

Development of flow injection analysis system with colorimetric detector for dual antioxidant assays

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This work presents a new flow injection analysis (FIA) system with an in-house colorimetric detector, based on pair emitter detector diode (PEDD) for dual antioxidant assays. The 2, 2'-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid) (ABTS) assay and ferric reducing antioxidant power (FRAP) assay were employed. The sample was injected into a 10-port valve with two sample loops (L1 and L2) as shown in Fig. 1. The sample zone in loop L1 was transferred by water carrier stream to mix with ABTS^{•+} reagent. Upon reaction with an antioxidant, the blue-green color of ABTS^{•+} was diminished and monitored by the colorimeter. Consequently, the sample in loop L2 was flown to mix with FRAP reagent. The dark blue color of the reducing product was also monitored by the same colorimeter. Changing in the voltage of the colorimetric detectors was correlated with the antioxidant capacity which was presented in the sample. The developed system illustrated good performance with low detection limit (LOD, 3s/n) of 1.98 μM and 1.39 μM and high precision (%RSD, 30 μM , n = 10) of 2.41 and 2.15 for ABTS assay and FRAP assay, respectively. Throughput of 48 samples h⁻¹ was achieved. The proposed method was low cost, simple and rapid. It should be noted that, using our developed system, the antioxidant capacity of a sample was obtained from two assays in the same time.

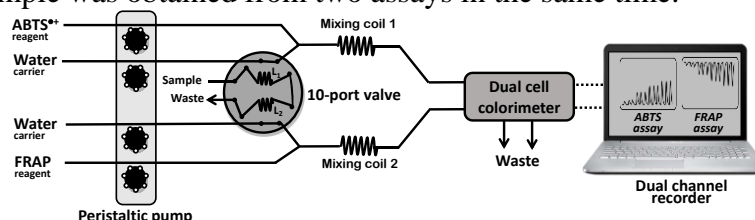


Fig 1. The FIA manifold for dual antioxidant assays (loading position)

Keywords: Antioxidant assays; ABTS assay; FRAP assay; Flow injection analysis (FIA); Pair emitter detector diode (PEDD)

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