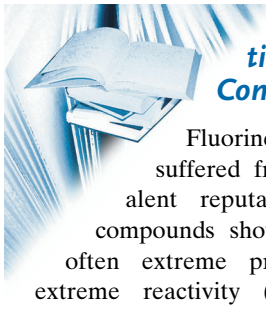

Efficient Preparations of Fluorine Compounds

Fluorine chemistry has always suffered from a somewhat ambivalent reputation. Fluorine and its compounds show a whole spectrum of often extreme properties, ranging from extreme reactivity (elemental fluorine) to noble-gas-like inertness (perfluoroalkanes, PTFE). Accordingly, the motivation to deal with the not always simple chemistry of fluorinated compounds is often driven by the quest for new materials with an extreme property profile. In particular, technical fluorine chemistry gained real momentum by the development of chemically extremely robust polymers and lubricants in the 1940s during the Manhattan Project which was directed towards the construction of the first atomic bombs. Highly fluorinated cooling fluids and propellants as well as perfluorosurfactants are causing environmental problems due to their enormous chemical stability. On the other hand, the extreme stability of perfluorinated anions is often used to stabilize labile and highly energetic cations, as was impressively demonstrated by the preparation of $N_5^+SbF_6^-$ in 1999.

Meanwhile, the situation has changed completely: 125 years after Henri Moissan's first isolation of elemental fluorine, fluorine chemistry is gaining more and more relevance for the design of pharmaceuticals, diagnostics and materials for the electronics industry. Recently, fluoroorganic chemistry got new impulses from positron emission tomography (PET), which requires ^{18}F-labeled biologically active compounds. Nowadays, the introduction of fluorine into complex molecules is no longer a privilege of the "magnificent men" of the first and second generation of fluorine chemists, but chemists of all subdisciplines are utilizing specific fluorination in order to modulate reactivity and physical properties of their target compounds.

Exactly this target group is addressed by Herbert Roesky's new book. Already the preface by Barry Sharpless emphasizes the interdisciplinarity of fluorine chemistry. The boundaries between organic, inorganic, physical and biochemistry are receding into the background, leaving the common goal to utilize the unique potential of the element fluorine.

Roesky's book is of particular usefulness as a pure "cook book". The selection of altogether 68 synthetic procedures is covering—with a few exceptions—all relevant topics and reaction types. The spectrum ranges from more historically interesting reactions, such as the first chemical synthesis of elemental fluorine by K. O. Christe, to a whole assortment of methods for ^{18}F radio-labeling of organic compounds by V. Gouverneur. Furthermore, the preparation of useful reagents, such as highly active silver fluoride (K. Seppelt) or tetramethylammonium fluoride as a source of "naked" fluoride (H.-J. Frohn), is covered by the collection of articles. Beyond pure molecular chemistry the book also provides examples from polymer chemistry (B. Ameduri) and a whole range of solid-state reactions for various application fields. Within this comprehensive selection of synthetic procedures there are only few omissions: among the "classics" of fluoroorganic chemistry the oxidative fluorodesulfuration is missing, which recently gained importance in the technical synthesis of liquid crystals for LCD. Also, the preparatively immensely useful in situ generation of naked fluoride from hexafluorobenzene by S. G. DiMagno is not covered. Not mentioned is also the huge variety of transition-metal-catalyzed methods for the introduction of fluorine and fluorinated functional groups that have been developed in particular over the last five years by the groups of S. L. Buchwald, T. Ritter, and M. Sanford.

The procedures themselves are presented in a common format, and they are elaborated in very much detail. Conveniently, each procedure has an overview of equipment and chemicals, as well as a set of instructions on necessary safety precautions and recommendations for disposal. In particular, the safety precautions are of great importance for some of the procedures, where extremely reactive (connaisseurs know the ClF_3 used in R. Haiges' contribution as "alien blood") and somewhat unusual reagents are used.

Beyond the detailed description of preparative procedures, Roesky's book also conveys the unique "flavor" of fluorine chemistry. All procedures have a short general introduction, often with details of historical interest. The typically quite numerous references invite to read more in depth into the subjects. Accordingly, the book is interesting not only for practitioners of fluorine chemistry, but also as an entry point into the field from a more historical perspective.

In conclusion, Roesky's book is quite unique as a comprehensive overview on synthetic fluorine chemistry. It can be recommended to readers who either are looking for an entry point into the subject or who simply need a compact encyclopedia of the relevant methodology.

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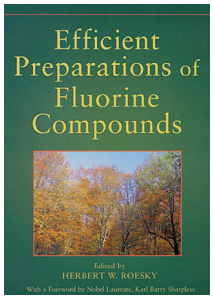

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