Assessment of nontoxic white pigment alternatives for titanium dioxide in airbrush make-up

Krause Janina

Biomedical Sciences, Institute of Health Research and Education, University of Osnabrück, Germany

Abstract: Titanium dioxide is classified as “suspected of causing cancer when inhaled” 1 by the European Chemical Agency’s Committee for Risk Assessment. 2 Accordingly, TiO2 has been banned from food and needs to be explicitly labelled on applications such as paint and varnish. 3,4 Nevertheless, cosmetics, in which TiO2 is broadly used as a white pigment 5, are excluded from these rules as in general cosmetics are applied as suspension on the skin and dermal absorption has not been observed. When facial make-up can be applied as an aerosol spray by an airbrush system, there is a risk that TiO2 particles are inhaled. 6 To avoid a health risk for the users posed by TiO2 our group searched for an alternative white pigment for use with the airbrush cosmetic system by uslu cosmetics GmbH.

Make-up formulations for five different colors of varying darkness were exemplary chosen. TiO2 was replaced by magnesium stearate, zinc oxide or kaolin, respectively. The only feasible alternative, which resembled TiO2-containing formulations in color, viscosity and opacity, was kaolin. However, only in dark colors, in which a relatively low content of white pigment is required and TiO2 could be replaced in a 1:1 ratio by kaolin to achieve a similar color, the viscosity remained unaffected. In light colors TiO2 needed to be replaced at a higher ratio by kaolin, which resulted in more viscous, no longer sprayable formulations. To reduce viscosity the water phase was increased while the amount of thickening agents was reduced. Nevertheless, brightness, opacity, and drying speed on the skin were negatively affected.

In conclusion, none of the analyzed white pigment alternatives resulted in similar qualities of TiO2 in terms of color, opacity and viscosity. These results indicate that further alterations of formulations for air brush systems are required for replacing TiO2.

Biography

Janina Krause studied biochemistry at the ruhr university in Bochum, Germany, where she focused on genetic engineering for secondary metabolite production in streptomycesfor her master thesis, after words she went to the university of Tubingen, Germany for her phd. Her doctoral thesis was about the isolation of new actinomycetical antibiotic producer strains and their genetic manipulation for the activation of silent gene clusters, now she works as a lecture for biochemistry and chemistry in the BA course cosmetology at the university of Osnabruck, Germany where she amongst others conducts research projects about optimization of air bruch make up formulations.

Janina.krause@uos.de