Catalytic cracking of tar model compounds using biochar as catalyst

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Date de la soutenance
21/01/2025 à 10:00

Lieu de la soutenance
LSPC

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Abstract

This thesis focuses on the study of the catalytic cracking of tars, which are substances that can be produced along with syngas and biochar during biomass gasification. Tars are one of the main obstacles to the use of syngas in certain industrial processes, due to the technical difficulties associated with their presence (clogging, condensation, reduced energy efficiency, etc.). Catalytic cracking is the technique of choice for transforming these tars, composed of heavy hydrocarbons (C6, C7, C8, etc.) into lighter species (H2, CH4, C2H4). This process can be catalyzed by biochar, whose use offers great economic and technological advantages as a by-product of gasification. This work focuses on the parametric study of the cracking of tars emulated by model compounds such as benzene, toluene and xylene while using biochar-based catalysts, either the biochar alone or otherwise, modified with metal oxides of iron and nickel. The catalysts prepared were characterized and their activity was compared during the cracking reaction of the various model molecules. The kinetics of the reaction and the transfer phenomena occurring during catalysis were also explored.