

ademtech STUDY OF THE RELEASE OF ON ENCAPSULATED ACTIVE IN DOUBLE EMULSION (DONE IN COLLABORATION WITH ADEMTECH)

INTRODUCTION

Double emulsions are colloidal systems of great interest for the cosmetics industry as they enable to encapsulate both hydrophilic and lipophilic molecules. However, their formulation is very delicate and requires an important know-how. Their characterization is also quite limited with classical techniques that, for most of them require dilution (particle size), or are not quantitative (microscopy).

In this application note, the release of an encapsulated active in the internal emulsion is studied using the Turbiscan technology. To release the active, the double emulsion has to be destabilized into a simple emulsion where the active will result in the external phase. This principle is usually used for topical emulsions where some constituents on the surface of the skin will trigger the destabilization of the double emulsions and so activate the release of the active. By measuring the emulsion breakdown of the formulation using the Turbiscan™, the release of the active is evaluated

PRINCIPLE

Measurement with Turbiscan®

Turbiscan™ instrument, based on Static Multiple Light Scattering, consists in sending a light source (880 nm) on a sample and acquiring backscattered and transmitted signal. Combining both detectors (BS & T) enables to reach wider concentration range. The backward reflected light comes from multiple scattering as the photons scatter several times on different particles (or drop).

This signal intensity is directly linked to the diameter (d), according to the Mie theory:

$$d = f(BS, \varphi, n_p, n_f)$$

[More information](#)

METHOD

The coalescence of the internal droplets of a double emulsion on the wall of the globules leads to the release of the

encapsulated active ingredient. This coalescence is triggered by the addition of a surfactant of high HLB in the external phase. The emulsion that was initially double is transformed into a simple emulsion. This instability is critical, both for the emulsion storage and for the release of the active ingredient during application (Figure 1).

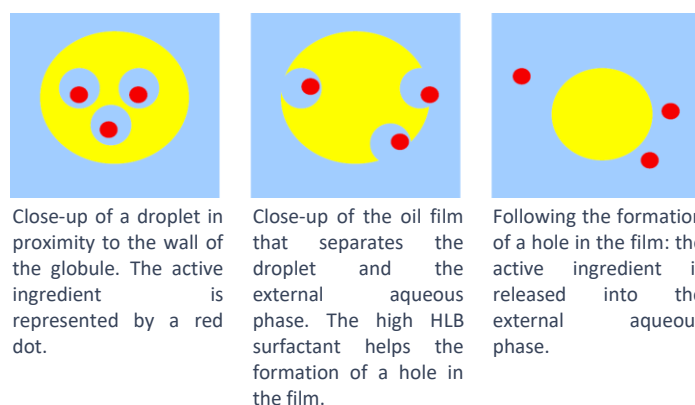


Figure 1: Coalescence of the internal droplets

In this application, a double emulsion of water/hexadecane/water is formulated with encapsulated salt in the internal phase.

First the stability of the double emulsions is studied to validate the stability of the double emulsion during storage. Then the effect of an excess of surfactant (SDS) is evaluated on the double emulsions stability. The aim is to simulate the action of the skin playing a role of hydrophilic surfactant and so trigger the destabilization. The double emulsion is analyzed with the Turbiscan at 33°C (skin temperature) during 30 minutes. The SDS is added at the concentration of:

- 0.5 CMC
- 1.5 CMC
- 3.0 CMC

RESULTS

By scanning the formulation according to the method, the graphs in Figure 2 are obtained