



Preparation of alginate - poly (vinyl alcohol) nanocapsules containing curcumin oil as the core

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Introduction

The word of Nanocapsules is called to those structures which have been formed from an external thin layer and an internal great space. This is known as core/shell structure. In present experimental test, the O/W Nanoemulsion /solvent evaporation method has been used for production of Nanomedicine containing the Turmeric oil.

AIM

The main purpose of this study is using of alginate - poly (vinyl alcohol) polymers as wall material in the encapsulation process of natural plant essences.

Materials & Methods

In first step, blend of polymers were used in wall and it was formed by dissolving a certain amount of polymer of Alginate and poly (vinyl alcohol) within water (concentration of 0:1, 0.25:0.75, 0.5:0.5, 0.75:0.25, 1:0 w/v). Later on, a certain amount of Turmeric oil (concentration of 0.75%, 05%, %25 w/v) were dissolved within ethanol and then it was added to the primary solution drop by drop. After that, a certain amount of Tween 80 as surfactant and also calcium chloride as crosslinking agent are added to final solvent. In next step, obtained solvent was subjected to sonication and after that it was evaporated by vacuum device.

Results & Discussion

In this research, we investigated effect of various factors such as layer of polymer concentration changes, variant concentration of Turmeric oil, variate time of sonication on the size of Nanocapsules. Scanning Electron Microscope (SEM), Zetasizer device with dynamic light scattering (DLS) technique were used to investigate of morphology and size of Nanocapsules. The results of (DLS) analyses have proven that the best combination percentage for structure of the polymer layer is Alginate with concentration of 0.25% and Poly (vinyl alcohol) with concentration of 0.75%. Therefore, the optimum amount of used polymer in the wall and different concentration of Turmeric oil as the core have been investigated. The results of DLS test have demonstrated that the optimum concentration of Turmeric oil is 0.75% (w/v) within ethanol. Furthermore, the optimum duration of sonication was just took long around 45 minutes. The ATCC100 standard test were used to prove antimicrobial effect of curcumin oil. The results shown that proposed Nanocapsules with optimum concentration of curcumin have an antibacterial property up to 99%. Therefore, they were just contained of a minimum positive gram (*S.aureus*) and negative gram (*E.coli*) bacteria.

Conclusion

As the results, the size of Nanocapsules has been obtained up to 50 nm, with the optimum amount of used polymer in the wall. Also, the size of produced Nanocapsule has been obtained up to 85 nm in the optimum concentration of Turmeric oil. In finally, 45 minutes sonication leads to produce a Nanocapsules with 50 nm.

Tables

Sample	Oil / AL-PVA mass ratios	Average size (nm)
1	0.25:1	218
2	0.5:1	113
3	0.75:1	85
4	1:1	50

Images

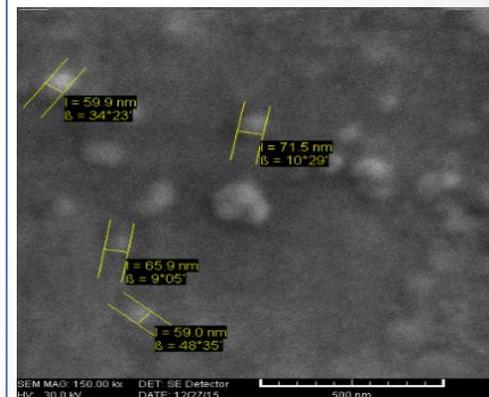


Fig. SEM image of prepared nanocapsules