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Performance Assessment of Received and Formulated Carbon Animalis: A Comparative Adsorption Isotherm Test

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ABSTRACT

With the stated advantages of finer adsorbent of high surface area, why then do manufacturers design unspecified active carbons of granular size even for the removal of medium size particles? This research attempts to provide one of such answers. A batch equilibrium adsorption study was carried out to assess the adsorption capacity and intensities of methyl red dye onto "Received" Granular Activated Carbon (GAC) and "formulated" Powdered Activated Carbon (PAC). The equilibrium data obtained were modeled using the Langmuir and Freundlich Isotherms. The data fitted best with the Langmuir model which was predicted by the highest R^2 value (0.981). The experiment carried out demonstrated that GAC had a higher adsorption efficiency range of 33.4% to 93.55% and a high adsorption capacity of 1.176 mg/g. Generally, the research ascertained the reason why the manufacturer supplied the chosen adsorbent as "granulated particulate" instead of "powdered" as formulated for the purpose of this research.

KEYWORDS

Methyl Red; Dye; Activated Carbon; Adsorption Isotherm; Carbon Animalis

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References

- [1] A. Hazrat and K. M. Shah, "Biosorption of Crystal Violet from Water on Leaf Biomass of *Calotropis procera*," *Journal of Environmental Science and Technology*, Vol. 1, No. 3, 2008, pp. 143-150. <http://scialert.net/abstract/?doi=jest.2008.143.150>
- [2] A. U. Itodo, F. W. Abdulrahman, L. G. Hassan, F. A. Atiku and H. U. Itodo, "GCMS Prediction of Organochlorine Herbicide Sorption Rate: A Batch Kinetic Studies," *Trends in Applied Sciences Research*, Vol. 6, No. 5, 2011, pp. 451-462. <http://scialert.net/abstract/?doi=tasr.2011.451.462>
- [3] B. H. Hameed, "Grass Waste: A Novel Sorbent for the Removal of Basic Dye from Aqueous Solution," *Journal of Hazardous Materials*, Vol. 166, 2009, pp. 233-2238. doi: 10.1016/j.jhazmat.2008.11.019
- [4] K. D. Shiv, P. Archana, K. B. Ashok and M. Krishna, "Some Commercial Azo Dyes as Inhibitors of Mushroom Tyrosinase DOPA Oxidase Activity," *Journal of Pharmacology and Toxicology*, Vol. 2, 2007, pp. 718-724. <http://scialert.net/abstract/?doi=jpt.2007.718.724>
- [5] O. D. Olukanni, A. A. Osuntoki and G. O. Gbenle, "Decolourization of Azo Dyes by a Strain of *Micrococcus* Isolated from a Refuse Dump Soil," *Biotechnology*, Vol. 8, No. 4, 2007, pp. 442-448. doi: 10.3923/biotech.2009.442.448; <http://scialert.net/abstract/?doi=biotech.2009.442.448>
- [6] K. Rajeswari, R. Subashkumar and K. Vijayaraman, "Biodegradation of Mixed Textile Dyes by Bacterial Strains Isolated from Dyewaste Effluent," *Research Journal of Environmental Toxicology*, Vol. 5, No. 2, 2011, pp. 97-107. doi: 10.3923/rjet.2011.97.107 <http://scialert.net/abstract/?doi=rjet.2011.97.107>

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- [7] S. Saiful, A. Azhar, G. Liew, D. Suhardy, K. Farizal Hafiz and M. D. Irfan Hatim, " Dye removal from aqueous solution by using adsorption on treated sugar cane Bagasse," *American Journal of applied sciences*, Vol. 2, No. 11, 2005, pp. 1499-1503. doi:10.3844/ajassp.2005.1499.1503
- [8] M. Jayarajan, R. Arunachalam and G. Annadurai, " Agricultural Wastes of Jackfruit Peel Nano-Porous Adsorbent for Removal of Rhodamine Dye," *Asian Journal of Applied Sciences*, Vol. 4, 2011, pp. 263-270. doi:10.3923/ajaps.2011.263.270 <http://scialert.net/abstract/?doi=ajaps.2011.263.270>
- [9] A. U. Itodo, " Comparative Study of the Preparation, Adsorption and Evaluation of Activated carbons prepared from Agricultural Wastes," Ph.D Thesis, Department of Pure and Applied Chemistry, Usmanu Danfodiyo, Sokoto, 2011, pp. 30-33.
- [10] N. Chilton, N. Jack, N. Losso, E. Wayne and R. Marshall, " Freundlich Adsorption Isotherm of Agricultural by Product Based Powered Activated Carbon in Geosmin Water System," *Bioresouruce Technology*, Vol. 85, No. 2, 2002, pp. 131-135. doi:10.1016/S0960-8524(02)00093-7
- [11] I. Soheila and R. Maryam, " Use of Beech Wood Sawdust for Adsorption of Textile Dyes," *Pakistan Journal of Biological Sciences*, Vol. 10, No. 2, 2007, pp. 287-293. doi:10.3923/pjbs.2007.287.293 <http://scialert.net/abstract/?doi=pjbs.2007.287.293>
- [12] B. H. Hamed, A. T. M. Din and Al. Ahmad, " Adsorption of Methylene Blue on to Bamboo-Based Activated Carbon. Kinetics and Equilibrium Studies," *Journal of Hazardous Materials*, Vol. 141, 2006, pp. 819-825. doi:10.1016/j.jhazmat.2006.07.049
- [13] J. C. Igwe and A. A. Abia, " Adsorption Kinetics and Intraparticulate Diffusivities for Bioremediation of Co(II), Fe(II) and Cu(II) Ions from Waste Water Using Modified and Unmodified Maize Cob," *International Journal of Physical Sciences*, Vol. 2, No. 5, 2007, pp. 119-127.
- [14] A. U. Itodo, A. Abdulrahman, A. Usman and V. C. Ugboaja, " Pseudo Constants for Methyl Red Sorption: A Rate Study of Received and Derived Activated Carbon," *Journal of Encapsulation and Adsorption Sciences*, Vol. 1, No. 4, 2011, pp. 57-64. doi:10.4236/jeas.2011.14008 http://www.scirp.org/fileOperation/download.aspx?path=JEAS20110400003_30055926.pdf&type=journal
- [15] N. Othman, R. Djamal, N. Mili and S. N. Zailani, " Removal of Red 3BS Dye from Wastewater using Emulsion Liquid Membrane Process," *Journal of Applied Sciences*, Vol. 11, No. 7, 2011, pp. 1406-1410. doi:10.3923/jas.2011.1406.1410 <http://scialert.net/abstract/?doi=jas.2011.1406.1410>
- [16] J. A. Otun, I. A. Oke, D. B. Olarinoye and C. A. Okuofu, " Adsorption Isotherms of Pb(II), Ni(II) and Cd (II) Ions onto PES," *Journal of Applied Sciences*, Vol. 6, No. 11, 2006, pp. 2368-2376.