

ChiralTek ChiralCTAM-2 Column Manual and Applications in HPLC& UPLC

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ChiralCTAM Chiral Columns for UPLC and HPLC

2. Introduction

ChiralCTAM columns are a new type of completely-substituted amylose-coated silica particles-packed chiral columns. The ChiralCTAM particles were prepared through a specially-designed procedure by coating the amylose derivatives onto the surface of the chemically-modified macroporous silica gel (2 μ m, 3 μ m, or 5 μ m for analytical columns). The schematic chemical structure of the ChiralCTAM phase is shown in Figure (A).



ChiralCTAM-2: R= 3,5-Dimethylphenylcarbamate;
 ChiralCTAM-3: R=3-Chloro-4-methyl-phenylcarbamate;
 ChiralCTAM-5: R= 3-Chloro-5-methyl-phenylcarbamate;
 ChiralCTAM-6: R= (S)- α -Methylbenzylcarbamate;

Figure (A). Schematic diagram of the ChiralCTAM phase

High-quality sphere macroporous silica particles with pore size 500Å, 1000Å and above are used to manufacture the ChiralCTAM phases. Therefore, high column efficiency can be easily achieved on the ChiralCTAM columns.

As the ChiralCTAM phases are amylose derivative-coated silica particles, they are designed only for normal phase conditions in HPLC, UPLC, and SFC. Typical mobile phases are mixtures of Hexane/IPA, or Hexane/EtOH, or Heptane/Butanol, or CO₂/EtOH, or CO₂/IPA, etc. with/or without organic acidic or basic additives. The ChiralCTAM columns cannot be used under reversed-phase or other non-typical mobile phase conditions.

Please use amylose-immobilized ChiralAM columns if other non-typical mobile phases or reversed-phase mobile phases are required for the chromatographic separations.

The ChiralCTAM columns can be used only under normal mobile phase conditions with some organic acidic or basic additives. A proper chiral guard column or a common Diol guard column can be used for ChiralCTAM column under normal phase conditions.

The ChiralCTAM column is stored in Hexane/IPA (90:10, v/v) upon delivery. It is strongly recommended to flush the column with compatible mobile phase to achieve a stable baseline under normal phase condition before final application in UPLC, HPLC, or SFC.

Non-typical solvents, e.g., Acetone, Chloroform, Dichloromethane, DMF, DMSO, 1,4-Dioxane, Ethyl acetate, THF, Toluene, etc., cannot be used to resolve samples and cannot be used as mobile phase additives.

The ChiralCTAM columns have many different types of dimension and configuration. Figure (B) show a new type of fast ChiralCTAM-2 column with dimension of 100 $\times$ 4.6mm, 3 μ m. The column head and column filter are specially designed to allow the column to be used in traditional HPLC to achieve UPLC-like fast separation with high resolution.



Figure (B). Typical photo a new type of ChiralCTAM-2 column for fast separation in traditional HPLC

ChiralTek provides analytical column with common dimension of 250 $\times$ 4.6mm, 5 μ m. ChiralTek also manufacture other dimension columns which can be used in both UPLC

ChiralCTAM Chiral Columns for UPLC and HPLC

and HPLC. The photo of a widely-used ChiralCTAM-2 analytical column for HPLC & UPLC with dimension of 250mm × 2.1 mm × 3μm is shown below.



Figure (C). Typical photo of an analytical ChiralCTAM-2 column

The column pressure for ChiralCTAM columns with 5μm particles is quite low in HPLC and SFC. However, when using ChiralCTAM columns with 2μm and 3μm particles, low flow rate (e.g., 0.1-0.5 mL/min) should be applied when used in traditional HPLC with highly viscous mobile phases in order to avoid high back pressure. However, there is no special flow rate limitation for use in UPLC or SFC.

Flow direction:	Arrow direction on the label
Pressure:	< 860 bar (~12500 psi , 2 μm, 3μm)
	< 460 bar (~7000 psi , 5 μm, HPLC)
Temperature:	0 – 40 °C
Guard column:	Chiral or standard Diol column
Mode:	HPLC, SFC, or UPLC

Besides the above analytical columns packed with 2μm or 3μm particles, varies of semi-preparative and preparative-scale columns packed with 5μm or 10μm particles are available as well. Figure (D) shows some typical semi-preparative and preparative-scale chiral columns from ChiralTek.



Figure (D). Typical photo of the semi-preparative and preparative ChiralCTAM columns

Notes and applications

Some typical chiral drug compounds were used to evaluate the enantiomeric separation performance of the ChiralCTAM-2 columns packed with 3μm or 5μm particles. Some of the typical chromatograms for those tests are shown in this notes and applications.

The chromatographic separations were performed on Agilent 1100 Agilent 1290 UPLC-UV system under normal phase conditions for coated chiral columns.

ChiralTek provides a type of screening kit: 803-SK1-61 (4 different types of analytical columns). ChiralTek also provide free screening tests for chiral separation if customer can provide the test samples.

3. Order Information for ChiralCTAM Columns

<i>Part Number</i>	<i>Type</i>	<i>Dimension</i>	<i>Description</i>
9022-CTAM2-01	ChiralCTAM-2	2μm, 1000Å, 50 × 2.1mm	2μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
9032-CTAM3-02	ChiralCTAM-3	2μm, 1000Å, 100 × 2.1mm	3μm amylose tris(3-chloro-4-methyl-phenylcarbamate)-coated analytical column
9053-CTAM5-03	ChiralCTAM-5	3μm, 1000Å, 150 × 2.1mm	3μm amylose tris(3-chloro-5-methyl-phenylcarbamate)-coated analytical column
9023-CTAM2-04	ChiralCTAM-2	3μm, 1000Å, 200 × 2.1mm	3μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
9023-CTAM2-05	ChiralCTAM-2	3μm, 1000Å, 250 × 2.1mm	3μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
9023-CTAM2-62	ChiralCTAM-2	3μm, 1000Å, 100 × 4.6mm	3μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
95023-CTAM2-61	ChiralCTAM-2	3μm, 500Å, 50 × 4.6mm	3μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
95023-CTAM2-62	ChiralCTAM-2	3μm, 500Å, 100 × 4.6mm	3μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
9033-CTAM3-62	ChiralCTAM-3	3μm, 1000Å, 100 × 4.6mm	3μm amylose tris(3-chloro-4-methyl-phenylcarbamate)-coated analytical column
9025-CTAM2-05	ChiralCTAM-2	5μm, 1000Å, 250 × 4.6mm	5μm amylose tris(3,5-dimethylphenyl-carbamate)-coated analytical column
9035-CTAM3-05	ChiralCTAM-3	5μm, 1000Å, 250 × 4.6mm	5μm amylose tris(3-chloro-4-methyl-phenylcarbamate)-coated analytical column
9075-CTAM6-05	ChiralCTAM-6	5μm, 1000Å, 250 × 4.6mm	5μm amylose tris((s)- α-methylbenzylcarbamate)-coated analytical column
9025-CTAM2-14	ChiralCTAM-2	5μm, 1000Å, 200 × 10.0mm	5μm amylose tris(3,5-dimethylphenyl-carbamate)-coated semi-preparative column
9025-CTAM2-25	ChiralCTAM-2	5μm, 1000Å, 250 × 20.0mm	5μm amylose tris(3,5-dimethylphenyl-carbamate)-coated preparative column
9025-CTAM2-35	ChiralCTAM-2	5μm, 1000Å, 250 × 30.0mm	5μm amylose tris(3,5-dimethylphenyl-carbamate)-coated preparative column
803-SK1-61	ChiralKit-1	3μm, 1000Å, 50 × 4.6mm	Screening Kit-1 (4 analytical columns)

ChiralCTAM columns with other dimensions are also available. This manual may not be updated on time, please visit English website <http://chiraltek-column.com/Downloads.php> for downloading the latest version of full product manual and application notes for ChiralCTAM columns. Please call an international phone number (+65)-93656129 to directly contact ChiralTek technical support team in Singapore. You also can call a special local phone number (+86)-95040358310 in the mainland of China to directly contact ChiralTek support team in Singapore.

Order Information

<i>Part number</i>	<i>Type</i>	<i>Column Dimension</i>	<i>Remarks</i>
9055-CTAM5-25	ChiralCTAM-5	5μm, 1000Å, 250 × 20.0mm	5μm amylose tris(3-chloro-5-methylphenyl-carbamate)-coated preparative column
9055-CTAM5-35	ChiralCTAM-5	5μm, 1000Å, 250 × 30.0mm	5μm amylose tris(3-chloro-5-methylphenyl-carbamate)-coated preparative column

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ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Benzoin on ChiralCTAM-2 column

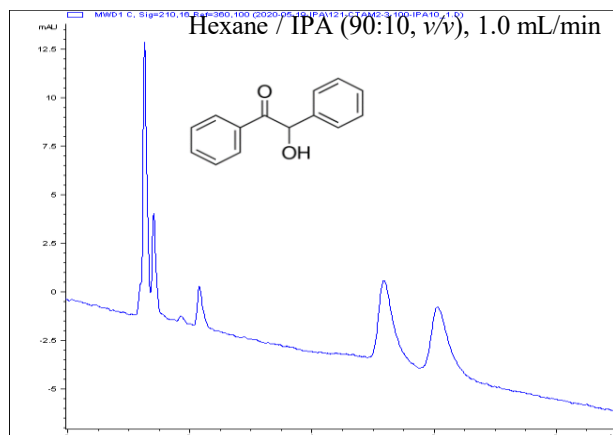


Figure (CTAM2)-1. Chiral separation of Benzoin on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@210nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Benzyl Mandelate on ChiralCTAM-2 column

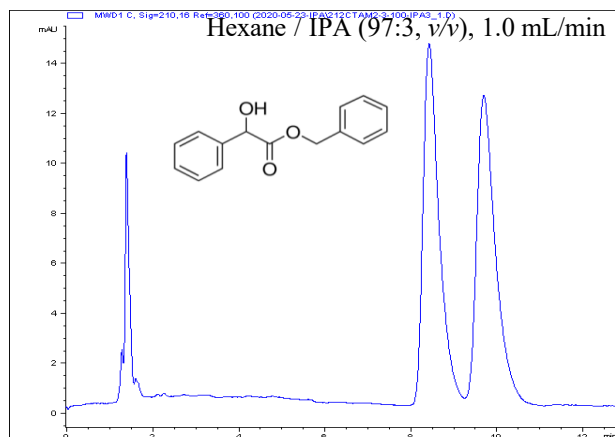


Figure (CTAM2)-2. Chiral separation of Benzyl Mandelate on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (97:3, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@210nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Bifonazole on ChiralCTAM-2 column

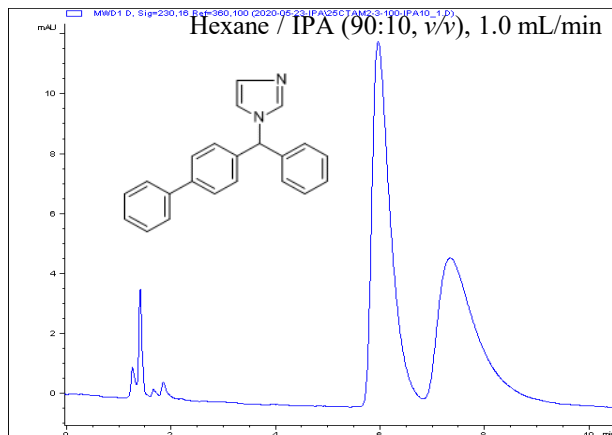


Figure (CTAM2)-3. Chiral separation of Bifonazole on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

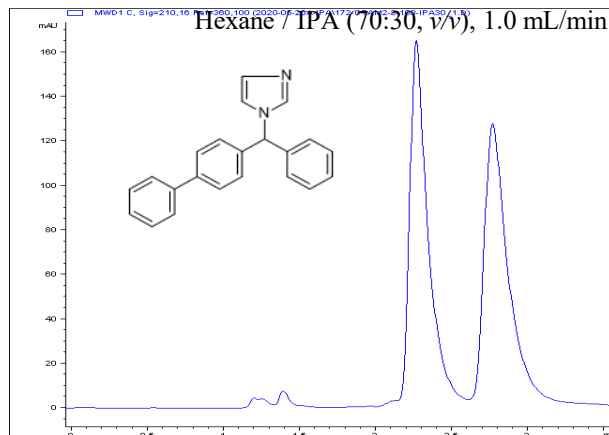


Figure (CTAM2)-4. Chiral separation of Bifonazole on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (70:30, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@210nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Chlormezanone on ChiralCTAM-2 column

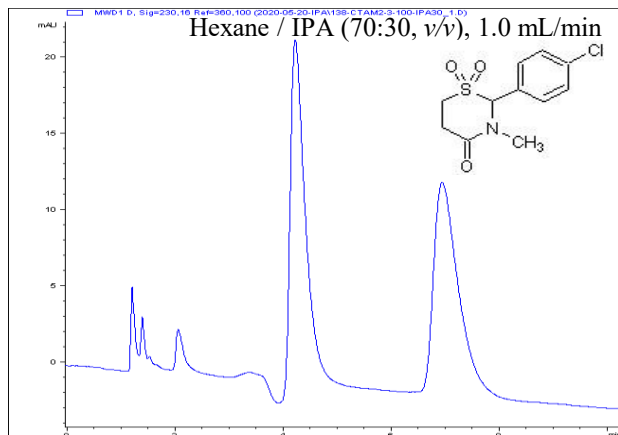


Figure (CTAM2)-5. Chiral separation of Chlormezanone on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (70:30, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@220nm
Temperature: Ambient

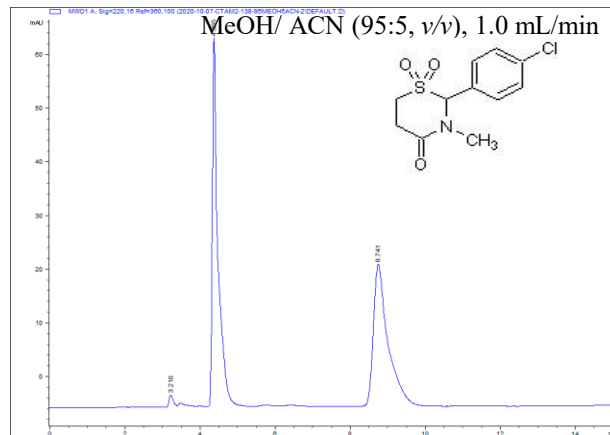


Figure (CTAM2)-6. Chiral separation of Metamifop on ChiralCTAM-2 under polar organic conditions using MeOH / ACN (95:5, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.
Part No. 9025-CTAM2-05
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

4-Chlorobenzoin on ChiralCTAM-2 column

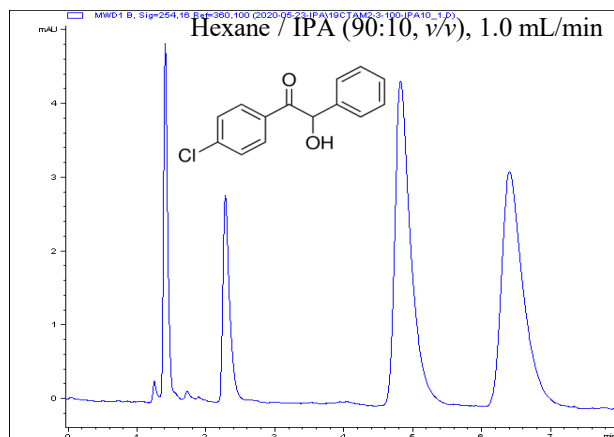


Figure (CTAM2)-7. Chiral separation of 4-Chlorobenzoin on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.

Part No. 95023-CTAM2-62

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@254nm

Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Corey Lactone Diol on ChiralCTAM-2 column

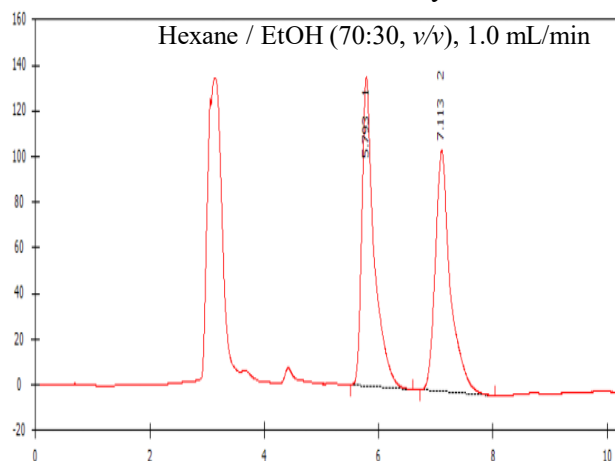


Figure (CTAM2)-8. Chiral separation of Corey Lactone Diol on ChiralCTAM-2 column under normal phase condition using Hexane / EtOH (70:30, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.
Part No. 9025-CTAM2-05
LC Mode: HPLC (Shimadzu LC20)
Flow rate: 1.0 mL/min
Detection: UV@210nm
Temperature: Ambient

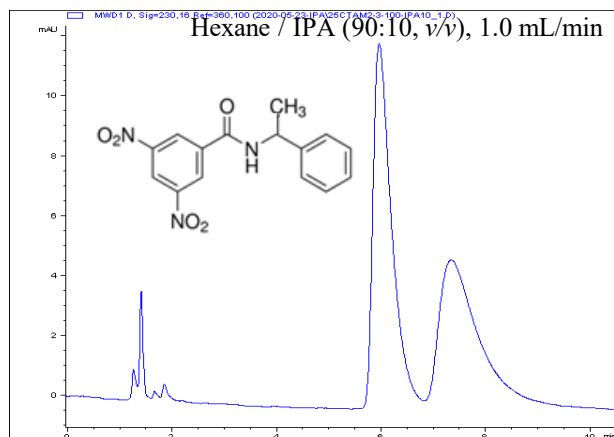
ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC**3,5-Dinitro-N-(1-phenylethyl)benzamide on ChiralCTAM-2 column**

Figure (CTAM2)-9. Chiral separation of 3,5-Dinitro-N-(1-phenylethyl)benzamide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.

Part No. 95023-CTAM2-62

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@230nm

Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Metamifop on ChiralCTAM-2 column

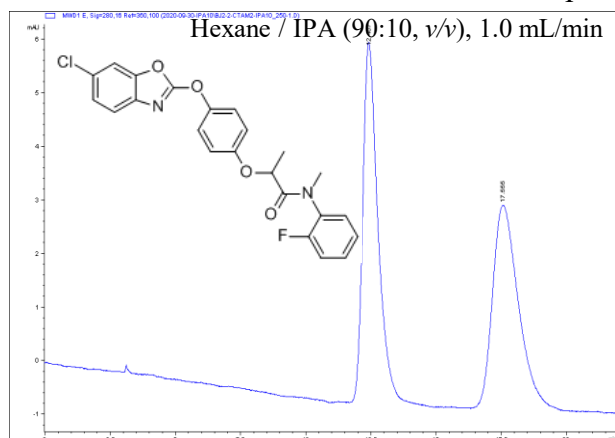


Figure (CTAM2)-10. Chiral separation of Metamifop on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.

Part No. 9025-CTAM2-05

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@230nm

Temperature: Ambient

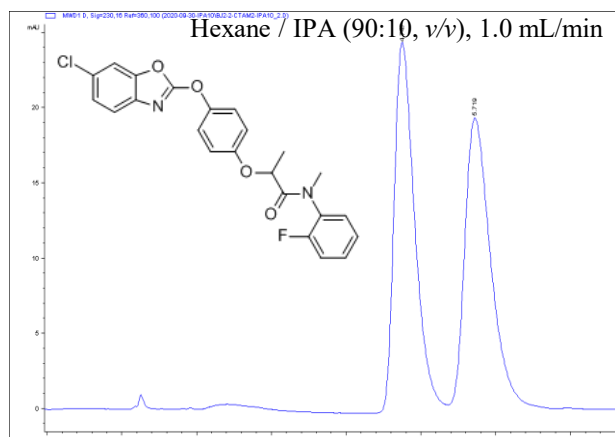


Figure (CTAM2)-11. Chiral separation of Metamifop on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.

Part No. 95023-CTAM2-62

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@230nm

Temperature: Ambient

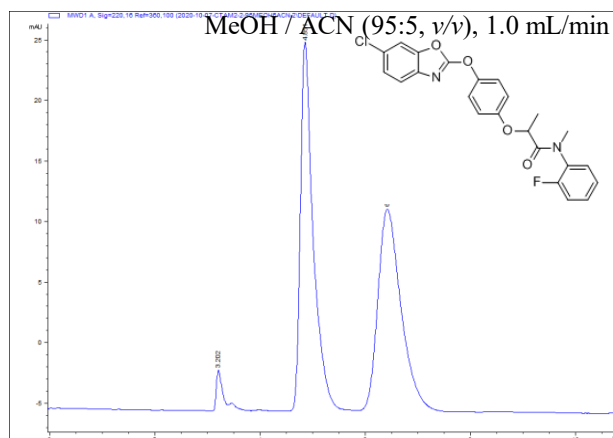


Figure (CTAM2)-12. Chiral separation of Metamifop on ChiralCTAM-2 using MeOH / ACN (95:5, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.

Part No. 9025-CTAM2-05

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@220nm

Temperature: Ambient

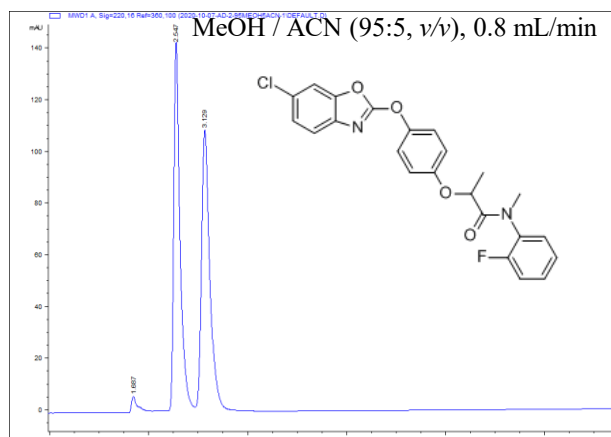


Figure (CTAM2)-13. Chiral separation of Metamifop on ChiralCTAM-2 using MeOH / ACN (95:5, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.

Part No. 95023-CTAM2-62

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@220nm

Temperature: Ambient

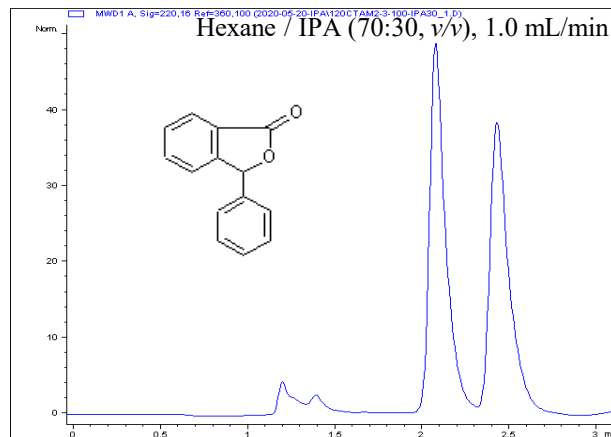
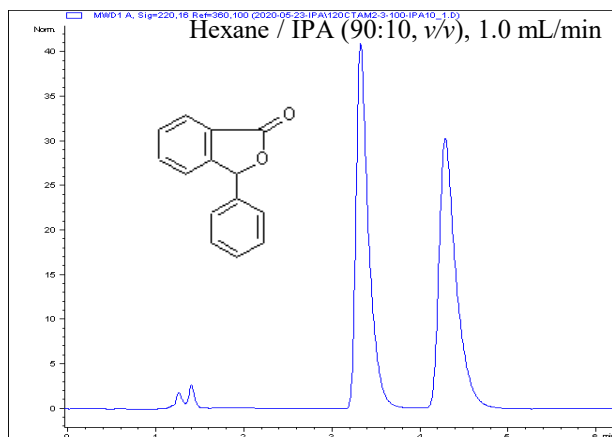
ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC**3-Phenylphthalide on ChiralCTAM-2 column**

Figure (CTAM2)-14. Chiral separation of 3-Phenylphthalide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@220nm
Temperature: Ambient

Figure (CTAM2)-15. Chiral separation of 3-Phenylphthalide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (70:30, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@220nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Praziquantel on ChiralCTAM-2 column

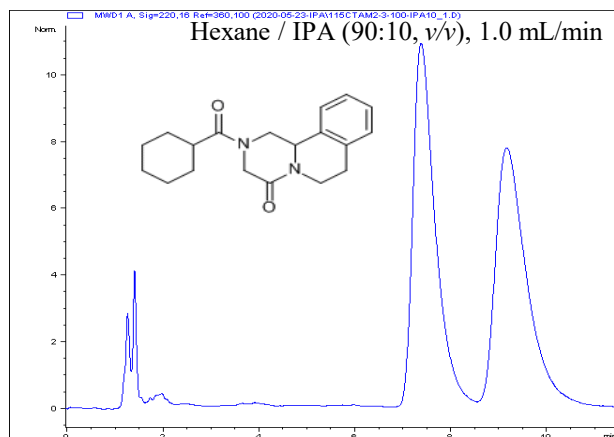


Figure (CTAM2)-16. Chiral separation of Praziquantel on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2

Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.

Part No. 95023-CTAM2-62

LC Mode: HPLC (Agilent1100)

Flow rate: 1.0 mL/min

Detection: UV@220nm

Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Stilbene Oxide on ChiralCTAM-2 column

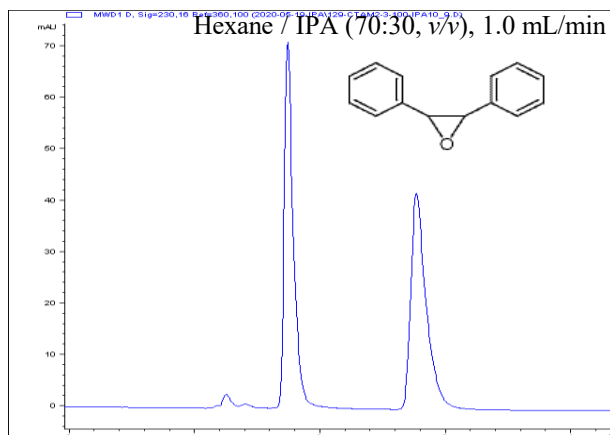


Figure (CTAM2)-17. Chiral separation of Stilbene Oxide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (70:30, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

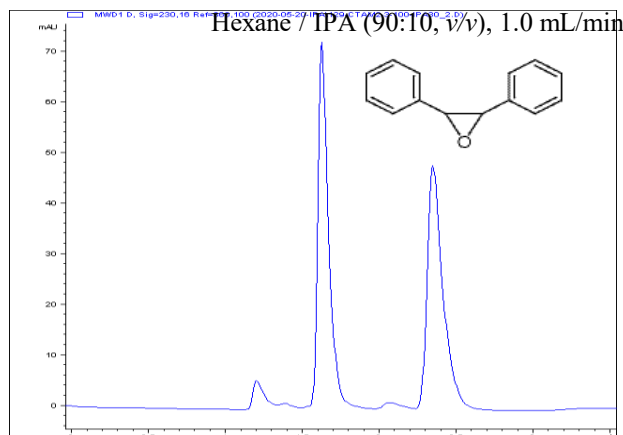


Figure (CTAM2)-19. Chiral separation of Stilbene Oxide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

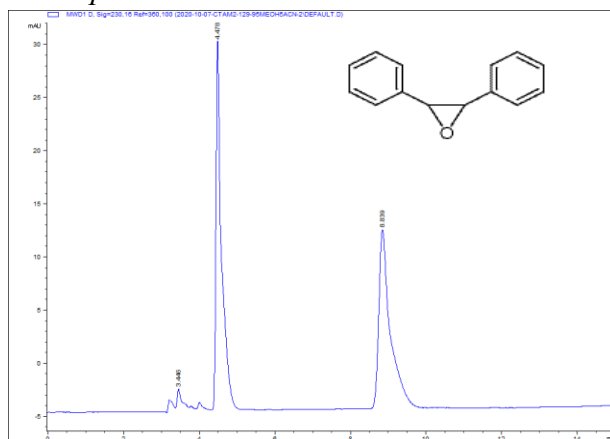


Figure (CTAM2)-18. Chiral separation of Stilbene Oxide on ChiralCTAM-2 using MeOH / ACN (95:5, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.
Part No. 9025-CTAM2-05
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

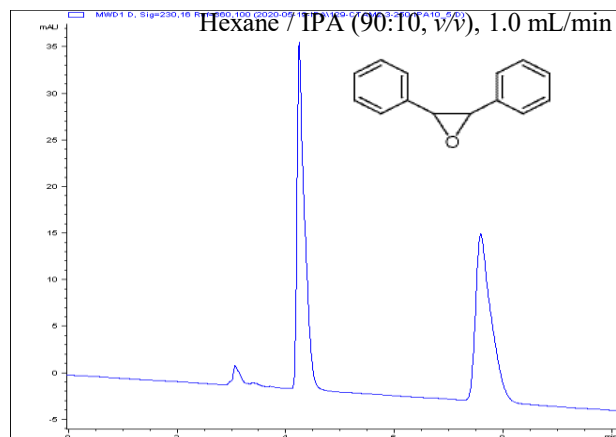
ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC**Stilbene Oxide on ChiralCTAM-2 column**

Figure (CTAM2)-20. Chiral separation of Stilbene Oxide on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.
Part No. 9025-CTAM2-05
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@230nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Thalidomide on ChiralCTAM-2 column

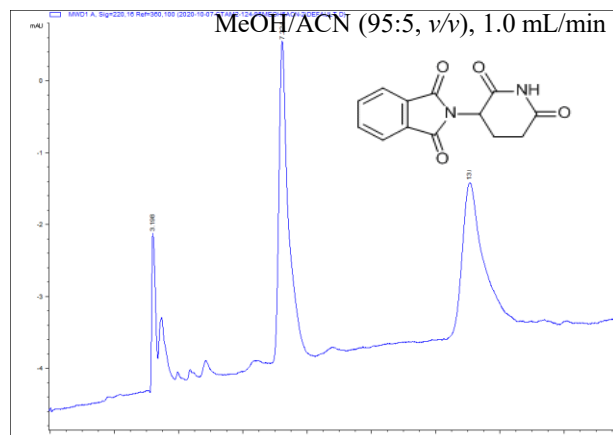


Figure (CTAM2)-21. Chiral separation of Thalidomide on ChiralCTAM-2 column under polar organic condition using MeOH/CAN (95:5, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 5 μ m, 250 $\times$ 4.6 mm I.D.
Part No. 9025-CTAM2-05
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@220nm
Temperature: Ambient

ChiralCTAM-2 Column Notes and Applications in HPLC and UPLC

Troger's Base on ChiralCTAM-2 column

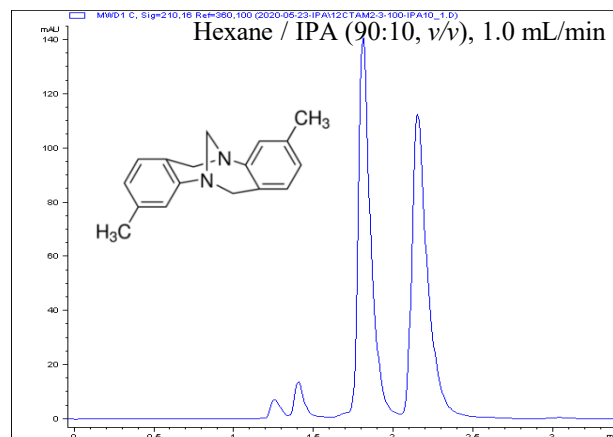
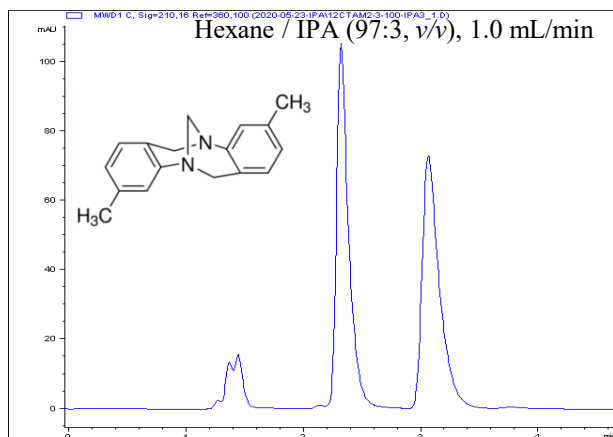


Figure (CTAM2)-22. Chiral separation of Troger's Base on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (79:3, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@210nm
Temperature: Ambient

Figure (CTAM2)-23. Chiral separation of Troger's Base on ChiralCTAM-2 column under normal phase condition using Hexane / IPA (90:10, v/v) as mobile phase

Column: ChiralCTAM-2
Dimension: 3 μ m, 100 $\times$ 4.6 mm I.D.
Part No. 95023-CTAM2-62
LC Mode: HPLC (Agilent1100)
Flow rate: 1.0 mL/min
Detection: UV@220nm
Temperature: Ambient