

S3-01

Green Chemistry and Catalysis for Sustainable Organic Synthesis

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New developments in process chemistry are largely driven by the growing need for processes that are more efficient in their use of raw materials and energy, generate less waste and avoid the use of toxic and/or hazardous reagents and solvents. In most cases the solution is to replace traditional organic syntheses, employing stoichiometric reagents in environmentally unattractive solvents, by green, atom-efficient, catalytic alternatives. Recent developments in homogeneous, heterogeneous and biocatalysis will be reviewed in the context of fine chemical synthesis with emphasis on chemo-, regio- and stereoselectivity issues and the use of novel reaction media and catalyst recycling.

S3-02

Microbial Systems for Production of Polyesters and Polyamides from Renewable Resources

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Nearly all organic matter existing on earth is synthesized from CO₂ by photoautotrophic or chemolithoautotrophic organisms or is derived from the organic molecules, which are synthesized by these organisms, by conversions catalyzed by heterotrophic organisms. In this regard, plants are the most important organisms for the provision of renewable resources. Furthermore, the organic material of the living matter consists mainly of biopolymers. Therefore, biopolymers are beside triacylglycerols and sucrose the most important renewable resources that are used as carbon sources by prokaryotic and eukaryotic microorganisms for biotechnological production processes.

S3-03

Sustainable Chemical Technology and the Importance of Information Infrastructure

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The extent of human activity increased substantially during the 20th century with a 3.7-fold increase in population, a 7-fold increase in grain production, a 20-fold increase in energy consumption, a 20-fold increase in steel production, and a 4000-fold increase in aluminum production. These increases have revealed the limitations of the earth in terms of resources and environment. If these conditions continue, it is unavoidable that the 21st century will bring global warming, depletion of fossil fuels and the accumulation of waste.