

# Critical Thickness for the Cracking of Latex Films

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## Abstract

In the coatings industry there is a need for hard and clear waterborne coatings, but these are often subject to cracking. One solution is to add plasticizers to aid film formation and to avoid cracking, but the use of these additives are coming under scrutiny for environmental reasons. In this work, we explore a possible solution to the problem, which is the addition of a water-soluble polymer, poly(vinyl pyrrolidone) (PVP) to the aqueous phase. We have cast films with increasing thicknesses, as measured with profilometry, in order to find the highest possible thickness for films without cracking (specified as the critical thickness) and to study the effect of the particle size. We have taken images with optical microscopy to find the critical thickness. In addition we studied the particle packing and ordering with atomic force microscopy (AFM). From our experiments we conclude that the critical thickness is higher for latexes with larger particle sizes, and also there is a possible increase in critical thickness with the addition of PVP.