DEVELOPMENT, CHARACTERIZATION AND COMPARATIVE STUDY OF SILICONE-BASED FORMULATIONS CONTAINING BOTH POTASSIUM MICA AND TITANIUM DIOXIDE

DELFIM SANTOS[1], MARIA HELENA AMARAL[1]*, MARIA GONÇALVES[1], JOSÉ LOBO[1], FERNANDO ALMEIDA[2], CELSO GOMES[2]

[1]*Faculty of Pharmacy University of Porto, Porto, 4050-047, Portugal*
[2]*University of Aveiro, Aveiro, 3810-193, Portugal*
hamaral@ff.up.pt

Micas are an important group of phyllosilicate minerals. Micas are extensively used in skin care and preventive medicine products as ultraviolet inorganic filters to provide skin protection, shine and softness. On the other hand, silicones are harmless, emollient, non occlusive and water repellent excipients. The aim of this study was the development and characterization of silicone emulsions and gels containing mica comparatively to the same silicone-based formulations containing titanium dioxide (TiO_2). Water/silicone emulsions and silicone gels containing mica (5%, w/w) of different particle sizes (SVP <125 m and SVR> 125 m) or the same percentage of TiO_2 were prepared by conventional techniques and submitted to texture, rheological and accelerated physical stability studies. The in vitro evaluation of the sun protection factor (SPF) was also performed by spreading 1mg/cm2 of each formulation in roughened polymethylmethacrylate (PMMA) plates. Then, UV-spectra from 290nm to 400nm were obtained using a spectrophotometer. Accelerated stability studies showed that silicone gels containing mica remained stable after 3 cycles (30 min) of centrifugation at 3000 rpm. For the other formulations tested, sedimentation of mica has occurred. All the emulsion and gel formulations presented reofluidificant behaviour, however, emulsions with mica or TiO_2 showed lower viscosity than gels. Besides, silicone formulations containing mica showed significantly higher values of firmness and adhesiveness comparatively to formulations with titanium dioxide. The SPF values of formulations containing mica were significantly lower than those obtained with TiO_2 formulations. Although silicone-based formulations containing potassium mica have shown good physical and mechanical characteristics for application on the skin, the SPF values (spectroscopic reflecting component) were lower than those obtained with TiO_2 bearing formulations, which means that a higher percentage of mica should be incorporated in the corresponding formulations.

Keywords: potassium mica, titanium dioxide, silicones