

Clean water on the cheap



The Thiopaq, a purification plant for biogas developed by Wageningen UR and Paques, is making wastewater purification much cheaper. Dutch waste water treatment company Industrierwater Eerbeek recouped its investment costs in no time. TEXT AND PHOTOGRAPHY HANS WOLKERS

‘Nearly all the H₂S turns into high-quality, fine sulphur’



Purifying wastewater is a complex process involving many steps. Bacteria, gravity and chemicals such as sodium hydroxide all play a part in the purification process. Industrierwater Eerbeek BV purifies the water from three local paper factories. ‘First we extract the sludge from the dirty water by letting it sink to the bottom, after which we put it in the incinerator’, says Jan Moorman, head of technology. ‘Then an army of bacteria gets to work on the contamination in the water.’ The company converts around 12 million litres of industrial wastewater into virtually clean water every day. Anaerobic bacteria play a key role in the purification process; they are able to convert three quarters of the contamination into biogas. This is a smelly mixture containing methane and the notorious hydrogen sulphide, H₂S. Biogas is an excellent energy source, but the H₂S does need to be removed first. That is a piece of cake for chemists: they bubble the biogas through a sodium hydroxide solution in what are known as scrubbers. This old-fashioned method dissolves the H₂S in the alkaline solution, where it is then converted into sodium sulphate. This salt is bad for the environment as it leads to eutrophication and salination of water.

Industrierwater Eerbeek had a world first in 1993 when it installed the first commercial application of the Thiopaq, a purification plant for biogas developed by the Wageningen professor of Environmental

Technology Cees Buisman in partnership with the firm Paques BV. It soon proved to be a wise decision. The plant was able to purify the raw biogas more cheaply and more effectively than the old gas scrubbers thanks to the efficient bacterial conversion of H₂S.

SULPHUR HAS MARKET VALUE

‘The bacteria are able to convert more than 99 percent of the H₂S in the raw biogas into fine, high-quality sulphur in a single step’, says the inventor Cees Buisman. ‘It is not easy to produce this form of sulphur by other methods and it actually has market value, unlike the residual products from the old technology.’ Not only did the environment benefit considerably, the sodium hydroxide costs also fell by more than 90 percent. That means annual savings of more than 130 thousand euros. ‘So we recouped the investment costs of around one hundred thousand euros in less than a year’, says a pleased Moorman.

Global sales of the Wageningen installations have already topped one hundred and they are still selling. ‘The technology is marketed by Paques BV and Shell. They have just set up a new joint venture, Paquell’, says Buisman. Paquell sells an extra-large version of the Thiopaq, which is used to extract sulphur from natural gas on a large scale. ‘It is really rather impressive that the chemical industry is using a technology based on a bacterial conversion process invented in Wageningen’, says Buisman. ■