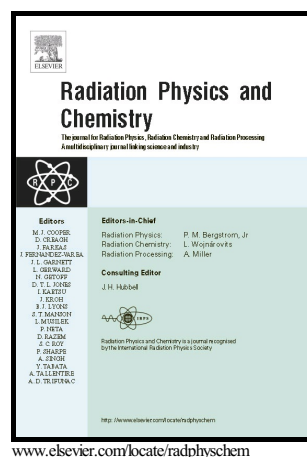


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Studying mechanism of radical reactions: From radiation to nitroxides as research tools

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Abstract

Radicals are part of the chemistry of life, and ionizing radiation chemistry serves as an indispensable research tool for elucidation of the mechanism(s) underlying their reactions. The ever-increasing understanding of their involvement in diverse physiological and pathological processes has expanded the search for compounds that can diminish radical-induced damage. This review surveys the areas of research focusing on radical reactions and particularly with stable cyclic nitroxide radicals, which demonstrate unique antioxidative activities. Unlike common antioxidants that are progressively depleted under oxidative stress and yield secondary radicals, nitroxides are efficient radical scavengers yielding in most cases their respective oxoammonium cations, which are readily reduced back in the tissue to the nitroxide thus continuously being recycled. Nitroxides, which not only protect enzymes, cells, and laboratory animals from diverse kinds of biological injury, but also modify the catalytic activity of heme enzymes, could be utilized in chemical and biological systems serving as a research tool for elucidating mechanisms underlying complex chemical and biochemical processes.

Abbreviations

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