Nanoemulsion of *Syzygium aromaticum* (L.) Merr. & L.M.Perry. oil extract in water prepared by emulsification process

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Abstract: *Syzygium aromaticum* (L.) Merr. & L.M.Perry. oil loaded nanocapsules were prepared from oil-in-water emulsions using chitosan (CS) as shell material. A sodium dodecyl sulfate (SDS) was used to stabilize the charge of nanocapsules by ionic interaction. The nanocapsules were prepared by ultrasonic emulsification with sonication time within 5 min and 37 kHz frequency. The effects of CS (50 to 150 ppm), SDS (5 x 10⁻³ to 20 x 10⁻³ M) and *Syzygium aromaticum* (L.) Merr. & L.M.Perry. oil (0.5 to 1.5 g) concentration on particle size, and colloidal stability of resulting emulsions were investigated using a dynamic light scattering (DLS) and zeta potential measurements, Fourier transform infrared (FTIR) spectroscopy, and scanning electron microscopy (SEM). The FTIR spectrum provided the signals of CS, SDS and *Syzygium aromaticum* (L.) Merr. & L.M.Perry. oil which confirmed that the oil was encapsulated by CS/SDS. The zeta potential of nanocapsules was in the range of -23.51 to 26.39 mV with particle size of 200-350 nm. The SEM image of the nanocapsules showed the spherical shape and uniform size distribution. Based on antimicrobial activity test, the developed nanocapsules could inhibit both *Escherichia coli* and *Staphylococcus aureus* with inhibition zone of 9.0±0.0 and 9.5±0.5 mm, respectively. Moreover, this nanocapsule is proved to be cost-effective and environmentally friendly.

Keywords: Nanoemulsion; *Syzygium aromaticum* (L.) Merr. & L.M.Perry.; Emulsification