

Analysis of Combination Cold Remedy

Introduction

Commercial combination cold remedy includes various components of medicine such as components for antifebrile and anodyne, components for antitussive and bronchodilation (for softening cough), components for anti-histamine (for softening snivel, sneeze and etc.), components for reducing sputum and anti-inflammatory enzyme (for softening cough, sputum, snivel), and the other vitamin and components which originate from crude drug, and etc. Among those components, 9 active ingredients (Acetaminophen, Anhydrous caffeine, Dihydrocodeine phosphate, *dl*-Methylephedrine Hydrochloride, Ethenzamide, chlorpheniramine maleate, Noscapine, Glycyrrhizic acid, and Ibuprofen) were separated by gradient elution with PDA detector.

The results of analysis about two combination cold remedies were reported also.

Keyword: Combination Cold Remedy, C18 Column, PDA Detector

Experimental

Equipment

Pump:	PU-2080	Column:	Develosil ODS-HG-5 (4.6 mmID x 250 mmL, 5 μm)
Degasser:	DG-2080-54	Eluent A:	10 mM Sodium phosphate buffer – 100 mM Sodium perchlorate (pH 2.5, adjusted with phosphoric acid)
Gradient unit:	LG-2080-04	Eluent B:	Acetonitrile
Column oven:	CO-2060	Gradient condition:	(A/B), 0 min (90/10) → 4.0 min (75/25) → 6.0 min (75/25) → 12.0 min (60/40) → 18.0 min (20/80) → 23.00 min (20/80) → 23.1 min (90/10)
Autosampler:	AS-2059		1 cycle: 35.0 min
Detector:	MD-2018		

Flow rate:	1.0 mL/min
Column temp.:	40°C
Wavelength:	200-400 nm
Injection volume:	10 μL
Standard sample:	9 pharmaceutical ingredients 100 μg/mL each in 50% ethanol, except dihydrocodeine phosphate: 50 μg/mL

Structural formula of components of medicine are showed in Fig. 1.

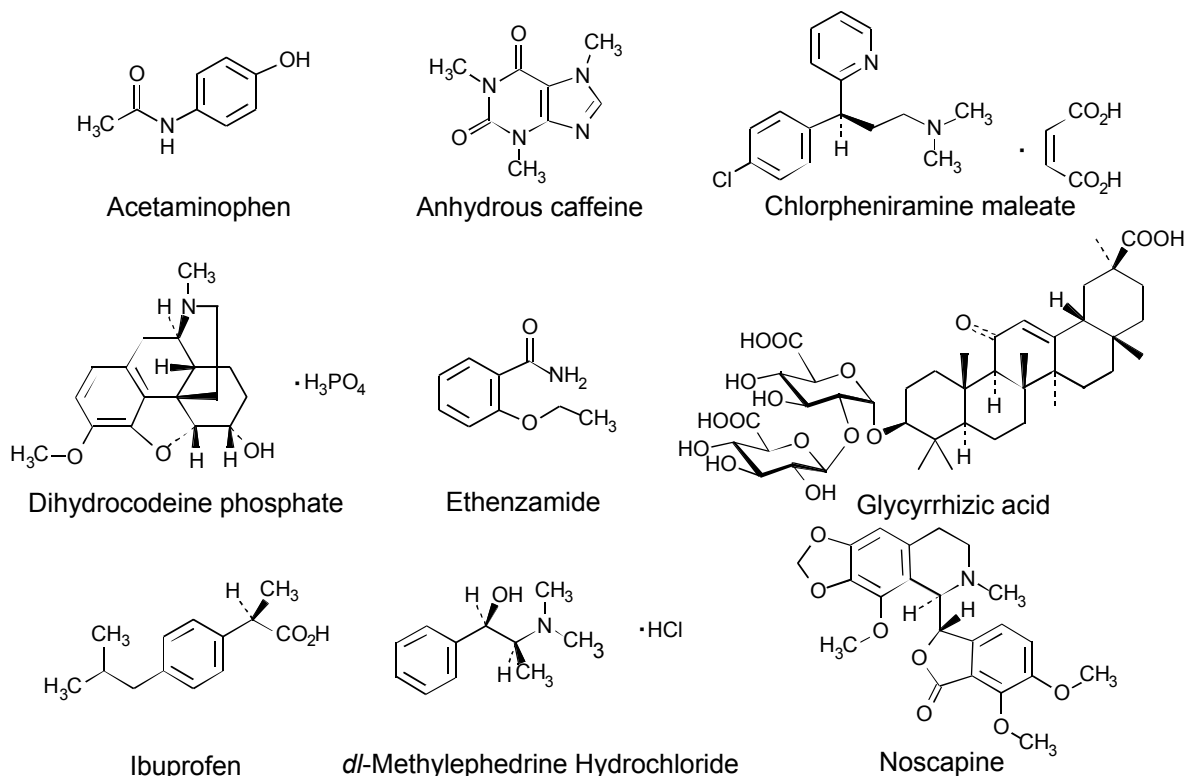


Fig.1. Structural formula of components of medicine

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Results

Chromatogram and contour plot of medicine's standard mixture (9 components) are showed on Fig. 2. Separation was completed within 22 minutes with good results. On peak spectra of medicine's standard mixture (9 components) are also shown in Fig. 3.

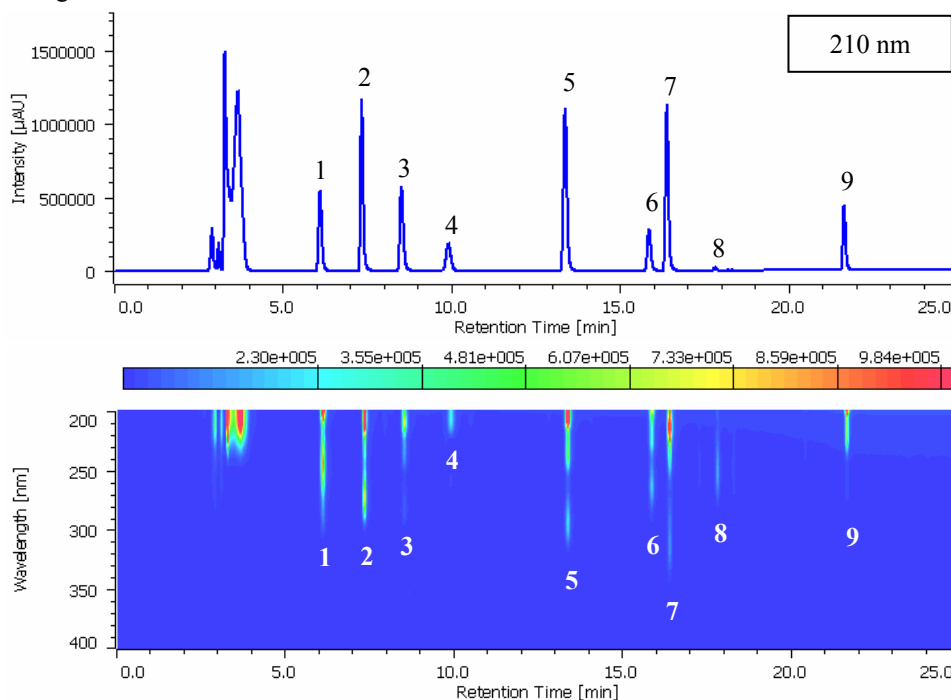


Fig. 2. Chromatogram and contour plot of medicine's standard mixture (9 components)

1: Acetaminophen, 2: Anhydrous caffeine, 3: Dihydrocodeine phosphate, 4: *dl*-Methylephedrine hydrochloride, 5: Ethenzamide, 6: Chlorpheniramine maleate, 7: Noscapine, 8: Glycyrrhizic acid, 9: Ibuprofen

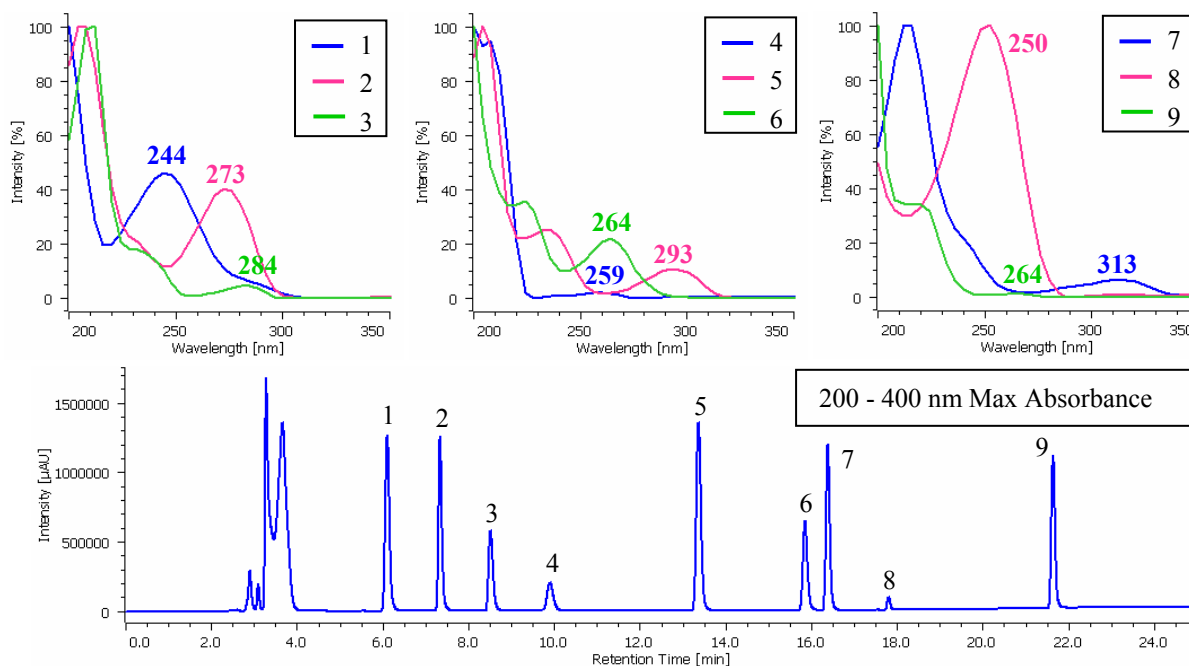


Fig. 3. On peak spectrum of medicine's standard mixture (9 components)

1: Acetaminophen, 2: Anhydrous caffeine, 3: Dihydrocodeine phosphate, 4: *dl*-Methylephedrine hydrochloride, 5: Ethenzamide, 6: Chlorpheniramine maleate, 7: Noscapine, 8: Glycyrrhizic acid, 9: Ibuprofen

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Procedure for sample preparation of commercial combination cold remedy is shown in Fig. 4.

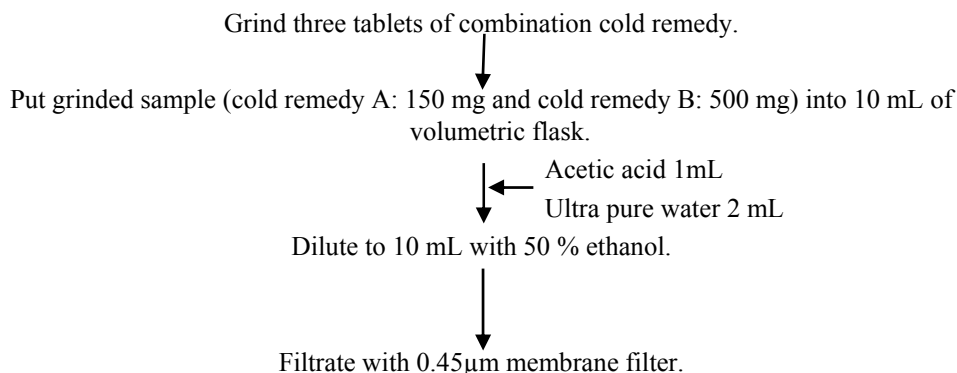


Fig. 4. Procedure for sample preparation of combination cold remedy

Chromatogram and contour plot of combination cold remedy A are showed on Fig. 5.

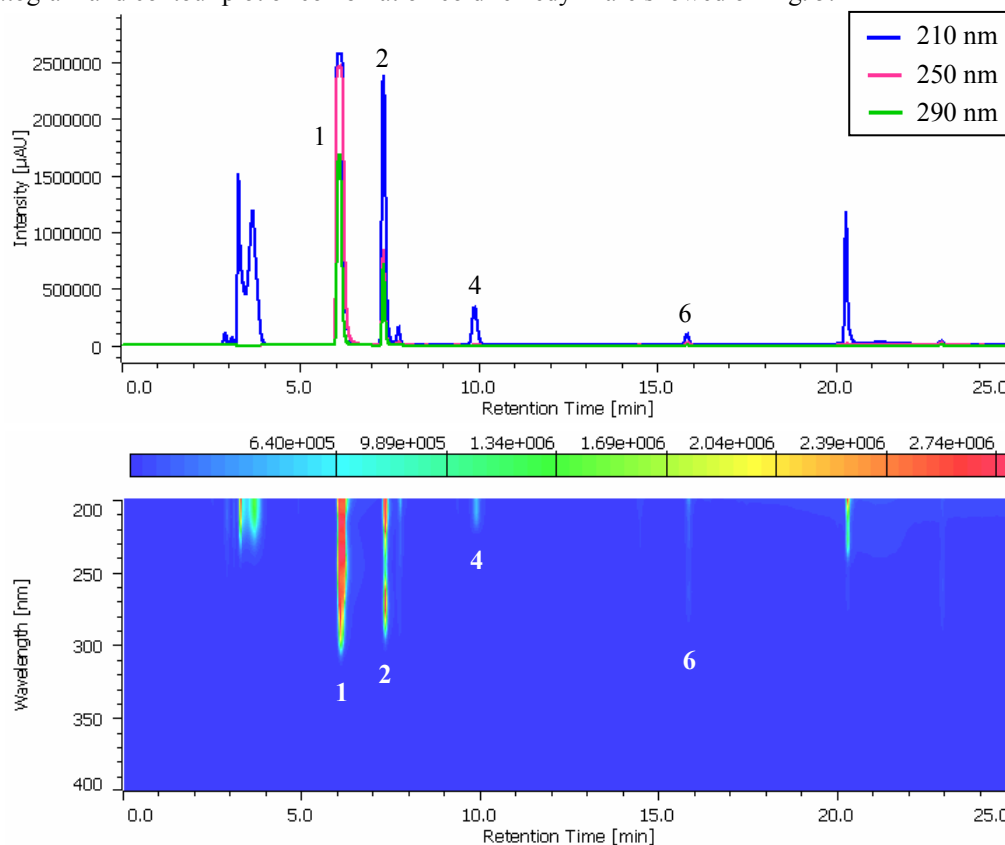


Fig. 5. Chromatogram and contour plot of combination cold remedy A

1: Acetaminophen, 2: Anhydrous caffeine, 3: Dihydrocodeine phosphate, 4: *dl*-Methylephedrine hydrochloride, 5: Ethenzamide, 6: Chlorpheniramine maleate, 7: Noscipine, 8: Glycyrrhizic acid, 9: Ibuprofen

Chromatogram and contour plot of combination cold remedy B are shown in Fig. 6.

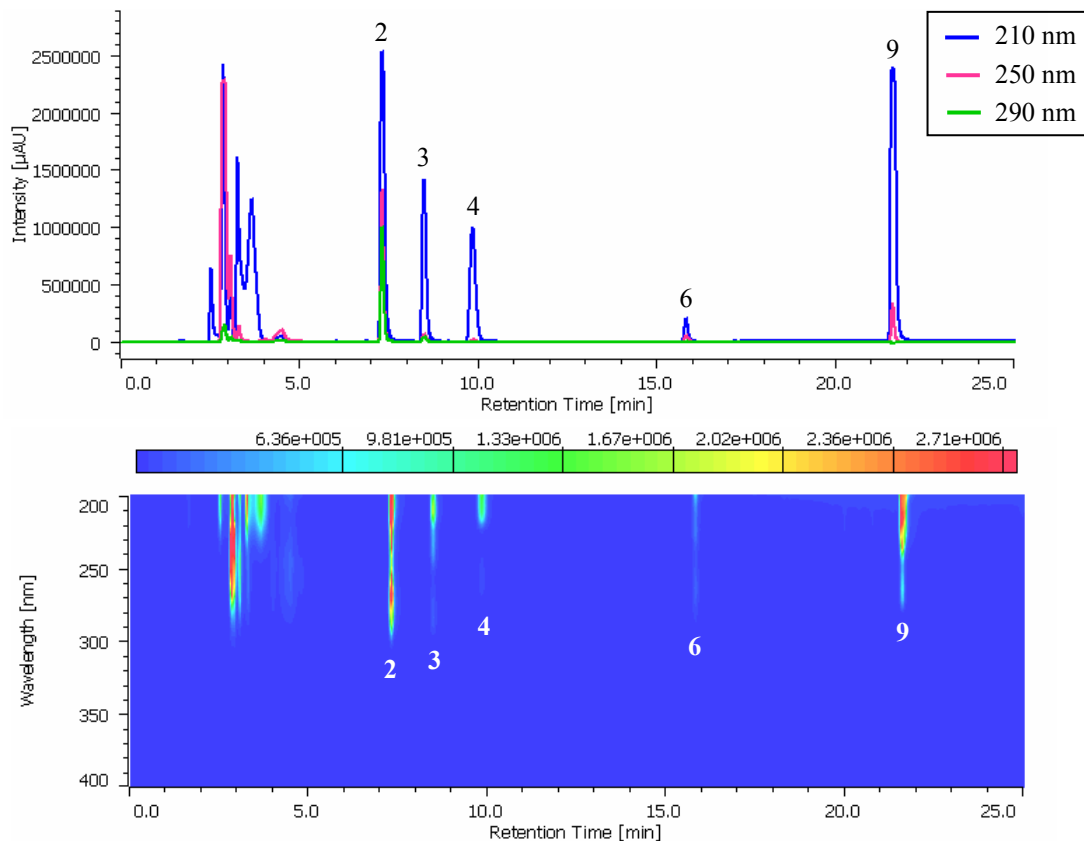


Fig. 6. Chromatogram and contour plot of combination cold remedy B
 1: Acetaminophen, 2: Anhydrous caffeine, 3: Dihydrocodeine phosphate, 4: *dl*-Methylephedrine hydrochloride,
 5: Ethenzamide, 6: Chlorpheniramine maleate, 7: Noscapine, 8: Glycyrrhizic acid, 9: Ibuprofen