KUMPULAN ABSTRAK

BIDANG KIMIA

RISTEKDIKTI

BKS PTN BARAT BIDANG MIPA

FMIPA - UNIB

SEMIRATA BKS PTN BARAT BIDANG MIPA 2019 & THE 2nd ICST

`` Science and Technology for Nation Prosperity ``

BENGKULU, 6-7 JULI 2019

GRAGE HOTEL

BICSE

BSM BENGKULU

DAFTAR ISI

KINETIKA ADSORPSI KRISTAL VIOLET DAN METILEN BIRU PADA HIBRIDA ALGA *Spirulina* sp.-SILIKA

ADSORPTION KINETICS OF CRYSTAL VIOLET AND METHYLENE BLUE ON ALGAE *Spirulina* sp.-SILIKA HYBRID

Buhani*, Ismi Aditya, Suharso

Department of Chemistry, Faculty of Mathematic and Natural Sciences, University of Lampung, Indonesia, Jl. Soemantri Brojonegoro No. 1 Bandar Lampung, Indonesia, 35145; Tel. +62721704625; Fax: +62721702767; email: buhani_s@yahoo.co.id

Abstrak

Pada penelitian ini telah dipelajari kinetika adsorpsi kristal violet (CV) dan metilen biru (MB) dalam larutan pada hibrida alga-silika yang berasal biomassa alga *Spirulina* sp. dengan silika sebagai matriks (HASS). Hibridisasi biomassa alga *Spirulina* sp. dengan silika. dilakukan melalui proses sol-gel menggunakan prekursor tetraetil orthosilikat (TEOS). Adsorben HASS dikarakterisasi menggunakan spektrofotometer infra merah (IR) dan *Scanning Electron Microscopy-energy-dispersive-X ray* (SEM-EDX). Kajian adsorpsi zat pewarna CV dan MB terhadap adsorben HASS dipelajari melalui eksperimen adsoprsi dengan metoda bacth. Adsorpsi zat pewarna CV dan MB optimum pada pH dan waktu kontak 60 menit. Model kinetika zat pewarna CV dan MB pada adsorben HASS cenderung mengikuti model kinetika pesudo orde dua dengan konstanta laju (k_2) masing-masing sebesar 0,204 and 0,302 (g $mg^{-1}.min^{-1}$).

Kata kunci: hibrida alga-silika, alga Spirulina sp.*, metilen biru, kristal violet, adsorpsi.*

Abstract

In this study, it was studied the crystal violet (CV) and methylene blue (MB) adsorption kinetics in solution in algal-silica hybrids derived from biomass of *Spirulina* sp. algae with silica as a matrix (HASS). Hybridization of *Spirulina* sp. algae biomass with silica was carried out through a sol-gel process using tetraethyl orthosilicate (TEOS) precursors. The HASS adsorbent was characterized using an Infrared (IR) Spectrophotometer and Scanning Electron Microscopy-Energy-Dispersive-X ray (SEM-EDX). The study of CV and MB dye adsorption on HASS adsorbents was studied through an adsorption experiment using the batch method. Optimal adsorption of CV and MB dyes at pH of 10 and contact time of 60 minutes. The CV and MB dye kinetics models on the HASS adsorbent tend to follow the second-order-pseudo kinetic model with a rate constant (k_2) of 0.204 and 0.302 (g mg^{-1} min^{-1}).

Buhani, Suharso, Rilyanti M., Sumadi. 2018. Implementation of sequential desorpsion in determining Cd (II) ion interaction with adsorbent of ionic imprinting amino-silica hybrid, *Rasayan J. Chem*., 11(2), 865-870.

Buhani, Suharso, Satria H.2011. Hybridization of *Nannochloropsis* sp. biomass-silica through sol-gel process to adsorb Cd(II) ion in aqueous solutions, *Eur. J. Sci. Res*., 51(4), 467–476.

Buhani, Suharso, Sembiring Z.2012. Immobilization of *Chetoceros* sp microalgae with silica gel through encapsulation technique as adsorbent of Pb metal from solution, *Orient. J. Chem.,* 28(1), 271-278.

Daneshvar E., Vazirzadeh A., Niazi A., Kousha M., Naushad M., and Bhatnagar A.2017. Desorption of Methylene blue dye from brown macro alga: Effects of operating parameters, isotherm study and kinetic modeling, *J. Clean. Prod*., 152, 443-453.

Dardouri S. and Sghaier J. 2017. A comparative study of adsorption and regeneration with different agricultural wastes as adsorbents for the removal of methylene blue from aqueous solution, *Chinese J. Chem. Eng.,* 25(9), 1282-1287.

Garg, V.K., Kumar R., and Gupta R.. 2004. Removal of malachite green dye from aqueous solution by adsorption using agro-industry waste: acase study of *Prosopis Cineraria*, *Dyes. Pigments*. 62, 1–10.

Guler U.A.and Sarioglu M. 2014. Mono and binary componentbiosorption of Cu(II), Ni(II), and Methylene Blue onto raw andpretreated *S. cerevisiae*: equilibrium and kinetics. *Des. WaterTreat.,* 52, 4871–4888.

Gupta V.K., Rastogi A.2008. Biosorption of lead from aqueous solution by green algae *Spirogyra* species : Kinetics and equilibrium studies, *J. Hazard. Mater.,* 152, 407-414.

Harris P.O. and Ramelow G.J. 1990. Binding of metal ions by particulate biomass derived from *Chorella vulgaris* and *Scenedesmus quadricauda, Environ. Sci. Technol*., 24, 220-228.

Jamwal H.S., Kumari S., Chauhan G.S., Reddy N.S., and Ahn J.H. 2017. Silica-polymer hybrid materials as methylene blue adsorbents, *J. Environ. Chem. Eng*., 5(1),103-113.

Kittappa S., Pichiah S., Kim J. R., Yoon Y., Snyder S. A., and Jang M.2015. Magnetized nanocomposite mesoporous silica and its application for effective removal of methylene blue from aqueous solution, *Sep. Purif. Technol.,*153, 67-75.

Machado R.S.A., da Fonseca M.G., Arakaki L.N.H., Espinola J.G.P,Oliveira S.F.2004. Silica Gel containing sulfur, nitrogen and oxygen as adsorbent centers on surface for removing copper aqueous/ ethanolic solution, *Talanta*., 63,317-322.

Senthilkumaar, S., Kalaamani, P., and Subburaam C.V. 2006. Liquid phase adsorption of crystal violet onto activated carbons derived from male flowers of coconut tree, *J. Hazard. Mater*., B136, 800–808.

Shu J., Liu R., Wu H., Liu Z., Sun X., and Tao C. 2018. Adsorption of methylene blue on modified electrolytic manganese residue: Kinetics, isotherm,

thermodynamics and mechanism analysis, *J. Taiwan Inst. Chem*. *E.,* 82, 351–359.

Veglio F., Beolchini F., Toro L. 1998. Kinetic Modelling of Copper Biosorption by Immobilized Biomass*, Ind. Eng. Chem. Res*., 37,1107-1111.

Yang H., Xu R., Xue X., Li F., and Li G.2008. Hybrid surfactant templated mesoporous silica formed in ethanol and its application for heavy metal removal, *J. Hazard. Mater*., 152, 690-698.