

About the Effect of Temperature and Heating Rate on the Pyrolysis of Lignocellulosic Biomass Waste

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Abstract : At the present time, conventional fossil fuels show environmental and sustainability disadvantages with regard to renewables energies. Producing energy and chemicals from biomass is an interesting alternative for substitution of conventional fossil sources with a renewable feedstock while enabling zero net greenhouse gases emissions. Pyrolysis is a well-known process to produce fuels and chemicals from biomass. In this work, conventional and fast pyrolysis of different agro-industrial residues (almond shells, hemp hurds, olive stones, and Kraft lignin) was studied. Both processes were carried out in a fixed bed reactor under nitrogen flow and using different operating conditions to analyze the influence of temperature (400-800 °C) and heating rate (10 and 20 °C/min for conventional pyrolysis and 50 °C/s for fast pyrolysis) on the yields, products distribution, and composition of the different fractions. The results showed that for both conventional and fast pyrolysis, the solid fraction yield decreased with temperature, while the liquid and gas fractions increased. In the case of the fast pyrolysis, a higher content of liquid fraction than that obtained in conventional pyrolysis could be observed due to cracking reactions occur at a lesser extent. With respect to the composition of the non-condensable fraction, the main gases obtained were CO, CO₂ (mainly at low temperatures), CH₄, and H₂ (mainly at high temperatures).

Keywords : bio-oil, biomass, conventional pyrolysis, fast pyrolysis

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