

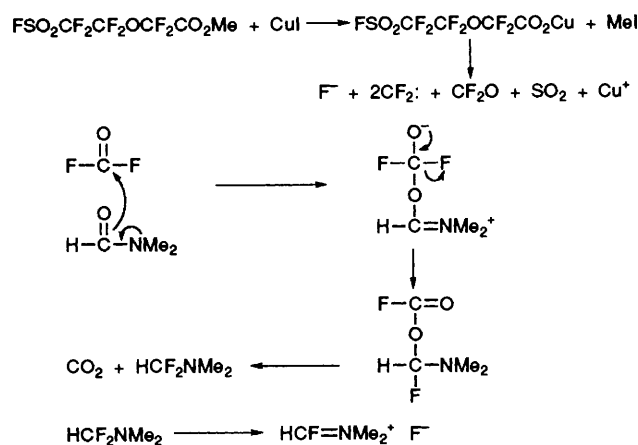
Methyl 3-Oxo- ω -fluorosulfonylperfluoropentanoate: a Versatile Trifluoromethylating Agent for Organic Halides

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Methyl 3-oxo- ω -fluorosulfonylperfluoropentanoate $\text{FSO}_2\text{CF}_2\text{CF}_2\text{OCF}_2\text{CO}_2\text{Me}$ **1**, prepared through the reaction of readily available $\text{ICF}_2\text{CF}_2\text{OCF}_2\text{CF}_2\text{SO}_2\text{F}$ and SO_3 followed by MeOH , is a very convenient trifluoromethylating agent; in the presence of copper(I) iodide, **1** not only reacts with vinyl, benzyl allyl, phenyl iodides and bromides, but also with aryl chlorides to give the corresponding trifluoromethyl compounds in moderate to high yield; a probable reaction mechanism is proposed.

Owing to the increasing interest of trifluoromethylated compounds in biochemistry and material science,¹ various methods for introducing trifluoromethyl groups into organic molecules have been reported,² e.g. fluorination of carboxylic acid with SF_4 ,³ conversion of CX_3 to CF_3 group with Swarts' reagent⁴ and addition of the trifluoromethyl radical to unsaturated molecules.⁵ A widely used trifluoromethylating agent is trifluoromethylcopper or its complex, which is prepared from copper powder with CF_3I ,⁶ $(\text{CF}_3)_2\text{Hg}$,⁷ $\text{CF}_3\text{N}(\text{NO})\text{SO}_2\text{CF}_3$ ⁸ or $\text{CF}_3\text{SiMe}_3/\text{CuI}$.⁹ Using a copper anode, an electrochemical method for preparing this species employing the low cost and readily available CF_3Br ¹⁰ has been reported. Recently, a number of reports described the utilization of compounds containing the difluorocarbene moiety as precursors to trifluoromethylcopper, such as CF_2XY ($\text{X}=\text{Y}=\text{Br}$; $\text{X}=\text{Br}$, $\text{Y}=\text{Cl}$),¹¹ $\text{ICF}_2\text{SO}_2\text{F}$,¹² $\text{XCF}_2\text{CO}_2\text{Me}$ ¹³ ($\text{X}=\text{FSO}_2$, Cl , Br , I) and $\text{BrCF}_2\text{CO}_2\text{K}$.¹⁴ All the reagents have been found to react with vinyl, allyl, benzyl and aryl iodides and bromides.



Scheme 1

is a good trifluoromethylating agent for all of organic halides especially for the unactivated aryl chlorides.

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