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IN-SITU AMMONIA TREATMENT IN ANAEROBIC DIGESTION REACTOR

Traitement in-situ de l'ammoniac dans un réacteur de méthanisation

Anaerobic digestion is a succession of biological processes by which microorganisms transform biodegradable materials into biogas in the absence of oxygen. It is one of the most sustainable methods for treating agricultural wastes by offering multiple benefits such as the conversion of organic wastes into biogas, the production of value-added digested solid waste used as soil additive and the production of ammonium-rich liquid digestate.

The degradation of nitrogen-rich manures leads to the production of inorganic ammonia (NH_3 and NH_4^+) in the reactor. However, microorganisms responsible for the degradation processes are sensible to high concentration of free ammonia (NH_3). It has been shown that a concentration up to 3 g.L^{-1} leads to inhibition of the overall process. This major drawback is a brake for nitrogen-rich waste anaerobic digestion such as sheep manure or cattle manure.

This PhD is part of a project named OCCIMETHA, supported by the Occitanie Region, which aims at providing a concrete solution to treat high nitrogen content waste, in collaboration with ARKOLIA Energie. The objective is to extract a part of the ammonia contained in the bulk, for example by stripping thanks to the reintroducing of a fraction of the produced biogas.

The purpose of the thesis is to develop a predictive model taking into account the negative effect of high concentration of ammonia on the anaerobic digestion processes and the in-situ treatment of this compound which will allow the recycling of a part of the liquid digestate. In doing so, monitoring of the reactor system would be optimized.



*Anaerobic digestion reactor (ARKOMETHA)
from ARKOLIA Energies*