ABSTRAK

Kopi merupakan salah satu tanaman yang banyak dibudidayakan dan dikonsumsi oleh masyarakat Indonesia. Salah satu jenis kopi yang banyak dikonsumsi adalah kopi robusta. Asam kafeat merupakan salah satu senyawa polifenol yang terkandung dalam kopi dan dilaporkan memiliki aktivitas biologis seperti antioksidan, antibakteri, dan antidiabetes. Analisis kadar asam kafeat dapat dilakukan menggunakan metode Kromatografi Cair Kinerja Tinggi (KCKT) fase terbalik. Meskipun demikian, metode ini memerlukan tahap optimasi sebelum diaplikasikan untuk menganalisis kandungan asam kafeat pada kopi. Penelitian ini bertujuan untuk mengetahui kondisi optimum analisis asam kafeat pada seduhan serbuk kopi robusta dengan KCKT fase terbalik dengan bantuan metode permukaan respon. Metode permukaan respon *Box-Behnken Design* digunakan sebagai model pendukung dalam optimasi metode KCKT. Variabel yang dievaluasi meliputi: persentase asetonitril (X1), persentase asam format (X2), dan laju alir (X3). Parameter respon pemisahan KCKT fase terbalik yang diamati adalah waktu retensi, resolusi, *tailing factor,* dan jumlah lempeng teoretis sebagai variabel tergantung. Kondisi optimum KCKT dalam analisis asam kafeat dapat diperoleh pada penelitian yaitu fase gerak metanol:asetonitril:asam format (10:15:75 v/v/v), laju alir 1,0 mL/menit, dan panjang gelombang deteksi pada 326 nm. Kondisi optimum dibuktikan melalui uji kesesuaian sistem yang memenuhi kriteria, antara lain waktu retensi <10 menit, *tailing factor* ≤ 2, resolusi > 2, jumlah lempeng teoretis (N > 2000), dan nilai standar baku relatif (SBR) ≤ 2%.

Kata kunci: Kopi, asam kafeat, KCKT, optimasi, metode permukaan respon

ABSTRACT

Coffee is widely cultivated and consumed by the people of Indonesia. One of the most widely consumed varieties of coffee is robusta coffee. Caffeic acid is one of the polyphenolic compounds present in coffee, and it has been demonstrated to possess biological activities, including antioxidant, antibacterial, and antidiabetic properties. The analysis of caffeic acid levels can be performed by reversed-phase high-performance liquid chromatography (HPLC) method. Nevertheless, this method necessitates an optimization stage prior to its implementation for the analysis of caffeic acid content in coffee. The objective of this study is to ascertain the optimal conditions for the analysis of caffeic acid in brewed roasted robusta coffee ground using the reversed-phase HPLC method, with the aid of the response surface method. The Box-Behnken Design response surface method was employed as a supporting model in the optimization of the HPLC method. The independent variables evaluated in this study were the percentage of methanol, the percentage of acetonitrile (X1), the percentage of formic acid (X2), and the flow rate (X3). The response parameters of reversed-phase HPLC separation observed were retention time, resolution, tailing factor, and theoretical plate number, which were identified as dependent variables. The optimized conditions for caffeic acid analysis were the mobile phase of methanol:acetonitrile:formic acid (10:15:75 v/v/v), flow rate of 1.0 mL/min, and detection wavelength of 326 nm. System suitability tests resulted the optimum conditions were indeed met, with the retention time < 10 minutes, tailing factor ≤ 2, resolution > 2, number of theoretical plates (N > 2000), and percentage of relative standard deviation (RSD) < 2%.

Keywords: Coffee, caffeic acid, reverse-phase HPLC, optimization of analytical methods, response surface method