Interfacial properties and anti-electrostatic ability of new sorbyloyl-type quaternary ammonium single and gemini polymerizable surfactants

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Polymerizable surfactants, also known as surfmers, are interesting compounds due to their ability to lower the surface tension and polymerization activity. They can be easily synthesized according to general recipes and polymerized in many ways resulting various structures.

In presented work sorbic acid derivatives were characterized. One single chained quaternary ammonium bromide bearing sorbyloyl group, sorbyloylundecyltrimethyl ammonium bromide, and three analogical gemini surfactants with propylene, butylene and hexylene spacers were obtained [1]. Chemical data, interfacial activity (CMC values: 3 - 15 mM) and micellar properties were investigated for both monomeric and gemini compounds.

Cationic surfactants include a positively charged nitrogen atom, which is able to conduct charges and thus quaternary salts are known for their anti-electrostatic properties. It is very important, especially in low hygroscopic atmosphere with high dust level, to easily conduct any charge from the surface of protective garments, i.e. glasses, clothing and other equipment. Synthesized compounds revealed very good and excellent capacities to neutralise appearing charges on polyethylene and polypropylene surfaces. The values of surface resistance \(R_s\) (0.01-9x10\(^{10}\) \(\Omega\)), charge half-decay times \(\tau_{1/2}\) [0.25-6.10 s] and induced potentials \(U_{\text{ind}}\) [145-850 V] of polymers impregnated with surfmers were presented. However, these were only results appearing until the first wash. Given the presence of polymerizable sorbyloyl group at the hydrophobic terminal, the UV-irradiated polymerisation processes [2] were performed. In next step the anti-electrostatic properties of polymerized films were determined and the stability on washing of anti-electrostatic layer was investigated.

![Fig. 1. Induced potential [V] as a function of time [s] on PP and PE polymeric foils respectively. Figures present data for sorbyloylundecyltrimethyl ammonium bromide: a) unpolymerized layer, b) polymerized layer, c) polymerized layer washed three times with water, d) unpolymerized layer washed once and for e) clean foil.](image)