

Clinoptilolite is a natural [zeolite](#) comprising a microporous arrangement of silica and alumina tetrahedra. It has the complex formula: $(\text{Na,K,Ca})_{2-3}\text{Al}_3(\text{Al,Si})_2\text{Si}_{13}\text{O}_{36}\cdot 12\text{H}_2\text{O}$. It forms as white to reddish tabular [monoclinic tectosilicate](#) crystals with a [Mohs hardness](#) of 3.5 to 4 and a [specific gravity](#) of 2.1 to 2.2. It commonly occurs as a [devitrification](#) product of [volcanic](#) glass shards in [tuff](#) and as vesicle fillings in [basalts](#), [andesites](#) and [rhyolites](#). It was described in 1969 from an occurrence in [Owl Canyon, San Bernardino County, California](#).

It forms a series with [heulandite](#):

- Clinoptilolite-Ca – heulandite-Ca solid solution series
- Clinoptilolite-K – heulandite-K solid solution series
- Clinoptilolite-Na – heulandite-Na solid solution series

Use of clinoptilolite in industry and academia focuses on its [ion exchange](#) properties having a strong exchange affinity for [ammonium](#) (NH_4^+). A typical example of this is in its use as an [enzyme](#) based [urea](#) sensor. It is also used as [fertiliser](#), and sold as a [deodorizer](#) in the form of pebble-sized chunks contained in a mesh bag.

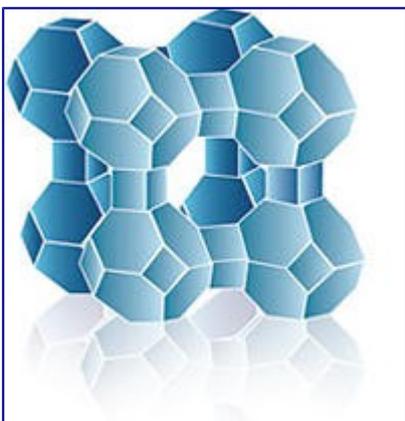
Research is generally focussed around the shores of the [Aegean Sea](#) due to the abundance of natural clinoptilolite in easily accessible surface deposits.

The name is derived from the Greek words klino (κλίνω; "oblique"), ptylon (πτερόν; "feather"), and lithos (λίθος; "stone").

Clinoptilolite in Human and Animal Health

Clinoptilolite Zeolite has a long history of use in livestock feed due to its ability to increase nutrient absorption. Swine and poultry studies in Japan have shown increased growth rates as well as a simultaneous decrease in the cost and amount of feed compared to control groups, when supplemented with $\leq 10\%$ clinoptilolite and mordenite. Mature and young pigs fed rations containing 5% clinoptilolite gained 16% more weight than control groups and the amount and severity of intestinal disease decreased. The excrement of the animals was also less odoriferous due to the zeolites uptake of NH_4^+ .[\[1\]](#)

It is also now used in human health to safely absorb and remove heavy metals from the body.



Clinoptilolite Zeolite Cage Structure curtesy of www.pureliquidzeolite.com

Clinoptilolite's negative charge and cage like structure has a high affinity for heavy metals like: mercury, arsenic, lead, aluminium, as referenced in peer reviewed studies [\[2\]](#) while also having a low affinity with the body's needed metals such as iron, calcium and magnesium.

Clinoptilolite Zeolite is also used for the removal of radioactive metals such as: caesium-137 strontium-90 and depleted uranium. Over 500 tones were dumped on the nuclear reactors in chernobyl to help stop the spread of radioactive particles. The addition of clinoptilolite to soils contaminated with Sr-90 markedly reduced the strontium uptake by plants.[\[3\]](#) In Bulgaria, clinoptilolite zeolite pills and cookies were prepared for human consumption to counteract Chernobyl fallout.[\[4\]](#)