Surfactants and Detergents: Chemistry and Applications

Syed Q. A. Rizvi
Syed Q. A. Rizvi, Ph.D.

Surfactants and Detergents: Chemistry and Applications

ASTM Stock Number: MNL80
Two common terms used to describe surface-active materials are amphiphiles and surfactants. The term amphiphile is derived from Greek-amphis meaning “both” and philia meaning “love or friendship.” An amphiphilic chemical is a chemical whose molecular structure has one or more hydrophilic groups and one or more hydrophobic groups. Another Greek-derived synonymic term used to describe amphiphilic chemicals is amphipathic (amphis meaning “both” and pátheia meaning “feeling”). Because all surfactants possess hydrophilic and hydrophobic groups, they are termed as amphiphilic or amphipathic compounds. The term surfactant, a contraction of surface-active agent, implies the material is active at surfaces. Surfactants have the tendency to adsorb at surfaces as well as interfaces. The difference between surfaces and interfaces is that surfaces involve a gas, usually air, as one of the phases, and the interfaces are boundaries between two immiscible phases. Five interfaces are possible from three common states of matter (solid, liquid, and gas).
Foreword

THIS PUBLICATION, Surfactants and Detergents: Chemistry and Applications, was sponsored by ASTM Committee on Publications. This publication is Manual 80 of ASTM’s manual series.
Contents

1 Surfactants: Fundamental Concepts 1
2 Anionic Surfactants 47
3 Cationic and Amphoteric Surfactants 91
4 Nonionic Surfactants 119
5 Specialty Surfactants 151
6 Biosurfactants 167
7 Surfactant Use in Detergents and Cleaning Products 191
8 Surfactant Use in Personal-Care and Cosmetics 239
9 Use of Emulsifiers in Foods 271
10 Surfactant Use in Ethical Drug Delivery 305
11 Agricultural Chemical Formulations and Delivery Systems 323
12 Surfactant Use in Textiles 333
13 Surfactant Use in Petroleum and Petroleum Products 349
14 Surfactant Use in Inks, Adhesives, Sealants, Paints, and Coatings 363
15 Surfactant-Enhanced Environmental Remediation 377
16 Miscellaneous Applications 397
17 Analytical and Testing Methods for Surfactants 427
18 Surfactants, Detergents, and the Environment 459
Index 481