USE OF SLUDGE BIOMASS IN THE PRODUCTION OF ENZYMES UNDER SULPHIDOGENIC CONDITIONS FOR THE TREATMENT OF TEXTILE EFFLUENT.

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Azo dyes constitute the largest amount of synthetic dyes that are produced globally and as such constitute the largest part of textile effluent. Ligninolytic enzymes from fungi such as laccases and peroxidases have been shown to catalyze the degradation of polyphenolic azo dyes through a one electron oxidation to from free radicals that causes cleavage of the azo bond. Non specific cytoplasmic reductase enzymes and hydrogenases from bacteria have also been shown to degrade azo dyes under aerobic and anaerobic conditions. The aims of this study were to identify and isolate key enzymes that degrade azo dyes under anaerobic biosulphidogenic conditions, and to optimize enzyme activity and production. Sulphate Reducing Bacteria (SRB) incubated for 48 h on agar plates with various azo dye concentrations ranging from 10 100 mg/l showed zones of clearing around the bacterial colonies with Orange II dye indicating the ability of these bacteria to degrade azo dyes. Reactive black 5, Reactive red 120, Amido black 10 and Reactive blue 2 had marginal zones of clearing indicating limited enzymatic activity and bacterial growth. Incubation of SRB in lactate media consisting of azo dye concentrations ranging from 100 300 mg/l resulted in decolorisation rates over 36 h of 98 % for Orange II, 98 % for Reactive Blue 2 , 75 % for Reactive Red 120 , 99 % for Amido black 10, and 84% for Reactive black 5 in 100 and 150 mg/l. Although there is some adsorption of the dyes onto the bacterial cells, it is evident that some activity that is attributed to enzymes produced by the SRB. The highest decolorisation due enzymatic activity was found in cultures that had Amido Black 10 and Reactive red 120 at concentrations of 150 mg/l each. Higher concentrations of azo dyes tended to inhibit activity of the enzymes and also became toxic to the bacteria. Redox enzyme activity of 2000 micromol/min for a hydrogenase enzyme and an activity of 58 micromol/min for a azoreductase enzyme have been found. These enzymes are now subject to purification and characterization so that they may be used in pilot trials on industrial effluent.

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