

# Car-washing formulations based on biosurfactants – synthesis and characterization

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The concept of sustainable development of personal care products, household detergents, as well as industrial and institutional cleaners is gaining increasing interest among consumers and industry representatives not only because of current trends but also because of the recommended implementation of the European Green Deal. The design of sustainable formulations encompasses all stages of their production and use, from the way raw materials are sourced and processed, through technological processes during production, to the selection of packaging, distribution, and disposal [1,2]. On the other hand, the constant growth in the automobile sector leads to an increase in the number of car washing centers, raising concerns about their impact on the environment, as the cleaning agents (detergents) used to wash cars can have harmful effects on the environment, especially on aquatic organisms [3]. A possible solution to this problem seems to be replacing synthetic surfactants in the car-washing formulations with biosurfactants, which not only possess good surface tension-reducing properties, but also have high biodegradability and reduced toxicity as they are produced by microorganisms, plants, and animals, or obtained by enzymatic synthesis [4].

Therefore, the purpose of our research was the development of biodegradable car-washing shampoos based on biosurfactants. The obtained formulations should be characterized by appropriate physicochemical parameters, good washing properties, and the ability to produce stable foam. In the framework of the presented research, the basic physicochemical parameters, i.e. pH, viscosity, and density of the shampoos obtained were evaluated. The contact angle was also measured using the droplet image analysis method. Moreover, the stability of the foam was assessed by applying the manual shaking technique, as well as the Static Multiple Light Scattering (SMLS) measurement with the Turbiscan<sup>LAB</sup> analyzer. Our research showed that we have developed two formulations with physicochemical parameters typical for products of this type, but with components that exhibit very high biodegradability according to the OECD 301B test procedure and low toxicity to aquatic organisms. In addition, the formulations obtained showed high application potential as shampoos for car washing.

The financial support of the IDUB project 141/04/UAM/X001 is highly acknowledged.

## References:

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