Effect of n-hexane extracted from food wastewater on biological substrate adsorption in wastewater treatment

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ABSTRACT

The purpose of this study was to assess the effects of n-hexane contained in food wastewater on biological substrate adsorption (substrate bio-sorption). To achieve the purpose, microbial activity was assessed based on substrate removal characteristics and specific oxygen uptake rates (SOUR) at different concentrations of injected n-hexane. The X-ray photoelectron spectroscopy (XPS) was applied for an overall observation of n-hexane effects on substrate bio-sorption. The result showed that with higher n-hexane levels, the TBOD5 concentrations increased in the effluent, thereby pushing down substrate removal efficiencies. The SOUR values fell from its maximum 86.4–38.6 mg O2/g MLVSS h, which indicates that microbial activity was affected by n-hexane injection. In addition, the sludge injected with n-hexane was analyzed by XPS, and it was found that carbon elements (especially C–C and C–H) were gradually reduced on the sludge surface. The injection of n-hexane is assumed to inhibit microbial substrate adsorption, consequently reducing extracellular polymeric substances. Therefore, n-hexane needs to be removed sufficiently through a pre-treatment process in food waste-to-resource facilities.

Keywords: Food wastewater; n-hexane; Bio-sorption; Specific oxygen uptake rate (SOUR); X-ray photoelectron spectroscopy (XPS)