

Ultra High-Speed Analysis of Curcumin in Turmeric by Ultra High-Performance Liquid Chromatography with Photodiode Array Detection

Introduction

Curcumin is the principal curcuminoid of the popular Indian spice turmeric, which is a member of the polyphenols. It is well known that it has physiological effects such as anti-ulcer, antioxidant and anti-inflammatory activities. Turmeric curcuminoids contain curcumin as of keto and enol types.

In this report, curcuminoids in turmeric were analyzed using Ultra High-Performance Liquid Chromatography (UHPLC) with PDA detector, which enables ultra high-speed data acquisition of 100 spectra/sec..

Keyword : UHPLC, Turmeric, Curcumin, 1.8 μ m, C18 Column, PDA Detector

Experimental

Equipment

Pump: X-LC 3185PU x 2
 Degasser: X-LC 3080DG
 Mixer: X-LC 3180MX
 Column oven: X-LC 3067CO
 Autosampler: X-LC 3159AS
 Detector: X-LC 3110MD

Conditions

Column: ZORBAX Eclipse Plus C18 (3.0 mmID x 50 mmL, 1.8 μ m)
 Eluent A: 0.2 % Formic acid
 Eluent B: Acetonitrile
 Gradient condition: (A/B), 0 min(95/5) \rightarrow 1 min(40/60) \rightarrow 1.05 min(10/90) \rightarrow 1.5 min (10/90) 1 cycle; 4 min
 Flow rate: 0.8 mL/min
 Column temp.: 40 $^{\circ}$ C
 Wavelength: 200-650 nm
 Injection volume: 1 μ L
 Standard sample: Bis-demethoxycurcumin, Demethoxycurcumin, Curcumin
 50 mg/mL each in Water/Acetonitrile (50/50)

Results

Fig. 1 shows the chromatogram and contour plot of the curcuminoid standard mixture. Components were clearly separated within 1 min.

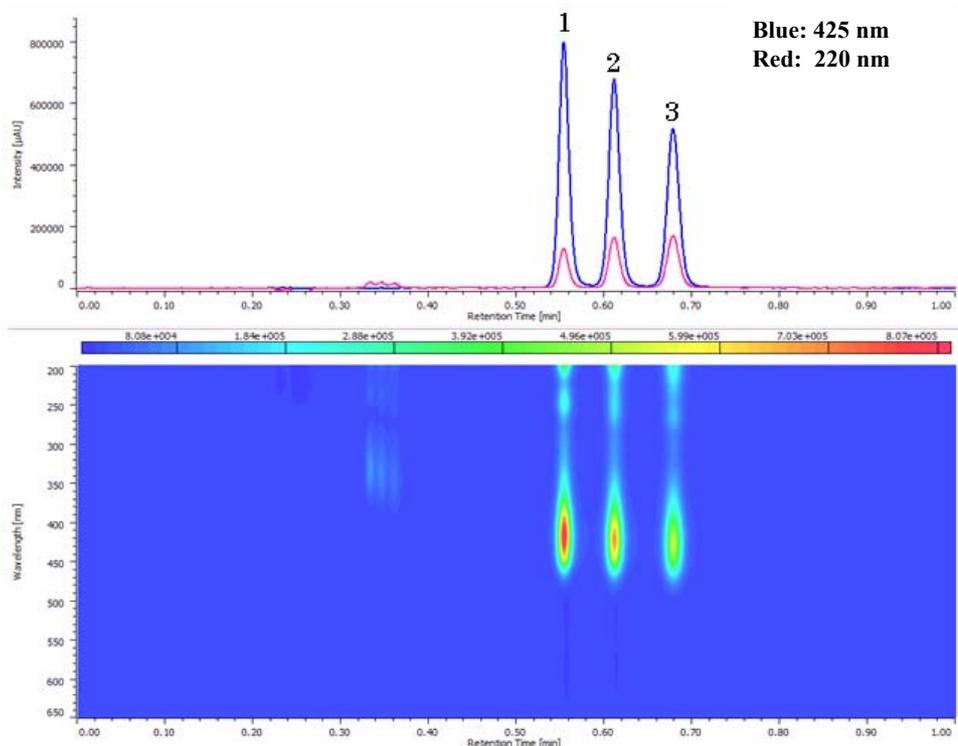


Fig. 1. Chromatogram of Curcumin standard mixture. 1: Bis-demethoxycurcumin, 2: Demethoxycurcumin, 3: Curcumin

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Fig. 2 shows on-peak spectra of components of the curcuminoid standard. High quality spectra were obtained for three components.

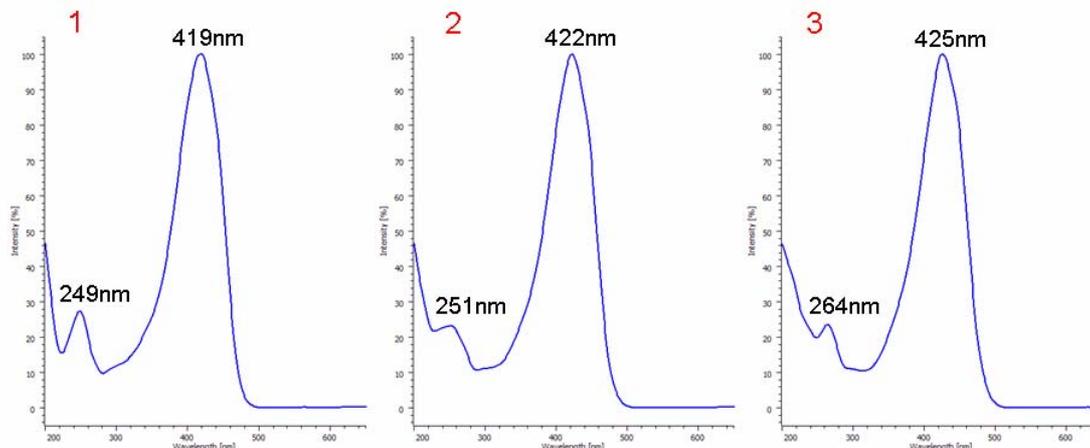


Fig. 2. On-peak spectra of Curcumin standard. 1: Bis-demethoxycurcumin, 2: Demethoxycurcumin, 3: Curcumin

Fig. 3 shows the chromatogram of commercial turmeric and on-peak spectrum of each peak. By registering spectra of standard components in Fig. 2, the correlation coefficient was calculated to be as good as 1.000.

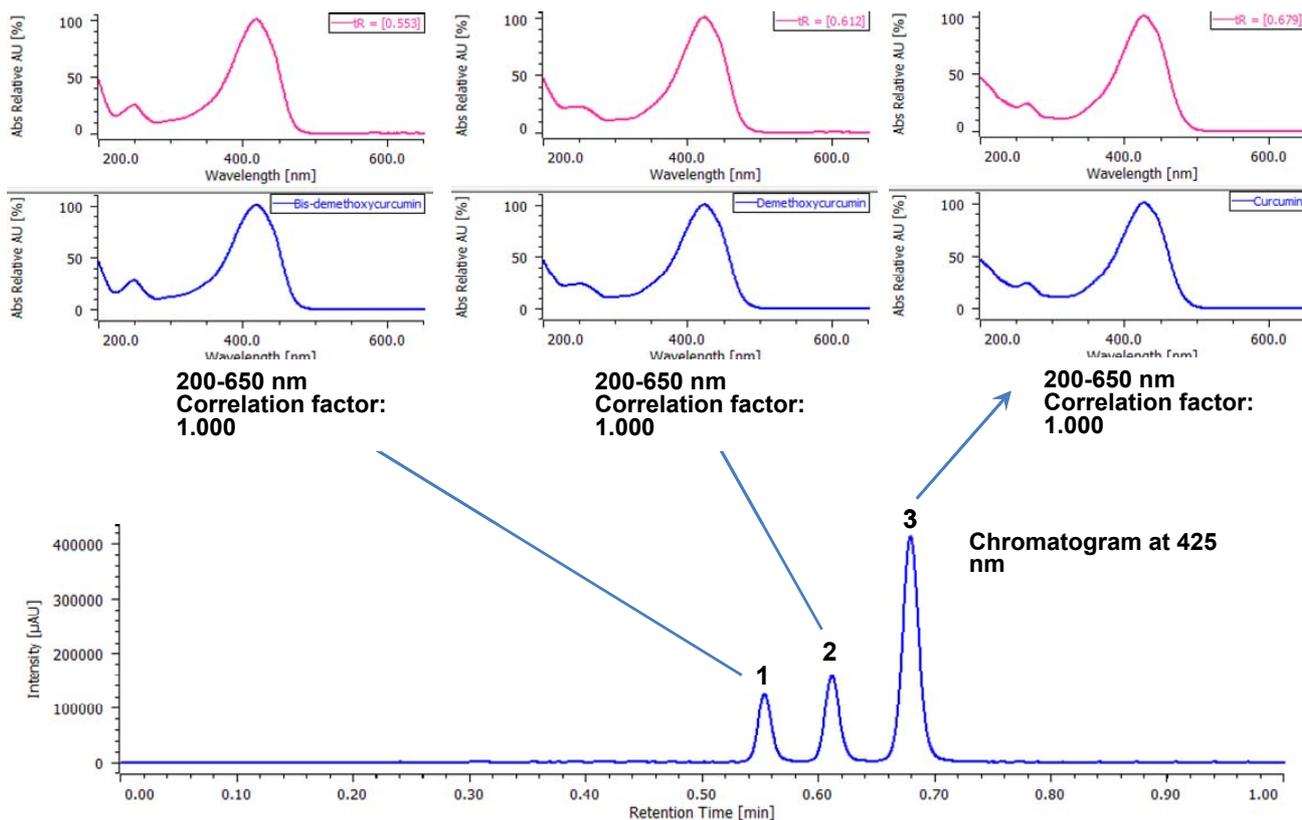


Fig. 3. Chromatogram of commercial turmeric. 1: Bis-demethoxycurcumin, 2: Demethoxycurcumin, 3: Curcumin.

Preparation: Five hundred milligrams of turmeric was first dissolved in 5 ml of acetonitrile. After sonication, the supernatant was filtered using 0.45 μm membrane filter and the filtrate was diluted with pure water (1:1) and it was filtered again using 0.2 μm membrane filter.