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Ring Opening of Aziridines by Pendant Silanols Allows for Stereospecific Preparations of 1'-Amino-Tetrahydrofurans

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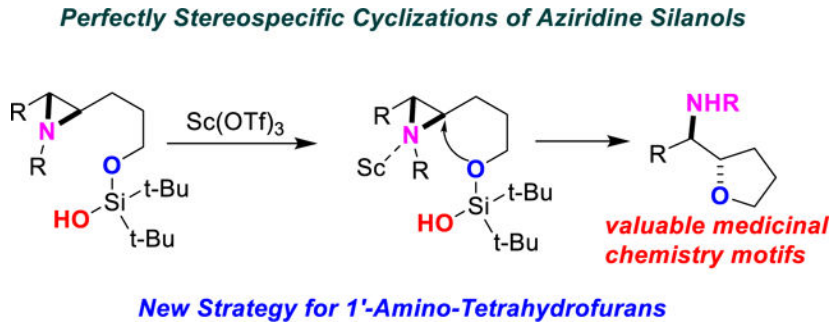
Abstract

We have developed a highly stereospecific cyclization of aziridine silanols into 1'-amino-tetrahydrofurans. Our protocol of stirring substrate with 10 mol% of $Sc(OTf)_3$ and 1 equivalent of $NaHCO_3$ in CH_2Cl_2 is mild and compatible with a range of activating aziridine *N*-substituents (including tosylates mesylates, and carbamates) and functional groups on the alkyl chains (including substituted aryl rings, alkyl bromides, and alkyl ethers) . In all cases examined, *trans* di-substituted aziridine silanols give products with an *erythro* configuration; conversely, *cis* di-substituted aziridine silanols give products with a *threo* configuration. While literature syntheses of 1'-amino-tetrahydrofurans exist, only one example, contemporaneous with our work, uses a similar cyclization for their construction. Control experiments demonstrate that, for this transformation, the silanol is not particularly privileged, and a variety of protecting groups on the alcohol (including other silicon protecting groups, benzyl ethers, and MOM ethers) are compatible with product formation.

Graphical Abstract



Introduction:

Our laboratory has a program of developing cyclization technology using the di-*tert*-butyl silanol auxiliary (Scheme 1A).[1–8] We have recently investigated the ring-opening of

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Supporting Information: Additional experimental details including structural reasoning, crystal structure data, NMR Spectra
Associated Content:

epoxides at varying distances from the pendant silanol tether.[5] When the epoxide is located at carbons 4 and 5 relative to the silanol, silanoxy-tetrahydrofurans form from a tandem S_N2 attack and silyl shift. We term this a *[5,5]-mechanism*, so named for the ring sizes involved in each step. As part of this line of inquiry, we wished to investigate a related reaction with aziridines bearing remote silanols. This is an intriguing problem because silanols contain two oxygens capable of nucleophilic attack, and a variety of heterocycles could form depending on the mode of aziridine ring cleavage (Scheme 1B).[9–13] Our past work with silanols has illustrated that the nature of the substrate strongly dictates the ring-size of the product heterocycle (Scheme 1A); with these aziridine silanols, 5, 7, or 8-membered heterocycles could conceivably form (Scheme 1B).

Treatment of silanol aziridine **A** with catalytic $Sc(OTf)_3$ and $NaHCO_3$ in CH_2Cl_2 formed amino tetrahydrofuran **B** as the sole product (Scheme 2A). This result was exciting and a bit unexpected for several reasons. First, there was no trace of the silanol auxiliary. Furthermore, the reaction was perfectly stereospecific and the product was a 1'-amino-tetrahydrofuran, a family of molecules found extensively in medicinal chemistry patents. A search of the literature revealed that, by far, the most common method for the synthesis of 1'-amino-tetrahydrofurans is *via* radical additions into imines (Scheme 2B).[14–28] Other approaches include hydrogenation of furans[29–31] and cyclization of linear diols (Scheme 2B).[32, 33] While these methods are inspiring, they suffer from lengthy starting material preparations or from a lack of stereoselectivity during product formation. To our surprise, the ring opening of aziridines by pendant free or protected alcohols has only been sparingly explored for the synthesis of 1'-amino-tetrahydrofurans. Das and co-workers have studied the cleavage of aziridines bearing pendant phenols[34]; during preparation of this manuscript, Phipps and co-workers disclosed some 5-*exo* cyclizations of aziridine alcohols as part of a larger study on enantioselective aziridination.[35] Together, these two reports represent the closest precedent for our own efforts, and only the Das study was present when we began our own investigation.

Results and Discussion:

We first wished to examine the capability of a range of Lewis acids to promote the conversion of silanol aziridine **A** into amino tetrahydrofuran **B** (Table 1). Our initial investigation was conducted with $Sc(OTf)_3$, a versatile yet fairly strong Lewis acid (Table 1, **Entry 1**).[36, 37] Switching to $Y(OTf)_3$ and tropylium tetrafluoroborate shut the reaction down completely (Table 1, **Entries 2–3**). With the stronger Lewis acids Ph_3CBF_4, $Bi(OTf)_3$ and $Al(OTf)_3$, reaction performance was excellent but worse than with $Sc(OTf)_3$ (Table 1, **Entries 4–6**). With $Sc(OTf)_3$, product formation in toluene was comparable to that in CH_2Cl_2, but using THF almost completely shut the reaction down. Thus, cyclization is promoted by a variety of Lewis acids but requires a non-coordinating solvent to be successful.

We sought to delineate the effect of aziridine *N*-substitution on the cyclization process (Scheme 3). With N–H aziridine **1**, no product formed, even with our optimized conditions of 10 mol% $Sc(OTf)_3$ and $NaHCO_3$ (1 equiv.) in CH_2Cl_2 (Scheme 3, **Entry 1**). In contrast, activated aziridines bearing electron-withdrawing substituents such as tosyl (Scheme 3,

Entry 2) and mesyl (Scheme 3, **Entry 3**) groups performed very well. Even bulky subsitutents, such as Cbz (Scheme 3, **Entry 4**), phosphoramidate (Scheme 3, **Entry 5**), and phthalimide (Scheme 3, **Entry 6**) groups were well tolerated. Interestingly, when acetate was used as an activating *N*-substitutent, no 1'-amino-tetrahydrofuran product formed; instead, dihydrooxazole **13** was the sole product. This type of rearrangement has been noted previously.[38–41] Overall, a variety of electrophilic *N*-substituents allow for productive cyclization, and the aziridine must be activated to engage.

We prepared a variety of *trans* and *cis* di-substituted aziridine silanols to explore the scope of the cyclization reaction (Schemes 4 and 5). Aziridines were prepared using Sharpless,[42] Che,[43, 44] or Kürti[45] aziridination reactions, and most alkenyl silanols were found to be fully compatible with one of these protocols. In all cases examined, the cyclization was perfectly stereospecific. When subjected to our optimized protocol of 10 mol% $Sc(OTf)_3$ and 1 equiv. of $NaHCO_3$ in CH_2Cl_2, *trans* di-substituted aziridine silanols reliably gave *erythro* 1'-amino-tetrahydrofuran products; conversely, *cis* di-substituted aziridine silanols gave *threo* products. Crystal structures of products **3** (Scheme 3, CCDC 2247028), **27** (Scheme 4, CCDC 2247031), **47** (Scheme 5, CCDC 2247029), and **53** (Scheme 5, CCDC 2247025) have allowed us to unambiguously confirm identity and relative stereochemistry. Many functional groups were tolerated by our reaction protocol; alkyl ethers (Scheme 4, **Entry 6** and Scheme 5, **Entries 4–6**), aryl ethers (Scheme 4, **Entries 2–3**), halogenated aryl rings (Scheme 4, **Entry 2**), alkyl bromides (Scheme 5, **Entry 7**), and terminal aziridines (Scheme 4, **Entry 5**) were all found to be compatible.

The scale of the reaction could be increased from 0.2 mmol to 1.1 or 2.6 mmol without loss of yield or selectivity (Scheme 6A). The products were amenable to further transformations (Scheme 6B). For example, hydrogenolysis of the Cbz group of **37** formed amino tetrahydrofuran **78** in a 60% yield. With benzyl ether substrates, hydrogenation formed valuable amino-alcohol compounds **79** and **80**. Interestingly, during Dess-Martin periodinane oxidation of alcohol **79**, tetrahydropyridine **81** was the sole observed product rather than the expected aldehyde (Scheme 6C).[46]

What is the mechanism underlying tetrahydrofuran formation? In this transformation, why is the silanol missing in the product, which stands in contrast to what we observe with the analogous silanol epoxide?[5] First, we must consider which oxygen of the silanol is involved in the initial S_N2 attack. If the distal oxygen of the silanol is involved, one may draw a rather convoluted mechanism to explain amino-tetrahydrofuran product formation, involving a series of nucleophilic attacks and silyl shifts (Scheme 7A, **Pathway 1**). If the distal oxygen is merely a spectator, then a simpler mechanism involving 5-*exo* S_N2 attack by the proximal oxygen is operative (Scheme 7A, **Pathway 2**). As silicon nitrogen bonds are far less stable than silicon oxygen bonds, the silanol is simply cleaved during the reaction or during its quench and workup. Indeed, a significant amount of $(t\text{-}Bu)_2Si(OH)_2$[47] is observed by ^1H NMR in unpurified reaction mixtures. Definitive evidence that only the proximal oxygen is involved in cyclization came from examining a series of substrates in which the silanol was replaced by TBDPS, di-*tert*-butyl silanoxy methyl ether, TBS, TIPS, MOM, and benzyl protecting groups (Scheme 7B, **Compounds 72–77**). In all cases, cyclization occurred to give 1'-amino-tetrahydrofuran **3**, albeit in varying isolated yields.

Conclusion:

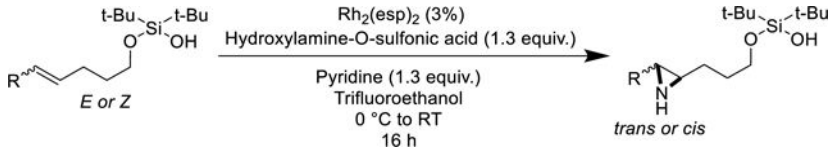
In summary, we have developed a highly stereospecific cyclization of aziridine silanols into 1'-amino-tetrahydrofurans. Our protocol of stirring substrate with 10 mol% of $Sc(OTf)_3$ and 1 equivalent of $NaHCO_3$ in CH_2Cl_2 is mild and compatible with a range of activating aziridine *N*-substituents and functional groups on the alkyl chains. In all cases examined, *trans* di-substituted aziridine silanols give products with an *erythro* configuration; conversely, *cis* di-substituted aziridine silanols give products with a *threo* configuration. Control experiments demonstrate that, for this transformation, the silanol is not particularly privileged, and a variety of protecting groups on the alcohol are compatible for product formation. Given the ubiquity of 1'-amino-tetrahydrofurans in targets of medicinal value, we expect this protocol to be a valuable addition to the synthetic armory.

Experimental Section:

I. General Considerations: All reagents were obtained commercially unless otherwise noted. Solvents were purified by passage under 10 psi N_2 through activated alumina columns. Infrared (IR) spectra were recorded on a Thermo Scientific™ Nicolet™ iS™5 FT-IR Spectrometer; data are reported in frequency of absorption (cm^{-1}). ^1H NMR spectra were recorded at 400, 500, or 600 MHz. Data are recorded as: chemical shift in ppm referenced internally using residual solvent peaks, multiplicity (s = singlet, d = doublet, t = triplet, q = quartet, m = multiplet or overlap of nonequivalent resonances), integration, coupling constant (Hz). ^{13}C NMR spectra were recorded at 101 or 126 MHz. Exact mass spectra were recorded using an electrospray ion source (ESI) either in positive mode or negative mode and with a time-of-flight (TOF) analyzer on a Waters LCT PremierTM mass spectrometer and are given in m/z. Thin Layer Chromatography (TLC) was performed on pre-coated glass plates (Merck) and visualized either with a UV lamp (254 nm) or by dipping into a solution of $KMnO_4$–K_2CO_3 or of ceric ammonium molybdate in water followed by heating. Flash chromatography was performed on silica gel (230–400 mesh) or Florisil (60–100 mesh).

II. Procedure for Substrate and Product Syntheses

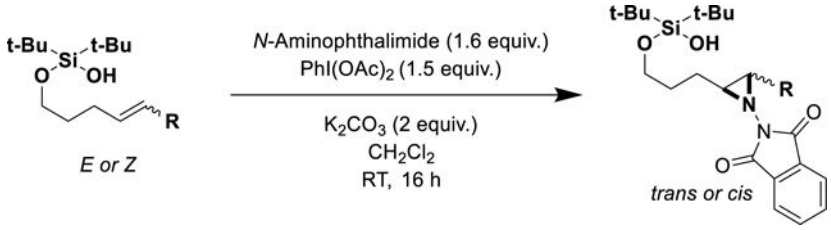
General Procedure A: Kürti Aziridination:



A 10 mL round-bottom flask was charged with a stir bar, silanol substrate (1 mmol), $Rh_2(esp)_2$ (0.023 g, 0.03 mmol, 0.03 equiv.), and trifluoroethanol (5 mL, final reaction concentration of 0.2 M). The reaction flask was cooled to 0 °C using an ice-water bath. Subsequently, hydroxylamine-O-sulfonic acid (HOSA) (0.147 g, 1.3 mmol, 1.3 equiv.) and pyridine (0.105 ml, 0.103 g, 1.3 mmol, 1.3 equiv.) were added. The reaction mixture was allowed to warm to room temperature over a period of 16 hours. Following this time, the mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of saturated, aqueous $NaHCO_3$ solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by

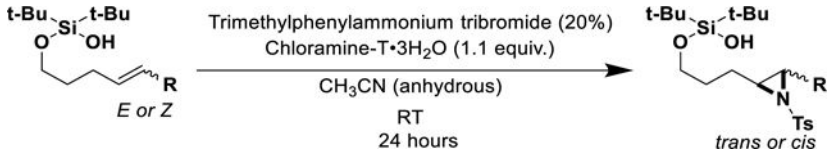
chromatography on silica gel (gradient of 0 to 100% acetone/CH_2Cl_2). *Note: quantities are given for a 1 mmol reaction and are changed appropriately with changes in scale.*

General Procedure B: Che Aziridination:



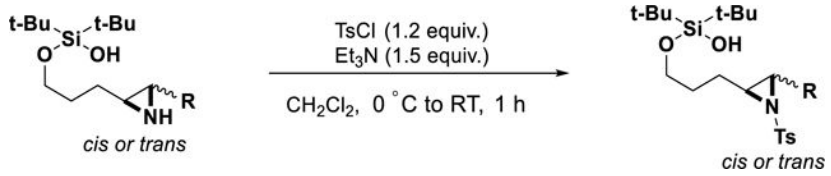
A 10 mL round-bottom flask was charged with a stir bar, alkenyl silanol substrate (1 mmol), *N*-aminophthalimide (0.259 g, 1.6 mmol, 1.6 equiv.), K_2CO_3 (0.276 g, 2 mmol, 2 equiv.), and CH_2Cl_2 (5 mL, final reaction concentration of 0.2 M). $PhI(OAc)_2$ (0.483 g, 1.5 mmol, 1.5 equiv.) was added in one portion. The heterogeneous mixture was stirred at room temperature for 16 hours. Following this time, the mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of saturated, aqueous $Na_2S_2O_3$ solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each compound). *Note: quantities are given for a 1 mmol reaction and are changed appropriately with changes in scale.*

General Procedure C: Sharpless Aziridination:



A 50 mL round-bottom flask was charged with a stir bar, alkenyl silanol substrate, and CH_3CN (5 mL/ mmol of substrate, 0.2 M final concentration). Chloramine-T•$3H_2O$ (1.1 equivalents) was added in one portion followed by trimethylphenylammonium tribromide (0.2 equiv.). The heterogenous mixture was allowed to stir for 24 hours. Following this time, the mixture was diluted with 50 mL of 50% EtOAc in hexanes and filtered through a pad of silica gel. The filtrate was concentrated under reduced pressure, and the resulting residue was purified by chromatography on silica gel (see individual substrates for specific conditions).

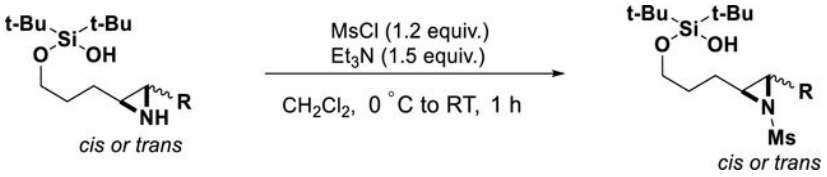
General Procedure D: Tosylation of N–H Aziridine Silanol:



A 10 mL round-bottom flask was charged with a stir bar, N–H aziridine silanol substrate (1 equiv.), and CH_2Cl_2 (final reaction concentration of 0.1 M). The reaction flask was cooled

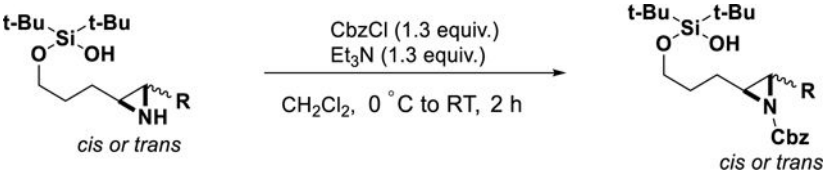
to 0 °C using an ice-water bath. 4-toluenesulfonyl chloride (TsCl) (1.2 equiv.) was added in one portion. Subsequently, Et_3N (1.5 equiv.) was added dropwise. The ice-water bath was removed, and the reaction mixture was allowed to warm to room temperature over a period of 1 hour. Following this time, the reaction mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of 0.2 M aqueous HCl solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each compound).

General Procedure E: Mesylation of N–H Aziridine Silanol:



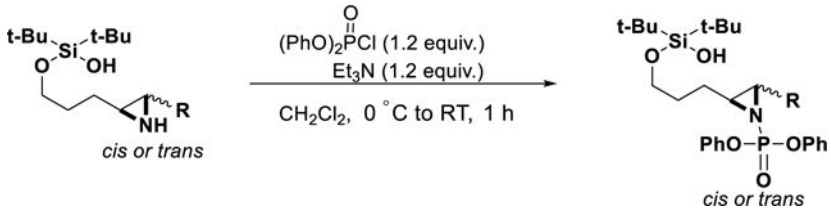
A 10 mL round-bottom flask was charged with a stir bar, N–H aziridine silanol substrate (1 equiv.), and CH_2Cl_2 (final reaction concentration of 0.1 M). The reaction flask was cooled to 0 °C using an ice-water bath. Methanesulfonyl chloride (MsCl) (1.2 equiv.) was added dropwise. Subsequently, Et_3N (1.5 equiv.) was added dropwise. The ice-water bath was removed, and the reaction mixture was allowed to warm to room temperature over a period of 1 hour. Following this time, the reaction mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of 0.2 M aqueous HCl solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each compound).

General Procedure F: Cbz protection of N–H Aziridine Silanol:



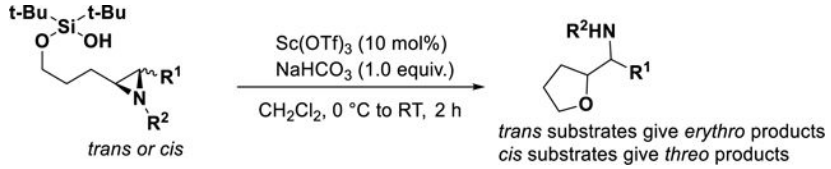
A 10 mL round-bottom flask was charged with a stir bar, N–H aziridine silanol substrate (1 equiv.), and CH_2Cl_2 (final reaction concentration of 0.1 M). The reaction flask was cooled to 0 °C using an ice-water bath. Subsequently, CbzCl (1.3 equiv.) and Et_3N (1.3 equiv.) were added dropwise, sequentially. The reaction mixture was allowed to warm to room temperature over a period of 2 hours. Following this time, the reaction mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of 0.2 M aqueous HCl solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each compound).

General Procedure G: Phosphoramidate synthesis from N–H aziridine silanol:



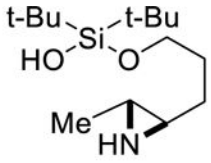
A 25 mL round-bottom flask was charged with a stir bar, N–H aziridine silanol (1 equiv.), and CH_2Cl_2 (final reaction concentration of 0.1 M). The reaction flask was cooled to 0 °C using an ice-water bath. Subsequently, diphenyl phosphoryl chloride (1.2 equiv.) and Et_3N (1.2 equiv.) were added dropwise. The reaction mixture was allowed to warm to room temperature over a period of 1 hour. Following this time, the reaction mixture was diluted with CH_2Cl_2, transferred to a separatory funnel, and washed with one portion of 0.2 M aqueous HCl solution. The organic layer was collected, dried over $MgSO_4$, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each compound).

General Procedure H: Conversion of Aziridine Silanol Substrates into 1'-Amino-Tetrahydrofuran Products:



An oven-dried 10 mL round-bottom flask was charged with a stir bar, aziridine silanol substrate (0.2 mmol, 1 equiv.), $NaHCO_3$ (0.0168 g, 0.2 mmol, 1 equiv.), and anhydrous CH_2Cl_2 (2.0 mL, reaction concentration of 0.1 M). The flask was cooled to 0 °C using an ice-water bath. $Sc(OTf)_3$ (0.0098 g, 0.02 mmol, 0.1 equiv.) was added in one portion. The reaction mixture was allowed to warm to room temperature over a period of two hours. Next, the reaction mixture was diluted with CH_2Cl_2, and transferred to a separatory funnel. The organic layer was washed with saturated aqueous $NaHCO_3$ solution, collected, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel (specific conditions are associated with each product). *Note: quantities are given for a 0.2 mmol reaction and are changed appropriately with changes in scale.*

III. Characterization of Substrates and Products (Schemes 3–5 & 7)—



di-*tert*-butyl(3-((2*R**,3*R**)-3-methylaziridin-2-yl)propoxy)silanol

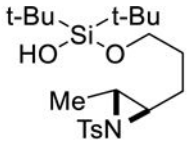
Compound 1: Synthesized using General Procedure A on a 1 mmol scale; Purified using 40% Et_2O/hexanes followed by a flush of 100% acetone on silica gel; single diastereomer; (light yellow oil, 0.199 g, 0.728 mmol, 73% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 4.09 – 3.95 (m, 1H), 3.80 (dt, *J* = 10.6, 4.3 Hz, 1H), 1.83 – 1.69 (m, 2H), 1.69 – 1.62 (m, 2H), 1.58 (tq, *J* = 11.3, 3.8 Hz, 1H), 1.36 (dtd, *J* = 14.2, 9.6, 4.5 Hz, 1H), 1.21 (dd, *J* = 5.5, 1.8 Hz, 3H), 1.00 (s, 9H), 0.96 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 61.5, 38.8, 31.7, 31.6, 27.9, 27.7, 27.4, 21.2, 20.4, 19.3.

IR ν 3080, 2854, 1598, 1344, 1107, 859 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{14}H_{32}NO_2Si^+$ 274.2197, Found 274.2187 (3.7 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-methyl-1-tosylaziridin-2-yl)propoxy)silanol

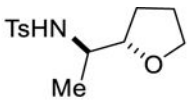
Compound 2: Synthesized using General Procedure C on an 8.24 mmol scale; Purified using a gradient of 0 to 100% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 1.80 g, 4.21 mmol, 51% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 – 7.79 (m, 2H), 7.35 – 7.28 (m, 2H), 3.74 (t, *J* = 6.1 Hz, 2H), 2.76 – 2.67 (m, 2H), 2.43 (s, 3H), 1.88 – 1.69 (m, 1H), 1.59 – 1.49 (m, 6H), 0.99 (s, 9H), 0.98 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 138.1, 129.6, 127.5, 62.5, 49.4, 46.0, 30.5, 27.5, 26.9, 21.7, 20.6, 20.5, 14.7.

IR ν 3562, 2857, 1598, 1473, 1302, 1013 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{21}H_{38}NO_4SSi^+$ 428.2285, Found 428.2286 (0.2 ppm error).



4-methyl-*N*-((*R**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)benzenesulfonamide

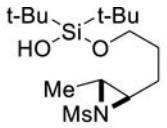
Compound 3: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 5% acetone/CH_2Cl_2 on silica gel; single diastereomer; (light yellow oil, 48 mg, 0.178 mmol, 89% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.81 – 7.70 (m, 2H), 7.28 (d, *J* = 8.0 Hz, 2H), 4.82 (d, *J* = 7.5 Hz, 1H), 3.77 (dt, *J* = 8.2, 6.6 Hz, 1H), 3.73 – 3.58 (m, 2H), 3.39 – 3.21 (m, 1H), 2.41 (s, 3H), 1.93 – 1.77 (m, 3H), 1.70 – 1.58 (m, 1H), 1.01 (d, *J* = 6.8 Hz, 3H).

^{13}C{^{1}H} NMR (126 MHz, $CDCl_3$) δ 143.3, 138.1, 129.7, 127.2, 81.7, 68.7, 52.5, 27.4, 25.7, 21.6, 16.8.

IR ν 3280, 2974, 2874, 1327, 1161, 816 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{13}H_{20}NO_3S^+$ 270.1158, Found 270.1154 (1.5 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-methyl-1-(methylsulfonyl)aziridin-2-yl)propoxy)silanol

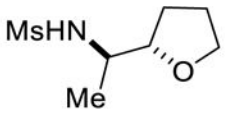
Compound 4: Synthesized using General Procedure E on a 0.571 mmol scale; Purified using a gradient of 15 to 40% ethyl acetate/hexanes on silica gel; single diastereomer; (light yellow oil, 0.180 g, 0.512 mmol, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.91 – 3.77 (m, 2H), 3.06 (s, 3H), 2.69 (q, *J* = 4.5 Hz, 2H), 1.81 (dq, *J* = 9.1, 4.0 Hz, 1H), 1.78 – 1.64 (m, 3H), 1.54 (d, *J* = 5.4 Hz, 3H), 1.01 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 62.5, 49.2, 45.5, 42.5, 30.5, 27.6, 27.0, 20.6 (2C), 20.5, 14.9.

IR ν 3600, 2934, 2857, 1473, 1310, 1147, 787 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{15}H_{34}NO_4SSi^+$ 352.1972, Found 352.1990 (5.1 ppm error).



N-((*R**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)methanesulfonamide

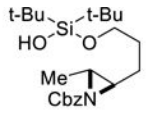
Compound 5: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 40% acetone/CH_2Cl_2 on silica gel; single diastereomer; (light yellow oil, 0.032 g, 0.166 mmol, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.55 (d, *J* = 7.9 Hz, 1H), 3.94 – 3.84 (m, 2H), 3.84 – 3.74 (m, 1H), 3.72 – 3.60 (m, 1H), 3.02 (s, 3H), 2.03 – 1.83 (m, 3H), 1.74 – 1.60 (m, 1H), 1.25 (d, *J* = 6.8 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 81.7, 68.7, 52.4, 41.8, 26.9, 25.9, 17.6.

IR ν 3280, 2974, 2877, 1441, 1313, 1147, 1070 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_7H_{15}NO_3SNa^+$ 216.0665, Found 216.0675 (4.6 ppm error).



benzyl (2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-methylaziridine-1-carboxylate

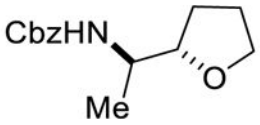
Compound 6: Synthesized using General Procedure F on a 0.6 mmol scale; Purified using a gradient of 0 to 50% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.212 g, 0.520 mmol, 87% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.43 – 7.28 (m, 5H), 5.14 (s, 2H), 3.85 (td, *J* = 6.4, 1.4 Hz, 2H), 2.33 (qd, *J* = 5.6, 3.3 Hz, 1H), 2.23 (td, *J* = 6.2, 3.3 Hz, 1H), 1.78 – 1.64 (m, 2H), 1.61 – 1.52 (m, 2H), 1.28 – 1.17 (m, 3H), 1.01 (s, 9H), 1.00 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 162.2, 136.0, 128.6, 128.4, 128.3, 68.1, 62.4, 44.7, 40.2, 30.4, 27.63, 27.60, 27.5, 20.6, 20.5, 16.2.

IR ν 3485, 2857, 1678, 1444, 1156, 825 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{22}H_{38}NO_4Si^+$ 408.2565, Found 408.2564 (0.2 ppm error).



benzyl ((*R**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)carbamate

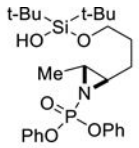
Compound 7: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 10% acetone/CH_2Cl_2 on silica gel followed by reverse phase HPLC (gradient of 0 to 100% CH_3CN/H_2O on a RediSep Prep C18 column, length: 250 mm, ID: 20 mm); single diastereomer; (light yellow oil, 40 mg, 0.160 mmol, 80% yield).

^{1}H NMR (400 MHz, CD_2Cl_2) δ 7.44 – 7.21 (m, 5H), 5.07 (s, 2H), 4.98 (br s, 1H), 3.81 (tt, *J* = 8.8, 6.8 Hz, 2H), 3.72 (tt, *J* = 8.1, 6.6 Hz, 2H), 2.01 – 1.75 (m, 3H), 1.68 – 1.51 (m, 1H), 1.12 (d, *J* = 6.6 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, CD_2Cl_2) δ 155.7, 137.0, 128.4, 127.9, 127.8, 81.6, 68.4, 66.2, 50.0, 27.8, 25.8, 15.8.

IR ν 3317, 2974, 2874, 1695, 1535, 1241, 1050 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{14}H_{20}NO_3^+$ 250.1438, Found 250.1461 (9.2 ppm error).



diphenyl ((2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-methylaziridin-1-yl)phosphonate

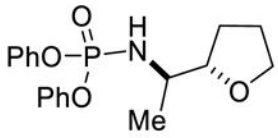
Compound 8: Synthesized using General Procedure G on a 0.6 mmol scale; Purified using a gradient of 0 to 50% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 180 mg, 0.356 mmol, 59% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.38 – 7.07 (m, 10H), 3.89 – 3.76 (m, 2H), 2.67 – 2.46 (m, 2H), 1.83 – 1.56 (m, 4H), 1.41 (d, *J* = 5.4 Hz, 3H), 1.00 (s, 9H), 0.99 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 151.0 (d, *J* = 3.7 Hz), 150.9 (d, *J* = 3.6 Hz), 129.6, 125.0, 120.5, 120.4, 62.5, 46.6 (d, *J* = 7.5 Hz), 41.8 (d, *J* = 8.0 Hz), 30.3, 27.6, 27.5, 20.5, 16.1 (d, *J* = 5.3 Hz).

IR ν 2963, 1592, 1490, 1193, 939 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{26}H_{41}NO_5PSi^+$ 506.2486, Found 506.2519 (6.5 ppm error).



diphenyl ((*R**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)phosphoramidate

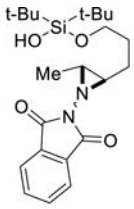
Compound 9: Synthesized using General Procedure H on a 0.158 mmol scale; Purified using a gradient of 0 to 50% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 41 mg, 0.118 mmol, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 – 7.04 (m, 10H), 3.95 – 3.64 (m, 3H), 3.60 – 3.39 (m, 1H), 3.27 (t, *J* = 10.5 Hz, 1H), 1.95 – 1.72 (m, 3H), 1.64 (ddt, *J* = 13.5, 9.9, 6.0 Hz, 1H), 1.18 (d, *J* = 6.7 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 151.0 – 150.9 (m), 129.6, 124.8, 120.3, 120.2, 82.6 (d, *J* = 7.3 Hz), 68.5, 51.3, 27.5, 25.8, 17.7 (d, *J* = 3.6 Hz).

IR ν 3400, 2971, 1590, 1490, 1193, 930 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{18}H_{23}NO_4P^+$ 348.1359, Found 348.1377 (5.2 ppm error).



2-((2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-methylaziridin-1-yl)isoindoline-1,3-dione

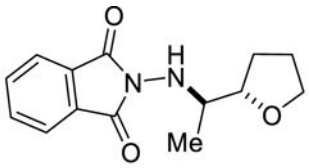
Compound 10: Synthesized using General Procedure B on a 1 mmol scale; Purified using Reverse-Phase High Pressure Liquid Chromatography using a gradient of 0 to 100% MeCN/H_2O on a RediSep Prep C18 column (length: 250 mm, ID: 20 mm); mixture of rotamers or *N*-epimers; (light yellow semi-solid, 0.206 g, 0.492 mmol, 49% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.76 (ddd, *J* = 10.2, 5.4, 3.0 Hz, 2H), 7.67 (ddd, *J* = 7.6, 5.4, 3.1 Hz, 2H), 3.97 (ddd, *J* = 10.2, 7.3, 6.0 Hz, 1H), 3.89 (dt, *J* = 10.3, 5.9 Hz, 1H), 2.87 – 2.75 (m, 1H), 2.45 (p, *J* = 5.8 Hz, 1H), 1.91 – 1.81 (m, 2H), 1.73 (qd, *J* = 6.8, 2.4 Hz, 2H), 1.28 (d, *J* = 6.0 Hz, 3H), 1.03 – 0.96 (m, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 166.6, 134.1, 130.6, 123.0, 62.6, 47.9, 44.2, 29.7, 28.1, 27.7, 27.6, 20.7, 20.5, 13.1.

IR ν 3502, 2931, 2857, 1715, 1376, 1101, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{22}H_{35}N_2O_4Si^+$ 419.2361, Found 419.2401 (9.5 ppm error).



2-(((*R**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)amino)isoindoline-1,3-dione

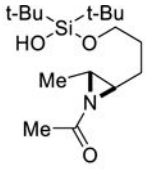
Compound 11: Synthesized using General Procedure H on a 0.219 mmol scale; Purified using a gradient of 0 to 20% acetone/CH_2Cl_2 on silica gel; single diastereomer; (light yellow oil, 51 mg, 0.196 mmol, 89% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (dd, *J* = 5.5, 3.1 Hz, 2H), 7.78 – 7.60 (m, 2H), 4.72 (d, *J* = 3.9 Hz, 1H), 3.95 – 3.82 (m, 2H), 3.80 – 3.69 (m, 1H), 3.52 (qt, *J* = 6.6, 4.1 Hz, 1H), 2.05 – 1.76 (m, 4H), 1.08 (d, *J* = 6.6 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 167.1, 134.2, 130.4, 123.5, 81.3, 68.6, 57.2, 26.5, 26.0, 15.0.

IR ν 3927, 2971, 2874, 1724, 1387, 1070, 885 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{14}H_{17}N_2O_3^+$ 261.1234, Found 261.1248 (5.4 ppm error).



1-((2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-methylaziridin-1-yl)ethan-1-one

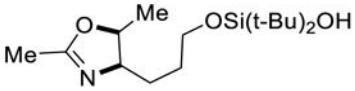
Compound 12: Synthesized by acetylation of the N–H aziridine[7] on a 0.571 mmol scale; Purified using a gradient of 0 to 100% EtOAC/hexanes on silica gel; single diastereomer; (light yellow oil, 0.057 g, 0.181 mmol, 32% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 3.90 – 3.78 (m, 2H), 2.38 (qd, *J* = 5.6, 3.0 Hz, 1H), 2.24 (td, *J* = 6.0, 3.0 Hz, 1H), 2.09 (s, 3H), 1.78 – 1.46 (m, 4H), 1.29 (d, *J* = 5.6 Hz, 3H), 1.00 (s, 9H), 0.99 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 181.6, 62.4, 43.6, 39.5, 30.5, 27.7, 27.6, 27.5, 24.7, 20.6, 20.5, 16.5.

IR ν 3525, 2934, 2857, 1652, 1104, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{16}H_{34}NO_3Si^+$ 316.2302, Found 316.2315 (4.1 ppm error).



di-*tert*-butyl(3-((4*R**,5*S**)-2,5-dimethyl-4,5-dihydrooxazol-4-yl)propoxy)silanol

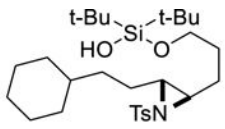
Compound 13: Synthesized using General Procedure H on a 0.151 mmol scale; Purified using a gradient of 0 to 100% Acetone/CH_2Cl_2 on silica gel; single diastereomer; (colorless oil, ~50% yield, estimated by ^{1}H NMR integration against an internal standard).

^{1}H NMR (400 MHz, $CDCl_3$) δ 4.01 (dtd, *J* = 6.9, 4.8, 2.6 Hz, 1H), 3.82 (h, *J* = 4.7 Hz, 2H), 3.71 – 3.60 (m, 1H), 1.94 (d, *J* = 1.4 Hz, 3H), 1.75 – 1.53 (m, 4H), 1.21 (d, *J* = 6.7 Hz, 3H), 1.00 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 164.1, 86.9, 66.9, 62.9, 31.3, 28.6, 27.6, 21.6, 20.6, 14.2.

IR ν 3400, 2931, 2857, 1670, 1473, 1104, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{16}H_{34}NO_3Si^+$ 316.2302, Found 316.2293 (2.9 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(2-cyclohexylethyl)-1-tosylaziridin-2-yl)propoxy)silanol

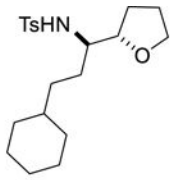
Compound 14: Synthesized using General Procedure C on a 1.12 mmol scale; purified using a gradient of 0 to 8% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 0.492 g, 0.93 mmol, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.2 Hz, 2H), 7.30 (d, *J* = 8.0 Hz, 2H), 3.77 (t, *J* = 6.2 Hz, 2H), 2.70 – 2.59 (m, 2H), 2.42 (s, 3H), 1.85 – 1.74 (m, 2H), 1.74 – 1.71 (m, 1H), 1.69 – 1.62 (m, 4H), 1.62 – 1.54 (m, 4H), 1.19 – 1.14 (m, 2H), 1.17 – 1.09 (m, 4H), 1.00 (s, 18H), 0.86 – 0.76 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 138.0, 129.5, 127.6, 62.6, 50.2, 49.6, 37.2, 35.2, 33.4, 33.0, 30.8, 27.6, 27.2, 26.7, 26.4, 26.36, 26.33, 21.7, 20.5 (2C).

IR ν 3549, 2927, 2854, 1598, 1471, 1316, 1157, 1091, 826, 710 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{28}H_{49}NO_4SSiNa^+$ 546.3049, Found 546.3043 (1.1 ppm error).



N-((*R**)-3-cyclohexyl-1-((*S**)-tetrahydrofuran-2-yl)propyl)-4-methylbenzenesulfonamide

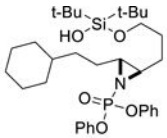
Compound 15: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 88 mg, 0.24 mmol, 85% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 8.3 Hz, 2H), 7.28 (d, *J* = 8.0 Hz, 2H), 4.55 (d, *J* = 7.7 Hz, 1H), 3.77 – 3.65 (m, 2H), 3.65 – 3.58 (m, 1H), 3.24 (tt, *J* = 8.1, 4.9 Hz, 1H), 2.41 (s, 3H), 1.90 – 1.76 (m, 3H), 1.69 – 1.55 (m, 4H), 1.52 – 1.33 (m, 4H), 1.17 – 0.98 (m, 4H), 0.96 – 0.87 (m, 2H), 0.78 – 0.66 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.2, 138.5, 129.6, 127.2, 80.8, 68.5, 57.3, 37.5, 33.4, 33.1, 32.9, 28.2, 27.5, 26.7, 26.3, 25.8, 21.6.

IR ν 3285, 2923, 2851, 1447, 1327, 1159, 1093, 813, 549 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{31}NO_3SNa^+$ 388.1922, Found 388.1915 (1.8 ppm error).



diphenyl ((2*R**,3*R**)-2-(2-cyclohexylethyl)-3-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)aziridin-1-yl)phosphonate

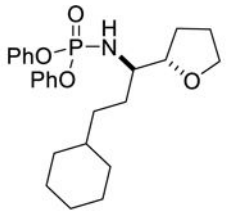
Compound 16: Synthesized using General Procedure G on a 1.06 mmol scale; Purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.560 g, 0.93 mmol, 87% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.33 – 7.28 (m, 4H), 7.25 – 7.21 (m, 4H), 7.17 – 7.12 (m, 2H), 3.83 (t, *J* = 6.1 Hz, 2H), 2.61 – 2.51 (m, 2H), 1.82 – 1.72 (m, 4H), 1.69 – 1.63 (m, 6H), 1.59 – 1.52 (m, 1H), 1.36 – 1.26 (m, 2H), 1.22 – 1.10 (m, 4H), 0.99 (overlapping singlets, 18H), 0.89 – 0.82 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 151.23 – 151.01 (m, 2C), 129.7, 125.0, 120.4 (d, *J* = 4.8 Hz), 62.6, 46.6 (d, *J* = 7.6 Hz), 46.2 (d, *J* = 8.1 Hz), 37.4, 34.8, 33.4, 33.2, 30.58, 28.5 (d, *J* = 4.6 Hz), 27.6, 27.3 (d, *J* = 4.8 Hz), 26.7, 26.4 (d, *J* = 2.2 Hz), 20.5 (d, *J* = 2.2 Hz).

IR ν 3380, 2927, 2854, 1592, 1490, 1193, 937, 826, 688 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{33}H_{52}NO_5PSiNa^+$ 624.3250, Found 624.3261 (1.8 ppm error).



diphenyl ((*R**)-3-cyclohexyl-1-((*S**)-tetrahydrofuran-2-yl)propyl)phosphoramidate

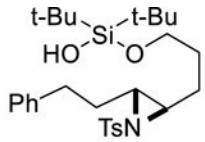
Compound 17: Synthesized using the General Procedure H on a 0.26 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 96 mg, 0.21 mmol, 81% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.31 (td, *J* = 8.0, 2.1 Hz, 4H), 7.25 (ddt, *J* = 7.3, 6.1, 1.1 Hz, 4H), 7.15 (tq, *J* = 7.5, 1.1 Hz, 2H), 3.81 – 3.73 (m, 1H), 3.71 – 3.64 (m, 1H), 3.35 (qt, *J* = 9.5, 4.7 Hz, 1H), 2.94 (t, *J* = 10.7 Hz, 1H), 1.90 – 1.82 (m, 2H), 1.79 – 1.75 (m, 1H), 1.69 – 1.65 (m, 1H), 1.65 – 1.60 (m, 4H), 1.59 – 1.54 (m, 2H), 1.44 – 1.32 (m, 1H), 1.28 – 1.16 (m, 2H), 1.16 – 1.07 (m, 4H), 0.83 – 0.70 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 151.3 – 151.2 (m, 2C), 129.7, 124.9, 120.3 (dd, *J* = 5.1, 1.8 Hz), 82.0 (d, *J* = 4.9 Hz), 68.4, 56.2, 37.7, 33.5, 33.2, 29.4 (d, *J* = 5.0 Hz), 27.8, 26.7, 26.4 (d, *J* = 2.6 Hz), 26.0.

IR ν 3208, 2927, 2850, 1592, 1493, 1254, 1196, 1070, 902, 773, 689 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{25}H_{34}NO_4PNa^+$ 466.2123, Found 466.2137 (3.0 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-phenethyl-1-tosylaziridin-2-yl)propoxy)silanol

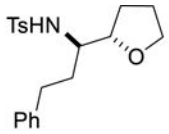
Compound 18: Synthesized using General Procedure D on a 0.531 mmol scale; Purified using a gradient of 25% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.221 g, 0.427 mmol, 80% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.90 – 7.77 (m, 2H), 7.34 – 7.25 (m, 4H), 7.21 – 7.16 (m, 1H), 7.16 – 7.10 (m, 2H), 3.71 (t, *J* = 6.2 Hz, 2H), 2.80 – 2.54 (m, 4H), 2.42 (s, 3H), 2.19 – 2.01 (m, 2H), 1.76 – 1.58 (m, 2H), 1.47 (dt, *J* = 7.8, 6.3 Hz, 2H), 0.99 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 144.0, 140.7, 137.9, 129.6, 128.6, 128.5, 127.6, 126.3, 62.5, 49.50, 49.48, 33.8, 31.3, 30.6, 27.6, 26.4, 21.7, 20.5.

IR ν 3625, 2857, 1598, 1473, 1316, 1159 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{28}H_{44}NO_4SSi^+$ 518.2755, Found 518.2778 (4.4 ppm error).



4-methyl-*N*-((*R**)-3-phenyl-1-((*S**)-tetrahydrofuran-2-yl)propyl)benzenesulfonamide

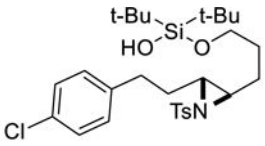
Compound 19: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 5% acetone/CH_2Cl_2 on silica gel; single diastereomer; (light yellow oil, 61 mg, 0.170 mmol, 85% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.81 – 7.69 (m, 2H), 7.29 (d, *J* = 8.0 Hz, 2H), 7.25 (t, *J* = 7.5 Hz, 2H), 7.17 (t, *J* = 7.3 Hz, 1H), 7.10 – 7.04 (m, 2H), 4.89 (d, *J* = 8.5 Hz, 1H), 3.76 (td, *J* = 7.1, 4.8 Hz, 1H), 3.68 (dt, *J* = 8.2, 6.5 Hz, 1H), 3.65 – 3.59 (m, 1H), 3.38 (tt, *J* = 8.6, 4.8 Hz, 1H), 2.66 (ddd, *J* = 13.9, 9.9, 6.0 Hz, 1H), 2.49 (ddd, *J* = 13.8, 10.1, 6.5 Hz, 1H), 2.43 (s, 3H), 1.90 – 1.66 (m, 5H), 1.63 – 1.52 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.2, 141.7, 138.5, 129.6, 128.4, 127.2, 126.0, 80.6, 68.4, 56.8, 32.6, 31.8, 27.6, 25.8, 21.6.

IR ν 3277, 2929, 2860, 1455, 1327, 1159, 816 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{25}NO_3SNa^+$ 382.1447, Found 382.1463 (4.2 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(4-chlorophenethyl)-1-tosylaziridin-2-yl)propoxy)silanol

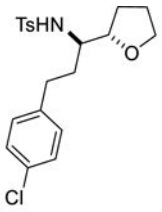
Compound 20: Synthesized using General Procedure C on a 0.78 mmol scale; purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.340 g, 0.61 mmol, 78% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 8.0 Hz, 2H), 7.24 (d, *J* = 8.5 Hz, 2H), 7.07 (d, *J* = 8.5 Hz, 2H), 3.71 (t, *J* = 6.2 Hz, 2H), 2.73 – 2.58 (m, 4H), 2.43 (s, 3H), 2.12 – 2.03 (m, 2H), 1.76 – 1.67 (m, 1H), 1.65 – 1.59 (m, 1H), 1.50 – 1.42 (m, 2H), 0.98 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 144.1, 139.2, 137.8, 132.0, 129.8, 129.6, 128.7, 127.6, 62.54, 49.29 (2C), 33.2, 31.3, 30.6, 27.5, 26.5, 21.7, 20.5.

IR ν 3544, 2931, 2857, 1598, 1471, 1304, 1157, 1091, 826, 710 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{28}H_{42}ClNO_4SSiNa^+$ 574.2190, Found 574.2214 (4.2 ppm error).



N-((*R**)-3-(4-chlorophenyl)-1-((*S**)-tetrahydrofuran-2-yl)propyl)-4-methylbenzenesulfonamide

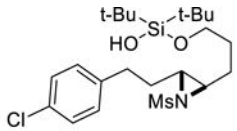
Compound 21: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 16% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 92 mg, 0.23 mmol, 82% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.3 Hz, 2H), 7.28 (d, *J* = 7.8 Hz, 2H), 7.20 (d, *J* = 8.5 Hz, 2H), 7.00 (d, *J* = 8.5 Hz, 2H), 4.80 (d, *J* = 8.6 Hz, 1H), 3.73 – 3.63 (m, 2H), 3.63 – 3.56 (m, 1H), 3.36 – 3.27 (m, 1H), 2.64 (ddd, *J* = 13.9, 9.5, 6.3 Hz, 1H), 2.48 (ddd, *J* = 14.0, 9.7, 6.7 Hz, 1H), 2.42 (s, 3H), 1.84 – 1.77 (m, 2H), 1.77 – 1.70 (m, 2H), 1.71 – 1.66 (m, 1H), 1.58 – 1.51 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.4, 140.1, 138.4, 131.7, 129.8, 129.7, 128.5, 127.2, 80.5, 68.5, 56.6, 32.5, 31.1, 27.6, 25.8, 21.6.

IR ν 3283, 2954, 2870, 1493, 1304, 1157, 1066, 815, 749 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{24}ClNO_3SNa^+$ 416.1063, Found 416.1075 (2.9 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(4-chlorophenethyl)-1-(methylsulfonyl)aziridin-2-yl)propoxy)silanol

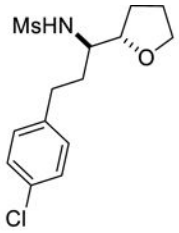
Compound 22: Synthesized using General Procedure E on a 0.66 mmol scale; Purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.208 g, 0.43 mmol, 65% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.26 (d, *J* = 8.5 Hz, 2H), 7.13 (d, *J* = 8.5 Hz, 2H), 3.81 (t, *J* = 6.0 Hz, 2H), 3.05 (s, 3H), 2.88 – 2.80 (m, 1H), 2.77 – 2.69 (m, 1H), 2.65 – 2.60 (m, 2H), 2.21 (dt, *J* = 8.3, 5.8 Hz, 1H), 2.06 – 2.00 (m, 1H), 1.77 – 1.71 (m, 2H), 1.68 – 1.60 (m, 2H), 1.01 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 139.0, 132.1, 129.9, 128.8, 62.6, 48.97, 48.91, 42.4, 33.2, 31.3, 30.5, 27.6, 26.7, 20.6.

IR 3537, 2933, 2857, 1471, 1311, 1147, 1093, 827, 787, 648 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{22}H_{38}ClNO_4SSiNa^+$ 498.1877, Found 498.1891 (2.8 ppm error).



N-((*R**)-3-(4-chlorophenyl)-1-((*S**)-tetrahydrofuran-2-yl)propyl)methanesulfonamide

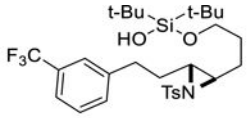
Compound 23: Synthesized using General Procedure H on a 0.32 mmol scale; purified using a gradient of 0 to 16% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 89 mg, 0.28 mmol, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.24 (d, *J* = 8.6 Hz, 2H), 7.14 (d, *J* = 8.6 Hz, 2H), 4.50 (d, *J* = 9.0 Hz, 1H), 3.93 – 3.86 (m, 1H), 3.86 – 3.80 (m, 1H), 3.78 – 3.70 (m, 1H), 3.63 (ddd, *J* = 13.1, 9.4, 3.9 Hz, 1H), 3.02 (s, 3H), 2.90 – 2.81 (m, 1H), 2.66 (ddd, *J* = 14.0, 10.1, 6.4 Hz, 1H), 1.97 – 1.90 (m, 2H), 1.90 – 1.86 (m, 1H), 1.84 – 1.73 (m, 1H), 1.71 – 1.62 (m, 1H), 1.61 – 1.58 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 139.9, 131.9, 129.9, 128.6, 81.0, 68.4, 56.4, 42.1, 33.7, 31.6, 26.6, 26.0.

IR ν 3285, 2934, 2873, 1491, 1308, 1119, 1014, 987, 519 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{14}H_{20}ClNO_3SNa^+$ 340.0750, Found 340.0773 (6.8 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-1-tosyl-3-(3-(trifluoromethyl)phenethyl)aziridin-2-yl)propoxy)silanol

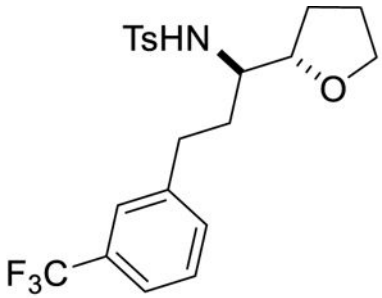
Compound 24: Synthesized using General Procedure D on a 1.37 mmol scale; Purified using a gradient of 5 to 30% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.789 g, 1.35 mmol, >95% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.92 – 7.81 (m, 2H), 7.53 – 7.32 (m, 6H), 3.75 (t, *J* = 6.2 Hz, 2H), 2.85 – 2.64 (m, 4H), 2.46 (s, 3H), 2.21 – 2.11 (m, 2H), 1.82 – 1.64 (m, 2H), 1.50 (dt, *J* = 8.1, 6.3 Hz, 2H), 1.01 (s, 18H).

^{13}C{^{1}H} NMR (126 MHz, $CDCl_3$) δ 144.0, 141.5, 137.6, 131.7, 130.8 (q, *J* = 32.0 Hz), 129.5, 128.9, 127.5, 125.2 (q, *J* = 238 Hz), 125.0 (q, *J* = 3.6 Hz), 123.1 (q, *J* = 4.2 Hz), 62.3, 49.2, 48.9, 33.5, 31.1, 30.5, 27.4, 26.2, 21.6, 20.4.

IR ν 3600, 2857, 1598, 1473, 1304, 1073, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{42}F_3NO_4SSiNa^+$ 608.2448, Found 608.2463 (2.5 ppm error).



4-methyl-*N*-((*R**)-1-((*S**)-tetrahydrofuran-2-yl)-3-(3-(trifluoromethyl)phenyl)propyl)benzenesulfonamide

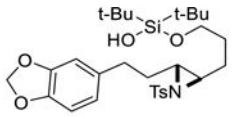
Compound 25: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 10% acetone/CH_2Cl_2 on silica gel; single diastereomer; (light yellow oil, 70 mg, 0.164 mmol, 82% yield).

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.76 (d, *J* = 7.9 Hz, 2H), 7.43 (d, *J* = 7.8 Hz, 1H), 7.36 (t, *J* = 7.7 Hz, 1H), 7.33 – 7.22 (m, 4H), 4.79 (d, *J* = 8.7 Hz, 1H), 3.74 – 3.66 (m, 2H), 3.62 (q, *J* = 7.2 Hz, 1H), 3.35 (tt, *J* = 8.8, 4.6 Hz, 1H), 2.72 (ddd, *J* = 15.4, 10.4, 5.6 Hz, 1H), 2.55 (ddd, *J* = 14.1, 10.6, 6.2 Hz, 1H), 2.42 (s, 3H), 1.94 – 1.46 (m, 6H).

^{13}C{^{1}H} NMR (126 MHz, $CDCl_3$) δ 143.5, 142.6, 138.4, 131.9, 130.6 (q, *J* = 31.8 Hz), 129.7, 128.9, 127.1, 125.4 (q, *J* = 263 Hz), 125.1 (q, *J* = 3.7 Hz), 122.9 (q, *J* = 3.9 Hz), 80.5, 68.5, 56.6, 32.5, 31.7, 27.8, 25.8, 21.6.

IR ν 3280, 2931, 2866, 1450, 1330, 1073, 816 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{24}F_3NO_3SNa^+$ 450.1321, Found 450.1340 (4.2 ppm error).



(3-((2*R**,3*R**)-3-(2-(benzo[*d*][1,3]dioxol-5-yl)ethyl)-1-tosylaziridin-2-yl)propoxy)di-*tert*-butylsilanol

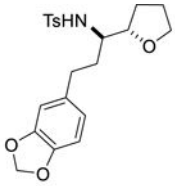
Compound 26: Synthesized using General Procedure D on a 0.446 mmol scale; Purified using a gradient of 0 to 30% EtOAc/hexanes on silica gel; single diastereomer; (red oil, 0.191 g, 0.340 mmol, 76% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.87 – 7.78 (m, 2H), 7.30 (d, *J* = 8.1 Hz, 2H), 6.71 (d, *J* = 7.9 Hz, 1H), 6.62 (d, *J* = 1.7 Hz, 1H), 6.58 (dd, *J* = 7.9, 1.7 Hz, 1H), 5.91 (s, 2H), 3.72 (t, *J* = 6.2 Hz, 2H), 2.69 – 2.51 (m, 4H), 2.43 (s, 3H), 2.12 – 2.05 (m, 1H), 2.04 – 1.97 (m, 1H), 1.74 (dtd, *J* = 13.9, 7.9, 5.8 Hz, 1H), 1.65 (dt, *J* = 14.3, 7.3 Hz, 1H), 1.48 (dt, *J* = 8.1, 6.4 Hz, 2H), 0.99 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 147.8, 146.0, 144.0, 137.9, 134.6, 129.6, 127.6, 121.3, 108.9, 108.3, 100.9, 62.5, 49.3, 33.6, 31.6, 30.6, 27.5, 26.5, 21.7, 20.5.

IR ν 3600, 2931, 2857, 1504, 1490, 1316, 1247, 1159, 828 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{43}NO_6SSiNa^+$ 584.2473, Found 584.2484 (1.9 ppm error).



N-((*R**)-3-(benzo[*d*][1,3]dioxol-5-yl)-1-((*S**)-tetrahydrofuran-2-yl)propyl)-4-methylbenzenesulfonamide

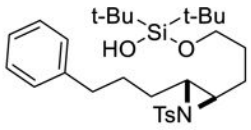
Compound 27: Synthesized using General Procedure H on a 0.301 mmol scale; Purified using a gradient of 0 to 5% acetone/CH_2Cl_2 on silica gel followed by preparative thin layer chromatography with 30% EtOAc/hexanes; (white solid, 98 mg, 0.243 mmol, 81% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 – 7.68 (m, 2H), 7.28 (d, *J* = 8.2 Hz, 2H), 6.75 – 6.60 (m, 1H), 6.51 – 6.49 (m, 2H), 5.90 (s, 2H), 4.87 (d, *J* = 8.6 Hz, 1H), 3.72 (td, *J* = 7.0, 4.8 Hz, 1H), 3.66 (dt, *J* = 8.2, 6.3 Hz, 1H), 3.60 (dt, *J* = 8.4, 6.6 Hz, 1H), 3.33 (tt, *J* = 8.3, 5.0 Hz, 1H), 2.56 (ddd, *J* = 13.9, 9.1, 6.5 Hz, 1H), 2.47 – 2.31 (m, 4H), 1.87 – 1.50 (m, 6H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 147.6, 145.7, 143.3, 138.5, 135.5, 129.6, 127.1, 121.1, 108.9, 108.2, 100.8, 80.5, 68.4, 56.7, 32.8, 31.5, 27.6, 25.8, 21.6.

IR ν 3400, 3000, 1490, 1327, 1159, 1039 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{25}NO_5SNa^+$ 426.1346, Found 426.1359 (3.1 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(3-phenylpropyl)-1-tosylaziridin-2-yl)propoxy)silanol

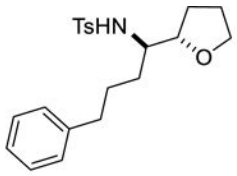
Compound 28: Synthesized using General Procedure D on a 1 mmol scale; Purified using a gradient of 0 to 40% EtOAc/hexanes on silica gel; (light yellow oil, 0.492 g, 0.925 mmol, 93% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.87 – 7.73 (m, 2H), 7.28 – 7.20 (m, 4H), 7.20 – 7.10 (m, 1H), 7.09 – 7.00 (m, 2H), 3.76 (t, *J* = 6.2 Hz, 2H), 2.71 – 2.61 (m, 2H), 2.56 (t, *J* = 7.7 Hz, 2H), 2.39 (s, 3H), 1.92 – 1.68 (m, 4H), 1.68 – 1.47 (m, 4H), 0.97 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 141.8, 137.9, 129.5, 128.5, 128.4, 127.6, 126.0, 62.5, 49.7, 49.5, 35.4, 30.8, 29.6, 29.3, 27.6, 26.2, 21.7, 20.5.

IR ν 3600, 2857, 1598, 1473, 1156, 825 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{45}NO_4SSiNa^+$ 554.2731, Found 554.2742 (2 ppm error).



4-methyl-*N*-((*R**)-4-phenyl-1-((*S**)-tetrahydrofuran-2-yl)butyl)benzenesulfonamide

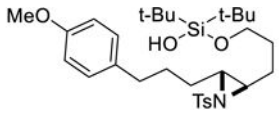
Compound 29: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 10% acetone/CH_2Cl_2 on silica gel; single diastereomer; (colorless oil, 67 mg, 0.18 mmol, 90% yield).

^{1}H NMR (600 MHz, $CDCl_3$) δ 7.76 – 7.65 (m, 2H), 7.30 – 7.21 (m, 4H), 7.21 – 7.10 (m, 1H), 7.09 – 6.98 (m, 2H), 4.80 (d, *J* = 8.5 Hz, 1H), 3.70 (td, *J* = 7.1, 5.1 Hz, 1H), 3.68 – 3.55 (m, 2H), 3.33 (tt, *J* = 8.5, 4.7 Hz, 1H), 2.49 (qt, *J* = 13.9, 6.7 Hz, 2H), 2.38 (s, 3H), 1.87 – 1.68 (m, 3H), 1.64 – 1.53 (m, 2H), 1.53 – 1.35 (m, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.1, 142.0, 138.6, 129.5, 128.4, 128.3, 127.1, 125.8, 80.8, 68.4, 57.0, 35.6, 30.6, 27.6, 27.1, 25.8, 21.6.

IR ν 3280, 2929, 2860, 1455, 1327, 1159, 813 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{27}NO_3SNa^+$ 396.1604, Found 396.1628 (6.1 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(3-(4-methoxyphenyl)propyl)-1-tosylaziridin-2-yl)propoxy)silanol

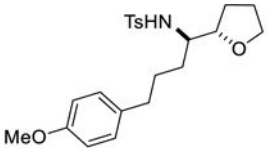
Compound 30: Synthesized using General Procedure C on a 0.76 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.267 g, 0.47 mmol, 62% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.3 Hz, 2H), 7.28 (d, *J* = 8.0 Hz, 2H), 7.01 (d, *J* = 8.7 Hz, 2H), 6.81 (d, *J* = 8.7 Hz, 2H), 3.79 (s, 3H), 3.76 (d, *J* = 6.3 Hz, 2H), 2.67 (t, *J* = 6.5 Hz, 2H), 2.52 (t, *J* = 7.7 Hz, 2H), 2.42 (s, 3H), 1.87 – 1.77 (m, 2H), 1.76 – 1.69 (m, 2H), 1.62 – 1.55 (m, 4H), 0.99 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 157.9, 143.9, 137.9, 133.9, 129.5, 129.3, 127.6, 113.8, 62.5, 55.4, 49.7, 49.6, 34.5, 30.8, 29.5 (2C), 27.6, 26.2, 21.7, 20.5.

IR ν 3545, 2931, 2857, 1513, 1471, 1303, 1246, 1157, 1091, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{30}H_{47}NO_5SSiNa^+$ 584.2842, Found 584.2877 (6.0 ppm error).



N-((*R**)-4-(4-methoxyphenyl)-1-((*S**)-tetrahydrofuran-2-yl)butyl)-4-methylbenzenesulfonamide

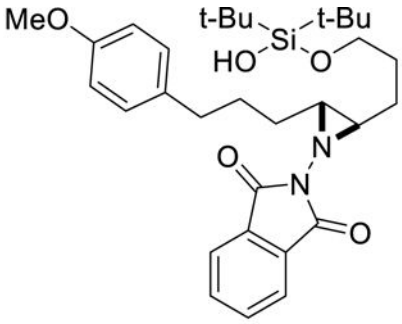
Compound 31: Synthesized using the General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 88 mg, 0.21 mmol, 75% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.72 (d, *J* = 8.3 Hz, 2H), 7.24 (d, *J* = 7.8 Hz, 2H), 6.97 (d, *J* = 8.7 Hz, 2H), 6.79 (d, *J* = 8.7 Hz, 2H), 4.60 (s, 1H), 3.79 (s, 3H), 3.73 – 3.67 (m, 1H), 3.67 – 3.57 (m, 2H), 3.36 – 3.27 (m, 1H), 2.43 (q, *J* = 6.3 Hz, 2H), 2.39 (s, 3H), 1.86 – 1.79 (m, 1H), 1.79 – 1.74 (m, 2H), 1.63 – 1.56 (m, 1H), 1.56 – 1.44 (m, 2H), 1.44 – 1.35 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 157.8, 143.2, 138.5, 134.1, 129.6, 129.3, 127.1, 113.7, 80.8, 68.4, 57.0, 55.3, 34.7, 30.4, 27.5, 27.4, 25.8, 21.6.

IR ν 3284, 2934, 2864, 1513, 1324, 1246, 1157, 1093, 815, 749 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{22}H_{29}NO_4SNa^+$ 426.1715, Found 426.1715 (0.0 ppm error).



2-((2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-(3-(4-methoxyphenyl)propyl)aziridin-1-yl)isoindoline-1,3-dione

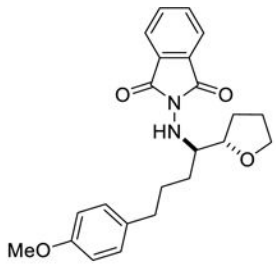
Compound 32: Synthesized using the General Procedure B on a 0.76 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; ~1:1 mixture of rotamers or *N*-epimers; (light yellow oil, 0.171 g, 0.30 mmol, 40% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 (ddd, *J* = 5.4, 4.2, 3.0 Hz, 2H), 7.72 – 7.62 (m, 2H), 7.18 – 7.08 (m, 2H), 6.87 – 6.79 (m, 2H), 3.98 (ddd, *J* = 10.2, 7.2, 5.6 Hz, 1H), 3.90 (dt, *J* = 10.3, 5.7 Hz, 1H), 3.79 (s, 3H), 2.98 – 2.79 (m, 1H), 2.66 (t, *J* = 7.6 Hz, 1H), 2.54 (ddd, *J* = 8.6, 6.8, 1.9 Hz, 1H), 2.41 – 2.31 (m, 1H), 2.05 – 1.61 (m, 8H), 1.02 (s, 9H), 1.01 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 166.5, 157.9, 134.1, 129.5, 123.1, 113.9, 62.7, 55.3, 48.7, 47.0, 34.9, 32.1, 29.7, 28.6, 27.7, 27.6, 24.2, 20.7, 20.5.

IR ν 3501, 2933, 2857, 1717, 1511, 1377, 1246, 1100, 827, 713 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{31}H_{44}N_2O_5SiNa^+$ 575.2917, Found 575.2908 (1.6 ppm error).



2-(((*R**)-4-(4-methoxyphenyl)-1-((*S**)-tetrahydrofuran-2-yl)butyl)amino)isoindoline-1,3-dione

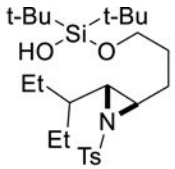
Compound 33: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 96 mg, 0.24 mmol, 85% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (dd, *J* = 5.5, 3.0 Hz, 2H), 7.72 (dd, *J* = 5.4, 3.2 Hz, 2H), 7.06 (d, *J* = 8.7 Hz, 2H), 6.76 (d, *J* = 8.7 Hz, 2H), 3.93 – 3.87 (m, 1H), 3.86 – 3.79 (m, 1H), 3.75 (s, 3H), 3.72 – 3.65 (m, 1H), 3.54 – 3.48 (m, 1H), 2.56 (t, *J* = 8.5 Hz, 2H), 2.05 – 1.91 (m, 2H), 1.90 – 1.82 (m, 2H), 1.78 – 1.67 (m, 2H), 1.55 – 1.47 (m, 2H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 167.2, 157.8, 134.2, 130.4, 129.3, 123.4, 113.8, 80.4, 68.4, 60.4, 55.3, 35.0, 29.3, 27.9, 25.8, 25.7.

IR ν 2937, 2861, 1720, 1507, 1387, 1244, 1067, 884, 710 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{23}H_{26}N_2O_4Na^+$ 417.1790, Found 417.1808 (4.3 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-3-(pentan-3-yl)-1-tosylaziridin-2-yl)propoxy)silanol

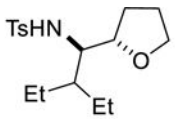
Compound 34: Synthesized using the General Procedure C on a 1.58 mmol scale; Purified using a gradient of 0 to 7% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.567 g, 1.17 mmol, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (d, *J* = 6.5 Hz, 2H), 7.29 (d, *J* = 8.4 Hz, 2H), 3.83 (t, *J* = 6.2 Hz, 2H), 2.69 – 2.56 (m, 2H), 2.42 (s, 3H), 2.07 – 1.97 (m, 2H), 1.78 – 1.63 (m, 2H), 1.46 – 1.36 (m, 1H), 1.32 – 1.23 (m, 2H), 1.12 (h, *J* = 6.6 Hz, 2H), 1.01 (s, 18H), 0.86 (t, *J* = 6.7 Hz, 3H), 0.72 (t, *J* = 7.4 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.9, 137.9, 129.4, 127.8, 62.7, 52.6, 50.4, 42.5, 31.2, 27.6, 25.5, 24.3, 23.4, 21.7, 20.5, 11.4, 10.1.

IR ν 3552, 2964, 2931, 2857, 1598, 1471, 1304, 1157, 1089, 827, 648 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{25}H_{45}NO_4SSiNa^+$ 506.2736, Found 506.2747 (2.2 ppm error).



N-((*R**)-2-ethyl-1-((*S**)-tetrahydrofuran-2-yl)butyl)-4-methylbenzenesulfonamide

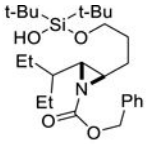
Compound 35: Synthesized using General Procedure H on a 0.31 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 85 mg, 0.26 mmol, 84% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, *J* = 8.5 Hz, 2H), 7.33 (d, *J* = 7.8 Hz, 2H), 4.59 (d, *J* = 4.9 Hz, 1H), 3.83 (q, *J* = 6.9 Hz, 1H), 3.64 (t, *J* = 6.6 Hz, 2H), 3.52 (ddd, *J* = 9.6, 6.6, 3.3 Hz, 1H), 2.48 (s, 3H), 1.90 – 1.82 (m, 2H), 1.77 – 1.70 (m, 1H), 1.56 – 1.46 (m, 1H), 1.43 – 1.35 (m, 1H), 1.33 – 1.24 (m, 1H), 1.20 – 1.11 (m, 1H), 1.11 – 1.03 (m, 2H), 0.92 (t, *J* = 7.4 Hz, 3H), 0.85 (t, *J* = 7.3 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.0, 139.1, 129.4, 127.1, 79.5, 68.0, 58.1, 43.3, 28.6, 25.8, 22.6, 22.1, 21.6, 12.3, 12.0.

IR ν 3290, 2963, 2874, 1323, 1159, 815, 749, 666 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{17}H_{27}NO_3SNa^+$ 348.1609, Found 348.1617 (2.3 ppm error).



benzyl (2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-(pentan-3-yl)aziridine-1-carboxylate

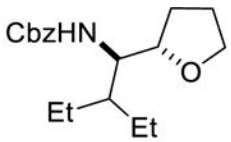
Compound 36: Synthesized by General Procedure F on a 2.07 mmol scale; Purified using a gradient of 0 to 8% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.772 g, 1.66 mmol, 80% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.29 (m, 5H), 5.13 (d, *J* = 1.9 Hz, 2H), 3.78 (t, *J* = 6.1 Hz, 2H), 2.32 (ddd, *J* = 7.5, 5.4, 3.5 Hz, 1H), 2.09 (dd, *J* = 8.8, 3.5 Hz, 1H), 1.84 – 1.72 (m, 2H), 1.72 – 1.62 (m, 2H), 1.61 – 1.55 (m, 1H), 1.51 – 1.39 (m, 2H), 1.39 – 1.27 (m, 2H), 1.00 (s, 9H), 0.99 (s, 9H), 0.93 (t, *J* = 7.2Hz, 3H), 0.90 – 0.88 (t, *J* = 7.3 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 162.2, 136.1, 128.6, 128.4, 128.3, 68.0, 62.8, 48.1, 44.1, 43.5, 30.5, 27.61, 27.59, 27.51, 24.8, 24.0, 20.59, 20.58, 11.5, 10.7.

IR ν 3502, 2963, 2933, 2857, 1718, 1684, 1457, 1196, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{26}H_{45}NO_4SiNa^+$ 486.3016, Found 486.3015 (0.2 ppm error).



benzyl ((*R**)-2-ethyl-1-((*S**)-tetrahydrofuran-2-yl)butyl)carbamate

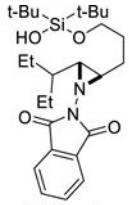
Compound 37: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 89 mg, 0.22 mmol, 79% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.40 – 7.36 (m, 1H), 7.36 – 7.30 (m, 4H), 5.10 (q, *J* = 12.3 Hz, 2H), 4.58 (d, *J* = 10.1 Hz, 1H), 3.90 – 3.69 (m, 4H), 1.99 – 1.88 (m, 2H), 1.87 – 1.71 (m, 2H), 1.59 – 1.41 (m, 3H), 1.26 – 1.14 (m, 1H), 1.06 – 0.99 (m, 1H), 0.95 (t, *J* = 7.3 Hz, 3H), 0.89 (t, *J* = 7.3 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 156.7, 136.7, 128.6, 128.2, 128.1, 79.2, 68.3, 66.8, 55.5, 42.0, 29.1, 25.6, 23.1, 21.3, 12.4, 11.9.

IR ν 3331, 2961, 2874, 1724, 1697, 1537, 1236, 1071, 696 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{18}H_{27}NO_3Na^+$ 328.1889, Found 328.1893 (1.2 ppm error).



2-((2*R**,3*R**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-(pentan-3-yl)aziridin-1-yl)isoindoline-1,3-dione

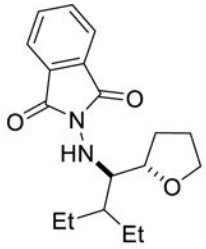
Compound 38: Synthesized using General Procedure B on a 1.90 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.106 g, 0.223 mmol, 11% yield).

^1H NMR (400 MHz, $CDCl_3$) δ 7.78 – 7.73 (m, 2H), 7.70 – 7.64 (m, 2H), 3.85 – 3.72 (m, 2H), 2.98 (dd, *J* = 8.9, 5.4 Hz, 1H), 2.39 (dt, *J* = 8.7, 5.1 Hz, 1H), 1.94 – 1.61 (m, 5H), 1.46 (qd, *J* = 7.5, 6.3 Hz, 2H), 1.37 – 1.23 (m, 1H), 1.15 – 1.06 (m, 1H), 1.01 – 0.97 (m, 3H), 0.97 – 0.93 (m, 3H), 0.92 (s, 9H), 0.90 (s, 9H).

$^{13}C\{^1H\}$ NMR (101 MHz, $CDCl_3$) δ 166.6, 134.0, 130.6, 122.9, 62.8, 50.3, 48.0, 44.3, 30.7, 27.53, 27.49, 24.3, 24.0, 23.2, 20.53, 20.50, 11.3, 11.1.

IR ν 3852, 2961, 2933, 2857, 1717, 1558, 1374, 1103, 826, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{26}H_{42}N_2O_4SiNa^+$ 497.2812, Found 497.2803 (1.8 ppm error).



2-(((*R**)-2-ethyl-1-((*S**)-tetrahydrofuran-2-yl)butyl)amino)isoindoline-1,3-dione

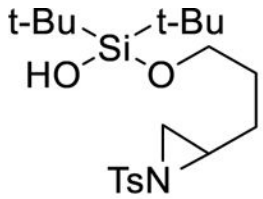
Compound 39: Synthesized using the General Procedure H on a 0.19 mmol scale; purified using a gradient of 0 to 11% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 45 mg, 0.14 mmol, 75% yield).

^1H NMR (400 MHz, $CDCl_3$) δ 7.83 (dd, *J* = 5.5, 3.0 Hz, 2H), 7.71 (dd, *J* = 5.4, 3.2 Hz, 2H), 3.90 (dt, *J* = 8.7, 5.6 Hz, 1H), 3.77 – 3.71 (m, 1H), 3.63 – 3.58 (m, 1H), 3.55 (dd, *J* = 5.1, 3.5 Hz, 1H), 2.08 – 1.93 (m, 2H), 1.91 – 1.84 (m, 2H), 1.80 – 1.72 (m, 1H), 1.56 (ddd, *J* = 13.5, 7.5, 6.1 Hz, 1H), 1.50 – 1.41 (m, 1H), 1.38 (ddd, *J* = 7.8, 6.4, 3.3 Hz, 1H), 1.35 – 1.23 (m, 1H), 0.96 (t, *J* = 7.3 Hz, 3H), 0.92 (t, *J* = 7.4 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 167.1, 134.2, 130.5, 123.3, 79.6, 67.4, 61.9, 42.8, 27.5, 26.1, 22.9, 22.5, 12.57, 12.55.

IR ν 3927, 2971, 2874, 1724, 1387, 1070, 885 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{18}H_{24}N_2O_3Na^+$ 339.1685, Found 339.1687 (0.6 ppm error).



di-*tert*-butyl(3-(1-tosylaziridin-2-yl)propoxy)silanol

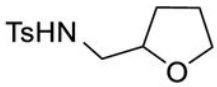
Compound 40: Synthesized using General Procedure C on a 1.22 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.266 g, 0.64 mmol, 52% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.5 Hz, 2H), 7.33 (d, *J* = 7.8 Hz, 2H), 3.77 (t, *J* = 5.8 Hz, 2H), 2.84 – 2.75 (m, 1H), 2.62 (d, *J* = 6.9 Hz, 1H), 2.44 (s, 3H), 2.07 (d, *J* = 4.5 Hz, 1H), 1.79 – 1.70 (m, 1H), 1.54 (dt, *J* = 8.3, 6.3 Hz, 2H), 1.38 (dtd, *J* = 14.1, 8.1, 6.1 Hz, 1H), 0.99 (s, 9H), 0.98 (s, 9H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 144.6, 135.1, 129.8, 128.1, 62.2, 40.2, 34.1, 30.2, 27.60, 27.58, 21.7, 20.6, 20.5.

IR ν 3560, 2931, 2857, 1558, 1457, 1318, 1161, 1094, 827, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{35}NO_4SSiNa^+$ 436.1954, Found 436.1960 (1.4 ppm error).



4-methyl-*N*-((tetrahydrofuran-2-yl)methyl)benzenesulfonamide

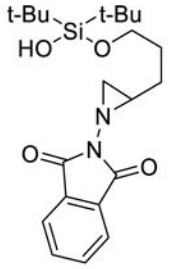
Compound 41: Synthesized using General Procedure H on a 0.31 mmol scale; purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; (Colorless oil, 47 mg, 0.18 mmol, 58% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.3 Hz, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 4.84 (s, 1H), 3.92 (qd, *J* = 6.8, 3.6 Hz, 1H), 3.81 – 3.73 (m, 1H), 3.73 – 3.65 (m, 1H), 3.10 (ddd, *J* = 12.4, 6.8, 3.5 Hz, 1H), 2.93 – 2.84 (m, 1H), 2.42 (s, 3H), 1.97 – 1.89 (m, 1H), 1.89 – 1.82 (m, 2H), 1.66 – 1.56 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.5, 137.0, 129.8, 127.1, 77.1, 68.3, 46.8, 28.4, 25.9, 21.6.

IR ν 3274, 2974, 2876, 1327, 1160, 1073, 815, 666, 550 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{12}H_{17}NO_3SNa^+$ 278.0827, Found 278.0844 (6.1 ppm error).



2-(2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)aziridin-1-yl)isoindoline-1,3-dione

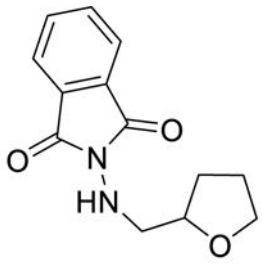
Compound 42: Synthesized using General Procedure B on a 2.04 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.114 g, 0.28 mmol, 13% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.77 (dd, *J* = 5.6, 3.0 Hz, 2H), 7.68 (dd, *J* = 5.6, 2.9 Hz, 2H), 4.02 (dt, *J* = 10.2, 6.6 Hz, 1H), 3.94 (dt, *J* = 10.2, 6.0 Hz, 1H), 2.65 (tt, *J* = 7.7, 5.6 Hz, 1H), 2.44 (dd, *J* = 7.7, 2.4 Hz, 1H), 2.30 (dd, *J* = 5.8, 2.4 Hz, 1H), 1.99 – 1.88 (m, 2H), 1.81 – 1.68 (m, 2H), 1.03 (overlapping singlets, 18H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 165.4, 134.2, 130.4, 123.1, 62.6, 43.2, 38.4, 29.9, 28.0, 27.7, 27.6, 20.7, 20.5.

IR ν 2958, 2927, 2857, 1717, 1467, 1377, 1276, 1103, 826, 750 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{32}N_2O_4SiNa^+$ 427.2029, Found 427.2051 (5.1 ppm error).



2-(((tetrahydrofuran-2-yl)methyl)amino)isoindoline-1,3-dione

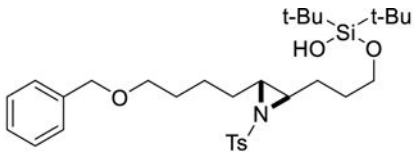
Compound 43: Synthesized using the General Procedure H on a 0.25 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 47 mg, 0.19 mmol, 76% yield)

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.84 (dd, *J* = 4.9, 3.0 Hz, 2H), 7.72 (dd, *J* = 5.6, 3.0 Hz, 2H), 4.12 (qd, *J* = 7.2, 4.0 Hz, 1H), 3.89 – 3.83 (m, 1H), 3.80 – 3.72 (m, 1H), 3.16 – 3.04 (m, 2H), 2.08 – 1.98 (m, 1H), 1.94 – 1.82 (m, 2H), 1.67 – 1.56 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 166.6, 134.2, 130.5, 123.4, 76.9, 68.1, 55.1, 29.3, 25.7.

IR ν 3290, 2950, 2867, 1720, 1383, 1194, 1070, 884, 710 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{13}H_{14}N_2O_3Na^+$ 269.0902, Found 269.0909 (2.6 ppm error).



(3-((2*R**,3*R**)-3-(4-(benzyloxy)butyl)-1-tosylaziridin-2-yl)propoxy)di-*tert*-butylsilanol

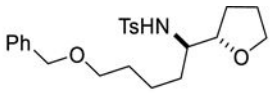
Compound 44: Synthesized using General Procedure C on a 4.6 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 1.1 g, 1.9 mmol, 42% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.5 Hz, 2H), 7.38 – 7.34 (m, 1H), 7.34 – 7.31 (m, 3H), 7.31 – 7.28 (m, 2H), 7.27 (d, *J* = 0.8 Hz, 1H), 4.48 (s, 2H), 3.77 (t, *J* = 6.3 Hz, 2H), 3.41 (t, *J* = 6.4 Hz, 2H), 2.73 – 2.62 (m, 2H), 2.41 (s, 3H), 1.87 – 1.77 (m, 2H), 1.76 – 1.68 (m, 2H), 1.63 – 1.52 (m, 4H), 1.45 – 1.37 (m, 2H), 0.99 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 138.6, 137.9, 129.5, 128.5, 127.8, 127.7, 127.5, 73.0, 70.0, 62.5, 49.7, 49.5, 30.8, 29.6, 29.3, 27.6, 26.4, 24.4, 21.7, 20.5.

IR ν 3545, 2933, 2856, 1471, 1316, 1157, 1100, 937, 826, 696, 648 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{31}H_{49}NO_5SSiNa^+$ 598.2998, Found 598.2992 (1.0 ppm error).



N-((*R**)-5-(benzyloxy)-1-((*S**)-tetrahydrofuran-2-yl)pentyl)-4-methylbenzenesulfonamide

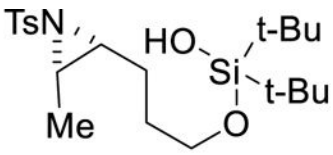
Compound 45: Synthesized using General Procedure H on a 1.9 mmol scale; purified using a gradient of 0 to 21% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 0.455 g, 1.09 mmol, 57% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.3 Hz, 2H), 7.38 – 7.33 (m, 1H), 7.34 – 7.30 (m, 3H), 7.30 – 7.26 (m, 2H), 7.24 (d, *J* = 2.0 Hz, 1H), 4.63 (d, *J* = 4.5 Hz, 1H), 4.46 (s, 2H), 3.73 – 3.63 (m, 2H), 3.60 (dt, *J* = 8.3, 6.8 Hz, 1H), 3.36 (t, *J* = 6.5 Hz, 2H), 3.32 – 3.26 (m, 1H), 2.39 (s, 3H), 1.85 – 1.77 (m, 2H), 1.76 – 1.70 (m, 1H), 1.62 – 1.55 (m, 1H), 1.54 – 1.46 (m, 2H), 1.46 – 1.38 (m, 2H), 1.38 – 1.29 (m, 1H), 1.25 – 1.14 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.2, 138.6, 138.5, 129.6, 128.5, 127.7, 127.6, 127.2, 80.6, 73.0, 70.2, 68.4, 57.0, 30.6, 29.6, 27.5, 25.8, 22.1, 21.6.

IR ν 3275, 2937, 2866, 1455, 1327, 1159, 1093, 815, 666, 548 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{23}H_{31}NO_4SNa^+$ 440.1872, Found 440.1879 (1.6 ppm error).



di-*tert*-butyl(3-((2*R**,3*S**)-3-methyl-1-tosylaziridin-2-yl)propoxy)silanol

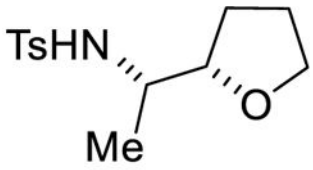
Compound 46: Synthesized using General Procedure C on a 1.55 mmol scale; purified using a gradient of 0 to 50% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 0.300 g, 0.701 mmol, 45% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.3 Hz, 2H), 7.40 – 7.28 (m, 2H), 3.79 (t, *J* = 5.9 Hz, 2H), 2.92 – 2.85 (m, 1H), 2.80 (td, *J* = 7.7, 4.9 Hz, 1H), 2.44 (s, 3H), 1.69 – 1.42 (m, 4H), 1.19 (d, *J* = 5.8 Hz, 3H), 0.99 (s, 9H), 0.98 (s, 9H).

$^{13}C\{^{1}H\}$ (101 MHz, $CDCl_3$) δ 144.4, 135.6, 129.8, 128.0, 62.4, 45.0, 40.5, 30.6, 27.6, 27.59, 22.7, 21.8, 20.6, 20.5, 12.1.

IR ν 3550, 2957, 2859, 1474, 1337, 1170 cm^{-1}

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{21}H_{38}NO_4SSi^+$ 428.2285, Found 428.2303 (4.2 ppm error).



4-methyl-*N*-((*S**)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)benzenesulfonamide

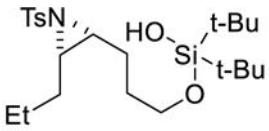
Compound 47: Synthesized using General Procedure H on a 0.2 mmol scale; Purified using a gradient of 0 to 30% EtOAc/hexanes on silica gel; single diastereomer; (white solid, 32 mg, 0.119 mmol, 60% yield).

^{1}H NMR (500 MHz, $CDCl_3$) δ 7.75 (d, J = 8.2 Hz, 2H), 7.29 (d, *J* = 8.1 Hz, 2H), 4.71 (d, *J* = 7.3 Hz, 1H), 3.75 – 3.59 (m, 3H), 3.24 (td, *J* = 6.9, 4.2 Hz, 1H), 2.42 (s, 3H), 1.83 (tt, *J* = 13.6, 6.7 Hz, 3H), 1.70 – 1.63 (m, 1H), 1.04 (d, *J* = 6.7 Hz, 3H).

$^{13}C\{^{1}H\}$ (126 MHz, $CDCl_3$) δ 143.3, 138.3, 129.7, 127.2, 81.7, 68.6, 52.7, 28.3, 26.1, 21.7, 19.1.

IR ν 2953, 2860, 1475, 1145, 651 cm^{-1}

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{13}H_{20}NO_3S^+$ = 270.1164, Found = 270.1178 (5.2 ppm error).



di-*tert*-butyl(3-((2*R**,3*S**)-3-propyl-1-tosylaziridin-2-yl)propoxy)silanol

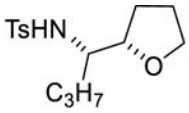
Compound 48: Synthesized from using General Procedure C on a 0.713 mmol scale; Purified using a gradient of 0 to 30% EtOAc/hexanes; single diastereomer; (colorless oil, 0.240 g, 0.526 mmol, 74% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.81 (d, *J* = 8.3 Hz, 2H), 7.31 (d, *J* = 7.8 Hz, 2H), 3.79 (t, *J* = 6.1 Hz, 2H), 2.86 – 2.73 (m, 2H), 2.43 (s, 3H), 1.68 – 1.56 (m, 2H), 1.55 – 1.46 (m, 2H), 1.45 – 1.35 (m, 2H), 1.32 – 1.23 (m, 2H), 0.99 (s, 9H), 0.99 (s, 9H), 0.85 (t, *J* = 7.3 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 144.4, 135.3, 129.6, 128.1, 62.3, 45.3, 45.0, 30.7, 28.8, 27.6, 27.5, 22.9, 21.7, 20.65, 20.63, 20.5, 13.8.

IR ν 3567, 2961, 2933, 2854, 1596, 1471, 1318, 1159, 1091, 827, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{23}H_{41}NO_4SSiNa^+$ 478.2422, Found 478.2417 (1.1 ppm error).



4-methyl-*N*-((*S**)-1-((*S**)-tetrahydrofuran-2-yl)butyl)benzenesulfonamide

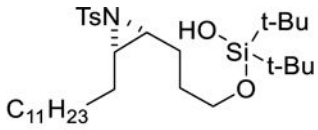
Compound 49: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 81 mg, 0.27 mmol, 96% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.3 Hz, 2H), 7.27 (d, *J* = 8.0 Hz, 2H), 4.68 (d, *J* = 8.0 Hz, 1H), 3.83 (td, *J* = 7.1, 2.8 Hz, 1H), 3.78 – 3.70 (m, 1H), 3.68 – 3.60 (m, 1H), 3.31 – 3.21 (m, 1H), 2.41 (s, 3H), 1.86 – 1.80 (m, 2H), 1.80 – 1.76 (m, 1H), 1.71 – 1.64 (m, 1H), 1.53 – 1.43 (m, 1H), 1.31 – 1.23 (m, 1H), 1.22 – 1.13 (m, 2H), 0.74 (t, *J* = 7.3 Hz, 3H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.1, 138.7, 129.6, 127.0, 79.4, 68.7, 56.3, 35.6, 28.1, 26.1, 21.6, 18.9, 13.9.

IR ν 3283, 2958, 2873, 1521, 1338, 1160, 815, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{15}H_{23}NO_3SNa^+$ 320.1296, Found 320.1287 (2.8 ppm error).



di-*tert*-butyl(3-((2*R**,3*S**)-3-dodecyl-1-tosylaziridin-2-yl)propoxy)silanol

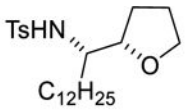
Compound 50: Synthesized using General Procedure D on a 0.995 mmol scale; Purified using a gradient of 0 to 7% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.421 g, 0.723 mmol, 72% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (d, *J* = 8.5 Hz, 2H), 7.31 (d, *J* = 8.6 Hz, 2H), 3.80 (t, *J* = 6.1 Hz, 2H), 2.91 – 2.76 (m, 1H), 2.73 (td, *J* = 8.1, 5.2 Hz, 1H), 2.43 (s, 3H), 1.69 – 1.56 (m, 4H), 1.51 – 1.42 (m, 2H), 1.38 – 1.29 (m, 2H), 1.25 (s, 10H), 1.16 (s, 8H), 1.00 (s, 9H), 0.99 (s, 9H), 0.90 (t, *J* = 6.9 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 144.3, 135.3, 129.6, 128.1, 62.2, 45.5, 44.9, 32.0, 30.7, 29.77, 29.75, 29.73, 29.55, 29.51, 29.4, 29.2, 27.59, 27.56, 27.3, 26.7, 22.8, 22.7, 21.7, 20.6, 20.5, 14.2.

IR ν 3567, 2927, 2856, 1507, 1471, 1318, 1160, 1091, 827, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{32}H_{59}NO_4SSiNa^+$ 604.3832, Found 604.3860 (4.6 ppm error).



4-methyl-*N*-((*S**)-1-((*S**)-tetrahydrofuran-2-yl)tridecyl)benzenesulfonamide

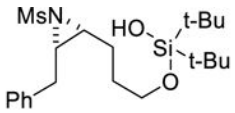
Compound 51: Synthesized using General Procedure H on a 0.25 mmol scale; Purified using a gradient of 0 to 5% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 100 mg, 0.23 mmol, 92% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.74 (d, *J* = 8.3 Hz, 2H), 7.28 (d, *J* = 8.0 Hz, 2H), 4.64 (d, *J* = 9.0 Hz, 1H), 3.84 (td, *J* = 6.8, 2.7 Hz, 1H), 3.79 – 3.72 (m, 1H), 3.70 – 3.62 (m, 1H), 3.29 – 3.20 (m, 1H), 2.41 (s, 3H), 1.87 – 1.81 (m, 2H), 1.78 – 1.69 (m, 1H), 1.47 (dd, *J* = 13.9, 6.9 Hz, 1H), 1.30 – 1.24 (m, 2H), 1.25 (s, 10H), 1.19 – 1.14 (m, 2H), 1.08 (s, 4H), 1.04 (s, 4H), 0.91 (t, *J* = 6.9 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.2, 138.9, 129.6, 127.1, 79.7, 68.8, 56.7, 33.6, 32.1, 29.81, 29.78, 29.7, 29.54, 29.52, 29.50, 28.2, 27.4, 26.2, 25.8, 22.8, 21.6, 14.3.

IR ν 3277, 2924, 2854, 1338, 1161, 813, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{24}H_{41}NO_3SNa^+$ 446.2705, Found 446.2709 (0.9 ppm error).



(3-((2*R**,3*S**)-3-benzyl-1-(methylsulfonyl)aziridin-2-yl)propoxy)di-*tert*-butylsilanol

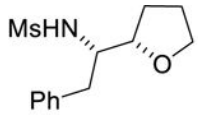
Compound 52: Synthesized using General Procedure E on a 1.05 mmol scale; Purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.347 g, 0.811 mmol, 77% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.30 (m, 2H), 7.28 – 7.26 (m, 2H), 7.24– 7.20 (m, 1H), 3.92 (t, *J* = 6.1 Hz, 2H), 2.99 – 2.96 (m, 1H), 2.94 (ddd, *J* = 6.4, 4.7, 2.0 Hz, 2H), 2.75 – 2.68 (m, 1H), 2.60 (s, 3H), 1.87 – 1.78 (m, 2H), 1.78 – 1.71 (m, 2H), 1.03 (s, 9H), 1.03 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 137.9, 129.0, 128.9, 127.1, 62.2, 47.1, 43.7, 39.3, 33.1, 30.8, 27.65, 27.62, 23.2, 20.6, 20.5.

IR ν 3534, 2963, 2933, 2857, 1497, 1471, 1313, 1149, 827 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{37}NO_4SSiNa^+$ 450.2110, Found 450.2105 (1.1 ppm error).



N-((*S**)-2-phenyl-1-((*S**)-tetrahydrofuran-2-yl)ethyl)methanesulfonamide

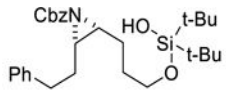
Compound 53: Synthesized using General Procedure H on a 0.28 mmol scale; purified using a gradient of 0 to 15% EtOAc/hexanes on silica gel; single diastereomer; (White solid, 67 mg, 0.24 mmol, 86% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.29 (m, 2H), 7.28 – 7.24 (m, 2H), 7.24 – 7.21 (m, 1H), 4.56 (d, *J* = 9.0 Hz, 1H), 3.95 – 3.87 (m, 2H), 3.80 – 3.73 (m, 1H), 3.68 (tdd, *J* = 9.5, 5.6, 2.3 Hz, 1H), 2.95 (dd, *J* = 13.6, 5.6 Hz, 1H), 2.85 (dd, *J* = 13.6, 9.6 Hz, 1H), 2.27 (s, 3H), 1.99 – 1.93 (m, 2H), 1.93 – 1.86 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 138.6, 129.9, 128.8, 126.9, 80.2, 68.9, 58.9, 41.6, 40.8, 28.3, 26.1.

IR ν 3291, 2951, 2874, 1455, 1311, 1147, 753, 452 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{13}H_{19}NO_3SNa^+$ 292.0983, Found 292.1002 (6.5 ppm error).



benzyl (2*R**,3*S**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-phenethylaziridine-1-carboxylate

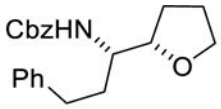
Compound 54: Synthesized using General Procedure F on a 1.12 mmol scale; Purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.430 g, 0.863 mmol, 77% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.39 – 7.32 (m, 5H), 7.28 – 7.24 (m, 2H), 7.20 – 7.15 (m, 3H), 5.14 (s, 2H), 3.90 (td, *J* = 6.4, 3.9 Hz, 2H), 2.93 – 2.85 (m, 1H), 2.81 – 2.71 (m, 2H), 2.56 – 2.48 (m, 2H), 1.84 – 1.78 (m, 2H), 1.75 (q, *J* = 6.6 Hz, 2H), 1.62 – 1.48 (m, 2H), 1.01 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 164.0, 141.4, 136.0, 128.69, 128.67, 128.5, 128.3, 128.1, 126.1, 68.2, 62.2, 42.9, 42.3, 33.7, 30.8, 29.8, 27.66, 27.61, 23.4, 20.6, 20.5.

IR ν 3501, 3030, 2933, 2857, 1718, 1701, 1455, 1224, 1103, 826, 452 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{43}NO_4SiNa^+$ 520.2859, Found 520.2894 (6.7 ppm error).



benzyl ((*S**)-3-phenyl-1-((*S**)-tetrahydrofuran-2-yl)propyl)carbamate

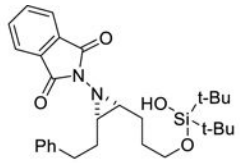
Compound 55: Synthesized using General Procedure H on a 0.26 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 63 mg, 0.19 mmol, 73% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.34 (m, 5H), 7.33 – 7.27 (m, 2H), 7.19– 7.13 (m, 3H), 5.13 (d, *J* = 3.9 Hz, 2H), 4.94 (d, *J* = 9.7 Hz, 1H), 3.90 – 3.82 (m, 2H), 3.78 – 3.68 (m, 2H), 2.74 – 2.65 (m, 2H), 1.90 – 1.84 (m, 4H), 1.69 – 1.61 (m, 2H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 156.8, 141.9, 136.8, 128.6, 128.53, 128.47, 128.2, 128.1, 125.9, 80.6, 68.7, 66.8, 53.4, 35.9, 32.6, 28.4, 26.1.

IR ν 3315, 2944, 2859, 1684, 1533, 1495, 1238, 1050, 697, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{25}NO_3Na^+$ 362.1732, Found 362.1743 (3.0 ppm error).



2-((2*R**,3*S**)-2-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)-3-phenethylaziridin-1-yl)isoindoline-1,3-dione

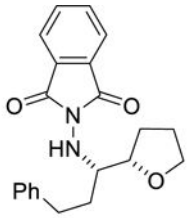
Compound 56: Synthesized using General Procedure B on a 1.72 mmol scale; purified using a gradient of 0 to 9% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.268 g, 0.526 mmol, 30% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 (dd, *J* = 5.5, 3.0 Hz, 2H), 7.67 (dd, *J* = 5.3, 3.2 Hz, 2H), 7.30 – 7.27 (m, 3H), 7.25 – 7.20 (m, 1H), 7.21 – 7.16 (m, 1H), 4.01 (dt, *J* = 10.2, 6.6 Hz, 1H), 3.92 (dt, *J* = 10.2, 5.8 Hz, 1H), 3.10 (ddd, *J* = 13.9, 10.0, 5.8 Hz, 1H), 2.97 (ddd, *J* = 14.0, 9.9, 6.4 Hz, 1H), 2.67 (td, *J* = 8.0, 5.4 Hz, 1H), 2.64 – 2.54 (m, 1H), 2.12 – 2.09 (m, 1H), 1.92 – 1.90 (m, 2H), 1.90 – 1.76 (m, 2H), 1.61– 1.59 (m, 1H), 1.03 (s, 9H), 1.02 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 165.3, 141.9, 134.1, 130.5, 128.6, 128.5, 126.0, 123.1, 62.7, 48.6, 48.5, 33.5, 30.3, 29.3, 27.7, 27.6, 23.1, 20.7, 20.5.

IR ν 3501, 2936, 2859, 1717, 1558, 1457, 1103, 826, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{40}N_2O_4SiNa^+$ 531.2655, Found 531.2657 (0.4 ppm error).



2-(((*S**)-3-phenyl-1-((*S**)-tetrahydrofuran-2-yl)propyl)amino)isoindoline-1,3-dione

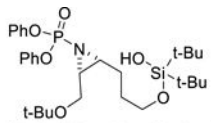
Compound 57: Synthesized using General Procedure H on a 0.22 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 62 mg, 0.17 mmol, 77% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (dd, *J* = 5.5, 3.1 Hz, 2H), 7.72 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.23 – 7.17 (m, 2H), 7.17 – 7.14 (m, 2H), 7.12 – 7.06 (m, 1H), 4.00 (q, *J* = 7.5 Hz, 1H), 3.95 – 3.87 (m, 1H), 3.84 – 3.74 (m, 1H), 3.28 (dt, *J* = 8.0, 4.8 Hz, 1H), 3.01 – 2.92 (m, 1H), 2.70 – 2.58 (m, 1H), 2.06 (dddd, *J* = 11.9, 8.3, 6.8, 4.9 Hz, 1H), 1.96 – 1.85 (m, 2H), 1.81 – 1.74 (m, 2H), 1.74 – 1.67 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 167.3, 142.1, 134.2, 130.5, 128.5, 128.4, 125.9, 123.4, 79.8, 68.1, 62.1, 32.0, 31.6, 28.4, 25.8.

IR ν 3850, 2974, 2867, 1734, 1374, 1064, 709, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{22}N_2O_3Na^+$ 373.1528, Found 373.1540 (3.2 ppm error).



diphenyl ((2*R**,3*R**)-2-(*tert*-butoxymethyl)-3-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)aziridin-1-yl)phosphonate

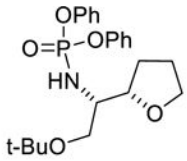
Compound 58: Synthesized using General procedure G on a 0.99 mmol scale; Purified using a gradient of 0 to 13% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.378 g, 0.654 mmol, 66% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.34 – 7.28 (m, 4H), 7.25 – 7.20 (m, 2H), 7.23 – 7.18 (m, 2H), 7.19 – 7.13 (m, 2H), 3.87 (t, *J* = 6.3 Hz, 2H), 3.49 (dd, *J* = 9.9, 5.4 Hz, 1H), 3.31 (dd, *J* = 9.9, 6.9 Hz, 1H), 2.99 – 2.95 (m, 1H), 2.90 – 2.80 (m, 1H), 1.80 – 1.72 (m, 2H), 1.71 – 1.67 (m, 1H), 1.58 – 1.49 (m, 1H), 1.17 (s, 9H), 1.00 (s, 9H), 0.99 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 150.9 (overlapping doublets, 2C), 129.7 (d, *J* = 2.6 Hz), 125.1, 120.5 (d, *J* = 4.6 Hz), 120.4 (d, *J* = 4.6 Hz), 73.6, 62.4, 59.6 (d, *J* = 6.9 Hz), 42.3 (d, *J* = 7.5 Hz), 41.9 (d, *J* = 7.9 Hz), 30.8, 27.67, 27.66, 27.5, 23.7 (d, *J* = 4.7 Hz), 20.6 (d, *J* = 7.0 Hz).

IR ν 3397, 2967, 2931, 2856, 1592, 1490, 1193, 826, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{30}H_{48}NO_6PSiNa^+$ 600.2886, Found 600.2930 (7.3 ppm error).



diphenyl ((*S**)-2-(*tert*-butoxy)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)phosphoramidate

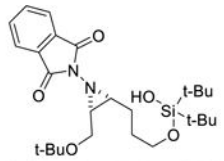
Compound 59: Synthesized using General Procedure H on a 0.25 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 88 mg, 0.21 mmol, 84% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.35 – 7.27 (m, 4H), 7.27 – 7.22 (m, 4H), 7.15 – 7.10 (m, 2H), 4.08 (d, *J* = 6.6 Hz, 1H), 3.79 – 3.66 (m, 2H), 3.44 – 3.36 (m, 2H), 3.34 – 3.29 (m, 1H), 3.30 – 3.24 (m, 1H), 1.84 – 1.75 (m, 2H), 1.73 – 1.64 (m, 2H), 1.11 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 152.4 – 149.6 (overlapping doublets, 2C), 129.7 (d, *J* = 1.9 Hz), 124.9 (d, *J* = 1.6 Hz), 120.4 (d, *J* = 5.1 Hz), 120.3 (d, *J* = 5.1 Hz), 77.3 (d, *J* = 6.3 Hz), 73.2, 68.7, 63.0 (d, *J* = 2.8 Hz), 54.7, 27.7, 27.5, 26.1.

IR ν 3225, 2974, 2874, 1558, 1490, 1196, 930, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{22}H_{30}NO_5PNa^+$ 442.1759, Found 442.1788 (6.6 ppm error).



2-((2*R**,3*R**)-2-(*tert*-butoxymethyl)-3-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)aziridin-1-yl)isoindoline-1,3-dione

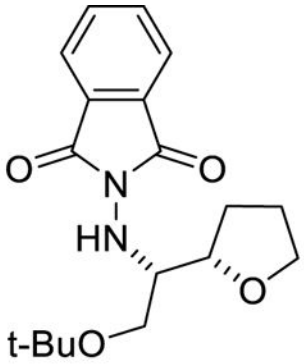
Compound 60: Synthesized using General Procedure B on a 1.20 mmol scale; purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.121 g, 0.246 mmol, 20% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 (dd, *J* = 5.6, 2.9 Hz, 2H), 7.67 (dd, *J* = 5.6, 2.9 Hz, 2H), 4.14 – 4.10 (m, 1H), 4.07 – 3.98 (m, 1H), 3.93 (dt, *J* = 10.2, 5.7 Hz, 1H), 3.39 – 3.19 (m, 1H), 2.81 – 2.71 (m, 2H), 2.03 – 1.92 (m, 2H), 1.90 – 1.81 (m, 1H), 1.74 (ddd, *J* = 14.4, 12.4, 7.1 Hz, 1H), 1.24 (s, 9H), 1.03 (s, 9H), 1.02 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 165.2, 134.2, 130.5, 123.1, 73.7, 62.8, 58.9, 48.3, 47.7, 30.3, 27.74, 27.69, 27.61, 23.0, 20.7, 20.5.

IR ν 3305, 2967, 2933, 2857, 1717, 1558, 1378, 1107, 1083, 826, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{26}H_{42}N_2O_5SiNa^+$ 513.2761, Found 513.2767 (1.2 ppm error).



2-(((*S**)-2-(*tert*-butoxy)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)amino)isoindoline-1,3-dione

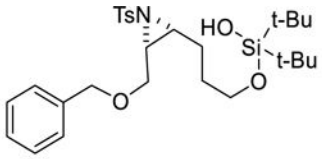
Compound 61: Synthesized using General Procedure H on a 0.21 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 57 mg, 0.17 mmol, 81% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.82 (dd, *J* = 5.4, 3.0 Hz, 2H), 7.69 (dd, *J* = 5.4, 3.2 Hz, 2H), 3.95 – 3.85 (m, 2H), 3.74 – 3.70 (m, 1H), 3.45 – 3.39 (m, 1H), 3.41 – 3.33 (m, 2H), 2.04 – 1.89 (m, 2H), 1.87 – 1.75 (m, 2H), 0.99 (s, 9H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 167.3, 134.0, 130.8, 123.2, 78.6, 72.9, 68.0, 62.5, 62.4, 28.8, 27.2, 25.7.

IR ν 3311, 2973, 2930, 2877, 1715, 1386, 1197, 1057, 886, 709, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{18}H_{24}N_2O_4Na^+$ 355.1634, Found 355.1633 (0.3 ppm error).



(3-((2*R**,3*R**)-3-((benzyloxy)methyl)-1-tosylaziridin-2-yl)propoxy)di-*tert*-butylsilanol

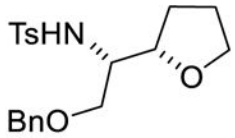
Compound 62: Synthesized using General Procedure D on a 0.35 mmol scale; Purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.156 g, 0.292 mmol, 83% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.3 Hz, 2H), 7.34 – 7.27 (m, 5H), 7.22 – 7.15 (m, 2H), 4.45 – 4.36 (m, 2H), 3.80 (t, *J* = 6.1 Hz, 2H), 3.57 (dd, *J* = 10.9, 5.7 Hz, 1H), 3.48 (dd, *J* = 10.9, 6.5 Hz, 1H), 3.05 (td, *J* = 6.8, 5.7 Hz, 1H), 2.90 (ddd, *J* = 8.7, 7.3, 4.7 Hz, 1H), 2.41 (s, 3H), 1.72 – 1.49 (m, 4H), 1.49 – 1.41 (m, 1H), 0.99 (s, 9H), 0.98 (s, 9H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 144.4, 137.6, 134.8, 129.6, 128.3, 128.1, 127.7, 127.6, 72.9, 66.6, 62.1, 43.4, 43.3, 30.6, 27.5, 27.4, 23.0, 21.6, 20.5, 20.4.

IR ν 3560, 2931, 2857, 1558, 1471, 1304, 1160, 1091, 827, 749 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{28}H_{43}NO_5SSiNa^+$ 556.2529, Found 556.2524 (0.9 ppm error).



N-((*S**)-2-(benzyloxy)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)-4-methylbenzenesulfonamide

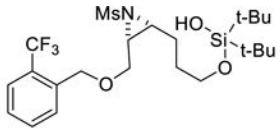
Compound 63: Synthesized using General Procedure H on a 0.26 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 70 mg, 0.19 mmol, 73% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.3 Hz, 2H), 7.35 – 7.27 (m, 3H), 7.23 – 7.18 (m, 4H), 4.86 (d, *J* = 8.2 Hz, 1H), 4.44 – 4.29 (m, 2H), 4.09 – 4.02 (m, 1H), 3.78 – 3.72 (m, 1H), 3.67 (dt, *J* = 8.5, 6.8 Hz, 1H), 3.49 – 3.42 (m, 1H), 3.42 – 3.33 (m, 2H), 2.39 (s, 3H), 1.89 – 1.81 (m, 2H), 1.81 – 1.78 (m, 1H), 1.70 – 1.62 (m, 1H).

$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.2, 138.3, 137.9, 129.6, 128.4, 127.8, 127.7, 127.1, 77.5, 73.3, 70.5, 68.7, 55.5, 28.0, 26.0, 21.6.

IR ν 3283, 2950, 2870, 1455, 1306, 1161, 1091, 815, 666, 550 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{25}NO_4SNa^+$ 398.1402, Found 398.1401 (0.3 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-1-(methylsulfonyl)-3-(((2-(trifluoromethyl)benzyl)oxy)methyl)aziridin-2-yl)propoxy)silanol

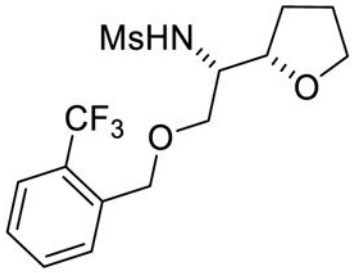
Compound 64: Synthesized using General Procedure E on a 0.40 mmol scale; Purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 89 mg, 0.169 mmol, 42% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 7.8 Hz, 2H), 7.56 (t, *J* = 7.2 Hz, 1H), 7.40 (t, *J* = 7.5 Hz, 1H), 4.75 (s, 2H), 3.88 (t, *J* = 5.9 Hz, 2H), 3.75 (dd, *J* = 10.5, 4.7 Hz, 1H), 3.58 (dd, *J* = 10.5, 7.6 Hz, 1H), 3.07 (s, 3H), 3.05 – 2.99 (m, 1H), 2.98 – 2.91 (m, 1H), 1.79 – 1.73 (m, 2H), 1.73 – 1.68 (m, 1H), 1.62 – 1.54 (m, 1H), 1.00 (s, 9H), 0.99 (s, 9H).

$^{13}C\{^{1}H\}$ NMR (126 MHz, $CDCl_3$) δ 136.4, 132.1, 128.9, 127.9 – 127.7 (m, 2C), 126.0 (q, *J* = 5.6 Hz), 124.4 (q, *J* = 274.1 Hz), 69.5 (q, *J* = 2.5 Hz), 67.6, 62.1, 43.6, 42.5, 39.6, 30.8, 27.61, 27.57, 23.4, 20.6, 20.5.

IR ν 3567, 2934, 2859, 1471, 1316, 1150, 827, 648 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{23}H_{38}F_3NO_5SSiNa^+$ 548.2090, Found 548.2091 (0.2 ppm error).



N-((*S**)-1-((*S**)-tetrahydrofuran-2-yl)-2-((2-(trifluoromethyl)benzyl)oxy)ethyl)methanesulfonamide

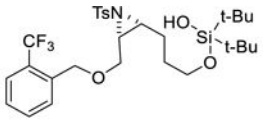
Compound 65: Synthesized using General Procedure H on a 0.14 mmol scale; purified using a gradient of 0 to 30% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 41 mg, 0.11 mmol, 79% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.65 (d, *J* = 7.8 Hz, 1H), 7.61 (d, *J* = 7.7 Hz, 1H), 7.55 (t, *J* = 7.6 Hz, 1H), 7.40 (t, *J* = 7.6 Hz, 1H), 4.77 – 4.64 (m, 3H), 4.00 – 3.93 (m, 1H), 3.91 – 3.83 (m, 1H), 3.76 – 3.70 (m, 1H), 3.69 – 3.65 (m, 1H), 3.64 – 3.60 (m, 2H), 3.00 (s, 3H), 2.01 – 1.92 (m, 2H), 1.91 – 1.83 (m, 2H).

^{13}C{^{1}H} NMR (126 MHz, $CDCl_3$) δ 136.4, 132.1, 129.4, 128.33 – 127.49 (m, 2C), 126.10 (q, *J* = 5.6 Hz), 124.41 (q, *J* = 273.5 Hz), 78.3, 72.7, 69.93 – 69.44 (m), 68.8, 56.8, 42.3, 28.4, 26.0.

IR ν 3283, 2929, 2873, 1457, 1314, 1157, 1039, 770, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{15}H_{20}F_3NO_4SNa^+$ 390.0963, Found 390.0966 (0.8 ppm error).



di-*tert*-butyl(3-((2*R**,3*R**)-1-tosyl-3-(((2-(trifluoromethyl)benzyl)oxy)methyl)aziridin-2-yl)propoxy)silanol

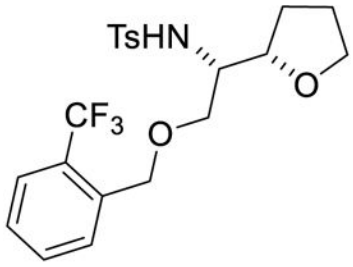
Compound 66: Synthesized using General Procedure C on a 1.38 mmol scale; Purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.554 g, 0.921 mmol, 66% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 10.5 Hz, 2H), 7.61 (d, *J* = 8.5 Hz, 1H), 7.52 – 7.43 (m, 2H), 7.40 – 7.34 (m, 1H), 7.28 (d, *J* = 8.0 Hz, 2H), 4.58 (d, *J* = 5.2 Hz, 2H), 3.81 (t, *J* = 6.1 Hz, 2H), 3.65 (dd, *J* = 10.9, 5.4 Hz, 1H), 3.52 (dd, *J* = 10.9, 6.8 Hz, 1H), 3.08 (td, *J* = 7.0, 5.4 Hz, 1H), 3.00 – 2.89 (m, 1H), 2.39 (s, 3H), 1.75 – 1.67 (m, 1H), 1.64 – 1.57 (m, 2H), 1.54 – 1.43 (m, 1H), 0.99 (s, 9H), 0.98 (s, 9H).

^{13}C{^{1}H} NMR (126 MHz, $CDCl_3$) δ 144.6, 136.6, 135.0, 132.0, 129.7, 128.7, 128.2, 127.84 – 127.01 (m, 2C), 125.8 (q, *J* = 5.8 Hz), 124.3 (q, *J* = 274.2 Hz), 69.0 (q, *J* = 3.0 Hz), 67.4, 62.1, 43.5, 43.4, 30.7, 27.60, 27.57, 23.2, 21.7, 20.6, 20.5.

IR ν 3544, 2933, 2857, 1598, 1471, 1314, 1039, 827, 442 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{42}F_3NO_5SSiNa^+$ 624.2403, Found 624.2403 (0.0 ppm error).



4-methyl-*N*-((*S**)-1-((*S**)-tetrahydrofuran-2-yl)-2-((2-(trifluoromethyl)benzyl)oxy)ethyl)benzenesulfonamide

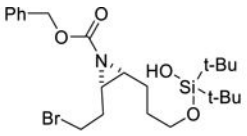
Compound 67: Synthesized using General Procedure H on a 0.33 mmol scale; purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 86 mg, 0.19 mmol, 58% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 – 7.70 (m, 2H), 7.61 (d, *J* = 7.8 Hz, 1H), 7.50 (dd, *J* = 4.0, 1.8 Hz, 2H), 7.36 (td, *J* = 6.8, 3.0 Hz, 1H), 7.21 (d, *J* = 8.0 Hz, 2H), 4.89 (d, *J* = 8.1 Hz, 1H), 4.50 (s, 2H), 4.06 (td, *J* = 7.2, 2.7 Hz, 1H), 3.78 (dt, *J* = 8.1, 6.4 Hz, 1H), 3.74 – 3.65 (m, 1H), 3.55 – 3.43 (m, 2H), 3.38 (dd, *J* = 9.0, 4.7 Hz, 1H), 2.37 (s, 3H), 1.92 – 1.83 (m, 2H), 1.82 (d, *J* = 6.8 Hz, 1H), 1.71 (ddd, *J* = 11.0, 9.1, 4.5 Hz, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.3, 138.3, 136.7, 132.0, 129.6, 128.8, 127.86 – 127.22 (m, 2C), 127.0, 126.0 – 125.7 (m), 123.01 (q, *J* = 273 Hz), 77.5, 71.0, 69.2 – 69.0 (m), 68.8, 55.5, 28.0, 26.0, 21.6.

IR ν 3283, 2954, 2874, 1455, 1316, 1161, 815, 772, 668, 550 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{21}H_{24}F_3NO_4SNa^+$ 466.1276, Found 466.1284 (1.7 ppm error).



benzyl (2*S**,3*R**)-2-(2-bromoethyl)-3-(3-((di-*tert*-butyl(hydroxy)silyl)oxy)propyl)aziridine-1-carboxylate

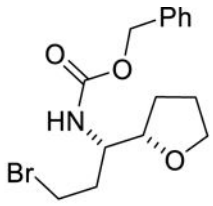
Compound 68: Synthesized using General Procedure F on a 0.77 mmol scale; Purified using a gradient of 0 to 8% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.235 g, 0.469 mmol, 60% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.37 – 7.32 (m, 5H), 5.13 (s, 2H), 3.90 (t, *J* = 6.3 Hz, 2H), 3.57 – 3.51 (m, 2H), 2.67 – 2.61 (m, 1H), 2.59 – 2.56 (m, 1H), 2.12 – 1.94 (m, 2H), 1.82 – 1.74 (m, 2H), 1.70 – 1.63 (m, 1H), 1.57 – 1.46 (m, 1H), 1.01 (s, 9H), 1.00 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 163.6, 135.9, 128.7, 128.4, 128.1, 68.3, 62.2, 42.6, 41.2, 31.3, 30.7, 30.3, 27.65, 27.61, 23.8, 20.7, 20.6.

IR ν 3508, 2964, 2934, 2857, 1700, 1684, 1447, 1103, 826, 418 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{23}H_{38}BrNO_4SiNa^+$ 522.1651, Found 522.1666 (2.9 ppm error).



benzyl ((*S**)-3-bromo-1-((*S**)-tetrahydrofuran-2-yl)propyl)carbamate

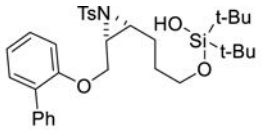
Compound 69: Synthesized using General Procedure H on a 0.25 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 74 mg, 0.22 mmol, 88% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.44 – 7.29 (m, 5H), 5.11 (s, 2H), 4.90 (d, *J* = 8.3 Hz, 1H), 3.96 – 3.89 (m, 1H), 3.84 – 3.80 (m, 2H), 3.70 – 3.65 (m, 1H), 3.51 – 3.40 (m, 2H), 2.22 – 2.06 (m, 2H), 1.94 – 1.91 (m, 1H), 1.90 – 1.79 (m, 2H), 1.65 – 1.59 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 156.6, 136.4, 128.5, 128.2, 128.1, 80.1, 68.7, 66.9, 52.3, 37.5, 29.7, 28.2, 25.9.

IR ν 3320, 2964, 2931, 2857, 1694, 1531, 1240, 1070, 827, 697 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{15}H_{20}BrNO_3Na^+$ 364.0524, Found 364.0526 (0.5 ppm error).



(3-((2*R**,3*R**)-3-(([1,1'-biphenyl]-2-yloxy)methyl)-1-tosylaziridin-2-yl)propoxy)di-*tert*-butylsilanol

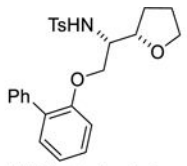
Compound 70: Synthesized using General Procedure C on a 1.40 mmol scale; Purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (colorless oil, 0.579 g, 0.971 mmol, 69% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.73 (d, *J* = 8.3 Hz, 2H), 7.48 (dd, *J* = 8.3, 1.4 Hz, 2H), 7.43 – 7.38 (m, 2H), 7.36 – 7.30 (m, 2H), 7.25 – 7.18 (m, 3H), 7.04 (td, *J* = 7.5, 1.0 Hz, 1H), 6.85 (dd, *J* = 8.2, 0.8 Hz, 1H), 4.05 (dd, *J* = 10.8, 6.0 Hz, 1H), 3.92 (dd, *J* = 10.8, 6.1 Hz, 1H), 3.76 (t, *J* = 6.0 Hz, 2H), 3.21 – 3.09 (m, 1H), 2.90 (td, *J* = 7.9, 4.9 Hz, 1H), 2.38 (s, 3H), 1.59 – 1.55 (m, 2H), 1.53 – 1.42 (m, 2H), 0.99 (s, 18H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 155.1, 144.6, 138.3, 134.7, 131.3, 131.1, 129.7, 129.6, 128.7, 128.13, 128.10, 127.1, 121.9, 113.2, 65.6, 62.1, 43.5, 42.8, 30.6, 27.61, 27.60, 23.1, 21.7, 20.6, 20.5.

IR ν 3449, 2933, 2857, 1597, 1474, 1323, 1161, 1093, 827, 735, 575 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{33}H_{45}NO_5SSiNa^+$ 618.2685, Found 618.2678 (1.1 ppm error).



N-((*S**)-2-([1,1'-biphenyl]-2-yloxy)-1-((*S**)-tetrahydrofuran-2-yl)ethyl)-4-methylbenzenesulfonamide

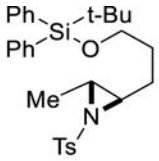
Compound 71: Synthesized using General Procedure H on a 0.41 mmol scale; purified using a gradient of 0 to 14% EtOAc/hexanes on silica gel; single diastereomer; (Colorless oil, 0.160 g, 0.37 mmol, 90% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.67 (d, *J* = 8.2 Hz, 2H), 7.46 (dd, *J* = 8.3, 1.3 Hz, 2H), 7.42 – 7.36 (m, 2H), 7.31 (ddt, *J* = 10.2, 8.8, 3.2 Hz, 2H), 7.26 – 7.18 (m, 3H), 7.04 (td, *J* = 7.5, 0.9 Hz, 1H), 6.82 (d, *J* = 7.6 Hz, 1H), 4.86 (d, *J* = 8.4 Hz, 1H), 3.97 – 3.89 (m, 2H), 3.88 – 3.79 (m, 1H), 3.74 – 3.66 (m, 1H), 3.61 (q, *J* = 6.9 Hz, 1H), 3.48 (tt, *J* = 8.0, 3.6 Hz, 1H), 2.39 (s, 3H), 1.79 – 1.69 (m, 2H), 1.68 – 1.61 (m, 1H), 1.50 – 1.42 (m, 1H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 155.2, 143.5, 138.4, 137.9, 131.4, 130.9, 129.7, 129.6, 128.7, 128.0, 127.1, 127.0, 121.7, 113.2, 77.2, 68.6, 68.4, 54.9, 27.8, 25.9, 21.6.

IR ν 3284, 2923, 2850, 1434, 1331, 1161, 815, 700, 549 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{25}H_{27}NO_4SNa^+$ 460.1559, Found 460.1577 (3.9 ppm error).



(2*R**,3*R**)-2-(3-((*tert*-butyldiphenylsilyl)oxy)propyl)-3-methyl-1-tosylaziridine

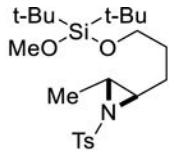
Compound 72: Synthesized using General Procedure C on a 1.47 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.581 g, 1.14 mmol, 77% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.85 – 7.78 (m, 2H), 7.62 (dt, *J* = 8.0, 1.5 Hz, 4H), 7.46 – 7.31 (m, 6H), 7.31 – 7.26 (m, 2H), 3.57 (t, *J* = 6.1 Hz, 2H), 2.68 (qd, *J* = 4.4, 2.1 Hz, 2H), 2.41 (s, 3H), 1.88 – 1.65 (m, 1H), 1.63 – 1.33 (m, 6H), 1.03 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.8, 138.2, 135.6, 133.93, 133.91, 129.7, 129.6, 127.7, 127.4, 63.0, 49.4, 46.0, 30.2, 27.1, 26.9, 21.7, 19.3, 14.8.

IR ν 3070, 2930, 2857, 1597, 1428, 1320, 1160, 1091, 815, 709 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{29}H_{37}NO_3SSiNa^+$ 530.2161, Found 530.2178 (3.2 ppm error).



(2*R**,3*R**)-2-(3-((di-*tert*-butyl(methoxy)silyl)oxy)propyl)-3-methyl-1-tosylaziridine

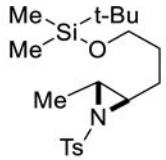
Compound 73: Synthesized using the General Procedure C on a 1.81 mmol scale; purified using a gradient of 0 to 12% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.555 g, 1.25 mmol, 69% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.3 Hz, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 3.76 (t, *J* = 6.1 Hz, 2H), 3.59 (s, 3H), 2.78 – 2.67 (m, 2H), 2.42 (s, 3H), 1.87 – 1.74 (m, 1H), 1.61 – 1.58 (m, 1H), 1.57 (d, *J* = 5.6 Hz, 3H), 1.55 – 1.48 (m, 2H), 0.98 (s, 9H), 0.97 (s, 9H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.8, 138.2, 129.6, 127.4, 62.9, 52.2, 49.5, 46.0, 30.5, 27.9, 27.1, 21.7, 21.2, 14.8.

IR ν 2934, 2857, 1558, 1473, 1323, 1160, 1096, 827, 710, 650 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{22}H_{39}NO_4SSiNa^+$ 464.2267, Found 464.2262 (1.1 ppm error).



(2*R**,3*R**)-2-(3-((*tert*-butyldimethylsilyl)oxy)propyl)-3-methyl-1-tosylaziridine

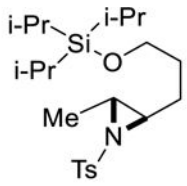
Compound 74: Synthesized using General Procedure C on a 2.79 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.599 g, 1.56 mmol, 56% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.5 Hz, 2H), 7.30 (d, *J* = 8.7 Hz, 2H), 3.56 – 3.51 (m, 2H), 2.71 (td, *J* = 10.3, 4.5 Hz, 2H), 2.43 (s, 3H), 1.79 – 1.69 (m, 1H), 1.60 – 1.56 (m, 1H), 1.56 (d, *J* = 5.7 Hz, 3H), 1.48 – 1.40 (m, 2H), 0.86 (s, 9H), 0.00 (s, 6H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.8, 138.2, 129.6, 127.4, 62.3, 49.5, 46.0, 30.4, 27.2, 26.0, 21.7, 18.4, 14.8, −5.2.

IR ν 2929, 2857, 1598, 1471, 1320, 1160, 1093, 836, 710, 685 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{19}H_{33}NO_3SSiNa^+$ 406.1848, Found 406.1862 (3.4 ppm error).



(2*R**,3*R**)-2-methyl-1-tosyl-3-(3-((triisopropylsilyl)oxy)propyl)aziridine

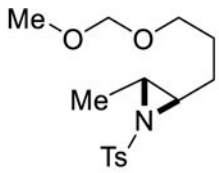
Compound 75: Synthesized using General Procedure C on a 2.44 mmol scale; purified using a gradient of 0 to 8% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.888 g, 2.08 mmol, 85% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.5 Hz, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 3.61 (t, *J* = 6.1 Hz, 2H), 2.80 – 2.66 (m, 2H), 2.42 (s, 3H), 1.83 – 1.72 (m, 1H), 1.57 (d, *J* = 5.7 Hz, 3H), 1.55 – 1.49 (m, 1H), 1.50 – 1.41 (m, 2H), 1.06 – 0.99 (m, 21H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.8, 138.2, 129.6, 127.4, 62.6, 49.6, 46.0, 30.6, 27.2, 21.7, 18.1, 14.8, 12.0.

IR ν 2943, 2866, 1598, 1463, 1323, 1160, 1094, 883, 710, 685 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{22}H_{39}NO_3SSiNa^+$ 448.2318, Found 448.2321 (0.7 ppm error).



(2*R**,3*R**)-2-(3-(methoxymethoxy)propyl)-3-methyl-1-tosylaziridine

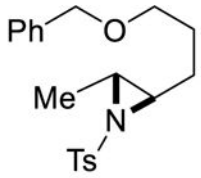
Compound 76: Synthesized using General Procedure C on a 4.15 mmol scale; purified using a gradient of 0 to 10% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.468 g, 1.49 mmol, 36% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.5 Hz, 2H), 7.30 (d, *J* = 8.0 Hz, 2H), 4.56 (s, 2H), 3.45 (td, *J* = 6.3, 3.5 Hz, 2H), 3.32 (s, 3H), 2.76 – 2.66 (m, 2H), 2.42 (s, 3H), 1.81 – 1.71 (m, 1H), 1.66 – 1.60 (m, 1H), 1.59 – 1.56 (m, 1H), 1.55 (s, 1H), 1.54 (d, *J* = 5.6 Hz, 3H).

^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 138.2, 129.6, 127.4, 96.4, 66.9, 55.3, 49.3, 45.9, 27.5, 27.4, 21.7, 14.8.

IR ν 3280, 2933, 2881, 1558, 1455, 1318, 1157, 1042, 816, 710, 686 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{15}H_{23}NO_4SNa^+$ 336.1246, Found 336.1255 (2.7 ppm error).



(2*R**,3*R**)-2-(3-(benzyloxy)propyl)-3-methyl-1-tosylaziridine

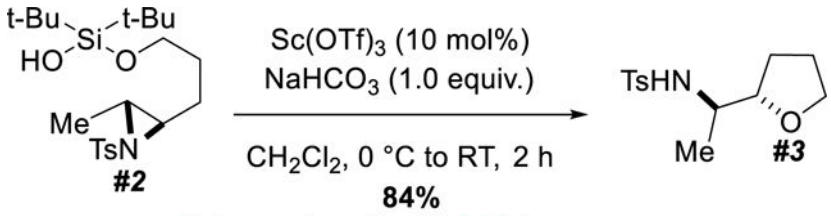
Compound 77: Synthesized using General Procedure C on a 6.83 mmol scale; purified using a gradient of 0 to 20% EtOAc/hexanes on silica gel; single diastereomer; (light yellow oil, 0.693 g, 1.92 mmol, 28% yield).

^{1}H NMR (400 MHz, $CDCl_3$) δ 7.83 (d, *J* = 8.3 Hz, 2H), 7.36 – 7.28 (m, 7H), 4.44 (s, 2H), 3.41 (tq, *J* = 6.8, 3.4 Hz, 2H), 2.69 (dq, *J* = 10.4, 5.2 Hz, 2H), 2.42 (s, 3H), 1.83 – 1.72 (m, 1H), 1.64 – 1.56 (m, 3H), 1.52 (d, *J* = 5.8 Hz, 3H).

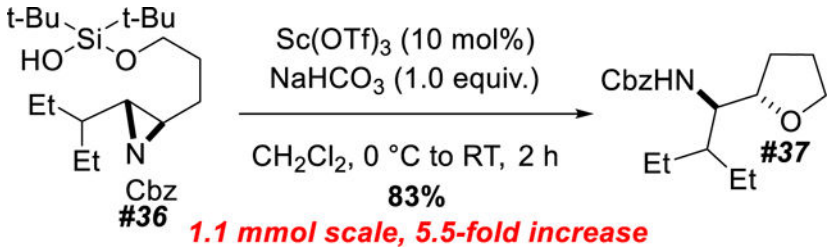
^{13}C{^{1}H} NMR (101 MHz, $CDCl_3$) δ 143.9, 138.5, 138.2, 129.6, 128.5, 127.8, 127.7, 127.4, 72.9, 69.4, 49.4, 45.9, 27.5, 27.4, 21.7, 14.8.

IR ν 3266, 1598, 1495, 1320, 1289, 1155, 1092, 872, 740, 683 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{20}H_{25}NO_3SNa^+$ 382.1453, Found 382.1450 (0.8 ppm error).

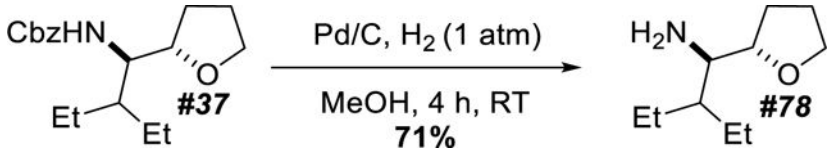


IV. Scale-Up Reactions (Scheme 6A)—An oven-dried 25 mL round-bottom flask equipped with a stir bar was cooled to 0 °C using an ice-water bath. **Compound 2** (1.1 g, 2.57 mmol, 1 equiv.) and anhydrous CH_2Cl_2 (12 mL) were added. $NaHCO_3$ (0.216 g, 2.57 mmol, 1.0 equiv.) and $Sc(OTf)_3$ (0.126 g, 0.25 mmol, 0.1 equiv.) were added sequentially. The ice-water bath was removed, and the reaction mixture was allowed to warm to room temperature over a period of two hours. Next, the reaction mixture was diluted with CH_2Cl_2, and transferred to a separatory funnel. The organic layer was washed with saturated aqueous $NaHCO_3$ solution, collected, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel using a gradient of 5 to 20% EtOAc/hexanes as eluent. **Compound 3** was obtained as colorless oil in an 84% yield (0.583 g, 2.16 mmol).

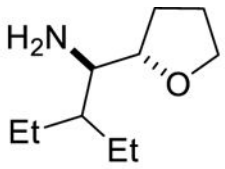


An oven-dried 25 mL round-bottom flask equipped with a stir bar was cooled to 0 °C using an ice-water bath. **Compound 36** (0.515 g, 1.11 mmol, 1 equiv.) and anhydrous CH_2Cl_2 (5 mL) were added. $NaHCO_3$ (0.093 g, 1.11 mmol, 1.0 equiv.) and $Sc(OTf)_3$ (0.054 g, 0.11 mmol, 0.1 equiv.) were added sequentially. The ice-water bath was removed, and the reaction mixture was allowed to warm to room temperature over a period of two hours. Next, the reaction mixture was diluted with CH_2Cl_2, and transferred to a separatory funnel. The organic layer was washed with saturated aqueous $NaHCO_3$ solution, collected, dried over anhydrous Na_2SO_4, and concentrated under reduced pressure. The resulting residue was purified by chromatography on silica gel using a gradient of 10 to 30% EtOAc/hexanes as eluent. **Compound 37** was obtained as colorless oil in an 83% yield (0.283 g, 0.927 mmol).

V. Product Transformations (Scheme 6B)—



A 25 mL round-bottom flask was charged with a stir bar, Compound **37 (**0.150 g, 0.491 mmol, 1.0 equiv.), MeOH (8 mL), and 10% Pd/C (0.026 g of heterogenous mixture, ~0.0026 g of Pd, 0.024 mmol of Pd, 0.05 equiv.). H_2 gas (~1 atm) was delivered *via* a rubber balloon affixed to the rubber septum of the round-bottom flask. The reaction mixture was stirred at room temperature for 4 hours under a constant pressure of H_2 gas. Following this time, the reaction mixture was saturated with N_2 gas, filtered through celite, and the filter cake was rinsed with EtOAc. The combined organics were removed under reduced pressure, and the resulting residue was purified using chromatography on basic alumina (gradient of 10 to 80% EtOAc/hexanes). The requisite fractions were combined and concentrated to give Compound **78** (colorless oil, 0.060 g, 0.350 mmol, 71% yield).



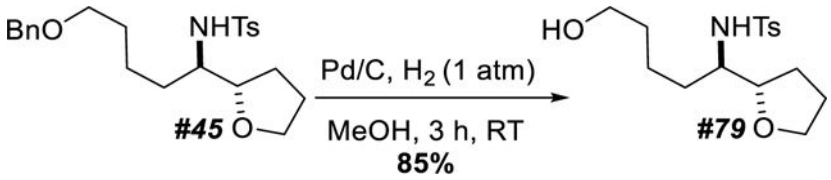
(*R**)-2-ethyl-1-((*S**)-tetrahydrofuran-2-yl)butan-1-amine

Compound 78: ^{1}H NMR (400 MHz, $CDCl_3$) δ 3.88 – 3.79 (m, 2H), 3.76 – 3.69 (m, 1H), 2.87 (t, *J* = 5.5 Hz, 1H), 1.88 (q, *J* = 6.0 Hz, 3H), 1.76 – 1.65 (m, 1H), 1.54 (ddd, *J* = 13.4, 7.6, 3.0 Hz, 1H), 1.41 – 1.29 (m, 3H), 1.22 (dd, *J* = 13.3, 7.3 Hz, 1H), 0.91 – 0.86 (m, 6H).

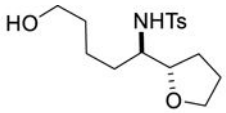
$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 80.9, 68.1, 55.1, 43.1, 26.9, 26.2, 22.2, 20.9, 11.5, 11.4.

IR ν 2960, 2930, 2873, 1558, 1457, 1066, 913, 822, 747, 648 cm^{-1}.

HRMS (ESI) m/z: $[M + H]^+$ calcd $C_{10}H_{22}NO^+$ 172.1701, Found 172.1693 (4.6 ppm error).



A 50 mL round-bottom flask was charged with a stir bar, Compound **45** (0.433 g, 1.04 mmol, 1.0 equiv.), MeOH (15 mL), and 10% Pd/C (0.055 g of heterogenous mixture, ~0.0055 g of Pd, 0.052 mmol of Pd, 0.05 equiv.). H_2 gas (~1 atm) was delivered *via* a rubber balloon affixed to the rubber septum of the round-bottom flask. The reaction mixture was stirred at room temperature for 3 hours under a constant pressure of H_2 gas. Following this time, the reaction mixture was saturated with N_2 gas, filtered through celite, and the filter cake was rinsed with EtOAc. The combined organics were removed under reduced pressure, and the resulting residue was purified using chromatography on silica gel (gradient of 5 to 40% EtOAc/hexanes). The requisite fractions were combined and concentrated to give Compound **79** (colorless oil, 0.290 g, 0.886 mmol, 85% yield).



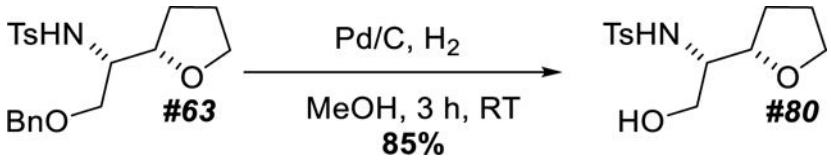
N-((*R**)-5-hydroxy-1-((*S**)-tetrahydrofuran-2-yl)pentyl)-4-methylbenzenesulfonamide

Compound 79: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.75 (d, *J* = 8.3 Hz, 2H), 7.28 (d, *J* = 8.2 Hz, 2H), 4.89 (s, 1H), 3.73 – 3.56 (m, 3H), 3.53 (t, *J* = 6.3 Hz, 2H), 3.30 (s, 1H), 2.41 (s, 3H), 1.86 – 1.74 (m, 4H), 1.63 – 1.55 (m, 1H), 1.50 – 1.39 (m, 4H), 1.39 – 1.30 (m, 1H), 1.27 – 1.16 (m, 1H).

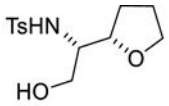
$^{13}C\{^{1}H\}$ NMR (101 MHz, $CDCl_3$) δ 143.2, 138.6, 129.6, 127.1, 80.7, 68.4, 62.5, 57.0, 32.4, 30.5, 27.6, 25.8, 21.6, 21.5.

IR ν 3292, 2937, 2867, 1320, 1157, 1093, 1066, 815, 749, 666, 549 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{16}H_{25}NO_4SNa^+$ 350.1402, Found 350.1409 (2.0 ppm error).



A 10 mL round-bottom flask was charged with a stir bar, Compound **63 (**0.040 g, 0.107 mmol, 1.0 equiv.), MeOH (5 mL), and 10% Pd/C (0.005 g of heterogenous mixture, ~0.0005 g of Pd, 0.005 mmol of Pd, 0.05 equiv.). H_2 gas (~1 atm) was delivered *via* a rubber balloon affixed to the rubber septum of the round-bottom flask. The reaction mixture was stirred at room temperature for 3 hours under a constant pressure of H_2 gas. Following this time, the reaction mixture was saturated with N_2 gas, filtered through celite, and the filter cake was rinsed with EtOAc. The combined organics were removed under reduced pressure, and the resulting residue was purified using chromatography on silica gel (gradient of 10 to 50% EtOAc/hexanes). The requisite fractions were combined and concentrated to give Compound **80** (colorless oil, 0.026 g, 0.091 mmol, 85% yield).



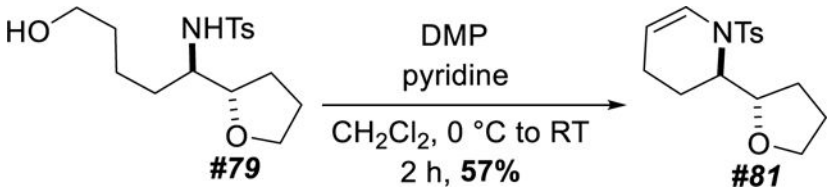
N-((*S**)-2-hydroxy-1-((*S**)-tetrahydrofuran-2-yl)ethyl)-4-methylbenzenesulfonamide

Compound 80: ^{1}H NMR (400 MHz, $CDCl_3$) δ 7.76 (d, *J* = 8.3 Hz, 2H), 7.30 (d, *J* = 7.8 Hz, 2H), 5.20 (d, *J* = 8.5 Hz, 1H), 4.06 – 3.88 (m, 1H), 3.86 – 3.75 (m, 1H), 3.73 – 3.67 (m, 1H), 3.67 – 3.57 (m, 1H), 3.32 (ddd, *J* = 11.4, 4.2, 1.8 Hz, 1H), 3.28 – 3.19 (m, 1H), 2.42 (s, 3H), 2.00 – 1.85 (m, 2H), 1.85 – 1.77 (m, 2H).

$^{13}C\{^1H\}$ NMR (101 MHz, $CDCl_3$) δ 143.7, 137.8, 129.9, 127.1, 80.6, 69.1, 64.4, 56.5, 28.2, 25.7, 21.6.

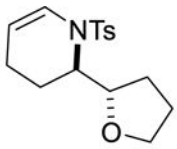
IR ν 3274, 2923, 2880, 1327, 1288, 1159, 1094, 1064, 913, 816, 666, 549 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{13}H_{19}NO_4SNa^+$ 308.0933, Found 308.0927 (1.9 ppm error).



A 20 mL round-bottom flask was charged with a stir-bar, **79** (0.070 g, 0.214 mmol, 1 equiv.), and anhydrous CH_2Cl_2 (7 mL). The reaction flask was cooled to 0 °C using an ice-water bath. Subsequently, Dess-Martin periodinane (0.090 g, 0.212 mmol, 1 equiv.) and pyridine (0.034 mL, 0.033 g, 0.422 mmol, 2 equiv.) were added. The ice-water bath was removed, and the reaction mixture was allowed to warm to room temperature over a period of 2 hours. After this time, the reaction was quenched by addition of saturated aqueous sodium thiosulfate solution, and this mixture was stirred for 1 hour. Following this time, the reaction mixture was transferred to a separatory funnel and extracted with CH_2Cl_2 (2 × 15 mL). The combined organic layers were dried over anhydrous Na_2SO_4, and the solvent was removed *in vacuo*. The resulting residue was purified through silica gel column chromatography

(gradient of 5 to 50% ethyl acetate/hexanes) to give compound **81** as a colorless oil (0.038 g, 0.124 mmol, 57% yield).



(*R**)-2-((*S**)-tetrahydrofuran-2-yl)-1-tosyl-1,2,3,4-tetrahydropyridine

Compound 81: ^{1}H NMR (500 MHz, C_6D_6) δ 7.65 (d, *J* = 8.4 Hz, 2H), 6.81 – 6.76 (m, 1H), 6.73 (dd, *J* = 8.2, 2.4 Hz, 2H), 4.83 – 4.79 (m, 1H), 3.97 (dt, *J* = 9.8, 3.7 Hz, 1H), 3.90 (dt, *J* = 9.6, 6.3 Hz, 1H), 3.68 (td, *J* = 7.7, 5.5 Hz, 1H), 3.53 – 3.48 (m, 1H), 2.42 (ddd, *J* = 12.5, 8.3, 6.2 Hz, 1H), 2.04 – 1.98 (m, 1H), 1.97 – 1.85 (m, 2H), 1.83 (s, 3H), 1.77 – 1.67 (m, 1H), 1.54 – 1.45 (m, 1H), 1.42 – 1.35 (m, 1H), 0.72 (tdd, *J* = 12.4, 5.9, 3.9 Hz, 1H).

^{13}C{^{1}H} NMR (126 MHz, C_6D_6) δ 143.1, 136.8, 129.7, 127.5, 124.7, 111.4, 76.1, 68.5, 56.6, 29.6, 25.6, 21.1, 20.2, 17.8.

IR ν 2963, 2923, 2873, 1358, 1338, 1166, 1094, 1071, 926, 692, 566, 548 cm^{-1}.

HRMS (ESI) m/z: $[M + Na]^+$ calcd $C_{16}H_{21}NO_3SNa^+$ 330.1140, Found 330.1144 (1.2 ppm error).

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

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Data Availability Statement:

The data underlying this study are available in the published article and its Supporting Information.

References

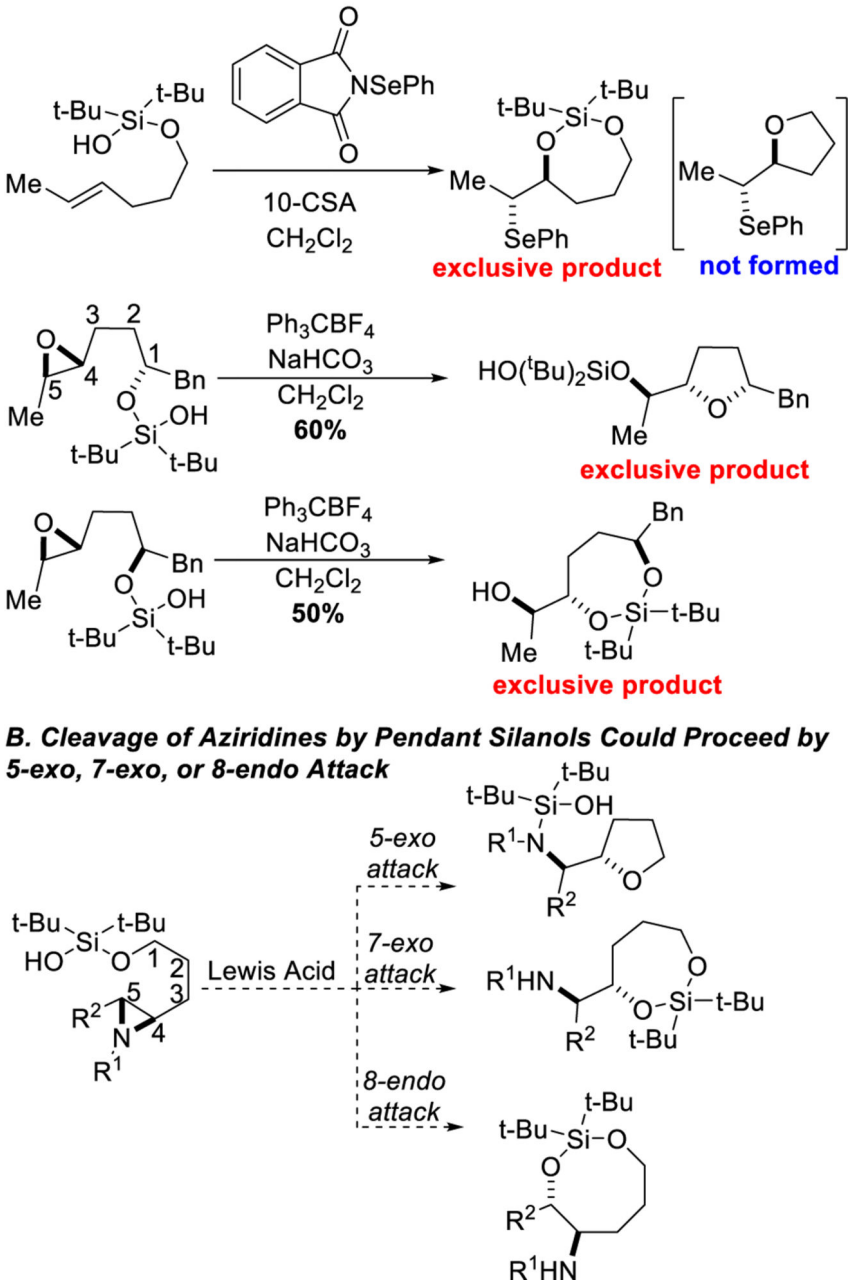
1. Shinde AH; Sathyamoorthi S, Tethered Silanoxymercuration of Allylic Alcohols. Org. Lett 2020, 22, 8665–8669. [PubMed: 33095992]
2. Dhokale RA; Seidl FJ; Sathyamoorthi S, A Formal Rearrangement of Allylic Silanols. Molecules 2021, 26, 3829. [PubMed: 34201779]
3. Dhokale RA; Seidl FJ; Shinde AH; Mague JT; Sathyamoorthi S, Tethered Silanoxyiodination of Alkenes. J. Org. Chem 2021, 86, 9233–9243. [PubMed: 34128664]
4. Nagamalla S; Dhokale RA; Seidl FJ; Mague JT; Sathyamoorthi S, Unusual rearrangement–remercuration reactions of allylic silanols. Org. Chem. Front 2021, 8, 5361–5368. [PubMed: 34868598]

5. Nagamalla S; Mague JT; Sathyamoorthi S, Ring Opening of Epoxides by Pendant Silanols. Org. Lett 2022, 24, 939–943. [PubMed: 35041437]
6. Joshi H; Sathyamoorthi S, Hydroxyselenylation and Tethered Silanoxyselenylation of Allylic Silanols. J. Org. Chem 2022, 87, 5017–5028. [PubMed: 35294203]
7. Nagamalla S; Paul D; Mague JT; Sathyamoorthi S, Ring Opening of Aziridines by Pendant Silanols Allows for Preparations of (±)-Clavaminol H, (±)-Des-Acetyl-Clavaminol H, (±)-Dihydrosphingosine, and (±)-N-Hexanoyldihydrosphingosine. Org. Lett 2022, 24, 6202–6207. [PubMed: 35951966]
8. Shinde AH; Dhokale RA; Mague JT; Sathyamoorthi S, Highly Stereospecific Cyclizations of Homoallylic Silanols. J. Org. Chem 2022, 87, 11237–11252. [PubMed: 35901375]
9. Tanner D, Chiral Aziridines—Their Synthesis and Use in Stereoselective Transformations. Angew. Chem. Int. Ed 1994, 33, 599–619.
10. Sweeney JB, Aziridines: epoxides' ugly cousins? Chem. Soc. Rev 2002, 31, 247–258. [PubMed: 12357722]
11. Lu P, Recent developments in regioselective ring opening of aziridines. Tetrahedron 2010, 66, 2549–2560.
12. Hu XE, Nucleophilic ring opening of aziridines. Tetrahedron 2004, 60, 2701–2743.
13. Sabir S; Kumar G; Verma VP; Jat JL, Aziridine Ring Opening: An Overview of Sustainable Methods. ChemistrySelect 2018, 3, 3702–3711.
14. Clerici A; Cannella R; Panzeri W; Pastori N; Regolini E; Porta O, TiCl3/PhN2+-mediated radical addition of ethers to aldimines generated in situ under aqueous conditions. Tetrahedron Lett. 2005, 46, 8351–8354.
15. Troisi L; Granito C; Ronzini L; Rosato F; Videtta V, An economic and efficient tetrahydrofuranylation of alcohols, imines and alkynes. Tetrahedron Lett. 2010, 51, 5980–5983.
16. Vil VA; Grishin SS; Baberkina EP; Kostyagina VA; Kovalenko AE; Terent'ev AO, Radical addition of tetrahydrofuran to imines assisted by tert-butyl hydroperoxide. Tetrahedron Lett. 2020, 61, 152150.
17. Pillitteri S; Ranjan P; Voskressensky LG; Van der Eycken EV; Sharma UK, Alkylation of in situ generated imines via photoactivation of strong aliphatic C-H bonds. Mol. Catal 2021, 514, 111841.
18. Rossi B; Pastori N; Prosperini S; Punta C, Multicomponent versus domino reactions: One-pot free-radical synthesis of β-amino-ethers and β-amino-alcohols. Beilstein J. Org. Chem 2015, 11, 66–73.
19. San Segundo M; Guerrero I; Correa A, Co-Catalyzed C(sp3)–H Oxidative Coupling of Glycine and Peptide Derivatives. Org. Lett 2017, 19, 5288–5291. [PubMed: 28937777]
20. Supranovich VI; Levin VV; Dilman AD, Radical Addition to N-Tosylimines via C–H Activation Induced by Decatungstate Photocatalyst. Org. Lett 2019, 21, 4271–4274. [PubMed: 31081641]
21. Kubisiak M; Zelga K; Bury W; Justyniak I; Budny-Godlewski K; Ochal Z; Lewiński J, Development of zinc alkyl/air systems as radical initiators for organic reactions. Chem. Sci 2015, 6, 3102–3108. [PubMed: 28706684]
22. Shatskiy A; Axelsson A; Stepanova EV; Liu J-Q; Temerdashev AZ; Kore BP; Blomkvist B; Gardner JM; Dinér P; Kärkäs MD, Stereoselective synthesis of unnatural α-amino acid derivatives through photoredox catalysis. Chem. Sci 2021, 12, 5430–5437. [PubMed: 34168785]
23. Yamada K-i.; Fujihara, H.; Yamamoto, Y.; Miwa, Y.; Taga, T.; Tomioka, K., Radical Addition of Ethers to Imines Initiated by Dimethylzinc. Org. Lett 2002, 4, 3509–3511. [PubMed: 12323056]
24. Prosperini S; Pastori N; Ghilardi A; Clerici A; Punta C, New domino radical synthesis of aminoalcohols promoted by TiCl4–Zn/t-BuOOH system: selective hydroxyalkylation of amines in alcohol or in cyclic ether cosolvents. Org. Biomol. Chem 2011, 9, 3759–3767. [PubMed: 21479301]
25. Mutra MR; Dhandabani GK; Wang J-J, Mild Access to N-Formylation of Primary Amines using Ethers as C1 Synthons under Metal-Free Conditions. Adv. Synth. Catal 2018, 360, 3960–3968.
26. Wei W-T; Song R-J; Li J-H, Copper-Catalyzed Oxidative α-Alkylation of α-Amino Carbonyl Compounds with Ethers via Dual C(sp3)-H Oxidative Cross- Coupling. Adv. Synth. Catal 2014, 356, 1703–1707.

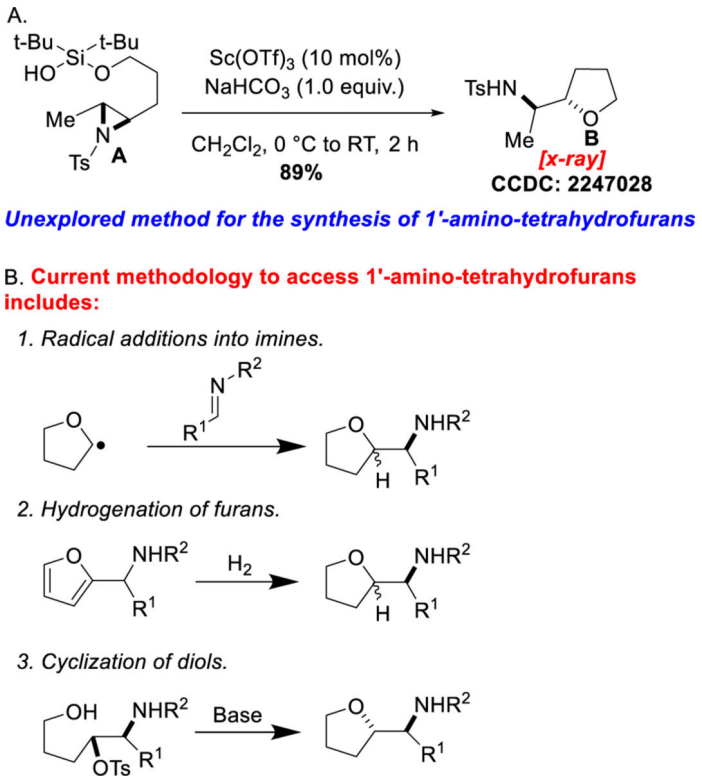
27. Zeng H; Lu D; Gong Y, Direct Metal-Free C–H Functionalization of Cyclic Ethers with Schiff Bases Through an Azobisisobutyronitrile-Initiated Radical Chain Process. Eur. J. Org. Chem 2017, 2017, 7231–7237.
28. Kinsella AG; Tibbetts JD; Stead D; Cresswell AJ, N-tosylhydrazones as acceptors for nucleophilic alkyl radicals in photoredox catalysis: A short case study on possible side reactions. Synth. Commun 2022, 52, 413–423.
29. Baker BR; McEvoy FJ; Schaub RE; Joseph JP; Williams JH, An Antimalarial Alkaloid From Hydrangea. XXI. Synthesis And Structure Of Febrifugine And Isofebrifugine. J. Org. Chem 1953, 18, 178–183.
30. Janusz JM; Young PA; Blum RB; Riley CM, High-potency dipeptide sweeteners. 2. L-Aspartylfuryl-, thienyl-, and imidazolylglycine esters. J. Med. Chem 1990, 33, 1676–1682. [PubMed: 2342061]
31. Kohn H; Sawhney KN; Bardel P; Robertson DW; Leander JD, Synthesis and anticonvulsant activities of .alpha.-heterocyclic .alpha.-acetamido-N-benzylacetamide derivatives. J. Med. Chem 1993, 36, 3350–3360. [PubMed: 8230125]
32. Davis FA; Ramachandar T, α-Amino 1,3-dithioketal mediated asymmetric synthesis of piperidines (L-733,060) and tetrahydrofuran glycines. Tetrahedron Lett. 2008, 49, 870–872. [PubMed: 19180171]
33. Jirgensons A; Marinozzi M; Pellicciari R, Conformationally constrained amino acids: enantiodivergent synthesis of all four stereoisomers of 2-(tetrahydrofuran-2-yl)glycine. Tetrahedron 2005, 61, 373–377.
34. Devi R; Das J; Sarma B; Das SK, Phenolate-induced intramolecular ring-opening cyclization of N-tosylaziridines: access to functionalized benzoxacycles. Org. Biomol. Chem 2018, 16, 5846–5858. [PubMed: 30070284]
35. Fanourakis A; Hodson NJ; Lit AR; Phipps RJ, Substrate-Directed Enantioselective Aziridination of Alkenyl Alcohols Controlled by a Chiral Cation. J. Am. Chem. Soc 2023, ASAP Articles.
36. Gaffen JR; Bentley JN; Torres LC; Chu C; Baumgartner T; Caputo CB, A Simple and Effective Method of Determining Lewis Acidity by Using Fluorescence. Chem 2019, 5, 1567–1583.
37. Bentley JN; Elgadi SA; Gaffen JR; Demay-Drouhard P; Baumgartner T; Caputo CB, Fluorescent Lewis Adducts: A Practical Guide to Relative Lewis Acidity. Organometallics 2020, 39, 3645–3655.
38. Cardillo G; Gentilucci L; Tolomelli A; Tomasini C, Ring expansion of N-acyl aziridine-2-imides to oxazoline-4-imides, useful precursors of pure β-Hydroxy α-aminoacids. Tetrahedron Lett. 1997, 38, 6953–6956.
39. Lindström UM; Somfai P, A Highly Stereoselective Aza-[3,3]-Claisen Rearrangement of Vinylaziridines as a Novel Entry to Seven-Membered Lactams. J. Am. Chem. Soc 1997, 119, 8385–8386.
40. Olofsson B; Somfai P, A Regio- and Stereodivergent Route to All Isomers of vic-Amino Alcohols. J. Org. Chem 2002, 67, 8574–8583. [PubMed: 12444641]
41. Legters J; Thijs L; Zwanenburg B, Synthesis of functionalized phenylalanine derivatives by ring opening reactions of 3-arylaziridine-2-carboxylic esters. Recl. Trav. Chim. Pays-Bas 1992, 111, 16–21.
42. Jeong JU; Tao B; Sagasser I; Henniges H; Sharpless KB, Bromine-Catalyzed Aziridination of Olefins. A Rare Example of Atom-Transfer Redox Catalysis by a Main Group Element. J. Am. Chem. Soc 1998, 120, 6844–6845.
43. Li J; Liang J-L; Chan PWH; Che C-M, Aziridination of alkenes with N-substituted hydrazines mediated by iodobenzene diacetate. Tetrahedron Lett. 2004, 45, 2685–2688.
44. Richardson RD; Desaize M; Wirth T, Hypervalent Iodine-Mediated Aziridination of Alkenes: Mechanistic Insights and Requirements for Catalysis. Chem. Eur. J 2007, 13, 6745–6754. [PubMed: 17514676]
45. Ma Z; Zhou Z; Kürti L, Direct and Stereospecific Synthesis of N-H and N-Alkyl Aziridines from Unactivated Olefins Using Hydroxylamine-O-Sulfonic Acids. Angew. Chem. Int. Ed 2017, 56, 9886–9890.

46. Yu C; Hu L, A facile synthesis of cyclic enecarbamates using Dess–Martin periodinane. Tetrahedron Lett. 2001, 42, 5167–5170.

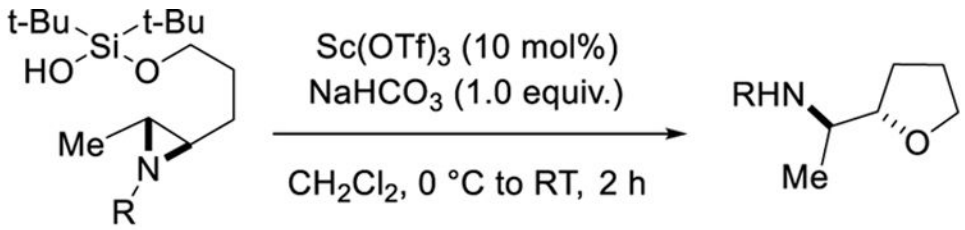
47. Cao J; Yang X; Ma L; Lu K; Zhou R, Metal-free hydrogen evolution cross-coupling enabled by synergistic photoredox and polarity reversal catalysis. Green Chem. 2021, 23, 8988–8994.

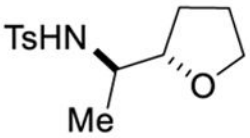
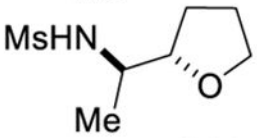
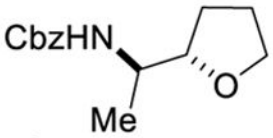
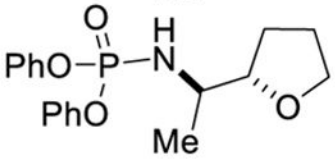
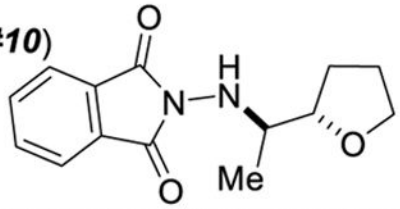
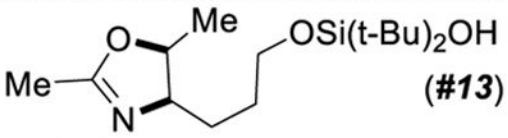


Scheme 1. Our previous work with silanol cyclizations suggests that multiple modes of nucleophllic attack are possible with aziridine silanols.



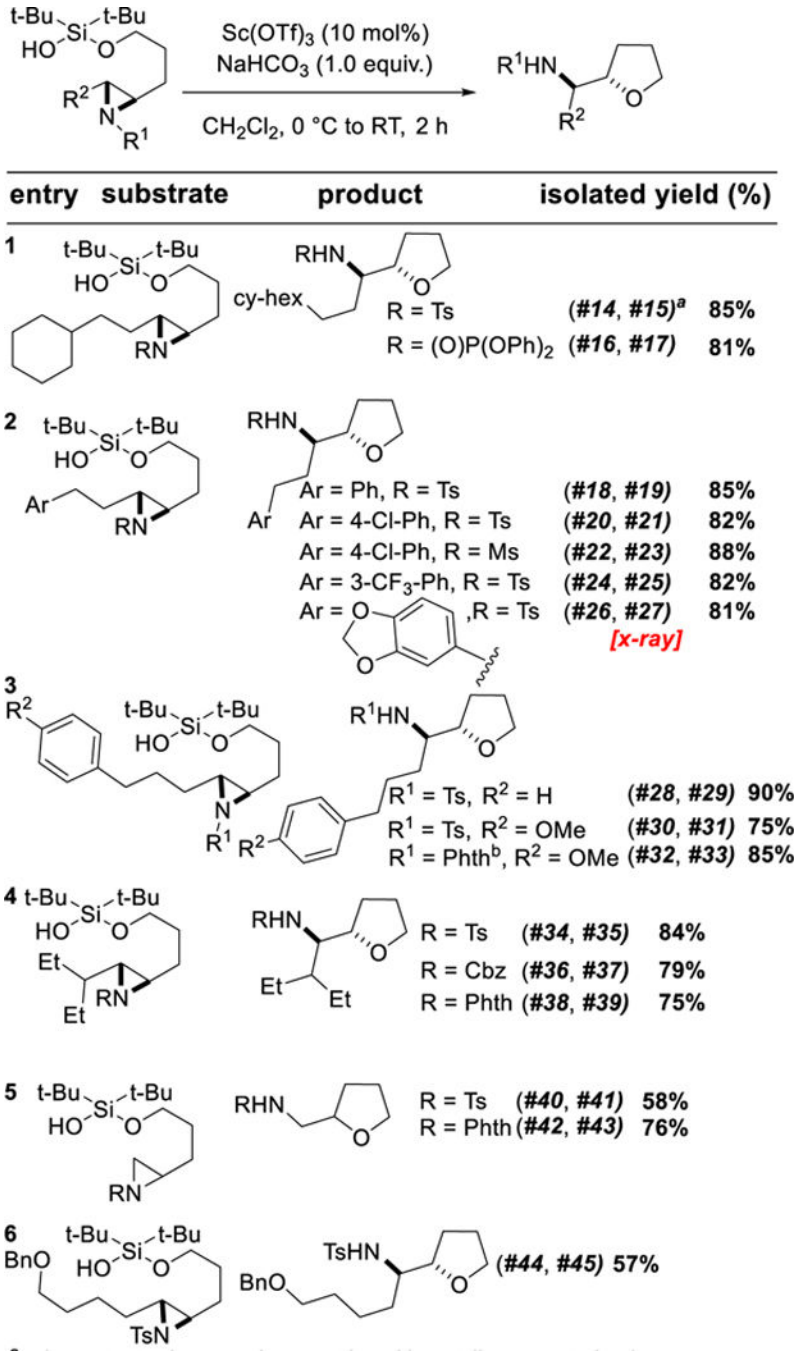
Scheme 2. A. Lewis acid catalyzed cleavage of aziridines by pendant silanols allows for stereospecific syntheses of 1'-amino-tetrahydrofurans. B. Analysis of the literature shows that this reaction type is underexplored for the construction of such heterocycles.



entry	R	product	isolated yield (%)
1	H (***#1***)	No reaction	———
2	Tosyl (***#2***)		(***#3***) ***[x-ray]*** **89%**
3	Mesyl (***#4***)		(***#5***) **83%**
4	Cbz (***#6***)		(***#7***) **80%**
5	$(PhO)_2P(O)$ (***#8***)		(***#9***) **74%**
6	Phthalimide (***#10***)		(***#11***) **89%**
7	Acetyl (***#12***)		**50%**[a]

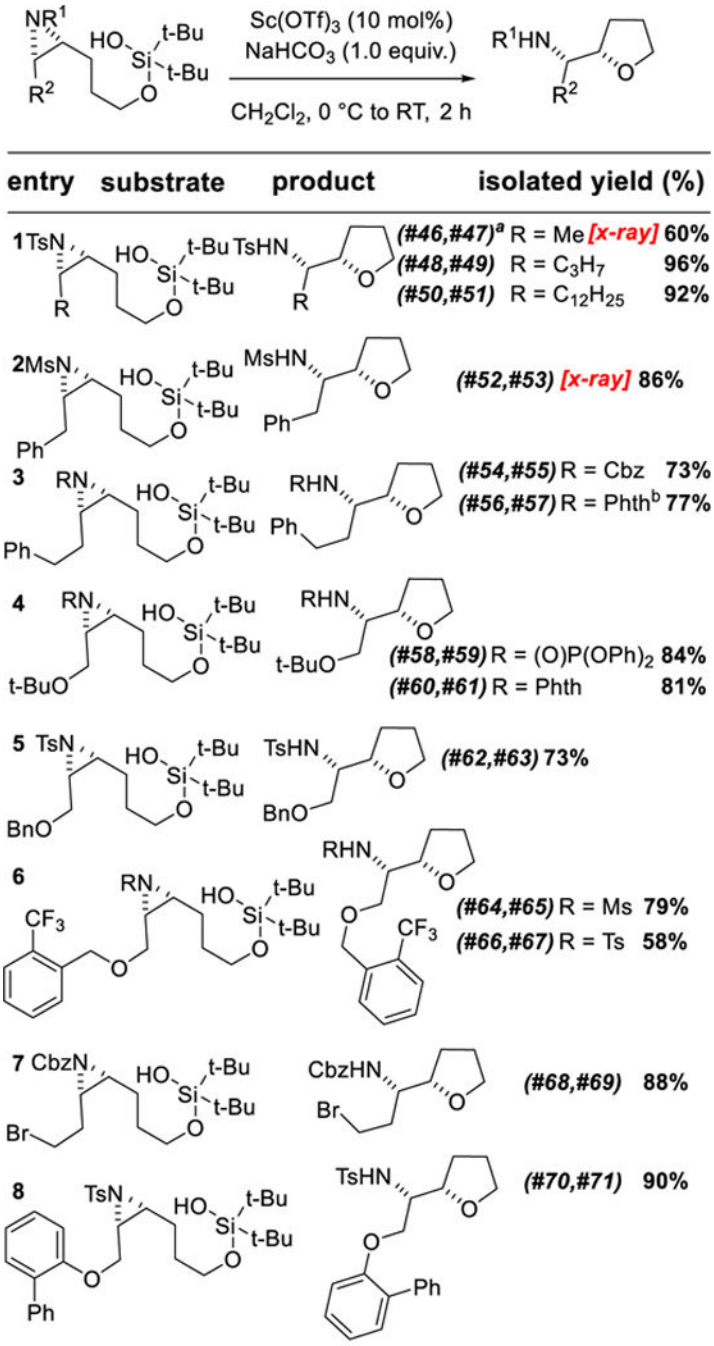
Scheme 3. Effect of the Aziridine *N*-Substituent

[a]Yield estimated from ^{1}H NMR integration against an internal standard.



Scheme 4. Substrate Scope (*trans aziridines*).

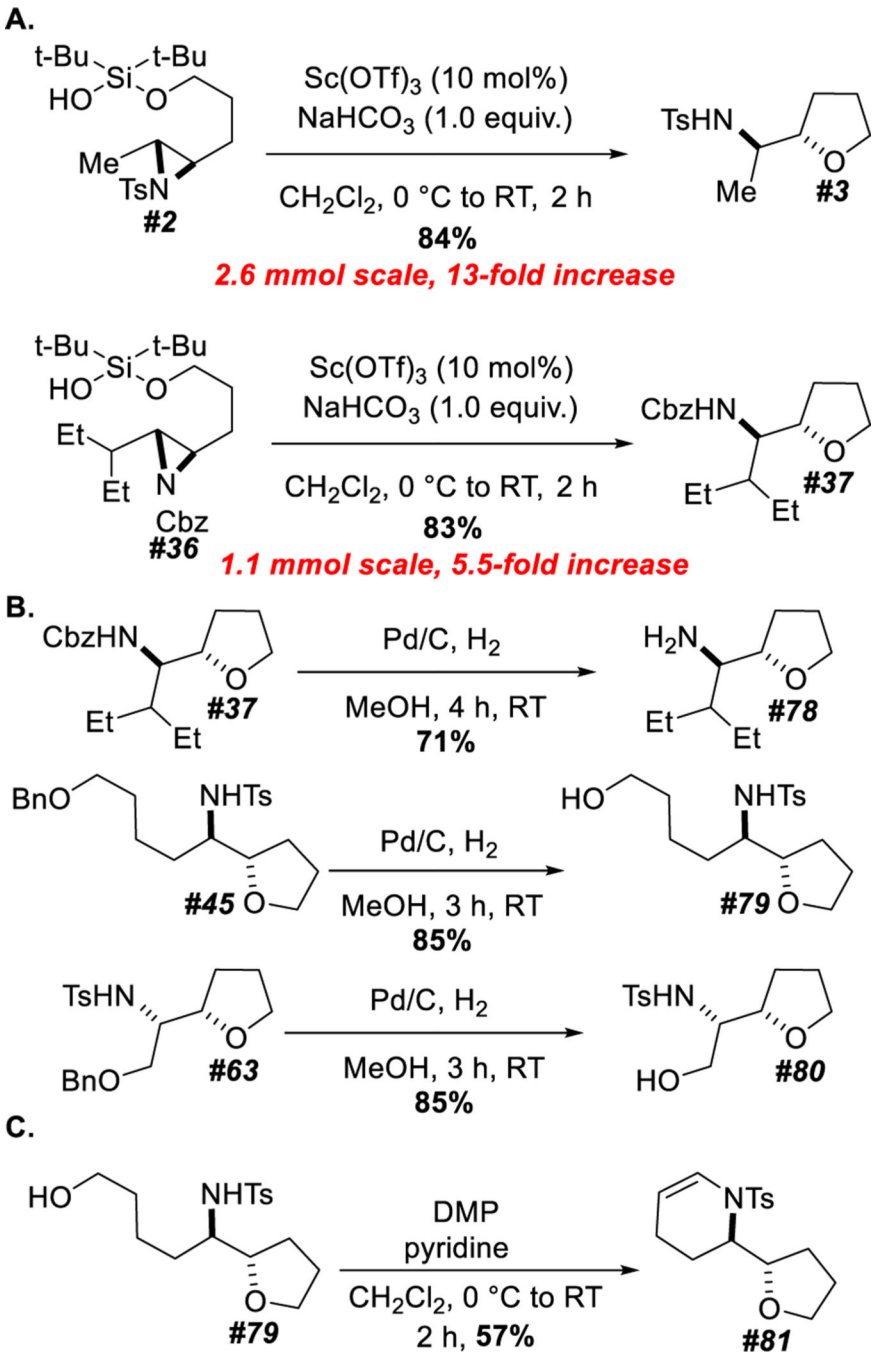
[a]substrate number, product number; Note: all compounds shown are racemic, and relative stereochemistry is depicted. [b]Phth = Phthallmide



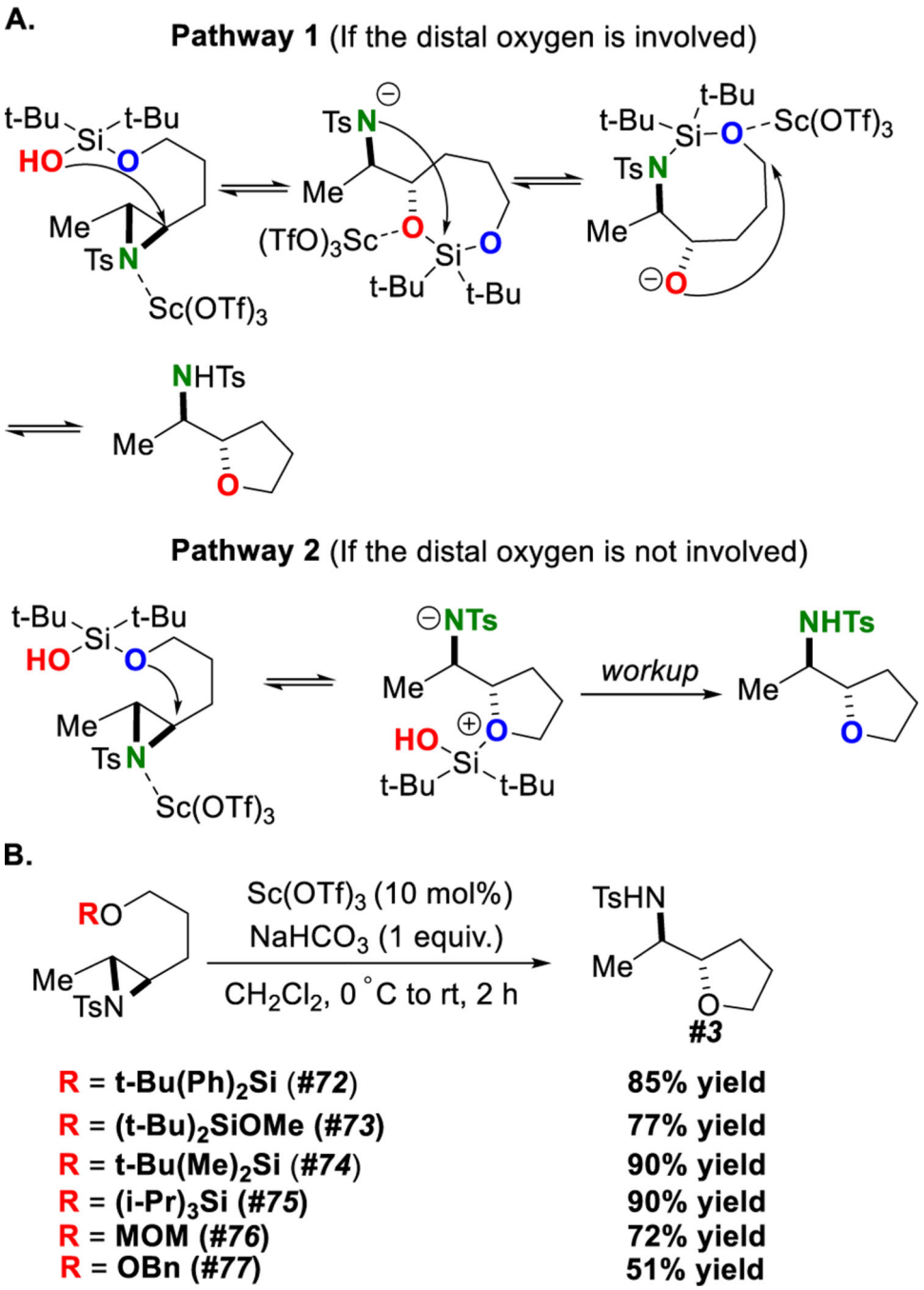
Scheme 5. Substrate Scope (*cis* aziridines).

[a]substrate number, product number; Note: all compounds shown are racemic, and relative stereochemistry is depicted.

[b]Phth = Phthalimide



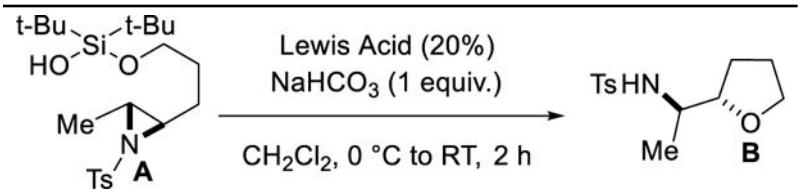
Scheme 6. A. Scale-up reactions B. Removal of alcohol or amine protecting groups C. Tetrahydropyridlne formation during alcohol oxidation with Dess-Martin periodinane.



Scheme 7. A. Two mechanistic scenarios. B. Control experiments suggest that Pathway 2 Is more likely.

Table 1.

Effect of Lewis Acids on Cyclization



	Lewis Acid	Yield[a]
1	$Sc(OTf)_3$	>95%
2	$Y(OTf)_3$	NR
3	Tropylium BF_4	NR
4	Ph_3CBF_4	60%
5	$Bi(OTf)_3$	90%
6	$AI(OTf)_3$	93%

[a]estimated from ^1H NMR integration against an internal standard.