Digestate Treatment

Digestate is the material remaining after the anaerobic digestion of a biodegradable feedstock. Anaerobic digestion is a complex biochemical process of biologically mediated reactions by various microorganisms (without the presence of oxygen) to convert organic compounds into digestate and biogas.

Anaerobic digestion is a well-established process for the treatment of organic waste and the generation of renewable energy. Historically, the digestate produced from the process is a nutrient-rich substance and has been applied to land as a fertilizer or soil conditioner.

Due to the high concentrations of nutrients such as nitrogen, ammonium, phosphorus and potassium, digestate is both a versatile commodity and an environmental challenge. These nutrients are useful in limited amounts, but over application of a fertilizer can lead to high nitrate values in the ground water and can be harmful to humans or animals if consumed.

With an increase in the number and capacity of anaerobic digestion plants to treat a variety of organic waste streams, it is necessary to treat digestate to prevent consumption of harmful nitrates.

DIGESTATE TREATMENT PROCESS

Digestate from the anaerobic digestion process is often dewatered by a conventional centrifuge or mechanical screen. Centrifugal treatment can retain up to 40% of present solids. The digestate fiber can then be used for land restoration, fertilizer or energy recovery.

Biological oxidation may be used to reduce the loading of organics (BOD) and ammonia in the digestate if necessary. The process is most commonly used to treat the digestate liquor prior to discharge, but can also be used as a pretreatment stage or used to treat the whole digestate (wet composting). Typically, the digestate is aerated in the presence of bacteria which oxidize the BOD and ammonia. This is can be done using a MBR system using MICRODYN BIO-CEL® MBR modules. This process produces a biological sludge as a byproduct which can be returned to the feed of the digester.

The filtrate from the MBR system can then be further treated with reverse osmosis (using either MICRODYN RO or TRISEP® X-20™ elements depending on the organics load in the MBR effluent). The concentrate of the reverse osmosis system may contain approximately 10-15% volume of the total input and can be dried out and sold/used as fertilizer. The permeate of the RO system may be further polished using an ion exchange for discharge or reuse.

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