NanoSolve: An Advanced Carrier System for Cosmetic Application

Authors: Dr R. Wajda, Dr J. Zirkel, Dr K. Sauter, Lipoid GmbH, Ludwigshafen, Germany

Keywords: NanoSolve, nano-emulsion, penetration enhancer, phospholipids, delivery system

Abstract

In the last decades many different carrier systems for cosmetic applications have been developed. This study presents a carrier system named NanoSolve which is based on natural ingredients only. The NanoSolve principle allows for the production of transparent emulsions with particle sizes of approximately 100 nm for a variety of lipids and/or lipophilic actives. This particle size distribution is significantly smaller in comparison to a traditional nanoemulsion. NanoSolve showed a good skin compatibility and a stabilising effect on the permeability barrier in a repetitive washing test. It is further to be seen as a delivery system for actives showing a skin penetration enhancement in a BUS study. The NanoSolve formulations bearing even sensitive actives can be easily incorporated into existing creams and lotions and might also be used to design new innovative concepts for cosmetic formulations, e.g. mouthwash gels, bath oils, face masks and sunscreen sprays.

Introduction

Twenty years ago, Dior introduced the liposomes in the anti-aging gel Capture™ as a novel carrier system for cosmetic use. In the following years numerous products followed. Liposomes have been found to improve the activities of some products in various types of cosmetic functions, for instance regeneration[1]. Liposomes are spherical, self closed structures composed of curved phospholipid bilayers which entrap an aqueous core. Hydrophilic actives can be entrapped in the aqueous environment of the interior, lipophilic actives are partly dissolved in the membrane. Thus, liposomes have a limited loading capacity of lipophilic actives by using an excess of phospholipids.

Herein, we present the compound NanoSolve, which is a promising carrier system for lipophilic actives. It meets all requirements for cosmetic application: it is easy to prepare, has an increased solubility for lipophilic actives by low contents of emulsifiers, leads to an increased penetration into the skin by good skin compatibility, guarantees a long shelf life and avoids synthetic ingredients and preservatives. Additionally, it can easily be incorporated into existing cosmetic products and enables the development of new innovative formulations.

The Principle

In some previous papers the NanoSolve principle was introduced as a new way to solubilise lipids or lipophilic actives[2-5]. The NanoSolve principle is solubilisation by means of a matrix of water/phospholipids/polyols or carbohydrates (glycerol, sorbitol, fructose…) produced via high pressure homogenisation6). Figure 1 shows the rationale of NanoSolve.

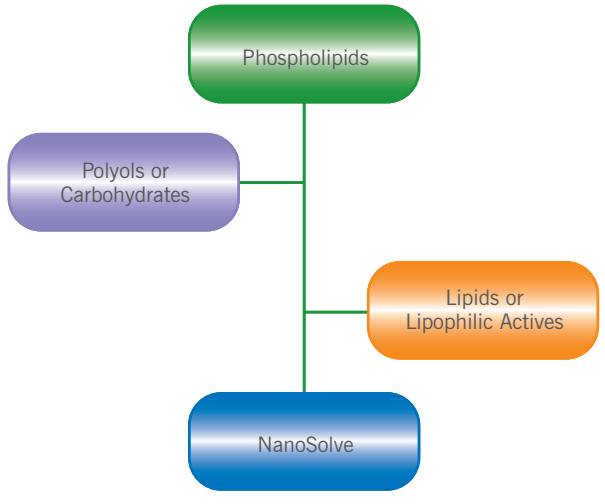

Figure 1: The NanoSolve principle

The phospholipids are dispersed in the polyol phase at appropriate temperatures. The lipid/lipophilic active is added and processed into a clear emulsion by means of high pressure homogenisation[6]. These transparent emulsions have particle sizes of about 100 nm and a lipid/lipophilic active content up to 40 %. NanoSolve is mixable with water in any ratio. Some