



Contents lists available at ScienceDirect

Journal of Environmental Chemical Engineering

journal homepage: www.elsevier.com/locate/jeceBiosorption of azo-dye using marine macro-alga of *Euchema Spinosum*Nadiyah Mokhtar^{a,*}, Edriyana A. Aziz^a, Azmi Aris^b, W.F.W. Ishak^c, Noor Saadiah Mohd Ali^d^a Faculty of Civil Engineering and Earth Resources, Universiti Malaysia Pahang, Lebuhraya Tun Razak, 26300 Gambang, Kuantan, Pahang, Malaysia^b Centre for Environmental Sustainability & Water Security (IPASA), Research Institute for Sustainable Environment, Block C07, Level 2, Universiti Teknologi Malaysia, 81310 UTM Johor Bahru, Johor, Malaysia^c Faculty of Bioengineering & Technology, Universiti Malaysia Kelantan, Locked Bag 100, Jeli, 17600 Ayer Lanas, Kelantan, Malaysia^d Department of Chemistry, Centre for Foundation Studies, International Islamic University Malaysia, Gambang Campus, 26300 Gambang, Pahang, Malaysia

ARTICLE INFO

Keywords:

Biosorbent

Euchema spinosum

Methylene blue

Decolorization

ABSTRACT

A study on various biosorbents in promoting environmental and economic sustainability has become a current attempt by researchers for removal of synthetic dye from industries. Marine algae are listed as excellent candidates for alternative biosorbents. Therefore, in this study, five indigenous species of marine macro-algae from a group of red, green and brown were investigated for their potential of removing azo-dye, Methylene Blue (MB) in aqueous solution. The best biosorbent was evaluated based on their maximum biosorption capacity (q_{max}) and affinity (b). Characterization of potential algae was determined by points zero charge (pHpzc), Fourier transform infrared spectroscopy (FT-IR) and Scanning electron microscope with Energy Dispersive X-Ray Analysis (SEM-EDX). It was further examined for the effect of various operational parameters such as pH (2–11), biosorbent dosage (0.2–1.2 g/L) and initial concentration (50–200 mg/L). The result reveals that the equilibrium time for all algae species can be reached within 60–80 min at 27 °C. At lower MB initial concentration (< 1000 mg/L), *Euchema Spinosum* (*E. spinosum*) performed the highest q_{max} and b , therefore it has been chosen as potential biosorbent. Experimental data were compiled well with Langmuir and Freundlich isotherm with $R^2 = 0.99$. According to Langmuir model, the maximum homogenous biosorption capacity, q_{max} is 833.33 mg/g and affinity, b , is 0.016. The kinetic data were better fitted to the pseudo-second-order kinetic model.