# Selective formation of a $Z$-trisubstituted double bond using a 1-(tert-butyl)tetrazolyl sulfone 

Supporting information

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## 1. General Procedures.

Tetrahydrofuran (THF) and $N, N$-dimethylformamide (DMF) were dried using a solvent purification system. All other solvents and reagents were used as purchased without further purification, unless otherwise indicated. Flash column chromatography was performed on silica gel ( $60 \mathrm{~A} 35-70 \mu \mathrm{~m}$ ) as stationary phase. Analytical TLC was performed on pre-coated silica gel 60 $\mathrm{F}_{254}$ plates ( 0.2 mm thick, $20 \times 20 \mathrm{~cm}$ ) and visualized under UV light ( 254 and 360 nm ), with anisaldehyde in conc. $\mathrm{H}_{2} \mathrm{SO}_{4}$ or with phosphomolybdic acid in ethanol. Polarimetry studies were performed on a polarimeter equipped with a Na-lamp. IR spectra were recorded on a FT-IR spectrometer. Chemical shifts are reported in ppm referenced to the appropriate residual solvent peaks $\left(\mathrm{CDCl}_{3}\right)$ and coupling constants are reported in Hz . Multiplicity of the carbons was assigned with gHSQC experiments. Standard abbreviations for off-resonance decoupling were employed: $s=$ singlet, $d=$ doublet, $t=$ triplet, $q=$ quadruplet. The same abbreviations were also used for the multiplicity of signals in ${ }^{1} \mathrm{H}-\mathrm{NMR}$, along with $\mathrm{bs}=$ broad singlet, $\mathrm{m}=$ multiplet. High Resolution Mass Spectroscopy (HRMS) was performed using the ESI-TOF-MS technique.

## 2. NMR Spectra of compounds

M400APCB_02072013_alc1067-H1
submitq / Mercury-400
odcl3 / Temp: 25C / N.Reg: 00000000
suari: ad / Mostra: alc1067
Nom: ADRIANA LORENTE CRIVILLE
Data: 01/07/13 / Ope.: A.LORENTE



MAM



M400APCB_02072013_alc1067-C13
submitg / Mercury-400
ddcl3 / Temp: $25 \mathrm{C} / \mathrm{N}$. Reg: 100000000
Usuari: ad / Mostra: alc1067
Nom: ADRIANA LORENTE CRIVILLE
Data: 01/07/13 / Ope.: A.LORENTE




M400APCB_18072013_alc1068-H1
Submit / Mercury-400
oddl3 / Temp: 25C / N.Reg: 100000000
suari: ad / Mostra: alc1068
Nom: ADRIANA LORENTE CRIVILLE
Data: 18/07/13 / Ope.: A.LORENTE



M400APCB_18072013_alc1068-C13
Submitq / Mercury-400
odcl3 / Temp: 25C / N.Reg: 1000000000
Usuari: ad / Mostra: alc1068
Nom: ADRIANA LORENTE CRIVILLE
Data: 18/07/13 / Ope.: A.LORENTE





M400APCB_30102013_alc1152p-H1
Submitq / Mercury-400
odcl3 / Temp: 25C / N.Reg: 100000000
Usuari: ad / Mostra: alc1152p
Nom: ADRIANA LORENTE CRIVILLE
Data: 30/10/13 / Ope.: A.LORENTE


M400APCB_30102013_alC1152p-C13
submitg / Mercury-400
dcl3 / Temp: $25 \mathrm{C} / \mathrm{N}$. Reg: $\times 0 \times \triangle \times \infty \times \infty$
Usuari: ad / Mostra: alc1152p
suari: ad IANA LORENTE CRIVILIE
ta: 30/10/13 / Ope: A IORENTE
Data: 30/10/13 / Ope.: A.LORENTE


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M400APCB_18122013_ALC1153p-H1
Submitq / Mercury-400
Usuari: ad / Mostra: ALC1153p
Nom: ADRIANA LORENTE CRIVILLE
Data: 18/12/13 / Ope.: A.LORENTE



M400APCB_20122013_alc1153P-C13
Submitq / Mercury-400

Usuari: ad / Mostra: alc1153P
Nom: ADRIANA LORENTE CRIVILLE
Data: 20/12/13 / Ope.: A.LORENTE



| 1 | 1 | 1 | 1 | , | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | , |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 190 | 180 | 170 | 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | -1 |



M400APCB_07022013_alc959p-H1
Submitq / Mercury-400
Usuari: ad / Mostra: alc959p
Nom: ADRIANA LORENTE CRIVILLE
Data: 07/02/13 / Ope.: A.LORENTE




| 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T | 1 | , | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 190 | 180 | 170 | 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | -1 |



M400APCB_19102012_alc903p-H1 Submitq / Mercury-400
Submitq / Mercury-400
Usuari: ad / Mostra: alc903p
Nom: ADRIANA LORENTE CRIVILLE
Data: 19/10/12 / Ope.: A.LORENTE


3a


M400APCB_12022013_alc979pur-C13
Submitg / Mercury-400
dcl3 / Temp: $25 \mathrm{C} / \mathrm{N}$. Reg: P 0000000
Usuari: ad / Mostra: alc979pur
Nom: ADRIANA LORENTE CRIVILLE
Data: 12/02/13 / Ope.: A.LORENTE


3a




M400APCB_19072013_alc1078-H1 Submit / Mercury-400
odcl3 / Temp: 25C / N.Reg: 100000000
Usuari: ad / Mostra: alc1078
Nom: ADRIANA LORENTE CRIVILLE
Data: 19/07/13 / Ope.: A.LORENTE



M400APCB_19072013_alc1078-C13
Submitq / Mercury-400
Submit / Temp: 25C / N.Reg: POOXOOOX
Usuari: ad / Mostra: alc1078
Nom: ADRIANA LORENTE CRIVILLE
Data: 19/07/13 / Ope.: A.LORENTE



M400APCB_23102013_alc1080-H1
Submitq / Mercury-400
Usuari: ad / Mostra: alc1080
Nom: ADRIANA LORENTE CRIVILLE
Data: 22/10/13 / Ope.: A.LORENTE


3b


M400APCB_23102013_alc1080-C13
Submitq / Mercury-400
dcl3 / Temp: $25 \mathrm{C} / \mathrm{N}$. Reg: O O $O$ O $O$ O
Usuari: ad / Mostra: alc1080
Nom: ADRIANA LORENTE CRIVILLE
Data: 22/10/13 / Ope.: A.LORENTE


3b




M400APCB_05122013_alc1161P-H1 Submita / Mercury-400
odcl3 / Temp: 25C / N.Reg: 100000000
Usuari: ad / Mostra: alc1161P
Nom: ADRIANA LORENTE CRIVILLE
Data: 04/12/13 / Ope.: A.LORENTE



M400APCB_05122013_alc1161P-C13
Submitg / Mercury-400
odcl3 / Temp: 25C / N.Reg: 10000000
Usuari: ad / Mostra: alc1161P
Nom: ADRIANA LORENTE CRIVILLE
Data: 04/12/13 / Ope.: A.LORENTE





M400APCB_05122013_alc1165P-H1 Submita / Mercury-400
ddl3 / Temp: 25C / N.Reg: 1000 00000
Usuari: ad / Mostra: alc1165P
Nom: ADRIANA LORENTE CRIVILLE
Data: 04/12/13 / Ope.: A.LORENTE



M400APCB_05122013_alc1165P-C13
ubmita / Mercury-400
dcl3/Temp: $25 \mathrm{C} / \mathrm{N}$ Reg: 10000000
Usuari: ad / Mostra: alc1165P
Nom: ADRIANA LORENTE CRIVILLE
bata: 04/12/13 / Ope.: A.LORENTE


3c



M400APCB_10072014_alc1164-H1
Submitq / 400
odcl3 / Temp: 25C/N.Reg: $10 \times 0 \times 0 \times X$
Usuari: ad / Mostra: alc1164
Nom: ADRIANA LORENTE CRIVILLE
Data: 09/07/14 / Ope.: A.LORENTE


3d


M400APCB 10072014 alc1164-C13
Submitq / 400
odcl3 / Temp: 25C / N.Reg: 100000000
Usuari: ad / Mostra: alc1164
Nom: ADRIANA LORENTE CRIVILLE
Data: 09/07/14 / Ope.: A.LORENTE


3d


|  | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | T | 1 | 1 | T | 1 | 1 | 1 |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| $!0$ | 210 | 200 | 190 | 180 | 170 | 160 | 150 | 140 | 130 | 120 |  | $100$ | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | -1 |



M400APCB_18122013_ALC1201p-H1
Submitq / Mercury-400
Submitq / Mercury-400
Usuari: ad / Mostra: ALC1201p
Nom: ADRIANA LORENTE CRIVILLE
Data: 18/12/13 / Ope.: A.LORENTE



M400APCB_18122013_ALC1201p-C13
Submitq / Mercury-400 ALC1201p-C13
Submitq / Mercury-400
suari. ad Molr: Reg: $1 \times \times \times \infty \times \infty$
suari: ad / Mostra: ALC1201p
Data: 18/12/13 / Ope: A CORENTE

-6a





1578-2014_V400_09042014_ALC201-irrad5-NOESY1D
Equip: VNMRS400
NOESY1D / Solvent: cdcl3 / Temp: 25 C
N.Reg: 1578/2014

Usuari: ad / Mostra: ALC201-irrad5
Nom: ADRIANA LORENTE CRIVILLE
Data: 09/04/14 ./ Ope.: ANA LINARES


M400APCB_04042014_ALC1070F2-H1
Submitq / 400 :
Submitq / 400
Usuari: ad / Mostra: ALC1070F2
Nom: JANIRE LAMARIANO MERKETEGI
ta: $04 / 14$ / Ope: J LAMARIANO


M400APCB_04042014_ALC1070F2-C13
Submitq / 400
Submitq / 400
Usuari: ad /Mostr:
Usuari: ad / Mostra: ALC1070F2
ata: 04/04/14 / Ope J LAMAREIEGI
Data: 04/04/14 / Ope.: J.LAMARIANO




f1 (ppm)


M400APCB_17072013_alc1085f1-H1
Submitq / Mercury-400
Submitq / Mercury-400
Usuari: ad / Mostra: alc1085f1
Nom: ADRIANA LORENTE CRIVILLE
Data: 17/07/13 / Ope.: A.LORENTE



M400APCB_18072013_alc1085f1-C13
ubmitg / Mercury-400

Usuari: ad / Mostra: alc1085f1
Nom: ADRIANA LORENTE CRIVILL
Data: 18/07/13 / Ope.: A.LORENTE






3086-2013_V400_23072013_ALC1085F1-irrad5.2-NOESY1D
Equip: Mercury-400F
NOESY1D / Solvent: cdcl3 / Temp: 25 C
N.Reg: 3086/2013

Usuari: ad / Mostra: ALC1085F1-irrad5.2
Nom: ADRIANA LORENTE CRIVILL
Data: 23/07/13 11:50:59 h./ Ope. ANA LINARE


M400APCB_17072013_alc1085f2-H1
M400APCB_17072013_alc1085f2-H1
Submitq / Mercury-400 Submitq / Mercury-400
Usuari: ad / Mostra: alc1085f2
Nom: ADRIANA LORENTE CRIVILLE
Data: 17/07/13 / Ope.: A.LORENTE




M400APCB_19072013_alc1085f2-C13
Submitq / Mercury-400

Usuari: ad / Mostra: alc1085f2
Nom: ADRIANA LORENTE CRIVILLE
Data: $18 / 07 / 13$ / Ope.: A.LORENTE






3085-2013_V400_23072013_ALC1085F2-irrad5.2-NOESY1D
Equip: Mercury-400F
NOESY1D / Solvent: cdcl3 / Temp: 25 C
N.Reg: 3085/2013

Usuari: ad / Mostra: ALC1085F2-irrad5. 2
Nom: ADRIANA LORENTE CRIVILLE
Data: 23/07/13 10:47:18 h./ Ope.: ANA LINARES


M400APCB_03122013_alc1166f3-H1
M400APCB_O3122013_alc1166f3-H1 Submitq / Mercury-400
Usuari: ad / Mostra: alc1166f3
Nom: ADRIANA LORENTE CRIVILLE
Data: 03/12/13 / Ope.: A.LORENTE


Z-6c


M400APCB_03122013_alc1166f3-C13
Submitq / Mercury-400
ddl3 / Temp: $25 \mathrm{C} / \mathrm{N}$ Reg: 0000000
Usuari: ad / Mostra: alc1166f3
Nom: ADRIANA LORENTE CRIVILLE
Data: 03/12/13 / Ope.: A.LORENTE


| 1 | 1 | 1 | 1 | , | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | , |  |  |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: | :---: |
| 190 | 180 | 170 | 160 | 150 | 140 | 130 | 120 | 110 | 100 | 90 | 80 | 70 | 60 | 50 | 40 | 30 | 20 | 10 | 0 | -1 |



M400APCB_03122013_alc1176P-H1 Submitq / Mercury-400
odcl3 / Temp: 25C / N.Reg: 100000000
Usuari: ad / Mostra: alc1176P
Nom: ADRIANA LORENTE CRIVILLE
Data: 03/12/13 / Ope.: A.LORENTE




M400APCB_03122013_alc1176P-C13
Submitq / Mercury-400
odcl3 / Temp: 25C / N.Reg: $10000000 \times$
Usuari: ad / Mostra: alc1176P
Nom: ADRIANA LORENTE CRIVILLE
Data: 03/12/13 / Ope.: A.LORENTE






[^0]:    $\begin{array}{lllllllllllllllllllllllll}190 & 180 & 170 & 160 & 150 & 140 & 130 & 120 & 110 & 100 & 90 & 80 & 70 & 60 & 50 & 40 & 30 & 20 & 10 & 0 & -1\end{array}$

