Modeling of a Pilot Installation for the Recovery of Residual Sludge from Olive Oil Extraction

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Abstract : The socio-economic importance of the olive oil production is significant in the Mediterranean region, both in terms of wealth and tradition. However, the extraction of olive oil generates huge quantities of wastes that may have a great impact on land and water environment because of their high phytotoxicity. Especially olive mill wastewater (OMWW) is one of the major environmental pollutants in olive oil industry. This work projects to design a smart and sustainable integrated thermochemical catalytic processes of residues from olive mills by hydrothermal carbonization (HTC) of olive mill wastewater (OMWW) and fast pyrolysis of olive mill wastewater sludge (OMWS). The byproducts resulting from OMWW-HTC treatment are a solid phase enriched in carbon, called biochar and a liquid phase (residual water with less dissolved organic and phenolic compounds). HTC biochar can be tested as a fuel in combustion systems and will also be utilized in high-value applications, such as soil bio-fertilizer and as catalyst or/and catalyst support. The HTC residual water is characterized, treated and used in soil irrigation since the organic and the toxic compounds will be reduced under the permitted limits. This project's concept includes also the conversion of OMWS to a green diesel through a catalytic pyrolysis process. The green diesel is then used as biofuel in an internal combustion engine (IC-Engine) for automotive application to be used for clean transportation. In this work, a theoretical study is considered for the use of heat from the pyrolysis non-condensable gases in a sorption-refrigeration machine for pyrolysis gases cooling and condensation of bio-oil vapors.

Keywords : biomass, olive oil extraction, adsorption cooling, pyrolisis
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