CHARACTERIZATION OF HYDROPROCESSED FAST PYROLYSIS OIL FRACTIONS

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Production of renewable fuel from biomass has both environmental and national security implications. Considering that liquid transportation fuels massively affects the way we live, technology to produce fuels need to be both technologically-appropriate and economical. Fast pyrolysis remains as one of the most promising thermochemical processing technologies for converting solid biomass into a liquid that can be further upgraded into hydrocarbon fuels. The presence of various types of oxygen-containing functional groups confer pyrolysis oils with unwanted fuel properties such as acidity and low heating value. In order to remove these oxygen functionalities, catalytic hydrodeoxygenation or hydroprocessed is needed. This process involves the catalytic treatment of pyrolysis oils at high temperature and high pressure hydrogen, similar to that employed in the petroleum industry to remove sulfur from crude oil. However, hydroprocessed fast pyrolysis oil is complicated by both the thermal and chemical instability of the pyrolysis oil itself and the presence of water, giving importance to proper catalysts design considerations. Hydroprocessing further produces water and CO_x gas species as a means to expel the oxygen. The aqueous phase typically contains very low to negligible amount of carbon while the organic phase will contain a mixture of hydrocarbons. If the degree of deoxygenation is lower, larger amounts of carbon are present in the aqueous phase while recalcitrant oxygen species, like phenols and carboxylic acids appear in the organic phase. This in turn can affect the composition of the different fractions generated after distillation of the organic phase product.
This presentation aims to discuss both the characterization of the various hydrotreated fast pyrolysis oil fractions, including elemental, ^{13}C NMR and autoignition properties. It will also describe the hydrotreating processes used to obtain the different degrees of deoxygenation.

References:
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