Supporting Information

Asymmetric Synthesis of (-)-Leiocarpin A via (-)-(S)-Goniothalamine Employing Julia-Kocienski Olefination.

Suresh Babu Meruva,^{a, b*} Raghavendra Rao K,^a Aaseef Mohammed,^a Vilas H. Dahanukar,^a U. K.
Syam Kumar,^{a*} P. K. Dubey^b

^aTechnology Development Centre, Custom Pharmaceutical Services, Dr. Reddy's
Laboratories Ltd, Miyapur, Hyderabad, India 500049.

^bDepartment of Chemistry, College of Engineering, JNTUH, Kukatpally,
Hyderabad, India 500085.

* Corresponding author. fax: 914044658699 / 8438; e-mail: *sureshbabum@drreddys.com*

* Corresponding author. e-mail: *syam_kmr@yahoo.com*

Synthesis of *tert*-Butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**).^[42]

To a stirred solution of *tert*-butyl 2-((4*R*,6*S*)-2,2-dimethyl-6-(((1-phenyl-1*H*-tetrazol-5-yl)sulfonyl)methyl)-1,3-dioxan-4-yl)acetate **10** (50.0 g, 0.11 mol) in dry THF (500 mL) was added benzaldehyde **13** (14.0 g, 0.13 mol). The reaction mixture was cooled to -75 °C. To the reaction mixture was added LiHMDS 22% THF solution (100 mL, 0.13mol) in 60 minutes. The reaction mixture maintained at that temperature for about 1 h and it was allowed to room temperature and stirred for 1-2 h. Then based on TLC indication for absence of starting material it was quenched with 5% aq. KHCO₃ solution and separated the THF layer. The organic layer was washed with saturated brine solution and dried over anhydrous sodium sulphate and concentrated to dryness. The crude residue purified by column chromatography (eluent: ethyl acetate/hexanes = 0.5/9.5) to yield 31 g (85%) of **9** as pale yellow liquid and upon holding in refrigerator at 0-10 °C an off-white solid was obtained. Yield = 85%; mp 53.2-55.4 °C. $[\alpha]_D^{25} = -2.5$ (c, 1 w/v, CHCl₃). ¹H NMR: (400 MHz, CDCl₃) δ : 1.41 (s, 12H), 1.45 (m, 1H), 1.48(s, 3H), 1.73-1.69 (td, $J = 2.4, 7.6$ Hz, 1H), 2.27 (dd, $J = 6.8, 8.4$ Hz, 1H), 2.48 (dd, $J = 6.8, 8.4$ Hz, 1H), 4.56 (m, 1H), 4.36 (m, 1H), 6.17 (dd, $J = 6.4, 16$ Hz, 1H), 6.62 (d, $J = 16$ Hz, 1H), 7.24 (d, $J = 4.8$ Hz, 1H), 7.31 (t, $J = 5.6$ Hz, 2H), 7.38 (d, $J = 1.8$ Hz, 2H). ¹³C NMR (100 MHz, CDCl₃) δ : 170.1, 136.5, 132.5, 130.7, 128.6, 128.2, 127.3, 126.4, 98.9, 80.2, 69.9, 65.7, 42.5, 36.6, 30.1, and 19.7. Mass (ESI) m/z $[M]^+$ 355.2. HPLC purity: 91.9 *E* isomer, 8.1 *Z* Isomer; Column: Kinetex, C18, diameter: 100 x 4.6, 2.5 μ . Mobile phase B: Acetonitrile: methanol 40:60; Mobile phase A: 20 mM Ammonium acetate: methanol 60:40.

Synthesis of (4*R*, 6*S*)-4-hydroxy-6-((*E*)-styryl)tetrahydro-2*H*-pyran-2-one (7**).** Aqueous NaOH solution (3.6 g, 0.09 mol) was added to a solution of **9** (10 g, 0.03 mol.) in MeOH (80 mL) and the reaction mixture was refluxed for 2-4 h. MeOH was removed under reduced

pressure; the residue was diluted with water (30 mL). Aqueous layer washed with AcOEt (25 mL) and layers were separated. Adjusted the aqueous layer pH to 1.5 - 2.5 using aqueous sodium bisulphate solution. Extracted the product into MTBE (50 mL) and evaporated under reduced pressure. Residue was diluted with acetonitrile (100 mL) and oxalic acid (4.0 g, 0.045 mol), water (12 mL) was added to it. Reaction mixture was stirred for 30-60 minutes at 25-35 °C and then based on TLC indication for starting material content approximately 5% it was diluted with saturated brine solution. Layers were separated and the acetonitrile layer was dried over anhydrous sodium sulphate and concentrated to dryness. Toluene (60mL) was added to the residue and it was refluxed for 5h. Cooled the reaction mass to room temperature and toluene layer washed with 2% sodium bicarbonate solution and concentrated to dryness under reduced pressure. The crude residue was purified by column chromatography using AcOEt / hexane (60:40) and obtained the 3.8g of **7** as white color solid (over all yield for 3 steps is 58%); White solid; mp 112-112.9 °C. $[\alpha]_D^{27} = 10.8$ (c, 0.8 w/v, CHCl₃); Reported $[\alpha]_D^{27} = 9.8$ (c, 0.8 w/v, CHCl₃).^[28] ¹H NMR: (400 MHz, CDCl₃) δ : 7.38 (d, $J = 6.8$ Hz, 2H), 7.33 (t, $J = 7.2$ Hz, 2H), 7.26 (d, $J = 6.8$ Hz, 1H), 6.68 (d, $J = 16$ Hz, 1H), 6.17 (dd, $J = 6.4, 16$ Hz, 1H), 5.38 (m, 1H), 4.45 (m, 1H), 2.82 (dd, $J = 4.8, 12.8$ Hz, 2H), 2.70-2.65 (td, $J = 2.4, 15.2$ Hz, 2H) and 1.98 (t, 1H). ¹³C NMR (125 MHz, CDCl₃) δ : 170.7, 135.7, 132.4, 128.5, 128.1, 126.5, 126.4, 76.4, 62.3, 38.5, and 30.0. Mass: $[M+1] = 219.2$, $[M+23] = 241.0$.

(S,E)-6-styryl-5,6-dihydro-2H-pyran-2-one (2): Mesyl chloride (1.05 gm, 9 mmol) was added to a solution of **7** (1.0 gm, 4.5 mmol) and TEA (1.85 gm, 18.3 mmol) in DCM (25 mL) at -35 °C. Stirring was continued for 4 h and by TLC indication for absent of starting material the reaction mixture washed with brine solution and the organic layer dried over anhydrous Na₂SO₄. The organic layer was concentrated to dryness under reduced pressure and the obtained residue was purified by column chromatography (hexane and ethyl acetate 60:40) to yield **2** as white color

solid. Yield: 80%; mp 82 °C. $[\alpha]_{\text{D}}^{25} = -111.6$ (c, 0.3 w/v, CHCl_3); Reported $[\alpha]_{\text{D}}^{25} = -112.7$ (c, 0.3 w/v, CHCl_3). ^1H NMR: (400 MHz, CDCl_3) δ : 7.38 (d, $J = 8.8$ Hz, 2H), 7.35 (t, $J = 7.0$ Hz, 2H), 7.28 (t, $J = 5.2$ Hz, 1H), 6.93 (m, 1H), 6.75 (d, $J = 15.6$ Hz, 1H), 6.29 (dd, $J = 5.6, 10$ Hz, 1H), 6.10 (td, $J = 1.6, 6.4$ Hz, 1H), 5.09 (q, $J = 7.0$ Hz, 1H), 2.54 (m, 2H). Mass: $[\text{M}+1] = 201.0$.

^1H , ^{13}C , Mass, and SOR spectrum

^1H NMR of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**).

TDC-206 CSUR/GON-1/001 in CDCl₃

NMR-400MHz

AR.No: NE1012/2462

Analyst: Haribabu

Date: 25th Oct. 2012

NUCLEUS : ^1H

FREQ (MHz): 400.23

EXP : s2pul

¹³CNMR of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**).

Mass spectrum of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**)

9

Mass Analysis Report

CPS,MIYAPUR

Data Filename	121112019.d	Sample Name	CSUR/GON-1/001
Sample Type	Sample	Position	Vial 19
Instrument Name	Instrument 1	User Name	
Acq Method	ESI.m	IRM Calibration Status	Success
DA Method	Default.m	Comment	

User Spectra

--- End Of Report ---

IR spectrum of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**)

SOR data of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**).

9

CSUR-GON-1-001

[Comment]

Sample name

Comment

User

CPS1

Workgroup

CPSARD

Division

CPS1

Company

CPS

[Data Information]

Creation Date

10/25/2012 5:51 PM

[Measurement Information]

Instrument Name

Polarimeter

Model Name

P-2000

Serial No.

A035861232

Polarizer

Glan-Taylor Prism

Faraday Cell

Flint Glass

Accessory

PTC-203

Accessory S/N

A014261234

Path Length

100 mm

Light Source

Na

Monitor wavelength

589 nm

D.I.T.

5 sec

No. of cycle

5

Cycle interval

5 sec

Temp. Monitor

Holder

Temp. Corr. Factor

None

Aperture(S)

3.0mm

Aperture(L)

Auto

Mode

Specific O.R.

Path Length

100 mm

Concentration

1 w/v

Factor

1

		No.	Sample No.	Calc. Data	Temperature(C)	Blank	Concentration(w/v%)
1	*	1	CSUR-GON-1-001-1	-2.5240	24.99	0.0001	1.0000
2	*	2	CSUR-GON-1-001-2	-2.4640	24.99	0.0001	1.0000
3	*	3	CSUR-GON-1-001-3	-2.5740	24.99	0.0001	1.0000
4	*	4	CSUR-GON-1-001-4	-2.5040	25.00	0.0001	1.0000
5	*	5	CSUR-GON-1-001-5	-2.5240	25.00	0.0001	1.0000
6	*	6	Avg.	-2.5180			
7		7	S.D	0.0397			
8		8	C.V	1.5786			

Handwritten signature
25/10/2012

HPLC chromatogram of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**):
Base LiHMDS *Z/E* ratio.

SAMPLE INFORMATION

Sample_Name : LiHMDS	Acquired By : System
Sample_Type : Unknown	Date Acquired : 1/29/2013 8:23:30 PM
Injection Volume : 51	Channel Name : PDA 245.0 nm
Vial no : 5.00 ul	Acq Method Set : CAST_METH
Run Time : 45.00 Minutes	Date Processed : 2/6/2013 8:54:18 AM
System Name : HPLC_005_PDA	Project Name : HPLC_005_JAN_2013
Sample Set Name : 13012902	Processing Method : 13
Injection # : 1	

HPLC CONDITIONS

Column : Kinetex C-18 (100*4.6 mm, 2.5μ)
 Buffer : 20mM Amm acetate
 Mobile_phase -A : Buffer:Methanol (60:40)
 Mobile_phase -B : Acetonitrile:Methanol (40:60)
 Diluent : ACN ; Flow rate : 1.0 mL/min, Column temp : 25 °C, Inj vol:10μl
 Sample conc. : 0.3 mg/mL , Wavelength ; 245nm

Peak Results

	Name	RT	Area	% Area	RT Ratio
1		19.450	1233796	8.04	
2		20.809	14120574	91.96	

HPLC chromatogram of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**):
Base NaHMDS *Z/E* ratio.

SAMPLE INFORMATION

Sample_Name : NaHMDS	Acquired By : System
Sample_Type : Unknown	Date Acquired : 1/29/2013 9:14:10 PM
Injection Volume : 52	Channel Name : PDA 245.0 nm
Vial no : 5.00 ul	Acq Method Set : CAST_METH
Run Time : 45.00 Minutes	Date Processed : 2/6/2013 8:54:42 AM
System Name : HPLC_005_PDA	Project Name : HPLC_005_JAN_2013
Sample Set Name : 13012902	Processing Method : 13
Injection # : 1	

HPLC CONDITIONS

Column : Kinetex C-18 (100*4.6 mm, 2.5μ)
 Buffer : 20mM Amm acetate
 Mobile_phase -A : Buffer:Methanol (60:40)
 Mobile_phase -B : Acetonitrile:Methanol (40:60)
 Diluent : ACN ; Flow rate : 1.0 mL/min, Column temp : 25 °C, Inj vol:10μl
 Sample conc. : 0.3 mg/mL , Wavelength ; 245nm

Peak Results

	Name	RT	Area	% Area	RT Ratio
1		19.220	32471477	33.18	
2		20.603	65396482	66.82	

HPLC chromatogram of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**):
Base KHMDS *Z/E* ratio.

SAMPLE INFORMATION

Sample_Name : KHMDS	Acquired By : System
Sample_Type : Unknown	Date Acquired : 1/30/2013 3:59:49 AM
Injection Volume : 53	Channel Name : PDA 245.0 nm
Vial no : 10.00 ul	Acq Method Set : CAST_METH
Run Time : 45.00 Minutes	Date Processed : 2/6/2013 8:55:03 AM
System Name : HPLC_005_PDA	Project Name : HPLC_005_JAN_2013
Sample Set Name : 13012902	Processing Method : 13
Injection # : 1	

HPLC CONDITIONS

Column : Kinetex C-18 (100*4.6 mm, 2.5μ)
 Buffer : 20mM Amm acetate
 Mobile_phase -A : Buffer:Methanol (60:40)
 Mobile_phase -B : Acetonitrile:Methanol (40:60)
 Diluent : ACN ; Flow rate : 1.0 mL/min, Column temp : 25 °C, Inj vol:10μl
 Sample conc. : 0.3 mg/mL , Wavelength ; 245nm

Peak Results

Name	RT	Area	% Area	RT Ratio
1	19.415	3264378	26.29	
2	20.809	9150714	73.71	

HPLC chromatogram of *tert*-butyl 2-((4*R*, 6*S*)-2,2-dimethyl-6-((*E*)-styryl)-1,3-dioxan-4-yl)acetate (**9**):
Base KO^tBu *Z/E* ratio.

SAMPLE INFORMATION

Sample_Name : KOtBu	Acquired By : System
Sample_Type : Unknown	Date Acquired : 1/29/2013 7:32:52 PM
Injection Volume : 50	Channel Name : PDA 245.0 nm
Vial no : 5.00 ul	Acq Method Set : CAST_METH
Run Time : 45.00 Minutes	Date Processed : 2/6/2013 8:54:08 AM
System Name : HPLC_005_PDA	Project Name : HPLC_005_JAN_2013
Sample Set Name : 13012902	Processing Method : 13
Injection # : 1	

HPLC CONDITIONS

Column : Kinetex C-18 (100*4.6 mm, 2.5μ)
 Buffer : 20mM Amm acetate
 Mobile_phase -A : Buffer:Methanol (60:40)
 Mobile_phase -B : Acetonitrile:Methanol (40:60)
 Diluent : ACN ; Flow rate : 1.0 mL/min, Column temp : 25 °C, Inj vol:10μl
 Sample conc. : 0.3 mg/mL , Wavelength : 245nm

Peak Results

	Name	RT	Area	% Area	RT Ratio
1		19.668	3317417	24.76	
2		21.049	10080640	75.24	

¹HNMR of (4*R*, 6*S*)-4-hydroxy-6-((*E*)-styryl)tetrahydro-2*H*-pyran-2-one (7).

TDC-206 CSTR-DIA-2-015 in CDCl₃

NMR-400MHz

Ac. No: ME1112/795

Analyst: Ganesh

Date: 9th Nov. 2012

NUCLEUS : H1
FREQ (MHz) : 400.23
EXP : s2pul

^{13}C NMR of (4*R*, 6*S*)-4-hydroxy-6-((*E*)-styryl)tetrahydro-2*H*-pyran-2-one (7).

AR&D, Aurigene Discovery Technologies Ltd, Hyderabad
Instrument : Unity INOVA (Varian 500MHz)
Date & Time : Mon Nov 12 15:23:48 IST 2012
Recorded By : Haribabu.R

CSUR/GOH-2/015 in CDCl₃
TDC-206

^{13}C NMR
NMR 500MHz
AR.No: IH112/58
Date: 12th Nov. 2012
Analyst: Haribabu

Mass spectrum of (4*R*, 6*S*)-4-hydroxy-6-((*E*)-styryl)tetrahydro-2*H*-pyran-2-one (7) .

7 0.000000

Mass Analysis Report

CPS,MIYAPUR

Data Filename	120913027.d	Sample Name	CSUR/Lactone
Sample Type	Sample	Position	Vial 27
Instrument Name	Instrument 1	User Name	
Acq Method	ESI.m	IRM Calibration Status	Success
DA Method	Default.m	Comment	

User Spectra

--- End Of Report ---

SOR data of (4*R*, 6*S*)-4-hydroxy-6-((*E*)-styryl)tetrahydro-2*H*-pyran-2-one (7).

CSUR-GON-2-015-4

[Comment]

Sample name

Comment

User

CPS1

Workgroup

CPSARD

Division

CPS1

Company

CPS

[Data Information]

Creation Date

11/9/2012 7:14 PM

[Measurement Information]

Instrument Name

Polarimeter

Model Name

P-2000

Serial No.

A035861232

Polarizer

Glan-Taylor Prism

Faraday Cell

Flint Glass

Accessory

PTC-203

Accessory S/N

A014261234

Path Length

100 mm

Light Source

Na

Monitor wavelength

589 nm

D.I.T.

5 sec

No. of cycle

5

Cycle interval

5 sec

Temp. Monitor

Holder

Temp. Corr. Factor

None

Aperture(S)

3.0mm

Aperture(L)

Auto

Mode

Specific O.R.

Path Length

100 mm

Concentration

0.8 w/v

Factor

1

		No.	Sample No.	Calc. Data	Temperature(C)	Blank	Concentration(w/v%)
1	*	1	CSUR-GON-2-015-4-1	10.5550	26.99	-0.0021	0.8000
2	*	2	CSUR-GON-2-015-4-2	10.7550	26.98	-0.0021	0.8000
3	*	3	CSUR-GON-2-015-4-3	11.4175	26.98	-0.0021	0.8000
4	*	4	CSUR-GON-2-015-4-4	10.8925	26.98	-0.0021	0.8000
5	*	5	CSUR-GON-2-015-4-5	10.7800	26.99	-0.0021	0.8000
6	*	6	Avg.	10.8800			
7		7	S.D	0.3242			
8		8	C.V	2.9794			

¹HNMR of (*S*, *E*)-6-styryl-5,6-dihydro-2*H*-pyran-2-one (**2**).

TDC-206 CSIR/SON-3/042 in CDCl₃

NMR-400MHz

AR.No:ME1012/2464

Analyst: Haribabu

Date: 25th Oct. 2012

NUCLEUS : H1
FREQ (MHz): 400.23
EXP : s2pul

¹³CNMR of (*S*, *E*)-6-styryl-5,6-dihydro-2*H*-pyran-2-one (**2**)

TDC-206 CSTR/60N-3/042 in CDCl₃

NMR-400MHz

AR.No:MEI012/2475

Analyst: Haribabu

Date:25th Oct.2012

NUCLEUS : C13

FREQ (MHz): 100.65

EXP : s2pul

Mass Spectrum of (*S, E*)-6-styryl-5,6-dihydro-2*H*-pyran-2-one (**2**)

SOR data of (S, E)-6-styryl-5,6-dihydro-2H-pyran-2-one (2)

CSUR-GON-3-042

[Comment]

Sample name

Comment

User CPS1
Workgroup CPSARD
Division CPS1
Company CPS

[Data Information]

Creation Date 10/25/2012 5:44 PM

[Measurement Information]

Instrument Name Polarimeter
Model Name P-2000
Serial No. A035861232
Polarizer Glan-Taylor Prism
Faraday Cell Flint Glass

Accessory PTC-203
Accessory S/N A014261234
Path Length 100 mm

Light Source Na
Monitor wavelength 589 nm
D.I.T. 5 sec
No. of cycle 5
Cycle interval 5 sec
Temp. Monitor Holder
Temp. Corr. Factor None
Aperture(S) 3.0mm
Aperture(L) Auto
Mode Specific O.R.
Path Length 100 mm
Concentration 0.3 w/v
Factor 1

		No.	Sample No.	Calc. Data	Temperature(C)	Blank	Concentration(w/v%)
1	*	1	CSUR-GON-3-042-1	-110.9333	24.97	-0.0011	0.3000
2	*	2	CSUR-GON-3-042-2	-110.2667	24.96	-0.0011	0.3000
3	*	3	CSUR-GON-3-042-3	-112.3667	24.96	-0.0011	0.3000
4	*	4	CSUR-GON-3-042-4	-112.2667	24.97	-0.0011	0.3000
5	*	5	CSUR-GON-3-042-5	-112.4333	24.98	-0.0011	0.3000
6	*	6	Avg.	-111.6533			
7		7	S.D	0.9918			
8		8	C.V	0.8883			

^1H NMR of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

¹HNMR of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

CSUR/GON-4/107 in DMSO
TDC-206

AR.No:IN0713/30

Date:05th July.2013

Analyst:Haribabu

INDEX	FREQUENCY	PPM	HEIGHT
1	3678.6	7.363	32.2
2	3671.2	7.348	56.9
3	3657.3	7.320	33.8
4	3649.8	7.305	54.2
5	3642.4	7.290	26.9
6	3622.7	7.251	18.5
7	3615.6	7.237	23.7
8	3608.5	7.222	8.5
9	2562.9	5.130	37.0
10	2556.8	5.117	37.3
11	2363.3	4.730	37.0
12	2324.0	4.651	13.0
13	2321.6	4.647	18.0
14	2319.9	4.643	22.1
15	2318.2	4.640	18.0
16	2316.2	4.636	12.8
17	2187.0	4.377	18.5
18	1871.5	3.746	19.1
19	1670.9	3.344	436.8
20	1511.9	3.026	14.7
21	1506.5	3.015	14.8
22	1492.9	2.988	20.2
23	1487.5	2.977	19.2
24	1387.2	2.776	18.9
25	1367.9	2.738	13.9
26	1251.0	2.504	46.1
27	1248.9	2.500	57.9
28	1247.2	2.496	44.0
29	1207.9	2.418	9.8
30	1205.9	2.414	11.2
31	1203.8	2.409	9.9
32	1194.0	2.390	11.0
33	1192.0	2.386	12.1
34	1189.9	2.382	10.4
35	925.6	1.853	11.6
36	921.9	1.845	11.6
37	911.7	1.825	10.7
38	908.0	1.817	10.3
39	701.2	1.403	10.4

¹HNMR COSY of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

CSUR/GON-4/107 in DMSO
TDC-206

AR.No:IN0713/31

Date:05th July,2013

Analyst:Haribabu

exp2 gpcosy

SAMPLE		FLAGS	
date	Jul 7 2013	hs	mn
solvent	DMSO	aspl	y
sample	hsglv1	4237	
ACQUISITION SPECIAL			
sw	5552.9	temp	25.0
at	0.184	gain	16
np	2048	spin	not used
fb	3000	F2 PROCESSING	
ss	32	ab	-0.138
dl	1.000	abs	-0.092
nt	8	lsfid	-17
2D ACQUISITION fn 2048			
sw1	5552.9	F1 PROCESSING	
ni	400	sb1	-0.055
TRANSMITTER			
tn	H1	gfl	0.034
sfreq	499.628	gfa1	not used
tof	-198.8	procl	lp
tpwr	57	fn1	2048
pw 7.500 DISPLAY			
GRADIENTS			
gzlv11	3177.5	wp	-51.1
gt1	0.002500	sp1	4121.3
gzlv12	6355	wp1	-24.0
gt2	0.002500	rf1	4110.4
gstab	0.000500	rfp	479.5
DECOUPLER			
dn	CH3	rf11	479.5
dm	nmn	rfp1	0
PLOT			
wc	138.9		
sc	10.0		
wc2	138.9		
sc2	0		
vs	82		
th	2		
al	cdc	ph	

¹HNMR NOSEY of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

CSUR/GON-4/107 in DMSO
TDC-206

AR.No:IN0713/33

Date:05th July.2013

Analyst:Haribabu

exp2 NOESY

SAMPLE		FLAGS	
date	Jul 7 2013 hs	n	
solvent	DMSO	sspul	Y
sample	PFGflg	Y	
ACQUISITION	hsplv1	4237	
sw	5552.9	SPECIAL	
at	0.184	temp	25.0
np	2048	gain	16
fb	3000	spin	not used
ss	32	F2 PROCESSING	
d1	1.000	gf	0.085
nt	24	gfs	not used
2D ACQUISITION	fn	2048	
sw1	5552.9	F1 PROCESSING	
ni	400	gf1	0.031
TRANSMITTER	gfsl	not used	
tn	H1	procl	lp
sfrq	499.628	fn1	2048
tof	-198.8	DISPLAY	
tpwr	57	sp	-99.9
pw	7.500	wp	4208.0
NOESY	sp1		-89.0
mix	0.600	wp1	4180.9
PRESSATURATION	rf1		479.5
satmode	nmn	rfp	0
satpwr	0	rf11	479.5
satdly	0	rfp1	0
satfrq	0	PLOT	
DECOUPLER	wc		138.9
dn	Cl3	sc	10.0
dm	nmn	wc2	138.9
	sc2		0
	vs		310
	th		2
	ai	cdc	ph

^{13}C NMR NOSEY of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

HRMS of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

Page 1

Elemental Composition Report

Single Mass Analysis

Tolerance = 5.0 PPM / DBE: min = -5.0, max = 80.0

Element prediction: Off

Number of isotope peaks used for i-FIT = 2

Monoisotopic Mass, Even Electron Ions

96 formula(e) evaluated with 1 results within limits (up to 5 best isotopic matches for each mass)

Elements Used:

C: 0-36 H: 0-50 N: 0-4 O: 0-4

C128/GON-6/003

140416001 10 (0.321) Cm (9:10)

1: TOF MS ES+
4.76e+002

Minimum: -5.0
Maximum: 80.0

Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	Formula
235.0964	235.0970	-0.6	-2.6	6.5	9.3	C13 H15 O4

Mass spectrum of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

Mass Analysis Report

CPS:MIYAPUR

Data Filename	130704029.d	Sample Name	CSUR/GON-4/107
Sample Type	Sample	Position	Vial 27
Instrument Name	Instrument 1	User Name	
Acq Method	ESI.M	IRM Calibration Status	Success
DA Method	Default.m	Comment	

User Spectra

--- End Of Report ---

SOR data of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

CSUR-GON-4-07

[Comment]

Sample name

Comment

User

CPS1

Workgroup

CPSARD

Division

CPS1

Company

CPS

[Data Information]

Creation Date

7/4/2013 2:37 PM

[Measurement Information]

Instrument Name

Polarimeter

Model Name

P-2000

Serial No.

A035861232

Polarizer

Glan-Taylor Prism

Faraday Cell

Flint Glass

Accessory

PTC-203

Accessory S/N

A014261234

Path Length

100 mm

Light Source

Na

Monitor wavelength

589 nm

D.I.T.

5 sec

No. of cycle

5

Cycle interval

5 sec

Temp. Monitor

Holder

Temp. Corr. Factor

None

Aperture(S)

3.0mm

Aperture(L)

Auto

Mode

Specific O.R.

Path Length

100 mm

Concentration

0.2 w/v

Factor

1

		No.	Sample No.	Calc. Data	Meas. Data	PMT Voltage[V]	Temperature(C)
1	*	1	1-1	-9.7700	-0.0195	309	25.00
2	*	2	1-2	-10.5700	-0.0211	309	25.00
3	*	3	1-3	-9.8700	-0.0197	308	24.99
4	*	4	1-4	-9.5700	-0.0191	309	25.00
5	*	5	1-5	-9.3200	-0.0186	309	25.00
6	*	6	Avg.	-9.8200			
7		7	S.D	0.4690			
8		8	C.V	4.7764			

DSC data of (1*S*,5*S*,7*R*,8*S*)-8-hydroxy-7-phenyl-2,6-dioxabicyclo[3.3.1]nonan-3-one (**3b**).

Dr. Reddy's Laboratories Limited

Custom Pharmaceutical Services