
Volume Editor's Preface

The chemical and patent literature contains very many monofluorinated compounds; most of them fall outside the scope of this volume because they contain fluorine bound to an aromatic or heteroaromatic nucleus. In these locations, a single fluorine atom can increase bioavailability by increasing hydrophobicity, or block metabolic oxidation; these effects are familiar and much exploited. In the molecules described in this volume, the solitary fluorine atom can modify pK_a (and bioavailability), conformation, molecular recognition (through the modulation of hydrogen bonding networks), and serve as a valuable label for NMR studies *in vivo* and *in vitro*, and all with minimal perturbation of molecular volume. Chemists working at the interface with biomolecular science often use molecules bearing this remarkable atom, either as candidate drug molecules or to gain insight concerning events in enzyme active sites, or when proteins bind to ligands, at the molecular level. Significant gains await other scientists bold enough to consider solving their problems using selectively fluorinated molecules.

Of course, synthesis is a prerequisite and there are aspects of organofluorine chemistry which are distinctly specialized. However, the various contributors to this volume show clearly how the subject has expanded to admit the non-specialist, through the development of methods which deliver valuable compounds via procedures which can be run at normal temperatures and pressures, in conventional laboratory glassware, and with commercial reagents. The synthetic chemistry described in this volume achieves the exchange of many of the most common functional groups for a single C—F bond. Some of the reagents required are relatively hazardous and require careful handling; others are considerably more amenable to general use.

The volume covers the entire landscape of reagents from elemental fluorine and hydrofluoric acid, to transition-metal catalysts which mediate the introduction of fluorine in novel ways. The chemistry often occurs close to, or at, mechanistic borderlines; there is little real physical organic understanding of any of the transformations described in this volume so reaction outcomes can be unpredictable. Despite this potential difficulty, considerable progress has been made and there are many effective and ingenious methods for use in target synthesis. One of the major challenges in this area of chemistry is sustainability; for example, the fluorinated methanes, a well-known class of building block for the synthesis of monofluorinated compounds, are under considerable pressure as known or potential stratospheric ozone depletors. It is likely that other familiar fluorinated starting materials will become progressively less available.

Much of the primary and review literature upon which this volume is based deals with methodology rather than types of target molecules. The organofluorine literature contains relatively few comparisons between methods, which can make route selection rather difficult. Where the literature is sufficiently extensive, individual contributors have been encouraged to compare and contrast the scope and effectiveness of the available methodologies. These comparisons, and the organization of the volume into target classes and types of functional group exchange reaction, will assist experimentalists in planning synthetic campaigns.

I would like to thank all those who have allowed the delivery of the project, the authors who have contributed to the volume, and especially the editorial staff who have realised the transmutation of manuscripts into volume so extremely professionally.

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