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Preface

Recent advances in oxidation chemistry

Oxidation reactions represent a fundamental class of organic transformations and almost every natural product total synthesis involves an oxidation step. As our living atmosphere contains oxygen, oxidation reactions have been involved in almost every cell. For example, the oxidation of carbon-containing compounds is an important energy source for most living organisms. No doubt, oxidation reactions are essential to organic synthesis as well as life processes, and great progress has been made in the last century on new catalysts, methodologies, and mechanistic studies for oxidation reactions. Nevertheless, the current methods available for oxidation reactions are still far from ideal, in particular, compared to Mother Nature, in terms of regioselectivity, stereoselectivity, mildness of conditions, efficiency, and environmental issues. It is high time for this Symposium-in-Print to focus on the advances in oxidation reactions, and to present the challenges and opportunities for future research in oxidation reactions.

Since it is impossible for this Symposium-in-Print to cover all the significant work done in the area, the following aspects of the recent developments in oxidation reactions have been highlighted instead: enantioselective epoxidation of olefins catalyzed by chiral iminium salts (Page), ketones (Armstrong, Shing), lanthanide/H_8-BINOL reagents (Shibasaki), and chiral Mn(salen) catalysts immobilized on mesoporous materials (Li); epoxidation of olefins using electrochemically generated hydrogen peroxide as the terminal oxidant (Wong and Chan); alcohol oxidation catalyzed by laccases (Sheldon) and gold nanoparticles (Corma and Garcia); manganese dioxide-mediated tandem oxidation processes for alcohols (Taylor); C–H bond oxidation catalyzed by trihydroxyisocyanuric acid (Ishii); asymmetric Baeyer–Villiger oxidation catalyzed by chiral BINOL/aluminum reagents (Bolm); and photooxidative cleavage of olefins (Turro).

From this selection of 13 contributions, we can see that oxidation chemistry is an active and frontier research field, with great opportunities to explore and significant challenges to meet.

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