

35.- One step ANAMMOX®

Title and name of product or technology
One-Step ANAMMOX®
Abstract
<p>NITROGEN (AMMONIA) REMOVAL FROM CONCENTRATED WASTEWATER</p> <p>Many industrial and other processes emit nitrogen compounds into the environment, thereby disturbing the nitrogen balance. Especially from high concentrated streams the nitrogen compounds such as ammonium and ammonia must be removed. Up till now physical/chemical processes like stripping and precipitation and conventional biological nitrification/denitrification have been the processes most commonly applied for the removal of ammonium. Those processes however are expensive in operational costs and often take up a large area.</p> <p>Paques has developed the innovative, cost effective and sustainable <i>One-Step ANAMMOX®</i> process to treat this high strength water in a single reactor. Operational cost are reduced significantly since no external carbon source is necessary, the power consumption is reduced by approx. 60% and the production of excess sludge is reduced by 80%. Several full scale installations are in operation treating nitrogen loads up to 11,000 kg N/d.</p>
Description including main features/advantages
<p>The <i>One-Step ANAMMOX®</i> process, which is in essence a shortcut in the nitrogen cycle, makes advanced use of anammox bacteria that directly convert NH_4^+ into N_2 gas in one-step and in one single reactor <i>without the addition of an expensive carbon source!</i></p> <p>The Anammox bacteria live in in the reactor in granular form, covered with a layer of nitrifying bacteria. This makes it possible to operate the single reactor in a constant process flow (so no need for sequential batch start-stop operation).</p> <p>The granular bacteria also allow easy separation between granules and other suspended solids.</p> <p>High nitrogen removal efficiency (up to 90%!) makes re-use of treated effluents possible.</p> <p>Compared to conventional nitrification/denitrification the operational costs are reduced by up to 90%, while CO₂ emission is reduced by 88%. Furthermore the plant requires only half the space taken up by nitrification/denitrification.</p>
Innovative aspects
<p>Although the Anammox process was developed already more than 10 years ago to be applied in combination with a nitrification process, it was later developed as a one-step process without any need for such nitrification pre-treatment. Nowadays the ammonium-rich rejectwater can be fed directly into the One-step ANAMMOX reactor.</p>
Current and potential industrial users/domains of application
<p>Treatment of reject water coming from dewatered sludge from digesters.</p> <p>Treatment of effluent from anaerobic pre-treated wastewater in e.g. potato processing industry.</p> <p>Treatment of other ammonium rich streams from different industries.</p>
Current state of development
<p>Development is finalised; First full scale plants are in operation. Paques is now ready to apply / roll-out this technology in a much broader range of industries. A mobile anammox pilot unit is available to do on-site testing with specific streams.</p>

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