Conference abstract POT04

Natural Surfactant of Alkyl Polyglucoside Type: A Physicochemical Characterization of New Mixed Emulsifier

M. LUKIC [1], I. JAKSIC [1], R. DANIELS [2], G. VULETA [1], S. SAVIC [1]

[1] Department of Pharmaceutical Technology and Cosmetology, University of Belgrade, Belgrade, Serbia
[2] Department of Pharmaceutical Technology, Eberhard-Karls Universität Tübingen, Tübingen, Germany

E-mail: mlukic@pharmacy.bg.rs (M. Lukic)

Sci Pharm. 2010; 78: 719 doi:10.3797/scipharm.cespt.8.POT04

In the light of the current trend for natural surfactants to be used as emulsifiers [1], a physicochemical characterization of a new mixed alkyl polyglucoside (APG) emulsifier (Arahidyl&Behenyl alcohol&Arahidyl glucoside) was performed. The characterization was carried out through the polarization microscopy (PLM), x-ray diffraction studies (WAXD and SAXD), thermal analysis (DSC and TGA) and rheological measurements. In order to investigate the emulsifier potential to build the lyotropic liquid crystalline phase, binary systems (with increasing percentage of emulsifier) and series of cream samples with fixed emulsifier/water ratio and increasing percentage of oil phase were prepared. Additionally, 5 cream samples with different oil phases (Candelilla oil, Avocado oil, Isopropyl myristate, Decyl oleate and Liquid Paraffin oil) were evaluated.

Anisotropic structures defined as distorted Maltese crosses were seen in PLM micrographs, as well as birefringence at the emulsion oil droplets border, indicating the liquid lamellar phase [2]. The DSC, WAXD and SAXD patterns additionally proved PLM findings, implying synergism of lamellar liquid and lamellar gel phases within the colloidal structure. Complex lamellar structures were preserved upon addition of various oils, with the exception of liquid paraffin which reduced the specific birefringence (observed in PLM micrographs and DSC thermograms). Percentage of water evaporation (TG results) indicated that more than one third of the water within the system is entrapped - interlamellarly fixed (‘‘depot’’ water). In steady state rheological measurements all samples showed “shear-thinning” behavior with thixotropy. Oscillatory measurements pointed at more pronounced elastic over viscous component (typical for lamellar phase). Overall, investigated APG emulsifier demonstrated good potential in lamellar liquid and gel phases formation, a property desirable for mixed emulsifier useful in stabilization of vehicles anticipated for dermopharmaceutics and dermocosmetics incorporation.

[1] Savic S, Savic M, Vesic S, Vuleta G, Muller-Goymann CC. Vehicles based on a sugar surfactant: Colloidal structure and its impact on in vitro/in vivo hydrocortisone permeation, Int J Pharm. 2006; 320: 86–95. doi:10.1016/j.ijpharm.2006.04.019

[2] Fairhust CE, Fuller S,Graz J, Holmes MC. Lyotropic surfactant liquid crystals. In: Demus D, Goodby J, Gray GW, Spiess HW, Vill V (Eds.), Handbook of liquid crystals, 1998. vol 3. Wiley-VCH, Weinheim, pp. 341–392.