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Bio-hydrocarbon and bio-hydrogen in the standard refinery

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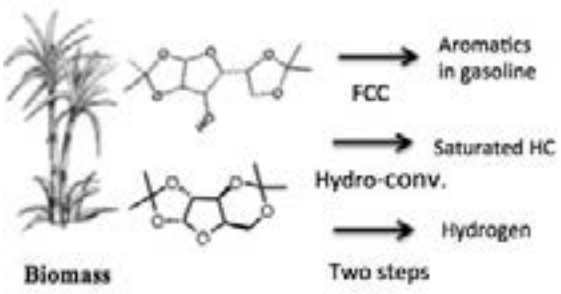
The production of green Hydrocarbon and green hydrogen in the standard refinery is a powerful approach to shortening our path to sustainable. However, second generation biomass is composed of reactive compounds and shows low density; than previously biomass should be transformed into a biocrude that fits the conditions of the oil industry. Herein this goal was archived in two steps. Firstly biomass was converted into a black bio-crude (density 1.1-1.2 gcm^{-3}, C,H,O composition in wt.% at about 60,10, and 30 respectively) that behaves like an oil-feed under the realistic refinery condition. Biomass can be fully converted, and the type of bio-crude can be tailor made by the reaction condition. Secondly, biocrude and model compounds were converted under realistic refinery condition into valuable products. For instance, bio-aromatics was obtained by using a pilot plant at laboratory scale of fluidized catalytic cracking (FCC) operation at 500^{0}C, 10 mLmin-1 of feed were injected during one minute using 20g of a commercial catalyst and a simplified catalyst. Saturated hydrocarbon up to diesel fraction was produced at 300-400^{0}C at hydrogen partial pressure of 50 bars. Bio-hydrogen was produced by couple pyrolysis of biocrude producing hydrogen and coke in the spent catalyst followed by reverse boudouard reaction in the presence of oxygen for CO production. Thanks to the bio-crude stability it can be stored, transported and converted into value products, fitting the requirements of up-, middle- and down- stream of oil industry. The present approach brings a central idea, i.e., the "future refinery", able to largely mitigate CO_2 emission, is just the standard, and the regular one and the key for reach such goal is to redesign biomass into a tailor-made bio crude proper for the refinery. Therefore oil could be partially or, in the future, entirely substitute by the bio-crude.



Biography

Marcelo Maciel Pereira is an Associate Professor at the Chemistry Institute of Federal University of Rio de Janeiro (UFRJ - Brazil). He obtained the MSc and the Ph.D. in Chemical Engineering at Federal University of Rio de Janeiro. His research interests focus on kinetics and catalysis, hydrocarbons, biomass conversion, zeolites, CO_2, greenhouse gas emissions, and sequestration.

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