Conditions of the Anaerobic Digestion of Biomass

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Abstract : Biological conversion of biomass to methane has received increasing attention in recent years. Grasses have been explored for their potential anaerobic digestion to methane. In this review, extensive literature data have been tabulated and classified. The influences of several parameters on the potential of these feedstocks to produce methane are presented. Lignocellulosic biomass represents a mostly unused source for biogas and ethanol production. Many factors, including lignin content, crystallinity of cellulose, and particle size, limit the digestibility of the hemicellulose and cellulose present in the lignocellulosic biomass. Pretreatments have used to improve the digestibility of the lignocellulosic biomass. Each pretreatment has its own effects on cellulose, hemicellulose and lignin, the three main components of lignocellulosic biomass. Solid-state anaerobic digestion (SS-AD) generally occurs at solid concentrations higher than 15%. In contrast, liquid anaerobic digestion (AD) handles feedstocks with solid concentrations between 0.5% and 15%. Animal manure, sewage sludge, and food waste are generally treated by liquid AD, while organic fractions of municipal solid waste (OFMSW) and lignocellulosic biomass such as crop residues and energy crops can be processed through SS-AD. An increase in operating temperature can improve both the biogas yield and the production efficiency, other practices such as using AD digestate or leachate as an inoculant or decreasing the solid content may increase biogas yield but have negative impact on production efficiency. Focus is placed on substrate pretreatment in anaerobic digestion (AD) as a means of increasing biogas yields using today's diversified substrate sources.

Keywords : anaerobic digestion, lignocellulosic biomass, methane production, optimization, pretreatment

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