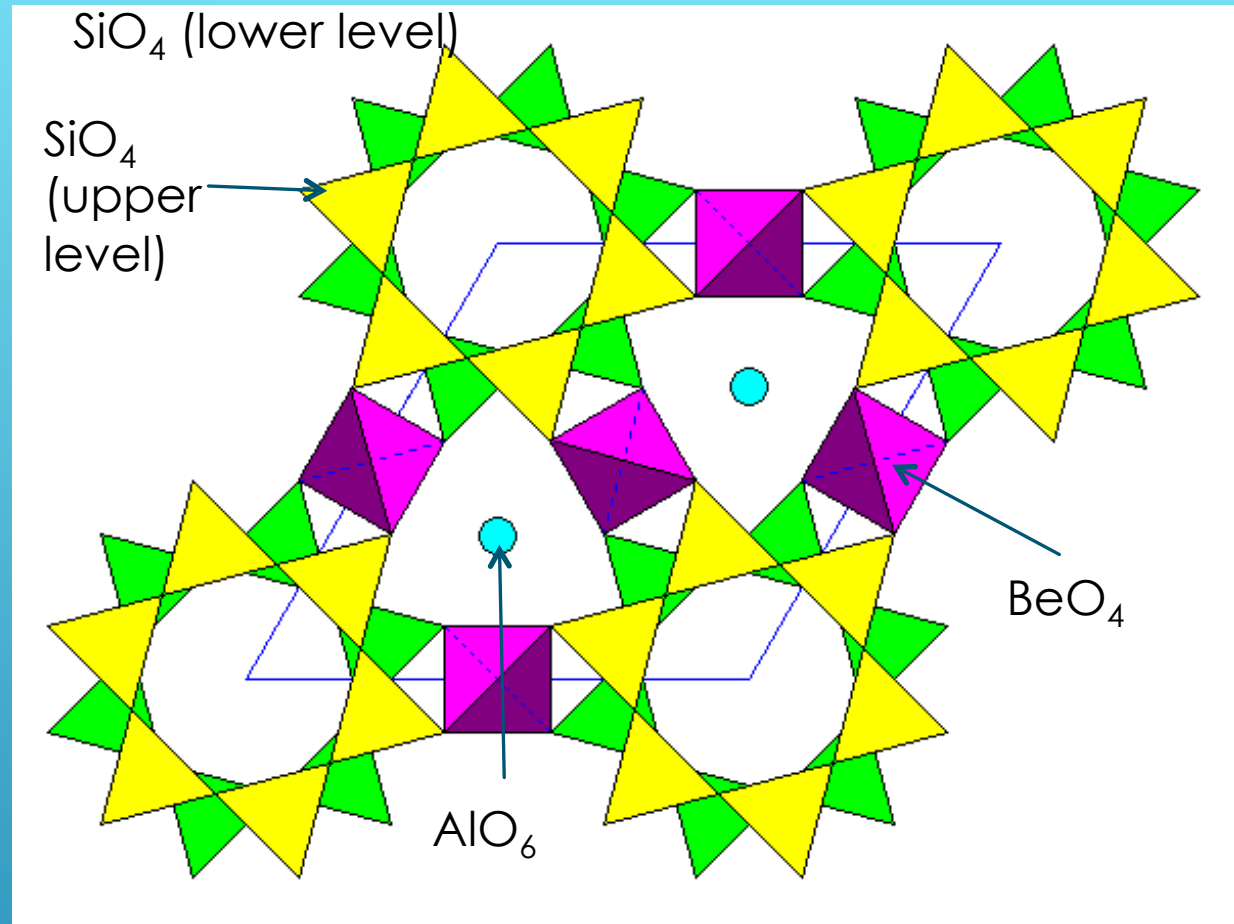
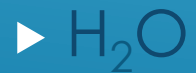
# CYCLOSILICATES = RING SILICATES

- ▶ **What?**
  - ▶ **Cyclos = circle**
  - ▶ **Ring of 3,4 or 6 tetrahedra**
  - ▶ **Important cyclosilicates:**
    - ▶ **Beryls**
    - ▶ **Tourmaline**
    - ▶ **cordierite**
- 6-fold rings of Si  
and Al tetrahedra**
- 

# BERYLS



▶ Potential cation (impurity) in the middle of the rings:



# BERYLS

## ▶ **Color:**

- $\text{Be}^{2+}$  replaced by  $\text{Fe}^{2+}$ : blue (aquamarine)
- $\text{Al}^{3+}$  replaced by  $\text{Fe}^{3+}$ : yellow
- Substitution by  $\text{Fe}^{2+}$  and  $\text{Fe}^{3+}$ : dark blue (maxixe)
- Traces of  $\text{Cr}^{3+}$  or vanadium: green (emerald)

## ▶ **Where?**

- ▶ Associated with Qz and Feldspar
- ▶ Common in pegmatite

# CORDIERITES

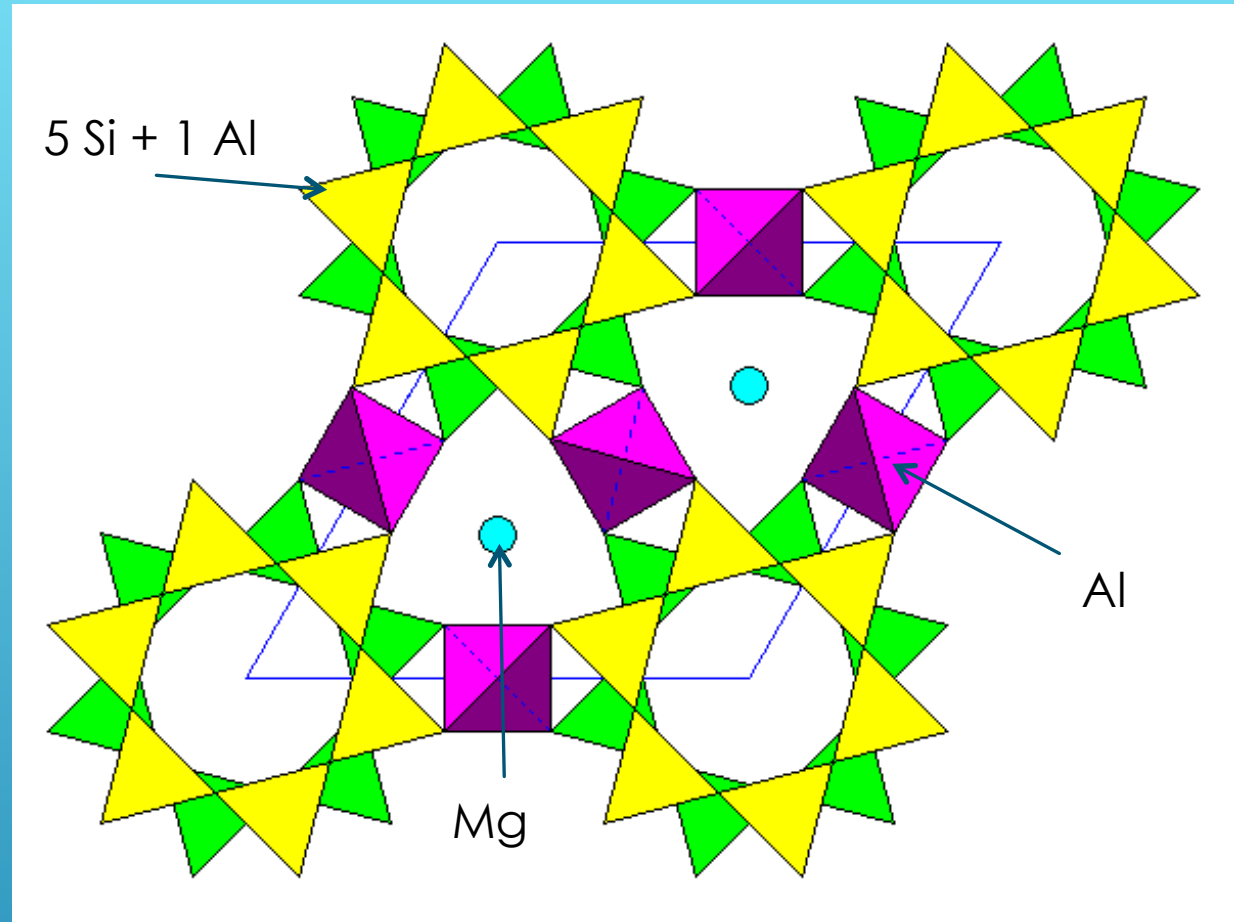


▶  $\text{Si}^{4+}$ : CN = 4

▶ Mg: CN = 6

▶  $\text{Al}^{3+}$ : CN = 4

▶ Beryl and cordierite: isostructural



▶ **Where?** Associated with sillimanite (medium and high grade pelitic metamorphic rocks)



# TOURMALINE

- ▶ Contains Fe, Mg, and a lot of Al
- ▶ **Where?**
  - ▶ In peraluminous ( $\text{Na}_2\text{O} + \text{K}_2\text{O} + \text{CaO} < \text{Al}_2\text{O}_3$  (mol%)) granites
  - ▶ In metamorphic rocks (HT/LP: contact metamorphism): metapelites