

Exploring the potentialities of torrefaction of biomass as a pre-treatment

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Pre-treatment helps alter biomass's physical properties and chemical composition and makes it more suitable for conversion. The motivation for this research arises from the potential usage of heat treatment processes as a pre-treatment to improve some of the characteristics of the final wood product.

Torrefaction is a thermo-chemical process for upgrading biomass that is usually run at temperatures ranging from 200 to more than 300°C in an oxygen-free atmosphere and at ambient pressure. During torrefaction, numerous reactions occur and different reaction pathways can be defined. Many reactions products are formed, their yield greatly depends on the torrefaction conditions and on biomass properties. Two of the most important parameters in evaluating torrefaction are the mass- and energy yield of the process.

During the last ten years, torrefaction has received attention as pretreatment technology to upgrade biomass for energy production chains (co-combustion and gasification). During this period new process concepts have been proposed and are under development. Laboratory-scale torrefaction reactors are common but continuous industrial torrefaction plants are still rare.

The principles of torrefaction can theoretically be used to upgrade practically all woody and herbaceous biomass, and even biomass containing mixed streams (waste streams, including plastics and other). However, the applied technology will strongly limit the allowable variation in feedstock properties of which size and shape characteristics are the most important ones.