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Chemistry of elemental fluorine

During the first century after the isolation of fluorine, organic chemistry did not show great interest in this element despite the fact that numerous fluoro-organic compounds exhibited many desirable functions in pharmacology, material chemistry, agricultural science and much more. The main obstacle was the mythical fear from this element. The truth is that this fear is baseless in case of diluted F_2. It is less toxic than chlorine and cannot spread to large areas since it will react with the surrounding to produce mainly harmless substances. We have started to use this element for very selective CH activation (no catalyst), for constructing CF_2 and CF_3 derivatives, for making fluorohydrins (especially 18[F]-FDG) and for constructing vicinal difluoro compounds. Elemental fluorine, however, was also used extensively for creating fluorine free materials which are practically impossible to make without the help of this element. Thus, for example, one can brominate any deactivated aromatic ring (no catalyst), iodinate benzene derivatives, produce methoxilium ion (electrophilic methoxylation) and may be most importantly to make the HOF•CH_3CN complex which is the best oxygen transfer agent organic chemistry can offer today. This hypofluorous acid can, for example, turn oligothiophenes into their all S,S-dioxo derivatives (not possible with any other agent) which are important ingredients in the electronic industry based on organic compounds.

Biography

Shlomo Rozen has completed his PhD from the Hebrew University of Jerusalem. In 1976, he has joined the School of Chemistry at the Tel Aviv University where he assumed the position of Professor of Chemistry in 1989. His main goal in chemistry is to demonstrate that elemental fluorine and reagents derived from it are very useful in general organic chemistry, as well as in fluorine chemistry and chemists should discard their unjustified fears and prejudice against this long known but somewhat neglected element.

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