

Tetranitromethane: As a multipurpose reagent

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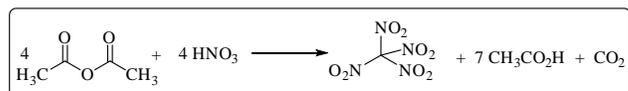


This feature focuses on a reagent chosen by a postgraduate, highlighting the uses and preparation of the reagent in current research.

Introduction

The principal investigation absorbed on the chemistry of tetranitromethane (TNM) had been distributed in 1976 [1]. Tetranitromethane as a pale yellow, oily liquid with a pungent, acrid odor, is highly explosive in the presence of impurities and has been used as an oxidizer in rocket propellants and as a stabilizer to increase the cetane number of diesel fuel [2]. It has correspondingly been used as a biochemical reagent for detection of double bonds, nitrating agent and reaction with tyrosine residues in proteins [3]. Tetranitromethane has oxidative properties to several degree. For example, aromatization of dihydroaromatic compounds has been accrued when preserved with it [4].

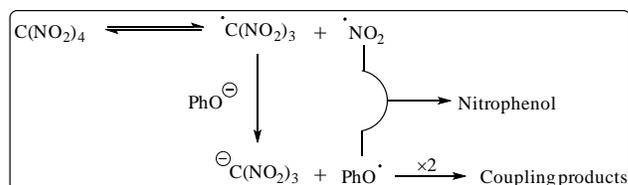
Tetranitromethane, which is effortlessly prepared from acetic anhydride and fuming nitric acid (Scheme 1) [5] is broadly used as an electron acceptor. Nevertheless the synthetic efficacy of this reagent is not completely concerned. The photochemistry of charge transfer complexes has been also accomplished by using of sulfides as donors and TNM as an acceptor [6]. It has been described that TNM did not react with native or denatured DNA in vitro [7].



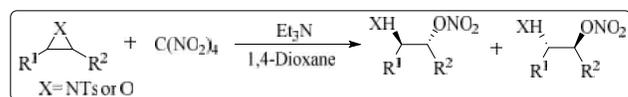
Scheme 1.

Abstracts

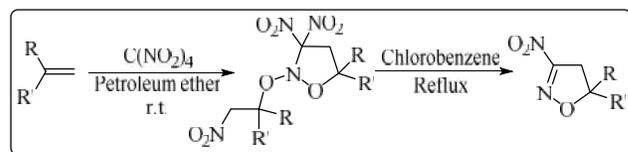
(A) Aromatic nitrations by tetranitromethane are revealed to be photo chemically offered and are supposed to progress *via* trinitromethyl nitrite [8].



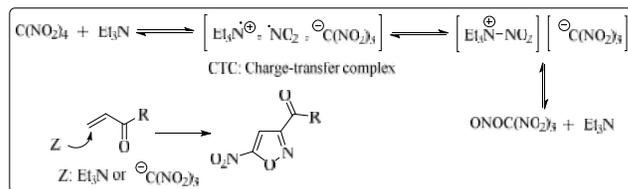
(B) An appropriate process for the preparation of α -tosylamino and α -hydroxy nitrates based on the ring-opening reaction of aziridines and epoxides by tetranitromethane in the presence of triethylamine have been reported [9,10].



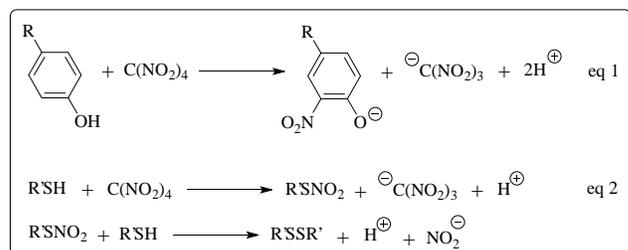
(C) An artificial corporate process has been established for the synthesis of nitroisoxazolines by the application of a thermal β -elimination reaction to *N*-alkoxy-3,3-dinitroisoxazolidines [11].



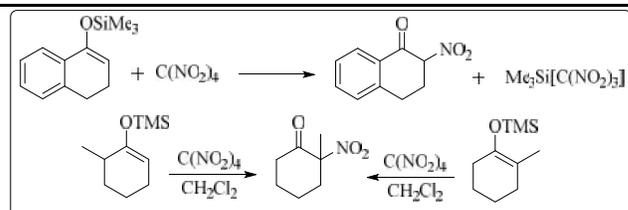
(D) Nitroisoxazoles could be produced *via* heterocyclization of electrophilic alkenes with tetranitromethane (TNM) in the presence of triethylamine [12].



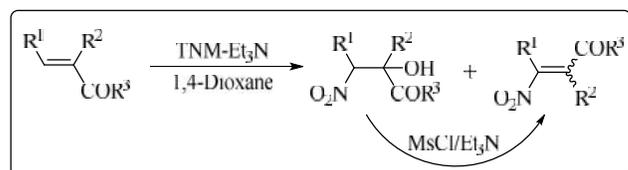
(E) TNM could be supposed to occur in an incompletely ionic form *via* dissociation to form nitronium ions and nitroformate ions. The phenolic group of tyrosine has been considered to react with nitronium ions leading to the formation of mononitrotyrosine and liberating protons. The thiol residue of cysteine is thought to react with the nitronium ion leading to the formation of an intermediate, which named "sulfenyl nitrate", and also liberating a proton [13].



(F) Highly red solutions of several enol silyl ethers and tetranitromethane (TNM) are excitedly lightened to afford good yields of α -nitro ketones in the dark at room temperature [14].



(G) An efficient method for the preparation of functionalized α -nitroalkenes based on the nitration of α , β -di- and α , β , γ -trisubstituted unsaturated aldehydes, ketones and esters with tetranitromethane has been also reported [15].



References

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