

## **Effects of nickel(II) addition on the activity of activated sludge microorganisms and activated sludge process**

### **Abstract**

The effects of Ni(II) in a synthetic wastewater on the activity of activated sludge microorganisms and sequencing batch reactor (SBR) treatment process were investigated. Two parallel lab-scale SBR systems were operated. One was used as a control unit, while the other received Ni(II) concentrations equal to 5 and 10 mg/l. The SBR systems were operated with FILL, REACT, SETTLE, DRAW and IDLE modes in the time ratio of 0.5:3.5:1.0:0.75:0.25 for a cycle time of 6 h. The addition of Ni(II) into SBR system caused drastically dropped in TOC removal rate ( $k$ ) and specific oxygen uptake rate (SOUR) by activated sludge microorganisms due to the inhibitory effects of Ni(II) on the bioactivity of microorganisms. The addition of 5 mg/l Ni(II) caused a slight reduction in TOC removal efficiency, whereas 10 mg/l Ni(II) addition significantly affected the SBR performance in terms of suspended solids and TOC removal efficiency. Termination of Ni(II) addition led to almost full recovery of the bioactivity in microorganisms as shown in the increase of specific oxygen uptake rate (SOUR) and SBR treatment performance.

### **Keywords**

Activated sludge; Inhibitory effect; Nickel; Sequencing batch reactor; SOUR