CAPSULES
preliminary notes and applications from Bioanalytical Systems, Inc.

Profiling Commercial Pain Relieving Agents By LCUV

Purpose
Determination of ingredients in common over-the-counter analgesics.

Das Gupta [1] reported a rapid assay for the simultaneous measurement of six active ingredients in commercial pain relievers (acetaminophen, aspirin, caffeine, codeine phosphate, phenacetin and salicylamide) as well as salicylic acid, the breakdown product of aspirin. We have modified this procedure slightly and document its use for the four most common ingredients.

Existing Methods
Formation of chromaphores followed by colorimetry, and formation of volatile derivatives followed by gas chromatography. These methods are not as rapid or convenient as LC.

Conditions
System: BAS 400 Liquid Chromatograph
Detector: BAS UV-8 fixed wavelength (254 nm)
Column: BAS 3 µm Phase II ODS (100 x 3.2 mm) (PN MF-6213)
Mobile Phase: 90% (v:v) 0.01 M KH_2PO_4 (pH 2.3), 10% CH_3CN. Flow rate was 0.9 mL/min.
Linear Range: Linear to 1 µg injected standard.

Sample Preparation
Tablets were ground to a fine powder and 25 mg portions were dissolved in 20 mL methanol. The samples were brought to 250 mL with water, and 1 mL aliquots were filtered through 0.45 µm membranes (PN MF-5655) in MF-1 microfiltration tubes (PN MF-5500). The filtrate was injected into the chromatograph in 20 µL aliquots.

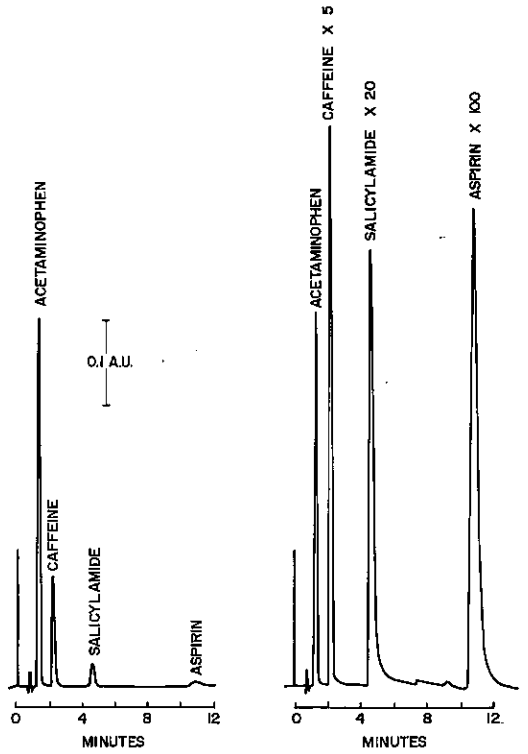

Figure 1. Chromatograms of analgesic standards (1 µg each) with (right) and without (left) gain changes.

Notes
The large differences in UV absorbance and retention time among the compounds necessitated the use of gain changes during each analysis (F1).

The relative purity and high concentration of active compounds in the tablets allowed the use of low gain, noise- free absorbance ranges (F2).

Calibration curves for the four ingredients were constructed by injecting 20 µL volumes of appropriately diluted standards (F3). These calibration curves were used to calculate (by comparison of peak

Table 1. Tablet analysis results. All values are in mg/tablet.

	VANQUISH®			EXCEDRIN®			DEWITT'S PILLS®*
Component	claimed	found	%claimed	claimed	found	%claimed	found
acetaminophen	194	185	95	250	254	102	-
caffeine	33	35	106	65	60	92	5.7
salicylamide	-	-	-	-	-	-	107
aspirin	227	237	104	250	262	105	-

* No amounts were listed. Ingredients included salicylamide, potassium nitrate, the medicinal herbs uva ursi and buchu, caffeine, several dyes, potato starch, shellac and wheat flour. None of these ingredients interfered with the analysis.

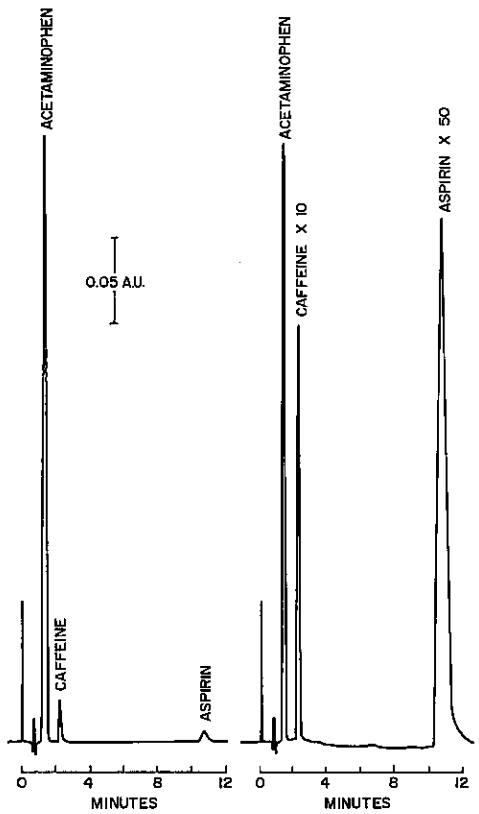

Figure 2. Active ingredients of Excedrin® chromatographed with (right) and without (left) gain changes.

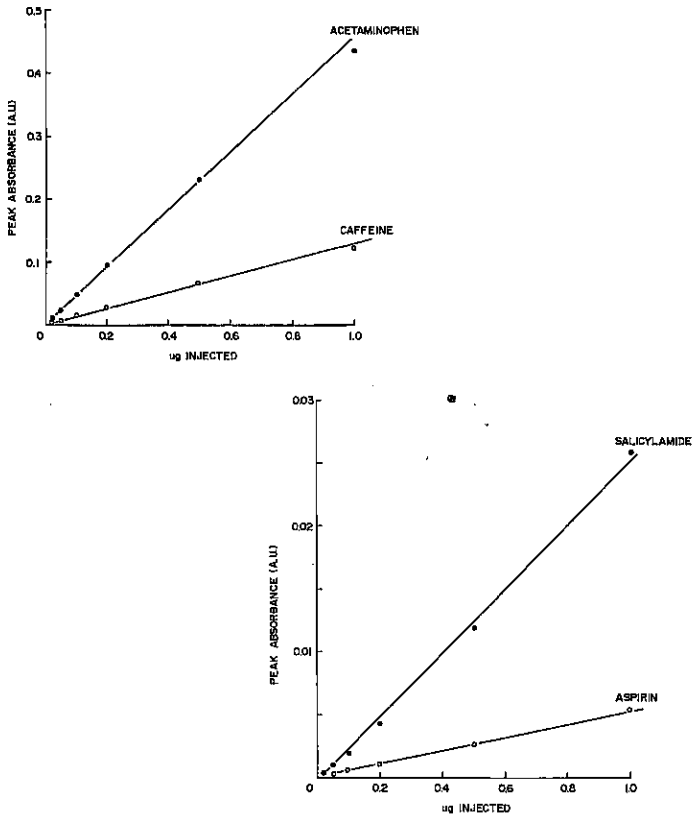

Figure 3. Calibration curves for analgesic ingredients. Each point represents the mean of two determinations.

heights) the amounts of the four compounds in commercial tablets (T1).

The determination of pain relievers presented above also can be performed on the BAS 200 Problem Solver. The model 200 allows gain changes to be programmed for automatic operation which would facilitate routine repetitive determinations.

Reference

1. Das Gupta, V., J. Pharm. Sci. 69 (1980) 109-113.