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PHD THESIS ABSTRACT

Control of anaerobic processes from obtaining biofuels

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In this thesis are presented, commented and analyzed, through modelling, simulation and experimental investigation, three cases of process control, for bioethanol, biobutanol and biogas. The technical-engineering characterization elements of the technologies used today for bioethanol, biobutanol and biogas are described. The first subject of the thesis presents the mathematical model used to characterize the alcoholic fermentation process coupled with ethanol pervaporation in order to control the inhibition effect through the product and to reduce energy consumption when concentrating bioethanol by rectification. Accorded to that is presented an experimental research on the synthesis of polyvinyl alcohol-biocellulose composite membranes and their use in water-ethanol pervaporation with water selectivity. Another mathematical model presented and developed is for the ABE synthesis process coupled with gas stripping of solvents from fermentation mass. This is also used for optimizing the fixation of carbon from substrate into acetone, butanol, and ethanol (ABE) solvents. Data obtained through simulation and experimental investigation respect to controlling biogas production process by fermentation of active sludge, from the treatment of household water from a large city, are also presented.