

Topaz

- Topaz has a hardness of 8 on mohs scale
- It occurs in colorless, brown, yellow, orange, sherry, red (Brazil and Sri Lanka) and Pink (Pakistan and Russia)
- Blue topaz is very popular, but darker blue results from irradiation

Topaz (cont...)

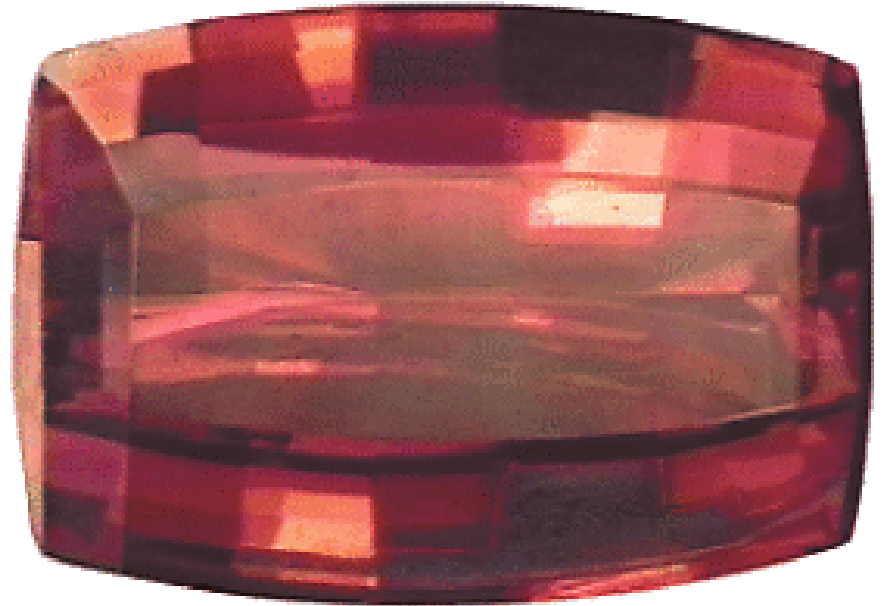
- Topaz is very often clear with few flaws
- Very large crystals are found
- One problem with topaz is that it has a perfect cleavage that makes it difficult to cut.
- The stone must be properly oriented or polishing will damage it.
- It also can not be cleaned with ultrasound for fear of breaking it.

Topaz broken



Imperial topaz

- Imperial topaz is intense reddish-orange color. It is the most sought-after of the topaz gems.
- The most important deposit is Ouro Preto, Brazil.



Topaz



Cutting of topaz

- To increase color a step or emerald cut it used.
- Perfect cleavage needs to be oriented at an angle to table in order to polish effectively (very difficult to polish cleavage surface).

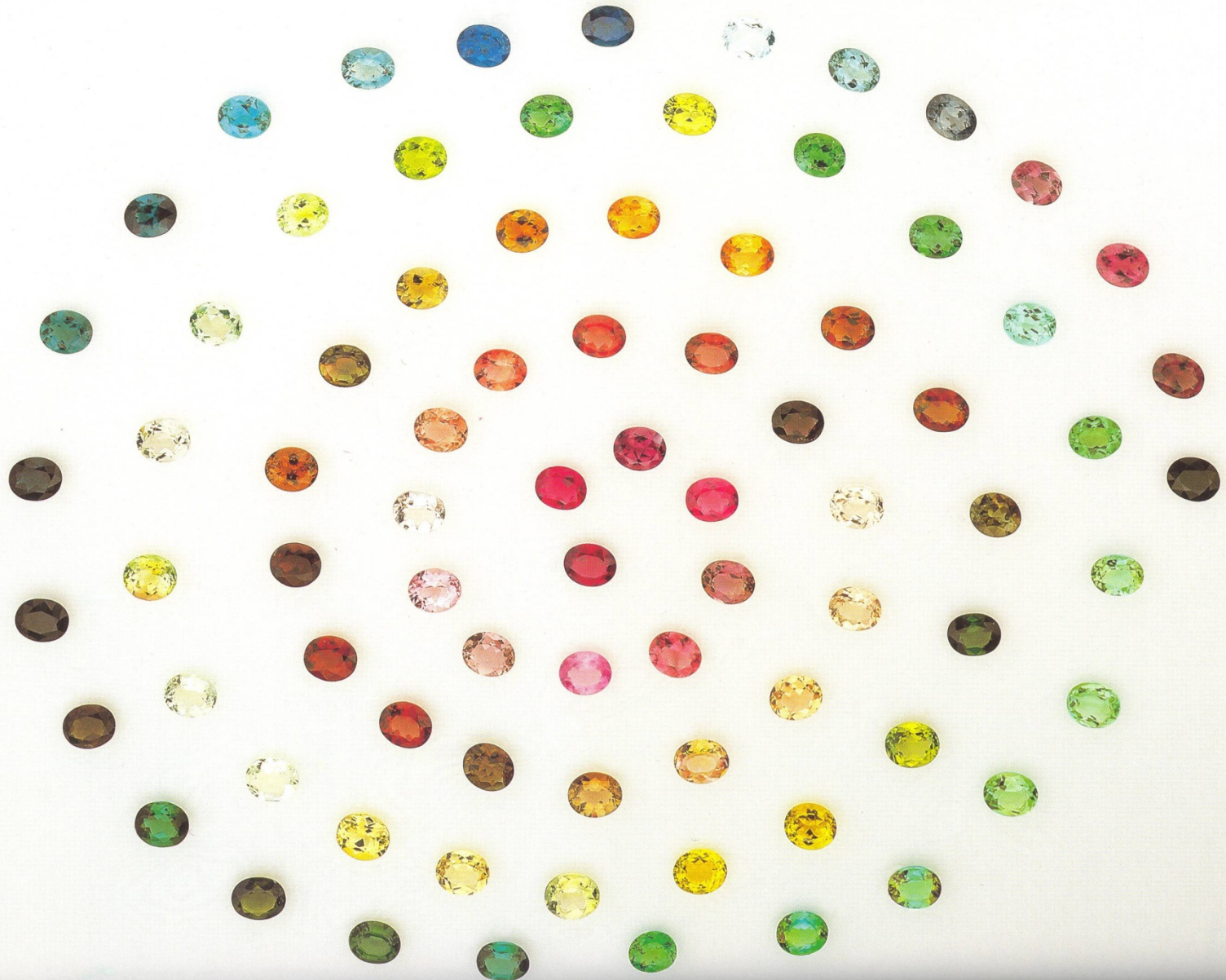
Heating and irradiation make the many colors of topaz



Tourmaline

- Tourmaline occurs in many colors
- It has a hardness of 7-7.5 (just hard enough for rings).
- It forms large crystals that are clear and transparent.
- Tourmaline is widespread in metamorphic, igneous, and sedimentary rocks
- Cut to show color, emerald and oval cuts

Many colors of tourmaline



Tourmaline (cont...)

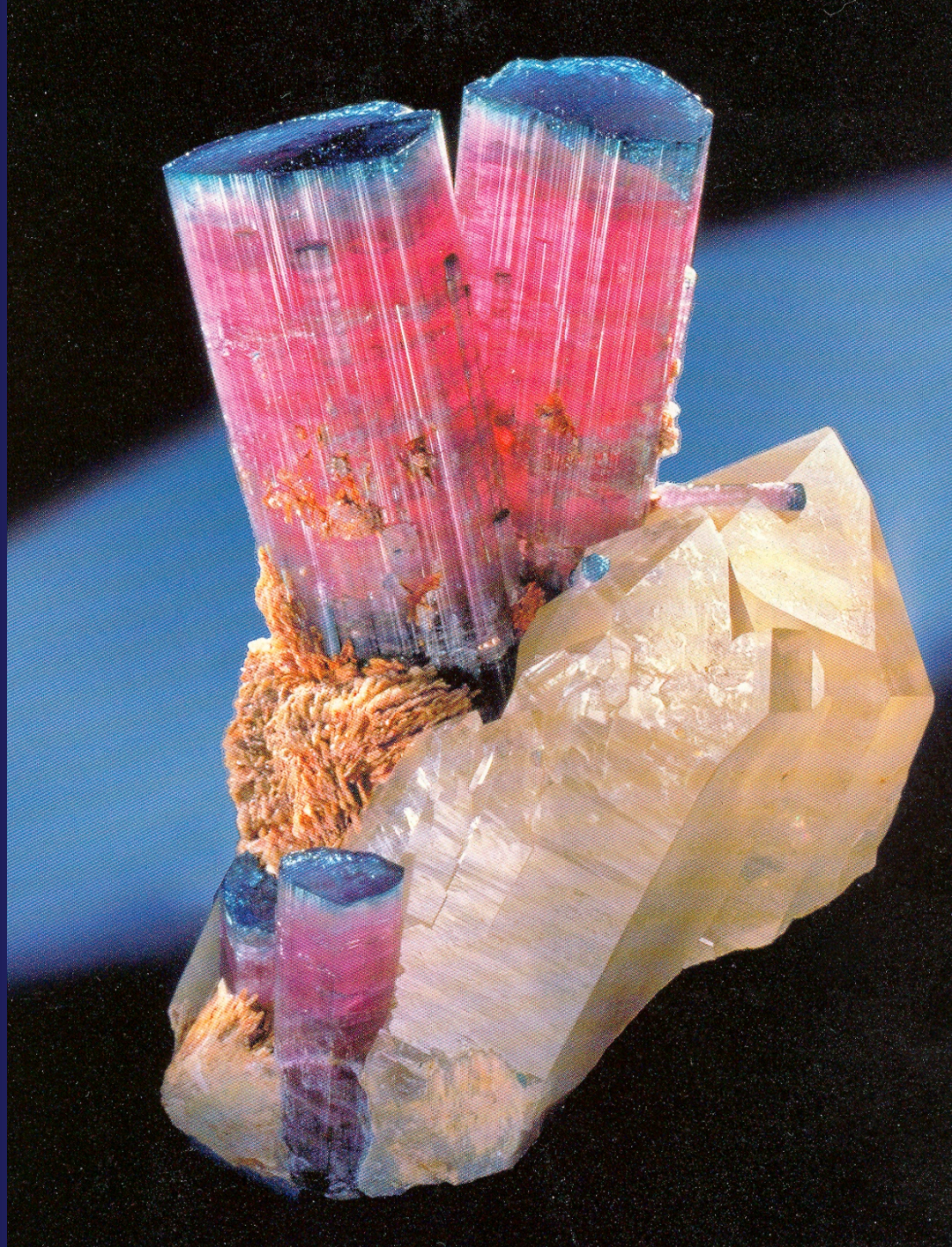
- The best tourmaline crystals come from igneous rocks
- Particularly from pegmatites (an igneous rock that has very large crystals).
- We saw famous tourmaline crystals from California. San Diego County is famous for its mines that have produced huge specimen of tourmaline

Candelabra

- One the next page is the candelabra a famous tourmaline from the Smithsonian
 - Below the rocket
- Show just how large a tourmaline crystal can get







Tourmaline Zoning

- Tourmaline crystals often have color zoning
- One of the most famous types of zoning is watermelon, which is green and red.
- Zoning can occur along the length or through the interior of a crystal
- Some of the finest zoned crystals come from Madagascar

Watermelon

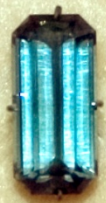


Watermelon Rhinoceros



There are many species of tourmaline

- The most important gem species is elbaite named for occurrence on the Island of Elba
- Elbaite come in many colors
- Schorl is black tourmaline
- Dravite is brownish tourmaline
- Many other rare varieties exist



Zoned elabaite from Madagascar



Very collectible



Paraiba electric blue tourmaline



Chrysoberyl

Chemical Formula/composition: BeAl_2O_4 , Beryllium Aluminum Oxide

Hardness: 8.5

Luster: vitreous or silky

Toughness: good; used in rings

Cleavage: fair in one direction and poor in another

Color: yellow, green (sometimes with red spots), red, and brown

Other: Alexandrite changes color when viewed in different lighting, Violet to red in electric light; other colors in natural sunlight including green (most common). Catseye is chatoyant (like tiger's eye)

Varieties: Chrysoberyl, Alexandrite (the most valuable), Catseye(cymophane) which has tiger's eye effect,

Localities: Ural Mountains, Russia, Sri Lanka, Brazil, Africa, and Burma

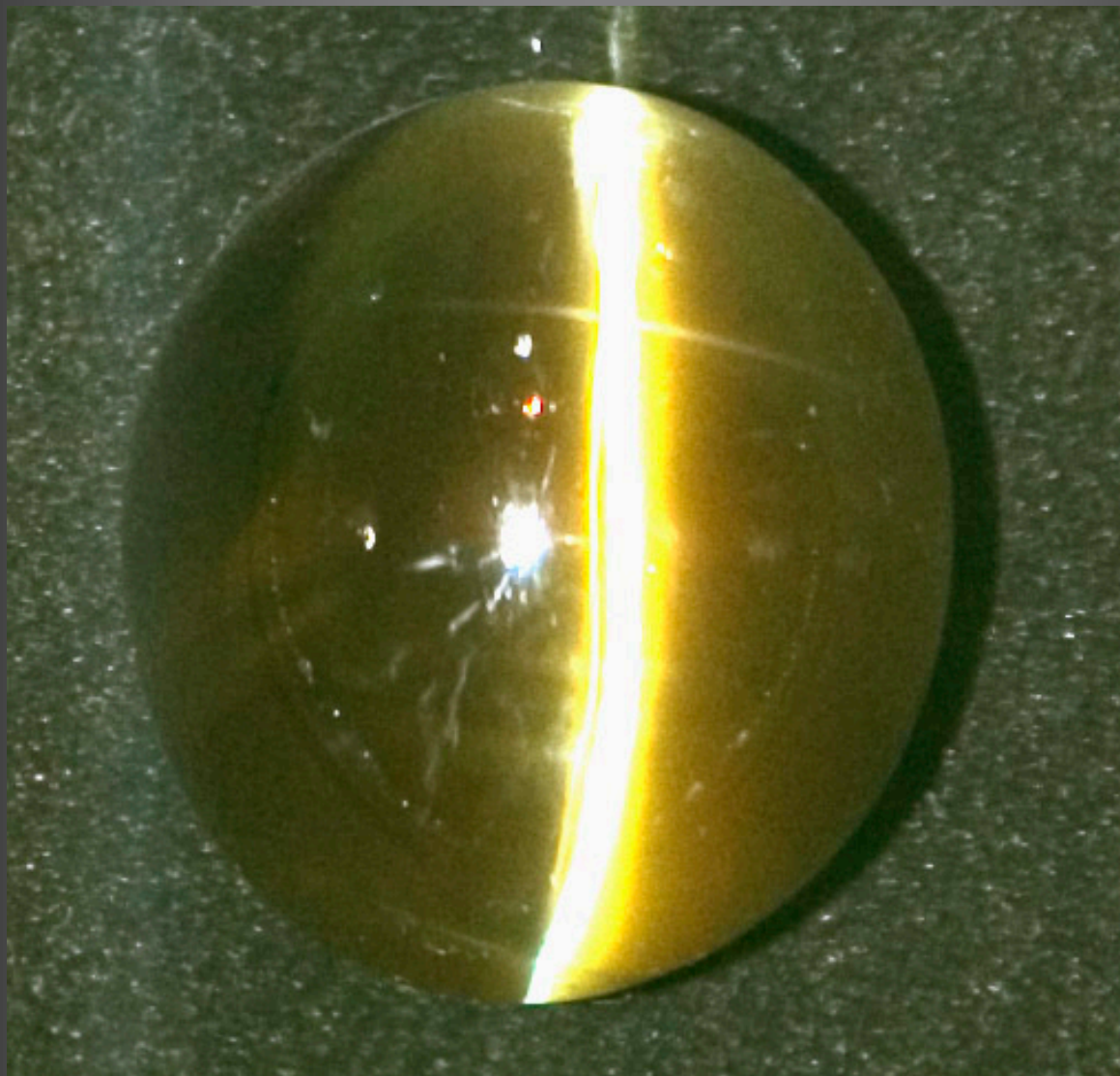
Chrysoberyl (cont...)

- Chrysoberyl has two important properties
- 1) Some specimens display Chatoyancy which creates **Cat's eye** (or cymophane)
- 2) Change of color depending on the type of light in which it is viewed. This variety is called **Alexandrite**

Cat's eye

- Chatoyancy is an appearance seen in tiger's eye as well. Fibers create an eye. Since Chrysoberly is superiors in hardness (8.5) it is better than tiger's eye.
- Tiger's eye does not make a good eye, but cat's eye makes a single bright line or eye.

Cat's eye



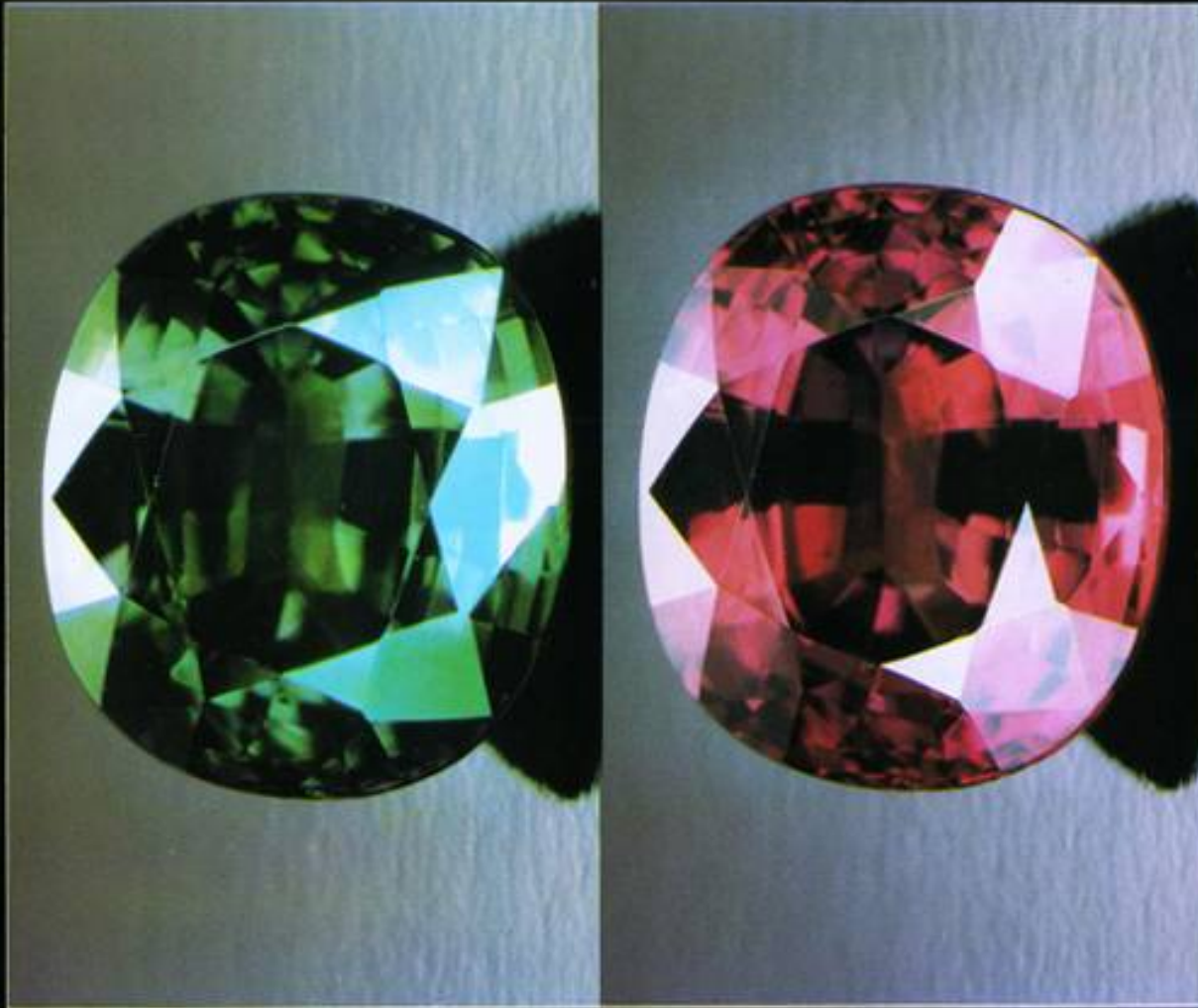
Alexandrite

- Alexandrite is the most valuable form of chrysoberyl.
- It is rare and has strong change of color depending on the type of light in which it is viewed.
- In sunlight the color turns an emerald green, while in incandescent light of a filament bulb it appears a violet-red.

Alexandrite (cont...)

- It was originally discovered in the Ural Mountains in 1830 on the birthday of Czar Alexander of Russia.
- An extraordinary coincidence was that the national colors of Russia were red and green.
- Today most stones are from Brazil & Africa

Alexandrite Color Change

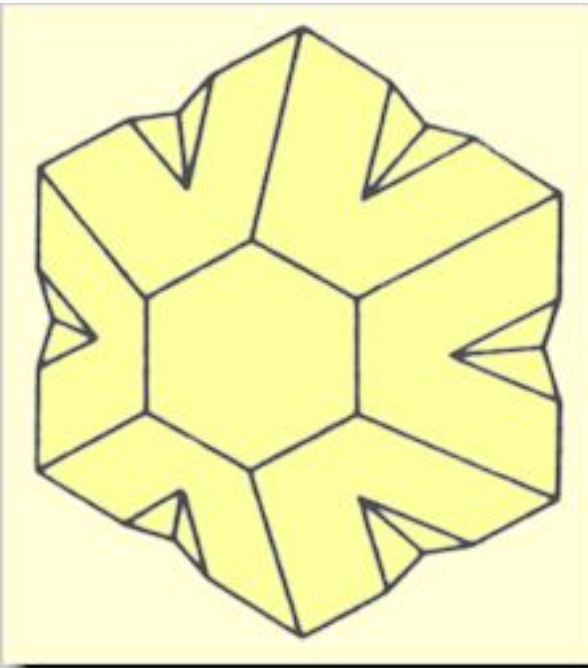


Synthetic Alexandrite (some is corundum)



Other forms

- Even though cat's eye and alexandrite dominate the market there are other varieties that may make attractive gems



Green and Yellow Chrysoberyl





Tanzanite

- The gem variety of the mineral zoisite is called tanzanite. It was discovered in Tanzania in 1967
- It occurs in pegmatite veins
- Tanzanite varies from light to deep blue in color, but it is heat treated to achieve this.

Tanzanite (cont...)

- Other colors include red variety (thulite), and a green variety (Zoisite).
- Hardness: 6.5-7 (less than desirable for a gem used in jewelry subject to abrasion)
- Composition: Ca-Al-silicate (tanzanite color is attributed to a Vanadium (V) as an impurity)

Heat treated at 600°C





A nice violet color

