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Study on the effect of wet torrefaction pretreatment on biomass gasification

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The pretreatment with wet torrefaction improves thermal and physical properties of biomass to overcome disadvantages of biomass. Dry torrefaction is usually carried out at a low heating rate with atmospheric pressure, whereas wet torrefaction is carried out under hydrothermal conditions. Therefore, wet torrefaction can pre-treat biomass more efficiently. Two kinds of biomass have employed as feedstock, including the Larch wood and Cornstalk. First, to investigate the efficiency of wet torrefaction and to find the optimal pretreatment condition, wet torrefaction and dry torrefaction were carried out under various temperature and reaction time conditions and then evaluated by heating value, solid yield, and energy yield. In this experiment, found an optimal condition of 200°C and 30min of reaction time. Wet torrefaction showed better physical properties at lower temperatures and reaction times than dry torrefaction. Secondly, to investigate the effect of the wet-torrefied biomass on the gasification, conducted a gasification experiment of wet-torrefied biomass and raw biomass. Wet-torrefied biomass produced higher amounts of H₂ and CO compared with raw biomass. It showed that wet torrefaction is superiority.

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