

Hydrogel Particle Size Swelling Measurements and Analysis

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Project Overview The goal of this project is to determine the effect of hydrogel particle size on swelling kinetics. This is important when using hydrogels as an internal curing agent in high performance concrete. Water migration in curing concrete is a time dependent process, so the rate at which the gel absorbs and releases water directly impacts the curing process. Dry hydrogel particles were ground using a coffee grinder then separated using various sized wire mesh sieves. Gravimetric swelling measurements were taken at regular time intervals on each sample to determine the swelling ratio of the gels in pure water. An initial rate and pseudo equilibrium analysis of the swelling data was preformed. The initial rate analysis showed an inverse linear relationship between average particle size and initial swelling rate. It was shown that there is no significant correlation between particle size and final equilibrium swelling ratio.

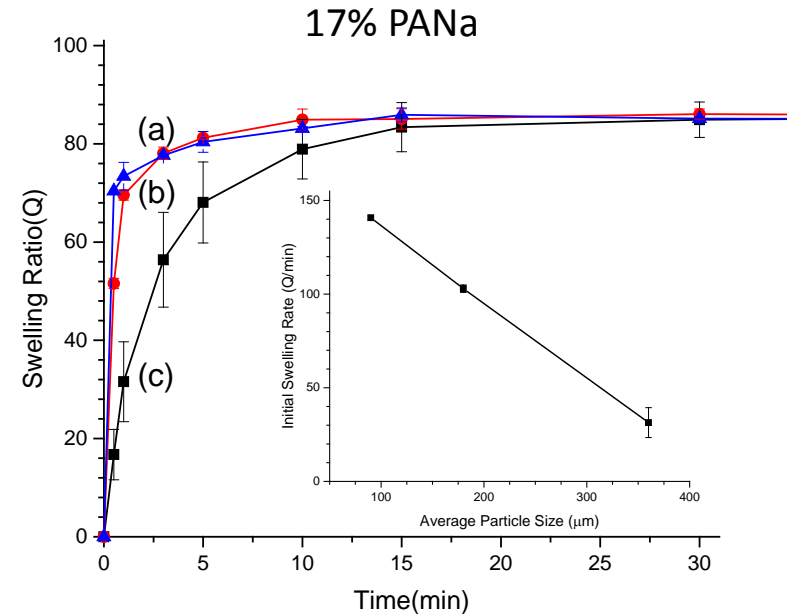


Figure 1: Swelling ratio for various sized particles of 17%PANa-83%PAM co-polymer during first 30 minutes of swelling on linear scale

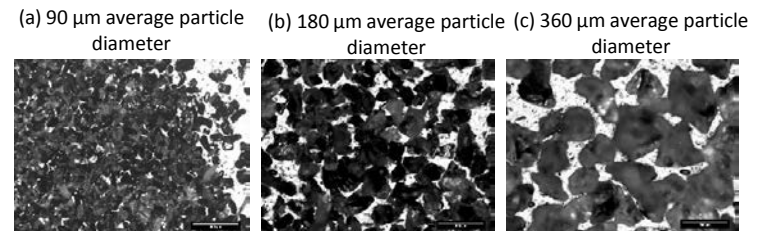


Figure 2: Optical micrograph of dry hydrogel particles (5x magnification)