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How to make crusty or patchy efflorescence

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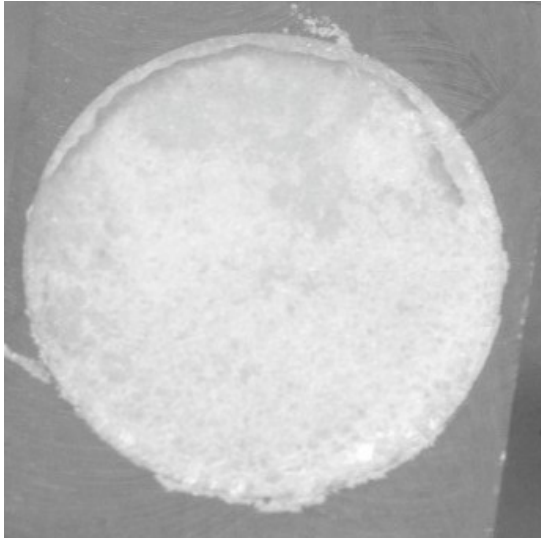
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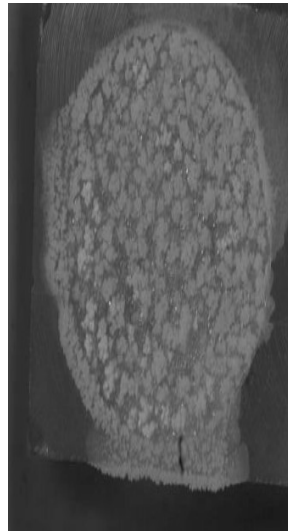
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ABSTRACT

We present an experimental study of drying in the presence of dissolved sodium chloride. The process is characterized by the formation of crystallized salt, referred to as efflorescence, at the evaporative surface of the porous medium. By varying the average size of the beads forming the porous medium, we show that the formation of the crystal layer does not affect significantly the drying process and can even enhance the drying rate when the beads are sufficiently large. By contrast the crystal layer can greatly affect the drying process and even blocks the evaporation process for sufficiently small beads. We therefore show the existence of a transition between the two regimes, namely the blocking regime and the enhanced drying rate regime. It is shown that the two regimes correspond to two different types of efflorescence, referred to as crusty and patchy respectively. Then by varying the initial salt concentration for a given bead size, we show that the interplay between drying and the efflorescence formation leads to a non-monotonous variation of the drying rate with the initial salt concentration when the efflorescence is patchy but not when the efflorescence is crusty.



Crusty efflorescence



Patchy efflorescence

Reference

H. Eloukabi, N.Sghaier, M. Prat, S. Ben Nasrallah, Experimental study of the effect of sodium chloride on drying of porous media: the crusty-patchy efflorescence transition, to be submitted.