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Device for Thermal Depolymerisation of Organic Substrates Prior to Methane Fermentation

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Abstract : This publication presents a device designed to depolymerise and structurally change organic substrate, for use in agricultural biogas plants or sewage treatment plants. The presented device consists of a heated tank equipped with an inlet valve for the crude substrate and an outlet valve for the treated substrate. The system also includes a gas conduit, which is at its tip equipped with a high-pressure solenoid valve and a vacuum relief solenoid valve. A conduit behind the high-pressure solenoid valve connects to the vacuum tank equipped with the outlet valve. The substrate introduced into the device is exposed to agents such as high temperature and cavitation produced by abrupt, short-term reduction of pressure within the heated tank. The combined effect of these processes is substrate destruction rate increase of about 20% when compared to using high temperature alone, and about 30% when compared to utilizing only cavitation. Energy consumption is greatly reduced, as the pressure increase is generated by heating the substrate. Thus, there is a 18% reduction of energy consumption when compared to a device designed to destroy substrate through high temperature alone, and a 35% reduction if compared to using cavitation as the only means of destruction.

Keywords : thermal depolymerisation, organic substrate, biogas, pre-treatment
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