

## **Simultaneous adsorption and biodegradation processes in sequencing batch reactor (SBR) for treating copper and cadmium-containing wastewater**

### **Abstract**

The application of simultaneous adsorption and biodegradation processes in the same reactor is known to be effective in the removal of both biodegradable and non-biodegradable contaminants in various kinds of wastewater. The objective of this study is to evaluate the efficacy of the two processes under sequencing batch reactor (SBR) operation in treating copper and cadmium-containing synthetic wastewater with powdered activated carbon (PAC) as the adsorbent. The SBR systems were operated with FILL, REACT, SETTLE, DRAW and IDLE periods in the ratio of 0.5:3.5:1.0:0.75:0.25 for a cycle time of 6h. In the presence of 10mg/L Cu(II) and 30mg/L Cd(II), respectively, the average COD removal efficiencies were above 85% with the PAC dosage in the influent solution at 143mg/L compared to around 60% without PAC addition. Copper(II) was found to exert a more pronounced inhibitory effect on the bioactivity of the microorganisms compared to Cd(II). It was observed that the combined presence of Cu(II) and Cd(II) did not exert synergistic effects on the microorganisms. Kinetic study conducted for the REACT period showed that the addition of PAC had minimized the inhibitory effect of the heavy metals on the bioactivity of microorganisms.

### **Keywords**

Sequencing batch reactor; Simultaneous adsorption and biodegradation