Wetting properties and kinetics of spreading of surfactant solutions

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Surfactants are broadly used to enhance the wetting properties of aqueous formulations. The mixtures often improve the wetting performance as compared to individual surfactants due to synergetic effect. The mixtures of cationic and anionic surfactants demonstrate an example of such synergism, enabling transition from partial to complete wetting on highly hydrophobic substrate, polyethylene [1-3].

If formulation provides the complete wetting then spreading kinetics becomes of importance. A fast spreading with formation of thin coating film (high spread area) is usually preferable. Kinetics of spreading of several surfactant formulations (solutions of superspreader BREAK-THRU S-278, triethylene glycol monodecyl ether and mixture of dodecyltrimethylammonium bromide and sodium octanesulfonate) on two substrates, polyethylene and polyvinylidene fluoride films are compared and the possible mechanisms responsible for the fast spreading are discussed with a special emphasis on the effect of Marangoni flow [4].

To reach the complete wetting surfactant concentration is to be higher than the critical wetting concentration. But the spreading performance of surfactant solution is non-linear as related to the surfactant concentration. There is a maximum in spread area at certain concentration in particular when experiments are performed at room humidity. At very high concentration the reverse transition from the complete to the partial wetting was observed. Under humidity close to 100 % spreading lasts longer and the spreading area is much higher than under the room humidity.

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