

INTISARI

Senyawa fenolik dan flavonoid merupakan kelompok senyawa metabolit sekunder yang ditemukan dalam berbagai tumbuhan dan memiliki beragam manfaat kesehatan. Senyawa ini dikenal karena aktivitas antioksidan sehingga memiliki potensi dalam aplikasi farmasi dan kosmetik. Secara umum, pengukuran kandungan fenolik dan flavonoid total pada sampel dilakukan dalam laboratorium menggunakan metode spektrofotometri. Namun, metode ini memerlukan waktu yang relatif lebih lama untuk pengukuran masing-masing sampel sehingga kurang efektif diaplikasikan dalam analisis sampel jumlah besar dan dalam waktu singkat.

Pada penelitian ini, akan dikembangkan kit uji berbahan kertas (*paper-based analytical device*/PAD) untuk mendeteksi kandungan fenolik dan flavonoid total secara simultan berdasarkan reaksi warna. Kandungan fenolik dan flavonoid total ditentukan berdasarkan intensitas warna dengan *software* secara kuantitatif. Tahapan penelitian meliputi fabrikasi, optimasi desain, optimasi waktu reaksi, evaluasi pengaruh pelarut sampel, dan pengujian performa analitik PAD meliputi linieritas, sensitivitas, batas deteksi, presisi, dan akurasi.

Secara kuantitatif, PAD yang dikembangkan memberikan respon intensitas yang linier pada konsentrasi 0 – 200 mg/L asam galat (fenolik) dan 0-100 mg/L kuersetin (flavonoid) dengan nilai koefisien korelasi (R) berturut-turut sebesar 0,996 dan 0,999. Batas deteksi (LOD) PAD adalah 23,1 mg GAE/L dan 7,02 mg QE/L. Pengujian PAD menggunakan beberapa ekstrak teh menghasilkan nilai RSD 0,690-3,38% (fenolik) dan 3,94-19,9% (flavonoid); dan nilai R% 95,3-110% (fenolik) dan 96,1-112% (flavonoid). PAD memiliki potensi besar untuk pengukuran kandungan fenolik dan flavonoid total secara simultan, cepat, dan *real-time* di lapangan. Meskipun demikian, diperlukan studi lebih lanjut untuk meningkatkan presisi dalam fabrikasinya.

Kata kunci: kit uji kertas, fenolik, flavonoid, simultan

ABSTRACT

Phenolic and flavonoid compounds are a group of secondary metabolite compounds found in various plants and have various health benefits. This compound known for antioxidant activity and has potential in pharmaceutical and cosmetic applications. In general, measurements of the phenolic and total flavonoid content in samples are carried out in the laboratory using spectrophotometric methods. However, this method requires a relatively longer time for measuring each sample and less effective in analyzing large numbers of samples in a short time.

In this research, a paper-based analytical device (PAD) will be developed to detect total phenolic and flavonoid content simultaneously based on color reactions. The total phenolic and flavonoid content was determined based on color intensity using quantitative software. The research stages include fabrication, design optimization, reaction time optimization, evaluation of the influence of sample solvents, and testing of PAD analytical performance including linearity, sensitivity, detection limit, precision and accuracy.

Quantitatively, the developed PAD provides a linear intensity response at concentrations of 0 – 200 mg/L gallic acid (phenolic) and 0-100 mg/L quercetin (flavonoid) with correlation coefficient (R) values of 0.996 and 0.999 respectively. The limit of detection (LOD) of PAD was 23.1 mg GAE/L and 7.02 mg QE/L. PAD testing using several tea extracts produced RSD values of 0.690-3.38% (phenolics) and 3.94-19.9% (flavonoids); and R% values of 95.3-110% (phenolics) and 96.1-112% (flavonoids). PAD has great potential for simultaneous, rapid and real-time measurement of total phenolic and flavonoid content in the field. Nevertheless, further studies are needed to improve precision in its fabrication.

Keywords: paper-based analytical device, phenolic, flavonoid, simultaneous