

CONTENTS

	Page
1. Introduction	1
I.	
ORGANIC CHEMISTRY OF CATIONIC SURFACTANTS	
2. Straight-Chain Alkylammonium Compounds	9
I Introduction	10
II Nomenclature of Alkylamines	11
III Preparation of Primary Amines	20
IV Preparation of Secondary Amines	22
V Preparation of Tertiary Amines	23
VI Synthesis of Bridged Amines	25
VII Preparation of Quaternary Ammonium Compounds	28
VIII Preparation of Amphoteric Surfactants	31
IX Physical Properties of Fatty Amines, Amine Salts, and Quaternary Ammonium Compounds	32
X Reactions of Fatty Amines and Quaternary Ammonium Compounds	43
XI Applications of Amines, Amine Salts, and Quaternary Ammonium Compounds	48
XII Conclusion	64
References	65
3. Cyclical Alkylammonium Compounds	71
I Introduction	72
II Unsaturated Heterocyclic Compounds	75
III Saturated Rings	116
4. Petroleum Derived Cationics	147
I Introductions	148
II Synthesis of Amines and Derivatives from Olefins	149
III Synthesis of Amines and Derivatives from Paraffins	155
IV Synthesis of Amines and Derivatives from Aromatic Hydrocarbons	157
V Analysis of Petroleum-Derived Cationic Surfactants	159
VI Physical Properties, Toxicity, and Applications	163
References	173
5. Polymeric Cationic Surfactants	179
I Introduction	179
II Polycations	180
III Applications	186
IV Summary	187
Reference	188
6. Miscellaneous Non-Nitrogen-Containing Cationic Surfactants	191
I Introduction	191
II General Synthesis	192
III Sulfoxonium and Sulfonium Compounds	193
IV Phosphonium Compounds	197
V Iodonium Compounds	197
VI Summary	198
References	199

II.

PHYSICAL CHEMISTRY OF CATIONIC SURFACTANTS

7.	Micelle Formation of Cationic Surfactants in Aqueous Media	203
	I Introduction	203
	II The Energetics of Micellization	207
	III Size and Shape	224
	IV Charge	272
	References	281
8.	Micelle Formation of Cationic Surfactants in Nonaqueous Media	289
	I Introduction	289
	II Micelle Formation	290
	III Micelle Formation and Solubilization	304
	References	309
9.	Absorption of Cationic Surfactants by Cellulosic Substrates	311
	I Introduction	311
	II Experimental Results	312
	III Discussion	329
	References	339
10.	Adsorption of Cationic Surfactants on Mineral Substrates	341
	I Introduction	341
	II Nature of Mineral Substrates	343
	III Adsorption Isotherms	348
	IV Contact Angle	352
	V Electrokinetic Data	356
	References	366
11.	Adsorption of Cationic Surfactants on Miscellaneous Solid Substrates	369
	I Introduction	369
	II Carbon and Hydrocarbon	370
	III Polymers, Fibers, and Textiles	372
	IV Biological Substrates	377
	References	385
12.	Coacervation in Cationic Surfactant Solutions	387
	I Introduction	387
	II Description and Classification of Coacervation	388
	III Coacervates of Cationic Surfactants	392
	IV Conclusions	413
	References	415

III.

ANALYTICAL CHEMISTRY OF CATIONIC SURFACTANTS

13.	A Critical Review of Techniques for the Identification and Determination of Cationic Surfactants	419
	I Qualitative Analysis	420
	II Quantitative Analysis	422
	III Cations Other Than Quaternary and Nonquaternary Ammonium	481
	References	483

IV.

BIOLOGY OF CATIONIC SURFACTANTS

14.	Germicidal Properties of Cationic Surfactants	491
	I Introduction	492
	II History	493
	III Mode of Antimicrobial Action	493
	IV Test Methods	495

15. Toxicology of Cationic Surfactants	527
Author Index	617
Subject Index	641