**DEVELOPMENT OF A UPLC METHOD FOR PHENYLEPHRINE CONTAINING FORMULATIONS**

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**CHEMICAL STRUCTURES**

**OVERVIEW**

Since 2004, phenylephrine has been increasingly marketed by various drug manufacturers as a replacement for pseudoephedrine, a decongestant found in commercially available drug products. The motivation behind this substitution is to prevent the misuse of pseudoephedrine to produce illicit drug substances. Due to the chemical similarities of pseudoephedrine to amphetamines, pseudoephedrine has become a sought-after precursor for the illicit manufacture of methamphetamine and methedrine (1).

Pharmaceutical formulations used to treat the common cold often contain multiple active ingredients to treat different symptoms. These actives can include combinations of decongestants, antihistamines, pain relievers, cough suppressants/expectorants in addition to numerous excipients, all of which exhibit different chemical properties, including polarity. It is this range of analyte polarity that often makes chromatographic methods development difficult.

In this study, we examine the feasibility of utilizing UPLC® to develop a single chromatographic method for the analysis of the most common pharmaceutical formulations targeted to relieve symptoms associated with the common cold.

**EXPERIMENTAL APPROACH**

• A new **High Strength Solid HSS UPLC®** stationary phase was used to develop a single chromatographic method for the analyses of a number of possible formulation compositions. This stationary phase was selected due to its ability to enhance the retention of polar analytes while also having good chromatographic selectivity of hydrophobic species.

• This methodology was applied to several over-the-counter (OTC) formulations to observe if any chromatographic interferences from excipients occurred.

**STANDARD AND SAMPLE PREPARATION**

• Reference standards were prepared in a solution of 75:25 (v/v) water: methanol containing 0.2% formic acid.

• OTC liquid suspension formulations were obtained from a local pharmacy and diluted 1:4 with a mixture of 75:25 (v/v) water:methanol. These diluted formulations were directly injected on column without any further sample treatment or filtration.

**EXPERIMENTAL CONDITIONS**

Column: ACQUITY® Spheri-5™ C18 UPLC® column, 3.5 μm, 2.1 mm x 50 mm

Mobile Phase A: 0.2% HCOOH in 75:25 (v/v) H2O:MeOH

Mobile Phase B: 0.02% CF3COOH in 75:25 (v/v) ACN:MeOH

Flow Rate: 0.6 mL/min

Gradient: Time   Profile

0.0  99.9    0.1
7.50    1.0  99.0
8.00    1.0  99.0
12.5 μg/mL acetaminophen

**SEPARATION OF COLD MEDICINE ACTIVE INGREDIENTS: REFERENCE STANDARDS**

**ANALYSIS OF OVER-THE-COUNTER (OTC) LIQUID FORMULATIONS**

OTC Liquid Formulation 1

**OTC Liquid Formulation 2**

Children’s Benadryl® Allergy and Sinus

(1:4) Dilution

**CONCLUSIONS**

A fast, high resolution chromatographic method was developed for pharmaceutical formulations targeted to relieve symptoms of the common cold by utilizing a new UPLC® column designed specifically for the retention of polar analytes, the ACQUITY® HSS T3.

This single chromatographic method can be used to analyze a number of possible formulation compositions containing different active ingredients.

When applied to OTC formulations, adequate resolution of the active ingredients from excipients was observed.

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