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SIMULTANEOUS FLOCCULATION AND FENTON’S HYDROLYSIS OF *Nitzschia* sp. BIOMASS IN AQUEOUS PHASE FOR ENHANCED LIPIDS EXTRACTION AND BIODIESEL PRODUCTION

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Abstract

In present research the development has been made to obtain *Nitzschia* sp., based biodiesel in more efficient paradigm through simultaneous flocculation and Fenton’s hydrolysis of aqueous biomass, which is a simple, novel and innovative process. Reduced cell destruction, solubilization of neutral lipids, and interference of water molecules with organic solvents all contribute to a poor lipid’s extraction yield (less than 50%) when microalgal biomass was in aqueous solution. Therefore, we have adopted Fenton’s hydrolysis as a novel technique to extract lipids from *Nitzschia* sp., biomass i.e., more than 95%, and then trans-esterify them into biodiesel. Consequently, it makes it an innovative and novel process for aqueous phase lipid extraction from *Nitzschia* sp. biomass. At neutral pH, FeSO₄ has shown maximum biomass recovery i.e., 77.86%, at 250 mgL⁻¹ dose, when incubated for 240 minutes. Likewise, FeCl₃ was found to be a more efficient flocculant to recover 84% of biomass, when 250 mgL⁻¹ dose was maintained for 120 minutes. Then at optimal conditions of flocculation wet biomass was subjected to Fenton’s hydrolysis which resulted in more than 95% of lipids recovery (%wt/wt). Gas chromatography–mass spectrometry (GCMS) studies confirmed the production of FAME through transesterification. The samples treated by Fenton’s hydrolysis at pH 7, about 26.97% were found to be unsaturated (C14:0, C16:0 and C18:0), 9.33% as monounsaturated (C16:1, C17:1 and C18:1) and 63.7% as polyunsaturated (C16:3, C18:2 and C22:2) fatty acids.

Key words: biomass, biodiesel, flocculation, Fenton’s hydrolysis, microalgae

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