S-1

GSC を指向したパラジウム触媒プロセス

辻　二郎　東京工業大学名誉教授

Palladium-Catalyzed Processes Directed Towards Green and Sustainable Chemistry

Jiro TSUJI

Professor Emeritus, Tokyo Institute of Technology

Organic synthesis based on palladium-catalyzed reactions has made remarkable progress and many unique palladium-catalyzed processes were developed. Palladium catalyzed commercial processes are surveyed and summarized from a standpoint of GSC. Clearly palladium catalyzed processes satisfy the requirements of GSC nearly, but not completely.　.

S-2

フッ素系洗浄剤 AK-２２５(代替フロン)の開発

森川 眞介 旭硝子株式会社　化学品事業本部　化学品開発研究所

Development of a Fluorinated Cleaning Agent AK-225

Shinsuke Morikawa

Asahi Glass Co., Ltd

CFC-113 was widely used as a precision cleaning agent in various applications due to its excellent physical and chemical properties. AK-225 (trade name of HCFC-225) was developed as an alternative to CFC-113. It has very similar properties to CFC-113. Brief history of cleaning, and development, properties, applications, toxicity, environmental acceptability and regulation of HCFC-225 will be discussed.

S-3

Mesoporous Solid Acids for Green Chemistry

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Solid acids based on mesoporous high surface area support materials are beginning to play a significant role in the greening of fine and speciality chemicals manufacturing processes. These materials can be designed to provide different types of acidity and are useful in a wide range of important organic reactions.

S-4

グリーン反応場としての超臨界流体の利用

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Supercritical Fluids as Greener Reaction Media

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Supercritical carbon dioxide ($scCO_2$) with non-toxicity and nonflammability is a promising alternative to hazardous organic solvents. The use of $scCO_2$ can offer great opportunities to improve the outcome of the catalytic reactions in terms of rate and selectivity because of high miscibility with gaseous reactants and tunable physicochemical. In this paper, molecular catalysis in homogeneous supercritical fluids or multiphasic systems including $scCO_2$, H_2O, or liquid reactants, will be discussed,

S-5

超臨界流体とグリーンプロセスの開発

新井邦夫　東北大学大学院 工学研究科 化学工学専攻

Development of Green Chemical Processes with Supercritical Fluids

Kunio ARAI

Tohoku University

To achieve sustainable development for society that is in harmony with nature, a large reduction in the amount of synthetic solvents will be required. Water and carbon dioxide, which exist throughout our environment, have a wide range of functionality and can be considered to be environmentally benign solvents. In this work, research and development trends of supercritical fluids are introduced, and supercritical fluid technology fundamentals that have the potential to revolutionize chemical processes are demonstrated.

S-6

Development of Bioremediation Technologies to Clean-up Contaminated Soil Environment

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Bioremediation is of great interest in cleaning up contaminated soil and groundwater with chlorinated organic compounds and heavy metals. Many microorganisms which can degrade and accumulate toxic chemicals have been found out and applied for bioremediation. It is necessary to better understand the efficacy measurement and the risk assessment of bioremediation. We have isolated and characterized a methane utilizing bacterium which can degrade trichloroethylene(TCE) in columns and pilot scale lysimeters.

S-7

グリーン度の評価法

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How to measure green for products/process/system?

Itaru YASUI

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Green is a concept to express the degree of small environmental burden caused by a product or service. Environmental burden is usually evaluated by 3 factors, i.e., by the bad effects on human health, by the bad effects on ecosystem and by the effects on depletion of energy and resources. This implies that it is necessary to have an integrated system with combined concept of life cycle assessment and risk assessment, but the concrete method/system must be created by further efforts.

S-8

Catalytic Activation of Hydrogen Peroxide for Green Chemical Processes

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Hydrogen peroxide is a key reagent in numerous enzymatic oxidations. With an annual production of more than 1.3 million tonnes, hydrogen peroxide is also an important commodity chemical for industrial oxidations. However, in contrast with biochemical processes, catalysis has been largely absent from peroxide technologies. Over the last two decades, we have been developing oxidatively robust tetraamido-macrocyclic ligands (TAML® activators) via an iterative design process in which oxidation-sensitive ligand moieties are identified and replaced. We have demonstrated that subtle changes in the structure and composition of TAML ligands can greatly enhance the robustness of their iron complexes towards oxidative and hydrolytic degradation in the presence of peroxide. Iron-TAML® complexes have been shown to be efficient and selective oxidation catalysts in a variety of technology areas. It will be shown that their lifetimes are dependent upon controllable features of ligand design. They are water soluble and are active under both neutral and basic conditions. They lead to rapid processes in which they are effective in micromolar to nanomolar quantities. Various Fe-TAML® activator-peroxide technologies will be introduced.

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グリーンポリマーの開発

土肥　義治 [1,2]

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R & D of Green Polymers

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Today, plastics of about 150 million tons have been produced from fossil resources and their products have gained universal use in our society. There is a growing demand for biodegradable polymers and plastics (green polymers and plastics) which are produced from renewable carbon sources (agricultural feedstocks as sugars and plant oils). We have studied on the fermentation production and material design of biodegradable polymers. The R & D of green polymers and plastics will be reviewed.

S-10

“グリーン化学”と企業経営

和田 啓輔　　三菱化学株式会社

“Green Chemistry” in managing chemical company

WADA, Keisuke

Mitsubishi Chemical Corporation

Aspects of “Green Chemistry” in a typical chemical company are briefly reviewed. A method, which includes both economical and environmental point of views, to estimate research program is proposed. Meanings of “Green Chemistry” in managing chemical company and ideas to promote activities of “Green Chemistry” are also discussed.