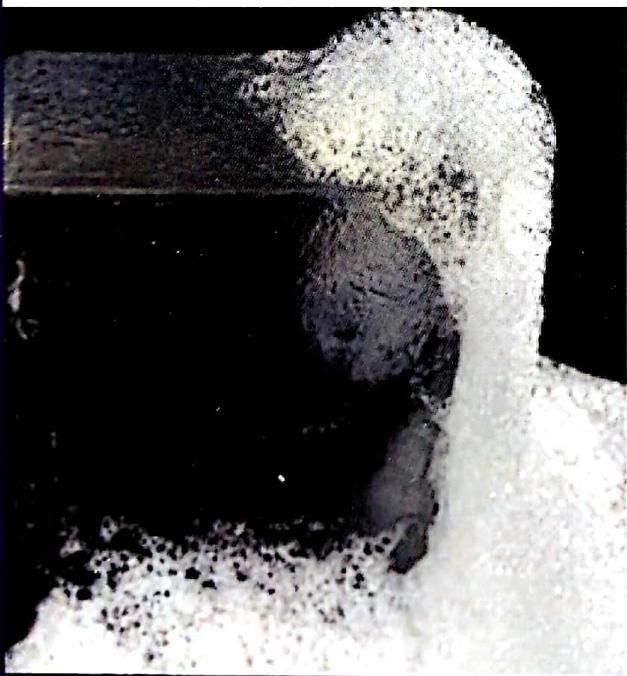
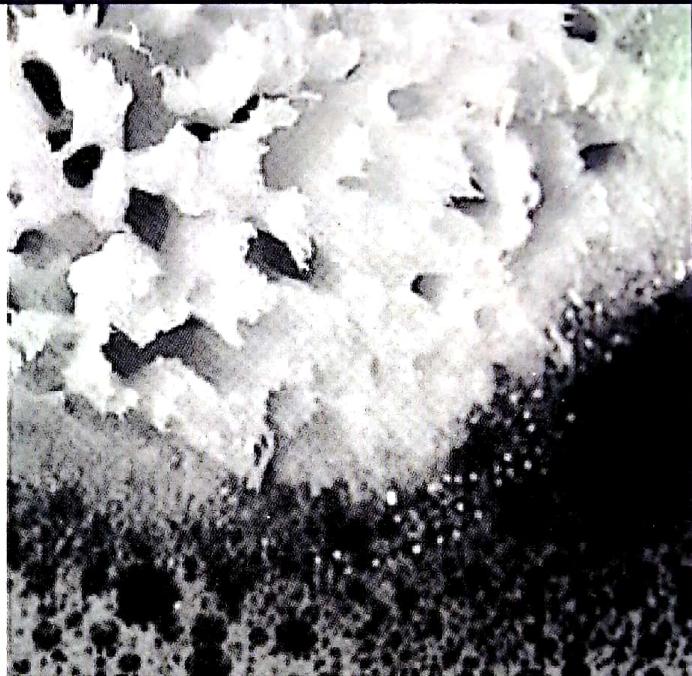


# Surfactants:

## Strategic Personal Care Ingredients



**Anthony J. O'Lenick, Jr.**

Best Regards  
Tony O'F

# Surfactants: Strategic Personal Care Ingredients

Anthony J. O'Lenick, Jr.

TONY O'F

**Surfactants: Strategic Personal Care Ingredients**  
by Anthony J. O'Lenick, Jr.

**ISBN 978-1-932633-96-2**

**Copyright 2014, by Anthony J. O'Lenick, Jr.**

This book is out of print. The copyright has reverted back to the author.  
It is being made available free of charge in electronic version. Please feel  
free to use it, download it or cite it in other publications.



**Allured Publishing Corporation**  
362 South Schmale Road, Carol Stream, IL 60188-2787 USA  
Tel: 630/653-2155 Fax: 630/653-2192  
e-mail: CustomerService@allured.com

# Table of Contents

Preface .....	vii
About the Author .....	viii
Acknowledgments .....	ix
<b>Chapter 1: Raw Materials for Surfactant Preparation</b>	
Background .....	1
Triglycerides .....	4
Methyl Esters .....	20
Fatty Acids .....	20
Natural Acids .....	20
Guerbet Acids .....	22
Synthetic Linear Acid .....	22
Synthetic Branched Acids .....	23
Ozone Acids .....	23
Fatty Alcohols .....	24
Oxo Alcohols .....	24
Ziegler Alcohols .....	24
Natural Alcohols .....	25
Guerbet Alcohols .....	26
<b>Chapter 2: Amphoteric Surfactants</b>	
Propionates .....	29
Alkyldimethyl Betaines .....	32
Alkylamido Betaines .....	33
Sulfobetaines .....	36
Imidazoline Amphoteric .....	37
Analysis of Amphoteric Surfactants .....	39
Instrumental Analysis .....	39
Wet Analysis .....	39
<b>Chapter 3: Anionic Surfactants</b>	
Fatty Alcohol Sulfates .....	43
Alpha Olefin Sulfonates .....	47
Sulfosuccinates .....	49
Sulfosuccinate Half Esters .....	49
Sulfosuccinate Diesters .....	49

---

Phosphate Esters .....	51
Carboxylates .....	58
Sarcosinates .....	59
Analysis of Anionic Surfactants .....	59
Instrumental Analysis .....	59
Wet Analysis .....	59

### **Chapter 4: Cationic Surfactants**

Alkyl Quats .....	91
Germicidal Quats .....	92
Conditioning Quats .....	92
Alkylamido Quats .....	93
Imidazoline Quats .....	96
Polymeric Quats .....	99
Analysis of Cationic Surfactants .....	100
Instrumental Analysis .....	100
Wet Analysis .....	100

### **Chapter 5: Nonionic Surfactants**

Alkanolamids .....	131
Ethoxylated Amids .....	138
Esters .....	141
Alkoxylated Alcohols .....	152
Alkoxylated Triglycerides .....	160
Alkylpolyglucosides .....	162
Amine Oxides .....	173
Sorbitan Esters and Ethoxylates .....	174
Analysis of Nonionic Surfactants .....	177
Instrumental Analysis .....	177
Wet Analysis .....	178

### **Chapter 6: Silicone Surfactants**

Dimethicone Copolyols .....	202
Alkyl Dimethicone Copolyols .....	207
Silicone Quaternium Compounds .....	208
Silicone Phosphate Esters .....	209
Silicone Esters .....	211

### **Chapter 7: Analytical Methods**

Colligative Tests .....	217
Alkali Value .....	219
Acid Value .....	219

---

Hydroxyl Value .....	220
Saponification Value .....	220
Summary .....	221
Other Wet Methods .....	221
Anionic Actives .....	221
Cationic Actives .....	221
Unsulfated Matter .....	222
Inorganic Salts .....	222
Bleaching Agents .....	222
Instrumental Methods .....	223
Fourier transform infrared analysis (FTIR) .....	223
Nuclear magnetic resonance (NMR) .....	224
Carbon NMR .....	225
Phosphorus NMR .....	225
Silicon NMR .....	226
Specific Tests .....	227
Gas Liquid Chromatographic (GLC) Hydrophobe Analysis .....	227
Gas Chromatographic Analysis .....	227

## Chapter 8: Patent References

Alkanolamids .....	229
Alkoxylates .....	230
Alkylpolyglucosides .....	231
Amphoteric .....	231
Guerbet Alcohols .....	232
Imidazolines .....	235
Peaked Ethoxylates .....	235
Phosphate Esters .....	235
Quaternaries .....	237
Sorbitol Esters and Ethoxylates .....	237
Sulfates .....	237
Sulfonates .....	237
Sulfosuccinates .....	237
Silicones .....	238

## Appendix I

“Three-Dimensional HLB,” reprinted from <i>Cosmetics &amp; Toiletries</i> , October 1996, Vol. 111, pages 37-44 .....	239
“Applying the Three-Dimensional HLB System,” reprinted from <i>Cosmetics &amp; Toiletries</i> , November 1997, Vol. 112, pages 59-64 .....	247

**Appendix II**  
Surfactant Interactions with Skin ..... 145

**Appendix III**  
Analytical Methods ..... 145

**Appendix IV**  
Instructions for Using a Pellet Press ..... 177

# The Author

Anthony J. O'Lenick, Jr. is currently President of Siltech LLC in Dacula, Georgia. Siltech is a silicone and surfactant specialty company. Prior to that he held technical and executive positions at Lambent Technologies Inc., Alkaril Chemicals Inc., Henkel Corporation and Mona Industries. He has been involved in the personal care market for over 25 years.

Tony has published more than 40 technical articles in trade journals, contributed chapters to three books, and is the inventor on more than 190 patents. He received a number of awards for work in silicone chemistry including the 1996 Samuel Rosen Award given by the American Oil Chemists' Society, the 1997 Innovative Use of Fatty Acids Award given by the Soap and Detergents Association, and the Partnership to The Personal Care Award given by the Advanced Technology Group. Tony was a member of the Committee on Scientific Affairs of the Society of Cosmetic Chemists.