Structural Change of Fibrous Web during Fluid Uptake and Its Impact on Absorbency

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ABSTRACT

A series of webs containing blends of hydrophilic and hydrophobic fibers were prepared using air laying techniques. These were needle punched to a number of levels. Absorbency behavior in these webs were characterized in the terms of capacity and rate. In order to systematically understand and rationalize capacity and rate, semi-empirical absorbency models in horizontal and vertical modes were developed. Key parameters in these models were the fluid transport coefficient (specific permeability), the driving force through pores (capillary pressure), and the pore volume (web thickness). Testing devices were designed and built to measure these parameters during the absorbency process. Results showed that structural changes during fluid uptake produced significant effects. Absorbency behaviors can be effectively explained using the models. Analysis of data measured from the developed testing devices led to exact criteria for web design for optimum absorbency.