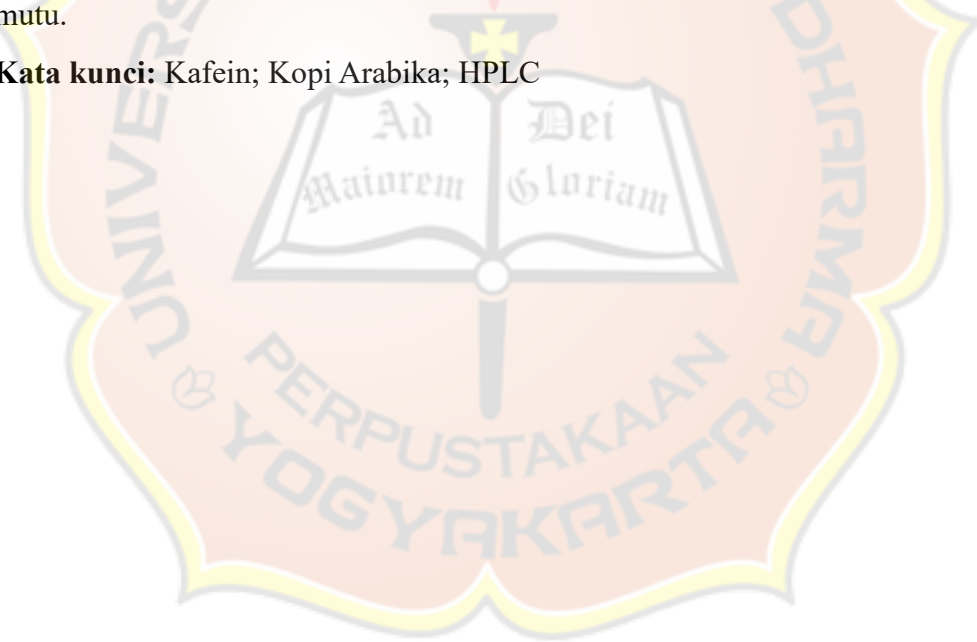


ABSTRAK

Kafein merupakan senyawa alkaloid utama dalam kopi yang berperan sebagai stimulan sistem saraf pusat, sehingga analisis kadarnya memerlukan metode yang akurat, presisi, dan memiliki kemampuan pemisahan yang baik. *High Performance Liquid Chromatography* (HPLC) merupakan salah satu metode yang banyak digunakan untuk analisis kafein, namun diperlukan optimasi kondisi kromatografi agar diperoleh pemisahan yang optimal. Penelitian ini bertujuan untuk menentukan kondisi optimum metode HPLC fase terbalik berdasarkan variasi komposisi fase gerak dan laju alir untuk analisis kafein pada bubuk kopi arabika (*Coffea arabica* L.) Bajawa. Penelitian menggunakan metode eksperimental dengan fase diam kolom C18 dan fase gerak metanol:aquabidest pada perbandingan 50:50, 60:40, dan 70:30 dengan variasi laju alir 0,6; 0,8; dan 1,0 mL/menit. Setiap kondisi dievaluasi melalui uji kesesuaian sistem sebanyak enam kali dengan parameter waktu retensi, resolusi, dan *tailing factor*. Kondisi optimum diperoleh pada fase gerak metanol:aquabidest (70:30) dengan laju alir 0,6 mL/menit, yang menunjukkan pemisahan dan efisiensi kolom terbaik. Diharapkan penelitian menghasilkan metode HPLC fase terbalik sekaligus menyediakan referensi metode analisis bagi pengembangan mutu produk kopi dan kepatuhan terhadap standar mutu.

Kata kunci: Kafein; Kopi Arabika; HPLC



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ABSTRACT

Caffeine is the primary alkaloid compound found in coffee and acts as a central nervous system stimulant. Therefore, its determination requires an analytical method with high accuracy, precision, and separation efficiency. *High Performance Liquid Chromatography* (HPLC) is one of the most widely used analytical techniques for caffeine determination; however, optimization of chromatographic conditions is necessary to achieve optimal separation performance. This study aimed to determine the optimum reversed-phase HPLC conditions based on variations in mobile phase composition and flow rate for the analysis of caffeine in Bajawa Arabica coffee (*Coffea arabica* L.) powder. An experimental study was conducted using a C18 column as the stationary phase and methanol:distilled water as the mobile phase at ratios of 50:50, 60:40, and 70:30 with flow rates of 0.6, 0.8, and 1.0 mL/min. Each chromatographic condition was evaluated through six replicate system suitability tests using retention time, resolution, and *tailing factor*. The optimum chromatographic condition was achieved using a methanol:distilled water (70:30) mobile phase at a flow rate of 0.6 mL/min, indicating excellent separation efficiency. Quantitative determination of caffeine was based on the chromatographic peak area. This study is expected to establish an optimized reversed-phase HPLC method and provide a reference analytical method to support coffee quality improvement and ensure compliance with established quality standards.

Keywords: Caffeine; Arabica coffee; *High Performance Liquid Chromatography* (HPLC)