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CHARACTERIZATION OF THYMOL-LOADED BIOPOLYMER AND CLAY MICROCAPSULES FOR ANTIMICROBIAL APPLICATION

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INTRODUCTION

The properties of essential oils, or volatile oils (VOs), have aroused great and growing interest in the cosmetics market and academia. Among these, the antimicrobial potential stands out. Thymol (TM), the major compound in the VO of thyme and oregano, has antimicrobial activity described in the literature, however, like the other constituents of VOs, the high volatility has a negative impact on use. Clays and natural polymers are inputs used in microencapsulation to protect and modify the release of an ingredient active. The present work aimed to develop a microencapsulated input of TM with clay (CL) and natural polymer (POL).

MATERIAL AND METHODS

Microparticles (MPs) containing TM were obtained by spray-drying. To optimize the microencapsulation process, a Box-Behnken factorial design was carried out. The independent parameters selected were temperature, inlet flow, and polymer concentration. The PMs were characterized as to their size, encapsulation efficiency, yield, thermal profile, and TM concentration.

RESULTS

Successful microencapsulation of TM was confirmed through the analysis of the thermal profile by differential exploratory calorimetry of the physical mixture of CL, POL, and TM, as well as the improvement in the thermal stability of the TM, which had the event referring to the boiling point in higher temperatures. The highest TM content reached was 1.36%, and the average content was 0.76%. The drying temperature had a significant influence on this parameter, higher temperatures resulted in higher TM contents. The drying process obtained an average yield of 57.04% and an average efficiency of 21.17%. The average size of the PM was 1.46 µm, not being significantly influenced by the tested variables. As for morphology, higher concentrations of POL provided spherical MPs, with less deformations on the surface, while lower concentrations showed the lamellar aspect of the CL.

CONCLUSIONS

The composition and process developed allowed to obtain MPs with physical and physicochemical properties suitable for application as a carrier input for thymol and with antimicrobial activity. The process and composition can act synergistically with thymol, increasing the antimicrobial potential of the material, from easy to obtain and natural resources of easy acquisition and reduced cost.

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