



Effective removal of methyl violet dye using pomelo leaves as a new low-cost adsorbent

Linda B.L. Lim^{a,*}, Namal Priyantha^{b,c}, YieChen Lu^a, Nur Afiqah Hazirah Mohamad Zaidi^a

^aChemical Sciences, Faculty of Science, Universiti Brunei Darussalam, Jalan Tungku Link, Gadong, Negara Brunei Darussalam, Tel. +00 673 8748010; emails: linda.lim@ubd.edu.bn (L.B.L. Lim), yiechen_93@hotmail.com (Y.C. Lu), afhazirah@gmail.com (N.A.H. Mohamad Zaidi)

^bDepartment of Chemistry, Faculty of Science, University of Peradeniya, Peradeniya, Sri Lanka

^cPostgraduate Institute of Science, University of Peradeniya, Peradeniya, Sri Lanka, email: namal.priyantha@yahoo.com

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ABSTRACT

A new adsorbent, pomelo leaves (PL), was investigated as a possible low-cost adsorbent for the removal of toxic methyl violet (MV) dye. Adsorption isotherm data when fitted into five different models, namely the Langmuir, Freundlich, Temkin, Redlich–Peterson and Sips models, indicated the Sips model was the best fit with good maximum adsorption capacity (q_{\max}) of 248.2 mg g⁻¹. Adsorption of MV by PL was an endothermic process and obeyed the pseudo-second order kinetics, showing a decrease in k_2 with increasing adsorbate concentration. PL's ability to adsorb MV was influenced by the presence of salts in solutions but is relatively resilient to changes in medium pH. An added attractive feature is its ability to be regenerated and reused, especially under both acid and base treatment, while maintaining good adsorption capacity even after five consecutive cycles. Thus, being readily available in abundance throughout the year, this study points to PL being a good, potential adsorbent in wastewater treatment given its high q_{\max} when compared with many other adsorbents, pH resilience and that the spent adsorbent can be easily regenerated and reused.

Keywords: *Citrus grandis* (pomelo) leaf adsorbent; Methyl violet 2B dye; Adsorption characteristics; Isotherm; Kinetics; Regeneration

* Corresponding author.