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**Osmotic Pressure in Ionic Microgel Dispersions**[1] ALAN R. DENTON, QIYUN TANG, Dept. of Physics, North Dakota State University — Microgels are microscopic gel particles, typically 10-1000 nm in size, that are swollen by a solvent. Hollow microgels (microcapsules) can encapsulate cargo, such as dye molecules or drugs, in their solvent-filled cavities. Their sensitive response to environmental conditions (e.g., temperature, pH) and influence on flow properties suit microgels to widespread applications in the chemical, pharmaceutical, food, and consumer care industries. When dispersed in water, polyelectrolyte gels become charged through dissociation of counterions. The electrostatic contribution to the osmotic pressure inside and outside of ionic microgels influences particle swelling and bulk materials properties, including thermodynamic, structural, optical, and rheological properties. Within the primitive and cell models of polyelectrolyte solutions, we derive an exact statistical mechanical formula for the contribution of mobile microions to the osmotic pressure within ionic microgels. Using Poisson-Boltzmann theory, we validate this result by explicitly calculating ion distributions across the surface of an ionic microgel and the electrostatic contribution to the osmotic pressure. Within a coarse-grained one-component model, we further chart the limits of the cell model for salty dispersions.

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