



*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  $\text{PO}_4$ -removal to P-recovery. Dosing of  $\text{MgO}$  instead of  $\text{MgCl}_2$  eliminates the need for additional dosing of caustic soda ( $\text{NaOH}$ ). 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 (PO<sub>4</sub>-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:



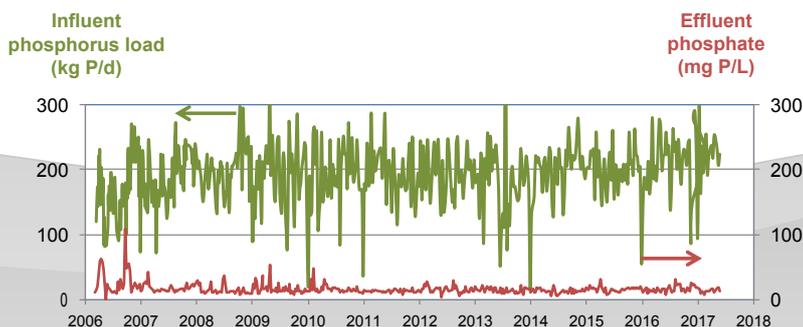
## Applications

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



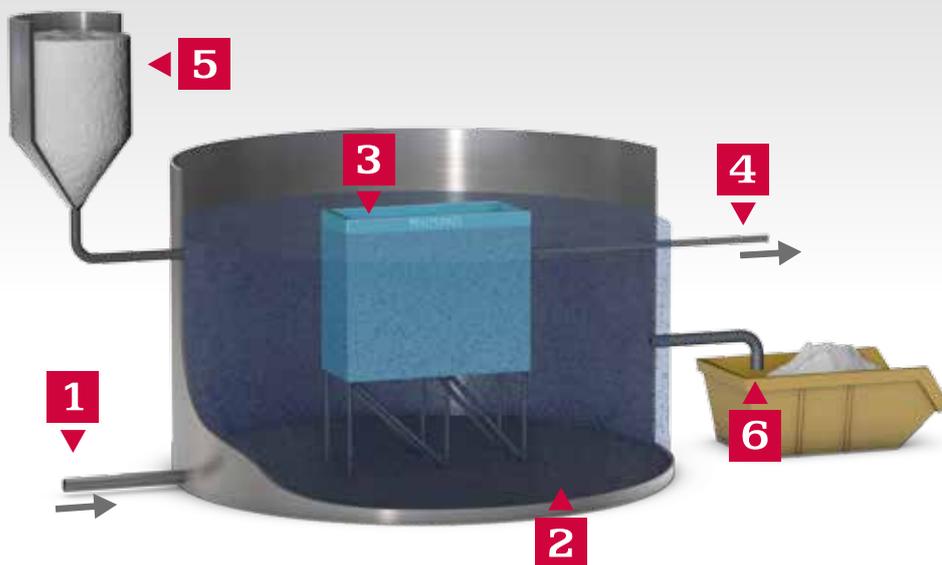
Struvite crystals from PHOSPAQ™



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



## Paques: leading in biological wastewater and gas treatment

For more than 40 years, Paques has been the world's leading company in the field of development and construction of cost-effective purification systems for water, wastewater and gases, based on innovative biotechnology. With over 3,000 reference installations worldwide, Paques has helped companies and municipalities succeed at to one of the major challenges of today: to reduce their water and carbon footprints and reclaim valuable resources.

The biogas produced by wastewater treatment plants can be used as green energy in boilers or gas engines. Beyond our headquarters in The Netherlands, Paques has subsidiaries and/or production locations in Brazil, China, India, Malaysia, Thailand and the United States. In many other countries, Paques is represented by licensed partners. This ensures our local presence and the best service for our clients worldwide.

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