

## About the Authors

### Anthony J. O'Lenick Jr.

Anthony J. O'Lenick Jr. is President of Siltech LLC, a company he founded in 1989, specializing in organo-functional silicones and specialty chemicals. He is the inventor of more than 250 patents and has more than 30 years of experience in innovative personal care ingredients. He has held technical and executive positions at Alkaril Chemicals, Henkel Corp. and Mona Industries.

Tony has four published books: *Patent Peace of Mind* (Allured Publishing Corp., 2008); *Surfactants—Strategic Personal Care Ingredients* (Allured Publishing Corp., 2005); *Silicones for Personal Care* (Allured Publishing Corp., 2003) and *Primary Ingredients* (Zenitech, 1998). He has written more than 40 technical articles in scientific and industry journals, including *Cosmetics & Toiletries magazine* and *HAPPI*. Additionally, he has authored two book chapters and co-edited *Chemistry of Colored Cosmetics* (Marcel Dekker). His next books, being published by Allured Publishing Corp., include *Oils of Nature* and *Silicones for Personal Care, 2<sup>nd</sup> Edition*. Tony also writes the *Comparatively Speaking* column for *Cosmetics & Toiletries magazine*.

Tony is the recipient of numerous awards for his research on silicone-based surfactants, including awards from the Soap and Detergents Association and the American Oil Chemists' Society. His work in developing a three-dimensional HLB system (oil-water-silicone) and its use in formulating emulsions was recognized by the Advanced Technology Group. In 2006, Tony was elected as a Fellow of the Society of Cosmetic Chemists (SCC), having served the Society as a member of its Committees on Scientific Affairs and Education. He teaches a course for the SCC on silicones and on patents. Additionally, Tony has been an invited speaker at a symposia organized by the Cosmetics Toiletry and Fragrance Association (CTFA), Allured Publishing and HBA. Tony and his wife reside outside of Atlanta. They have three sons (Kevin, Thomas and Andrew), two daughters-in-law (Nicole and Courtney) and two grandsons (Ty and Jackson).

### Thomas G. O'Lenick

Thomas G. O'Lenick earned his BS degree in chemistry from Georgia Southern University and is now a doctoral candidate at the University of Tennessee in Knoxville, pursuing a PhD in polymer and organic chemistry. Thomas has six patents and four publications. Thomas is Tony's middle son. He resides in Knoxville, Tennessee with his wife Courtney and his infant son, Ty.

## **Acknowledgement**

The authors are grateful to the many mentors who have provided insight into the subject matter. These include both academic professors and industrial mentors who have unselfishly provided their knowledge, insights, thoughts and encouragement. It is on foundations provided by others that science is built.

## **Dedication**

This book is dedicated to our family, for they provide the inspiration and encouragement to complete the work. The generations working together toward a common goal provides a truly enjoyable undertaking. During the writing of this book Thomas and his wife Courtney had a son, Ty Anthony, and Kevin and his wife Nicole had a son, Jackson. A new generation has entered our world and hopefully in the fullness of time, there will be a new generation in our industry.

## Introduction

The cosmetic chemist speaks many “languages” in today’s global world. These include not only traditional languages, but also strange tongues that exist as a result of the specialized terminology used in many specific disciplines. These include the regulatory language, the marketing language, the patent language and the business language. Often, cosmetic products need to be modified to meet local acceptance or must be completed in ever-shorter periods of time due to increased demands of the consumer. This coupled with an ever decreasing research and development budget adds to the workload and stress levels encountered by the cosmetic chemist.

In addition to the many languages encountered in our business world, there is one common language we as cosmetic chemists must understand in order to be effective in our activities. That language is chemistry. Like all languages, the chemical language can become rather rusty if not practiced. Our industry is very diverse in terms of academic training. Cosmetic chemists come from a wide variety of backgrounds. Some of us were trained as chemists, others as pharmacists, biologists, biochemists, botanists and still others have wider backgrounds. Additionally, a growing number of us have not attended a university in many years.

The objective of this book is to provide a refresher course in the fundamental chemistry required to make the components used in formulating cosmetic products. The approach is to first present the theory as you might have learned it in school, followed by practical examples using that technology. The link between theory and usage will ground the concepts in practice, as well as make them easier to remember. This understanding will also provide a basis for the chemist to make associations between chemical technologies to allow for new combinations to make improved processes. The development of new products continues to be a collaboration between the raw material chemist and the formulation chemist. Only by this cooperation will the science advance.

This book is a companion to the book *Surfactants: Strategic Personal Care Ingredients* published by Allured Publishing Corp. While the two books cover different aspects of the field, there are some common chapters—namely raw materials and analytical. These are needed to make both books stand independently. This book is intended to cover the synthesis and organic chemistry of surfactants, while the other book is much more oriented to application.

## Sample Problems

Many chapters include a sample problem. In each case the reader will be given a number of grams of reactant added to the reaction. Several questions will follow to calculate other materials used or produced. The mole ratio is assumed to be 1:1 and no solvent is added unless otherwise stated. Throughout the book there will be variations in formatting of problems to accommodate the chemistry required, though typically the format will be as follows: