Winter 2024
Published: 01 December
www.LustreGemmology.com/research

Gemmology Bulletin

A Tourmaline Lamp

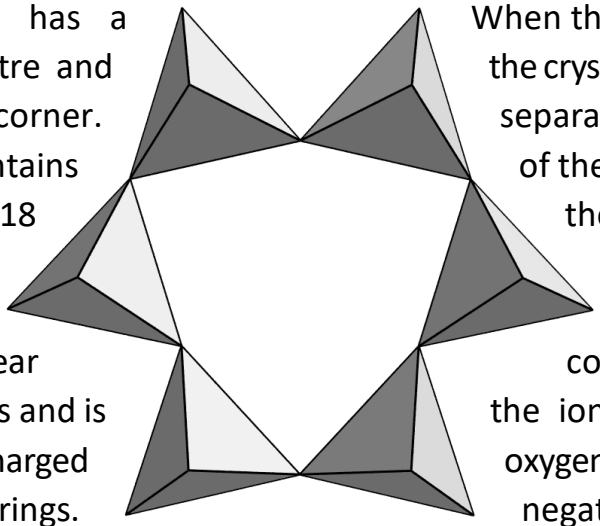
By James Evans, EG

We've upgraded a typical salt lamp with a terminated prism of tourmaline.

Whilst salt lamps have a certain aesthetic appeal, they frequently appear alongside a claim of positive health impacts. The claim is that the lamps, when hot, absorb water vapour from the atmosphere then re-release negative ions (negatively-charged molecules of oxygen with an extra electron). Whether negative ions have a positive health impact is, in this case, redundant – for salt would not in fact produce them. But a gem that could, is tourmaline.

Tourmaline crystals typically form trigonal prisms with one flat (basal) end and one pointy (pyramidal) end. This reflects the material's atomic structure, which has no central point of symmetry. Indeed, it is this asymmetry that enables the crystal to be pyroelectric; meaning it generates an electric charge in response to changing temperatures. To consider this in further detail, the crystal's structure is based on stacked rings of six triangular pyramids (tetrahedra) of silicate (making tourmaline a 'cyclosilicate').

Each silicate pyramid has a silicon atom at its centre and oxygen atoms at each corner. Each ring therefore contains 6 atoms of oxygen and 18 of silicon, and thus an electric charge of -12. This charge is centred near the base of the pyramids and is balanced by positively-charged metal ions between the rings.



A cyclosilicate ring.[1]

When the temperature changes, the crystal's atoms shift position,[2] separating the centre of charge of the metal ions from that of the silicate rings. The result is a static charge on the crystal's surface, which could plausibly facilitate the ionisation of atmospheric oxygen (to form the much-feted negative ions).

Aside from the potential negative ions, tourmaline can be found in the full spectrum of colours (in contrast to salt). Indeed, there is evidence that a greater electric charge would be produced by more transparent and more colourful specimens. With a full rainbow of prismatic crystals on offer, we'd certainly recommend the upgrade from salt to tourmaline.

Notes

[1] Image by Bubenik / Wikimedia, used under Creative Commons licence CC BY-SA 4.0.

[2] The predominant cause of this shift is thermal expansion (all pyroelectric crystals are also piezoelectric – meaning they generate a charge from a change in mechanical stress).