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An investigation of wetting phase evaporation from capillary porous matrices[1] CURTIS LEE, JESSICA WHITE, AARON SANSOM, LORNE DAVIS, APS — Drying of porous materials is important to a wide variety of applications spanning art, architecture, cooking, agriculture, and engineering. To better understand the phenomenon, we used low-field NMR relaxometry to gain insight into the behavior of air and water within the individual pores during drying. We applied a singular value decomposition algorithm to invert low-field NMR CPMG T_2 data into apparent pore size distributions and measured the drying rates and the changes in relaxation distributions for alumina matrices of differing pore sizes and for sandstones. We observed two regions of constant drying rate with a large, sharp break in slope when the wetting phase saturation became discontinuous. In both regimes, the surface evaporation rate was controlled by capillary wicking action. Moreover, the drying rate in the early regime was greatly enhanced over evaporation from bulk fluid. The continuous decrease in mean T_2 of the sample during drying suggests that air penetrates along the pore centers while leaving water wetting the pore walls.

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