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EFFECT OF REDOX MEDIATORS AND VARIOUS MEDIA ON THE DECOLOURISATION OF THE AZO DYE METHYL RED; AND ITS BIODEGRADATION BY *Providencia rettgeri* STRAIN ODO

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Abstract

The discharge of coloured wastewaters into water-bodies is a serious environmental and public health problem. Developing efficient, effective and low cost procedure for wastewater treatment thus becomes expedient. A bacterium isolated from textile dye was identified using 16S rDNA as *Providencia rettgeri*. The organism decolourised various textile and non-textile dyes within 6 h at 100 mg/L. The prospect of redox mediators: quinol, nicotinamide adenine dinucleotide (NAD), reduced NAD (NADH), nicotinamide adenine dinucleotide phosphate (NADP) and reduced NADP (NADPH) to influence the decolourisation of the azo dye Methyl Red was investigated. Effects of various media on the decolourisation were also examined. The possible biodegradation of the model dye was investigated by subjecting the decolourised dye to UV-visible, high performance liquid chromatography (HPLC) and fourier transform infrared (FTIR) analyses. The organism preferred quinol to other redox mediators and nutrient broth to yeast, glucose, starch and peptone as media. The decolourisation time was reduced to 5 h. The results of the UV-visible and HPLC analyses suggested the biodegradation of the dye. This was confirmed by the removal of signature peaks of aromatic C-H bending ($617, 704$ and 834 cm^{-1}) and the N=N peak at 1621 cm^{-1} observed when the FTIR of the dye was compared to that of its metabolite. The high Methyl Red decolourisation and biodegradation ability of *Providencia rettgeri* would enable this bacterium to be used in the biological treatment of industrial effluents containing azo dyes.

Key words: biodegradation, decolourisation, Methyl Red, *Providencia rettgeri*, redox mediators
