

## Ultra High-Speed Analysis of Cold and Sinus Medicines by Ultra High-performance Liquid Chromatography with Photodiode Array Detection

### Introduction

Acetaminophen (Paracetamol), anhydrous caffeine, hesperidin, ethenzamide, tipepidine hibenzate or apronalide etc. are known as active ingredients of cold or sinus medicines. Acetaminophen has antipyretic and analgesic effects. Anhydrous caffeine increases an analgesic effect. Hesperidin improves blood circulation and has an antiallergic effect. Ethenzamide has antipyretic, analgesic and antiphlogistic effects. Tipepidine hibenzate has antitussive and expectorant effects. Apronalide has analgesic and hypnotic effects.

In this report, active ingredients contained in cold and sinus medicines are analyzed by UHPLC with PDA detection, which enables ultra-high speed data acquisition at the rate of 100 spectra/sec.

**Keyword:** UHPLC, Acetaminophen, Anhydrous Caffeine, Hesperidin, Ethenzamide, Tipepidine, hibenzate, Apronalide, 1.8  $\mu\text{m}$ , C18 Column, PDA Detector

### Experimental

#### Equipment.

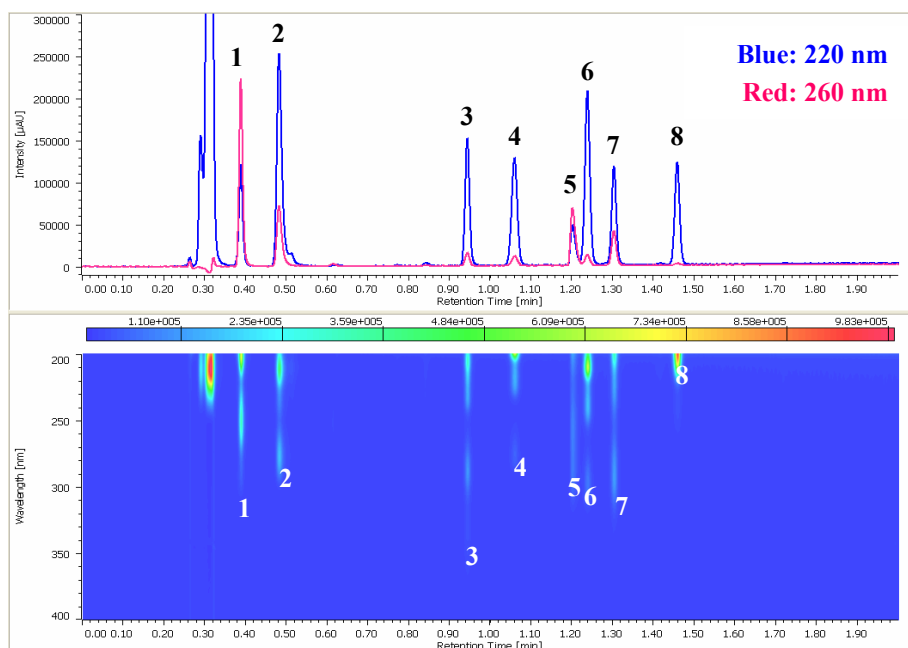
Pump: X-LC 3185PU x 2  
 Degasser: X-LC 3080DG  
 Mixer: X-LC 3180MX  
 Column oven: X-LC 3067CO  
 Autosampler: X-LC 3159AS  
 Detector: X-LC 3110MD

#### Conditions.

Column: ZORBAX SB-C18 (3.0 mmID x 50 mmL, 1.8  $\mu\text{m}$ )  
 Eluent: A; 0.1% Phosphoric acid, B; Acetonitrile  
 Gradient condition: (A/B), 0 min(20/80)  $\rightarrow$  1.4 min(50/50)  $\rightarrow$  2.0min(50/50)  $\rightarrow$  2.05 min(20/80) 1 cycle; 4.5 min  
 Flow rate: 0.8 mL/min  
 Column temp.: 40°C  
 Wavelength: 200-400 nm  
 Injection volume: 1  $\mu\text{L}$   
 Standard sample: Acetaminophen, Caffeine, Phenol (I.S.), Ethenzamide, Hesperidin, Tipepidine Hibenzate 0.02mg/mL each, Apronalide 0.1mg/mL

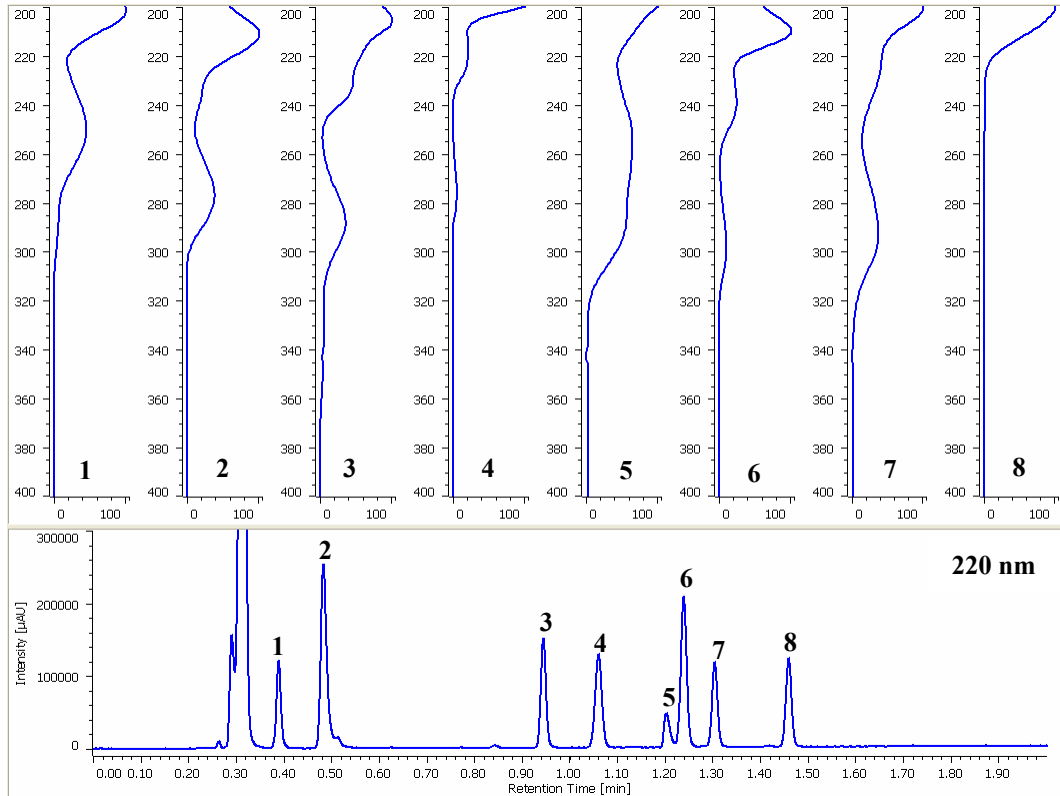
### Results

Fig. 1 shows the chromatogram and contour plot of active ingredients contained in a cold and sinus medicine. Seven active ingredients and phenol added as internal standard(I.S.) are clearly separated within 1.5 min.



**Fig. 1.** Chromatogram of Active Ingredients contained in Cold and Sinus medicines. 1: Acetaminophen, 2: Caffeine, 3: Hesperidin, 4: Phenol (I.S.), 5: Hibenzic acid, 6: Ethenzamide, 7: Tipepidine, 8: Apronalide.

Fig. 2 shows on peak spectra of active ingredients contained in a cold and sinus medicine. Good spectrum was obtained for each component.



**Fig. 2.** On peak Spectra of Active Ingredients contained in a cold and sinus medicine. 1: Acetaminophen, 2: Caffeine, 3: Hesperidin, 4: Phenol (I.S.), 5: Hibenzic acid, 6: Ethenzamide, 7: Tipepidine, 8: Apronalide.