UNIVERSITI TEKNOLOGI MARA

FTIR ANALYSIS ON ENCAPSULATED CITRONELLA-JAVA ESSENTIAL OIL (ECJEO) FROM COMPLEX COACERVATION TECHNIQUE

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AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

Citronella oil can be an effective mosquito repellent, but due to its nature which having high volatility, oils rapidly evaporate causing loss of efficacy and shorten the repellent effect. Therefore, microencapsulation technology was implemented to ensure the encapsulated material being protected from immediate contact with the environment and offers controlled release. In this study, microencapsulation of citronella oil was done by employing complex coacervation using chitosan−gelatin (B) system and proanthocyanidins as the cross-linker. In the identification of operating pH and operating wall material ratio for citronella oil encapsulation process, it was found that pH 5 and wall ratio of 1:35 was the best operating condition based on zeta potential and turbidity analysis. Finding from FTIR analysis shows that gelatin-B had coated the citronella oil droplet during emulsification step, chitosan started to interact with gelatin-B to form a polyelectrolyte complex in adjust pH step, citronella oil capsules solidified at the cooling process and were hardened during cross-linking process. The final product of citronella oil capsules was identified at the top layer of the post-settling step (after 12 hours of natural separation through gravitational force). The surface morphology of citronella oil capsules obtained in this study was described as having a rough surface and almost spherical in shape. The encapsulation efficiency (EE) obtained from this work gives a percentage of 68.79% and having an average ECJEO particle size of 118.41±4.41 μm. It was found that ECJEO able to release its content within 14 days and the release is expected to have lasted for more than that. The ECJEO was able to release 6.89% of its content through 12 hours of the settling process. ECJEO prepared form this research was compatible to be applied in fabric softener formulation since the average ECJEO particle size of 118.41±4.41 μm was within the acceptable range of additive size for addition in fabric softener formulation. Besides the release ability of prepared ECJEO make it compatible to be added in fabric softener formulation as it can control the release of its content. Basic properties of ECJEO-FS obtained in this research were 0.9924 g/ml for density, 55.8 cps for viscosity, and 6.6 for pH. All of these three basic properties of ECJEO-FS obtained were also within the acceptable range for fabric softener composition and it shows that it is compatible to be applied in fabric softener formulation. In conclusion, the proposed method of complex coacervation using chitosan−gelatin (B) system was able to encapsulate CJEO successfully and has good compatibility to be applied in fabric softener formulation.

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May this research work will benefit to others.

Thank you.

FITRAH RABANI ABDUL AZIZ

TABLE OF CONTENTS