SYNLETT Spotlight 124

2-Iodoxybenzoic Acid (IBX): A Versatile Reagent

Compiled by Indresh Kumar

This feature focuses on a reagent chosen by a postgraduate, highlighting the uses and preparation of the reagent in current research

Indresh Kumar was born in Meerut, Uttar Pradesh, India. He completed his MSc in organic chemistry at C. C. S. University Meerut, India, in 2000. In that same year, he joined the National Chemical Laboratory in Pune, India, where he is currently a PhD student with Dr. C. V. Rode. His main research interests are asymmetric catalysis, new synthetic methods for nitrogen heterocycles and natural product synthesis.

Indresh Kumar c/o Dr. C. V. Rode, Homogenous Catalysis Division, National Chemical Laboratory, Pune, 411008, India
E-mail: indreshmalik@yahoo.co.in

Introduction

The importance of hypervalent iodine reagents in organic chemistry has been demonstrated in recent years, and they have been found to have several desirable properties: they are mild, selective, efficient and eco-friendly.¹ 2-Iodoxybenzoic acid (IBX) has been developed as a powerful reagent for several organic transformations, and a recent

surge in interest was driven by the publication of an improved method for its synthesis.^{2a} IBX is a powerful single-electron transfer oxidant that readily accepts a new heteroatom-based ligand, and has been applied successfully for the construction of novel heterocycles.

Preparation

According to a new improved procedure, IBX can be prepared in very good yield by the oxidation of 2-iodobenzoic acid with Oxone;^{2a} this shows advantages over the previously reported methods.^{2b}

Abstracts

(A) IBX oxidizes 1° and 2° alcohols to the corresponding aldehydes and ketones, without any over-oxidation, in DMSO at room temperature.³ Using different solvent systems and higher temperatures, yields of 90–100% can be obtained.⁴ Environmentally benign ionic liquids have also been used as solvents for this transformation.⁵

(B) IBX has been used to oxidize oximes and tosyl hydrazones to the corresponding carbonyl compounds.⁶

(C) IBX was used to oxidize saturated alcohols and carbonyl compounds^{7a} to the corresponding α,β -unsaturated carbonyl system in one pot. It can also be used to oxidize the benzylic position.^{7b}

(D) IBX reacts with certain unsaturated N-aryl amides (anilides) to form novel heterocycles such as δ -lactams, cyclic urethanes, hydroxylamine and aminosugar building blocks.⁸

(E) In combination with an N-oxide (MPO), IBX was used to oxidize a carbonyl^{9a} and its silyl enol ether^{9b} to the corresponding α,β -unsaturated compounds in high yield at ambient temperature.

(F) A regioselective oxidation of phenols to *o*-quinones was performed with IBX.¹⁰

(G) Recently, IBX was used to convert nitrogen- and sulfur-containing substrates to synthetically useful intermediates.¹¹

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