



Highlights

- Accurate pH control with carbon dioxide (CO₂) gas
- Fast neutralization of alkaline wastewaters
- Protection of aquatic organisms by containing TBT contaminants
- Elimination of harmful, toxic and corrosive mineral acids for greater user safety
- Flexible, portable solution
- High capacity on a small footprint

SOLVOCARB[®] Mobile

Port of Gothenburg catches the tide of innovation as it expands with the help of pH control technologies from Linde.

Customer

The Port of Gothenburg is the largest port in Scandinavia. It is located on the west coast of Sweden and currently manages close to 30 percent of Swedish foreign trade. It also operates 130 direct services to destinations in Europe, Asia, the Middle East, Africa and North America. Approximately 70 percent of Sweden's total population and industrial capability is located within a 500-kilometer radius of the port.

Challenge

In 2018, the Port of Gothenburg started constructing a new terminal to cope with the anticipated rise in freight volumes. Covering an area of 220,000 square meters, the new terminal is scheduled to start operations in 2024/2025. It is being built using clay dredged from the bed of the Göta älv river. However, the clay contains potentially harmful substances such as tributyltin (TBT), an environmental toxin that was previously used in antifouling paints on the hulls of vessels.

The contamination stems from a time when environmental regulations were less stringent and sea- and riverbeds were often contaminated with pollutants. Before the clay can be used in construction, the Port of Gothenburg must ensure that it is treated to neutralize the contaminants. In addition to this, significant amounts of residual water also have to be pH-neutralized and purified before being released back into the sea.

On the pH scale, a level of seven is neutral. Six and below is acidic, while eight and above is alkaline. Both extremes are potentially harmful to people, animals and the environment. Today's stricter environmental regulations mandate that wastewater can only be discharged into outlet channels if it is within a narrow pH range around the neutral point. "The material we're working with is alkaline and the high pH level creates a greater risk of the TBT being freed and released into the environment," explains Kristina Bernstén, environmental project manager at the Port of Gothenburg. However, it's not just a matter of reducing the pH. Tight control over the adjustment is essential to make sure that the pH is not reduced so far that the water becomes too acidic.

Solution

The Port of Gothenburg turned to Linde to help it solve its pH neutralization challenge. It decided to deploy SOLVOCARB® Mobile, Linde's submerged diffusion system for carbon dioxide (CO₂), to neutralize the pH of water displaced during construction. The first of its kind to be installed in Scandinavia, the unit dissolves CO₂ gas into the water where it forms carbonic acid, which reduces the pH value and neutralizes the water. The patented venturi nozzle design of SOLVOCARB Mobile ensures excellent bubble distribution and thus reduces the neutralization time.

"Keeping the pH neutral ensures that the TBT stays safely locked in the water, which makes it less accessible to aquatic organisms," Kristina Bernstén continues.

SOLVOCARB Mobile is a versatile solution. It can be used for pH control across a variety of industries from food and textiles through pulp and paper to chemicals and petroleum. In addition to wastewater treatment, it can be used to control the pH of process water.

Benefits

Most pH neutralization solutions use mineral acids to reduce alkalinity. CO₂ is a safer, more sustainable option that also affords greater precision over the resulting pH value. "Using CO₂ for pH adjustment comes with two major advantages," explains Bernstén. "Firstly, we can avoid the risk of reducing the pH in the water by too much and making it too acidic. Secondly, it is a far safer solution to work with since handling acids can always be a risky business."

The compact dimensions of the mobile unit are also proving to be a benefit: "The SOLVOCARB unit can dissolve large amounts of CO₂ on a small footprint. This is a great advantage when it comes to dealing with high flows and large volumes of water with a high pH," adds Johan Magnusson, CEO of Clean Water Engineering, the company responsible for water treatment at the Port of Gothenburg.

With SOLVOCARB Mobile, it's full steam ahead for the Port of Gothenburg and its expansion plans. The port now has a robust, reliable way to re-use contaminated land and water without incurring the harmful, toxic environmental risks associated with the use of corrosive mineral acids.



SOLVOCARB® neutralization basin in operation, complete with liquid CO₂ supply scheme



SOLVOCARB® mobile installed in the neutralization tank during commissioning

Linde GmbH

Gases Division, Dr.-Carl-von-Linde-Strasse 6-14, 82049 Pullach, Germany
info-watertreatment@linde.com, www.linde-gas.com/watertreatment

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