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Recovery of nitrogen compounds from tobacco seeds bio-oil: Acid-extraction and GC×GC/qMS analysis

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Over the last two decades, a special attention has been done to the conversion of residual biomass and renewable materials into bio-oil, which is a very complex mixture containing many organic compounds originated from the degradation of cellulose, hemicellulose, lignin and other bio-molecules from biomass. One important residual biomass is the tobacco seed (*Nicotiana tabacum*) that is a well-known plant whose leaves are used to produce cigarette and cigar. This plant is not suitable for human food and actually has their production clearly questioned on environmental and health aspects. Tobacco grows in poor soil, thus being an optimal alternative to biomass source. Due to the intense use of agrotoxics in the last years, the soils where tobacco is grown presents high levels of contaminants and can not be used for food culture. Then, one of the possibilities is the production of tobacco for energetic uses. Nicotine is main compound in tobaco and causes severe dependence in humans. Recently, studies have evaluated The Energetic Tobacco, which is practically free of nicotine and may be grown on nutrient poor soils. It produces a high amount of seeds that are not collected from the fields and have not commercial importance. However, some researches have demonstrated that tobacco seed contains a significant amount of a non edible oil (35–49% in weight) that can be used in different applications such as biodiesel production. Additionally, after the extraction of oil, the remaining cake can be used in pyrolysis process for producing bio-oil. The objective of this study is the pyrolysis of the residue after extraction of oil by pressing and characterize the obtained bio-oil. The conditions of pyrolysis, after optimization were: Temperature 700°C, heating rate of 100°C/min and inert nitrogen atmosphere. The yield of bio-oil was high (aprox. 40%) and mainly rich in phenols, hydrocarbons and nitrogen compounds, with a potential to be exploited. Thus, the acid-alkaline extraction was performed to separate the nitrogen compounds in a simple and efficient way, reaching until 65% of nitrogenous compounds. Bio-oil and the alkaline extract were analyzed by comprehensive two-dimensional gas chromatography with quadrupole mass spectrometry detection (GC×GC/qMS). For identifying the compounds, the GC Image software was used, and confirmed by comparing retention index with the literature.The GC×GC analysis identified nitrogenous compounds as amides, amines, nitriles, pyridines, pyrimidines and pyrazines. Some of the major compounds of alkaline extract were 3-phenyl-pyridine and 3-methyl-indole. The large number of pyridines and anilines is interesting for chemical and pharmaceutical industry and nitriles for the production of pesticides.

Biography

Bruna Onorevoli is graduated in Industrial Chemistry at UFRGS. She did master degree and PhD in Materials Science at UFRGS.

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