



ELIQUO | HYDROK

EloPhos[®]



Phosphate reduction and recovery

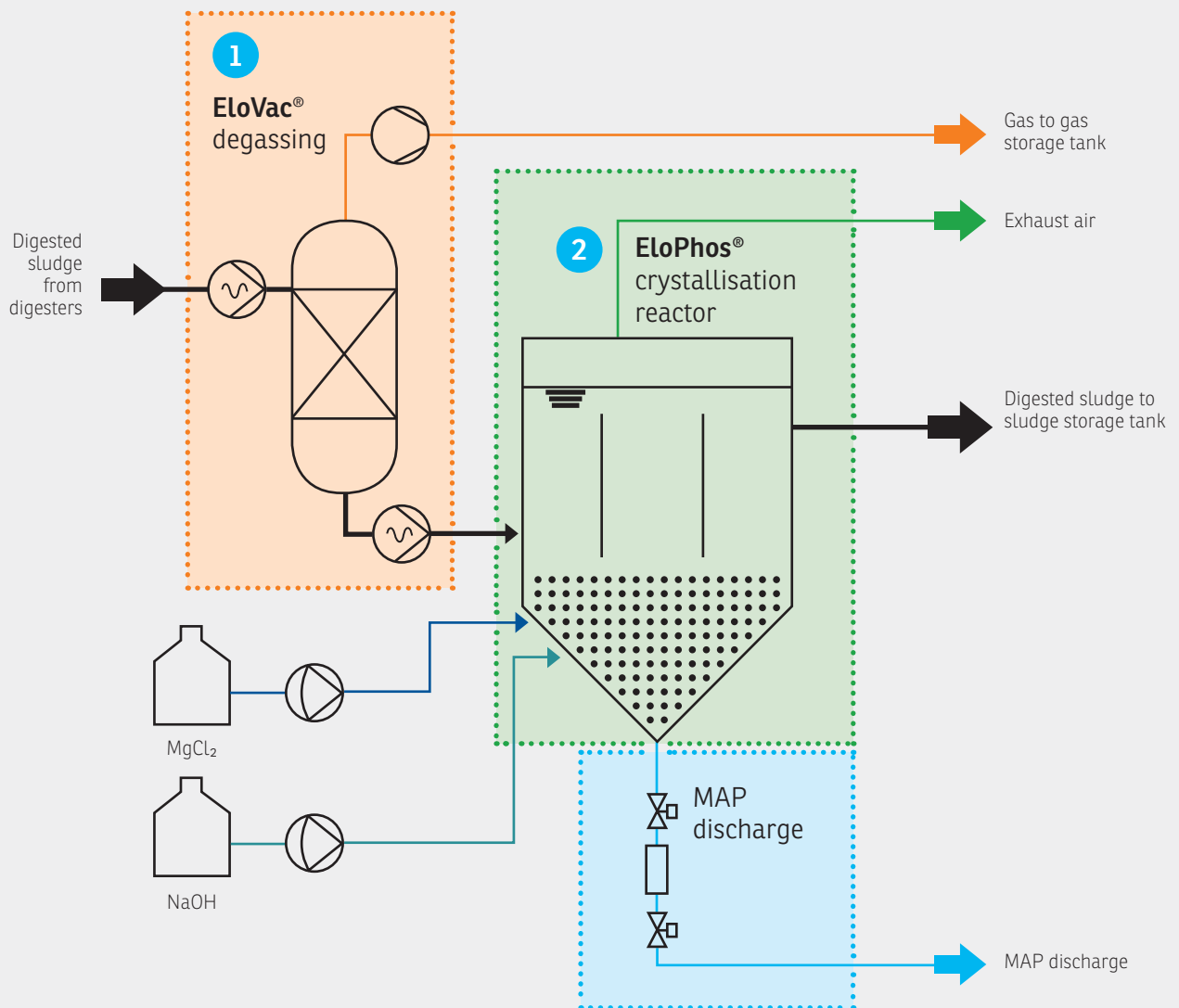


EloPhos[®]

IS A SYSTEM FOR THE RECOVERY OF PHOSPHATE FROM DIGESTED SEWAGE SLUDGE EMANATING FROM WASTE WATER TREATMENT PLANTS WITH BIOLOGICAL PHOSPHATE (bio-P) REMOVAL IN THE FORM OF MAGNESIUM-AMMONIUM-PHOSPHATE ("MAP" OR "STRUVITE") FERTILISER. **EloPhos[®]** IS A PROPRIETARY TECHNOLOGY OF ELIQUO STULZ (PATENT PENDING).

THE **EloPhos[®]** PROCESS IS BASED ON THE PRECIPITATION OF DISSOLVED PHOSPHATE FROM DIGESTED SEWAGE SLUDGE USING MAGNESIUM SALTS, USUALLY MAGNESIUM CHLORIDE ($MgCl_2$). CRYSTALS WHICH ARE GROWN IN THE **EloPhos[®]** CRYSTALLISATION REACTOR UP TO APPROX. 1 - 2 MM DIAMETER OR ABOVE CAN SUBSEQUENTLY BE SEPARATED FROM THE SLUDGE.

Schematic diagram



Core components

1 THE EloVac® DEGASSING MODULE

For efficient MAP precipitation in the EloPhos® crystallisation reactor, the pH value of the sewage sludge must be increased. This is normally carried out by addition of an alkaline solution, usually sodium hydroxide solution (NaOH), or by aeration of the sludge. The latter leads to a pH increase due to the stripping of dissolved carbon dioxide in the sludge. However, in addition to carbon dioxide, digested sludge also contains dissolved hydrogen sulphide gas, ammonia gas and methane. Aeration can therefore cause a high degree of undesirable odours and lead to unacceptable methane emissions.

The EloVac® degassing module ensures no unwanted gas emission takes place.

In the EloVac® module, the digested sewage sludge is degassed under vacuum. This leads to a pH increase of 0.3 – 0.4 pH units and at the same time prevents emissions. The gas mixture extracted from the sewage sludge can be fed into the gas stream of the anaerobic digestion system.

2 THE EloPhos® CRYSTALLISATION REACTOR

The core of the EloPhos® system is the EloPhos® crystallisation reactor. In the reactor, the dissolved phosphate is chemically precipitated from the digested sewage sludge as Magnesium–Ammonium–Phosphate (MAP) by dosing magnesium salts, usually magnesium chloride (MgCl₂).

The EloPhos® reactor is designed as a reactor with specific and optimized flow conditions. Selective magnesium salt dosing and digested sludge addition lead to a zone of rapid chemical reaction of the dissolved phosphate and the magnesium salt. Thus high degrees of nucleation and growth of the MAP crystals are achieved without significant overdosing of the precipitant.

If the pH increase of the digested sludge by the degassing stage is not sufficient to ensure efficient precipitation, supplementary dosing of alkaline solution into the crystallisation reactor is possible.

The MAP crystals formed in the EloPhos® are initially very small. If separation and MAP recovery are not required, these can be discharged together with the sludge. However, the hydraulic retention time of the crystals in the reactor can be controlled independently of the hydraulic retention time of the sludge and crystal growth can be encouraged in a targeted manner.

This process is used if a MAP fertiliser is desired with MAP crystals being recovered separately. With this option, MAP crystals of > 1 - 2 mm in diameter are separated from the sludge and collected via the automatic discharge system.

The entire EloPhos® system is automatically controlled and monitored by a process control system. The cost of plant operation is therefore kept to a minimum.

Benefits

The following benefits can be expected by treating digested sludge from bio-P waste water treatment plants using EloPhos®:

An increase of up to approx. 5 % in solids content in the digested and dewatered sewage sludge

 **Reduced sludge disposal costs**

A reduction of up to approx. 20 % in the consumption of polymer for the dewatering of the digested sludge

 **Reduced sludge dewatering costs**

A reduction in crystallisation problems by virtue of unwanted, spontaneous MAP deposits in the zone downstream from the EloPhos® system, e.g. in the digested sludge dewatering zone

 **Reduced maintenance costs**

A reduction of up to approx. 95 % in phosphate recycle load / sludge liquor


 **Reduced operational costs**

The recovery of MAP fertiliser

 **Revenues**

So far, EloPhos® systems for the treatment of digested sewage sludge in bio-P plants amortise favourably predominantly because of improved dewatering of digested sewage sludge, i.e. amortisation is dependent on the respective sludge disposal costs and must be individually calculated on a case by case basis.

Increasingly, both thermal hydrolysis processes (THP) and bio-P are found together. For such plants, the EloPhos® system is an ideal addition as it removes the phosphorus which is released by the THP process. EloPhos® is therefore also an ideal partner to ELIQUO's LysoTherm® system (thermal sludge hydrolysis process) in such circumstances.



We will be delighted to provide you with further information or calculate a business case for you.

Phosphorus is one of the raw materials expected to be subject to severe shortages in the near future. Whereas in 1979 the global stocks were estimated to be sufficient for 500 years at the forecast rate of consumption, in 2012 the amount of exploitable stocks was estimated to be sufficient for only around 100 years. The majority of raw phosphate extracted today is used for the production of fertilisers.

Waste water has the potential to be a significant source of secondary phosphate. Historically, phosphorus recovery from waste water was achieved by land application of sewage sludge. However, with the increasing use of thermal sludge disintegration processes where phosphorus is released, technical solutions for phosphorus recovery from the sludge liquid are of growing importance.

In some countries such as Germany or Switzerland, the governments intend to mandate phosphorus recovery.

[EloPhos® supports your recovery efforts.](#)

Version 001

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