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Making a bridge between biomass and hydrocarbon in a standard refinery

Leandro Soter de Mariz e Miranda[1], Marcelo Maciel Pereira[1], Joana Pinto[1], Rafael Garret[1], Célia Fernandes[2]
[1]Instituto de Química, Universidade Federal do Rio de Janeiro, Brazil
[2]Universidade de Lisboa, Portugal

A conventional refinery is based on mature processes that obtain standard products from a large variety of non- renewable feeds. Despite enormous benefits to modern civilization, the adopted production and consumption patterns paradoxically put us at environmental risk. Therefore it is mandatory a paradigm shift to decrease the carbon footprint without reducing the energy access to people. Biomass is composed of functionalized biopolymers (lignin-cellulose) based on sugars- and phenol-derivatives. On the other hand, refinery processes have been designed to operate on poorly reactive compounds like hydrocarbons. The bridge between these two remarkable worlds was archived in two steps: 1- by transforming the biomass into a bio-crude, which was produced by ketalyzation in acetone [1, 2] and acetylation reactions in acetic anhydride [3] under mild temperature conditions (around 100^0C). This black bio-crude (density 1.0-1.3 gmL-1 and Typical CHO composition of 60, 8 and 32 respectively) is chemically distinct of any other bio-feed so far. 2- -The transformation of bio-crude and model compounds by the fluid catalytic cracking and hydrotreatment into monoaromatic and saturated hydrocarbons respectively [4]. Herein the results of the fluidized bed pilot plant in laboratory scale of both model test and bio-crude are presented. A representative ketal- derivative,1,2:5,6-di-O-isopropyliden-α-D-glucofuranose (DX) mixture up to 50% in n-hexane achieved three main goals: small coke formation, remarkable selectivity to hydrocarbons and slight improvement in n-hexane conversion as presented in Table1. Moreover, no oxygenated compounds were observed in the liquid phase, thus resulting in a drop-in fraction in the fuel pool.

Biography

Marcelo Pereira Graduated in Chemical Engineering at UFRJ in 1991, D.Sc. Degree in COPPE/UFRJ in 1997 and started a scientific career in 1994 at the Institute of Chemistry at UFRJ. His research is focused on applied catalysis in hydrocarbons, emission mitigation, CO2 recycling, biomass conversion, green hydrocarbon production and new routes for catalyst and material preparations with the assistance of biomass. The main idea of his research is to decrease carbon footprint without decreasing the energy access to people.

maciel@iq.ufrj.br

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