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Interaction between protonated waste biomass of *Corynebacterium glutamicum* and anionic dye Reactive Red 4

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Abstract

The protonated waste biomass of *Corynebacterium glutamicum* discharged from an industrial lysine fermentation plant was used as a new type of biosorbent for the removal of anionic dye Reactive Red 4. The dye uptake increased as the solution pH was decreased and at pH >7, the uptake was negligible. The maximum uptake of dye was estimated to be 104.6 ± 8.7 mg/g at pH 1. To identify the binding sites in the biomass, the biomass was potentiometrically titrated. As a result, three types of functional groups were present in the biomass, which was confirmed by FTIR analysis. Among functional groups, primary amine groups (—NH_2) were likely the binding sites for anionic Reactive Red 4. The proton dissociated constant pK_{H} and molar content of the protonated amine groups were 9.14 ± 0.07 and 0.68 ± 0.02 mmol/g,

respectively. It was also found that carboxyl and phosphonate groups played a role in electrostatic interference with the binding of dye molecules.



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Keywords

Reactive Red 4; Biosorption; Biomass waste; *Corynebacterium glutamicum*

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