FORMULASI NANOEMULSI PICKERING KATEKIN MENGGUNAKAN *BOX-BEHNKEN DESIGN*

SKRIPSI

DYTA KHARISMA PUTRI
A221090

SEKOLAH TINGGI FARMASI INDONESIA
YAYASAN HAZANAH
BANDUNG
2026

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Sebagai salah satu syarat untuk memperoleh gelar Sarjana Farmasi

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Juni 2026

Disetujui oleh:

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Skripsi ini kupersembahkan kepada kedua orang tuaku tercinta, Mama dan Papa. Terima kasih atas doa yang tak pernah putus, dukungan moral dan finansial. Diri sendiri yang telah berjuang, bertahan, dan tidak pernah menyerah hingga titik ini.

"Allah tidak membebani seseorang melainkan sesuai dengan kesanggupannya." (QS. Al-Baqarah: 286)

ABSTRAK

Katekin merupakan senyawa polifenol yang memiliki aktivitas farmakologis, namun memiliki stabilitas yang rendah akibat mudah mengalami degradasi oleh cahaya, oksigen, dan perubahan pH. Nanoemulsi Pickering merupakan sistem emulsi yang distabilkan oleh partikel padat pada antar muka minyak dan air. Penelitian ini bertujuan untuk memperoleh formula optimum nanoemulsi Pickering katekin menggunakan metode *Box-Behnken Design* (BBD). Nanoemulsi Pickering katekin diformulasikan menggunakan nanopartikel kitosan-tripolifosfat (TPP) sebagai penstabil Pickering. Faktor yang dioptimasi meliputi konsentrasi kitosan-tripolifosfat (TPP) (25–75%), gliserin (0–5%), dan MCT oil (0,5–2%), dengan respon persen transmitan. Formula optimum yang diperoleh selanjutnya divalidasi dan dikarakterisasi melalui pengujian organoleptik, pH, viskositas, sentrifugasi, ukuran droplet, *indeks polidispersitas* (PDI), dan zeta potensial. Hasil optimasi menunjukkan formula optimum terdiri atas kitosan-tripolifosfat (TPP) 25%, gliserin 0%, dan MCT oil 0,5% dengan nilai *desirability* sebesar 0,988. Hasil validasi menunjukkan nilai transmitan aktual sebesar 93,457 ± 0,238. Nilai viskositas yang diperoleh sebesar 1,153 ± 0,002 cP, pH 4,31 ± 0,000, ukuran droplet 570,4 nm, PDI 0,301, dan zeta potensial -40,39 mV. Hasil tersebut menunjukkan bahwa metode *Box-Behnken Design* berhasil digunakan untuk memperoleh formula optimum nanoemulsi Pickering katekin dengan karakteristik fisik yang baik dan stabil.

Kata kunci : Katekin, nanoemulsi Pickering, *box-behnken design*, Kitosan-TPP, Transmitan.

ABSTRACT

Catechin is a polyphenol compound that has pharmacological activity, but has low stability due to its easy degradation by light, oxygen, and pH changes. Pickering nanoemulsion is an emulsion system stabilized by solid particles at the oil-water interface. This study aims to obtain the optimum formula of catechin Pickering nanoemulsion using the Box-Behnken Design (BBD) method. The catechin Pickering nanoemulsion was formulated using chitosan-tripolyphosphate (TPP) nanoparticles as a Pickering stabilizer. The optimized factors include the concentration of chitosan-tripolyphosphate (TPP) (25–75%), glycerin (0–5%), and MCT oil (0.5–2%), with a response of percent transmittance. The optimum formula obtained was then validated and characterized through organoleptic testing, pH, viscosity, centrifugation, droplet size, polydispersity index (PDI), and zeta potential. The optimization results showed that the optimum formula consisted of 25% chitosan-tripolyphosphate (TPP), 0% glycerin, and 0.5% MCT oil with a desirability value of 0.988. The validation results showed an actual transmittance value of 93.457 ± 0.238. The viscosity value obtained was 1.153 ± 0.002 cP, pH 4.31 ± 0.000, droplet size 570.4 nm, PDI 0.301, and zeta potential -40.39 mV. These results indicate that the Box-Behnken Design method was successfully used to obtain the optimum formula of Pickering catechin nanoemulsion with good and stable physical characteristics.

Keywords: *Catechin, Pickering nanoemulsion, Box–Behnken Design, chitosan-TPP, transmittance.*

KATA PENGANTAR

Bismillahirrohmanirrahim,

Puji dan syukur penulis panjatkan ke hadirat Allah SWY atas segala berkah rahmat dan ridho-Nya penluis dapat menyelesaikan penelitian yang berjudul **"Formulasi Nanoemulsi Pickering Katekin Menggunakan *Box-Behnken Design*".**

Penelitian dan penulisan skripsi ini dilakukan untuk memenuhi salah satu syarat untuk mendapatkan gelar sarjana pada Program Studi Sarjana Farmasi Sekolah Tinggi Farmasi Indonesia.

Penulis mengucapkan terima kasih kepada dosen pembimbing apt. Yola Desnera Putri, M.Farm dan apt. Debby Tristiyanti, M.Farm atas bimbingan, nasihat, dukungan serta pengorbanan yang diberikan. Pada kesempatan kali ini, tidak lupa penulis mengucapkan terima kasih yang sebesar-besarnya kepada :

1. Dr. apt. Adang Firmansyah, M.Si., selaku Ketua Sekolah Tinggi Farmasi Indonesia
2. Dr. apt. Diki Prayugo, M.Si., selaku Wakil Ketua I Bidang Akademik,
3. Dr. apt. Hesti Riasari, M.Si., selaku Ketua Program Studi Sarjana Farmasi
4. Dr. apt. Diki Prayugo, M.Si., selaku Dosen Wali yang telah banyak memberikan bimbingan dan arahan kepada penulis.
5. Seluruh dosen, staff administrasi, serta seluruh karyawan Sekolah Tinggi Farmasi Indonesia atas ilmu, pengalaman dan bantuan kepada penulis selama penelitian.
6. Orang tua dan kakak tercinta yang senantiasa memberikan doa, kasih sayang, dukungan, serta semangat yang tiada henti kepada penulis.
7. Sahabatku SMA yang telah memberikan semangat, dukungan, serta kebersamaan hingga saat ini yang sangat berarti bagi penulis.
8. Seluruh teman – teman Reguler Pagi angkatan 2022 yang telah membantu dan membersamai penulis selama penelitian serta selalu memberikan support kepada penulis selama menempuh pendidikan di Sekolah Tinggi Farmasi Indonesia.
9. Seluruh pihak yang tidak disebutkan satu persatu yang telah membantu selama penelitian dan penyusunan skripsi

Saya menyadari bahwa skripsi ini masih memiliki beberapa keterbatasan. Oleh karena itu, dengan kerendahan hati, saya membuka diri untuk menerima kritik dan saran yang konstruktif. Semoga segala upaya dan karya ini dapat menjadi berkat dan bermanfaat bagi dunia akademik dan masyarakat luas. Semoga bantuan dan dukungan dari berbagai pihak menjadi amal jariyah yang mendapatkan balasan terbaik dari-Nya

Bandung, Juni 2026

Penulis

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