

## Abstrak

### STABILITAS DENGAN DEGRADASI PAKSA PADA SEDIAAN TETES TELINGA KLORAMFENIKOL MENGGUNAKAN SPEKTROFOTOMETRI DERIVATIF DAN KEMOMETRIK

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**Latar Belakang:** Stabilitas kloramfenikol dipengaruhi oleh hidrolisis ikatan amida di bawah kondisi asam, basa, termal. Analisis hasil degradasi paksa dengan instrumen sederhana dan akurat seperti spektrofotometri derivatif dan kemometrik diterapkan pada penelitian ini. Uji ini untuk melihat apakah spektrofotometri dapat menunjukkan degradasi berdasarkan persentase degradasi.

**Metodologi:** Uji linearitas, akurasi, dan presisi dilakukan dengan larutan standar 4-16 µg/mL. Uji degradasi paksa dilakukan dengan menempatkan sampel pada kondisi asam (HCl 0,1 N; 80°C selama 2 jam), basa (NaOH 0,1 N; 80°C selama 2 jam), dan termal (90°C selama 4 jam) lalu diukur dengan spektrofotometri derivatif. Analisis kemometrik dilakukan dengan PCA dan PLS-DA.

**Hasil Penelitian:** Panjang gelombang maksimum kloramfenikol berurutan dari derivat ke nol hingga ketiga yaitu 278 nm, 260 nm, 234 nm, 292 nm. Metode memiliki linearitas yang baik ( $0,995 \leq r \leq 1$ ). Kloramfenikol cenderung terdegradasi kecil dalam asam dan besar dalam basa maupun termal. Analisis kemometrik menunjukkan sampel asam cenderung mengelompok dekat kontrol.

**Kesimpulan:** Spektrofotometri derivatif dapat menunjukkan persentase degradasi kloramfenikol walaupun tidak dapat dipastikan terkait produk degradasinya. Pada analisis kemometrik diperoleh pengaruh degradasi berdasarkan pengelompokan sampel kontrol dan perlakuan.

**Kata Kunci:** Kloramfenikol, uji degradasi paksa, spektrofotometri, kemometrik

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## Abstract

### STABILITY WITH FORCED DEGRADATION OF CHLORAMPHENICOL EAR DROPS USING DERIVATIVE SPECTROPHOTOMETRY AND CHEMOMETRICS

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**Background:** The stability of chloramphenicol is influenced by hydrolysis of amide bond under acidic, basic and thermal. Forced degradation analysis results with simple and accurate instruments such as derivative spectrophotometry and chemometrics applied in this research. This study aims to see whether spectrophotometry can show degradation based on percentage of degradation.

**Methods:** Linearity, accuracy and precision tests were carried out with standard solutions of 4-16 µg/mL. Forced degradation tests were carried out by placing samples in acidic (0.1 N HCl; 80°C for 2 hours), alkaline (0.1 N NaOH; 80°C for 2 hours), and thermal (90°C for 4 hours) then measuring them using derivative spectrophotometry. Chemometric was carried out with PCA and PLS-DA.

**Result:** The maximum wavelengths of chloramphenicol sequentially from the zero to the third derivative are 278 nm, 260 nm, 234 nm, 292 nm. The method has good linearity ( $0.995 < r < 1$ ). Chloramphenicol tends to be degraded to a lesser extent in acids and to a greater extent in alkalis and thermals. Chemometric analysis showed acid samples tended to cluster near controls.

**Conclusion:** Derivative spectrophotometry can show the percentage of chloramphenicol degradation although it cannot be certain regarding the degradation products. In the chemometric analysis, the degradation was obtained based on the grouping of control and treatment samples.

**Keywords:** Chloramphenicol, forced degradation study, spectrophotometry, chemometrics

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