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Recoverable and recyclable catalysts for sustainable chemical processes

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There is continued pressure on chemical and pharmaceutical industries to reduce chemical waste and improve the selectivity and efficiency of synthetic processes. The need to implement green chemistry principles is a driving force towards the development of recoverable and recyclable catalysts. A typical chemical process generates products and wastes from raw materials such as substrates, solvents and reagents. The prevention of waste can be achieved if most of the reagents and the solvent are recyclable. The design and synthesis of recoverable catalysts is a highly challenging interdisciplinary field combining chemistry, materials science engineering with economic and environmental objectives. Recyclability can either be achieved when the catalyst is bound to a solid phase, or when its solubility characteristics are modified so that it can readily be separated from the product by extraction during work-up. For example, catalysts and reagents such as acids and bases that are bound to a solid phase can be filtered off, and can be regenerated and reused in a subsequent run. Case studies concerning the recoverable and recyclable catalysts for chemical processes like oxidation of alcohols and ketones, alkylation of aromatic compounds and Diels-Alder reaction will be presented. The main emphasis will be placed on the application of ionic liquids as both homogeneous and heterogeneous catalysts. Recycling of ionic liquids prevents them from ending up in the aquatic environment, as their low volatility prevents them from release into the atmosphere. Additionally the possibility of designing of recyclable biocatalysts will be demonstrating.

Biography

Anna Chrobok, Dsc has completed her PhD in 2001 from Silesian University of Technology. In 2002 she was taking the Postdoctoral fellowship at University of Vienna. Now, she is Associate Professor and the Head of Department of Chemical Organic Technology and Petrochemistry at Silesian University of Technology, Faculty of Chemistry (Gliwice, Poland). She has published more than 50 papers in reputed journals. Her main fields of interest are: chemical technology, green chemistry, oxidation processes and ionic liquids.

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