

Research Work Title

Providing Effective Models Based on the Principles of Green Chemistry to Optimize Chemical Processes



Researcher | Farhad Shirini

Collaborating Organization | University of Guilan

Abstract

The research focuses on the diverse catalysts that are effective in organic reactions, including the sodium chloride, potassium bromide and calcium chloride, and those that can be easily prepared, such as hydrogen sulfates, new types of nano-catalysts (especially types with magnetic capabilities), nanocomposites, metal-organic frameworks, a wide range of ionic liquids and natural deep eutectic solvents, as very effective and inexpensive catalysts with significant efficiency in a wide range of organic reactions, especially multi-component ones.. Furthermore, the research highlights natural catalysts, including rice husk , rice husk ash, and Shal Tasbih plant powder as a weed found in the forest areas of Guilan province, Verjuice, orange peel powder, taurine, pregabalin, and caffeine. These catalysts are particularly useful in the preparation of polycyclic heterocyclic compounds, given their high selectivity and ability to perform asymmetric induction reactions. The research also addresses the critical issue of catalyst stabilization, particularly for nano-catalysts with the ability to be agglomerated, ionic liquids, salts with a predisposition to absorb moisture, and some natural compounds with the ability to oxidize. This project suggests a significant number of the catalysts under examination can be utilized in industrial settings, including for the treatment of industrial wastewater and carbon dioxide absorption. Some of these catalysts are also leveraged in drug delivery processes for breast cancer treatment. On the other hand, a number of heterocyclic products have demonstrated exceptional antibacterial activity.

