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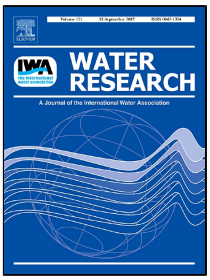


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# Dual starch–polyacrylamide polymer system for improved flocculation

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## Abstract

Organic polyelectrolytes such as polyacrylamide (PAM) are commonly used in the water industry to improve flocculation. However, potential adverse health effects may arise from the use of PAM owing to the presence of trace acrylamide monomers in commercial products. Hence, there is growing interest in replacing synthetic polyelectrolytes with natural and sustainable alternatives, which would eliminate risks related to the presence of toxic monomers/impurities and oxidation by-products from the interaction of polymers and common disinfectants such chlorine and ozone. Starch-based flocculants are recognized to offer fairly good flocculation performance, but require higher polymer dosages than conventional high-molecular-weight PAM. To reduce exposure to acrylamide monomers, this study examined the combination of an activated starch-based polymer with PAM to determine whether synergistic effects can be achieved using a dual polymer system. Flocculation performance (floc size, density and rate of aggregation) was monitored using jar tests. Turbidity removal was also assessed to confirm settling performance. Single PAM/starch mixture injection and sequential dual polymer injection were compared in order to simplify practical industrial applications. For the tested samples of surface water and wastewater, jar tests showed that the PAM dosage can be significantly reduced (50–70% for surface water) for both conventional and ballasted flocculation if a dual starch–PAM polymer system is used.