SYNLETT
Spotlight 391

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

Lead(IV) Acetate

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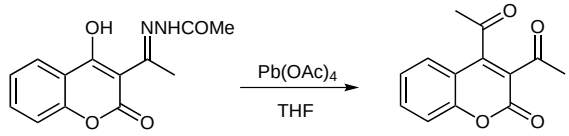
Introduction

Lead acetate or lead tetraacetate (LTA) is a versatile oxidizing agent, which has been widely used in the organic synthesis and as an excellent reagent for the introduction of lead into organolead compounds. It is hygroscopic and toxic in nature. It has several applications in organic synthesis *viz.* synthesis of fullerenyl esters,[1] formation of spirocyclic tetrahydrofuran derivatives,[2] diastereoselective aziridination of enones,[3] C–N bond formation[4] and several others. Very interesting multistage heterodomino transformation,[5] oxidative fragmentation of homoallylic alcohols,[6] and an oxidative cleavage of allyl alcohols induced by the O_3/$Pb(OAc)_4$,[7] oxidative decyclization in the synthesis of 6-hydroxycarvone derivatives [8] have been more recently reported.

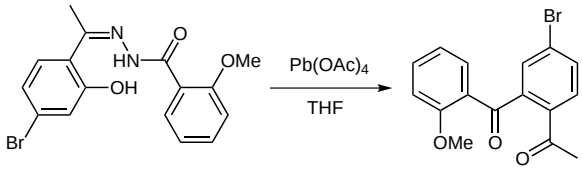
LTA can be prepared by slowly adding red lead oxide (Pb_3O_4) to a mixture of acetic acid and acetic anhydride at 60–80 °C. This mixture is to be cooled followed by filtration and finally recrystallization of the obtained solid residue from acetic acid to yield white needles of LTA.[9]

Abstracts

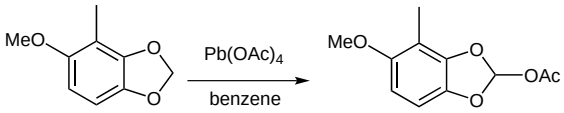
(A) Recently, novel 3,4-diacylcoumarins were synthesized by converting hydroxyl group into an acyl group on the α-pyrone ring of coumarin using LTA and it is first report on heterocyclic ring systems.[10]



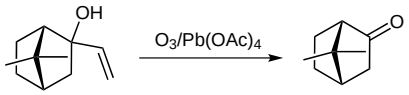
(B) LTA was used in a key step of the synthesis of boron-dibenzopyrromethenes, responsible for light-harvesting sensitizers for polymeric solar cells for oxidation.[11]



(C) Hussain and co-workers reported the synthesis of novel antioxidants. In this synthesis LTA was used as acetoxylating agent for the formation of the intermediate orthoester.[12]



(D) A novel and efficient method for the oxidation of allyl alcohols to the corresponding carbonyl compounds in good yields under mild conditions was achieved with the 'ozone/LTA' system.[7]



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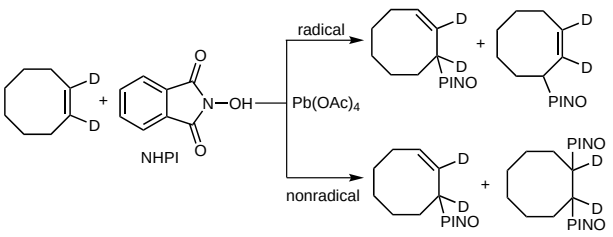
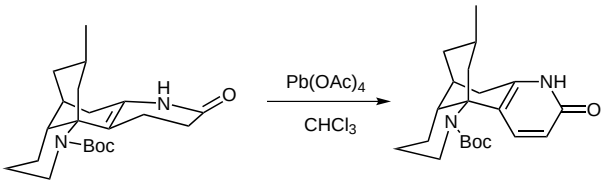
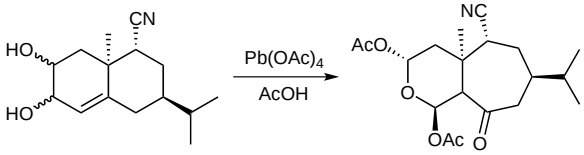
(E) 1,2-Dideuterio cyclooctene reacts with the phthalimide-*N*-oxyl (PINO) radical in the presence of LTA yielding substituted cyclooctenes. PINO is a powerful catalytic agent generated from NHPI by abstracting a proton. The PINO radical gets involved in organic oxidations by abstracting a proton from the target molecule.[13]



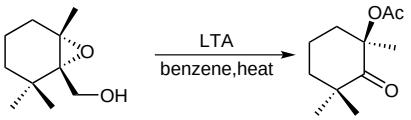
(F) LTA was used in the preparation of a key intermediate, the pyridone ring, to synthesize the *Lycopodium* alkaloid complanadine A.[14]



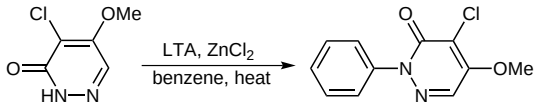
(G) Treatment of LTA with (*R*)-(–)-carvone-derived bicyclic unsaturated 1,2-diol afforded bis-acetoxy acetal, which further after treatment with mild base yielded the bicyclo[3,2,2]nonane framework.[15]



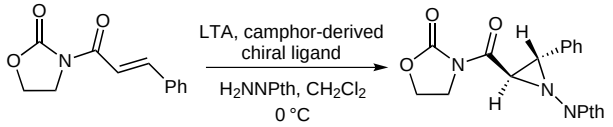
(H) A regio- and stereoselective synthesis of α-hydroxy carbonyl compounds were obtained from 2,3-epoxy primary alcohols by treatment with LTA.[16]



(I) A versatile method for the N-arylation of pyridazin-3(*2H*)-ones using LTA/zinc chloride in benzene was reported.[17]



(J) The LTA/camphor-derived chiral ligands mediated the reaction between various *N*-enoyl oxazolidinones and *N*-aminopthalimide produced *N*-pthalimidoaziridines in good to high enantiomeric excess at 0 °C within 15 minutes.[4]



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