

# Quantitative Measurement of Calcium Ion Absorption in Superabsorbent Polymer Hydrogels

**Matthew J. Parsons**

School of Materials Engineering, Class of 2017

Advisor: Professor Kendra A. Erk

**Project Overview** The goal of the project was to quantitatively characterize ion absorption in superabsorbent polymer (SAP) hydrogels. The total absorption of calcium ions in poly(sodium acrylate acrylamide) (PANa-PAM) copolymer gels with 33% and 67% PANa content after 24 hours in 100 mL of 0.025 M calcium solution was observed via complexometric titration. The 33% and 67% gels absorbed  $(129 \pm 23) \times 10^{-5}$  and  $(122 \pm 3.6) \times 10^{-5}$  moles of calcium ions, respectively. This is significantly higher than the predicted absorption of  $46.4 \times 10^{-5}$  and  $94.4 \times 10^{-5}$  moles for the 33% and 67% gels respectively, based on the assumption that for every 2 moles of PANa sections, 1 mole of calcium ions would be absorbed. In addition, as seen from the predicted absorptions, a significantly larger difference in absorption was expected between the two gels.

Reference: Zhu *et al.*, *Materials and Structures*, 2014

Table 1: Ion absorption in 33% and 67% PANa-PAM hydrogels

Gel Composition	Total Moles of Calcium Absorbed	Percent of Initial Calcium Absorbed
33% poly(sodium acrylate)	$(129 \pm 23) \times 10^{-5}$	$51.6\% \pm 8.93\%$
67% poly(sodium acrylate)	$(122 \pm 3.6) \times 10^{-5}$	$52.8\% \pm 1.35\%$

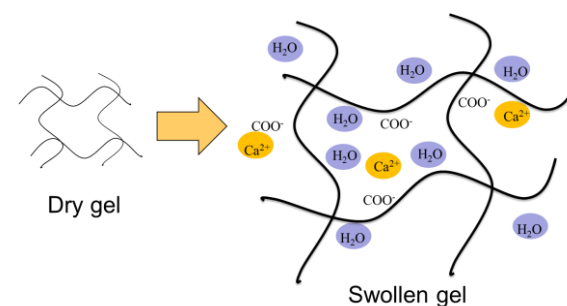


Figure 1: Schematic of ion absorption in PANa-PAM gel