

**Graduate Student Recruitment and Training Support**

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Associate Professor Dr. Kenneth J. Haller  
School of Chemistry  
Institute of Science  
Suranaree University of Technology  
Nakhon Ratchasima 30000

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## PRECIPITATION OF BARIUM ARSENATE IN THE PRESENCE OF CATIONIC POLYELECTROLYTE

**Kenneth J. Haller and Preeyaporn Pookrod**

School of Chemistry, Institute of Science, Suranaree University of Technology,  
Nakhon Ratchasima 30000 Thailand

**John F. Scamehorn**

Institute for Applied Surfactant Research, The University of Oklahoma,  
Norman, Oklahoma 73019 USA

Polyelectrolyte-enhanced ultrafiltration (PEUF) can achieve 99.95% removal of arsenate from solutions with initial arsenate concentration of 100 ppb, thereby easily meeting the new 10 ppb drinking water standard (1). For the process of arsenate removal by PEUF to be economically competitive, the polymer must be recovered from the retentate for reuse by recycling to the PEUF feed. One promising method for recovering the polyelectrolyte is addition of divalent metal ion to precipitate the arsenate ions. The influence of cationic polyelectrolyte, poly(diallyldimethylammonium chloride) (QUAT), on the formation and dispersion stability of barium hydrogen arsenate monohydrate particles is discussed (2). Although the addition of QUAT results in larger average particle size, coalescence barriers due to polymer adsorption and to increased viscosity also result in increased dispersion stability (decreased sedimentation rate). The adsorption of polyelectrolyte on the particles increases with increasing polymer concentration, decreasing ionic strength, and decreasing barium to arsenate concentration ratio. The sedimentation rate of the crystals increases with decreasing polymer concentration, increasing electrolyte concentration, and increasing temperature. The viscosity of the supernatant solution increases with increasing polymer concentration, decreasing ionic strength, decreasing temperature, and decreasing barium to arsenate concentration ratio. The barium hydrogen arsenate monohydrate crystallizes with a plate morphology, and the size of the plates increase when formed in the presence of QUAT. The average particle size increases with increasing polymer concentration, increasing salt concentration, increasing temperature, and decreasing barium to arsenate concentration ratio. The sedimentation rate generally increases with increasing average particle size except when QUAT concentration increases. When QUAT is present during formation of the particles the entire size distribution shifts to larger particles, implying faster sedimentation. However, the very fine particles are stabilized as a dispersion by QUAT adsorption and the increased viscosity leading to longer settling times for the total particulate material.

1. Pookrod, P.; Haller, K. J.; Scamehorn, J. F.; Sep.Sci.Technol. 2003, accepted.
2. Pookrod, P.; Haller, K. J.; Scamehorn, J. F.; Langmuir 2003, submitted.