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**Flocculation and sterilization of bacteria by a cationized starch-based flocculants**

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In this study, a series of cationized starch-based flocculants (starch-3-chloro-2-hydroxypropyl triethyl ammonium chloride, St-CTA) containing various quaternary ammonium salt groups on the starch backbone were prepared using a simple etherification reaction. All of the prepared starch-based flocculants show effective performance for the flocculation of kaolin suspension, two bacterial (*Escherichia coli* and *Staphylococcus aureus*) suspensions and two contaminant mixtures (kaolin and each bacterium) under most pH conditions. St-CTA with a high substitution degree of CTA demonstrates improved contaminant removal efficiency because of the strong cationic nature of the grafted quaternary ammonium salt groups and the charge naturalization flocculation effect. The antibacterial effects of St-CTA were also evaluated, considering that many quaternary ammonium salt compounds elicit bactericidal effects. Three-dimensional excitation-emission matrix spectra and direct cell morphological observation under scanning electron microscopy reveal that the starch-based flocculants exhibit better antibacterial effects on the Gram-negative bacterium *E. coli* than on the Gram-positive bacterium *S. aureus*. The thicker cell wall due to the presence of abundant peptidoglycan and teichoic acids of *S. aureus* than *E. coli* explains the uneasy breakage of *S. aureus* cell wall after being attacked by the cationized starch-based flocculants.

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