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## Note

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### High-performance thin-layer chromatography of propoxyphene hydrochloride diastereomers

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In this work, high-performance thin-layer chromatography (HPTLC)<sup>1,2</sup> is shown to be an effective means of resolving the  $\alpha$  and  $\beta$  diastereomers of the model compound propoxyphene hydrochloride. This is significant not only because it demonstrates application of the technique to separation of diastereomers, but also because of the potential use for fast identification of  $\alpha$ -propoxyphene in forensic<sup>3,4</sup> and drug chemistry<sup>5,6</sup> laboratories. Although propoxyphene may exist as two pairs of enantiomers<sup>7</sup>, resolution of the (*d, l*) mixtures is not discussed here. The TLC developing solvent system described is an improvement over earlier work<sup>3</sup> where spots appeared to tail significantly.

#### EXPERIMENTAL

##### *Materials*

Reagent grade methanol, acetone and concentrated ammonium hydroxide were used to prepare developing solvents for these experiments. Iodine crystals for a vapor exposure chamber as well as potassium iodide, bismuth nitrate and glacial acetic acid used to prepare Dragendorff's spray reagent<sup>8</sup> were also of reagent grade. The  $\alpha$ - and  $\beta$ -propoxyphene hydrochloride samples were obtained in-house and were used without further purification.

##### *Apparatus*

HPTLC plates were Whatman 10 × 10 cm silica gel silica gel 60 LHP-KDF 200  $\mu$ m layer with preadsorbent and fluorescent indicator (Whatman, Clifton, NJ, U.S.A.). These plates were developed in Camag twin trough chambers for 10 × 10 cm plates (Applied Analytical Industries, Wilmington, NC, U.S.A.).

Conventional TLC plates were precoated silica gel 60 F<sub>254</sub>, 20 × 20 cm with 0.25 mm adsorbent layer (E. Merck, from Brinkmann, Westbury, NY, U.S.A.). Rectangular, heavy-wall glass tanks, 30 × 10 × 28 cm (Brinkmann), were used for their development.

Plates were spotted using a Hamilton 1- $\mu$ l syringe (cat. no. 7001) and were viewed (after developing, drying and iodine or spray treatment) under visible or short-wave UV (254 nm) light using a Chromato-Vu (Ultra-Violet Products, San Gabriel, CA, U.S.A.).

TABLE I

COMPARISON OF CONVENTIONAL TLC AND HPTLC FOR  $\alpha$ - AND  $\beta$ -PROPOXYPHENE HYDROCHLORIDE DIASTEREOMER SEPARATIONS

	<i>Conventional TLC</i>	<i>HPTLC</i>
Developing time	75 min ( $\pm 5$ )	19 min ( $\pm 1$ )
Relative $R_F$ ( $\beta/\alpha$ )	1.09 ( $\pm 0.02$ )	1.08 ( $\pm 0.02$ )
Actual $R_F$ values		
$\beta$	0.70	0.78
$\alpha$	0.64	0.72

*Thin-layer chromatography*

Developing solvent consisted of 70 ml methanol, 30 ml acetone and 0.05 ml concentrated ammonium hydroxide. Unlined chambers were allowed 15 min for equilibration before use for plate development. Using a 1- $\mu$ l syringe, each plate was spotted at a nominal distance from the bottom using mixtures containing 50 mg/ml of each diastereomer. Plates were developed until the solvent migrated over approximately 90% of the length. Only single developments were tested in this work.

## RESULTS AND DISCUSSION

Table I compares data (averaged for three replicates) from diastereomer separations by conventional TLC and HPTLC techniques. Complete resolution of the isomers was possible in a single development in either case, but was accomplished by HPTLC in one-fourth the time. Note that the  $\beta$  isomer was the more mobile. Data in Table I are from separations of mixtures containing 10  $\mu$ g of each isomer. Although

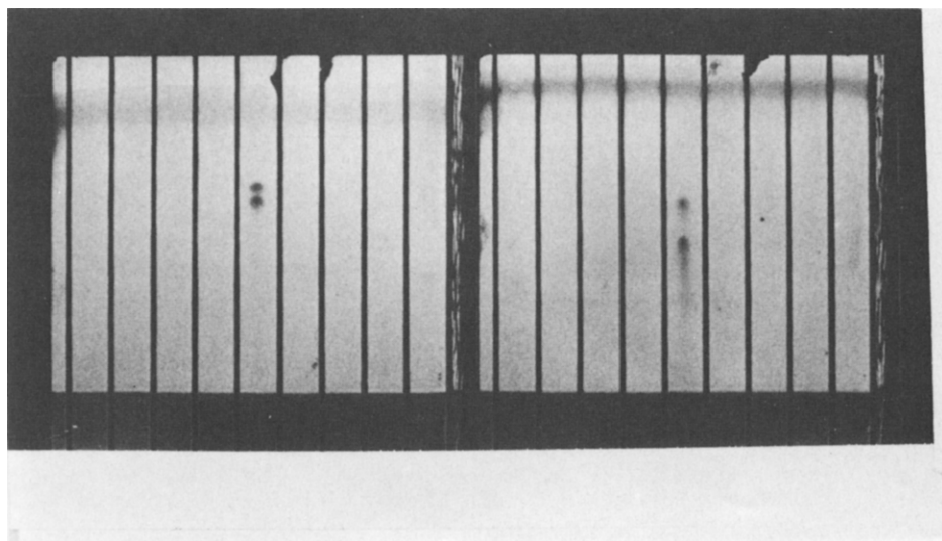


Fig. 1. HPTLC separations of  $\alpha$ - and  $\beta$ -propoxyphene hydrochloride in (left) the solvent system from this work and (right) in acetone described in ref. 3; spot size 50  $\mu$ g/isomer.

the diastereomers still separated when quantities up to 50  $\mu\text{g}$  each were spotted, small amounts of  $\beta$  isomer (1%) in the presence of large amounts of  $\alpha$  did not resolve. However, such quantitation is possible by high-performance liquid chromatography<sup>5</sup>. Good visualization of the spots was possible by either iodine vapor exposure or by use of the Dragendorff spray reagent<sup>8</sup>. In these experiments the developing system always produced compact round spots with essentially no tailing. Fig. 1 demonstrates the spot tailing on plates developed in acetone used in a literature system<sup>3</sup> and the lack of tailing in the present solvent system.

#### CONCLUSIONS

The diastereomers of propoxyphene hydrochloride may be resolved completely by HPTLC in substantially less time than that required for conventional TLC. The experimental system produces round, small spots and offers promise as a fast control or identity technique. Moreover, the potential for effective laboratory resolution of diastereomers is demonstrated.

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