

The behavior of Ni(II), Cr(III), and Zn(II) in biological wastewater treatment process

Abstract

The purpose of this research was to investigate the effects of Ni(II), Cr(III), and Zn(II) on the treatment performance of sequencing batch reactor (SBR) system. The kinetics of adsorption study showed that the pseudo second-order reaction model provided the best description of the data obtained. From the Langmuir isotherm, the maximum adsorption capacities of Ni(II), Cr(III), and Zn(II) were 30 mg/g, 23 mg/g, and 18 mg/g, respectively. Cr(III) and Ni(II) were found to exert a more pronounced inhibitory effect on the bioactivity of the microorganisms compare to Zn(II). The increase of Cr(III) and Ni(II) concentration from 5 to 10 mg/L caused significant effect on the suspended solids (SS) and total organic carbon (TOC) removal efficiency in SBR system but vice versa in the case of Zn(II). The addition of powdered activated carbon (PAC) and termination of metal ions addition into SBR systems were carried out to investigate the capability of system recovery from the toxic effects of metal.

Keywords

Activated sludge; Heavy metal; Inhibitory effect; Sequencing batch reactor