A PROMISING APPLICATION OF A HYDROTHERMAL PROCESSING ON RESIDUES OF AGAVE UNDER THE BIOREFINERY CONCEPT

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Introduction. Due to environmental considerations concerning sustainable development, the production of renewable energy as bioethanol and high added-value chemicals from lignocellulosic materials require efficient technologies and processes. In the recent years, the concept or philosophy called biorefinery has drawn much attention. The term “biorefinery” of lignocellulosic materials from agricultural residues and industry is analogous to the classical petroleum refinery concept and refers to biomass conversion into biofuels and chemicals with high added value through the integration of clean processes and the biorefinery philosophy demands efficient utilization of the main components (cellulose, hemicellulose and lignin) of these raw materials. Hydrothermal processing is a potential clean technology to convert raw materials such as lignocellulosic materials into bioenergy and high added-value chemicals, which can also be applied to residues of Agave. In this technology, water at high temperatures and pressures is applied for hydrolysis, extraction and structural modification of materials.

Methods. The methodologies are based on a series of studies performed on our authorship (1,3,4).
The extraction and application of hemicellulose from agricultural residues indicate that it is a promising material for making new renewable polymer blend films. Moreover, the bioactive compounds production, as the xylooligosaccharides are applied as prebiotics in food industry, also the lignin extraction using a sequential hydrothermal process prove a material highly pure. Additionally, hydrothermal processing is an effective pretreatment that increased the cellulose content in this type of material, making it a good substrate for the bioethanol production of second generation

Results and discussion. This work is focused on providing an updated overview on the application of biorefinery concept on the main components of agricultural residues into value-added products as polymeric blend films and xylooligosaccharides (prebiotics) from hemicellulose, lignin production with

high purity and bioenergy as bioethanol from cellulose fraction using hydrothermal processing. The fundamentals, modeling and separation of hydrothermal are also studied.

Conclusions. The hydrothermal processing can cause several effects including hemicellulose depolymerization (oligomers, monomers), alteration/degradation of lignin (phenolic compounds) and increased availability of cellulose. Due to these effects, the products obtained area valuable source of materials for the chemical, pharmaceutical, food and energy industries according to integrated biorefinery concept and therefore could be an alternative for processing residues of Agave.

References.

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