

# Technology for P recovery as phosphate salts from drinking water and waste water by the Crystalactor® water treatment process



**Keywords:** zero-waste water treatment • Waste-to-revenue • Sustainable • Multi applicable

## Key facts:

- **Category of the technology:** Phosphorus precipitation from wastewater/sludge
- **Input:** Waste water
- **Output product(s):** Calcium phosphate, magnesium phosphate or struvite (and also: calcium carbonate, calcium fluoride, metal carbonates or hydroxides)
- **Available capacity:** More than 70 Crystalactor plants are running
- **Focusing geographical areas:** Present in all continents
- **Technology status:** TRL 9
- **EC/MS Authority permits:** n.a.



## Summary of the technology:

The patented zero-waste Crystalactor® water treatment technology is used as advanced treatment of both drinking water and (industrial) waste water for removal of a large number of heavy metals and other inorganic compounds. The Crystalactor technology is a flexible technology that can be used for treatment of both large and small water flows. The heart of the Crystalactor treatment plant is the pellet reactor, partially filled with suitable seed material such as sand, garnet, or small crushed pellets.

Crystalactor is sustainable and cost-effective: it produces a valuable resource as revenue. Phosphorus is recovered in the form of calcium phosphate, magnesium phosphate or struvite by dosing lime or magnesium hydroxide, or a combination of caustic soda and magnesium chloride as reagents. Struvite formation occurs by dosing magnesium salts if the ammonium required for struvite formation is present in the water. The bulk of the phosphate is removed in the form of pellets from the reactor. Effluent filtration is usually required to remove suspended phosphate flocs that are present as carry over from the reactor. Other possible resulting resources are calcium carbonate, calcium fluoride, metal carbonates or hydroxides.

## Competitive position and advantages:

- Crystalactor is **sustainable** and **cost-effective**: compared to other technologies like precipitation, ion exchange or membrane filtration, it produces a valuable resource as **revenue** instead of waste and associated costs.
- Suitable for reducing the concentration from over 25 mg P/L to 0.2-0.5 mg P/L at loads over 1 kg P/h
- Recently, we enhanced the Crystalactor with a **smart controller**, which was developed in close collaboration with Delft University of Technology and Amsterdam Water Works (Waternet). The advanced controller reduces the chemical, operational and maintenance costs by predictive control of formed pellets.
- Wide range of application in the industry

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