

Preface

Why Fluorine in Heterocyclic Chemistry?

Organofluorine chemistry is almost as old as organic chemistry. First organofluorine compound synthesized ever was a very simple compound. In 1835, Dumas prepared fluoromethane by the reaction of potassium fluoride with dimethyl sulfate. Therefore, organofluorine chemistry is only 7 years younger than organic chemistry, which started its history from urea synthesis by Wöler in 1828. For more than one century the development of organofluorine chemistry has been not very active. Maybe the most important impulse was done by weapon chemists mainly in USA, USSR and UK before and after the Second World War. After that new fluorinated reagents appeared to intensify the development in the field of fluorinated organic compounds. As a result this part of organic chemistry started its enormous growth.

Another milestone in this field was the synthesis of 5-fluorouracil by Heidelberger in 1957. It was demonstrated that 5-fluorouracil works as antineoplastic agent being antimetabolite of natural uracil. It was the first fluorinated synthetic drug. Nowadays fluorine substitution is a commonly used tool in medicinal chemistry and agrochemistry. The presence of fluorine can result in substantial functional changes in the biological as well as physicochemical properties of organic compounds. Incorporation of fluorine into drug molecules can greatly affect their physicochemical properties, such as bond strength, lipophilicity, bioavailability, conformation, electrostatic potential, dipole moment, pK_a etc. as well as pharmacokinetic properties, such as tissue distribution, rate of metabolism and pharmacological properties, such as pharmacodynamics and toxicology.

The main part of modern marketed drugs are heterocyclic compounds of various types. Fluorinated heterocycles are becoming increasingly important in many areas including the pharmaceutical industry, materials science and agriculture. To reflect the importance of this topic, two excellent books (Petrov V.A. (ed.) *Fluorinated Heterocyclic Compounds: Synthesis, Chemistry, and Applications*. 2009, Wiley; and Gakh A., Kirk K.L. (eds.) *Fluorinated Heterocycles*. 2009, ACS) and a number of nice reviews have been published recently.

The present work combines comprehensive information on the chemistry of the fluorinated heterocycles of interest to synthetic organic chemists in general, and particularly for those colleagues working in the fields of heterocyclic-compound chemistry, materials chemistry, medicinal chemistry, and fluorine chemistry. All information is presented and classified clearly to be effective source for broad auditory of chemists. The main feature of this book is classification based on the type of heterocycle. I believe that separate presentation of each type of heterocycles makes clear reading, operation and search through this book to be helpful for readers. I hope that this book will be also interesting for scientists working in the field of inorganic and coordination chemistry as well as materials science.

It is a great honor and pleasure for me to be the editor of this book. I would like to thank all the contributors for their excellent chapters. These outstanding scientists are known experts in this field. Thank you very much for your efforts and your time! This book is a result of worldwide cooperation of contributors from many countries. I would like also to thank all my collaborators at Springer for help to realize this project.

I wish to dedicate this book to my wife Svetlana and our daughters Liza and Zhenya. Their support is really invaluable for me.

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