

## Efficient removal of Reactive Orange 13 with magnetic *Mucor circinelloides* from mill scale

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### ABSTRACT

*Mucor circinelloides* isolated from mill scale was magnetized by using the method of co-precipitation under alkaline conditions and this magnetized fungus was utilized efficiently to remove reactive textile dyestuff such as Reactive Orange 13. The value of saturation magnetization was obtained 4.93083 emu/g and Brunauer–Emmett–Teller surface area for this untreated magnetic biosorbent and dye-loaded magnetic biosorbent were obtained as 7.88 and 23.25 m<sup>2</sup>/g, respectively. After experimental study was carried out, predicted values obtained at 95% confidence interval indicated that the magnetized fungal biomass (1.60 g/L) could adsorb RO13 dyestuff (339.86 ppm) at 34.95°C with a yield of 93.476% (predicted value) in 84.90 min. In these conditions, the experiment was realized, and dye removal was found to be 95.765%. The adsorption kinetic and isotherm of magnetic biosorbent were examined. The results indicated that the adsorption process of Reactive Orange 13 by magnetized fungus was more suitable with Pseudo-second-order kinetic model. The adsorption isotherm was fitted better with Langmuir model. Fourier transform infrared spectroscopy, Raman spectroscopy, X-ray diffraction, and scanning electron microscopy/energy dispersive X-ray spectroscopy analyses were utilized for biosorbent characterization.

**Keywords:** Magnetic biosorbent; Mill scale; Biosorption

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