



## Chapter 13 - Anammox process: role of reactor systems for its application and implementation in wastewater treatment plants

Shelly Verma, Achlesh Daverey

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### Abstract

Over the years anammox has emerged as a promising technique to replace the conventional biological nitrogen removal and has been a research hotspot in the field of wastewater treatment. Anammox is an energy-autarchic process that possesses advantages like cost effectiveness, no organic carbon requirement, less sludge production and lesser footprints. Nevertheless, substantial difficulties still persist, making the mainstream industrial applications of anammox confined and less observed around the world. Slow growth, long start-up time, reactor configuration, operational strategy are the key regulators that limits the potential of anammox. Reactor configuration is a powerful tool that plays a significant role in the application of anammox. Different bioreactor configurations including sequencing batch reactor, moving bed biofilm reactor, upflow anaerobic sludge blanket, membrane bioreactor, etc., have been tried and tested for harnessing the full potential of anammox. The innovations and advances made in form of hybrid reactor systems such as integrated fixed-biofilm activated sludge reactor and processes such as denitrifying ammonium oxidation has significantly aided in extending the mainstream applications of anammox worldwide. Strategies have been devised to retrofit or integrate these anammox-based systems in the existing wastewater treatment plants in order to make the existing nitrogen removal process more commercially viable and environmentally sustainable.