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**Use of a new sorbent based on granulated polyethylene waste for the
elimination of paracetamol**

Meriem Turkman^{1,*}, Bouthaina Badaoui², Rayane Mezyane², Nadji Moulai-Mostefa¹,
Omar Bouras³, Hocine Boutoumi³

¹Material and Environmental Laboratory, University of Medea, 26001 Medea, Algeria,
E-mail: turkman.meriem@univ-medea.dz,

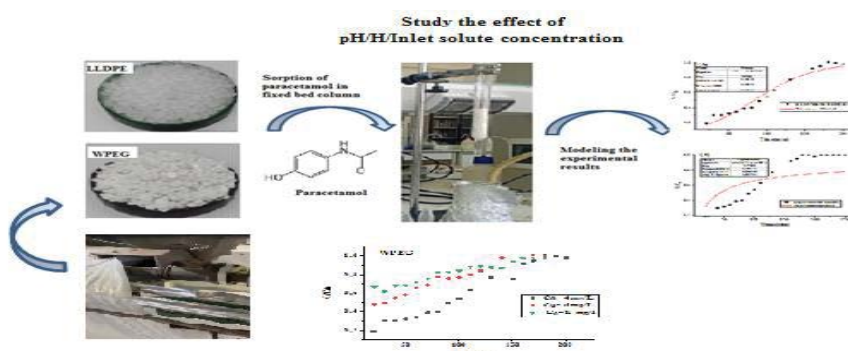
²Department of Process Engineering, University of Medea, 26001 Medea, Algeria,

³Water Environment and Sustainable Development Laboratory, University of Blida 1, Blida, Algeria

HIGHLIGHTS

- WPEG and LLDPE were investigated for dynamic sorption
 - WPEG and LLDPE are effective sorbents for paracetamol removal
 - High sorption yield was around 71.89% for WPEG under optimal conditions
 - Nonlinear models of Ogata–Bank and Thomas were studied
 - The sorption mechanism for both materials is of Langmuir type
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GRAPHICAL ABSTRACT



Sorption of paracetamol in fixed bed column

*Corresponding author

ABSTRACT

The present research concerns a comparative study of the dynamic sorption of paracetamol in a fixed bed column on a new category of sorbents based on available wastes of granulated polyethylene (WPEG) and linear low-density polyethylene (LLDPE). The sorbents were mainly characterised by differential scanning calorimetry (DSC) method. Study of sorption kinetics was carried out by examining the effects of pH, bed height (H), and paracetamol concentration (C_0). The obtained results showed that the highest removal efficiency was achieved under the following optimal parameters: $C_0 = 4$ mg/L, $H = 7$ cm, and pH = 3. The use of the Thomas and Ogata–Bank equations to model the results showed that the Thomas model predicts the experimental data well, with a satisfactory correlation coefficient ($R^2 = 0.96$). The maximum sorption capacity obtained by the sorbent based on WPEG waste was approximately 115 mg/g, thus demonstrating the high effectiveness of this sorbent in the removal of paracetamol and, therefore, water-soluble organic pollutants.

keywords: Paracetamol; Waste polyethylene granulated; Sorption; Fixed bed column; Modelling
