Wetting Properties of Cosmetic Polymeric Solutions on Hair Tresses

Anna Trybala[1], Nina Kovalchuk[1,2], Omid Arjmandi-Tash[1], Victor Starov[1]

[1] Department Of Chemical Engineering, Loughborough University, Loughborough, UK
[2] Institute of Biocolloid Chemistry, Kiev, Ukraine

A.Trybala@lboro.ac.uk

Hair care products are expected to wet hair well, even when the hair is hydrophobic (undamaged or covered with greasy deposits). Thus wetting properties of various cosmetic formulations on hair are very important, as they influence consumer satisfaction with the product. Wettability of a single hair fibre is an important characteristic; however, it may not be representative of a hair array on head, as it does not take into account complex packing of multiple hair strands. Also, wetting behaviour of polymer solutions on hair is less studied than the properties of surfactants. The objective of the present work is to investigate wetting of hair tresses with the solutions of two polyacrylate polymers broadly used in cosmetic products.

Rheology and wetting properties of the neutralized Aculyn22™ (A22) and Aculyn33™ (A33) polymer solutions on dry hair tresses are studied. Spreading kinetics of the solution droplets is analysed, including penetration, spreading and evaporation, as well as the influence of several additives common in cosmetic formulations [1].

The solutions of both polymers spread on hair tresses. However, they show markedly different behavior presented in Fig. 1.

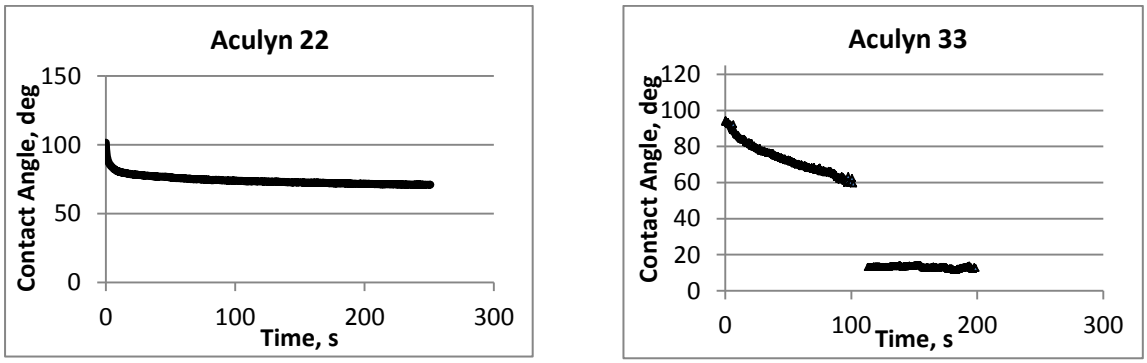

Figure 1 Contact angle of Aculyn 22 and Aculyn 33 solutions on a hair tress.

For the A22 solutions, the droplet remains on the surface of the hair for almost half an hour, and only slow (if any) imbibition is observed. For the A33 solutions, the complete penetration/imbibition happens fast, after the contact angle reaches a critical value (around 60°). This can be attributed to the so−called Cassie−Wenzel wetting transition, when the liquid starts to penetrate inside the hair array. The conditions for this transition are more favourable for the A33 solutions in comparison to the A22.

[1] A. Trybala, A. Bureiko, N. Kovalchuk, O. Arjmandi-Tash1, Z. Liu, V. Starov, Wetting properties of cosmetic polymeric solutions on hair tresses. Colloids and Interface Science Communications, COLCOM_2015_69, submitted December 2015