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Authors: María M. Martorell, Hipólito F. Pajot, Lucía I.C. de Figuero

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Biological degradation of Reactive Black 5 dye by yeast *Trichosporon akiyoshidainum*

María M. Martorell[1,2], Hipólito F. Pajot[1], Lucía I. C. de Figuero[1,3]

[1], Planta Piloto de Procesos Industriales Microbiológicos PROIMI-CONICET, Tucumán-Argentina.

[2], Instituto Antártico Argentino, Buenos Aires Argentina (Permanent address)

[3], Facultad de Bioquímica, Química y Farmacia, Universidad Nacional de Tucumán, Tucumán-Argentina

Corresponding author: María M. Martorell

Tel: +54 11 54 11 4964 8269

Fax:+54 54 11 4964 8270

E-mail addresses: mariamartha86@hotmail.com,

ABSTRACT

The textile dyeing and other industries use an extensive amount of azo dyes. Their effluents are specifically colored and could cause severe damage to the environment. The anaerobic treatment of textile dying effluents could generate carcinogenic aromatic amines. For this reason, in the recent years yeasts have become a promising alternative, combining unicellular growth with oxidative mechanisms. This work reports the oxidative Reactive Black 5 (RB5) biodegradation mechanism by *Trichosporon akiyoshidainum* HP 2023, isolated from a non-contaminated environment and extensively studied for its exceptional decoloration abilities on azo dyes. Several analytical techniques (HPLC, FTIR, GC-MS, UV-Vis) were used as to monitor the dye-decoloration process and the enzyme produced during biodecoloration. Starting with 200 mgL^{-1} of RB5, at 12 h, 89% color removal and a shift from dark blue to purple was observed, at 24 h no color was visible. Also, a decrease of aromatic amines and total aromacity (71 and 75%, respectively) was observed and biomass presented no color. The mechanism is driven by phenol oxidase and peroxidase enzymes, as they were no present in cultures without dye. During decoloration, at 15 h both enzymes reached it maximum activity levels, 353 UL^{-1} for phenol oxidase and 2750 UL^{-1} for peroxidase. The two-stages proposed mechanism involves the formation of a purple-colored