Hurlbutite from Myanmar

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A crystal of the very rare mineral hurlbutite $CaBe_2(PO_4)_2$ originating from Myanmar (without further locality details) was studied and faceted afterwards in two gems, which we also studied. This specimen is of particular interest because the species rarely produces well-formed crystals, but rather masses or globules (spherulites; Mindat, 2025). The crystal is a near-colorless, short lozengic prism, measuring approximately 17 x 10 x 7 mm and weighing about 2 grams. It is naturally etched, with few inclusions visible through the frosted surface, and a dissolved dislocation near the broken base. The ultraviolet (UV) luminescence is weak, greenish white in longwave, and weak orange in shortwave UV. The rough was faceted into two stones, a 0.64 ct round brilliant cut and a 2.56 ct rectangular scissor cut (RSC; Figure 1).

The refractive indices measured on the faceted stones are $n\alpha = 1{,}593$, $n\beta = 1{,}600$ and $n\gamma = 1{,}606$, close to values provided in the original description $n\alpha = 1.595(3)$ $n\beta = 1.601(3)$ $n\gamma = 1.604(3)$ (Mrose, 1952). It is optically biaxial negative. The specific gravity measured by the hydrostatic method is 2,88 compared to 2.877(5) (measured: Mrose, 1952) and 2.90 (calculated) (Mindat).

To verify the exact nature of this rare gem, on which very limited literature is available, we combined Raman scattering with X-ray diffraction and chemical analysis using Energy Dispersive X-ray Fluorescence (EDXRF).

The Raman scattering was obtained on a Renishaw InVia Raman microscope with a 514 nm laser and a 4 cm^{-1} resolution. The main peak is that of phosphates, at about 1017 cm^{-1} (Figure 2). The patterns obtained on the rough and the two faceted gems match both RRUFF references R070612 (from Finland) and R090048 (from the type locality in the USA).

Figure 1: The rough hurlbutite crystal (height about 17 mm), and the two fashioned gems, a 2.56 ct rectangular scissor cut and a 0.64 ct round brilliant cut. Photos LFG

Powder X-ray diffraction was performed on a D6 Phaser de Bruker, with a copper anode, a 30 kV voltage and a 18 mA current, on ground fragments remaining from the cutting process. The diffractogram obtained in the 5 to 90° 2θ angle range matches hurlbutite references in RRUFF and the Crystallography Open Database (COD).

The semi quantitative chemistry on the rough and afterwards on the faceted stones using EDXRF was measured on a ThermoScientific QUANTX. As expected from the chemical formula, calcium and phosphorus are responsible for the strongest signals, confirming identification indirectly. The main impurity is strontium (Sr) known to substitute for Ca. Additionally minor Mn, Pb, Al, Si and S were detected. The beryllophosphate hurlbutite is typical of the pegmatitic environment; Two of its components, beryllium and phosphorus, are generally found concentrated in pegmatitic fluids. In its original occurrence, Chandlers Mill Quarry, Newport, New Hampshire, USA, hurlbutite appears in a complex granitic pegmatite (Mrose, 1952).

Photoluminescence (PL) excited at 514 nm (RSC 2.56 ct) shows a broad band centered about 580 nm (greenish yellow) extending from about 500 to 650 nm, and a more intense one with apparent maximum about 737 nm in the red and near infrared (Figure 3). The 580 nm band may correspond to the greenish white emission observed in LWUV. There are in addition a few sharp lines at 543 nm, as well as a group at 854, 859, 869, 874, 886 nm, possibly caused by trivalent rare earth elements ions (REE^{3+}).

To our knowledge, there was no existing description of hurlbutite as a gem material in the literature before our contribution. We were able to confirm properties from the mineralogical references and gather some gemological properties, which are awaiting confirmation if another gem-quality hurlbutite is found.

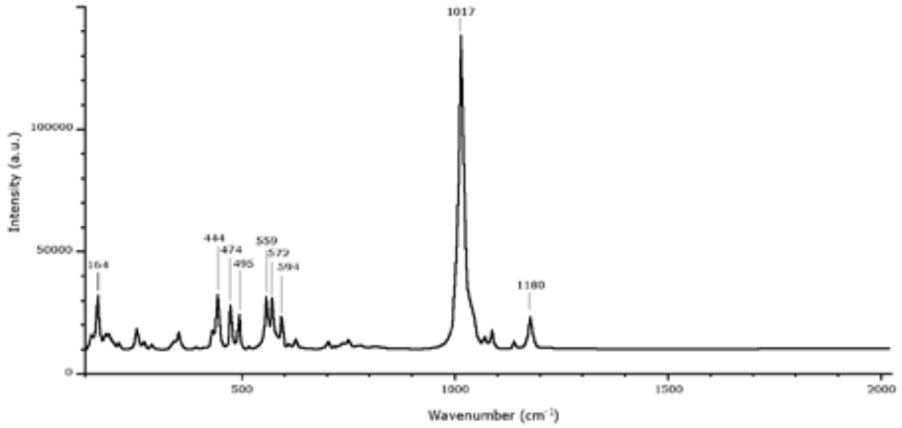

Figure 2: Raman spectra of the hurlbutite crystal. Vertical scale arbitrary.

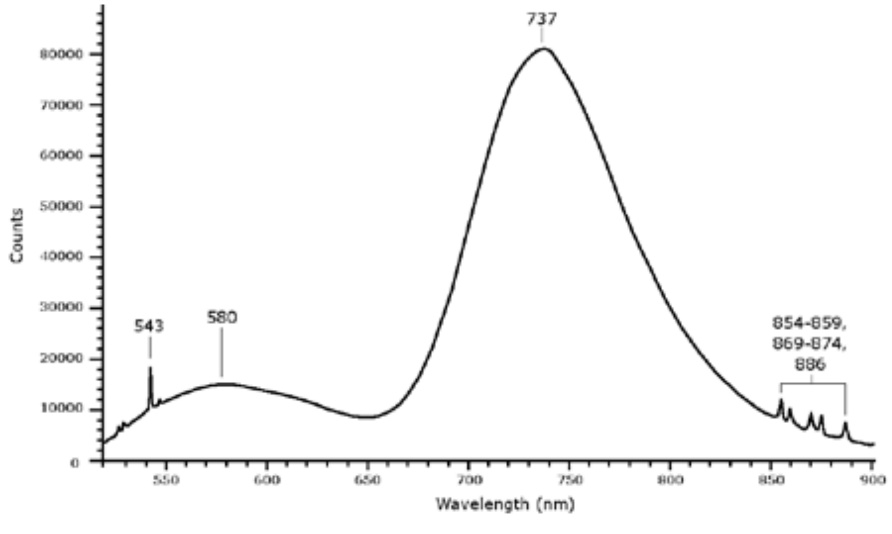

Figure 3: Photoluminescence spectrum of the 2.56 ct hurlbutite excited with a 514 nm laser at room temperature, from 500 to 900 nm. Vertical scale arbitrary.

References:

- Mrose, M., 1952. Hurlbutite, $CaBe_2(PO_4)_2$, a new mineral. American Mineralogist, 37, 931–940.
- Mindat https://www.mindat.org/min-1953.html (consulted 04-2025)