

ABSTRACT:

The yeast strain *Candida tropicalis* was used for the biodegradation of gaseous toluene. Toluene was effectively treated by a liquid culture of *C. tropicalis* in a bubble-column bioreactor, and the toluene removal efficiency increased with decreasing gas flow rate. However, toluene mass transfer from the gas-to-liquid phase was a major limitation for the uptake of toluene by *C. tropicalis*. The toluene removal efficiency was enhanced when granular activated carbon (GAC) was added as a fluidized material. The GAC fluidized bioreactor demonstrated toluene removal efficiencies ranging from 50 to 82% when the inlet toluene loading was varied between 13.1 and 26.9 g/m³/h. The yield value of *C. tropicalis* ranged from 0.11 to 0.21 g-biomass/g-toluene, which was substantially lower than yield values for bacteria reported in the literature. The maximum elimination capacity determined in the GAC fluidized bioreactor was 172 g/m³/h at a toluene loading of 291 g/m³/h. Transient loading experiments revealed that approximately 50% of the toluene introduced was initially adsorbed onto the GAC during an increased loading period, and then slowly desorbed and became available to the yeast culture. Hence, the fluidized GAC mediated in improving the gas-to-liquid mass transfer of toluene, resulting in a high toluene removal capacity. Consequently, the GAC bubble-column bioreactor using the culture of *C. tropicalis* can be successfully applied for the removal of gaseous toluene.