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Some New Observations on Poly (acrylic acid) Gels and Fibers and Possible Connections to Physiological Phenomena

Abstract: Poly (acrylic acid) (PAA) gels have been of broad scientific interest due to large volumetric changes that can accompany changes in pH or monovalent/multi-valent cation exchange, and as a possible crude mimic of cytoskeletal proteins. In collaboration with colleagues in the Department of Pediatric Neurology, it has been verified that PAA gels can exhibit large, static electrical potentials of up to -120mV, leading us to investigate the effect of bathing salt composition and concentration on the magnitude of the potential. Specific attention has been directed to the influence of the bathing anion, and especially interesting effects with dihydrogen phosphate have been observed. This previously unexplored area may have connections to important biological phenomena. Toward that end, a proposed involvement of macromolecules in the process of nerve signal conduction will be outlined. In a separate study, we investigated the synthesis of PAA gels in the presence of various added salts, which has led to a variety of materials with interesting elastic and viscoelastic properties. A summary of property characterization of this new class of soft materials will be presented.