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Review

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Pyrolysis characteristics and kinetics of microalgae via thermogravimetric analysis

(TGA): A state-of-the art review

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Abstract

Pyrolysis is a promising route for biofuels production from microalgae at moderate temperatures (400 to 600 °C) in an inert atmosphere. Depending on the operating conditions, pyrolysis can produce biochar and/or bio-oil. In practice, knowledge for thermal decomposition characteristics and kinetics of microalgae during pyrolysis is essential for pyrolyzer design and pyrolysis optimization. Recently, the pyrolysis kinetics of microalgae has become a crucial topic and received increasing interest from researchers. Thermogravimetric analysis (TGA) has been employed as a proven technique for studying microalgae pyrolysis in a kinetic control regime. In addition, a number of kinetic models have been applied to process the TGA data for kinetic evaluation and parameters estimation. This paper aims to provide a state-of-the art review on recent research activities in pyrolysis characteristics and kinetics of various microalgae. Common kinetic models predicting the thermal degradation of microalgae are examined and their pros and cons are illustrated.

Keywords: Microalgal biomass; Pyrolysis and torrefaction; Kinetics; Thermogravimetric analysis; Biochar and bio-oil.

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