

## Remediation of metal containing dye solutions by combined ozonation-adsorption process

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### ABSTRACT

Many dyes applied for textile colouration contain heavy metal ions posing double complexity in possible recycling of such wastewater. The metal containing dyes, color index (C.I.) Acid Red 362 [containing Cr (III)] and Reactive Blue 71 [containing Cu (II)] were first decolourised/degraded by ozonation followed by batch adsorption on activated carbon (AC), synthesized from wild almond shells. This process enhanced the adsorption efficiency of the AC. Thirty sec pre-ozonation of 500 mg/L dye concentration, carried out at pH 7.4 with ozone flow rate 2 L/min and 48 mg/L ozone concentration led to partial decolourisation. The increase in dye adsorption was 25.5 and 64.1%, respectively after 8 h adsorption at initial pH 2.0 and a carbon dosage of 0.2 g/L, due to pre-ozonation. Prolonged ozonation followed by adsorption removed 73.3 and 98.9% of Cr (III) and Cu (II) released from these dye solutions respectively, with no residual colour at 0.5 g/L carbon dosage. Maximum metal ion adsorption was 45.5 and 54.8 mg/g from dye solutions comparing to synthetic metal solutions (80.16 and 79 mg/g) confirmed the adsorption of metabolites formed due to pre-ozonation. Toxicity of the treated solutions to green gram and common wheat revealed germination of seeds, thus confirmed that it can be safely recycled for irrigation purposes.

*Keywords:* Chromium (III); Copper (II); Phytotoxicity; Pre-ozonation; Wastewater

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