

Strippers & Scrubbers – the fight for nitrogen recovery, recycling & removal

27th April 2017

The Studio, Leeds

9.00- 9.30 Registration

9.30-9.35 Chair's welcome: Matthew Smyth, Associate Technical Director, Aqua Enviro

SETTING THE SCENE:

9.35- 10.05 What goes in must come out

Kristy Blakeborough-Wesson, Biomass Fertiliser and Feedstock Co-ordinator, SecAnim

Examining the need for nitrogen in the UK agricultural industry and the current tonnages of digestate potentially available through food waste AD, considering:

- The digestate product itself
- Farming confidence
- The future

REMOVAL:

10.05- 10.35 Complete Nitrification and Denitrification of Very High Concentrations of ammoniacal-N in Leachates and Digestates

Howard Robinson, Process Director, Phoenix Engineers

- Innovative process designs have allowed full-scale plants to be designed and operated successfully, in the UK and overseas, for complete nitrification and denitrification of up to 3000mg/l of ammoniacal-N in landfill leachates
- Digestates have very similar characteristics to leachates, and are presently being tested for treatment by similar processes
- The availability of readily-degradable organic compounds in digestates may allow full denitrification to be achieved using these as a free carbon source, but issues related to direct toxicity of ammoniacal-N are having to be overcome by innovative process designs

10.35 – 11.05 Sustainable Ammoniacal Nitrogen Removal of Organic Digestate Reject Liquor with the ANAMMOX® Process

Willie Driessen, Global Technology & Product Manager, Paques

- There is an increasing interest in anaerobic digestion of sewage sludge, organic waste and industrial effluents. Dewatering liquors and effluents derived from anaerobic digestion processes contain significant amounts of nutrients.
- The biological ANAMMOX® process is an effective nitrogen removal method consuming up to 60 % less aeration energy as compared to conventional nitrification-denitrification processes.
- Long term operational experience of the ANAMMOX® process treating dewatering liquors from a co-digestion plant are discussed in detail. A start-up was achieved within 3 weeks and biological ammonia removal in excess of 90 % was demonstrated.

11.05 -11.30 Morning break

11.30- 12.00 Liquor Nitrogen Removal via Energy Efficient Combined Strippers and Biological Processes

Henk Wim de Mooij, Project Manager and Paula Smith, Principal Engineer, Sweco

- Use of combined strippers and biological processes to achieve tough effluent standards in Biowaste nitrogen removal
- Use of DEMON® technology in wastewater treatment
- Two project examples

12.00-12.30 Solids removal for ammonia reduction at a brewery effluent AD plant in the UK

James Montgomery, Senior Development Scientist, SUEZ Industrial Water UK.

- Overview of the sites' ammonia compliance issues
- Operation of the solids removal process
- Delivery of a compliant ammonia removal solution

12.30-13.15 Lunch

RECOVERY:

13.15- 13.20 Welcome from Chair: Matthew Taylor, Organic Technical Manager, Aqua Enviro

13.20- 13.50 Options for integrated digestate processing at a large AD Plant in the UK.

Justin Rigden, Andigestion and Pete Smith, Cleansing Services Group

Over the last year, we have assessed a number of technologies for processing our digestate with the aim of:

- Separating nitrogen and phosphorous components from our digestate for individual deployment as targeted fertilizers
- Significantly reducing the volume of material for transport from the plant
- Using/disposing of any separated water on-site

13.50- 14.20 Nijhuis Ammonia Recovery (NAR) operational challenges and lessons learned

Eddie Broeders, Research & Development Technologist, Nijhuis Industries

- Overview of Nijhuis Ammonia Recovery (NAR) system
- Operational challenges of ammonia recovery and lessons learned
- Application of NAR for digestate and manure treatment in the Netherlands

14.20- 14.50 AD and Chicken Litter – Realising the Agronomic and Environmental Potential

Andy Bull, Associate Project Manager, Severn Wye Energy Agency

- Chicken litter is a potential pollutant and AD has potential in reducing risks
- The standard solution is to use it as a minority constituent of digester feedstock but the necessary high carbon buffer material is not always available
- Solutions are being developed and the “prize” is most certainly worth pursuing

14.50-15.05 Afternoon break

15.05-15.35 Use of Acid-tolerant Nitrifying Bacteria to Generate Acid for Ammonia Scrubbers on Animal Facilities

Philip Moore, Soil Scientist, US Dept. of Agriculture

- Scrubbing ammonia from the exhaust air of animal rearing facilities is not cost-effective using typical acids because the value of the nitrogen captured is less than the cost of the acid, hence our objective was to develop a biological system that produced “free” acid

- Nitrification is an acid-forming process in which two moles of acidity are formed when one mole of ammonia is converted to nitrate
- We developed an acid-tolerant nitrifying bacterial culture in a laboratory microcosm which was transferred to an ammonia scrubber located on the exhaust fan of a poultry house and the bacteria produced sufficient acidity to capture 20 kg of nitrogen, indicating this technology was feasible

15.35- 16.05 Hot Microbubble Injection in Thin Liquid Layers for Ammonia-Water Separation

Pratik Desai, Research & Innovations Director, Perlemax

- Ammonia -Water separations possible at 200-300 fold reduction in processing time
- Ammonia separation possible at low CAPEX/OPEX and in a sustainable way following circular economy principles
- Processing can be performed using low grade waste heat and workable for high concentrations down to low concentrations with very high removal efficiencies and can work with most ammonia-rich waste streams

INNOVATION:

16.05 – 16.35 Microvi: The Paradigm shift in biological treatment for nitrogen removal

Ajay Nair, Global Director Commercial & Technical Strategy, Microvi Biotechnologies

- Microvi technology sits at the innovation fulcrum of material science and microbiology to create specific, highly concentrated, low byproduct production and resilient reactors
- It's unique mechanism for encapsulating specifically isolated, non GMO, allows unprecedented levels of process stability using enhanced metabolic pathways for nitrogen removal and nutrient capture
- In pilot stage, the process is showing extreme promise in harnessing the alternative, higher efficiency ammonia removal techniques of Nitritation / Anammox in both side stream and main-scale

16.35 – 16.50 Final Discussion and close