

## Abstrak

### **OPTIMASI FORMULA *SELF-NANOEMULSIFYING DRUG DELIVERY SYSTEM* (SNEDDS) ETIL-*P*-METOKSISINAMAT (EPMS) DENGAN KOMBINASI TWEEN 80 DAN PROPILEN GLIKOL**

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**Latar Belakang:** Etil-*p*-metoksisinamat (EPMS) hasil isolasi *Kaempferia galanga* diketahui dapat berperan sebagai agen antiinflamasi. Namun memiliki kelarutan yang rendah dalam air sehingga memiliki bioavailabilitas yang rendah. Oleh karena itu, perlu dilakukan formulasi untuk meningkatkan kelarutan EPMS, yaitu melalui formulasi *self-nanoemulsifying drug delivery system* (SNEDDS) dengan optimasi basis menggunakan metode *simplex lattice design* (SLD). Tujuan penelitian ini adalah mengetahui pengaruh variasi komposisi Tween 80 dan propilen glikol terhadap sifat dan stabilitas fisik serta mengetahui formula optimum SNEDDS EPMS.

**Metodologi:** Tahapan penelitian terdiri dari isolasi EPMS dari serbuk rimpang kencur, optimasi SLD basis SNEDDS dengan basis Tween 80, propilen glikol, dan VCO dengan menggunakan software *design expert*, pembuatan SNEDDS EPMS, dan evaluasi formula optimum dengan parameter pengamatan visual, persen transmitan, waktu emulsifikasi, ukuran partikel, zeta potensial serta stabilitas fisik yang meliputi stabilitas termodinamika dan stabilitas dalam media simulasi gastrointestinal.

**Hasil Penelitian:** Diperoleh kristal EPMS murni sebanyak 6,37 gram dengan rendemen 0,0637%. Formula basis optimum terpilih yaitu formula dengan komposisi Tween 80 65% dan propilen glikol 25%. SNEDDS EPMS dengan *drug loading* 100 mg/mL memiliki persen transmitan  $99,07\% \pm 0,09$ , waktu emulsifikasi dalam akuades  $0,69 \pm 0,33$  menit, ukuran partikel  $18,37 \pm 0,25$  nm, zeta potensial  $-60,87 \pm 0,54$  mV, indeks polidispersitas  $0,350 \pm 0,02$  dan sediaan stabil.

**Kesimpulan:** Komposisi Tween 80 dan propilen glikol dalam formula berpengaruh terhadap sifat dan stabilitas fisik SNEDDS EPMS. Formula optimum SNEDDS EPMS memiliki komposisi EPMS 100 mg/mL, Tween 80 65%, propilen glikol 25%, dan VCO 10%.

**Kata Kunci:** SNEDDS, EPMS, *Simplex Lattice Design* (SLD), Tween 80, Propilen glikol

## Abstract

### **OPTIMIZATION OF SELF-NANOEMULSIFYING DRUG DELIVERY SYSTEM (SNEDDS) ETHYL-P-METHOXYCINNAMATE (EPMC) WITH COMBINATION OF TWEEN 80 AND PROPYLENE GLYCOL** Nada Shafa Salsabila, Muhamad Salman Fareza, Beti Pudyastuti

**Background:** Ethyl-p-methoxycinnamate (EPMC) isolated from *Kaempferia galanga* is known act as an anti-inflammatory agent. However, it has low solubility in water which can result low bioavailability. Therefore, it is necessary to make a formulation to increase the solubility of EPMC through a formulation in the form of a self-nanoemulsifying drug delivery system (SNEDDS) with base optimization using simplex lattice design method. The purpose of this study was to determine the effect of variations in the composition of Tween 80 and propylene glycol on physical properties and stability and to determine the optimum formula for SNEDDS EPMC.

**Methodology:** The research consisted of isolation of EPMC from *Kaempferia galanga* powder, optimization SLD of SNEDDS base with Tween 80, propylene glycol, and VCO using design expert software, preparation of the SNEDDS EPMC, and evaluation of the optimum formula with parameters of visual observation, percent transmittance, emulsification time, particle size, zeta potential and the physical stability which includes thermodynamics stability and stability in the gastrointestinal simulation media.

**Results:** 6.37 grams of pure EPMC crystals were obtained with a yield 0.0637%. The optimum base formula chosen was the formula with the composition of Tween 80 65% and propylene glycol 25%. SNEDDS EPMC with drug loading 100 mg/mL has a transmittance of  $99.07\pm 0,09$ , emulsification time in distilled water  $0.69\pm 0,33$  minutes, particle size  $18.37\pm 0,25$  nm, zeta potential  $-60.87\pm 0,54$  mV, polydispersity index  $0.350\pm 0,02$  and good stability.

**Conclusions:** The composition of Tween 80 and propylene glycol in the formula affects the physical properties and stability of SNEDDS EPMC. The optimum formula for SNEDDS EPMC has a composition of EPMC 100 mg/mL, Tween 80 65%, propylene glycol 25%, and VCO 10%.

**Keywords:** SNEDDS, EPMC, Simplex Lattice Design (SLD), Tween 80, Propylene glycol