Cause of scum formation on the water surface of flocculation basin in water treatment plant

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ABSTRACT

Scum is often found on the water surface of flocculation and sedimentation basin in water treatment plants, although water treatment facilities should always be in clean condition. A series of analytical experiments were conducted on the raw water and scum to investigate the cause and characteristics of scum formation in the Seokseong water treatment plant, which has been experiencing scum treatment problems. The measurements results in the field indicated that the raw water in the receiving well was oversaturated with dissolved oxygen by the pressure of the intake pumping and conveyance. The oversaturated oxygen triggered micro-bubbles because of the sudden decrease in surface tension that is caused by the coagulant dose. Observations of the experimental facilities revealed that bubbles are generated originally on the surface of a floc, and the flocs are acting as a nucleation of the bubble formation. The chemical composition of scum consists of various hydrophobic compounds, similar to the sludge in the sedimentation basin. These findings led us to conclude that with an exception of the nucleation of bubble formation, the mechanism of scum formation is similar to the particle separation of the flotation process in the water treatment plant. Therefore, scum formation may be prevented or reduced if excessive increase in pipeline pressure is avoided when mixing with air during processes of intake pumping and conveyance.

Keywords: Scum; Bubble; Float; Hydrophobicity; Surface tension; Flotation