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REVIEW

Redefining *N*-Bromosuccinimide: Chemistry Beyond Allylic Bromination

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ABSTRACT

Bromination or subsequent reactions followed by bromination have become easier and more convenient after the invention of N-bromoamides. As a brominating agent, molecular bromine has limitations like decomposition, volatility, high reactivity, and toxicity. Hence, N-bromoamides have emerged as a widely used laboratory reagent for bromination. Among the other N-bromoamides, N-bromosuccinimide (also called NBS) is the most commonly used laboratory reagent. Apart from its most common use in allylic/benzylic bromination and as an electrophilic brominating agent, this reagent has paved its way through various rearrangements, hydrolysis, multicomponent reaction, C—C bond cleavage of β-keto amides, benzylic bromination, stereoselective synthesis, oxidation, catalysis, aromatization, and one-pot tandem reaction. The present review will highlight applications of NBS in organic chemistry apart from bromination. It will focus on how this reagent facilitates various chemical transformations, thereby proving its versatility beyond a mere brominating agent.

1 | Introduction

N-Bromosuccinimide (NBS) is a convenient, inexpensive, and widely available crystalline compound (m.p. 153°C) that has become a staple reagent in synthetic organic chemistry. Typically prepared by the reaction of succinimide with bromine in alkaline ice-water medium, NBS was first introduced by Ziegler [1, 2] and coworkers in the late 1930s in their seminal studies on allylic bromination. Since then, it has steadily gained prominence as a safer and more selective alternative to elemental bromine and bromine water. Unlike bromine, which is volatile, corrosive, and prone to uncontrolled over-bromination, NBS is a stable crystalline solid that can be weighed accurately, stored safely, and dispensed reproducibly. Its solid-state nature and milder release of bromine equivalents account for its superior handling, higher chemoselectivity, and wider synthetic applicability. Structurally, the succinimide framework stabilizes the N–Br bond and confers a unique dual reactivity to NBS. Under radical conditions, homolysis generates bromine radicals, enabling efficient allylic and benzylic brominations. In contrast, under ionic conditions, the polarized N–Br bond provides an electrophilic bromine source for olefin, aromatic, and carbonyl brominations. This mechanistic versatility has made NBS indispensable not only in selective halogenation but also in a broad spectrum of transformations. While the mechanistic pathway of bromination, whether bromination is mediated by the bromine radical or succinimidyl radical- remains a subject of debate, the synthetic utility of NBS is beyond question [3–12].

Beyond conventional bromination chemistry, NBS-mediated processes often proceed through bromination–substitution sequences, enabling hydroxylation, methoxylation, and

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