Catalysts

an Open Access Journal by MDPI

CiteScore: 7.6
Impact Factor: 4.0

Special Issue Reprint

Applications of Heterogeneous Catalysts in Green Chemistry

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Heterogeneous catalysts play a central role in chemical industries by enabling molecular transformations to produce desired products. Their role is even more important in sustainable and environmentally benign processes, where active, selective, and stable catalysts efficiently convert feedstocks while minimizing process interruptions caused by deactivation. High catalytic activity improves energy efficiency and allows large-scale processing in reactors with smaller footprints, whereas high selectivity reduces the formation of undesired byproducts that require downstream separation. Catalyst stability ensures consistent performance, reducing frequent shutdowns and restarts, which lowers operational costs and enhances plant productivity. In chemical industries, reactors are often followed by energy-intensive separation units to remove unreacted feedstock, byproducts, and solvents, resulting in significant waste generation. Efficient catalysts also help in reducing the separation requirement by generating lower numbers of byproducts. In short, the role of heterogeneous catalysts is vital in making sustainable and environmentally friendly processes a reality. In this Special Issue, we have included research articles and review papers highlighting the critical role of heterogeneous catalysts in green processes. The scope broadly covers the various aspects of chemistry and chemical industries such as green synthesis techniques, pollution control, energy efficiency, environmental catalysis, clean energy, CO_2 conversion, hydrogen production, and auto emission catalysts.

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