FLOCCULATION OF MICROALGAE AND COHESIVE SEDIMENT

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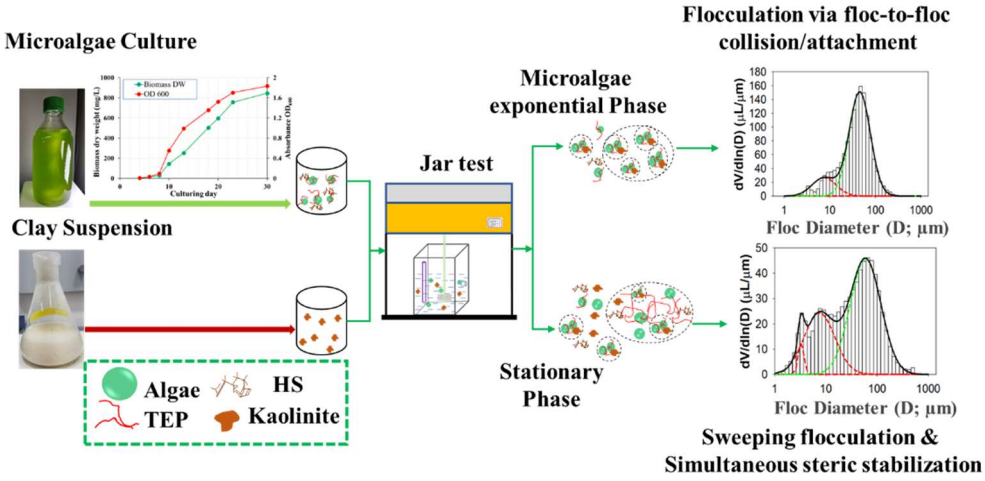
Interaction between microalgae and clay minerals enhances biologically mediated flocculation, therefore affecting the sedimentation and transportation of suspended particulate matter (SPM) in the aquatic system. This interaction forms larger flocs with a higher settling velocity and controls the fate of SPM. In this research, we investigated the flocculation kinetics of microalgae and cohesive sediment to elucidate the associated mechanism in such kinds of interactions. The procedure of research is disrobed in below figure:



A flocculation jar test was applied to various mixtures of kaolinite and microalgae samples from batch culture (*Chlorella vulgaris*) to estimate the biologically mediated flocculation kinetics. The organic matter (OM) composition, secreted from the microalgae, was characterized by a liquid chromatography-organic carbon detection system, and quantitative analysis on transparent exopolymer particles was led separately. A two-class flocculation kinetic model, based on the interaction between flocculi and flocs, was also adopted to quantitatively analyze the experimental data from the flocculation. Results from the flocculation kinetic tests and OM analyses, in association with other data analyses (i.e., floc size distribution, flocculation kinetic model), showed that flocculation increased with OM concentration during the growth phase. However, on the day of the early stationary phase, flocculation kinetics started decreasing and substantially declined as time went even though the amount of OM was still increasing. Our results indicate that an adequate quantity of biopolymers produced by the microalgae cells in the growth phase enhanced floc-to-floc attachment, and hence flocculation kinetics. In contrast, an excessive quantity of biopolymers and humic substances in the stationary phase enhanced the formation of polymeric backbone structures and flocculation via scavenging particles, but it simultaneously increased steric stabilization with the production of many fragmented particles.