

Utilization of Raw and Treated *Arundo donax L.* Biosorbents for the Removal of Industrial Dye from Aqueous Solutions

Fouzia OUAZANI ⁽¹⁾, Soufiane GUELLA ⁽¹⁾, Yamina CHERGUI ⁽²⁾, Yassine KHALFI ⁽¹⁾, Khedidja BENOUIS ⁽¹⁾

⁽¹⁾Laboratory of Process Engineering, Materials and Environment, faculty of Technology, University of Djillali Liabes, PO Box 89, Sidi Bel Abbès 22000 –Algeria

⁽²⁾ Laboratoire des Ressources Naturelles Sahariennes. Faculté des sciences et de la technologie,

Université Ahmed Draia – Adrar, Algeria

ouazanifouzia@yahoo.fr

Abstract:

This study involved the preparation of treated *Arundo donax L.* biomasses by combining specific amounts of raw *Arundo donax L.* powder with predetermined volumes of phosphoric acid (H_3PO_4), ammonia (NH_4OH), and acetone (C_3H_6O) individually. These treated *Arundo donax L.* biomasses were employed for adsorbing Bemacid red dye. Various techniques, including SEM, RX, and FTIR analysis, were employed to characterize the treated *Arundo donax L.* The impact of contact time, pH, initial dye concentration, and adsorbent amount on the adsorption of Bemacid red dye onto the various treated *Arundo donax L.* samples was investigated.

The optimal conditions for adsorption were identified as a pH value of 2.0, an adsorbent amount of 25mg, and a contact time of 40 minutes. Notably, the basic treated *Arundo donax L.* achieved an impressive dye removal efficiency of 98.91% under these optimal conditions. Additionally, the adsorption process was analyzed using isotherm, kinetic and thermodynamic models. The Freundlich model provided the most accurate description of the removal of Bemacid red dye by the different treated *Arundo donax L.* samples. Meanwhile, the Elovich model and the second-order kinetic model offered reliable descriptions at concentrations of 10 and 20-30 mg/L, respectively.

In conclusion, the adsorption of Bemacid red dye by treated *Arundo donax L.* was found to be feasible and occurred spontaneously.

Keywords: Adsorption, Bemacid red dye, Biosorbent, *Arundo donax L.*, Organic Treatment; Inorganic Treatment