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SPRAY DRYING OF NANOCAPSULES CONTAINING SUNSCREEN: PRELIMINARY STUDY

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Introduction: The use of sunscreen is essential to avoid skin damage due to ultraviolet radiations. The nanotechnology has become important in the cosmetic field, especially concerning the sunscreens. The reduction of the substance penetration into the skin layers is the great benefit of the nanoencapsulation, what leads to increase on the effectiveness of the applied sunscreens.[1,2] Besides that, the control of the sunscreen release is also possible, reducing the time for a new application.[3]
Objective: This work aimed to preliminary optimize a nanocapsule aqueous suspension (NCS) containing octyl methoxycinamate and dry the obtained formulation by *spray drying*.
Materials and Methods: The nanocapsule suspensions (NCS_s) were prepared according to interfacial deposition of preformed polymer method. Three formulations were prepared, by the addition of increasing concentrations of octyl methoxycinnamate (0.8 mL for NCS_1, 0.4 mL for NCS_2 and 1.2 mL for NCS_3), and evaluated by means of the determination of the particle size (laser diffraction). Then, the nanocapsule suspensions containing the highest oil content (NCS_3) were prepared in triplicate of batches and the formulations were called NCS_{3A}, NCS_{3B}, NCS_{3C}. These were characterized in terms of pH (potentiometer), particle size (light scattering and laser diffraction) and zeta potential (eletrophoretic mobility). After, the formulation SNC_{3C} was submitted to *spray drying* (inlet temperature of 150°C, sample flow of 0.3 L / h). The powder obtained was evaluated by particle size (dry laser diffraction). The yield was calculated dividing the weighted mass, after drying, by the raw materials sum of masses before *spray drying*.
Results and Discussion: All formulations prepared were appropriated regarding particle size. Initially, the NCS_1, NCS_2 e NCS_3 presented average sizes between 214 nm and 385 nm, without micrometer particles. Because of the high sunscreen content in NCS_3, it was prepared in triplicate. Both size determination methods allowed to check nano-sized particles (between 300 e 361 nm by laser diffraction and between 236 and 282 by light scattering) with low polydispersion (PDI below 0.200). The pH values were 5,20 ± 0,090 for NCS_{3A}, 5,29 ± 0,046 for NCS_{3B} and 5,18 ±0,076 for NCS_{3C}. These pH values were appropriated for skin application. The nanoparticles presented a zeta potential of -3.04 ± 1.35 mV. The dry powder showed a good yield (48,35%) and average particle size of 35,572 µm (Table 1).
Conclusion: Considering the obtained results, the formulations will be dried in the *spray drying* in triplicate and analyzed in terms of their yield, moisture, assay and morphology. Thus, this study demonstrates the possibility of preparing *spray drying* nanocapsules containing sunscreen. The powder obtained can be used as a pharmaceutical ingredient, which may be later incorporated into semi-solid pharmaceutical forms and may be appropriate for people with skin prone acne.

Table 1: Particle Size distribution of the powder by dry laser diffraction:

Formulation	d(0,1)	d(0,5)	d(0,9)	d(4,3)	Span
Nanocapsules powder	3.795 µm	13. 967 µm	75.386 µm	35,572	5.126

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