

Preface

Organic chemistry of singlet oxygen

This special issue on singlet oxygen chemistry consists of 20 papers, from laboratories around the world—in China, Italy, France, Turkey, United States, Brazil, Germany, Chile, and Greece. Some of the papers explore singlet oxygen's unique ability to oxidize molecules. Other papers describe methods in the generation of $^1\text{O}_2$. The formation and subsequent reactions of $^1\text{O}_2$ are reported in a variety of media, such as common organic solvents, aqueous media, zeolites, and an ionic liquid.

The focus on $^1\text{O}_2$ chemistry in ene, [2+2], and [2+4] reactions with unsaturated molecules plays a leading role in this symposium. The contributors include Iesce, Erden, Griesbeck, Balci, Linker, Stratakis, Orfanopoulos, Turro, Tung, and Stensaas. The research is largely driven by an attempt to find selective reactions. The study of mechanisms of $^1\text{O}_2$ reactions also fuels the research.

Cadet and O'Shea have probed $^1\text{O}_2$ chemistry to learn about reactions with biologically important (unsaturated) molecules, such as deoxyguanosine and methyl urocanate. There, the $^1\text{O}_2$ reactions yield unstable endoperoxides, which readily rearrange to stable products.

Singlet oxygen reactions with heteroatom-containing molecules are also under intense study. Albini and Clennan describe the latest of what has been learned about reactions of $^1\text{O}_2$ with sulfides. The reaction of $^1\text{O}_2$ with phosphines and diimines are described by Selke and Lemp, respectively, to get a handle on the reactions and how they may be of interest from a synthetic point of view.

As a reactive species, $^1\text{O}_2$ has a short lifetime in solution. The effectiveness in how $^1\text{O}_2$ oxidizes compounds depends

on the relative chemical and physical reaction pathways. Lemp, Selke, and Albini provide insight on these relative contributions. Turro discusses a provocative idea for vibrational deactivation of $^1\text{O}_2$ by which regioselective oxidation is achieved.

The symposium papers also include data on the chemical generation of $^1\text{O}_2$. In an ozone reaction, Dussault presents data in support of generating $^1\text{O}_2$ via a new reaction. In another study, Aubry discusses the chemical generation of $^1\text{O}_2$ in microemulsions by the reaction of sodium molybdate with H_2O_2 . Di Mascio describes the thermal decomposition of a water-soluble anthracene endoperoxide.

The symposium highlights information on the chemistry of singlet oxygen. There are many challenges that remain for the application of $^1\text{O}_2$ in organic chemistry. Research will continue toward an ever better understanding of mechanisms. During the period of collection of manuscripts, I sensed an enthusiasm felt by the researchers in many ways. This makes the area inviting to exploit and rich with new research opportunities. I thank Harry H. Wasserman for the invitation to serve as guest editor.

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