

Modeling Drying and Pyrolysis of Moist Wood Particles at Slow Heating Rates

Authors : Avdhesh K. Sharma

Abstract : Formulation for drying and pyrolysis process in packed beds at slow heating rates is presented. Drying of biomass particles bed is described by mass diffusion equation and local moisture-vapour-equilibrium relations. In gasifiers, volatilization rate during pyrolysis of biomass is modeled by using apparent kinetic rate expression, while product compositions at slow heating rates is modeled using empirical fitted mass ratios (i.e., CO/CO_2 , ME/CO_2 , H_2O/CO_2) in terms of pyrolysis temperature. The drying module is validated fairly with available chemical kinetics scheme and found that the testing zone in gasifier bed constituted of relatively smaller particles having high airflow with high isothermal temperature expedite the drying process. Further, volatile releases more quickly within the shorter zone height at high temperatures (isothermal). Both, moisture loss and volatile release profiles are found to be sensitive to temperature, although the influence of initial moisture content on volatile release profile is not so sensitive.

Keywords : modeling downdraft gasifier, drying, pyrolysis, moist woody biomass

Conference Title : ICBGP 2018 : International Conference on Biomass Gasification and Pyrolysis

Conference Location : London, United Kingdom

Conference Dates : November 19-20, 2018