

Usage of nanoemulsion in preparation of chemical sunscreen

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Background and Aims: Electromagnetic waves which radiate from sun contain broadspectrum of waves. One of them is an Ultra violet (UV) waves. This zone has divided into three sections of UVA, UVB, and UVC. UVB includes the wave length range of 290-320 nm that causes of sun burning and erythromatosis. UVA includes the wave length range of 320-400 nm and causes direct and rapid sun burning and aging of skin. So usage of sunscreen that has a good effect, absorption and uniformity is important. For achieving to these purposes, nano oil-in-water emulsions are chosen as a new system to improve the efficiency of chemical sunscreens.

Methods: In this research, we use some of chemical active ingredient sunscreen such as Benzophenone-3, Octocrylene, Buthyl methoxy dibenzoyl methane, ethyl hexyl cinnamate. Active ingredients was dissolved in the lipid phase and then hot lipid phase was dispersed in water containing 1 % Tween 80 as a surfactant at 75°C and a premix was formed by homogenizing in a high-speed stirrer for 1 min at 2000 rpm. Nano-emulsions were then prepared by a hot high pressure homogenization technique. Five cycles were carried out (500 bar at 75°C). Particle size and zeta potential of the nano-emulsions were determined by Photon Correlation Spectroscopy (PCS) and checked by Transmission Electron Microscopy (TEM). Stability of the nano-emulsions was checked in 4, 25 and 40°C. This product was studied for sun protection factor (SPF) by SPF290 device.

Results: PCS and TEM studies showed that the particle size of nano-emulsion was 170 nm and the Zeta potential of oil nano particles was -34mv. Also the SPF of this nano sunscreen formulation is near 20.

Conclusions: The size of the particles depends on the production temperature, pressure and the number of homogenization cycles.

Keywords: Sunscreen; Nanoemulsion; High pressure homogenizer