Biomass wastes as a raw material for mesoporous catalyst applied in HDO of guaiacol

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As we all know, a clean energy revolution is taking place all over the world in pursuit of replacing oil. The present work stands out an environmental point of view by proposing biomass wastes different industrial areas to produce not only a biofuel but also as raw material to synthetize the catalyst involved in the HDO reaction. In this way the process ceases to rely on the antiquated and obsolete linear economy where products, services, wastes, materials, water and energy have a beginning and an end to become a process with greater tendency to the modern circular economy, closely related to the idea of sustainability. Products, materials and resources are expected to last as long as possible while minimizing waste as much as possible too.

Agricultural and forestry waste are available everywhere being a low cost raw material and it is possible to provide added value to the organic wastes of small and medium size enterprises.

The hydrodeoxygenation (HDO) of guaiacol has been performed in a batch reactor under 12 atm of H_2 and different temperatures over activated carbon synthetized orange peel discarded juice industry.

Carbon activation was carried out through a chemical process with phosphoric acid as an activating agent, varying the acid concentration, the ratio substrate/activating agent and time of contact between them. The best support was obtained using carbonization time of 1 h, temperature of carbonization of 470^{o}C, phosphoric acid concentration of 50 wt.% and with BET area of 1429 m^2/g. Subsequently, the metallic nanoparticles were deposited in the activated carbon to use the solid as a catalytic material for the hydrodeoxygenation of guaiacol. The catalytic material was modified with metallic nanoparticles of Pt. The catalysts were characterized by means of X-ray diffraction, N_2 isotherms, XPS, SEM and TEM. Good structure, narrow pore size distribution and high platinum dispersion were achieved in the synthesized catalysts.

The objective of this investigation is the evaluation of the catalytic activity and to compare it with SBA-15 support studied previously. The catalyst presented excellent performance for biofuels generation.

Keywords: HDO, activated carbon, biomass

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