What is the Composition of Phoenix Stone, a Mystic Stone?

By Donald Kasper 10-6-2022

A family member picked up a pyramid of Phoenix Stone, at a mystic shop in Solvang. The author had the opportunity to scan it in infrared to settle what its composition is.

The composition, depending on your source from Google is:

1. Chrysocolla, malachite, turquoise. This is just a guess of every copper mineral since it clearly has disseminated copper mineralization.
2. Quartz, chalcedony, opal, chrysocolla. This is a guess of some kind of quartz and more copper mineralization.
3. Ajoite. Now this one is interesting, and no, good science literature on the infrared spectra for ajoite so far, the author has not found, so this slows down the study of this candidate.

We have a start. The white is clearly quartz in infrared. This is some type of copper mineralization in quartz. The white quartz also contains a signature peak the author assigns to Japan Law twinned quartz.

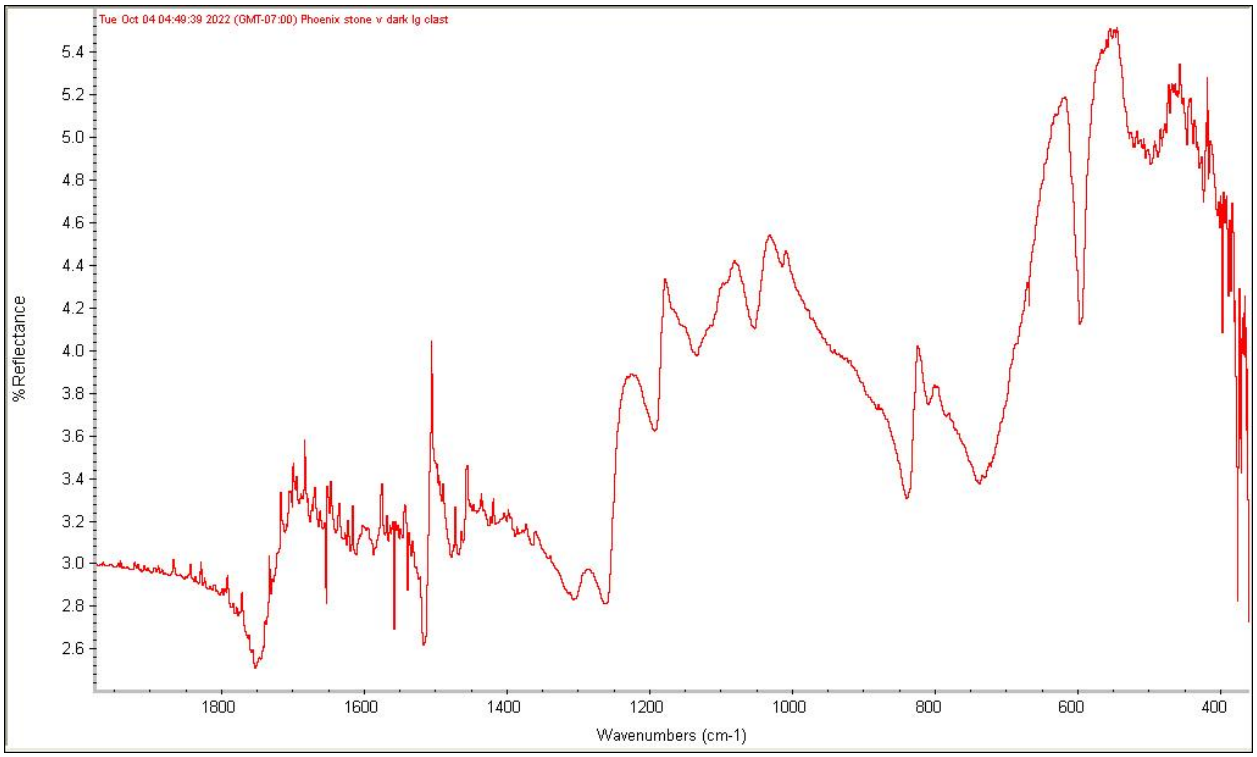
We also have a strong doublet in the 600 cm-1 region with steep trough inbetween, so we know that we are only going to study phyllosilicate candidates. This matches no known clay in the author's archives, clays have this sharp doublet over in the 500 cm-1 region, so this is going to be a copper phyllosilicate, not a clay. Malachite and turquoise are now out as is azurite, lapis lazuli (hauyne), and shattuckite.

Some really deep, translucent green areas in my specimen look like diopside. Infrared confirms this is not diopside and this is a phyllosilicate while diopside is not.

The spectral graph below is candidate ajoite, which matches the color (blue-green) as color matters for two mineral groups—iron and copper minerals. Ajoite is a phyllosilicate. A major Russian mineral spectral book somewhat matches this spectrum, but they use another type of infrared, so the peaks can drift 10 to 15 cm, which does not help. Also, they only use mid-infrared not near-infrared, so a very obvious phyllosilicate doublet position they don't have data for.

Other than quartz and ajoite, there are no other infrared candidates seen so far. Staining areas picks up quartz with ajoite water in infrared, while a large, solid clast inclusion in my specimen is closer to ajoite fundamental peaks than any other candidate. The ajoite water is a doublet at 4729/4682 cm-1.

For copper, the only other possible phyllosilicate is chrysocolla, whose spectrum does not match, so that is out. The only other phyllosilicate candidate is cavansite-pentagonite for which the author does not have reference specimens with their spectra, but infrared literature indicates this is not it, and the color is different. It is green-blue to rich blue, but there are no rich blue inclusions in online photos or my specimen.



Phoenix stone on blue-green clast, indicating likely ajoite. Noise on the far left of the spectrum is from atmospheric water interference starting to intrude, which occurs because the reflectance laser signal on this clast is very low. The huge sweep at 600 cm-1 is diagnostic for the phyllosilicates, which includes all the clays. Sweeping troughs on the left are from water. Ajoite is a hydrate mineral.