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# Enhanced dewaterability of sewage sludge by $Fe^{2+}$-activated persulfate oxidation under mild temperature

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**ABSTRACT**

We investigated the improvement in dewaterability of sewage sludge by two-valent iron activated persulfate oxidation process under mild temperature. Sludge dewaterability was found to be improved in this system. Capillary suction time (CST) and setting property were used to characterize sludge dewatering. Zeta potential, Fourier-transformed infrared (FT-IR) spectroscopy, scanning electronic microscopy (SEM), three-dimensional excitation-emission matrix (EEM) fluorescence spectroscopy, thermogravimetry (TG) and differential scanning calorimetry (DSC) analyses were used to explore influencing mechanisms. The optimal conditions to achieve the highest CST reduction efficiency (95.3% reduction within 3 min) in room temperature were found to be 62.9 mg persulfate ($S_2O_8^{2-}$) $g^{-1}$ dry solid (DS), 19.6 mg $Fe^{2+}$ $g^{-1}$ DS, and pH 5. SEM images revealed the rupture of sludge flocs; EEM, TG-DSC, and FT-IR analyses indicated that the degradation of protein-like and polysaccharide-like substances in extracellular polymeric substances (EPS), which contributed to the release of EPS-bound water and interstitial water trapped between flocs, as well as subsequent enhanced dewaterability.

*Keywords:* Sewage sludge; Dewaterability; Two-valent iron; Persulfate oxidation

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