



## INTISARI

Penggunaan tabir surya dengan minimal nilai *Sun Protecting Factor* (SPF) 30 direkomendasikan untuk menurunkan risiko hiperpigmentasi dan kanker kulit akibat sinar ultraviolet (UV) berlebih. Salah satu bahan tabir surya yang banyak digunakan adalah avobenzone. Namun, sinar UV juga menyebabkan fotodegradasi avobenzone sehingga menghasilkan radikal bebas yang dapat memicu fotoalergi pada kulit dan menurunkan efikasinya. Enkapsulasi dengan lapisan lemak diketahui memberikan perlindungan pada avobenzone sehingga memiliki fotostabilitas yang lebih baik. Penelitian ini bertujuan untuk mengembangkan bentuk mikroemulgel dan mengetahui pengaruhnya pada fotostabilitas avobenzone.

Mikroemulsi dibuat dengan menyusun diagram fase pseudoterner dari komponen sistem mikroemulsi yaitu minyak alpukat sebagai fase minyak, tween 80 sebagai surfaktan, PEG 400 sebagai kosurfaktan dan air. Stabilitas fisik gel yang diuji meliputi organoleptis, pH, daya sebar, daya lekat, dan viskositas selama tiga siklus beku-cair. Efektivitas tabir surya dievaluasi dengan nilai SPF sebelum dan setelah paparan sinar secara *in vitro* menggunakan spektrofotometri. Data uji sifat fisik, stabilitas fisik, dan efektivitas tabir surya dianalisis menggunakan SPSS.

Hasil penelitian menunjukkan bahwa mikroemulgel avobenzone memiliki pH sebesar  $5,007 \pm 0,005$ , viskositas  $2673,33 \pm 12,4722$  cPas, daya sebar  $6,42 \pm 0,12$  cm, serta daya lekat  $2,92 \pm 0,51$  detik. Mikroemulgel avobenzone stabil pada karakter daya sebar dan pH, namun kurang stabil pada karakter daya lekat, dan viskositas selama penyimpanan beku-cair tiga siklus. Selain itu, mikroemulgel avobenzone dapat dikategorikan fotostabil karena memberikan nilai persentase efektivitas SPF (%SPF<sub>eff</sub>) sebesar 94,593. Nilai ini melebihi batas minimal %SPF<sub>eff</sub> untuk dikategorikan fotostabil yaitu %SPF<sub>eff</sub> >80%. Sediaan memiliki nilai SPF  $7,414 \pm 0,001$  dan  $7,014 \pm 0,014$  sebelum dan setelah dilakukan uji fotostabilitas.

**Kata Kunci:** Tabir surya, avobenzone, minyak alpukat, mikroemulsi, gel



## ABSTRACT

The use of sunscreen with a minimum Sun Protecting Factor (SPF) value of 30 is recommended to reduce the risk of hyperpigmentation and skin cancer due to excessive ultraviolet (UV) exposure. Avobenzone is one of the most commonly used ingredients in sunscreens. However, UV rays also cause the photodegradation of avobenzone. This leads to the production of free radicals that trigger photoallergy reaction in human skin and decrease its efficacy. Studies show that encapsulation with a lipid layer provide protection to avobenzone, resulting in better photostability. This study aims to develop a microemulgel formulation and investigate its effect on the photostability of avobenzone.

Microemulsions were created by constructing a pseudoternary phase diagram of the microemulsion system components, which included avocado oil as the oil phase, Tween 80 as the surfactant, PEG 400 as the co-surfactant, and water. The physical stability of the gel was evaluated based on organoleptic properties, pH, spreadability, adhesion time, and viscosity over three freeze-thaw cycles. The effectiveness of the sunscreen product was assessed by measuring the SPF value before and after UV exposure in vitro using spectrophotometry. Datas of physical properties, physical stability, and sunscreen effectiveness were analyzed using SPSS.

The findings revealed that the avobenzone microemulgel had a pH of  $5.007 \pm 0.005$ , viscosity of  $2673.33 \pm 12.4722$  cPas, spreadability of  $6.42 \pm 0.12$  cm, and adhesion time of  $2.92 \pm 0.51$  seconds. The avobenzone microemulgel was stable in terms of spreadability and pH. However, it was less stable regarding adhesion time and viscosity parameters during the three freeze-thaw cycles. Furthermore, the avobenzone microemulgel demonstrated an SPF effectiveness percentage (%SPEff) of 94,593. This value exceeded the threshold of 80% indicating that this formulation is photostable. The microemulgel's SPF values was  $7,414 \pm 0,001$  and  $7,014 \pm 0,014$  before and after UV exposure during the photostability test.

**Keywords:** Sunscreen, avobenzone, avocado oil, microemulsion, gel