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Formulir Berlangganan
A COMPARATIVE STUDY ON THE REMOVAL OF REMAZOL GOLDEN YELLOW 6 BYE BY MIXED CULTURE OF DEAD FUNGAL BIOMASS AND ACTIVATED CARBON

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Abstract
Remazol Golden Yellow 6 is a vinyl sulfone reactive dye with an azo-based chromophore, which produces a coloured wastewater that is difficult to treat by biological treatment. Physical adsorption of coloured wastewaters with activated carbon although effective is economically expensive. It is therefore necessary to find effective and economic alternatives for absorbant, such as microorganisms. The biosorption capacity of a mixed culture of dead fungi biomass (Aspergillus sp., Penicillium sp., and Saccharomyces sp.) for Remazol Golden Yellow 6 was examined as a function of initial pH and initial dye concentration. The results were compared to the adsorption capacity of a commercial activated carbon. Optimum initial biosorption pH was determined as 1. The percent dye removal of 0.5 g biomass with initial dye concentrations of 60 mg/l, 80 mg/l and 100 mg/l were 90.3%, 93.6% and 97.6% respectively with equilibrium established within 75, 125 and 150 minutes. In comparison, dye removal with granular activated carbon for the same dye concentrations were respectively 32.1%, 36.4% and 37.8 % with equilibrium time at 275, 400 and 475 minutes.

Keywords: activated carbon, biosorption, fungi, textile dye

1. Introduction
Remazol Golden Yellow, a vinyl sulfone reactive dye with an azo-based chromophore (Figure 1), is widely used in the batik industry of Pekalongan. The textile industry favours the use of reactive dyes because of their bright colors, as well as colour-fast and water-resistant characteristics. However, 10-50% of the dyes are not fixed by the textile cloth and are eventually discharged with the effluents (O’Neill et al., 1999). Coloured wastewater is undesirable as a part from being aesthetically displeasing, it enables to inhibit photosynthetic activity and demonstrate toxic effects to aquatic organisms. Hence, the colour should be removed before discharging the wastewater into the environment. However, azo dyes are often difficult to treat by biological treatment because of its complex structure.

Conventional physical and chemical treatments of dye wastewater include flocculation, precipitation, ion-exchange and adsorption. Adsorption with activated carbon is known to be effective, but requires regeneration besides the activated carbon is also expensive. Accordingly, there is a need to find inexpensive and efficient alternative materials, such as agricultural by-products. The use of microorganisms also offers another potential alternative to the existing adsorption methods.

Figure 1. Remazol Golden Yellow 6

Biosorption, is the uptake of pollutants from aqueous solutions by the use of either living or dead microorganisms. It is usually rapid and efficient. A wide range of microorganisms, including fungi and yeasts, has been reported to be capable of removing dyes by biosorption.