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‘Efficiency of coupling of mesophilic anaerobic digestion-thermophilic reactor for reducing sludge production, improving biogas production and micropollutant removal’

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Background

Urban wastewater contains a wide variety of compounds, including pharmaceutical residues, but also recoverable organic matter. Organic micropollutants have become a problem in recent years due to the risk they present to the aquatic environment and to human health, e.g. endocrine disruptors. These various compounds, depending on their physicochemical properties, can be distributed in the liquid phase or adsorbed onto the sludge. After primary treatment, anaerobic digestion is of interest whatever the destination of the sludge (spreading, incineration, composting, etc.). Extensive separation of particulate matter at the start of the WWTP would make it possible to increase both the flow of organic matter for its recovery in the form of biogas, and the flow of contaminants for efficient degradation.

Objectives

Past studies (SMS Project) have shown the benefit of coupling conventional mesophilic digestion (MAD) with aerated thermophilic digestion (TAR) or not (TAD). The main objectives of the thesis are, for a better understanding of mechanisms, to evaluate the respective role of thermophilic regime and presence of oxygen on key points such as reduction of amount of digestate, volume of methane produced and biodegradation of organic micropollutants.

Methodology

- → Evaluation of the properties of the sludge paying special attention to partitioning aspects
- → Comparing the three operating conditions, i.e. MAD, MAD-TAR and MAD-TAD in regards with overall conventional parameters and micropollutants removal.

Keywords

mesophilic anaerobic digestion, Thermophilic digestion, micropollutants, partitioning

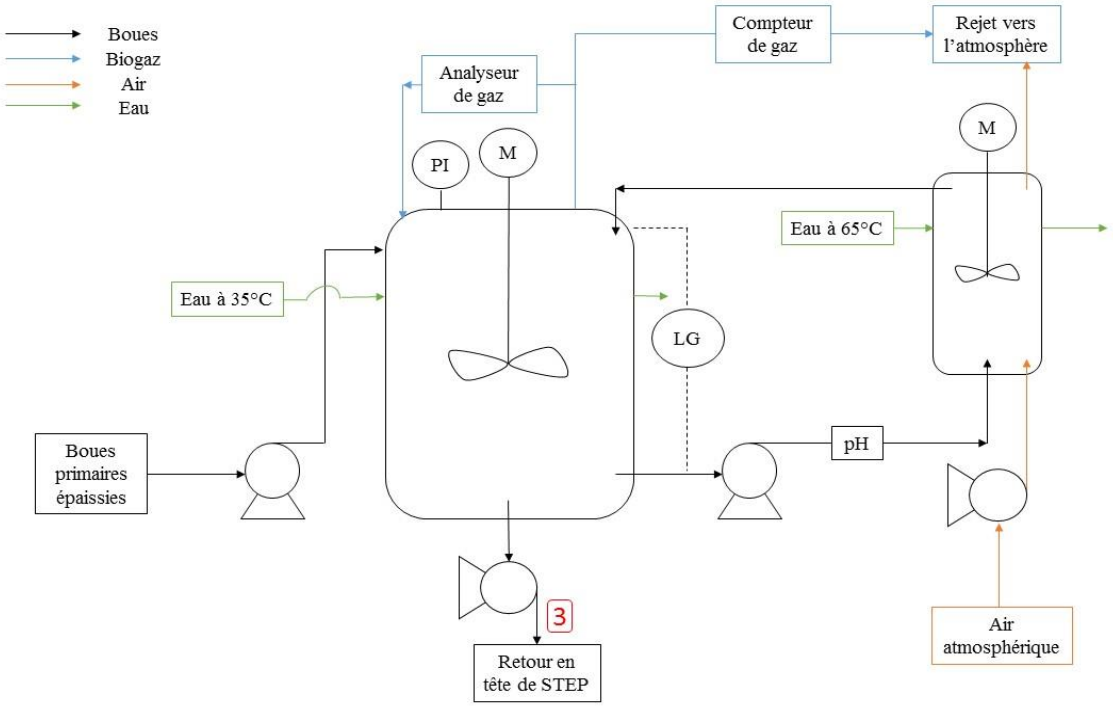

Figure 1. MAD-TAR configuration