**A Flexible Approach Toward Tri-Substituted Piperidines and
Indolizidines: Synthesis of 6-*epi*-Indolizidine 223A**

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Supporting Information Available: ¹H and ¹³C-NMR spectra for new compounds lacking elemental analyses together with an Ortep of compound **15**. This material is available free of charge *via* the Internet at <http://pubs.acs.org>.

General Experimental Section Paragraph

Melting points are uncorrected. Mass spectra were determined at an ionizing voltage of 70eV. Unless otherwise noted, all reactions were performed in flame dried glassware under an atmosphere of dry argon. Solutions were evaporated under reduced pressure with a rotary evaporator and the residue was chromatographed on a silica gel column using a 5% ethyl acetate/hexane mixture as the eluent unless specified otherwise. All solids were recrystallized from 3% ethyl acetate/hexane for analytical data.

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Sample_ID:XSZ-IV-23a
CDC13

Pulse Sequence: s2pu1
Solvent: cdcl3
Ambient temperature
INOVA-400 "Inova400"

PULSE SEQUENCE

Relax. delay 1.000 sec
Pulse 22.5 degrees
Acq. time 3.737 sec
Width 3211.0 Hz
16 repetitions

OBSERVE H1, 399.9383071 MHz

DATA PROCESSING

Line broadening 0.2 Hz
FT size 32768
Total time 1 min, 15 sec

Sample_ID:XSZ-IV-23a
CDC13

-2-

Pulse Sequence: szpu1
Solvent: cdcl3
Ambient temperature
INNOVA-400 "Innova400"
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 27.0 degrees
Acq. time 2.495 sec
Width 3334.0 Hz
16 repetitions
OBSERVE: H1, 399.9389071
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 0 min, 56 sec

SN_H1

Pulse Sequence: s2pu1

Solvent: cdcl3

Ambient temperature

INOVA-400 "1NOVA400"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 63.0 degrees

Acq. time 3.720 sec

Width 3225.5 Hz

16 repetitions

OBSERVE H1, 399.9389071 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 1 min, 15 sec

U11H1-22

Sample_ID:XSZ-IV-23a
CDC13

Pulse Sequence: s2pu1

Solvent: cdc13

Ambient temperature

INOVA-400 "Inova400"

PULSE SEQUENCE

Relax. delay 1.000

Pulse 22.5 degrees

Acq. time 3.737 sec

Width 3211.0 Hz

16 repetitions

OBSERVE H1, 399.93t

DATA PROCESSING

Resol. enhancement -

FT size 32768

Total time 1 min, 15

SN_H1

Pulse Sequence: s2pul1

Solvent: cdcl3

Ambient temperature

INOVA-400 "INOVA400"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 63.0 degrees

Acq. time 4.899 sec

Width 3266.0 Hz

16 repetitions

OBSERVE H1

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 1 min, 34 sec

Sample ID: XSZ-IV-23a
CDC13

Pulse Sequence: s2pu1

Solvent: cdcl3
Ambient temperature
INNOVA-400 "INNOVA400"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 22.5 degrees

Acq. time 4.941 sec

Width 3238.3 Hz

32 repetitions

OBSERVE H1

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 12 min, 41 sec

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SN_H1

Pulse Sequence: s2pul

Solvent: cdc13

Ambient temperature

File: jmh1-166_H

INOVA-500 "inovadata"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 63.0 degrees

Acq. time 4.971 sec

Width 3218.9 Hz

16 repetitions

OBSERVE H1 399.9389025 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 1 min, 35 sec

JMH1-166

13C SENSITIVITY
ASTM SAMPLE

Pulse Sequence: s2pul

Solvent: cdc13

Ambient temperature

User: 1-15-87

INNOVA-600 "Inova600"

PULSE SEQUENCE

Relax. delay 2.000 sec

Pulse 45.0 degrees

Acq. time 0.443 sec

Width 32840.7 Hz

960 repetitions

OBSERVE C13, 150.8065344 MHz

DECOUPLE H1, 599.7523292 MHz

Power 40 dB

continuously on

WALTZ-16 modulated

DATA PROCESSING

Line broadening 2.0 Hz

FT size 32768

Total time 3 hr, 24 min, 18 sec

SN_H1

Pulse Sequence: s2pu1

Solvent: cdcl3

Ambient temperature

INNOVA-400 "Inova400"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 63.0 degrees

Acq. time 4.950 sec

Width 3232.3 Hz

16 repetitions

OBSERVE H1, 399.9389026 MHz

DATA PROCESSING

Line broadening 0.2 Hz

F1 size 32768

Total time 1 min, 35 sec

JMH2-157

42

C16

STANDARD CARBON PARAMETERS

Pulse Sequence: s2pu1

Solvent: cdcl3
Ambient temperature
INNOVA-600 "1nova600"

PULSE SEQUENCE

Relax. delay 1.000 sec
Pulse 43.3 degrees
Acq. time 3.278 sec
Width 4881.3 Hz
16 repetitionsOBSERVE H1, 599.7471214 MHz
DATA PROCESSINGLine broadening 0.2 Hz
FT size 32768

Total time 1 min. 8 sec

-10-

Total time 1 min, 35 sec

184

SN_H1

Pulse Sequence: s2pul

Solvent: cdcl3

Ambient temperature

INOVA-400 "Inova400"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 63.0 degrees

Acq. time 4.981 sec

Width 3212.1 Hz

32 repetitions

OBSERVE H1, 399.9389025 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 6 min, 23 sec

-12-

28

Pulse Sequence: s2pu1
Solvent: cdcl3
Ambient temperature
INOVA-400 "nova400"
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 63.0 degrees
Acq. time 3.626 sec
Width 3309.3 Hz
16 repetitions
OBSERVE H1: 399.3289025 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 1 min, 14 sec

STANDARD 1H OBSERVE

-14-

Pulse Sequence: szpul
Solvent: cdcl3
Ambient temperature
INOVA-400 "inova400"
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 63.0 degrees
Acq. time 3.531 sec
Width 3398.2 Hz
16 repetitions
OBSERVE H1, 399.9389025 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 1 min 12 sec

ppm

8

7

6

5

4

3

2

1

Pulse Sequence: s2pu1
Solvent: cdcl3
Ambient temperature
INNOVA-400 "1nova400"
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 63.0 degrees
Acq. time 4.979 sec
Width 3213.6 Hz
16 repetitions
OBSERVE H1. 399.9389022 MHz
DATA PROCESSING
line broadening 0.2 Hz
FT size 32768
Total time 1 min, 35 sec

JMH2-191

C22

ppm

4 2 5 2

STANDARD CARBON PARAMETERS

Pulse Sequence: szpul

Solvent: cdcl3

Ambient temperature

INOVA-600 "INOVA600"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 43.3 degrees

Acq. time 3.278 sec

Width 4881.3 Hz

16 repetitions

OBSERVE H1, 599.7471257 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 1 min, 8 sec

-16-

STANDARD CARBON PARAMETERS

Pulse Sequence: s2pu1

Solvent: cdcl3
Ambient temperature
INNOVA-600 "innova600"

PULSE SEQUENCE

Relax. delay 1.000 sec
Pulse 43.3 degrees
Acq. time 2.453 sec
Width 4891.8 Hz
16 repetitions

OBSERVE H1, 599.7471212 MHz
DATA PROCESSING
Line broadening 0.2 Hz
Ft size 32768

Total time 0 min, 55 sec

JMH 1-276

STANDARD CARBON PARAMETE

Pulse Sequence: s2pu1

Solvent: cdcl3

Ambient temperature

INOVA-600 "INOVAA600"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 43.3 degrees

Acq. time 2.183 sec

Width 5496.8 Hz

16 repetitions

OBSERVE H1 599.7471214 MHz

DATA PROCESSING

Line broadening 0.2 Hz

FT size 32768

Total time 0 min, 51 sec

36

Pulse Sequence: s2pul

Solvent: cdcl3

Ambient temperature

INNOVA-600 "INNOVA600"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 43.3 degrees

Acq. time 1.538 sec

Width 4891.8 Hz

16 repetitions

OBSERVE H1, 599.7471219

DATA PROCESSING

Line broadening 0.2 Hz

FT size 16364

Total time 0 min, 41 sec

STANDARD 1H OBSERVE

5MK2-52

-21-

Pulse Sequence: s2pul
Solvent: cdcl3
Ambient temperature:
INOVA-400 "inov400"
PULSE SEQUENCE
Relax. delay 1.000 sec
Pulse 45.0 degrees
Acq. time 3.832 sec
Width 3131.5 Hz
16 repetitions
OBSERVE H1, 399.9389027 MHz
DATA PROCESSING
Line broadening 0.2 Hz
FT size 32768
Total time 1 min, 17 sec

39

(JMHa-63)

-22-

STANDARD CARBON PARAMETERS

Pulse Sequence: szpu1

Solvent: cdcl3

Ambient temperature

INNOVA-600 "innova600"

PULSE SEQUENCE

Relax. delay 1.000 sec

Pulse 43.3 degrees

Acq. time 3.522 sec

Width 4542.9 Hz

16 repetitions

OBSERVE H1, 599.7471224 MHz

DATA PROCESSING

line broadening 0.2 Hz

FT size 32768

Total time 1 min, 12 sec

cdcl3

5a

13C OBSERVE

Pulse Sequence: s2pu1

Solvent: cdcl3
Ambient temperature
INOVA-400 "inova400"

PULSE SEQUENCE

Relax. delay 2.500 sec

Pulse 69.2 degrees

Acq. time 2.581 sec

Width 9737.3 Hz

64 readbacks

OBSERVED F1, 100.5647181 MHz

DECOUPLE H1, 399.9407068 MHz

Power 20.0 dB

continuously on

WALTZ-16 modulated

DATA PROCESSING

Line broadening 2.0 Hz

FT size 65536

Total time 1 hr, 24 min, 30 sec

2-63

-23-

CDCl₃

5a

Ortep Drawing of 6-Methoxy-2,5-dimethyl-1-(toluene-4-sulfonyl)-piperidin-3-one (15).