

Turbiscan as a Tool for Studying the Phase Separation Tendency of Pyrolysis Oil

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Abstract

One of the main obstacles in using pyrolysis oils in heat and power applications is their instability upon storage, which leads to unacceptable quality, from the end user's point of view. Because of the opaque nature of pyrolysis oils, there are presently many challenges associated with determining their stability. Thus, techniques are needed for the characterization of the phase separation of pyrolysis oils, as well as determining the underlying mechanisms of their instability. Here, we present the application of the Turbiscan technique for the evaluation of phase separation tendency of pyrolysis oils over a period of 24 h at various temperatures, compared to the Karl Fischer method. A well-stored pyrolysis oil from poplar wood and fresh pyrolysis oil from forest residue were used for the investigation. For each of the oils, one batch was diluted with water in order to force phase separation, and a second batch was used without dilution. The study reveals that the Turbiscan technique makes it possible to study several aspects of phase separation in a single experiment; such as sedimentation, clarification, migration velocity and phase fraction. The advantages and potential limitation of the Turbiscan technique are discussed.