FENTON-LIKE OXIDATION OF DYES USING $Co_xFe_{3-x}O_4$ CATALYST

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own, unless otherwise indicated or acknowledged as referenced work.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Under Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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SUPERVISOR'S CERTIFICATION

We declare that we read this thesis and in our point of view this thesis is qualified in term of scope and quality for the purpose of awarding the Bachelor of Chemical Engineering (Environment) with Honours.

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ABSTRACT

The cobalt ferrite catalyst were synthesised through the substitution of cobalt into iron oxide matrix via co-precipitation and inverse co-precipitation methods. XRD analysis shown that both catalysts exhibited with cubic spinel phase. No impurity was detected in co-precipitated cobalt ferrite phase. Meanwhile, there is a presence of halide impurity being observed in the inversed co-precipitated catalyst. The FTIR spectrum of co-precipitated cobalt ferrite depicted with higher tetrahedral and octahedral bond substitution compared to inverse co-precipitation catalyst. The particle size of both catalysts were found to be approximately 1.44 $\pm$ 0.19 and 1.71 $\pm$ 0.28 μm for co-precipitation and inverse route, respectively. Interestingly, both catalyst were stable in suspension at neutral pH based on the zeta potential value of -32 mV. The inherent catalytic activity of these catalyst were evaluated based on the degradation of three types of difference dyes. The oxidative degradation of Acid Orange 7 (AO7), Methylene Blue (MB), Rhodamine B (RhB) were performed in the heterogeneous Fenton-like reaction. It was found that different dye behaved differently during the catalysis. AO7 has shown significant removal in both adsorption and catalysis processes; whilst the removal of MB and RhB were negligible. The co-precipitated catalyst shown higher performance in AO7 degradation (66%) compared to inverse co-precipitated catalyst (11%). Such findings suggested that the catalyst synthesised through co-precipitation method was favourable in contrast with the inverse co-precipitation method.