TITLE: COMPOSITION AND ANTIBACTERIAL ACTIVITY OF BIOOIL SAMPLES DERIVED FROM THE PYROLYSIS OF RESIDUAL TEXTILE SLUDGE.

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ABSTRACT

The textile industry uses large amounts of water, energy and chemical substances in order to generate its products. As a consequence of this, large quantities of residue is generated as by-product, often composed of organic material, inorganic salts and metals. When discarted inadequately, this residue can become a dangerous source of pollution to the envirionment. Given the rich composition of organic compounds, an alternative for the disposal of sludge is its conversion in biooils through pyrolysis. This process decomposes the organic material at high temperatures and in absence of oxygen, generating energy-rich compounds that can be applied in the generation of biofuels, detergents and other utilities. At the same time, an increasing issue in modern health is the emergence and spread of antibiotic resistance in diverse pathogens, making the discovery of novel antibiotic compounds urgent. Given the poor exploration of biooils as sources of antimicrobial molecules in the literature, the objective of this study is to characterize the composition of a biooil sample obtained from the pyrolysis of residual textile sludge and to analyse its antibiotic properties. The biooil was characterized mainly using Fourier transform infrared spectroscopy and nuclear magnetic ressonance, in which signals referring to aromatic, amine, amide, carboxilic and ketone groups were observed. In gas chromatography assays, it was possible to identify piperazine in the library spectra of the chromatographer. This molecule was found in a significant concentration in the biooil. To test the antibacterial properties of the biooil, inocula of different bacterial species (*Escherichia coli* ATCC 700336, *Staphylococcus aureus* ATCC 25923, *Pseudomonas aeruginosa* ATCC BAA-47 and *Klebsiella pneumoniae* ATCC 10031) were cultivated in 96-well microplates, whose wells contained Mueller-Hinton medium and different concentrations of the biooil. The growth kinetics of the cultures was monitored by optical density every 30 minutes for four hours. 10 mg of biooil in 230 µL of culture was sufficient to inhibit growth of all tested bacteria. Further tests are needed to determine whether generic aspects (i.e pH) or specific molecules of the biooil are responsible for the antibacterial activity. It is important to test the biooil against other pathogens, such as fungi. Lastly, it is also important to evaluate the effects of the biooil on virulence traits.

Keywords: antibacterial activity, biooil, chemical composition, pyrolysis, textile industry

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