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Dark Fermentation of de-proteinized cheese whey: is nitrogen a key factor for process stability?

This paper focuses on the production of bio-hydrogen by Dark Fermentation (DF) of de-proteinized (by membrane ultra-filtration) cheese whey, an abundant waste stream of the food industry. The aim was to study the role of nitrogen as a factor governing the growth of antagonistic microorganism in a CSTR fermenter with an SRT above 2 days (usually considered as a threshold value for a stable hydrogen production) in order to understand if high rate bioreactors, largely used in the anaerobic digestion of industrial wastewaters, could be appropriate for DF. The CSTR fermenter was conducted by using a thermally treated anaerobic sludge as inoculum of fermentative bacteria. Low concentration of nitrogen (6 mg/L), suboptimal for cell growth, resulted in a stable hydrogen production, even if with a low yield (1.3 ± 0.29 mol hydrogen / mol lactose) mainly due to a partial shift from acetogenesis to solventogenesis metabolism.