Module B. Colour from the Cosmos

Lesson 14: Beryl Mineralogy and Gemology

How is Beryl Recognized and Distinguished from other Materials?

Because of its prismatic hexagonal nature, rough beryl crystals can sometimes be confused with quartz at first glance. However, beryl (hardness, H=7.5 to 8) is harder than quartz (H=7) and usually has flat crystal terminations rather than culminating to a point like quartz does. Beryl often has striations parallel to the length of the crystal, whereas striations on quartz crystals will run perpendicular to the length of the crystal. Beryl tends to exhibit basal cleavage and uneven fractures, while quartz commonly exhibits conchoidal fracture. However, there are many non-destructive ways to find out whether your crystal is beryl other than smashing a chip off! Depending on the specimen, beryl can also be strongly pleochroic (showing two different colours) when looking parallel and perpendicular to the long axis. Aquamarine is sometimes difficult to distinguish from blue topaz but specific gravity aided by refractive index can rule out this similarly coloured stone.

*The Scientific Method and Beryl Testing?*

Let's see how to apply the Scientific Method (Lesson 5.4) to identification a mineral of unknown identity. In this example we'll try to identify a pink mineral with hexagonal habit originating from granitic pegmatite:

1. *Compile observations*: Making detailed unambiguous and clear observations is vital to any scientific investigation whether that is recording results in a laboratory or describing the geology and mineralogy of a rock in the field.
   1. **Our initial observations:**The mineral is pink, fractured, non-transparent, and has hexagonal habit, vitreous luster, and poor cleavage perpendicular to its c-axis.
2. *Form a Hypothesis*: This is a provisional theory to explain the observations made.
   1. **Our provisional hypothesis:**This mineral is either corundum, beryl or possibly apatite (check your textbook!).
3. *Test the Hypothesis*: Procedures or tests used to collect data in order to determine if the hypothesis is correct.
   1. **Our tests:** Because the mineral is contained within a rock we are limited to testing hardness, streak, cleavage, luster, and habit. If you need a refresher on these properties, please refer to L7 or and your textbook (pages ~92-95).
   2. **Our results:** Hardness = 7.5, Streak = white, Cleavage = poor & perpendicular to the c-axis, Fracture = conchoidal, Luster = vitreous, Habit = tabular & hexagonal
   3. **Our conclusion:**Comparing these properties to those of corundum, beryl and apatite, it is apparent that the hardness = 7.5, cleavage = poor perpendicular to the c-axis, and luster = vitreous are characteristic for beryl and not corundum or apatite.  However, the streak, fracture, and habit are characteristic for the three minerals.
4. *Repeated testing*, if needed, on the hypothesis will aid in enhancing the confidence of your conclusions.
   1. **Do you feel that our test results confirm or reject the hypothesis that this is beryl?**
   2. **What other properties could be tested to support or reject the identification?**
   3. **Is it possible for all of these minerals to occur in granitic host rock?**
   4. **If this mineral was gem quality, what would it be called?**