



Paques: leading in biological wastewater and gas treatment

Paques has over 30 years experience in helping industries and municipalities to reduce their water and carbon footprints and reclaim valuable resources. The cost-effective effluent purification systems produce energy from wastewater, whilst purifying the water and facilitating water reuse.

Since 1980, Paques realised more than 2000 references worldwide. Besides the headquarters in The Netherlands, Paques has subsidiaries and/or production locations in China, Brazil, North America, India and Malaysia. In many other countries, the company is represented by licensed partners. This ensures local presence and the best service for clients worldwide.

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*Hi, I'm Steve.
I recover your
phosphate!*



PHOSPAQ™

Sustainable phosphorus recovery

The PHOSPAQ™ process is the cost-effective and sustainable solution for removing and recovering phosphorus from industrial effluents and municipal sludge reject liquors.

revitalizing resources

Sustainable phosphorus recovery

The PHOSPAQ™ process is the cost-effective and sustainable solution for removing and recovering phosphorus from industrial effluents and municipal sludge reject liquors. It prevents uncontrolled struvite scaling and produces a slow-release fertilizer.

The PHOSPAQ™ process

The PHOSPAQ™ process was developed by Paques as a commercial solution to recover phosphate and prevent uncontrolled struvite scaling. The recovered phosphorus remains biologically available, in contrast to phosphate that is removed by iron salts. This way the PHOSPAQ™ process contributes towards a closed phosphorus cycle and a sustainable economy.

The PHOSPAQ™ advantages

The PHOSPAQ™ process introduces the possibility for modular upgrade from PO_4 -removal to P-recovery. Dosing of MgO instead of MgCl_2 eliminates the need for additional dosing of caustic soda (NaOH). Struvite formation is robust, with high tolerance to solids.

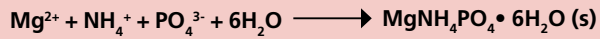
About PHOSPAQ™

- Struvite is a valuable fertiliser
- Struvite up to 70-95% dry solids
- Simultaneous P recovery and BOD removal
- Simple tank geometry
- Only dosing of magnesium oxide
- Caustic soda dosing not required
- > 10 PHOSPAQ™ references
- Proven and stable process
- Full scale experience since 2006

PHOSPAQ™

Operation principle

The PHOSPAQ™ process is a continuously aerated reactor in which phosphorus ($\text{PO}_4\text{-P}$) is recovered by controlled precipitation of magnesium-ammonium-phosphate crystals (struvite). Magnesium is dosed as MgO , which reacts with the phosphate and ammonium in the water:



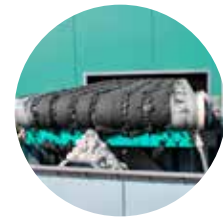
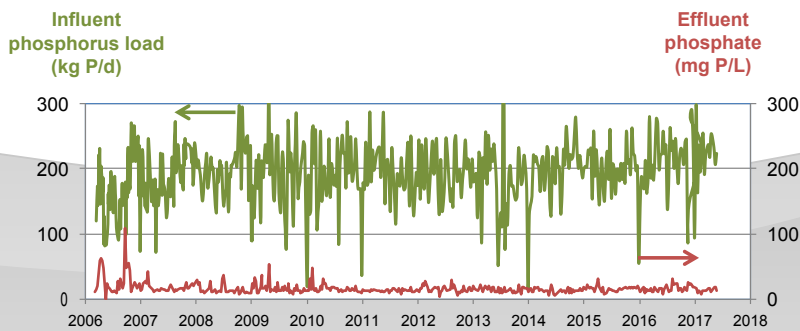
Applications

The PHOSPAQ™ process is the preferred technology in combination with ANAMMOX® for ammonia removal, as it:

- adds alkalinity (MgO)
- removes BOD and inhibiting compounds
- prevents uncontrolled struvite scaling

The combination PHOSPAQ™ – ANAMMOX® offers a compact and cost-effective solution to nutrient-rich effluents. The PHOSPAQ™ process has proven its robust performance since its commercial introduction in 2006.

- incoming phosphate > 50 mg P/L
- references for 60 – 1100 kg P/d
- removal efficiencies > 80-90%



Struvite dewatering



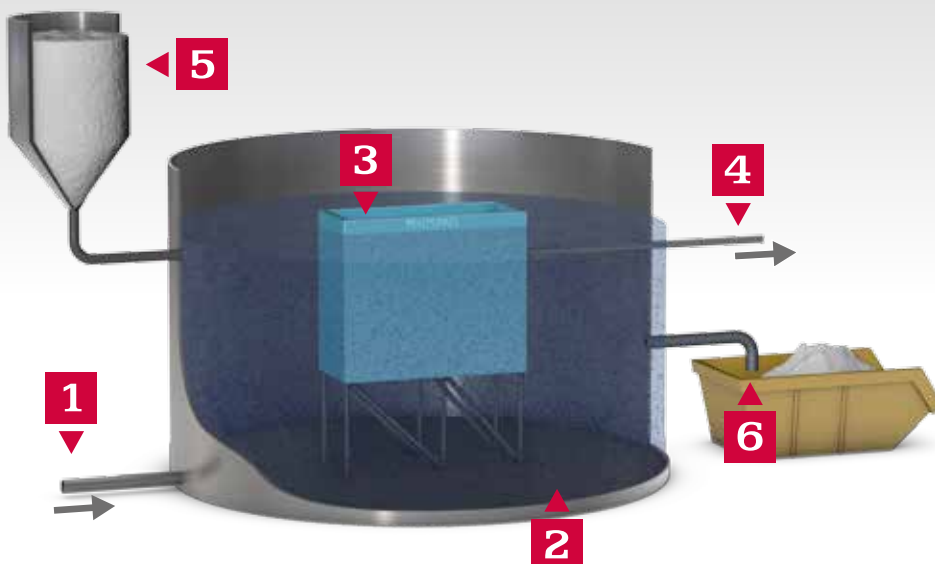
Struvite crystals from PHOSPAQ™



Pelletized struvite product



Recovered phosphate used as fertilizer



PHOSPAQ™ process

- 1 Phosphate rich Influent
- 2 Aerators grid for mixing
- 3 PHOSPAQ™ separator for struvite retention
- 4 Effluent from reactor
- 5 MgO dosing
- 6 Struvite harvesting