

Biodegradation of redox dye Methylene Blue by up-flow anaerobic sludge blanket reactor

Abstract

The objective of this study is to evaluate the decolorization of Methylene Blue (MB) by an up-flow anaerobic sludge blanket (UASB) reactor. The UASB reactor was operated under batch condition with total treatment volume of 3 l and operation time of 24 h per batch. It was found that the color of MB disappeared within a few minutes after entering into the UASB reactor due to reduction by anaerobic biomass. However, the reduced MB was re-oxidized again by air after discharged from the reactor and thus caused low color removal efficiency. The presence of suitable amount of organic content (sucrose and peptone) as an electron donor played an important factor for color removal. It was observed that more than 90% of color removal efficiency was achieved in the UASB reactor with 0.627 mmol l⁻¹ of MB concentration and the presence of low amount of organic content (< 0.45 g COD/(l d)). Biological dye reduction kinetics depends on the concentration of dye and reducing equivalents. The kinetic behavior of MB biodegradation by microbes was also investigated to determine the model involved in the process.

Keywords

Anaerobic reduction; Autocatalysis; Dye; Methylene Blue; UASB