

عنوان مقاله:

Three Level Design to Estimate Dyes Adsorption Parameters using Oenological By-Product as Adsorbent Service Unavailable

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نویسندگان:

Fouzia Ouazani - Energy and process engineering department, Faculty of Technology UDL-SBA -Algeria

Yamina Chergui - Saharan Natural Resources Laboratory. Faculty of Science and Technology, Ahmed Draia University - Adrar ۰۱۰۰۰, Algeria

Samia Benhammedi - Laboratory of Science, Technology and Process Engineering - LSTGP. University of Science and Technology USTO-Oran Algeria

Aya Saidi - Energy and process engineering department, Faculty of Technology UDL-SBA -Algeria

خلاصه مقاله:

In this study, Grape Marc (an oenological by-product) obtained from local winemaking was used as an adsorbent. Two ways are used to determine Methyl Blue (MB) and BEMACID Red (BR) dyes adsorption parameters' effects on adsorbent efficiency. In a kinetic way, the batch mode tests the effects of different parameters: solution pH, contact time, initial dyes concentration, and sorbent weight. The statistical way used response surface methodology with three-level designs. In the batch mode, the high dyes removal of ۹۵% and ۹۱.۸% were observed at pH = ۶ and pH = ۲ for BM and BR dyes respectively for initial dyes concentration of ۵۰ mg/L. The pseudo-second-order kinetic model could better define the experimental data with a high determination coefficient  $R^2 = ۰.۹۹$ . Also from the kinetic study, the two empirical correlations reflect the weak effect of sorbent weight on the external mass coefficient for the BR dye  $k_f \text{ BR dye} = ۲.۲.۱۰^{-۶} M \cdot ۰.۶۱۸$ . While the statistical results show positive effects of pH on adsorption capacities values for the BR dye removal and negative effect toward the second dye (MB). The two mathematics formulas generated by the BBD model are tested in a confidence level greater than ۹۵% ( $p\text{-value} < ۰.۰۵$ ) and the dependence percentage between the factors and the response is ۹۹% and ۹۸% for MB and BR dye respectively. In summary, the GM has a high affinity towards MB dye compared to BR dye and the statistical way gives more adsorption information compared to the classical way. In this study, Grape Marc (an oenological by-product) obtained from local winemaking was used as an adsorbent. Two ways are used to determine Methyl Blue (MB) and BEMACID Red (BR) dyes adsorption parameters' effects on adsorbent efficiency. In a kinetic way, the batch mode tests the effects of different parameters: solution pH, contact time, initial dyes concentration, and sorbent weight. The statistical way used response surface methodology with three-level designs. In the batch mode, the high dyes removal of ۹۵% and ۹۱.۸% were observed at pH = ۶ and pH = ۲ for BM and BR dyes respectively for initial dyes concentration of ۵۰ mg/L. The pseudo-second-order kinetic model could better define the experimental data with a high determination coefficient  $R^2 = ۰.۹۹$ . Also from the kinetic study, the two empirical correlations reflect the weak effect of sorbent weight on the external mass coefficient for the BR dye  $k_f \text{ BR dye} = ۲.۲.۱۰^{-۶} M \cdot ۰.۶۱۸$ . While the statistical results show positive effects of pH on adsorption capacities values for ... the BR dye removal and negative effect toward the s

کلمات کلیدی:

Adsorption, Optimization, Three-level design, Grape Marc waste, Textile dye, Statistical study

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