



Quynh-May Dao

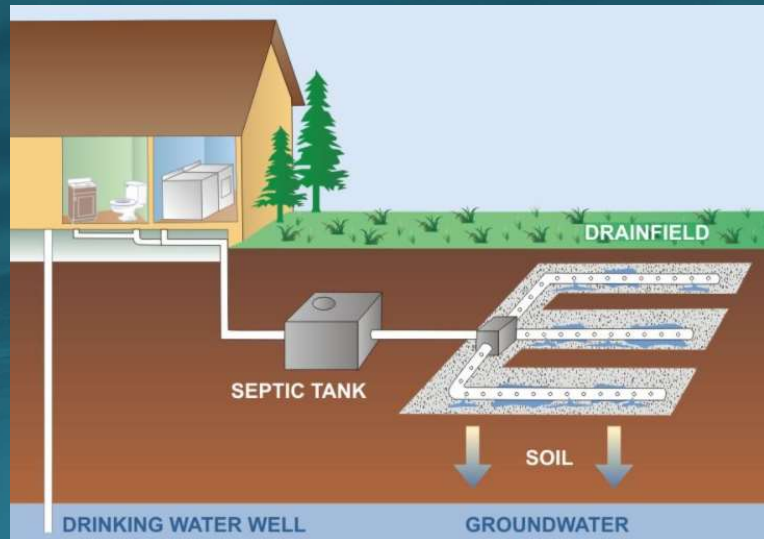
Electrochemical Systems for Nitrogen
Treatment in Septics

Nitrogen



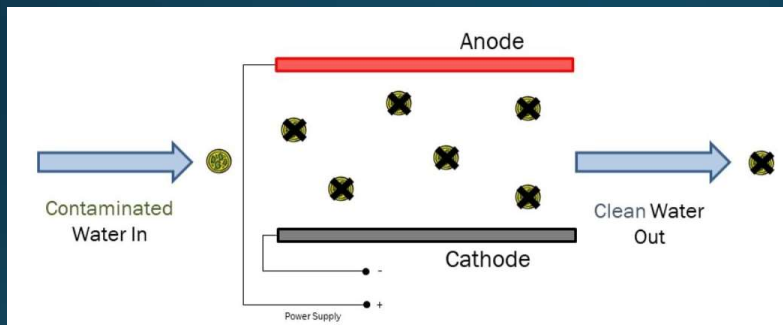
- Nitrogen exists in many constituents such as nitrate, ammonia, TKN
- Considered an essential nutrient, commonly used in fertilizer
- Can lead to algal blooms that destroy aquatic life → \$49 million in damages
- Is linked to gastrointestinal cancers
- Proposed regulations can result in costly plant retrofitting
- Conventional wastewater treatment processes focused on removal of carbonaceous materials (BOD) and only on nutrient removal (including nitrogen) in sensitive areas.
- Insufficient in nitrogen removal → often require the use of additional post-treatment processes.
- Biological removal also affected by temperature and sensitive to many water quality conditions

Septic Systems



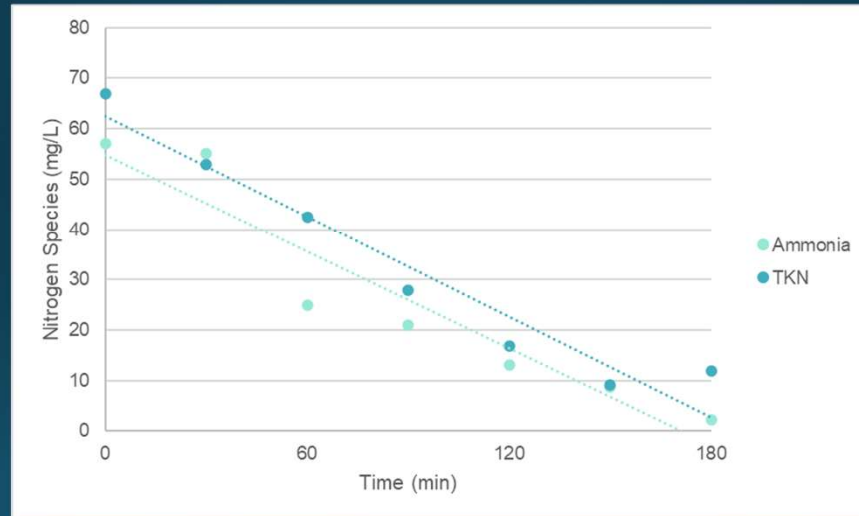
- 20% of homes in US use septic systems
- Septic systems use a combo of natural processes & technology
- Treated water went to drain fields that use bacteria
- Primarily designed for BOD not nitrogen removal
- Can lead to excessive discharge of ammonia and nitrate

Electrochemical Reactor



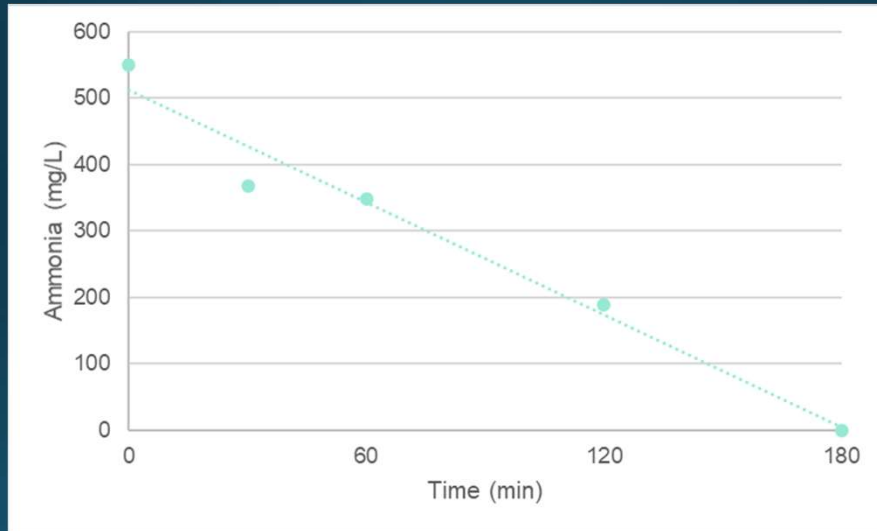
- Passing current is used to oxidize constituents naturally occurring in the water, such as chloride, to form different oxidants
- Compact design, can be stacked to handle full scale operation
- Reactor can be used in different water matrices and for numerous types of contaminant removal

Nitrogen Species Removal in Secondary Effluent



- Secondary effluent dosed with urea and ammonium chloride was re-circulated through Aclarity's reactor and subjected to 20A.
- Passing current oxidizes the chloride in the water to form hypochlorous acid, which reacts with ammonia and organic nitrogen present to form chloramine.
- Ammonia is oxidized to nitrogen gas through the same process as breakpoint chlorination
- Aclarity's reactor achieved over 96% removal of ammonia from a starting concentration of 57 and over 80% removal of TKN from a starting concentration of 70 and in 3 hours.

Ammonia Removal in Landfill Leachate



- Aclarity recently had the opportunity to test landfill leachate that was very concentrated and had a high initial ammonia concentration of 550 mg/L.
- After just 3 hours, Aclarity's device was able to completely remove the ammonia to below detection limits.
- Ammonia follows kinetics of 1st order decay

Where We Are At Now

www.aclaritywater.com

info@aclaritywater.com

- Aclarity's reactor is effective in nitrogen removal from a variety of water types
- Also capable of treating a wide range of other contaminants
- Can change certain variables (flow, conductivity, materials used) to target WIDE range of contaminants
- Removal of bacteria and viruses, 1,4-Dioxane, PFAS, nitrate