

PROPERTIES OF SOLUTIONS AND THEIR ROLE IN THE DRYING AND WETTING OF CEMENTITIOUS MATERIALS

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ABSTRACT

The properties of the fluid in the pores of cementitious systems can dramatically influence the drying and wetting behavior. While there are numerous studies that focus on drying and wetting very few explicitly consider the properties of the fluid. This work will do this focusing on two different systems. First, the work will examine the influence of Shrinkage Reducing Admixtures (SRAs). SRAs are increasingly being used in concrete as a method to minimize the potential for restrained shrinkage cracking. SRAs reduce the surface tension and increase the viscosity of the pore solution. While a small number of measurements have been reported in literature little information is available about these properties over a wide range of concentrations or temperatures. This work provides measurements over this range and fits an empirical relationship to the data enabling wider use of the solution properties in modeling. Second, this work considers the influence of deicing salts on the properties of the pore fluid. The deicing salts also alter the surface tension, viscosity and activity. These properties are also described as a function of concentration and temperature. The implications of the fluid properties on model equations that describe drying and wetting is discussed.