

Aragonite crystallization in the Vortex

In the Limeteq Converter™ the Vortex Process Technology® (figure₄) creates a powerful and stable vortex. This essentially is a **controlled cavitation**. In figure₁ is an uncontrolled cavitation can be seen, created by the pressure difference of a ship's propeller. In the Limeteq Converter™ the Vortex removes unbound gasses from the water by a vacuum in the middle of the vortex. This is a controlled cavitation. All unbound gasses, including carbon dioxide CO₂ gasses, are withdrawn by the sub pressure of the vortex. The relatively soluble calcium hydrogen carbonate Ca(HCO₃)₂(aq) will be converted by this process in Calcium Carbonate CaCO₃(s), see formula₁.



Figure 1 uncontrolled cavitation

There is one important difference, the build-up of the CaCO₃ crystal!

Calcium carbonate CaCO₃ formed in the Limeteq Converter™ by the Vortex Process Technology® (figure₄) crystallizes differently. The **Aragonite crystal** (figure₃) is formed instead of the **Calcite crystal** (figure₂). **During the formation of calcium carbonate, by the removal of CO₂ gas bubbles, the forces of the vortex prevent that the Calcite crystal is formed. Instead, the polymorph Aragonite is formed.** Aragonite cultures that are created in the Vortex ensure that more Aragonite crystals form when calcium carbonate CaCO₃ is formed in a later process. The length of the Vortex, and thus the cavitation tunnel, determines the amount of unbounded gasses that are extracted. When more carbon dioxide CO₂ gas bubbles by the vortex are extracted more of the calcium carbonate polymorph Aragonite is formed.

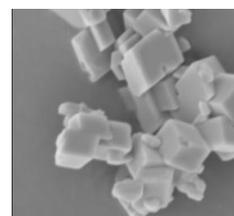


figure 2 Calciet

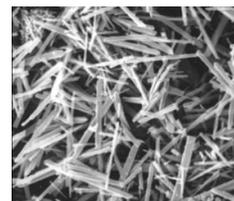


Figure 3 Aragoniet

Properties of Aragonite

The polymorphic **Aragonite has a main characteristic that it does not scale**. Calcium Carbonate CaCO₃ formed in the vortex remains dissolved in water and will not catch on to heat sources or other surfaces. **Treatment with salts or chemicals is no longer needed**. Furthermore, Aragonite is slightly harder than Calcite and usually grows in needle-shaped crystals (aculair), while Calcite has a leaf-shaped habit. The more harder Aragonite can even wear down older Calcite lime scales and remove them over time.

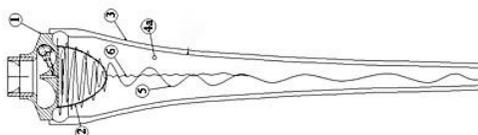


Figure 4 Vortex Process Technology®

Vlottum, (2006), Ketelsteen, Wikipedia.org, 24/10/2010 <http://nl.wikipedia.org/wiki/Ketelsteen>