

# 氟白普洛芬於醇性溶媒之光解研究

## Photolytic Studies of Flurbiprofen in Alcoholic Solvents

### 中文摘要

氟白普洛芬 (FB) 為一具有光敏感特性的非類固醇抗發炎藥物 (NSAIDs)。為發展一敏感度高、準確的安定性指標之高壓液相層析分析法，並藉此來定量氟白普洛芬並觀察其光解反應。液相層析方法是使用 Inertsil ODS-3V 管柱，移動相組成為甲醇：氰甲烷：純水（加入 1% 醋酸）為 2:4:4，UV 檢測器波長設定在 247nm。進而將氟白普洛芬檢量線作線性回歸、日內及日間精密度 (Precision) 試驗並予以確效。檢量線的 R<sup>2</sup> 值為 0.9984，而日內、日間試驗的 C.V. (%) 值皆低於 2.5% 和 3.2%，模擬回收率亦在 99.35%~101.61% 之間。以上結果顯示，已發展出的 HPLC 分析方法具有良好的選擇性和專一性。

當將氟白普洛芬之甲醇溶液以 Philips 400-W 紫外燈照射，可觀察到氟白普洛芬有醇基 (FB-1)、酮基 (FB-2) 及酯類 (FB-3) 三種光解衍生產物的產生。而當於乙醇溶液，酸性條件下，亦可觀察到氟白普洛芬乙基酯 (FB-4) 的生成。這些光解產物除以製備型高壓液相層析系統逐一單離，之後並藉由 EI-MS、UV、IR、<sup>1</sup>H-、<sup>13</sup>C-NMR 之檢測來解析其化學結構。以不同濃度、不同溶媒的兩項變異，來觀察氟白普洛芬之光解動力學情形。結果發現，氟白普洛芬於高濃度對進行光分解會呈現零階次動力學模式，低濃度則較偏向一階次動力學模式；藉由使用不同醇類溶媒作仔細的觀察，則可看到其動力學模式，隨著溶媒極性的降低，而較偏向一階次動力學模式。

### 英文摘要

Flurbiprofen (FB) is one of photosensitizing non-steroidal anti-inflammatory drugs (NSAIDs). A sensitive, and accurate stability-indicating high performance liquid chromatography for determining the photodegradation of FB was developed and validated with linear regression of calibration curve, intra-day test, inter-day test. The quantitation for FB was monitored with an Inertsil ODS-3V column. The component of mobile phase was methanol- acetonitrile -deionized water (with 1% acetic acid added) = 2:4:4 and setting of UV detector was 247 nm. The R square of calibration curve regression was 0.9984 and the C.V. (%) of intra-day and inter-day tests was lower than 2.5% and 3.2%, respectively. The mimic percent recovery were between 99.35%~101.61%. The above results showed that our established HPLC assay method exhibit good selectivity and specificity.

When FB was irradiated with a Philips 400-W UV lamp in methanol, 3 photoproducts of FB; ketone (FB-1), aldehyde (FB-2) and methyl ester (FB-3) could be observed, respectively. FB-ethyl ester (FB-4) also could be observed, when FB was dissolved in ethanol in acidic condition. Using preparative HPLC system, the resulting photoproducts were isolated and their chemical structures were analyzed by

EI-MS、UV、IR、<sup>1</sup>H-,<sup>13</sup>C-NMR spectroscopies.

Under the conditions of different concentrations and various alcoholic solvents, the photo-kinetic behaviors of FB were observed. The kinetics of FB under the photo-irradiation conditions followed the first order at lower concentrations. The kinetic results of FB followed the first order in n-propanol and zeroth order in methanol solutions.