

Torrefaction of Biomass Pellets: Modeling of the Process in a Fixed Bed Reactor

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Abstract : Torrefaction of biomass pellets is considered as a useful pretreatment technology in order to convert them into a high quality solid biofuel that is more suitable for pyrolysis, gasification, combustion and co-firing applications. In the course of torrefaction the temperature varies across the pellet, and therefore chemical reactions proceed unevenly within the pellet. However, the uniformity of the thermal distribution along the pellet is generally assumed. The torrefaction process of a single cylindrical pellet is modeled here, accounting for heat transfer coupled with chemical kinetics. The drying sub-model was also introduced. The non-stationary process of wood pellet decomposition is described by the system of non-linear partial differential equations over the temperature and mass. The model captures well the main features of the experimental data.

Keywords : torrefaction, biomass pellets, model, heat, mass transfer

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