## Effect of Non-ionic Surfactant on Wetting Property of Cationic Surfactant

Samiran Mahapatra

Unilever R&D Bangalore, 64 Main Road, Whitefield, Bangalore 560066, India



**Abstract:** Binary mixtures of surfactants exhibit fascinating behavior based on the intermolecular interactions between different surfactant classes. This study explores explicitly how adding non-ionic surfactants (alkyl polyglucoside (APG215), and fatty alcohol ethoxylate (EO7)) affects the wetting properties of a cationic surfactant benzalkonium chloride (BKC) on steel plates using the dynamic contact angle method. We observed a significant decrease in contact angle and enhanced wetting upon incorporating non-ionic surfactants into the BKC system. Interestingly, APG215 addition proved to be more effective than EO7 in promoting wetting properties of BKC. To understand the difference in synergestic behaviour, proton NMR spectroscopy analysis was carried out on individual and mixed surfactant systems. The NMR analysis revealed that the comparable size of BKC and APG215 molecules facilitates efficient mixed micelle formation, which enhances its effectiveness. Conversely, the long and flexible head group of EO7 affects the packing of monmers thereby hindering optimal mixed micelle formation, resulting in a less pronounced wetting effect. This is a collaborative work between Unilever R&D and IIT Kanpur (Prof Yogesh M Joshi).

**About Dr. Samiran Mahapatra**: Samiran is R&D Director of Science & Technology for Home Care Hygiene at Unilever R&D Bangalore, has over 27 years of experience in research, development, and innovation management. Since joining Unilever R&D in 1997, he has led the global Science & Technology division for Home Hygiene, developing disruptive technologies that have successfully transitioned from lab to market. He has also established an extensive open innovation network and external ecosystem, fostering over 300 academic collaborations worldwide for Unilever.

Samiran holds a Ph.D. in Chemistry from IIT Kanpur and completed a four-year postdoctoral fellowship at the University of Minnesota, USA. He is the co-inventor of 85 patents and has 40 publications with over 3,500 citations and an H-index of 26. Additionally, he is a member of various industry-academia bodies, including the Expert Committee of IRRD, Department of Science and Technology, Government of India, and the Advisory Committee of the Institute of Nano Science & Technology (INST) in Mohali.