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Pressurized solvent fractionation of bio-oil from spent coffee grounds: Characterization of compounds by GC×GC/TOFMS

Carmem Tatiane Primaz[1], **Tiago Schena**[1], **Rosângela Assis Jacques**[1] and **Elina Bastos Caramão**[1,2,3]

[1]Universidade Federal do Rio Grande do Sul, Brazil

[2]Instituto Nacional de Ciência e Tecnologia – Energia e Meio Ambiente, Brazil

[3]Universidade Tiradentes, Brazil

Coffee is the most important worldwide food commodity and its economic importance is mainly due to consumption of this drink. The residues obtained during its preparation (spent coffee grounds) are produced in tons and does not have a noble use, becoming an interesting biomass for the production of bio-oil through pyrolysis process. This procedure allows the alternative use of this material as source of renewable energy or industrial raw material. The goal of this study is to use the comprehensive two-dimensional gas chromatography (GC×GC/TOFMS (Time-of-flight mass spectrometry)) for analyzing the bio-oil of spent coffee grounds. For better analysis of the bio-oil, it was fractionated using pressurized solvent fractionation. The bio-oil obtained through pyrolysis was fractionated using the following solvents CO_2, Hexane (HEX), Ethyl Acetate (EAc) and Ethanol (Et) in a semi-preparative LC-column packed with silica gel 60 (0,063 mm and 230 mesh). Fluid flow and pressure were kept in 1 mL/min and 80 bar respectively. The bio-oil and its fractions were characterized by GC×GC/TOFMS, and the identification of compounds was done by the retention index according to Van Der Dool and Kratz and comparison with mass spectra NIST (National Institute of Standards and Technology) library. The fractionation process facilitated the identification of constituents, and can be used as bio-oil upgrading, because it was possible to separate its constituents according to its solubility in the solvents used. The fraction of CO_2 presented hydrocarbons as its major compounds (potentially usable as alternative fuels to petroleum); HEX fraction presented large amounts of fatty materials (useful for the production of biodiesel); EAc and Et fractions presented in its composition ketones, phenols and N-compounds that can be applied as raw material for the chemical industry in general.

Biography

Carmem Tatiane Primaz is a researcher at Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil

carmemprimaz@gmail.com

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