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S.V. Manjunath, Mathava Kumar

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Evaluation of Single and Multi-component Adsorption of Metronıdazole, Phosphate and Nitrate on Activated Carbon from Prosopıs Julıflora

Manjunath S V[1], Mathava Kumar[1*]

[1]Department of Civil Engineering, Indian Institute of Technology Madras, Chennai 600036, Tamil Nadu, India

*Corresponding author Email: mathav@iitm.ac.in

ABSTRACT

In this investigation, activated carbon was prepared from Prosopis juliflora (PJAC) and characterized using porosimetry, scanning electron microscope (SEM-EDX), Elemental analysis (CHNS), Fourier Transmission-Infrared Radiation (FTIR) and X-ray Diffraction (XRD) analysis. Subsequently, PJAC was used in single (metronidazole (MNZ), phosphate (PO_4^{3-}) and nitrate (NO_3^-)) and multi-component adsorption system (MNZ:P:N). As a first step, single-component batch adsorption experiments, i.e. kinetic and equilibrium studies, were conducted at controlled conditions (30^{o}C) and outcomes were used to find out the rate constant and maximum adsorption capacity (q_m). The pseudo-second-order kinetic model was found to well represent the removals of MNZ, PO_4^{3-} and NO_3^- on PJAC. Among the five isotherm models used, Langmuir isotherm model has predicted $q_m$of PJAC for MNZ (17.33 mg/g), PO_4^{3-} (13.55 mg/g) and NO_3^- (10.99 mg/g) with good correlation. In addition, the thermodynamic parameters have shown that the adsorption of MNZ, PO_4^{3-} and NO_3^- was non-spontaneous, endothermic and increased