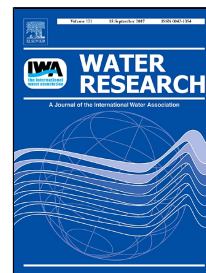


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Dual starch–polyacrylamide polymer system for improved flocculation

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7 Abstract

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

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