

SYNLETT Spotlight 44

Potassium Monopersulfate Triple Salt [Oxone®]

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

Venkat Narsaiah was born in Bathulapally (Village) Kallur (Mandal) Khammam (District) Andhra Pradesh (India). He received his Bachelors Degree (BSc) from S.R.&B.G.N.R college, Khammam (India) and his MSc with specialization in organic chemistry from Osmania University (India). Thereafter he joined the University of Hyderabad (India) to receive his MPhil in Chemical Education. At the same time he was appointed at the Indian Institute of Chemical Technology (CISR-Laboratory) as scientific assistant. Currently he is working under the supervision of Dr D. Subhas Bose in the PhD program on asymmetric synthesis of β -blockers and functional group transformations, which are more useful in organic synthesis.

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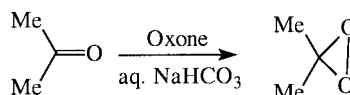
Introduction

Potassium monoperoxysulfate triple salt ($\cdot 2\text{KHSO}_5 \cdot \text{KHSO}_4 \cdot \text{K}_2\text{SO}_4$) is available as 'Oxone' (Dupont registered name). Oxone® is a white, granular and free flowing solid. It is soluble in water and insoluble in common organic solvents. It has a low order of toxicity. Traces of heavy metal salts catalyze the decomposition of Oxone.

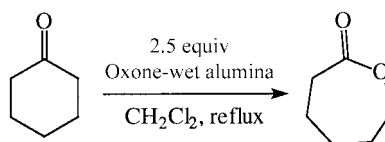
This triple salt is a convenient and stable form of the unstable potassium monopersulfuric acid (Caroate). In situ generated unstable caroate serves as a stoichiometric oxidizing agent for a number of functional groups including alkenes, arenes, amines, imines, sulfides, and is used for the preparation of dioxaranes under a variety of conditions. Oxone is used for the cleavage of acetals, ketals and also for the dehydration of oximes.

Abstracts

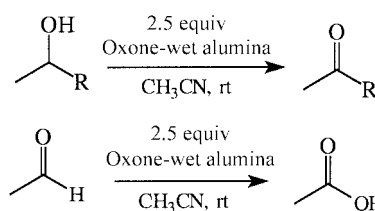
A: Various ketones can be converted into the corresponding dioxiranes by treatment with buffered aqueous solutions of Oxone®.¹



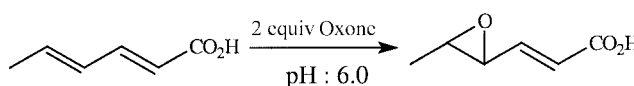
B: The reaction of a solid slurry of Oxone and wet alumina with solutions of cyclic ketones in CH_2Cl_2 provokes Baeyer–Villiger oxidation to give the corresponding lactones.²



C: A slurry of the solid Oxone-wet alumina reagent can be used to oxidize secondary alcohols to ketones as well as aldehydes to acids.^{3,4}



D: Aqueous solutions of oxone can epoxidize alkenes, which are soluble under the reaction conditions. (The high selectivity for the epoxidation of the 4,5-double bond is noteworthy.)⁵



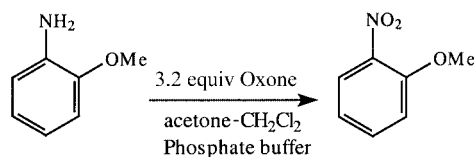
Synlett 2002, No. 7, Print: 01 07 2002.

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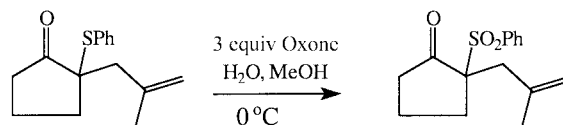
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ISSN 0936-5214

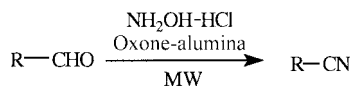
E: An aqueous Oxone–acetone combination has been developed for the transformation of certain anilines into the corresponding nitrobenzene derivatives. This process involves sequential oxidation steps proceeding by way of an intermediate nitrate compound.⁶



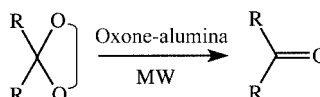
F: Aqueous Oxone solutions selectively oxidize sulfides to sulfones even in highly functionalized molecules.⁷



G: Oxone is used for the preparation of nitriles from aldehydes under microwave irradiation with the help of a solid-support (neutral alumina).⁸



H: The Oxone–alumina reagent system is also used for the efficient cleavage of acetals and ketals under solvent-free conditions using microwave technology.⁹



References

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