Perspectives for the anaerobic treatment of effluents with high content of lipids

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Anaerobic wastewater treatment facilities producing biogas, possess multifunctional characteristics: besides nutrients and raw materials like sulphur, energy and water are recycled. Therefore, biogas either for electricity production, vehicle transport or for injection in the natural gas grid after upgrading, is one of the clearest examples of synergy between water and energy sectors.

From the beginning of the eighties, high-rate anaerobic wastewater treatment technology (HR-AnWT) has become a standard for a certain range of biodegradable industrial wastewaters, including those from distilleries, pulp and paper, breweries and beverage industries. However, complex wastewaters with high content of lipids are not effectively treated by HR-AnWT. On the other hand, addition of waste lipids to a manure based biogas plant, without a proper feeding strategy, is risky, if accumulation of long-chain fatty acids (LCFA) is not prevented. Nevertheless, waste lipids are ideal substrates for methane production, since theoretically their degradation produces more biogas with higher methane content, when compared with proteins or carbohydrates. The energy value of lipids makes them an ideal co-substrate to increase the economical feasibility of any AD plant based on co-digestion concepts. The existing gap in HR-AnWT for complex wastewaters with lipids and the importance of lipids as co-substrate in AD plants, make this issue of global interest in the environmental biotechnology field. New concepts to avoid inhibition by lipids and to enhance its degradation are presented. The research route, from lab-scale basics to technological development, scale-up, and pilot testing is presented.

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