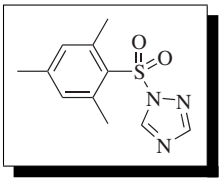
Mesitylsulfonyl-1*H*-1,2,4-triazole



[54230-59-0] $C_{11}H_{13}N_3O_2S$ (MW 251.34)

InChI = 1/C11H13N3O2S/c1-8-4-9(2)11(10(3)5-8)17(15,16)14-7-12-6-13-14/h4-7H,1-3H3

InChIKey = XNKYPZJMRHXJJQ-UHFFFAOYAL

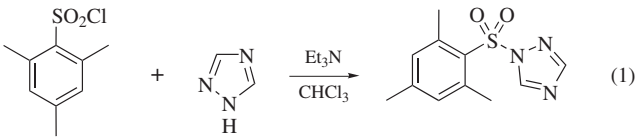
(reagent for phosphate activation[1] and nucleotide condensation[2])

Alternate Name: MST.

Physical Data: mp 135 °C.

Form Supplied in: solid; widely available from commercial sources.

Preparative Method: readily prepared by the reaction of equimolar ratios of ***Mesitylenesulfonyl Chloride***, ***1,2,4-Triazole***, and ***Triethylamine*** in a chloroform solution (eq 1).[3]



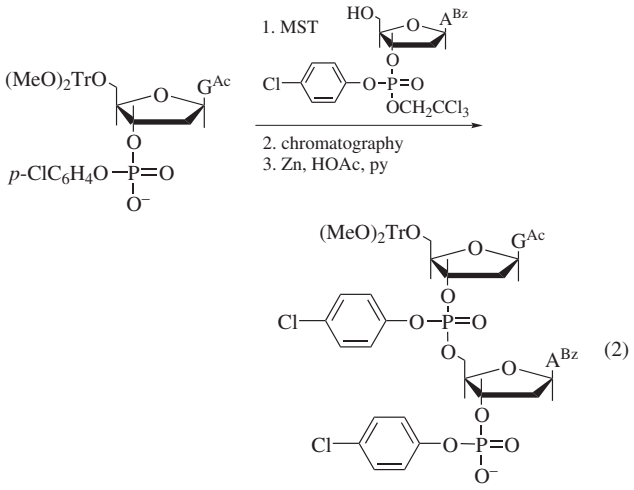
(1)

Purification: recrystallization from benzene.

Phosphate Activator. MST was shown to be an effective catalyst for the phosphorylation of a 5′-protected mononucleoside.[1] MST was stirred with *p*-chlorophenyl phosphorodichloridate and triethylamine and the resulting agent was used directly for the phosphorylation of 5′-protected nucleosides in 70–85% yields.

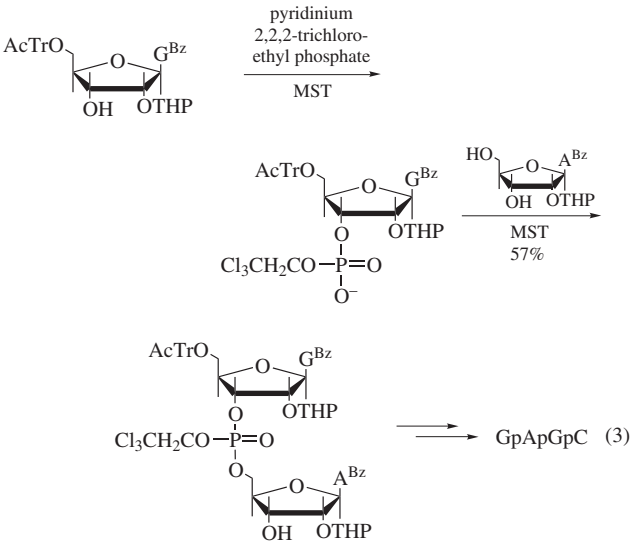
Oligonucleotide Synthesis. As originally reported, the triester approach to the formation of oligonucleotides involved using triisopropylbenzenesulfonyl chloride (TPS) as a condensing agent for a 5′–3′ internucleotide condensation. Since that time, many modifications of this procedure have been reported, including (i) using a stepwise phosphorylation then condensation procedure,[2] (ii) synthesizing the oligonucleotide in the 3′–5′ rather than the 5′–3′ direction,[2] (iii) varying the protecting groups used in these transformations, and (iv) changing the condensing agent. MST is one of the more recently reported condensing agents for the synthesis of oligonucleotides through the formation of 3′,5′-internucleotide bonds via the triester approach. The initial report of the use of MST was in the synthesis of a fully protected dinucleotide (eq 2).[3]

A follow-up full paper by the same authors extended this methodology to the synthesis of hexanucleotides by an iterative phosphorylation and condensation sequence.[1] This paper also kinetically compared this reagent to some of the previously used condensing agents. It was reported that although the reaction using MST was significantly slower than that using TPS, the reaction mixture was much cleaner and the yields were much higher. This was especially true for synthesis of nucleotides that contained purine units, which were formed only in low yields when TPS was employed as the condensing agent, perhaps due to the liberation of HCl from the reagent. MST was also employed as the condensing reagent in the synthesis of 3′,5′-bisphosphorylated oligonucleotides.[4]



(2)

Oligoribonucleotide Synthesis. Subsequent work showed that this reagent was useful in the synthesis of the less stable oligoribonucleotides as well as deoxyribonucleotides.[5] In the same iterative manner as described above for deoxyribonucleotide synthesis, the tetrameric ribonucleotide GpApGpC was formed(eq 3). Yields were reported to be significantly improved over previously described methods that employed TPS as the condensing agent, especially in the coupling of purine residues. Note again that MST can also be used in the phosphorylation step of the condensation



(3)

sequence. MST was also used as a condensing agent for the synthesis of 2′(3′)-*O*-aminoacyl triribonucleoside diphosphates.[6]

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2. Itakura, K.; Katagiri, N.; Bahl, C. P.; Wightman, R. H.; Narang, S. A., *J. Am. Chem. Soc.* **1975**, *97*, 7327.
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4. Ikehara, N.; Oshie, K.; Hasegawa, A.; Ohtsuka, E., *Nucleic Acids Res.* **1981**, *9*, 2003.
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