
Navigating Adsorption Intelligence: A Schiff's Base and Design Expert Approach

Khaoula Alia¹, Djamel Atia²

¹ Department of Process and Petrochemical Engineering, faculty of Technology, University of Echahide Hama Lakhder El Oued, Algeria. Laboratory Biotechnology, biomaterials and condensed materials.

² Department of Chemistry, University of Echahide Hama Lakhder El Oued, Algeria;

alia-khaoula@univ-eloued.dz

Abstract

Schiff's bases, foundational in coordination chemistry, exert a profound influence on the behavior of metal complexes. This study explores their pivotal role in enhancing dye adsorption, with a specific emphasis on their application in environmental remediation. The intricate process of dye adsorption is systematically approached, leveraging Schiff's bases to optimize fundamental mechanisms. Key factors, including surface interactions, chemical affinities, and structural properties, are meticulously considered to augment the efficiency of the adsorption process.

Central to our methodology is the strategic application of the Design Expert software, providing a systematic and optimized framework for experimental design and parameter selection. The study revolves around Schiff bases, a versatile class of compounds formed through the condensation of carbonyl and amino groups. Advanced analytical techniques, such as spectroscopy and chromatography, guided by Schiff's rules, offer a nuanced understanding of the molecular and structural aspects of the complexes.

Noteworthy results highlight the efficacy of Schiff's bases and Design Expert optimizations in achieving significant improvements in dye absorption. Trends, patterns, and optimized conditions are elucidated, showcasing the success of the approach in facilitating efficient and sustainable dye uptake. The discussion interprets these results within the context of broader implications for environmental applications, emphasizing considerations such as reusability, efficiency, and environmental friendliness. Challenges encountered during the study are candidly addressed, contributing to a comprehensive reflection on the experimental journey.

In conclusion, this study advances our understanding of dye absorption by strategically applying Schiff's bases and Design Expert enhancements. The research provides a notable contribution to the field, underscoring the pivotal role of these principles in elevating adsorption efficiency. The study suggests promising avenues for future research, emphasizing further exploration of Schiff bases in environmental remediation and materials science. This work significantly contributes to the evolving landscape of sustainable solutions for dye removal and environmental protection.

Keywords: Schiff base, design expert, Adsorption, dye