

## Optimization of azo dye decolorization process by zero valent iron nanoparticles using response surface methodology

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### Abstract:

In this work the decolorization of reactive navy blue SP-BR dye using nano zero valent iron (NZVI) particles was studied in a batch reactor. The NZVI particles were synthesized via borohydride reduction method with a mean size of 11 nm. The synthesized NZVI particles were characterized by X-ray diffraction (XRD), scanning electron microscopy (SEM) and transmission electron microscopy (TEM). Response surface methodology (RSM) with central composite design (CCD) was employed to evaluate individual and interactive effects of four main independent parameters (reaction time, initial pH, NZVI dosage and initial concentration of the dye) on the decolorization efficiency. Predicted values of decolorization efficiency were found to be in good agreement with experimental values ( $R^2=0.966$  and  $Adj-R^2= 0.909$ ). Optimization results showed that maximum decolorization efficiency was achieved at optimum conditions including: initial dye concentration 10 mg/L, initial pH 6, NZVI dosage 260 mg/L and reaction time 75 min.

**Keywords:** NZVI; Azo dye; CCD; Reactive navy blue SP-BR; Optimization