

Wicking and Evaporation of Liquids in Knitted Fabrics: Analytic Solution of Capillary Rise Restrained by Gravity and Evaporation

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Abstract : Wicking and evaporation of water in porous knitted fabrics is investigated by combining experimental and analytical approaches: The standard wicking model from Lucas and Washburn is enhanced to account for evaporation and gravity effects. The goal is to model the effect of gravity and evaporation on wicking using simple analytical expressions and investigate the influence of fabrics geometrical parameters, such as porosity and thickness on evaporation impact on maximum reachable height values. The results show that fabric properties have a significant influence on evaporation effect. In this paper, an experimental study of determining water kinetics from different knitted fabrics were gravimetrically investigated permitting the measure of the mass and the height of liquid rising in fabrics in various atmospheric conditions. From these measurements, characteristic pore parameters (capillary radius and permeability) can be determined.

Keywords : evaporation, experimental study, geometrical parameters, model, porous knitted fabrics, wicking

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