SUPPORTING INFORMATION: SINGLE CRYSTAL X-RAY DATA

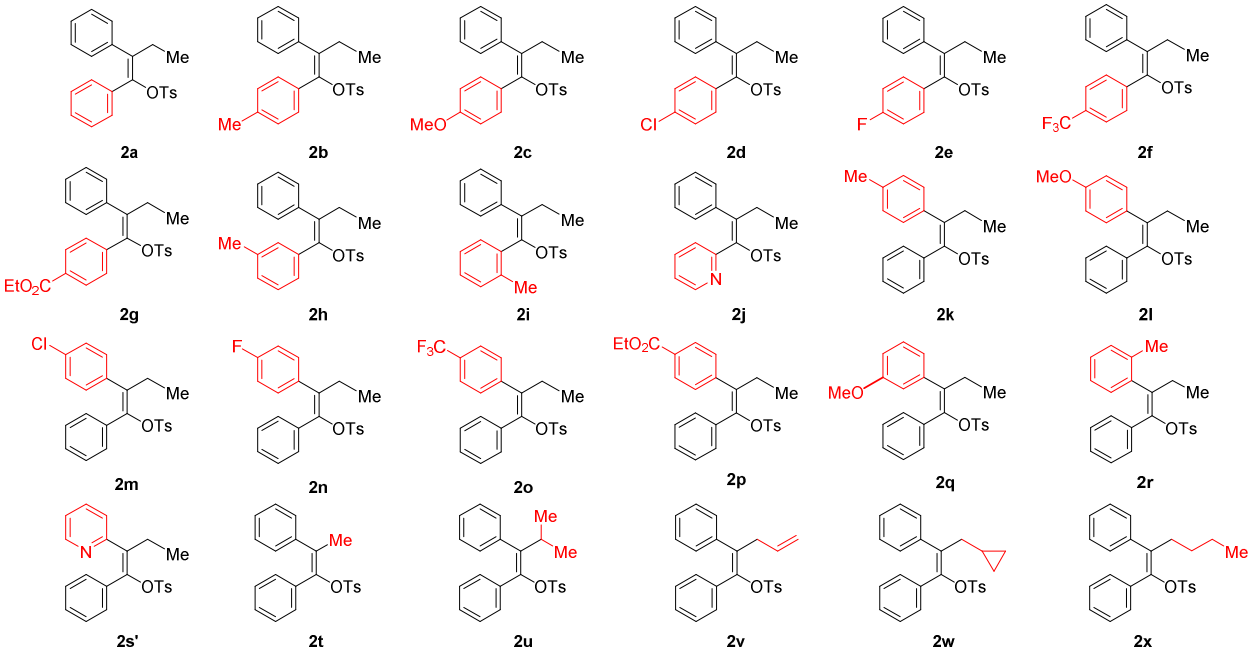
Highly Stereoselective Synthesis of Tetrasubstituted Acyclic All-carbon Olefins via Enol Tosylation and Suzuki–Miyaura Coupling

Beryl X. Li,[†] Diane N. Le,[†] Kyle A. Mack,[‡] Andrew McClory,[†] Ngiap-Kie Lim,[†] Theresa Cravillion,[†] Scott Savage,[†] Chong Han,[†] David B. Collum,[‡] Haiming Zhang,[†,*] and Francis Gosselin,[†,*]

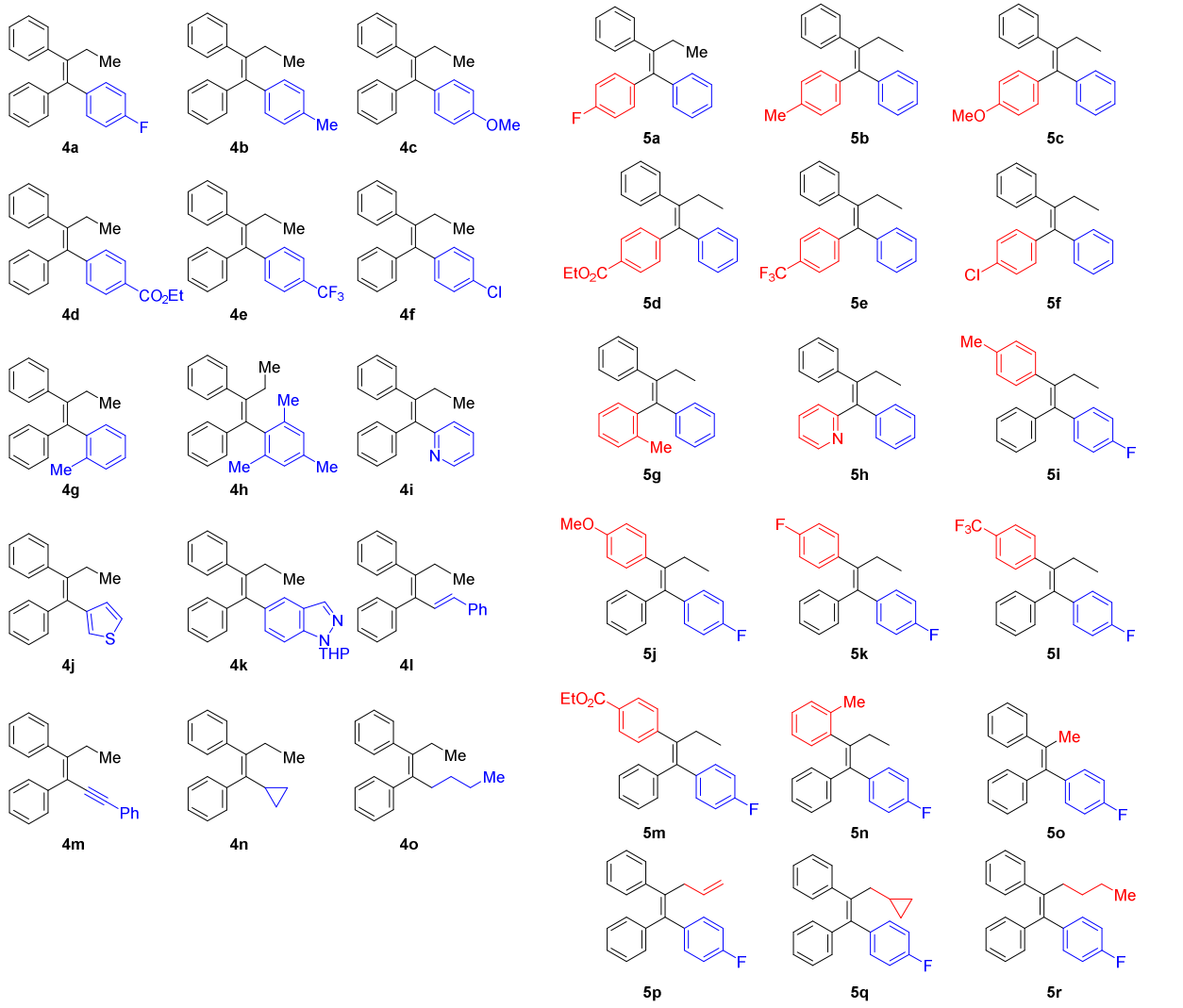
[†]Small Molecule Process Chemistry, Genentech, Inc., 1 DNA Way, South San Francisco, CA 94080, United States

[‡]Baker Laboratory, Department of Chemistry and Chemical Biology, Cornell University, Ithaca, NY 14853–1301, United States

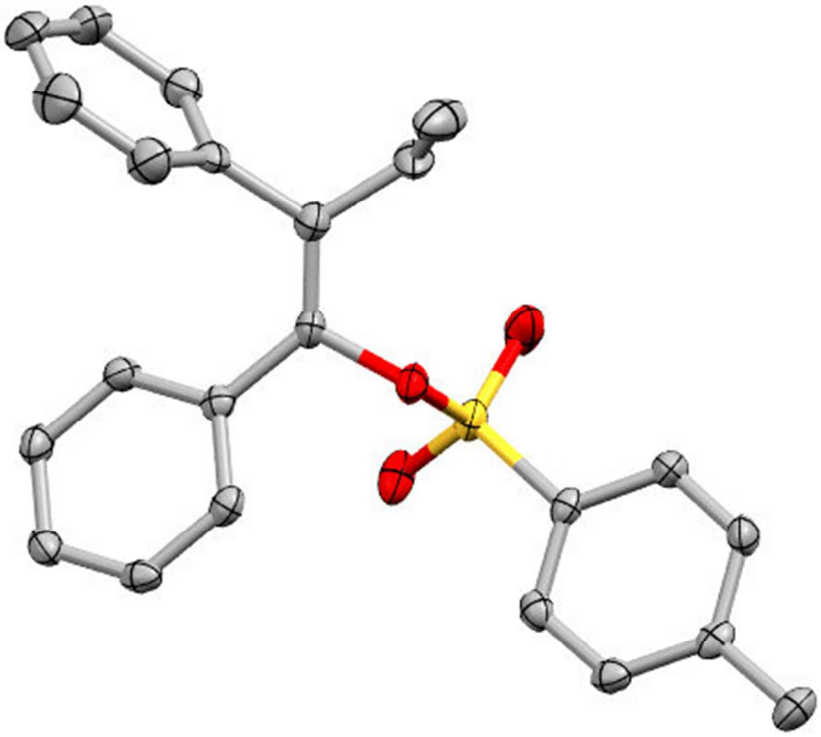
Scheme S1. Tosylates



Scheme S2. Tetrasubstituted olefins



(*E*)-1,2-diphenylbut-1-en-1-yl 4-methylbenzenesulfonate (2a)



Crystals were used as received. A colorless prism 0.060 x 0.050 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 20 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in □. A total of 39097 reflections were collected covering the indices, -7<=*h*<=7, -9<=*k*<=9, -49<=*l*<=49. 3528 reflections were found to be symmetry independent, with an Rint of 0.0440. Indexing and unit cell refinement indicated a primitive, orthorhombic lattice. The space group was found to be P 21 21 21 (No. 19). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S1. Crystal data and structure refinement for tosylate **2a**.

X-ray ID	gene800	
Sample/notebook ID	71452-53	
Empirical formula	C23 H22 O3 S	
Formula weight	378.46	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P 21 21 21	
Unit cell dimensions	a = 5.9623(3) Å	α= 90°.
	b = 7.8320(3) Å	β= 90°.
	c = 41.1862(18) Å	γ = 90°.
Volume	1923.26(15) $Å^3$	
Z	4	
Density (calculated)	1.307 Mg/m^3	
Absorption coefficient	0.189 mm^{-1}	
F(000)	800	
Crystal size	0.060 x 0.050 x 0.040 mm^3	
Theta range for data collection	1.978 to 25.369°.	
Index ranges	-7<=h<=7, -9<=k<=9, -49<=l<=49	
Reflections collected	39097	
Independent reflections	3528 [R(int) = 0.0440]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.830	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3528 / 0 / 260	
Goodness-of-fit on F^2	1.116	
Final R indices [I>2sigma(I)]	R1 = 0.0396, wR2 = 0.0881	
R indices (all data)	R1 = 0.0427, wR2 = 0.0896	
Absolute structure parameter	0.00(3)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.337 and -0.231 e.$Å^{-3}$	

Table S2. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2a**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5814(5)	7035(4)	4398(1)	20(1)
C(2)	3783(5)	6639(4)	4541(1)	22(1)
C(3)	2589(6)	7925(4)	4689(1)	25(1)
C(4)	3348(5)	9603(4)	4689(1)	23(1)
C(5)	5425(6)	9958(4)	4549(1)	26(1)
C(6)	6664(6)	8688(4)	4404(1)	24(1)
C(7)	1963(6)	11034(4)	4831(1)	31(1)
C(8)	6342(5)	4069(4)	3635(1)	20(1)
C(9)	7740(6)	4356(4)	3388(1)	27(1)
C(10)	9185(17)	5894(10)	3368(2)	40(2)
C(11)	8292(11)	7146(7)	3120(1)	47(2)
C(10A)	8630(50)	6280(30)	3290(5)	40(2)
C(11A)	11092(19)	6240(15)	3292(2)	25(3)
C(12)	7967(6)	3135(4)	3112(1)	24(1)
C(13)	9942(6)	2227(4)	3067(1)	31(1)
C(14)	10173(7)	1125(5)	2807(1)	40(1)
C(15)	8437(7)	919(5)	2587(1)	45(1)
C(16)	6498(7)	1824(6)	2628(1)	47(1)
C(17)	6259(6)	2932(5)	2888(1)	36(1)
C(18)	4869(5)	2594(4)	3703(1)	19(1)
C(19)	5445(5)	933(4)	3613(1)	22(1)
C(20)	4017(6)	-407(4)	3676(1)	26(1)
C(21)	1982(6)	-140(4)	3831(1)	26(1)
C(22)	1411(5)	1499(4)	3925(1)	24(1)
C(23)	2827(5)	2852(4)	3863(1)	23(1)
O(1)	9549(4)	6010(3)	4136(1)	39(1)
O(2)	7009(4)	3823(3)	4344(1)	32(1)
O(3)	5987(4)	5467(3)	3858(1)	24(1)
S(1)	7321(1)	5440(1)	4194(1)	23(1)

Table S3. Bond lengths [Å] and angles [°] for tosylate **2a**.

C(1)-C(2)	1.383(4)	C(10A)-H(10D)	0.9900
C(1)-C(6)	1.390(4)	C(11A)-H(11D)	0.9800
C(1)-S(1)	1.753(3)	C(11A)-H(11E)	0.9800
C(2)-C(3)	1.376(4)	C(11A)-H(11F)	0.9800
C(2)-H(2)	0.9500	C(12)-C(17)	1.381(5)
C(3)-C(4)	1.390(4)	C(12)-C(13)	1.388(5)
C(3)-H(3)	0.9500	C(13)-C(14)	1.382(5)
C(4)-C(5)	1.394(4)	C(13)-H(13)	0.9500
C(4)-C(7)	1.509(4)	C(14)-C(15)	1.384(6)
C(5)-C(6)	1.376(4)	C(14)-H(14)	0.9500
C(5)-H(5)	0.9500	C(15)-C(16)	1.367(6)
C(6)-H(6)	0.9500	C(15)-H(15)	0.9500
C(7)-H(7A)	0.9800	C(16)-C(17)	1.386(5)
C(7)-H(7B)	0.9800	C(16)-H(16)	0.9500
C(7)-H(7C)	0.9800	C(17)-H(17)	0.9500
C(8)-C(9)	1.334(4)	C(18)-C(19)	1.395(4)
C(8)-O(3)	1.443(3)	C(18)-C(23)	1.399(4)
C(8)-C(18)	1.478(4)	C(19)-C(20)	1.376(4)
C(9)-C(10)	1.483(9)	C(19)-H(19)	0.9500
C(9)-C(12)	1.493(4)	C(20)-C(21)	1.387(5)
C(9)-C(10A)	1.64(3)	C(20)-H(20)	0.9500
C(10)-C(11)	1.513(9)	C(21)-C(22)	1.382(4)
C(10)-H(10A)	0.9900	C(21)-H(21)	0.9500
C(10)-H(10B)	0.9900	C(22)-C(23)	1.379(4)
C(11)-H(11A)	0.9800	C(22)-H(22)	0.9500
C(11)-H(11B)	0.9800	C(23)-H(23)	0.9500
C(11)-H(11C)	0.9800	O(1)-S(1)	1.421(3)
C(10A)-C(11A)	1.47(3)	O(2)-S(1)	1.421(2)
C(10A)-H(10C)	0.9900	O(3)-S(1)	1.597(2)
C(2)-C(1)-C(6)	121.4(3)	C(9)-C(8)-O(3)	116.6(2)
C(2)-C(1)-S(1)	119.6(2)	C(9)-C(8)-C(18)	130.3(3)
C(6)-C(1)-S(1)	119.0(2)	O(3)-C(8)-C(18)	112.7(2)
C(3)-C(2)-C(1)	118.6(3)	C(8)-C(9)-C(10)	122.8(4)
C(3)-C(2)-H(2)	120.7	C(8)-C(9)-C(12)	122.0(3)
C(1)-C(2)-H(2)	120.7	C(10)-C(9)-C(12)	115.2(4)
C(2)-C(3)-C(4)	121.6(3)	C(8)-C(9)-C(10A)	122.9(10)
C(2)-C(3)-H(3)	119.2	C(12)-C(9)-C(10A)	111.7(9)
C(4)-C(3)-H(3)	119.2	C(9)-C(10)-C(11)	111.0(6)
C(3)-C(4)-C(5)	118.5(3)	C(9)-C(10)-H(10A)	109.4
C(3)-C(4)-C(7)	121.6(3)	C(11)-C(10)-H(10A)	109.4
C(5)-C(4)-C(7)	119.9(3)	C(9)-C(10)-H(10B)	109.4
C(6)-C(5)-C(4)	120.9(3)	C(11)-C(10)-H(10B)	109.4
C(6)-C(5)-H(5)	119.6	H(10A)-C(10)-H(10B)	108.0
C(4)-C(5)-H(5)	119.6	C(10)-C(11)-H(11A)	109.5
C(5)-C(6)-C(1)	119.0(3)	C(10)-C(11)-H(11B)	109.5
C(5)-C(6)-H(6)	120.5	H(11A)-C(11)-H(11B)	109.5
C(1)-C(6)-H(6)	120.5	C(10)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7A)	109.5	H(11A)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7B)	109.5	H(11B)-C(11)-H(11C)	109.5
H(7A)-C(7)-H(7B)	109.5	C(11A)-C(10A)-C(9)	107.8(15)
C(4)-C(7)-H(7C)	109.5	C(11A)-C(10A)-H(10C)	110.2
H(7A)-C(7)-H(7C)	109.5	C(9)-C(10A)-H(10C)	110.2
H(7B)-C(7)-H(7C)	109.5	C(11A)-C(10A)-H(10D)	110.2

C(9)-C(10A)-H(10D)	110.2	C(19)-C(18)-C(23)	118.3(3)
H(10C)-C(10A)-H(10D)	108.5	C(19)-C(18)-C(8)	122.2(3)
C(10A)-C(11A)-H(11D)	109.5	C(23)-C(18)-C(8)	119.5(3)
C(10A)-C(11A)-H(11E)	109.5	C(20)-C(19)-C(18)	120.6(3)
H(11D)-C(11A)-H(11E)	109.5	C(20)-C(19)-H(19)	119.7
C(10A)-C(11A)-H(11F)	109.5	C(18)-C(19)-H(19)	119.7
H(11D)-C(11A)-H(11F)	109.5	C(19)-C(20)-C(21)	120.9(3)
H(11E)-C(11A)-H(11F)	109.5	C(19)-C(20)-H(20)	119.6
C(17)-C(12)-C(13)	118.5(3)	C(21)-C(20)-H(20)	119.6
C(17)-C(12)-C(9)	121.0(3)	C(22)-C(21)-C(20)	118.9(3)
C(13)-C(12)-C(9)	120.5(3)	C(22)-C(21)-H(21)	120.5
C(14)-C(13)-C(12)	120.5(3)	C(20)-C(21)-H(21)	120.5
C(14)-C(13)-H(13)	119.7	C(23)-C(22)-C(21)	120.7(3)
C(12)-C(13)-H(13)	119.7	C(23)-C(22)-H(22)	119.6
C(13)-C(14)-C(15)	120.3(4)	C(21)-C(22)-H(22)	119.6
C(13)-C(14)-H(14)	119.8	C(22)-C(23)-C(18)	120.6(3)
C(15)-C(14)-H(14)	119.8	C(22)-C(23)-H(23)	119.7
C(16)-C(15)-C(14)	119.4(3)	C(18)-C(23)-H(23)	119.7
C(16)-C(15)-H(15)	120.3	C(8)-O(3)-S(1)	117.90(18)
C(14)-C(15)-H(15)	120.3	O(2)-S(1)-O(1)	118.32(16)
C(15)-C(16)-C(17)	120.5(3)	O(2)-S(1)-O(3)	108.84(12)
C(15)-C(16)-H(16)	119.8	O(1)-S(1)-O(3)	108.51(14)
C(17)-C(16)-H(16)	119.8	O(2)-S(1)-C(1)	111.11(14)
C(12)-C(17)-C(16)	120.7(4)	O(1)-S(1)-C(1)	109.55(14)
C(12)-C(17)-H(17)	119.6	O(3)-S(1)-C(1)	98.67(12)
C(16)-C(17)-H(17)	119.6		

Symmetry transformations used to generate equivalent atoms:

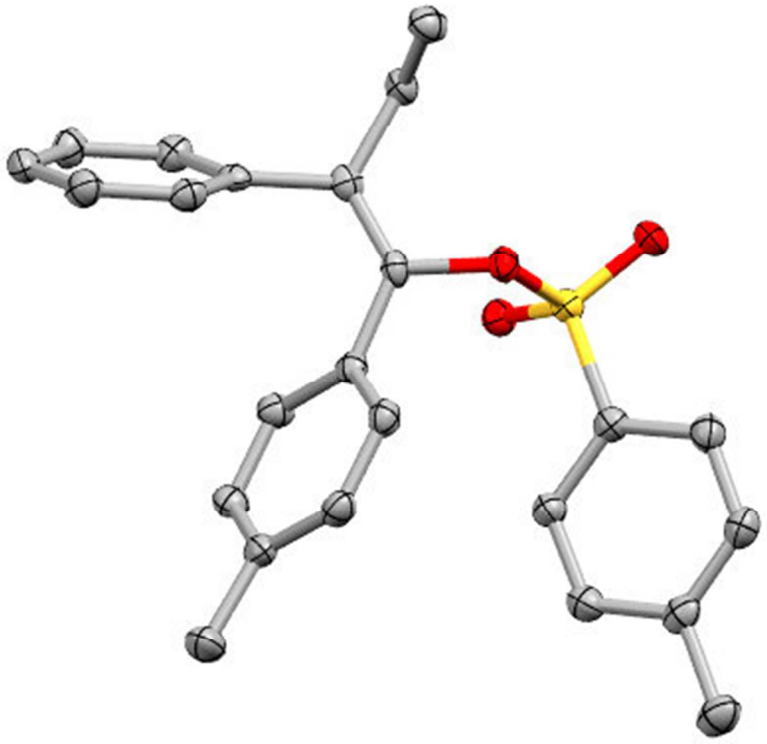
Table S4. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2a**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	25(2)	19(1)	16(1)	-2(1)	-3(1)	3(1)
C(2)	25(2)	22(2)	21(1)	0(1)	-4(1)	-5(1)
C(3)	25(2)	31(2)	18(1)	-1(1)	2(1)	-1(2)
C(4)	28(2)	25(1)	15(1)	0(1)	-4(1)	6(2)
C(5)	33(2)	17(2)	28(2)	-3(1)	0(1)	-4(1)
C(6)	26(2)	23(2)	24(2)	-3(1)	4(1)	-4(1)
C(7)	37(2)	31(2)	23(1)	-7(1)	3(1)	7(2)
C(8)	24(2)	16(1)	20(1)	-4(1)	-3(1)	-1(1)
C(9)	34(2)	25(2)	23(1)	-4(1)	2(1)	-6(2)
C(10)	69(6)	32(4)	18(4)	-1(3)	14(3)	-19(4)
C(11)	73(5)	30(3)	39(3)	7(2)	24(3)	7(3)
C(10A)	69(6)	32(4)	18(4)	-1(3)	14(3)	-19(4)
C(11A)	28(7)	30(6)	17(5)	3(4)	5(4)	-7(5)
C(12)	28(2)	27(2)	19(1)	2(1)	5(1)	-10(2)
C(13)	30(2)	37(2)	25(2)	-1(1)	0(1)	-7(2)
C(14)	35(2)	44(2)	40(2)	-15(2)	14(2)	-6(2)
C(15)	50(3)	55(2)	29(2)	-18(2)	17(2)	-17(2)
C(16)	46(3)	66(3)	27(2)	-11(2)	-7(2)	-18(2)
C(17)	30(2)	43(2)	35(2)	-5(2)	-2(2)	-2(2)
C(18)	20(2)	21(1)	16(1)	0(1)	-3(1)	0(1)
C(19)	22(2)	24(2)	21(1)	-1(1)	4(1)	2(1)
C(20)	38(2)	17(1)	25(2)	-2(1)	4(1)	0(2)
C(21)	33(2)	24(2)	22(1)	1(1)	1(1)	-10(1)
C(22)	19(2)	35(2)	17(1)	-1(1)	0(1)	-3(1)
C(23)	26(2)	23(1)	20(1)	-5(1)	-3(1)	2(1)
O(1)	23(1)	38(1)	55(2)	-22(1)	2(1)	0(1)
O(2)	48(2)	23(1)	26(1)	-4(1)	-10(1)	5(1)
O(3)	34(1)	16(1)	21(1)	-3(1)	0(1)	-1(1)
S(1)	24(1)	20(1)	25(1)	-7(1)	-4(1)	2(1)

Table S5. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2a**.

	x	y	z	U(eq)
H(2)	3225	5503	4538	27
H(3)	1211	7660	4794	30
H(5)	5992	11091	4554	31
H(6)	8078	8937	4308	29
H(7A)	2720	11496	5023	46
H(7B)	484	10596	4893	46
H(7C)	1786	11939	4668	46
H(10A)	10728	5551	3308	48
H(10B)	9251	6453	3584	48
H(11A)	8368	6633	2904	71
H(11B)	9200	8189	3125	71
H(11C)	6731	7427	3172	71
H(10C)	8073	6595	3072	48
H(10D)	8077	7125	3449	48
H(11D)	11628	5970	3511	38
H(11E)	11670	7359	3226	38
H(11F)	11623	5368	3139	38
H(13)	11145	2364	3216	37
H(14)	11529	506	2779	48
H(15)	8592	156	2409	54
H(16)	5304	1693	2477	56
H(17)	4906	3559	2913	43
H(19)	6835	725	3508	27
H(20)	4430	-1530	3613	32
H(21)	996	-1068	3873	32
H(22)	27	1695	4033	28
H(23)	2412	3970	3929	27

(*E*)-2-phenyl-1-(*p*-tolyl)but-1-en-1-yl 4-methylbenzenesulfonate (2b)



Crystals were used as received. A colorless plate 0.120 x 0.080 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 99.6% complete to 25.000° in θ. A total of 15332 reflections were collected covering the indices, -12<=*h*<=12, -13<=*k*<=13, -13<=*l*<=13. 3765 reflections were found to be symmetry independent, with an R_{int} of 0.0425. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S6. Crystal data and structure refinement for tosylate **2b**.

X-ray ID	gene776	
Sample/notebook ID	71462-45	
Empirical formula	C24 H24 O3 S	
Formula weight	392.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 10.1195(10) Å	α= 62.149(2)°.
	b = 11.0431(11) Å	β= 70.126(2)°.
	c = 11.1733(11) Å	γ = 87.430(2)°.
Volume	1028.44(18) $Å^3$	
Z	2	
Density (calculated)	1.267 Mg/m^3	
Absorption coefficient	0.179 mm^{-1}	
F(000)	416	
Crystal size	0.120 x 0.080 x 0.040 mm^3	
Theta range for data collection	2.106 to 25.389°.	
Index ranges	-12<=h<=12, -13<=k<=13, -13<=l<=13	
Reflections collected	15332	
Independent reflections	3765 [R(int) = 0.0425]	
Completeness to theta = 25.000°	99.6 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.845	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3765 / 0 / 256	
Goodness-of-fit on F^2	1.062	
Final R indices [I>2sigma(I)]	R1 = 0.0477, wR2 = 0.1166	
R indices (all data)	R1 = 0.0597, wR2 = 0.1252	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.360 and -0.423 $e.Å^{-3}$	

Table S7. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2b**.. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5118(2)	435(2)	6566(2)	20(1)
C(2)	4183(2)	1382(2)	6192(2)	24(1)
C(3)	2842(2)	908(2)	6395(2)	26(1)
C(4)	2409(2)	-491(2)	6971(2)	25(1)
C(5)	3367(2)	-1416(2)	7326(2)	27(1)
C(6)	4721(2)	-967(2)	7129(2)	25(1)
C(7)	931(2)	-985(3)	7203(3)	33(1)
C(8)	6609(2)	2428(2)	7682(2)	21(1)
C(9)	7800(2)	3013(2)	7573(2)	20(1)
C(10)	9156(2)	2374(2)	7432(2)	22(1)
C(11)	9210(2)	1364(2)	8911(2)	28(1)
C(12)	7786(2)	4279(2)	7734(2)	19(1)
C(13)	6902(2)	4278(2)	8998(2)	24(1)
C(14)	6903(2)	5449(2)	9149(2)	26(1)
C(15)	7781(2)	6655(2)	8030(2)	26(1)
C(16)	8665(2)	6672(2)	6770(2)	26(1)
C(17)	8677(2)	5492(2)	6625(2)	24(1)
C(18)	5218(2)	2938(2)	7824(2)	20(1)
C(19)	5124(2)	4290(2)	6882(2)	23(1)
C(20)	3836(2)	4792(2)	7059(2)	25(1)
C(21)	2599(2)	3962(2)	8180(2)	24(1)
C(22)	2694(2)	2601(2)	9086(2)	25(1)
C(23)	3982(2)	2084(2)	8915(2)	23(1)
C(24)	1227(2)	4557(2)	8430(3)	33(1)
O(1)	7292(1)	2370(1)	5109(1)	23(1)
O(2)	7693(2)	-58(1)	6386(2)	26(1)
O(3)	6632(1)	1101(1)	7752(1)	22(1)
S(1)	6829(1)	1011(1)	6311(1)	21(1)

Table S8. Bond lengths [Å] and angles [°] for tosylate **2b**..

C(1)-C(6)	1.389(3)	C(12)-C(17)	1.394(3)
C(1)-C(2)	1.392(3)	C(13)-C(14)	1.380(3)
C(1)-S(1)	1.754(2)	C(13)-H(13)	0.9500
C(2)-C(3)	1.382(3)	C(14)-C(15)	1.385(3)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.390(3)	C(15)-C(16)	1.380(3)
C(3)-H(3)	0.9500	C(15)-H(15)	0.9500
C(4)-C(5)	1.391(3)	C(16)-C(17)	1.385(3)
C(4)-C(7)	1.510(3)	C(16)-H(16)	0.9500
C(5)-C(6)	1.387(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-C(19)	1.391(3)
C(6)-H(6)	0.9500	C(18)-C(23)	1.391(3)
C(7)-H(7A)	0.9800	C(19)-C(20)	1.380(3)
C(7)-H(7B)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7C)	0.9800	C(20)-C(21)	1.393(3)
C(8)-C(9)	1.334(3)	C(20)-H(20)	0.9500
C(8)-O(3)	1.431(2)	C(21)-C(22)	1.387(3)
C(8)-C(18)	1.477(3)	C(21)-C(24)	1.505(3)
C(9)-C(12)	1.490(3)	C(22)-C(23)	1.388(3)
C(9)-C(10)	1.508(3)	C(22)-H(22)	0.9500
C(10)-C(11)	1.521(3)	C(23)-H(23)	0.9500
C(10)-H(10A)	0.9900	C(24)-H(24A)	0.9800
C(10)-H(10B)	0.9900	C(24)-H(24B)	0.9800
C(11)-H(11A)	0.9800	C(24)-H(24C)	0.9800
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4248(14)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4246(14)
C(12)-C(13)	1.391(3)	O(3)-S(1)	1.6031(14)
C(6)-C(1)-C(2)	120.89(19)	O(3)-C(8)-C(18)	114.47(16)
C(6)-C(1)-S(1)	119.19(16)	C(8)-C(9)-C(12)	119.79(18)
C(2)-C(1)-S(1)	119.92(15)	C(8)-C(9)-C(10)	122.78(18)
C(3)-C(2)-C(1)	118.97(19)	C(12)-C(9)-C(10)	117.18(17)
C(3)-C(2)-H(2)	120.5	C(9)-C(10)-C(11)	111.37(17)
C(1)-C(2)-H(2)	120.5	C(9)-C(10)-H(10A)	109.4
C(2)-C(3)-C(4)	121.5(2)	C(11)-C(10)-H(10A)	109.4
C(2)-C(3)-H(3)	119.3	C(9)-C(10)-H(10B)	109.4
C(4)-C(3)-H(3)	119.3	C(11)-C(10)-H(10B)	109.4
C(3)-C(4)-C(5)	118.40(19)	H(10A)-C(10)-H(10B)	108.0
C(3)-C(4)-C(7)	120.4(2)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	121.2(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.3(2)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.3	C(10)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.3	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.9(2)	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.6	C(13)-C(12)-C(17)	118.23(18)
C(1)-C(6)-H(6)	120.6	C(13)-C(12)-C(9)	121.11(18)
C(4)-C(7)-H(7A)	109.5	C(17)-C(12)-C(9)	120.65(17)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	120.94(19)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.5
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.5
H(7A)-C(7)-H(7C)	109.5	C(13)-C(14)-C(15)	120.28(19)
H(7B)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	119.9
C(9)-C(8)-O(3)	117.09(17)	C(15)-C(14)-H(14)	119.9
C(9)-C(8)-C(18)	128.34(18)	C(16)-C(15)-C(14)	119.50(19)

C(16)-C(15)-H(15)	120.3	C(21)-C(22)-C(23)	121.49(19)
C(14)-C(15)-H(15)	120.3	C(21)-C(22)-H(22)	119.3
C(15)-C(16)-C(17)	120.3(2)	C(23)-C(22)-H(22)	119.3
C(15)-C(16)-H(16)	119.9	C(22)-C(23)-C(18)	120.07(19)
C(17)-C(16)-H(16)	119.9	C(22)-C(23)-H(23)	120.0
C(16)-C(17)-C(12)	120.78(19)	C(18)-C(23)-H(23)	120.0
C(16)-C(17)-H(17)	119.6	C(21)-C(24)-H(24A)	109.5
C(12)-C(17)-H(17)	119.6	C(21)-C(24)-H(24B)	109.5
C(19)-C(18)-C(23)	118.69(19)	H(24A)-C(24)-H(24B)	109.5
C(19)-C(18)-C(8)	120.56(18)	C(21)-C(24)-H(24C)	109.5
C(23)-C(18)-C(8)	120.74(18)	H(24A)-C(24)-H(24C)	109.5
C(20)-C(19)-C(18)	120.69(19)	H(24B)-C(24)-H(24C)	109.5
C(20)-C(19)-H(19)	119.7	C(8)-O(3)-S(1)	118.76(12)
C(18)-C(19)-H(19)	119.7	O(2)-S(1)-O(1)	120.39(9)
C(19)-C(20)-C(21)	121.1(2)	O(2)-S(1)-O(3)	104.01(8)
C(19)-C(20)-H(20)	119.4	O(1)-S(1)-O(3)	107.95(8)
C(21)-C(20)-H(20)	119.4	O(2)-S(1)-C(1)	109.15(9)
C(22)-C(21)-C(20)	117.87(19)	O(1)-S(1)-C(1)	109.75(9)
C(22)-C(21)-C(24)	121.65(19)	O(3)-S(1)-C(1)	104.28(8)
C(20)-C(21)-C(24)	120.42(19)		

Symmetry transformations used to generate equivalent atoms:

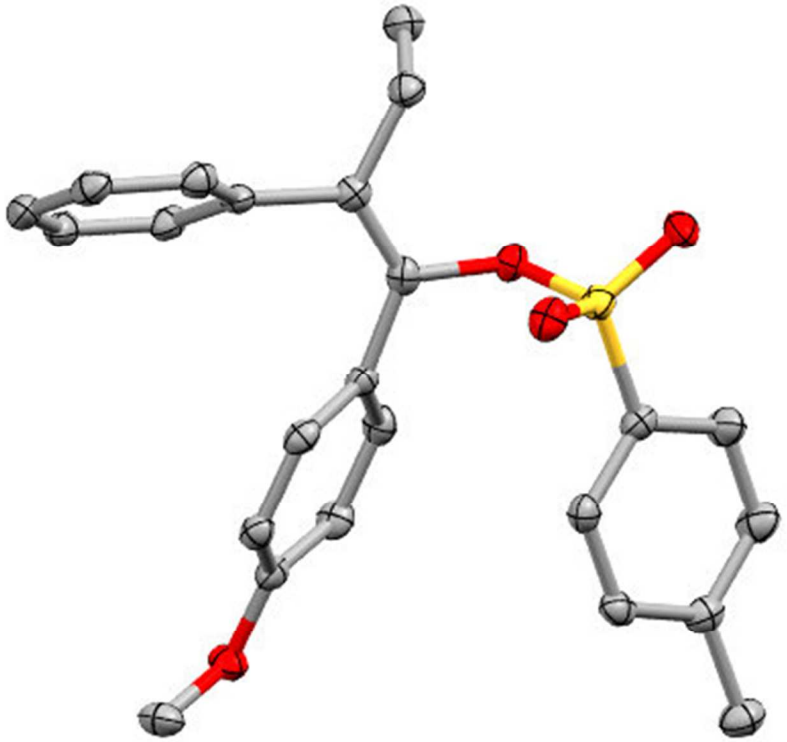
Table S9. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2b**.. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	20(1)	22(1)	18(1)	-9(1)	-5(1)	1(1)
C(2)	22(1)	22(1)	26(1)	-11(1)	-9(1)	3(1)
C(3)	25(1)	28(1)	27(1)	-14(1)	-11(1)	8(1)
C(4)	24(1)	31(1)	22(1)	-16(1)	-6(1)	1(1)
C(5)	31(1)	23(1)	27(1)	-13(1)	-9(1)	-1(1)
C(6)	30(1)	23(1)	26(1)	-13(1)	-12(1)	5(1)
C(7)	25(1)	42(2)	36(1)	-24(1)	-7(1)	0(1)
C(8)	27(1)	14(1)	18(1)	-6(1)	-8(1)	4(1)
C(9)	24(1)	17(1)	15(1)	-5(1)	-6(1)	3(1)
C(10)	23(1)	20(1)	23(1)	-10(1)	-9(1)	5(1)
C(11)	27(1)	22(1)	29(1)	-7(1)	-13(1)	4(1)
C(12)	19(1)	21(1)	21(1)	-9(1)	-12(1)	5(1)
C(13)	21(1)	24(1)	24(1)	-10(1)	-8(1)	1(1)
C(14)	24(1)	31(1)	28(1)	-18(1)	-8(1)	4(1)
C(15)	29(1)	22(1)	35(1)	-16(1)	-18(1)	9(1)
C(16)	30(1)	18(1)	26(1)	-6(1)	-11(1)	-2(1)
C(17)	25(1)	24(1)	20(1)	-10(1)	-8(1)	2(1)
C(18)	23(1)	19(1)	19(1)	-10(1)	-10(1)	3(1)
C(19)	23(1)	23(1)	22(1)	-8(1)	-9(1)	2(1)
C(20)	26(1)	23(1)	26(1)	-10(1)	-14(1)	5(1)
C(21)	23(1)	25(1)	30(1)	-17(1)	-14(1)	5(1)
C(22)	22(1)	25(1)	28(1)	-14(1)	-6(1)	-2(1)
C(23)	27(1)	17(1)	23(1)	-8(1)	-9(1)	1(1)
C(24)	24(1)	31(1)	44(1)	-18(1)	-13(1)	7(1)
O(1)	25(1)	19(1)	21(1)	-7(1)	-8(1)	1(1)
O(2)	24(1)	23(1)	35(1)	-16(1)	-13(1)	9(1)
O(3)	28(1)	16(1)	23(1)	-8(1)	-11(1)	3(1)
S(1)	21(1)	19(1)	23(1)	-10(1)	-9(1)	4(1)

Table S10. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2b**.

	x	y	z	U(eq)
H(2)	4462	2341	5802	28
H(3)	2203	1552	6135	31
H(5)	3089	-2374	7711	32
H(6)	5366	-1609	7375	30
H(7A)	236	-807	7943	49
H(7B)	837	-1979	7527	49
H(7C)	760	-489	6290	49
H(10A)	9976	3113	6893	27
H(10B)	9227	1883	6869	27
H(11A)	9055	1827	9502	41
H(11B)	10142	1043	8788	41
H(11C)	8470	572	9396	41
H(13)	6290	3460	9768	28
H(14)	6300	5429	10023	32
H(15)	7773	7464	8131	31
H(16)	9267	7496	5999	31
H(17)	9300	5511	5759	28
H(19)	5953	4875	6110	28
H(20)	3793	5718	6404	29
H(22)	1859	2009	9840	30
H(23)	4020	1146	9544	27
H(24A)	431	3833	8847	49
H(24B)	1220	5308	7505	49
H(24C)	1136	4917	9103	49

(*E*)-1-(4-methoxyphenyl)-2-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2c)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 19698 reflections were collected covering the indices, -12<=*h*<=12, -13<=*k*<=13, -22<=*l*<=20. 3848 reflections were found to be symmetry independent, with an R_{int} of 0.0543. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S11. Crystal data and structure refinement for tosylate **2c**.

X-ray ID	gene774	
Sample/notebook ID	71462-44	
Empirical formula	C24 H24 O4 S	
Formula weight	408.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 10.1785(11) Å	α= 90°.
	b = 11.2505(12) Å	β= 99.021(2)°.
	c = 18.6095(19) Å	γ = 90°.
Volume	2104.7(4) $Å^3$	
Z	4	
Density (calculated)	1.289 Mg/m^3	
Absorption coefficient	0.181 mm^{-1}	
F(000)	864	
Crystal size	0.070 x 0.050 x 0.050 mm^3	
Theta range for data collection	2.122 to 25.358°.	
Index ranges	-12<=h<=12, -13<=k<=13, -22<=l<=20	
Reflections collected	19698	
Independent reflections	3848 [R(int) = 0.0543]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.837	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3848 / 0 / 265	
Goodness-of-fit on F^2	1.029	
Final R indices [I>2sigma(I)]	R1 = 0.0472, wR2 = 0.1139	
R indices (all data)	R1 = 0.0654, wR2 = 0.1261	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.431 and -0.293 $e.Å^{-3}$	

Table S12. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2c**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6579(2)	6066(2)	6750(1)	21(1)
C(2)	6708(2)	7204(2)	6486(1)	28(1)
C(3)	7946(2)	7593(2)	6371(1)	30(1)
C(4)	9067(2)	6868(2)	6518(1)	23(1)
C(5)	8905(2)	5733(2)	6785(1)	23(1)
C(6)	7675(2)	5321(2)	6909(1)	23(1)
C(7)	10412(2)	7321(2)	6401(1)	30(1)
C(8)	4496(2)	3607(2)	6166(1)	20(1)
C(9)	3393(2)	3018(2)	6239(1)	19(1)
C(10)	2121(2)	3640(2)	6346(1)	24(1)
C(11)	1299(2)	3948(2)	5610(1)	30(1)
C(12)	3357(2)	1695(2)	6161(1)	19(1)
C(13)	3591(2)	1143(2)	5524(1)	23(1)
C(14)	3572(2)	-82(2)	5459(1)	26(1)
C(15)	3327(2)	-777(2)	6035(1)	27(1)
C(16)	3087(2)	-248(2)	6671(1)	26(1)
C(17)	3091(2)	986(2)	6735(1)	24(1)
C(18)	5786(2)	3145(2)	6020(1)	19(1)
C(19)	6358(2)	3585(2)	5438(1)	23(1)
C(20)	7512(2)	3102(2)	5267(1)	24(1)
C(21)	8133(2)	2162(2)	5675(1)	21(1)
C(22)	7607(2)	1741(2)	6273(1)	21(1)
C(23)	6440(2)	2233(2)	6438(1)	21(1)
C(24)	9892(2)	733(2)	5834(1)	28(1)
O(1)	5182(2)	4726(1)	7486(1)	27(1)
O(2)	4156(1)	6566(1)	6923(1)	30(1)
O(3)	4421(1)	4885(1)	6169(1)	22(1)
O(4)	9235(1)	1710(1)	5439(1)	25(1)
S(1)	5013(1)	5568(1)	6905(1)	22(1)

Table S13. Bond lengths [Å] and angles [°] for tosylate **2c**.

C(1)-C(2)	1.385(3)	C(13)-C(14)	1.383(3)
C(1)-C(6)	1.390(3)	C(13)-H(13)	0.9500
C(1)-S(1)	1.755(2)	C(14)-C(15)	1.381(3)
C(2)-C(3)	1.382(3)	C(14)-H(14)	0.9500
C(2)-H(2)	0.9500	C(15)-C(16)	1.381(3)
C(3)-C(4)	1.395(3)	C(15)-H(15)	0.9500
C(3)-H(3)	0.9500	C(16)-C(17)	1.393(3)
C(4)-C(5)	1.389(3)	C(16)-H(16)	0.9500
C(4)-C(7)	1.508(3)	C(17)-H(17)	0.9500
C(5)-C(6)	1.388(3)	C(18)-C(23)	1.392(3)
C(5)-H(5)	0.9500	C(18)-C(19)	1.398(3)
C(6)-H(6)	0.9500	C(19)-C(20)	1.377(3)
C(7)-H(7A)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7B)	0.9800	C(20)-C(21)	1.395(3)
C(7)-H(7C)	0.9800	C(20)-H(20)	0.9500
C(8)-C(9)	1.329(3)	C(21)-O(4)	1.365(2)
C(8)-O(3)	1.440(3)	C(21)-C(22)	1.391(3)
C(8)-C(18)	1.476(3)	C(22)-C(23)	1.388(3)
C(9)-C(12)	1.495(3)	C(22)-H(22)	0.9500
C(9)-C(10)	1.512(3)	C(23)-H(23)	0.9500
C(10)-C(11)	1.528(3)	C(24)-O(4)	1.429(3)
C(10)-H(10A)	0.9900	C(24)-H(24A)	0.9800
C(10)-H(10B)	0.9900	C(24)-H(24B)	0.9800
C(11)-H(11A)	0.9800	C(24)-H(24C)	0.9800
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4281(16)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4259(15)
C(12)-C(13)	1.393(3)	O(3)-S(1)	1.6027(15)
C(12)-C(17)	1.393(3)		

C(2)-C(1)-C(6)	121.0(2)	C(9)-C(8)-C(18)	129.3(2)
C(2)-C(1)-S(1)	119.51(17)	O(3)-C(8)-C(18)	113.70(17)
C(6)-C(1)-S(1)	119.46(17)	C(8)-C(9)-C(12)	119.67(18)
C(3)-C(2)-C(1)	119.2(2)	C(8)-C(9)-C(10)	122.50(19)
C(3)-C(2)-H(2)	120.4	C(12)-C(9)-C(10)	117.69(17)
C(1)-C(2)-H(2)	120.4	C(9)-C(10)-C(11)	110.30(18)
C(2)-C(3)-C(4)	121.5(2)	C(9)-C(10)-H(10A)	109.6
C(2)-C(3)-H(3)	119.2	C(11)-C(10)-H(10A)	109.6
C(4)-C(3)-H(3)	119.2	C(9)-C(10)-H(10B)	109.6
C(5)-C(4)-C(3)	117.91(19)	C(11)-C(10)-H(10B)	109.6
C(5)-C(4)-C(7)	121.6(2)	H(10A)-C(10)-H(10B)	108.1
C(3)-C(4)-C(7)	120.5(2)	C(10)-C(11)-H(11A)	109.5
C(6)-C(5)-C(4)	121.8(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.1	H(11A)-C(11)-H(11B)	109.5
C(4)-C(5)-H(5)	119.1	C(10)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.6(2)	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.7	H(11B)-C(11)-H(11C)	109.5
C(1)-C(6)-H(6)	120.7	C(13)-C(12)-C(17)	118.6(2)
C(4)-C(7)-H(7A)	109.5	C(13)-C(12)-C(9)	121.40(19)
C(4)-C(7)-H(7B)	109.5	C(17)-C(12)-C(9)	120.04(19)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	121.1(2)
C(4)-C(7)-H(7C)	109.5	C(14)-C(13)-H(13)	119.5
H(7A)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.5
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	119.9(2)
C(9)-C(8)-O(3)	116.81(18)	C(15)-C(14)-H(14)	120.0

C(13)-C(14)-H(14)	120.0	C(22)-C(21)-C(20)	119.66(19)
C(14)-C(15)-C(16)	119.9(2)	C(23)-C(22)-C(21)	119.5(2)
C(14)-C(15)-H(15)	120.0	C(23)-C(22)-H(22)	120.3
C(16)-C(15)-H(15)	120.0	C(21)-C(22)-H(22)	120.3
C(15)-C(16)-C(17)	120.3(2)	C(22)-C(23)-C(18)	121.41(19)
C(15)-C(16)-H(16)	119.9	C(22)-C(23)-H(23)	119.3
C(17)-C(16)-H(16)	119.9	C(18)-C(23)-H(23)	119.3
C(12)-C(17)-C(16)	120.2(2)	O(4)-C(24)-H(24A)	109.5
C(12)-C(17)-H(17)	119.9	O(4)-C(24)-H(24B)	109.5
C(16)-C(17)-H(17)	119.9	H(24A)-C(24)-H(24B)	109.5
C(23)-C(18)-C(19)	118.22(19)	O(4)-C(24)-H(24C)	109.5
C(23)-C(18)-C(8)	121.20(19)	H(24A)-C(24)-H(24C)	109.5
C(19)-C(18)-C(8)	120.54(19)	H(24B)-C(24)-H(24C)	109.5
C(20)-C(19)-C(18)	120.9(2)	C(8)-O(3)-S(1)	117.99(13)
C(20)-C(19)-H(19)	119.5	C(21)-O(4)-C(24)	117.56(16)
C(18)-C(19)-H(19)	119.5	O(2)-S(1)-O(1)	120.41(10)
C(19)-C(20)-C(21)	120.3(2)	O(2)-S(1)-O(3)	104.38(9)
C(19)-C(20)-H(20)	119.9	O(1)-S(1)-O(3)	108.26(9)
C(21)-C(20)-H(20)	119.9	O(2)-S(1)-C(1)	109.09(10)
O(4)-C(21)-C(22)	124.73(19)	O(1)-S(1)-C(1)	109.35(10)
O(4)-C(21)-C(20)	115.60(19)	O(3)-S(1)-C(1)	104.06(9)

Symmetry transformations used to generate equivalent atoms:

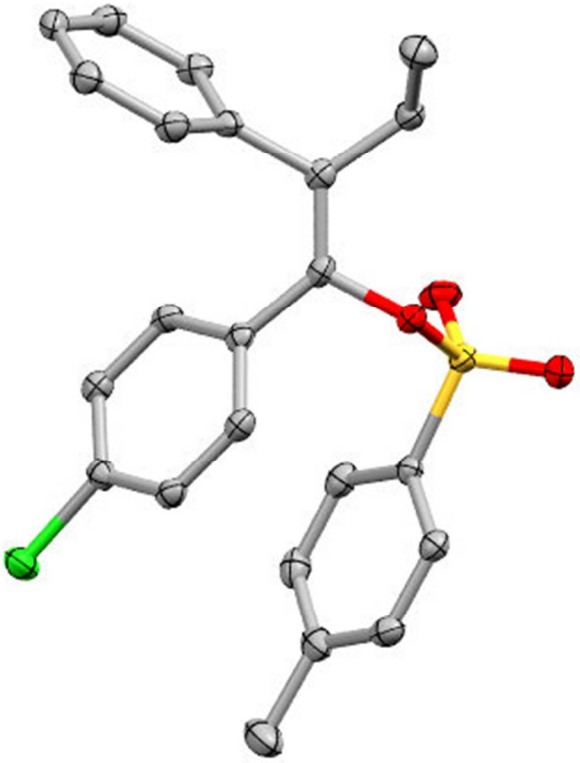
Table S14. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2c**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	21(1)	24(1)	19(1)	-1(1)	3(1)	-5(1)
C(2)	24(1)	26(1)	33(1)	6(1)	4(1)	-1(1)
C(3)	29(1)	29(1)	33(1)	9(1)	5(1)	-5(1)
C(4)	23(1)	30(1)	17(1)	-3(1)	3(1)	-4(1)
C(5)	21(1)	28(1)	22(1)	-6(1)	4(1)	3(1)
C(6)	26(1)	20(1)	21(1)	-3(1)	2(1)	-1(1)
C(7)	25(1)	39(2)	29(1)	-2(1)	7(1)	-5(1)
C(8)	25(1)	18(1)	16(1)	1(1)	2(1)	0(1)
C(9)	21(1)	22(1)	15(1)	0(1)	3(1)	-1(1)
C(10)	22(1)	24(1)	28(1)	-2(1)	7(1)	-3(1)
C(11)	23(1)	28(1)	38(2)	1(1)	2(1)	0(1)
C(12)	14(1)	21(1)	23(1)	-1(1)	3(1)	-2(1)
C(13)	20(1)	27(1)	23(1)	-2(1)	6(1)	-5(1)
C(14)	20(1)	28(1)	29(1)	-9(1)	6(1)	-3(1)
C(15)	20(1)	20(1)	39(2)	-3(1)	0(1)	-2(1)
C(16)	22(1)	26(1)	28(1)	6(1)	1(1)	-5(1)
C(17)	22(1)	28(1)	22(1)	-3(1)	2(1)	-2(1)
C(18)	19(1)	19(1)	19(1)	-2(1)	2(1)	-3(1)
C(19)	26(1)	20(1)	21(1)	2(1)	2(1)	-1(1)
C(20)	28(1)	24(1)	21(1)	3(1)	7(1)	-4(1)
C(21)	20(1)	22(1)	21(1)	-4(1)	5(1)	-6(1)
C(22)	21(1)	20(1)	22(1)	3(1)	1(1)	-2(1)
C(23)	21(1)	24(1)	18(1)	2(1)	4(1)	-6(1)
C(24)	19(1)	34(1)	32(1)	6(1)	5(1)	4(1)
O(1)	33(1)	26(1)	22(1)	1(1)	7(1)	-5(1)
O(2)	26(1)	21(1)	45(1)	-3(1)	14(1)	1(1)
O(3)	26(1)	19(1)	21(1)	1(1)	3(1)	-2(1)
O(4)	22(1)	25(1)	30(1)	2(1)	10(1)	2(1)
S(1)	22(1)	20(1)	24(1)	-1(1)	7(1)	-2(1)

Table S15. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2c**.

	x	y	z	U(eq)
H(2)	5955	7711	6385	33
H(3)	8035	8372	6188	36
H(5)	9657	5225	6885	28
H(6)	7584	4546	7098	27
H(7A)	11047	6660	6446	46
H(7B)	10720	7927	6767	46
H(7C)	10342	7670	5914	46
H(10A)	2337	4376	6632	29
H(10B)	1597	3116	6622	29
H(11A)	1788	4522	5356	45
H(11B)	449	4296	5686	45
H(11C)	1133	3225	5316	45
H(13)	3767	1616	5126	28
H(14)	3727	-444	5019	31
H(15)	3323	-1619	5993	32
H(16)	2919	-728	7067	31
H(17)	2912	1345	7172	29
H(19)	5945	4227	5158	27
H(20)	7886	3409	4868	29
H(22)	8043	1122	6565	25
H(23)	6080	1942	6845	25
H(24A)	10183	968	6340	42
H(24B)	10666	500	5613	42
H(24C)	9276	60	5817	42

(*E*)-1-(4-chlorophenyl)-2-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2d)



Crystals were used as received. A colorless prism 0.120 x 0.100 x 0.100 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 28441 reflections were collected covering the indices, -13<=*h*<=13, -12<=*k*<=12, -21<=*l*<=21. 3699 reflections were found to be symmetry independent, with an R_{int} of 0.0470. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S16. Crystal data and structure refinement for tosylate **2d**.

X-ray ID	gene779	
Sample/notebook ID	71462-49	
Empirical formula	C23 H21 Cl O3 S	
Formula weight	412.91	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 11.0293(6) Å	α= 90°.
	b = 10.1869(6) Å	β= 95.8530(10)°.
	c = 18.0805(10) Å	γ = 90°.
Volume	2020.8(2) $Å^3$	
Z	4	
Density (calculated)	1.357 Mg/m^3	
Absorption coefficient	0.314 mm^{-1}	
F(000)	864	
Crystal size	0.120 x 0.100 x 0.100 mm^3	
Theta range for data collection	2.073 to 25.355°.	
Index ranges	-13<=h<=13, -12<=k<=12, -21<=l<=21	
Reflections collected	28441	
Independent reflections	3699 [R(int) = 0.0470]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.840	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3699 / 0 / 255	
Goodness-of-fit on F^2	1.057	
Final R indices [I>2sigma(I)]	R1 = 0.0399, wR2 = 0.0976	
R indices (all data)	R1 = 0.0462, wR2 = 0.1030	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.357 and -0.400 $e.Å^{-3}$	

Table S17. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2d**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4646(2)	6470(2)	8763(1)	18(1)
C(2)	5352(2)	5353(2)	8900(1)	23(1)
C(3)	4815(2)	4224(2)	9143(1)	26(1)
C(4)	3579(2)	4191(2)	9246(1)	26(1)
C(5)	2902(2)	5336(2)	9123(1)	23(1)
C(6)	3421(2)	6476(2)	8885(1)	20(1)
C(7)	2994(2)	2942(2)	9482(1)	38(1)
C(8)	5326(2)	7115(2)	7009(1)	18(1)
C(9)	6054(2)	7740(2)	6577(1)	18(1)
C(10)	6404(2)	9170(2)	6664(1)	22(1)
C(11)	6018(2)	9990(2)	5974(1)	29(1)
C(12)	6552(2)	7022(2)	5954(1)	19(1)
C(13)	5790(2)	6664(2)	5326(1)	22(1)
C(14)	6256(2)	6001(2)	4744(1)	24(1)
C(15)	7481(2)	5687(2)	4786(1)	24(1)
C(16)	8248(2)	6046(2)	5411(1)	24(1)
C(17)	7787(2)	6715(2)	5988(1)	22(1)
C(18)	5025(2)	5703(2)	7034(1)	18(1)
C(19)	3851(2)	5305(2)	7163(1)	19(1)
C(20)	3587(2)	4001(2)	7285(1)	19(1)
C(21)	4511(2)	3071(2)	7278(1)	20(1)
C(22)	5668(2)	3430(2)	7116(1)	20(1)
C(23)	5925(2)	4744(2)	6999(1)	19(1)
O(1)	4721(1)	9014(1)	8676(1)	28(1)
O(2)	6563(1)	7746(1)	8430(1)	28(1)
O(3)	4731(1)	7882(1)	7531(1)	20(1)
S(1)	5271(1)	7877(1)	8392(1)	20(1)
CL1	4240(1)	1452(1)	7510(1)	27(1)

Table S18. Bond lengths [Å] and angles [°] for tosylate **2d**.

C(1)-C(2)	1.387(3)	C(12)-C(13)	1.390(3)
C(1)-C(6)	1.391(3)	C(12)-C(17)	1.393(3)
C(1)-S(1)	1.7535(18)	C(13)-C(14)	1.393(3)
C(2)-C(3)	1.385(3)	C(13)-H(13)	0.9500
C(2)-H(2)	0.9500	C(14)-C(15)	1.383(3)
C(3)-C(4)	1.396(3)	C(14)-H(14)	0.9500
C(3)-H(3)	0.9500	C(15)-C(16)	1.388(3)
C(4)-C(5)	1.390(3)	C(15)-H(15)	0.9500
C(4)-C(7)	1.508(3)	C(16)-C(17)	1.386(3)
C(5)-C(6)	1.383(3)	C(16)-H(16)	0.9500
C(5)-H(5)	0.9500	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-C(23)	1.398(3)
C(7)-H(7A)	0.9800	C(18)-C(19)	1.400(3)
C(7)-H(7B)	0.9800	C(19)-C(20)	1.382(3)
C(7)-H(7C)	0.9800	C(19)-H(19)	0.9500
C(8)-C(9)	1.337(3)	C(20)-C(21)	1.392(3)
C(8)-O(3)	1.434(2)	C(20)-H(20)	0.9500
C(8)-C(18)	1.478(3)	C(21)-C(22)	1.386(3)
C(9)-C(12)	1.494(2)	C(21)-CL1	1.7354(18)
C(9)-C(10)	1.511(3)	C(22)-C(23)	1.389(3)
C(10)-C(11)	1.525(3)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-H(23)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.4261(14)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.4260(15)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.6096(13)
C(11)-H(11C)	0.9800		
C(2)-C(1)-C(6)	120.83(17)	C(8)-C(9)-C(12)	119.76(16)
C(2)-C(1)-S(1)	120.26(15)	C(8)-C(9)-C(10)	124.11(16)
C(6)-C(1)-S(1)	118.84(14)	C(12)-C(9)-C(10)	116.11(15)
C(3)-C(2)-C(1)	119.17(18)	C(9)-C(10)-C(11)	113.37(16)
C(3)-C(2)-H(2)	120.4	C(9)-C(10)-H(10A)	108.9
C(1)-C(2)-H(2)	120.4	C(11)-C(10)-H(10A)	108.9
C(2)-C(3)-C(4)	121.15(18)	C(9)-C(10)-H(10B)	108.9
C(2)-C(3)-H(3)	119.4	C(11)-C(10)-H(10B)	108.9
C(4)-C(3)-H(3)	119.4	H(10A)-C(10)-H(10B)	107.7
C(5)-C(4)-C(3)	118.32(18)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	121.02(19)	C(10)-C(11)-H(11B)	109.5
C(3)-C(4)-C(7)	120.66(19)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.48(18)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.3	H(11A)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.3	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.99(17)	C(13)-C(12)-C(17)	118.98(17)
C(5)-C(6)-H(6)	120.5	C(13)-C(12)-C(9)	120.41(17)
C(1)-C(6)-H(6)	120.5	C(17)-C(12)-C(9)	120.60(16)
C(4)-C(7)-H(7A)	109.5	C(12)-C(13)-C(14)	120.34(18)
C(4)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.8
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.8
C(4)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	120.26(18)
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.9
H(7B)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	119.9
C(9)-C(8)-O(3)	117.87(16)	C(14)-C(15)-C(16)	119.68(17)
C(9)-C(8)-C(18)	129.12(16)	C(14)-C(15)-H(15)	120.2
O(3)-C(8)-C(18)	113.01(15)	C(16)-C(15)-H(15)	120.2

C(17)-C(16)-C(15)	120.14(18)	C(22)-C(21)-CL1	119.11(15)
C(17)-C(16)-H(16)	119.9	C(20)-C(21)-CL1	119.99(15)
C(15)-C(16)-H(16)	119.9	C(21)-C(22)-C(23)	119.47(17)
C(16)-C(17)-C(12)	120.61(18)	C(21)-C(22)-H(22)	120.3
C(16)-C(17)-H(17)	119.7	C(23)-C(22)-H(22)	120.3
C(12)-C(17)-H(17)	119.7	C(22)-C(23)-C(18)	120.69(18)
C(23)-C(18)-C(19)	118.56(17)	C(22)-C(23)-H(23)	119.7
C(23)-C(18)-C(8)	121.09(17)	C(18)-C(23)-H(23)	119.7
C(19)-C(18)-C(8)	120.09(16)	C(8)-O(3)-S(1)	119.04(11)
C(20)-C(19)-C(18)	121.18(17)	O(2)-S(1)-O(1)	121.16(9)
C(20)-C(19)-H(19)	119.4	O(2)-S(1)-O(3)	108.45(8)
C(18)-C(19)-H(19)	119.4	O(1)-S(1)-O(3)	102.52(8)
C(19)-C(20)-C(21)	119.11(17)	O(2)-S(1)-C(1)	109.55(9)
C(19)-C(20)-H(20)	120.4	O(1)-S(1)-C(1)	109.19(8)
C(21)-C(20)-H(20)	120.4	O(3)-S(1)-C(1)	104.56(8)
C(22)-C(21)-C(20)	120.85(17)		

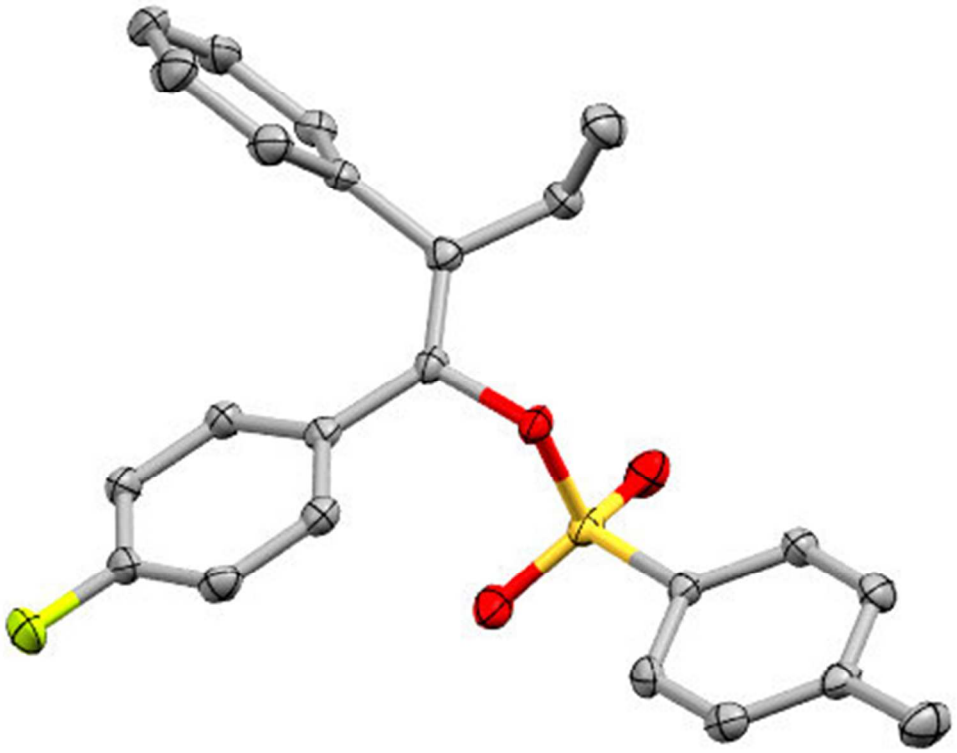
Table S19. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2d**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	21(1)	20(1)	14(1)	-3(1)	2(1)	-2(1)
C(2)	23(1)	28(1)	18(1)	-2(1)	1(1)	4(1)
C(3)	35(1)	21(1)	20(1)	-1(1)	0(1)	7(1)
C(4)	37(1)	24(1)	17(1)	-2(1)	2(1)	-5(1)
C(5)	21(1)	30(1)	20(1)	-1(1)	5(1)	-4(1)
C(6)	21(1)	22(1)	16(1)	-1(1)	3(1)	2(1)
C(7)	56(2)	26(1)	33(1)	2(1)	7(1)	-10(1)
C(8)	18(1)	22(1)	15(1)	-3(1)	2(1)	2(1)
C(9)	16(1)	22(1)	15(1)	-1(1)	-1(1)	1(1)
C(10)	24(1)	23(1)	19(1)	-2(1)	5(1)	-4(1)
C(11)	32(1)	27(1)	28(1)	3(1)	4(1)	0(1)
C(12)	21(1)	19(1)	17(1)	2(1)	4(1)	-3(1)
C(13)	20(1)	26(1)	21(1)	0(1)	3(1)	-2(1)
C(14)	28(1)	26(1)	19(1)	-2(1)	3(1)	-6(1)
C(15)	33(1)	18(1)	23(1)	-2(1)	11(1)	-1(1)
C(16)	21(1)	26(1)	28(1)	4(1)	7(1)	2(1)
C(17)	20(1)	27(1)	20(1)	2(1)	2(1)	-2(1)
C(18)	19(1)	21(1)	13(1)	-2(1)	1(1)	-1(1)
C(19)	16(1)	24(1)	16(1)	-2(1)	1(1)	2(1)
C(20)	17(1)	24(1)	17(1)	-3(1)	2(1)	-3(1)
C(21)	22(1)	18(1)	18(1)	-2(1)	0(1)	-3(1)
C(22)	19(1)	22(1)	18(1)	-1(1)	2(1)	2(1)
C(23)	16(1)	26(1)	16(1)	-1(1)	3(1)	-3(1)
O(1)	38(1)	21(1)	26(1)	-6(1)	13(1)	-6(1)
O(2)	21(1)	42(1)	23(1)	-2(1)	4(1)	-10(1)
O(3)	21(1)	20(1)	19(1)	-1(1)	6(1)	1(1)
S(1)	22(1)	22(1)	17(1)	-3(1)	5(1)	-5(1)
CL1	23(1)	20(1)	38(1)	2(1)	6(1)	-2(1)

Table S20. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2d**.

	x	y	z	U(eq)
H(2)	6193	5362	8828	27
H(3)	5297	3458	9241	31
H(5)	2065	5335	9205	28
H(6)	2947	7252	8805	24
H(7A)	2652	3087	9955	57
H(7B)	3608	2245	9543	57
H(7C)	2342	2683	9101	57
H(10A)	7300	9234	6778	26
H(10B)	6025	9540	7091	26
H(11A)	6366	9612	5544	43
H(11B)	6313	10892	6053	43
H(11C)	5127	9994	5882	43
H(13)	4947	6874	5294	27
H(14)	5731	5763	4315	29
H(15)	7797	5229	4390	29
H(16)	9089	5831	5442	29
H(17)	8318	6968	6410	27
H(19)	3223	5943	7166	22
H(20)	2787	3743	7372	23
H(22)	6281	2782	7086	24
H(23)	6719	4994	6895	23

(*E*)-1-(4-fluorophenyl)-2-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2e)



Crystals were used as received. A colorless prism 0.090 x 0.070 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 3866 reflections were collected covering the indices, -7<=*h*<=7, -9<=*k*<=9, -47<=*l*<=48. 3866 reflections were found to be symmetry independent, with an R_{int} of ?. Indexing and unit cell refinement indicated a primitive, orthorhombic lattice. The space group was found to be P 21 21 21 (No. 19). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S21. Crystal data and structure refinement for tosylate **2e**.

X-ray ID	gene775	
Sample/notebook ID	71462-43	
Empirical formula	C23 H21 F O3 S	
Formula weight	396.46	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P 21 21 21	
Unit cell dimensions	a = 6.1380(3) Å	α= 90°.
	b = 8.0372(4) Å	β= 90°.
	c = 40.2939(18) Å	γ = 90°.
Volume	1987.79(16) $Å^3$	
Z	4	
Density (calculated)	1.325 Mg/m^3	
Absorption coefficient	0.193 mm^{-1}	
F(000)	832	
Crystal size	0.090 x 0.070 x 0.050 mm^3	
Theta range for data collection	2.022 to 25.372°.	
Index ranges	-7<=h<=7, -9<=k<=9, -47<=l<=48	
Reflections collected	3866	
Independent reflections	3866 [R(int) = ?]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.759	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3866 / 0 / 256	
Goodness-of-fit on F^2	1.117	
Final R indices [I>2sigma(I)]	R1 = 0.0314, wR2 = 0.0883	
R indices (all data)	R1 = 0.0321, wR2 = 0.0889	
Absolute structure parameter	0.00(2)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.192 and -0.298 $e.Å^{-3}$	

Table S22. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2e**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4295(4)	3202(3)	4418(1)	18(1)
C(2)	6359(5)	3427(4)	4552(1)	22(1)
C(3)	7418(4)	2060(4)	4687(1)	23(1)
C(4)	6474(5)	496(3)	4684(1)	23(1)
C(5)	4382(5)	312(4)	4553(1)	26(1)
C(6)	3288(5)	1656(3)	4419(1)	23(1)
C(7)	7681(6)	-1010(4)	4815(1)	35(1)
C(8)	3646(4)	6019(3)	3633(1)	18(1)
C(9)	2173(5)	5798(3)	3393(1)	20(1)
C(10)	652(5)	4319(4)	3382(1)	25(1)
C(11)	1530(6)	2932(4)	3158(1)	33(1)
C(12)	2054(5)	6944(3)	3101(1)	20(1)
C(13)	160(5)	7834(4)	3033(1)	23(1)
C(14)	55(5)	8906(4)	2762(1)	28(1)
C(15)	1840(6)	9077(4)	2555(1)	33(1)
C(16)	3715(5)	8169(5)	2615(1)	34(1)
C(17)	3823(5)	7108(4)	2887(1)	27(1)
C(18)	5200(4)	7399(3)	3689(1)	18(1)
C(19)	4641(5)	9043(3)	3609(1)	20(1)
C(20)	6089(5)	10328(3)	3669(1)	24(1)
C(21)	8071(5)	9954(4)	3810(1)	23(1)
C(22)	8671(5)	8372(4)	3899(1)	23(1)
C(23)	7207(5)	7089(3)	3836(1)	21(1)
O(1)	685(3)	4607(3)	4222(1)	28(1)
O(2)	3741(4)	6418(2)	4366(1)	27(1)
O(3)	3917(3)	4676(2)	3863(1)	20(1)
F(1)	9494(3)	11215(2)	3867(1)	36(1)
S(1)	2975(1)	4887(1)	4233(1)	19(1)

Table S23. Bond lengths [Å] and angles [°] for tosylate **2e**.

C(1)-C(6)	1.388(4)	C(12)-C(17)	1.391(4)
C(1)-C(2)	1.390(4)	C(12)-C(13)	1.392(4)
C(1)-S(1)	1.745(3)	C(13)-C(14)	1.392(4)
C(2)-C(3)	1.388(4)	C(13)-H(13)	0.9500
C(2)-H(2)	0.9500	C(14)-C(15)	1.383(5)
C(3)-C(4)	1.384(4)	C(14)-H(14)	0.9500
C(3)-H(3)	0.9500	C(15)-C(16)	1.383(5)
C(4)-C(5)	1.396(4)	C(15)-H(15)	0.9500
C(4)-C(7)	1.514(4)	C(16)-C(17)	1.392(4)
C(5)-C(6)	1.383(4)	C(16)-H(16)	0.9500
C(5)-H(5)	0.9500	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-C(23)	1.390(4)
C(7)-H(7A)	0.9800	C(18)-C(19)	1.402(4)
C(7)-H(7B)	0.9800	C(19)-C(20)	1.384(4)
C(7)-H(7C)	0.9800	C(19)-H(19)	0.9500
C(8)-C(9)	1.336(4)	C(20)-C(21)	1.376(4)
C(8)-O(3)	1.432(3)	C(20)-H(20)	0.9500
C(8)-C(18)	1.480(4)	C(21)-F(1)	1.357(3)
C(9)-C(12)	1.497(4)	C(21)-C(22)	1.371(4)
C(9)-C(10)	1.512(4)	C(22)-C(23)	1.391(4)
C(10)-C(11)	1.531(4)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-H(23)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.424(2)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.423(2)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.6071(18)
C(11)-H(11C)	0.9800		
C(6)-C(1)-C(2)	121.4(3)	C(8)-C(9)-C(12)	121.4(2)
C(6)-C(1)-S(1)	119.3(2)	C(8)-C(9)-C(10)	122.9(2)
C(2)-C(1)-S(1)	119.3(2)	C(12)-C(9)-C(10)	115.5(2)
C(3)-C(2)-C(1)	118.5(3)	C(9)-C(10)-C(11)	111.8(2)
C(3)-C(2)-H(2)	120.8	C(9)-C(10)-H(10A)	109.2
C(1)-C(2)-H(2)	120.8	C(11)-C(10)-H(10A)	109.2
C(4)-C(3)-C(2)	121.2(3)	C(9)-C(10)-H(10B)	109.2
C(4)-C(3)-H(3)	119.4	C(11)-C(10)-H(10B)	109.2
C(2)-C(3)-H(3)	119.4	H(10A)-C(10)-H(10B)	107.9
C(3)-C(4)-C(5)	119.0(3)	C(10)-C(11)-H(11A)	109.5
C(3)-C(4)-C(7)	121.2(3)	C(10)-C(11)-H(11B)	109.5
C(5)-C(4)-C(7)	119.8(3)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	120.8(3)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.6	H(11A)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.6	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.0(3)	C(17)-C(12)-C(13)	118.8(2)
C(5)-C(6)-H(6)	120.5	C(17)-C(12)-C(9)	120.4(3)
C(1)-C(6)-H(6)	120.5	C(13)-C(12)-C(9)	120.7(3)
C(4)-C(7)-H(7A)	109.5	C(12)-C(13)-C(14)	120.7(3)
C(4)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.7
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.7
C(4)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	119.8(3)
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	120.1
H(7B)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	120.1
C(9)-C(8)-O(3)	116.6(2)	C(14)-C(15)-C(16)	120.2(3)
C(9)-C(8)-C(18)	130.2(2)	C(14)-C(15)-H(15)	119.9
O(3)-C(8)-C(18)	113.1(2)	C(16)-C(15)-H(15)	119.9

C(15)-C(16)-C(17)	119.9(3)	F(1)-C(21)-C(20)	118.4(2)
C(15)-C(16)-H(16)	120.0	C(22)-C(21)-C(20)	123.2(3)
C(17)-C(16)-H(16)	120.0	C(21)-C(22)-C(23)	117.8(2)
C(12)-C(17)-C(16)	120.6(3)	C(21)-C(22)-H(22)	121.1
C(12)-C(17)-H(17)	119.7	C(23)-C(22)-H(22)	121.1
C(16)-C(17)-H(17)	119.7	C(18)-C(23)-C(22)	121.2(2)
C(23)-C(18)-C(19)	118.9(3)	C(18)-C(23)-H(23)	119.4
C(23)-C(18)-C(8)	120.1(2)	C(22)-C(23)-H(23)	119.4
C(19)-C(18)-C(8)	120.9(2)	C(8)-O(3)-S(1)	118.60(16)
C(20)-C(19)-C(18)	120.4(3)	O(2)-S(1)-O(1)	118.28(13)
C(20)-C(19)-H(19)	119.8	O(2)-S(1)-O(3)	108.79(11)
C(18)-C(19)-H(19)	119.8	O(1)-S(1)-O(3)	108.13(12)
C(21)-C(20)-C(19)	118.5(3)	O(2)-S(1)-C(1)	110.88(13)
C(21)-C(20)-H(20)	120.7	O(1)-S(1)-C(1)	110.41(13)
C(19)-C(20)-H(20)	120.7	O(3)-S(1)-C(1)	98.44(11)
F(1)-C(21)-C(22)	118.4(2)		

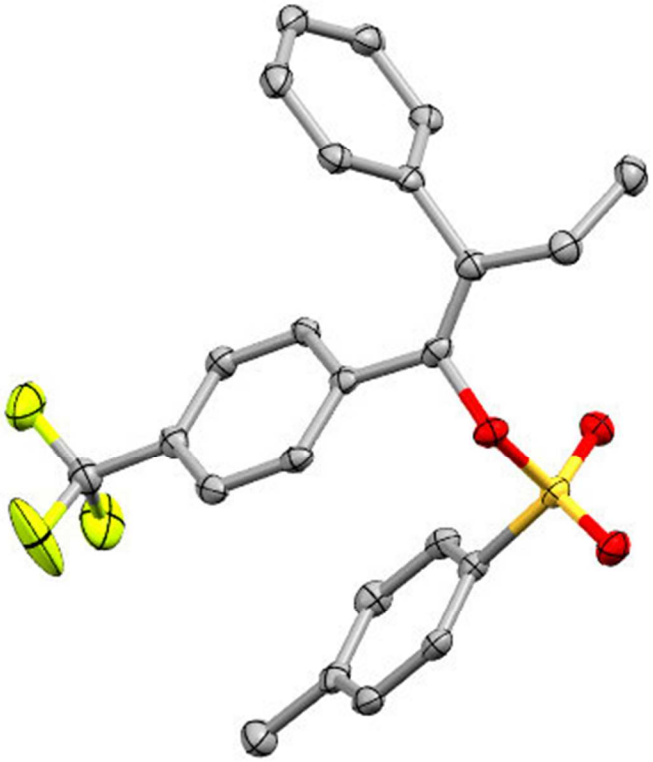
Table S24. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2e**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	22(1)	17(1)	15(1)	1(1)	1(1)	2(1)
C(2)	23(1)	21(1)	23(1)	2(1)	2(1)	-6(1)
C(3)	21(1)	30(2)	20(1)	1(1)	0(1)	1(1)
C(4)	32(2)	21(1)	16(1)	0(1)	0(1)	5(1)
C(5)	36(2)	18(1)	23(1)	-2(1)	-4(1)	-2(1)
C(6)	27(1)	19(1)	23(1)	0(1)	-5(1)	-3(1)
C(7)	48(2)	28(2)	28(1)	4(1)	-9(1)	11(1)
C(8)	22(1)	15(1)	18(1)	2(1)	2(1)	1(1)
C(9)	23(1)	19(1)	18(1)	0(1)	1(1)	0(1)
C(10)	33(2)	22(1)	21(1)	-1(1)	-2(1)	-6(1)
C(11)	45(2)	21(1)	33(2)	-4(1)	-9(2)	0(1)
C(12)	26(1)	18(1)	15(1)	-2(1)	-4(1)	-4(1)
C(13)	26(2)	25(1)	20(1)	-1(1)	-4(1)	-4(1)
C(14)	31(2)	26(2)	27(1)	2(1)	-11(1)	-4(1)
C(15)	41(2)	37(2)	22(1)	11(1)	-9(1)	-14(2)
C(16)	31(2)	50(2)	22(1)	8(1)	2(1)	-13(2)
C(17)	24(1)	33(2)	22(1)	1(1)	-1(1)	-3(1)
C(18)	20(1)	20(1)	14(1)	1(1)	1(1)	-1(1)
C(19)	22(1)	20(1)	20(1)	2(1)	-2(1)	0(1)
C(20)	31(2)	19(1)	22(1)	4(1)	-5(1)	-1(1)
C(21)	24(1)	26(1)	19(1)	2(1)	-1(1)	-9(1)
C(22)	19(1)	30(2)	20(1)	3(1)	-3(1)	1(1)
C(23)	22(1)	22(1)	17(1)	3(1)	1(1)	2(1)
O(1)	23(1)	31(1)	29(1)	8(1)	2(1)	6(1)
O(2)	42(1)	19(1)	21(1)	0(1)	4(1)	2(1)
O(3)	26(1)	16(1)	17(1)	3(1)	2(1)	1(1)
F(1)	38(1)	32(1)	38(1)	8(1)	-13(1)	-19(1)
S(1)	24(1)	16(1)	17(1)	3(1)	2(1)	2(1)

Table S25. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2e**.

	x	y	z	U(eq)
H(2)	7031	4492	4551	27
H(3)	8817	2201	4784	28
H(5)	3701	-749	4557	31
H(6)	1870	1523	4328	27
H(7A)	9207	-716	4856	52
H(7B)	7611	-1910	4651	52
H(7C)	7007	-1380	5023	52
H(10A)	-789	4682	3298	30
H(10B)	450	3881	3609	30
H(11A)	1695	3353	2932	49
H(11B)	509	1994	3159	49
H(11C)	2949	2560	3242	49
H(13)	-1073	7710	3173	28
H(14)	-1239	9518	2720	34
H(15)	1777	9819	2372	40
H(16)	4928	8270	2470	41
H(17)	5115	6491	2928	32
H(19)	3260	9276	3514	24
H(20)	5722	11443	3614	29
H(22)	10041	8159	4000	27
H(23)	7587	5981	3894	25

(*E*)-2-phenyl-1-(4-(trifluoromethyl)phenyl)but-1-en-1-yl 4-methylbenzenesulfonate (2f)



Crystals were used as received. A colorless rod 0.060 x 0.040 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 29879 reflections were collected covering the indices, -7<=*h*<=7, -27<=*k*<=28, -18<=*l*<=18. 3844 reflections were found to be symmetry independent, with an R_{int} of 0.0488. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S26. Crystal data and structure refinement for tosylate **2f**.

X-ray ID	gene804	
Sample/notebook ID	68863-199	
Empirical formula	C24 H21 F3 O3 S	
Formula weight	446.47	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 6.0473(2) Å	α= 90°.
	b = 23.2692(9) Å	β= 98.752(2)°.
	c = 15.0816(5) Å	γ = 90°.
Volume	2097.51(13) $Å^3$	
Z	4	
Density (calculated)	1.414 Mg/m^3	
Absorption coefficient	0.205 mm^{-1}	
F(000)	928	
Crystal size	0.060 x 0.040 x 0.040 mm^3	
Theta range for data collection	1.622 to 25.392°.	
Index ranges	-7<=h<=7, -27<=k<=28, -18<=l<=18	
Reflections collected	29879	
Independent reflections	3844 [R(int) = 0.0488]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.869	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3844 / 0 / 282	
Goodness-of-fit on F^2	1.020	
Final R indices [I>2sigma(I)]	R1 = 0.0453, wR2 = 0.1065	
R indices (all data)	R1 = 0.0608, wR2 = 0.1149	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.569 and -0.392 $e.Å^{-3}$	

Table S27. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2f**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2640(3)	5393(1)	1375(1)	18(1)
C(2)	1932(4)	5219(1)	2165(2)	22(1)
C(3)	3264(4)	4850(1)	2732(2)	25(1)
C(4)	5282(4)	4650(1)	2520(2)	23(1)
C(5)	5941(4)	4823(1)	1713(2)	23(1)
C(6)	4646(4)	5198(1)	1145(1)	20(1)
C(7)	6727(4)	4248(1)	3145(2)	33(1)
C(8)	2159(3)	6807(1)	1692(1)	20(1)
C(9)	861(4)	7274(1)	1598(2)	21(1)
C(10)	-424(4)	7463(1)	707(2)	27(1)
C(11)	-2870(4)	7605(1)	712(2)	29(1)
C(12)	851(4)	7671(1)	2380(1)	20(1)
C(13)	2654(4)	8041(1)	2619(2)	25(1)
C(14)	2711(4)	8414(1)	3340(2)	30(1)
C(15)	946(4)	8423(1)	3826(2)	30(1)
C(16)	-869(4)	8066(1)	3592(2)	28(1)
C(17)	-925(4)	7692(1)	2867(2)	23(1)
C(18)	3621(3)	6588(1)	2500(1)	18(1)
C(19)	5712(3)	6361(1)	2411(2)	20(1)
C(20)	7077(4)	6133(1)	3146(2)	22(1)
C(21)	6385(3)	6130(1)	3979(2)	21(1)
C(22)	4311(4)	6354(1)	4078(2)	22(1)
C(23)	2942(3)	6585(1)	3346(1)	19(1)
C(24)	7809(4)	5864(1)	4766(2)	27(1)
O(1)	1315(3)	5795(1)	-225(1)	27(1)
O(2)	-1074(2)	5958(1)	944(1)	26(1)
O(3)	2416(2)	6492(1)	899(1)	21(1)
F(1)	9893(3)	5781(1)	4644(1)	75(1)
F(2)	7057(3)	5352(1)	4977(1)	49(1)
F(3)	7861(3)	6170(1)	5520(1)	62(1)
S(1)	1083(1)	5899(1)	683(1)	20(1)

Table S28. Bond lengths [Å] and angles [°] for tosylate **2f**.

C(1)-C(2)	1.387(3)	C(12)-C(17)	1.392(3)
C(1)-C(6)	1.389(3)	C(13)-C(14)	1.388(3)
C(1)-S(1)	1.750(2)	C(13)-H(13)	0.9500
C(2)-C(3)	1.380(3)	C(14)-C(15)	1.384(4)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.388(3)	C(15)-C(16)	1.380(4)
C(3)-H(3)	0.9500	C(15)-H(15)	0.9500
C(4)-C(5)	1.397(3)	C(16)-C(17)	1.393(3)
C(4)-C(7)	1.507(3)	C(16)-H(16)	0.9500
C(5)-C(6)	1.380(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-C(19)	1.396(3)
C(6)-H(6)	0.9500	C(18)-C(23)	1.399(3)
C(7)-H(7A)	0.9800	C(19)-C(20)	1.382(3)
C(7)-H(7B)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7C)	0.9800	C(20)-C(21)	1.384(3)
C(8)-C(9)	1.335(3)	C(20)-H(20)	0.9500
C(8)-O(3)	1.432(3)	C(21)-C(22)	1.386(3)
C(8)-C(18)	1.482(3)	C(21)-C(24)	1.491(3)
C(9)-C(12)	1.499(3)	C(22)-C(23)	1.383(3)
C(9)-C(10)	1.512(3)	C(22)-H(22)	0.9500
C(10)-C(11)	1.516(3)	C(23)-H(23)	0.9500
C(10)-H(10A)	0.9900	C(24)-F(1)	1.315(3)
C(10)-H(10B)	0.9900	C(24)-F(2)	1.331(3)
C(11)-H(11A)	0.9800	C(24)-F(3)	1.338(3)
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4197(16)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4243(16)
C(12)-C(13)	1.392(3)	O(3)-S(1)	1.6062(15)
C(2)-C(1)-C(6)	121.0(2)	O(3)-C(8)-C(18)	112.58(18)
C(2)-C(1)-S(1)	120.05(17)	C(8)-C(9)-C(12)	119.42(19)
C(6)-C(1)-S(1)	118.87(16)	C(8)-C(9)-C(10)	123.0(2)
C(3)-C(2)-C(1)	119.1(2)	C(12)-C(9)-C(10)	117.16(19)
C(3)-C(2)-H(2)	120.4	C(9)-C(10)-C(11)	115.39(19)
C(1)-C(2)-H(2)	120.4	C(9)-C(10)-H(10A)	108.4
C(2)-C(3)-C(4)	121.2(2)	C(11)-C(10)-H(10A)	108.4
C(2)-C(3)-H(3)	119.4	C(9)-C(10)-H(10B)	108.4
C(4)-C(3)-H(3)	119.4	C(11)-C(10)-H(10B)	108.4
C(3)-C(4)-C(5)	118.7(2)	H(10A)-C(10)-H(10B)	107.5
C(3)-C(4)-C(7)	120.7(2)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	120.5(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	120.9(2)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.6	C(10)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.6	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.1(2)	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.4	C(13)-C(12)-C(17)	118.6(2)
C(1)-C(6)-H(6)	120.4	C(13)-C(12)-C(9)	119.2(2)
C(4)-C(7)-H(7A)	109.5	C(17)-C(12)-C(9)	122.2(2)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	121.0(2)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.5
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.5
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	119.7(2)
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	120.2
C(9)-C(8)-O(3)	117.69(19)	C(13)-C(14)-H(14)	120.2
C(9)-C(8)-C(18)	129.4(2)	C(16)-C(15)-C(14)	120.2(2)

C(16)-C(15)-H(15)	119.9	C(23)-C(22)-C(21)	120.1(2)
C(14)-C(15)-H(15)	119.9	C(23)-C(22)-H(22)	119.9
C(15)-C(16)-C(17)	120.0(2)	C(21)-C(22)-H(22)	119.9
C(15)-C(16)-H(16)	120.0	C(22)-C(23)-C(18)	120.5(2)
C(17)-C(16)-H(16)	120.0	C(22)-C(23)-H(23)	119.8
C(12)-C(17)-C(16)	120.5(2)	C(18)-C(23)-H(23)	119.8
C(12)-C(17)-H(17)	119.7	F(1)-C(24)-F(2)	105.8(2)
C(16)-C(17)-H(17)	119.7	F(1)-C(24)-F(3)	107.3(2)
C(19)-C(18)-C(23)	118.72(19)	F(2)-C(24)-F(3)	103.8(2)
C(19)-C(18)-C(8)	119.17(19)	F(1)-C(24)-C(21)	113.6(2)
C(23)-C(18)-C(8)	122.07(19)	F(2)-C(24)-C(21)	112.67(19)
C(20)-C(19)-C(18)	120.5(2)	F(3)-C(24)-C(21)	113.1(2)
C(20)-C(19)-H(19)	119.7	C(8)-O(3)-S(1)	119.60(13)
C(18)-C(19)-H(19)	119.7	O(1)-S(1)-O(2)	120.76(10)
C(19)-C(20)-C(21)	120.2(2)	O(1)-S(1)-O(3)	102.85(9)
C(19)-C(20)-H(20)	119.9	O(2)-S(1)-O(3)	108.35(9)
C(21)-C(20)-H(20)	119.9	O(1)-S(1)-C(1)	109.65(10)
C(20)-C(21)-C(22)	119.9(2)	O(2)-S(1)-C(1)	109.41(10)
C(20)-C(21)-C(24)	120.5(2)	O(3)-S(1)-C(1)	104.45(9)
C(22)-C(21)-C(24)	119.5(2)		

Symmetry transformations used to generate equivalent atoms:

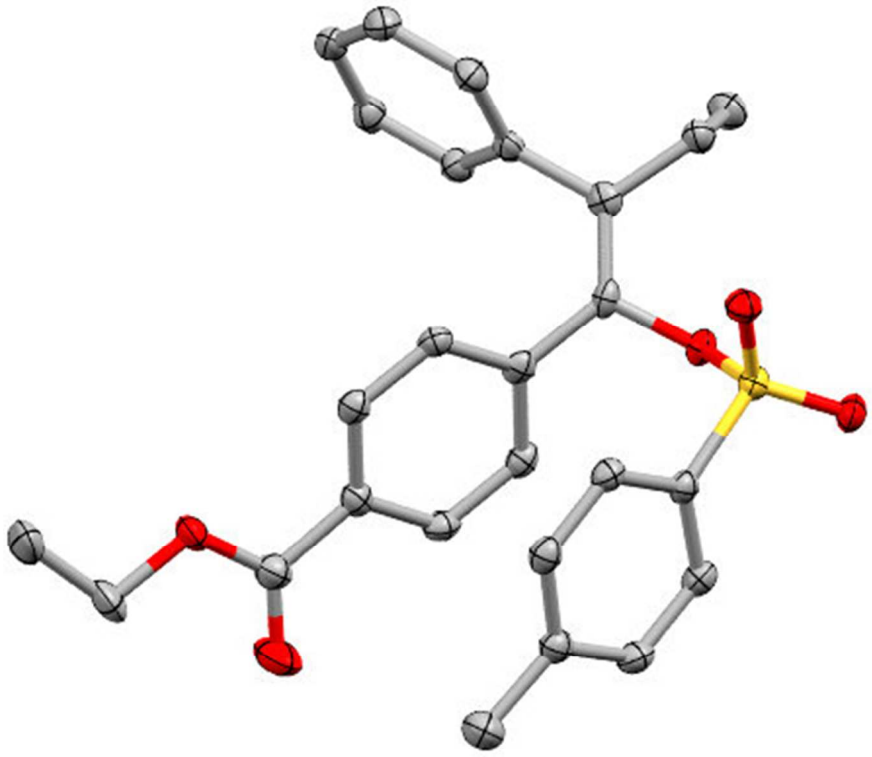
Table S29. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2f**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	23(1)	17(1)	16(1)	-2(1)	4(1)	-4(1)
C(2)	23(1)	20(1)	24(1)	-4(1)	9(1)	-3(1)
C(3)	33(1)	24(1)	21(1)	1(1)	7(1)	-4(1)
C(4)	30(1)	14(1)	23(1)	-3(1)	0(1)	-3(1)
C(5)	21(1)	20(1)	27(1)	-7(1)	5(1)	-1(1)
C(6)	23(1)	20(1)	17(1)	-4(1)	5(1)	-3(1)
C(7)	37(1)	27(1)	32(1)	1(1)	-4(1)	5(1)
C(8)	21(1)	21(1)	18(1)	-3(1)	6(1)	-3(1)
C(9)	21(1)	19(1)	23(1)	1(1)	3(1)	-1(1)
C(10)	33(1)	24(1)	22(1)	2(1)	2(1)	4(1)
C(11)	30(1)	31(1)	24(1)	4(1)	-3(1)	1(1)
C(12)	26(1)	15(1)	20(1)	2(1)	-1(1)	5(1)
C(13)	24(1)	20(1)	28(1)	1(1)	1(1)	3(1)
C(14)	32(1)	21(1)	33(1)	-2(1)	-8(1)	-1(1)
C(15)	41(2)	24(1)	23(1)	-4(1)	-7(1)	10(1)
C(16)	33(1)	27(1)	23(1)	1(1)	3(1)	11(1)
C(17)	24(1)	19(1)	26(1)	0(1)	0(1)	3(1)
C(18)	20(1)	13(1)	21(1)	-2(1)	3(1)	-3(1)
C(19)	20(1)	17(1)	23(1)	-4(1)	7(1)	-3(1)
C(20)	16(1)	17(1)	33(1)	-3(1)	3(1)	-1(1)
C(21)	18(1)	18(1)	25(1)	2(1)	1(1)	-2(1)
C(22)	23(1)	22(1)	21(1)	-1(1)	4(1)	-1(1)
C(23)	15(1)	18(1)	23(1)	-2(1)	4(1)	1(1)
C(24)	23(1)	28(1)	30(1)	2(1)	0(1)	0(1)
O(1)	36(1)	29(1)	17(1)	-4(1)	2(1)	4(1)
O(2)	20(1)	28(1)	28(1)	-2(1)	4(1)	1(1)
O(3)	25(1)	20(1)	18(1)	-1(1)	7(1)	0(1)
F(1)	25(1)	140(2)	61(1)	58(1)	9(1)	24(1)
F(2)	61(1)	38(1)	44(1)	19(1)	-9(1)	-6(1)
F(3)	87(1)	47(1)	39(1)	-10(1)	-29(1)	21(1)
S(1)	22(1)	21(1)	17(1)	-2(1)	3(1)	1(1)

Table S30. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2f**.

	x	y	z	U(eq)
H(2)	550	5351	2315	26
H(3)	2790	4731	3275	30
H(5)	7298	4680	1553	27
H(6)	5121	5320	603	24
H(7A)	6010	3870	3136	49
H(7B)	6918	4404	3756	49
H(7C)	8194	4210	2950	49
H(10A)	-333	7154	263	32
H(10B)	320	7807	502	32
H(11A)	-3636	7267	907	44
H(11B)	-3566	7715	107	44
H(11C)	-2987	7924	1126	44
H(13)	3862	8038	2283	30
H(14)	3956	8662	3499	36
H(15)	985	8676	4323	36
H(16)	-2082	8074	3925	33
H(17)	-2186	7450	2704	28
H(19)	6201	6363	1842	23
H(20)	8495	5978	3078	26
H(22)	3829	6348	4648	26
H(23)	1531	6742	3419	22

Ethyl (*E*)-4-(2-phenyl-1-(tosyloxy)but-1-en-1-yl)benzoate (2g)



Crystals were used as received. A colorless prism 0.120 x 0.100 x 0.100 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 60 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 18066 reflections were collected covering the indices, -11<=*h*<=12, -17<=*k*<=17, -18<=*l*<=18. 4240 reflections were found to be symmetry independent, with an R_{int} of 0.0502. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S31. Crystal data and structure refinement for tosylate **2g**.

X-ray ID	gene777	
Sample/notebook ID	71462-46	
Empirical formula	C26 H26 O5 S	
Formula weight	450.53	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 10.1549(7) Å	α= 90°.
	b = 14.8484(10) Å	β= 102.9150(10)°.
	c = 15.7384(11) Å	γ = 90°.
Volume	2313.1(3) $Å^3$	
Z	4	
Density (calculated)	1.294 Mg/m^3	
Absorption coefficient	0.175 mm^{-1}	
F(000)	952	
Crystal size	0.120 x 0.100 x 0.100 mm^3	
Theta range for data collection	1.909 to 25.360°.	
Index ranges	-11<=h<=12, -17<=k<=17, -18<=l<=18	
Reflections collected	18066	
Independent reflections	4240 [R(int) = 0.0502]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.816	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4240 / 0 / 292	
Goodness-of-fit on F^2	1.072	
Final R indices [I>2sigma(I)]	R1 = 0.0465, wR2 = 0.1181	
R indices (all data)	R1 = 0.0576, wR2 = 0.1267	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.427 and -0.397 $e.Å^{-3}$	

Table S32. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2g**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2284(2)	6069(1)	4581(1)	19(1)
C(2)	1035(2)	6495(1)	4331(1)	22(1)
C(3)	830(2)	7083(1)	3634(1)	24(1)
C(4)	1840(2)	7250(1)	3180(1)	23(1)
C(5)	3092(2)	6842(1)	3470(1)	23(1)
C(6)	3322(2)	6245(1)	4167(1)	20(1)
C(7)	1578(2)	7846(2)	2386(1)	32(1)
C(8)	2400(2)	3880(1)	4262(1)	20(1)
C(9)	3000(2)	3099(1)	4525(1)	20(1)
C(10)	3207(2)	2758(1)	5450(1)	23(1)
C(11)	2165(2)	2047(1)	5537(1)	29(1)
C(12)	3388(2)	2468(1)	3886(1)	21(1)
C(13)	4736(2)	2247(1)	3937(1)	24(1)
C(14)	5089(2)	1649(1)	3347(1)	28(1)
C(15)	4094(2)	1252(1)	2706(1)	26(1)
C(16)	2748(2)	1456(1)	2659(1)	25(1)
C(17)	2400(2)	2059(1)	3248(1)	23(1)
C(18)	2166(2)	4296(1)	3387(1)	19(1)
C(19)	935(2)	4713(1)	3026(1)	21(1)
C(20)	729(2)	5112(1)	2214(1)	22(1)
C(21)	1727(2)	5092(1)	1737(1)	21(1)
C(22)	2963(2)	4684(1)	2095(1)	20(1)
C(23)	3178(2)	4294(1)	2914(1)	20(1)
C(24)	1458(2)	5537(1)	868(1)	27(1)
C(25)	2276(2)	5830(2)	-397(1)	34(1)
C(26)	3442(3)	5549(2)	-773(1)	42(1)
O(1)	3911(1)	5042(1)	5680(1)	24(1)
O(2)	1687(1)	5400(1)	5989(1)	25(1)
O(3)	1786(1)	4361(1)	4862(1)	21(1)
O(4)	471(2)	5991(1)	585(1)	50(1)
O(5)	2434(1)	5386(1)	440(1)	25(1)
S(1)	2503(1)	5224(1)	5378(1)	19(1)

Table S33. Bond lengths [Å] and angles [°] for tosylate **2g**.

C(1)-C(6)	1.382(3)	C(14)-C(15)	1.390(3)
C(1)-C(2)	1.394(3)	C(14)-H(14)	0.9500
C(1)-S(1)	1.7524(19)	C(15)-C(16)	1.386(3)
C(2)-C(3)	1.381(3)	C(15)-H(15)	0.9500
C(2)-H(2)	0.9500	C(16)-C(17)	1.390(3)
C(3)-C(4)	1.397(3)	C(16)-H(16)	0.9500
C(3)-H(3)	0.9500	C(17)-H(17)	0.9500
C(4)-C(5)	1.391(3)	C(18)-C(23)	1.397(3)
C(4)-C(7)	1.505(3)	C(18)-C(19)	1.397(3)
C(5)-C(6)	1.388(3)	C(19)-C(20)	1.382(3)
C(5)-H(5)	0.9500	C(19)-H(19)	0.9500
C(6)-H(6)	0.9500	C(20)-C(21)	1.389(3)
C(7)-H(7A)	0.9800	C(20)-H(20)	0.9500
C(7)-H(7B)	0.9800	C(21)-C(22)	1.395(3)
C(7)-H(7C)	0.9800	C(21)-C(24)	1.488(3)
C(8)-C(9)	1.333(3)	C(22)-C(23)	1.385(3)
C(8)-O(3)	1.433(2)	C(22)-H(22)	0.9500
C(8)-C(18)	1.480(3)	C(23)-H(23)	0.9500
C(9)-C(12)	1.491(3)	C(24)-O(4)	1.207(3)
C(9)-C(10)	1.510(2)	C(24)-O(5)	1.336(2)
C(10)-C(11)	1.521(3)	C(25)-O(5)	1.449(2)
C(10)-H(10A)	0.9900	C(25)-C(26)	1.496(3)
C(10)-H(10B)	0.9900	C(25)-H(25A)	0.9900
C(11)-H(11A)	0.9800	C(25)-H(25B)	0.9900
C(11)-H(11B)	0.9800	C(26)-H(26A)	0.9800
C(11)-H(11C)	0.9800	C(26)-H(26B)	0.9800
C(12)-C(17)	1.391(3)	C(26)-H(26C)	0.9800
C(12)-C(13)	1.392(3)	O(1)-S(1)	1.4288(14)
C(13)-C(14)	1.389(3)	O(2)-S(1)	1.4257(14)
C(13)-H(13)	0.9500	O(3)-S(1)	1.6019(13)
C(6)-C(1)-C(2)	121.48(17)	H(7B)-C(7)-H(7C)	109.5
C(6)-C(1)-S(1)	119.06(14)	C(9)-C(8)-O(3)	117.76(16)
C(2)-C(1)-S(1)	119.25(15)	C(9)-C(8)-C(18)	128.26(17)
C(3)-C(2)-C(1)	118.51(18)	O(3)-C(8)-C(18)	113.73(16)
C(3)-C(2)-H(2)	120.7	C(8)-C(9)-C(12)	120.62(16)
C(1)-C(2)-H(2)	120.7	C(8)-C(9)-C(10)	123.13(17)
C(2)-C(3)-C(4)	121.45(18)	C(12)-C(9)-C(10)	116.00(16)
C(2)-C(3)-H(3)	119.3	C(9)-C(10)-C(11)	111.68(16)
C(4)-C(3)-H(3)	119.3	C(9)-C(10)-H(10A)	109.3
C(5)-C(4)-C(3)	118.42(18)	C(11)-C(10)-H(10A)	109.3
C(5)-C(4)-C(7)	120.52(19)	C(9)-C(10)-H(10B)	109.3
C(3)-C(4)-C(7)	121.05(19)	C(11)-C(10)-H(10B)	109.3
C(6)-C(5)-C(4)	121.18(19)	H(10A)-C(10)-H(10B)	107.9
C(6)-C(5)-H(5)	119.4	C(10)-C(11)-H(11A)	109.5
C(4)-C(5)-H(5)	119.4	C(10)-C(11)-H(11B)	109.5
C(1)-C(6)-C(5)	118.86(18)	H(11A)-C(11)-H(11B)	109.5
C(1)-C(6)-H(6)	120.6	C(10)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.6	H(11A)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7A)	109.5	H(11B)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7B)	109.5	C(17)-C(12)-C(13)	118.76(18)
H(7A)-C(7)-H(7B)	109.5	C(17)-C(12)-C(9)	120.27(18)
C(4)-C(7)-H(7C)	109.5	C(13)-C(12)-C(9)	120.91(17)
H(7A)-C(7)-H(7C)	109.5	C(14)-C(13)-C(12)	120.57(19)

C(14)-C(13)-H(13)	119.7	C(21)-C(22)-H(22)	120.1
C(12)-C(13)-H(13)	119.7	C(22)-C(23)-C(18)	120.89(17)
C(13)-C(14)-C(15)	120.2(2)	C(22)-C(23)-H(23)	119.6
C(13)-C(14)-H(14)	119.9	C(18)-C(23)-H(23)	119.6
C(15)-C(14)-H(14)	119.9	O(4)-C(24)-O(5)	123.69(19)
C(16)-C(15)-C(14)	119.60(19)	O(4)-C(24)-C(21)	123.6(2)
C(16)-C(15)-H(15)	120.2	O(5)-C(24)-C(21)	112.66(17)
C(14)-C(15)-H(15)	120.2	O(5)-C(25)-C(26)	107.23(18)
C(15)-C(16)-C(17)	120.07(19)	O(5)-C(25)-H(25A)	110.3
C(15)-C(16)-H(16)	120.0	C(26)-C(25)-H(25A)	110.3
C(17)-C(16)-H(16)	120.0	O(5)-C(25)-H(25B)	110.3
C(16)-C(17)-C(12)	120.79(19)	C(26)-C(25)-H(25B)	110.3
C(16)-C(17)-H(17)	119.6	H(25A)-C(25)-H(25B)	108.5
C(12)-C(17)-H(17)	119.6	C(25)-C(26)-H(26A)	109.5
C(23)-C(18)-C(19)	118.84(17)	C(25)-C(26)-H(26B)	109.5
C(23)-C(18)-C(8)	120.72(17)	H(26A)-C(26)-H(26B)	109.5
C(19)-C(18)-C(8)	120.43(17)	C(25)-C(26)-H(26C)	109.5
C(20)-C(19)-C(18)	120.18(18)	H(26A)-C(26)-H(26C)	109.5
C(20)-C(19)-H(19)	119.9	H(26B)-C(26)-H(26C)	109.5
C(18)-C(19)-H(19)	119.9	C(8)-O(3)-S(1)	121.17(11)
C(19)-C(20)-C(21)	120.85(18)	C(24)-O(5)-C(25)	116.00(16)
C(19)-C(20)-H(20)	119.6	O(2)-S(1)-O(1)	119.98(8)
C(21)-C(20)-H(20)	119.6	O(2)-S(1)-O(3)	102.82(8)
C(20)-C(21)-C(22)	119.37(17)	O(1)-S(1)-O(3)	108.97(8)
C(20)-C(21)-C(24)	118.75(18)	O(2)-S(1)-C(1)	110.58(9)
C(22)-C(21)-C(24)	121.86(18)	O(1)-S(1)-C(1)	109.29(9)
C(23)-C(22)-C(21)	119.85(18)	O(3)-S(1)-C(1)	103.82(8)
C(23)-C(22)-H(22)	120.1		

Symmetry transformations used to generate equivalent atoms:

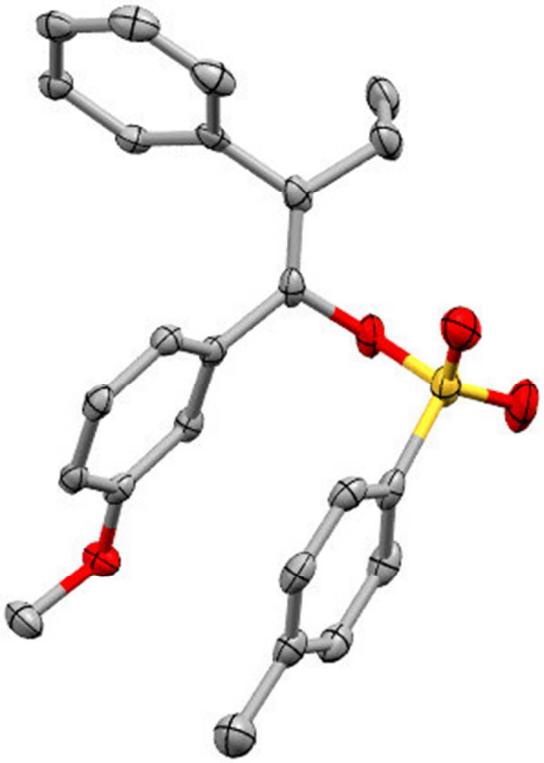
Table S34. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2g**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	21(1)	17(1)	18(1)	-3(1)	4(1)	0(1)
C(2)	20(1)	21(1)	26(1)	-4(1)	7(1)	0(1)
C(3)	21(1)	23(1)	29(1)	-3(1)	4(1)	4(1)
C(4)	26(1)	20(1)	22(1)	-3(1)	3(1)	1(1)
C(5)	24(1)	22(1)	24(1)	-3(1)	8(1)	-2(1)
C(6)	18(1)	19(1)	23(1)	-3(1)	3(1)	0(1)
C(7)	35(1)	32(1)	30(1)	5(1)	6(1)	5(1)
C(8)	20(1)	21(1)	19(1)	-6(1)	8(1)	-5(1)
C(9)	19(1)	20(1)	22(1)	0(1)	5(1)	-5(1)
C(10)	29(1)	20(1)	20(1)	0(1)	5(1)	1(1)
C(11)	35(1)	25(1)	30(1)	4(1)	11(1)	-1(1)
C(12)	27(1)	17(1)	18(1)	3(1)	6(1)	0(1)
C(13)	24(1)	27(1)	21(1)	0(1)	2(1)	1(1)
C(14)	28(1)	30(1)	26(1)	3(1)	7(1)	9(1)
C(15)	36(1)	22(1)	20(1)	2(1)	8(1)	6(1)
C(16)	32(1)	23(1)	20(1)	-2(1)	5(1)	-2(1)
C(17)	23(1)	22(1)	24(1)	-1(1)	5(1)	1(1)
C(18)	22(1)	14(1)	22(1)	-4(1)	5(1)	-3(1)
C(19)	19(1)	20(1)	24(1)	-5(1)	6(1)	-2(1)
C(20)	18(1)	20(1)	25(1)	-2(1)	0(1)	3(1)
C(21)	24(1)	19(1)	19(1)	-2(1)	2(1)	-3(1)
C(22)	21(1)	18(1)	22(1)	-3(1)	5(1)	-2(1)
C(23)	20(1)	16(1)	23(1)	-1(1)	5(1)	1(1)
C(24)	29(1)	26(1)	25(1)	2(1)	4(1)	2(1)
C(25)	45(1)	39(1)	18(1)	10(1)	4(1)	0(1)
C(26)	64(2)	40(1)	27(1)	8(1)	20(1)	7(1)
O(1)	21(1)	25(1)	24(1)	1(1)	3(1)	2(1)
O(2)	29(1)	27(1)	22(1)	-3(1)	12(1)	2(1)
O(3)	21(1)	22(1)	21(1)	-3(1)	9(1)	-2(1)
O(4)	43(1)	68(1)	40(1)	26(1)	10(1)	24(1)
O(5)	32(1)	26(1)	17(1)	4(1)	4(1)	0(1)
S(1)	19(1)	20(1)	19(1)	-2(1)	6(1)	0(1)

Table S35. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2g**.

	x	y	z	U(eq)
H(2)	339	6383	4633	26
H(3)	-16	7380	3459	29
H(5)	3803	6974	3187	28
H(6)	4177	5964	4356	24
H(7A)	2435	8096	2305	49
H(7B)	974	8339	2464	49
H(7C)	1156	7492	1872	49
H(10A)	3141	3269	5842	27
H(10B)	4124	2497	5632	27
H(11A)	1255	2289	5316	44
H(11B)	2277	1882	6151	44
H(11C)	2294	1513	5199	44
H(13)	5421	2508	4380	29
H(14)	6013	1511	3381	33
H(15)	4335	843	2302	31
H(16)	2063	1184	2225	30
H(17)	1475	2194	3214	28
H(19)	237	4723	3340	25
H(20)	-106	5403	1978	26
H(22)	3656	4672	1778	24
H(23)	4025	4022	3158	24
H(25A)	2275	6492	-322	41
H(25B)	1413	5650	-789	41
H(26A)	4288	5751	-389	63
H(26B)	3350	5821	-1351	63
H(26C)	3450	4891	-825	63

(*E*)-1-(3-methoxyphenyl)-2-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2h)



Crystals were used as received. A colorless plate 0.070 x 0.060 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 14498 reflections were collected covering the indices, -6<=*h*<=6, -22<=*k*<=22, -23<=*l*<=23. 14498 reflections were found to be symmetry independent, with an R_{int} of 0.0623. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S36. Crystal data and structure refinement for tosylate **2h**.

X-ray ID	gene769	
Sample/notebook ID	71462-047	
Empirical formula	C24 H24 O4 S	
Formula weight	408.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 5.7536(3) Å	α= 100.729(3)°.
	b = 18.8396(10) Å	β= 92.651(3)°.
	c = 19.4640(11) Å	γ = 91.874(3)°.
Volume	2068.87(19) $Å^3$	
Z	4	
Density (calculated)	1.311 Mg/m^3	
Absorption coefficient	0.184 mm^{-1}	
F(000)	864	
Crystal size	0.070 x 0.060 x 0.030 mm^3	
Theta range for data collection	1.381 to 25.501°.	
Index ranges	-6<=h<=6, -22<=k<=22, -23<=l<=23	
Reflections collected	14498	
Independent reflections	14498 [R(int) = 0.0623]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.779	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	14498 / 0 / 530	
Goodness-of-fit on F^2	1.024	
Final R indices [I>2sigma(I)]	R1 = 0.0588, wR2 = 0.1361	
R indices (all data)	R1 = 0.0942, wR2 = 0.1520	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.243 and -0.429 $e.Å^{-3}$	

Table S37. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2h**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	7446(6)	1192(2)	2846(2)	20(1)
C(2)	9508(6)	830(2)	2756(2)	23(1)
C(3)	9944(6)	444(2)	2109(2)	27(1)
C(4)	8339(7)	411(2)	1537(2)	30(1)
C(5)	6299(6)	777(2)	1641(2)	29(1)
C(6)	5832(6)	1171(2)	2286(2)	22(1)
C(7)	8851(8)	-20(2)	829(2)	46(1)
C(8)	8142(6)	2998(2)	3430(2)	19(1)
C(9)	7622(6)	3584(2)	3883(2)	20(1)
C(10)	7606(6)	3586(2)	4659(2)	26(1)
C(11)	9985(7)	3825(2)	5014(2)	35(1)
C(12)	7259(6)	4294(2)	3671(2)	17(1)
C(13)	5304(6)	4687(2)	3872(2)	24(1)
C(14)	5013(6)	5362(2)	3701(2)	24(1)
C(15)	6639(6)	5659(2)	3333(2)	23(1)
C(16)	8594(6)	5278(2)	3130(2)	20(1)
C(17)	8892(6)	4602(2)	3295(2)	19(1)
C(18)	8218(6)	2875(2)	2655(2)	19(1)
C(19)	6407(6)	3101(2)	2257(2)	21(1)
C(20)	6437(6)	2956(2)	1535(2)	22(1)
C(21)	8225(6)	2578(2)	1199(2)	23(1)
C(22)	10012(6)	2349(2)	1592(2)	21(1)
C(23)	10034(6)	2507(2)	2321(2)	19(1)
C(24)	11934(7)	1825(2)	568(2)	32(1)
C(25)	2947(6)	8774(2)	2093(2)	24(1)
C(26)	4756(6)	9222(2)	2438(2)	30(1)
C(27)	4538(6)	9559(2)	3126(2)	31(1)
C(28)	2556(7)	9443(2)	3475(2)	30(1)
C(29)	755(6)	8991(2)	3113(2)	28(1)
C(30)	933(6)	8661(2)	2425(2)	27(1)
C(31)	2334(8)	9803(2)	4230(2)	45(1)
C(32)	3862(6)	7030(2)	1587(2)	23(1)
C(33)	3311(6)	6443(2)	1104(2)	26(1)
C(34)	3444(7)	6428(2)	326(2)	35(1)
C(35)	5687(7)	6108(2)	54(2)	37(1)
C(36)	2695(6)	5738(2)	1307(2)	22(1)
C(37)	574(7)	5368(2)	1085(2)	34(1)
C(38)	23(6)	4708(2)	1273(2)	34(1)
C(39)	1607(6)	4403(2)	1666(2)	29(1)
C(40)	3726(6)	4753(2)	1884(2)	24(1)
C(41)	4268(6)	5417(2)	1707(2)	22(1)
C(42)	3650(6)	7145(2)	2358(2)	20(1)
C(43)	1625(6)	6915(2)	2633(2)	22(1)
C(44)	1384(6)	7067(2)	3346(2)	23(1)
C(45)	3113(6)	7449(2)	3800(2)	22(1)
C(46)	5137(6)	7675(2)	3529(2)	21(1)
C(47)	5397(6)	7520(2)	2808(2)	19(1)
C(48)	6908(7)	8156(2)	4668(2)	34(1)
O(1)	7795(4)	1347(1)	4199(1)	31(1)
O(2)	4664(4)	1970(1)	3668(1)	29(1)

O(3)	8798(4)	2387(1)	3726(1)	21(1)
O(4)	11834(4)	1960(1)	1317(1)	26(1)
O(5)	1035(5)	8002(1)	948(1)	41(1)
O(6)	4665(5)	8714(1)	871(1)	49(1)
O(7)	4862(4)	7648(1)	1355(1)	29(1)
O(8)	6986(4)	8053(1)	3921(1)	27(1)
S(1)	6973(2)	1714(1)	3663(1)	23(1)
S(2)	3253(2)	8298(1)	1243(1)	33(1)

Table S38. Bond lengths [Å] and angles [°] for tosylate **2h**.

C(1)-C(2)	1.389(4)	C(25)-S(2)	1.747(3)
C(1)-C(6)	1.392(4)	C(26)-C(27)	1.385(5)
C(1)-S(1)	1.746(3)	C(26)-H(26)	0.9500
C(2)-C(3)	1.372(5)	C(27)-C(28)	1.385(5)
C(2)-H(2)	0.9500	C(27)-H(27)	0.9500
C(3)-C(4)	1.403(5)	C(28)-C(29)	1.395(5)
C(3)-H(3)	0.9500	C(28)-C(31)	1.512(5)
C(4)-C(5)	1.385(5)	C(29)-C(30)	1.378(5)
C(4)-C(7)	1.511(5)	C(29)-H(29)	0.9500
C(5)-C(6)	1.377(4)	C(30)-H(30)	0.9500
C(5)-H(5)	0.9500	C(31)-H(31A)	0.9800
C(6)-H(6)	0.9500	C(31)-H(31B)	0.9800
C(7)-H(7A)	0.9800	C(31)-H(31C)	0.9800
C(7)-H(7B)	0.9800	C(32)-C(33)	1.330(5)
C(7)-H(7C)	0.9800	C(32)-O(7)	1.438(4)
C(8)-C(9)	1.330(4)	C(32)-C(42)	1.487(4)
C(8)-O(3)	1.432(3)	C(33)-C(36)	1.491(5)
C(8)-C(18)	1.486(4)	C(33)-C(34)	1.515(4)
C(9)-C(12)	1.489(4)	C(34)-C(35)	1.518(5)
C(9)-C(10)	1.511(4)	C(34)-H(34A)	0.9900
C(10)-C(11)	1.519(5)	C(34)-H(34B)	0.9900
C(10)-H(10A)	0.9900	C(35)-H(35A)	0.9800
C(10)-H(10B)	0.9900	C(35)-H(35B)	0.9800
C(11)-H(11A)	0.9800	C(35)-H(35C)	0.9800
C(11)-H(11B)	0.9800	C(36)-C(41)	1.392(4)
C(11)-H(11C)	0.9800	C(36)-C(37)	1.394(5)
C(12)-C(17)	1.393(4)	C(37)-C(38)	1.391(5)
C(12)-C(13)	1.399(4)	C(37)-H(37)	0.9500
C(13)-C(14)	1.386(4)	C(38)-C(39)	1.371(5)
C(13)-H(13)	0.9500	C(38)-H(38)	0.9500
C(14)-C(15)	1.370(5)	C(39)-C(40)	1.377(5)
C(14)-H(14)	0.9500	C(39)-H(39)	0.9500
C(15)-C(16)	1.387(5)	C(40)-C(41)	1.388(4)
C(15)-H(15)	0.9500	C(40)-H(40)	0.9500
C(16)-C(17)	1.384(4)	C(41)-H(41)	0.9500
C(16)-H(16)	0.9500	C(42)-C(47)	1.386(5)
C(17)-H(17)	0.9500	C(42)-C(43)	1.394(5)
C(18)-C(23)	1.392(4)	C(43)-C(44)	1.379(4)
C(18)-C(19)	1.394(4)	C(43)-H(43)	0.9500
C(19)-C(20)	1.382(4)	C(44)-C(45)	1.386(5)
C(19)-H(19)	0.9500	C(44)-H(44)	0.9500
C(20)-C(21)	1.389(5)	C(45)-C(46)	1.387(4)
C(20)-H(20)	0.9500	C(45)-H(45)	0.9500
C(21)-C(22)	1.381(4)	C(46)-O(8)	1.376(4)
C(21)-H(21)	0.9500	C(46)-C(47)	1.395(4)
C(22)-O(4)	1.371(4)	C(47)-H(47)	0.9500
C(22)-C(23)	1.394(4)	C(48)-O(8)	1.433(4)
C(23)-H(23)	0.9500	C(48)-H(48A)	0.9800
C(24)-O(4)	1.436(4)	C(48)-H(48B)	0.9800
C(24)-H(24A)	0.9800	C(48)-H(48C)	0.9800
C(24)-H(24B)	0.9800	O(1)-S(1)	1.426(2)
C(24)-H(24C)	0.9800	O(2)-S(1)	1.428(2)
C(25)-C(30)	1.383(5)	O(3)-S(1)	1.603(2)
C(25)-C(26)	1.384(5)	O(5)-S(2)	1.427(3)

O(6)-S(2)	1.422(3)	O(7)-S(2)	1.599(2)

C(2)-C(1)-C(6)	120.8(3)	C(17)-C(16)-C(15)	120.2(3)
C(2)-C(1)-S(1)	118.8(3)	C(17)-C(16)-H(16)	119.9
C(6)-C(1)-S(1)	120.2(2)	C(15)-C(16)-H(16)	119.9
C(3)-C(2)-C(1)	119.4(3)	C(16)-C(17)-C(12)	121.0(3)
C(3)-C(2)-H(2)	120.3	C(16)-C(17)-H(17)	119.5
C(1)-C(2)-H(2)	120.3	C(12)-C(17)-H(17)	119.5
C(2)-C(3)-C(4)	120.9(3)	C(23)-C(18)-C(19)	119.7(3)
C(2)-C(3)-H(3)	119.6	C(23)-C(18)-C(8)	120.4(3)
C(4)-C(3)-H(3)	119.6	C(19)-C(18)-C(8)	119.9(3)
C(5)-C(4)-C(3)	118.5(3)	C(20)-C(19)-C(18)	119.6(3)
C(5)-C(4)-C(7)	121.5(4)	C(20)-C(19)-H(19)	120.2
C(3)-C(4)-C(7)	120.0(3)	C(18)-C(19)-H(19)	120.2
C(6)-C(5)-C(4)	121.6(3)	C(19)-C(20)-C(21)	120.9(3)
C(6)-C(5)-H(5)	119.2	C(19)-C(20)-H(20)	119.5
C(4)-C(5)-H(5)	119.2	C(21)-C(20)-H(20)	119.5
C(5)-C(6)-C(1)	118.8(3)	C(22)-C(21)-C(20)	119.6(3)
C(5)-C(6)-H(6)	120.6	C(22)-C(21)-H(21)	120.2
C(1)-C(6)-H(6)	120.6	C(20)-C(21)-H(21)	120.2
C(4)-C(7)-H(7A)	109.5	O(4)-C(22)-C(21)	124.5(3)
C(4)-C(7)-H(7B)	109.5	O(4)-C(22)-C(23)	115.4(3)
H(7A)-C(7)-H(7B)	109.5	C(21)-C(22)-C(23)	120.0(3)
C(4)-C(7)-H(7C)	109.5	C(18)-C(23)-C(22)	120.1(3)
H(7A)-C(7)-H(7C)	109.5	C(18)-C(23)-H(23)	119.9
H(7B)-C(7)-H(7C)	109.5	C(22)-C(23)-H(23)	119.9
C(9)-C(8)-O(3)	116.1(3)	O(4)-C(24)-H(24A)	109.5
C(9)-C(8)-C(18)	130.2(3)	O(4)-C(24)-H(24B)	109.5
O(3)-C(8)-C(18)	113.7(2)	H(24A)-C(24)-H(24B)	109.5
C(8)-C(9)-C(12)	122.5(3)	O(4)-C(24)-H(24C)	109.5
C(8)-C(9)-C(10)	121.5(3)	H(24A)-C(24)-H(24C)	109.5
C(12)-C(9)-C(10)	115.8(3)	H(24B)-C(24)-H(24C)	109.5
C(9)-C(10)-C(11)	110.7(3)	C(30)-C(25)-C(26)	120.9(3)
C(9)-C(10)-H(10A)	109.5	C(30)-C(25)-S(2)	118.9(3)
C(11)-C(10)-H(10A)	109.5	C(26)-C(25)-S(2)	120.1(3)
C(9)-C(10)-H(10B)	109.5	C(25)-C(26)-C(27)	119.3(3)
C(11)-C(10)-H(10B)	109.5	C(25)-C(26)-H(26)	120.4
H(10A)-C(10)-H(10B)	108.1	C(27)-C(26)-H(26)	120.4
C(10)-C(11)-H(11A)	109.5	C(26)-C(27)-C(28)	120.9(3)
C(10)-C(11)-H(11B)	109.5	C(26)-C(27)-H(27)	119.5
H(11A)-C(11)-H(11B)	109.5	C(28)-C(27)-H(27)	119.5
C(10)-C(11)-H(11C)	109.5	C(27)-C(28)-C(29)	118.6(3)
H(11A)-C(11)-H(11C)	109.5	C(27)-C(28)-C(31)	120.9(3)
H(11B)-C(11)-H(11C)	109.5	C(29)-C(28)-C(31)	120.6(3)
C(17)-C(12)-C(13)	117.9(3)	C(30)-C(29)-C(28)	121.2(3)
C(17)-C(12)-C(9)	121.5(3)	C(30)-C(29)-H(29)	119.4
C(13)-C(12)-C(9)	120.6(3)	C(28)-C(29)-H(29)	119.4
C(14)-C(13)-C(12)	120.7(3)	C(29)-C(30)-C(25)	119.2(3)
C(14)-C(13)-H(13)	119.6	C(29)-C(30)-H(30)	120.4
C(12)-C(13)-H(13)	119.6	C(25)-C(30)-H(30)	120.4
C(15)-C(14)-C(13)	120.7(3)	C(28)-C(31)-H(31A)	109.5
C(15)-C(14)-H(14)	119.7	C(28)-C(31)-H(31B)	109.5
C(13)-C(14)-H(14)	119.7	H(31A)-C(31)-H(31B)	109.5
C(14)-C(15)-C(16)	119.5(3)	C(28)-C(31)-H(31C)	109.5
C(14)-C(15)-H(15)	120.2	H(31A)-C(31)-H(31C)	109.5
C(16)-C(15)-H(15)	120.2	H(31B)-C(31)-H(31C)	109.5

C(33)-C(32)-O(7)	117.6(3)	C(43)-C(42)-C(32)	120.2(3)
C(33)-C(32)-C(42)	129.2(3)	C(44)-C(43)-C(42)	119.7(3)
O(7)-C(32)-C(42)	113.2(3)	C(44)-C(43)-H(43)	120.2
C(32)-C(33)-C(36)	121.1(3)	C(42)-C(43)-H(43)	120.2
C(32)-C(33)-C(34)	123.0(3)	C(43)-C(44)-C(45)	121.5(3)
C(36)-C(33)-C(34)	115.8(3)	C(43)-C(44)-H(44)	119.3
C(33)-C(34)-C(35)	111.3(3)	C(45)-C(44)-H(44)	119.3
C(33)-C(34)-H(34A)	109.4	C(44)-C(45)-C(46)	119.1(3)
C(35)-C(34)-H(34A)	109.4	C(44)-C(45)-H(45)	120.5
C(33)-C(34)-H(34B)	109.4	C(46)-C(45)-H(45)	120.5
C(35)-C(34)-H(34B)	109.4	O(8)-C(46)-C(45)	124.9(3)
H(34A)-C(34)-H(34B)	108.0	O(8)-C(46)-C(47)	115.3(3)
C(34)-C(35)-H(35A)	109.5	C(45)-C(46)-C(47)	119.8(3)
C(34)-C(35)-H(35B)	109.5	C(42)-C(47)-C(46)	120.7(3)
H(35A)-C(35)-H(35B)	109.5	C(42)-C(47)-H(47)	119.6
C(34)-C(35)-H(35C)	109.5	C(46)-C(47)-H(47)	119.6
H(35A)-C(35)-H(35C)	109.5	O(8)-C(48)-H(48A)	109.5
H(35B)-C(35)-H(35C)	109.5	O(8)-C(48)-H(48B)	109.5
C(41)-C(36)-C(37)	117.9(3)	H(48A)-C(48)-H(48B)	109.5
C(41)-C(36)-C(33)	120.5(3)	O(8)-C(48)-H(48C)	109.5
C(37)-C(36)-C(33)	121.5(3)	H(48A)-C(48)-H(48C)	109.5
C(38)-C(37)-C(36)	121.0(3)	H(48B)-C(48)-H(48C)	109.5
C(38)-C(37)-H(37)	119.5	C(8)-O(3)-S(1)	118.87(19)
C(36)-C(37)-H(37)	119.5	C(22)-O(4)-C(24)	116.8(2)
C(39)-C(38)-C(37)	119.8(3)	C(32)-O(7)-S(2)	119.8(2)
C(39)-C(38)-H(38)	120.1	C(46)-O(8)-C(48)	117.3(3)
C(37)-C(38)-H(38)	120.1	O(1)-S(1)-O(2)	119.98(15)
C(38)-C(39)-C(40)	120.2(3)	O(1)-S(1)-O(3)	103.48(13)
C(38)-C(39)-H(39)	119.9	O(2)-S(1)-O(3)	109.11(13)
C(40)-C(39)-H(39)	119.9	O(1)-S(1)-C(1)	109.27(14)
C(39)-C(40)-C(41)	120.1(3)	O(2)-S(1)-C(1)	109.99(16)
C(39)-C(40)-H(40)	120.0	O(3)-S(1)-C(1)	103.62(13)
C(41)-C(40)-H(40)	120.0	O(6)-S(2)-O(5)	120.24(17)
C(40)-C(41)-C(36)	120.8(3)	O(6)-S(2)-O(7)	103.46(15)
C(40)-C(41)-H(41)	119.6	O(5)-S(2)-O(7)	108.64(14)
C(36)-C(41)-H(41)	119.6	O(6)-S(2)-C(25)	109.89(16)
C(47)-C(42)-C(43)	119.3(3)	O(5)-S(2)-C(25)	109.48(16)
C(47)-C(42)-C(32)	120.4(3)	O(7)-S(2)-C(25)	103.74(14)

Symmetry transformations used to generate equivalent atoms:

Table S39. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2h**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

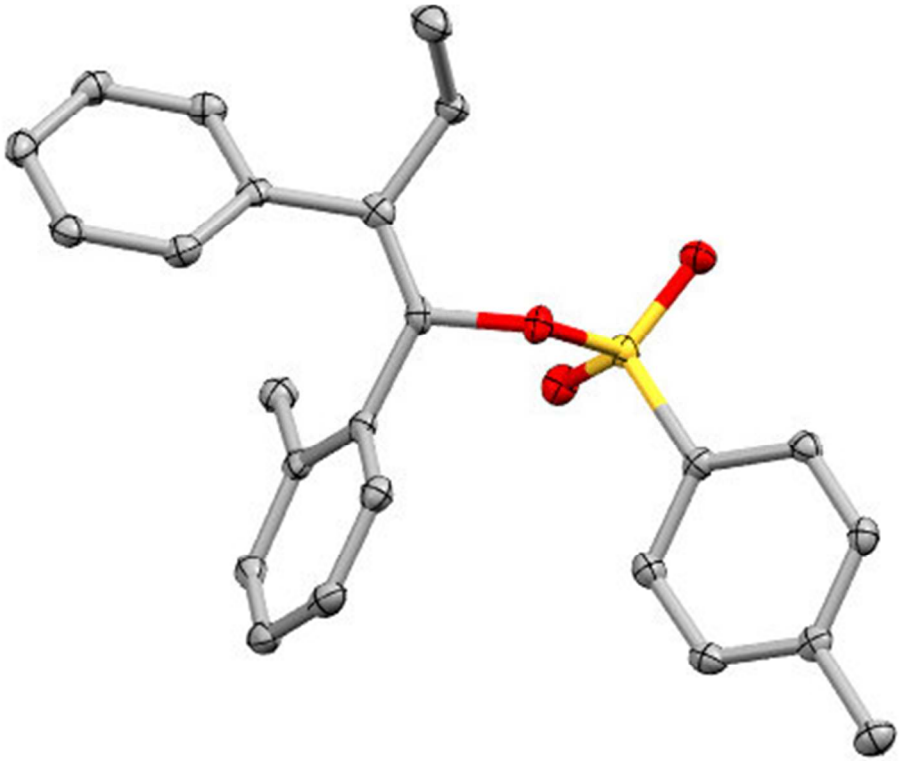
	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	22(2)	14(2)	25(2)	6(1)	2(2)	-1(1)
C(2)	22(2)	18(2)	31(2)	9(2)	0(2)	-2(1)
C(3)	26(2)	19(2)	39(2)	8(2)	13(2)	3(2)
C(4)	42(2)	20(2)	29(2)	2(2)	15(2)	-6(2)
C(5)	32(2)	27(2)	26(2)	6(2)	-2(2)	-7(2)
C(6)	22(2)	18(2)	28(2)	8(1)	1(2)	1(1)
C(7)	59(3)	39(2)	35(2)	-6(2)	20(2)	-13(2)
C(8)	18(2)	19(2)	21(2)	7(1)	-1(2)	-2(1)
C(9)	18(2)	24(2)	18(2)	6(1)	2(2)	-1(1)
C(10)	34(2)	24(2)	22(2)	7(1)	4(2)	2(2)
C(11)	41(2)	46(2)	19(2)	5(2)	-2(2)	5(2)
C(12)	18(2)	17(2)	15(2)	0(1)	-2(1)	0(1)
C(13)	24(2)	28(2)	19(2)	1(1)	3(2)	1(2)
C(14)	24(2)	23(2)	22(2)	-4(1)	0(2)	8(2)
C(15)	29(2)	17(2)	22(2)	0(1)	-4(2)	1(2)
C(16)	23(2)	20(2)	17(2)	1(1)	-1(2)	-4(1)
C(17)	18(2)	20(2)	17(2)	0(1)	1(1)	2(1)
C(18)	25(2)	12(1)	19(2)	4(1)	0(2)	-3(1)
C(19)	23(2)	17(2)	24(2)	3(1)	-1(2)	2(1)
C(20)	24(2)	21(2)	21(2)	6(1)	-6(2)	2(2)
C(21)	34(2)	18(2)	16(2)	3(1)	0(2)	-1(2)
C(22)	25(2)	17(2)	20(2)	5(1)	4(2)	-2(1)
C(23)	20(2)	18(2)	20(2)	6(1)	-2(2)	-3(1)
C(24)	37(2)	38(2)	19(2)	0(2)	7(2)	4(2)
C(25)	21(2)	22(2)	33(2)	15(2)	5(2)	5(2)
C(26)	18(2)	32(2)	45(2)	21(2)	7(2)	3(2)
C(27)	28(2)	24(2)	41(2)	13(2)	-7(2)	-1(2)
C(28)	32(2)	22(2)	37(2)	11(2)	1(2)	6(2)
C(29)	24(2)	23(2)	42(2)	15(2)	8(2)	4(2)
C(30)	24(2)	20(2)	38(2)	7(2)	0(2)	3(2)
C(31)	57(3)	40(2)	38(2)	8(2)	0(2)	9(2)
C(32)	23(2)	26(2)	23(2)	13(2)	6(2)	9(2)
C(33)	26(2)	31(2)	21(2)	7(2)	-1(2)	13(2)
C(34)	50(3)	37(2)	20(2)	6(2)	-3(2)	16(2)
C(35)	47(3)	45(2)	21(2)	10(2)	5(2)	10(2)
C(36)	23(2)	25(2)	14(2)	-5(1)	-1(2)	8(2)
C(37)	29(2)	43(2)	27(2)	-3(2)	-5(2)	11(2)
C(38)	21(2)	40(2)	35(2)	-7(2)	2(2)	-2(2)
C(39)	33(2)	28(2)	22(2)	-4(2)	10(2)	-2(2)
C(40)	27(2)	23(2)	21(2)	2(1)	2(2)	3(2)
C(41)	20(2)	23(2)	19(2)	-2(1)	-1(2)	1(2)
C(42)	24(2)	16(2)	22(2)	7(1)	2(2)	6(1)
C(43)	22(2)	18(2)	26(2)	5(1)	-1(2)	1(1)
C(44)	24(2)	20(2)	28(2)	10(1)	9(2)	2(2)
C(45)	29(2)	18(2)	20(2)	6(1)	8(2)	4(2)
C(46)	21(2)	15(2)	26(2)	5(1)	2(2)	3(1)
C(47)	16(2)	20(2)	25(2)	9(1)	7(2)	4(1)
C(48)	38(2)	41(2)	20(2)	2(2)	-2(2)	-2(2)
O(1)	43(2)	28(1)	26(1)	13(1)	0(1)	-1(1)
O(2)	25(1)	27(1)	35(1)	3(1)	12(1)	3(1)

O(3)	27(1)	19(1)	19(1)	7(1)	1(1)	2(1)
O(4)	28(1)	32(1)	18(1)	5(1)	4(1)	5(1)
O(5)	47(2)	40(1)	36(2)	7(1)	-7(1)	18(1)
O(6)	71(2)	42(2)	45(2)	28(1)	24(2)	15(2)
O(7)	33(2)	33(1)	25(1)	15(1)	10(1)	10(1)
O(8)	24(1)	31(1)	23(1)	2(1)	2(1)	-3(1)
S(1)	27(1)	21(1)	22(1)	7(1)	5(1)	0(1)
S(2)	42(1)	31(1)	31(1)	16(1)	7(1)	13(1)

Table S40. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2h**.

	x	y	z	U(eq)
H(2)	10604	850	3140	28
H(3)	11352	196	2046	33
H(5)	5196	755	1259	34
H(6)	4433	1424	2348	27
H(7A)	8322	-526	799	69
H(7B)	10531	4	768	69
H(7C)	8031	181	461	69
H(10A)	7176	3095	4735	31
H(10B)	6425	3919	4870	31
H(11A)	11149	3491	4810	53
H(11B)	9940	3823	5516	53
H(11C)	10400	4314	4944	53
H(13)	4163	4490	4129	29
H(14)	3672	5622	3841	29
H(15)	6429	6122	3218	28
H(16)	9732	5482	2877	24
H(17)	10230	4344	3149	22
H(19)	5159	3352	2480	26
H(20)	5218	3118	1264	27
H(21)	8220	2478	702	27
H(23)	11291	2363	2591	23
H(24A)	10569	1525	356	48
H(24B)	13353	1572	434	48
H(24C)	11949	2285	403	48
H(26)	6133	9298	2205	35
H(27)	5765	9873	3362	37
H(29)	-619	8911	3345	34
H(30)	-313	8359	2182	33
H(31A)	3769	10088	4403	67
H(31B)	2074	9432	4514	67
H(31C)	1016	10122	4261	67
H(34A)	3353	6926	234	42
H(34B)	2099	6137	71	42
H(35A)	7014	6425	268	55
H(35B)	5659	6064	-456	55
H(35C)	5837	5629	175	55
H(37)	-512	5571	802	41
H(38)	-1448	4470	1130	41
H(39)	1242	3948	1788	34
H(40)	4819	4539	2156	29
H(41)	5731	5656	1861	26
H(43)	417	6654	2330	26
H(44)	2	6908	3531	28
H(45)	2915	7553	4290	26
H(47)	6788	7674	2624	23
H(48A)	5617	8464	4821	50
H(48B)	8378	8389	4886	50
H(48C)	6676	7687	4808	50

(*E*)-2-phenyl-1-(*o*-tolyl)but-1-en-1-yl 4-methylbenzenesulfonate (2i)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 39197 reflections were collected covering the indices, -17<=*h*<=17, -9<=*k*<=9, -23<=*l*<=23. 3588 reflections were found to be symmetry independent, with an R_{int} of 0.0575. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S41. Crystal data and structure refinement for tosylate **2i**.

X-ray ID	gene778	
Sample/notebook ID	71462-48	
Empirical formula	C24 H24 O3 S	
Formula weight	392.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 14.7622(13) Å	α= 90°.
	b = 7.5055(7) Å	β= 112.6380(10)°.
	c = 19.1024(18) Å	γ = 90°.
Volume	1953.4(3) $Å^3$	
Z	4	
Density (calculated)	1.335 Mg/m^3	
Absorption coefficient	0.188 mm^{-1}	
F(000)	832	
Crystal size	0.070 x 0.050 x 0.050 mm^3	
Theta range for data collection	1.496 to 25.414°.	
Index ranges	-17<=h<=17, -9<=k<=9, -23<=l<=23	
Reflections collected	39197	
Independent reflections	3588 [R(int) = 0.0575]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.837	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3588 / 0 / 256	
Goodness-of-fit on F^2	1.056	
Final R indices [I>2sigma(I)]	R1 = 0.0417, wR2 = 0.0976	
R indices (all data)	R1 = 0.0545, wR2 = 0.1062	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.392 and -0.331 $e.Å^{-3}$	

Table S42. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2i**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	3180(1)	6716(2)	6660(1)	15(1)
C(2)	4069(1)	5860(3)	7045(1)	18(1)
C(3)	4458(1)	5886(3)	7831(1)	19(1)
C(4)	3979(1)	6739(2)	8235(1)	16(1)
C(5)	3105(1)	7638(3)	7833(1)	18(1)
C(6)	2701(1)	7627(3)	7050(1)	17(1)
C(7)	4382(2)	6658(3)	9090(1)	22(1)
C(8)	2439(1)	3510(2)	5015(1)	15(1)
C(9)	1750(1)	3339(2)	4317(1)	16(1)
C(10)	854(1)	4528(3)	4022(1)	20(1)
C(11)	-111(2)	3531(3)	3788(1)	25(1)
C(12)	1819(1)	1910(3)	3801(1)	16(1)
C(13)	1534(1)	2224(3)	3024(1)	19(1)
C(14)	1563(1)	888(3)	2537(1)	21(1)
C(15)	1875(1)	-799(3)	2811(1)	21(1)
C(16)	2163(1)	-1142(3)	3581(1)	20(1)
C(17)	2128(1)	194(3)	4069(1)	17(1)
C(18)	3385(1)	2563(2)	5396(1)	16(1)
C(19)	3528(2)	1626(3)	6063(1)	18(1)
C(20)	4397(2)	738(3)	6454(1)	21(1)
C(21)	5140(2)	798(3)	6183(1)	22(1)
C(22)	5013(1)	1735(3)	5530(1)	20(1)
C(23)	4137(1)	2627(3)	5121(1)	17(1)
C(24)	4036(2)	3590(3)	4406(1)	21(1)
O(1)	1839(1)	7838(2)	5415(1)	20(1)
O(2)	3388(1)	6779(2)	5358(1)	19(1)
O(3)	2219(1)	4678(2)	5529(1)	17(1)
S(1)	2657(1)	6654(1)	5669(1)	15(1)

Table S43. Bond lengths [Å] and angles [°] for tosylate **2i**.

C(1)-C(2)	1.390(3)	C(12)-C(13)	1.397(3)
C(1)-C(6)	1.390(3)	C(13)-C(14)	1.380(3)
C(1)-S(1)	1.7472(18)	C(13)-H(13)	0.9500
C(2)-C(3)	1.386(3)	C(14)-C(15)	1.380(3)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.388(3)	C(15)-C(16)	1.389(3)
C(3)-H(3)	0.9500	C(15)-H(15)	0.9500
C(4)-C(5)	1.395(3)	C(16)-C(17)	1.384(3)
C(4)-C(7)	1.509(2)	C(16)-H(16)	0.9500
C(5)-C(6)	1.381(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-C(19)	1.399(3)
C(6)-H(6)	0.9500	C(18)-C(23)	1.400(3)
C(7)-H(7A)	0.9800	C(19)-C(20)	1.382(3)
C(7)-H(7B)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7C)	0.9800	C(20)-C(21)	1.384(3)
C(8)-C(9)	1.337(3)	C(20)-H(20)	0.9500
C(8)-O(3)	1.443(2)	C(21)-C(22)	1.379(3)
C(8)-C(18)	1.484(3)	C(21)-H(21)	0.9500
C(9)-C(12)	1.487(3)	C(22)-C(23)	1.397(3)
C(9)-C(10)	1.512(3)	C(22)-H(22)	0.9500
C(10)-C(11)	1.516(3)	C(23)-C(24)	1.501(3)
C(10)-H(10A)	0.9900	C(24)-H(24A)	0.9800
C(10)-H(10B)	0.9900	C(24)-H(24B)	0.9800
C(11)-H(11A)	0.9800	C(24)-H(24C)	0.9800
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4253(14)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4230(14)
C(12)-C(17)	1.396(3)	O(3)-S(1)	1.5983(14)
C(2)-C(1)-C(6)	121.04(17)	O(3)-C(8)-C(18)	111.96(15)
C(2)-C(1)-S(1)	119.66(14)	C(8)-C(9)-C(12)	120.70(17)
C(6)-C(1)-S(1)	119.30(15)	C(8)-C(9)-C(10)	122.42(17)
C(3)-C(2)-C(1)	118.66(18)	C(12)-C(9)-C(10)	116.85(16)
C(3)-C(2)-H(2)	120.7	C(9)-C(10)-C(11)	113.96(16)
C(1)-C(2)-H(2)	120.7	C(9)-C(10)-H(10A)	108.8
C(2)-C(3)-C(4)	121.45(18)	C(11)-C(10)-H(10A)	108.8
C(2)-C(3)-H(3)	119.3	C(9)-C(10)-H(10B)	108.8
C(4)-C(3)-H(3)	119.3	C(11)-C(10)-H(10B)	108.8
C(3)-C(4)-C(5)	118.60(17)	H(10A)-C(10)-H(10B)	107.7
C(3)-C(4)-C(7)	120.68(17)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	120.70(17)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.03(17)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.5	C(10)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.5	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.16(18)	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.4	C(17)-C(12)-C(13)	117.88(18)
C(1)-C(6)-H(6)	120.4	C(17)-C(12)-C(9)	121.20(16)
C(4)-C(7)-H(7A)	109.5	C(13)-C(12)-C(9)	120.86(17)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	121.27(19)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.4
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.4
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	120.22(18)
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.9
C(9)-C(8)-O(3)	116.89(17)	C(13)-C(14)-H(14)	119.9
C(9)-C(8)-C(18)	130.88(17)	C(14)-C(15)-C(16)	119.52(18)

C(14)-C(15)-H(15)	120.2	C(21)-C(22)-C(23)	121.62(18)
C(16)-C(15)-H(15)	120.2	C(21)-C(22)-H(22)	119.2
C(17)-C(16)-C(15)	120.28(19)	C(23)-C(22)-H(22)	119.2
C(17)-C(16)-H(16)	119.9	C(22)-C(23)-C(18)	118.05(17)
C(15)-C(16)-H(16)	119.9	C(22)-C(23)-C(24)	119.10(17)
C(16)-C(17)-C(12)	120.82(17)	C(18)-C(23)-C(24)	122.85(17)
C(16)-C(17)-H(17)	119.6	C(23)-C(24)-H(24A)	109.5
C(12)-C(17)-H(17)	119.6	C(23)-C(24)-H(24B)	109.5
C(19)-C(18)-C(23)	119.75(17)	H(24A)-C(24)-H(24B)	109.5
C(19)-C(18)-C(8)	118.06(16)	C(23)-C(24)-H(24C)	109.5
C(23)-C(18)-C(8)	122.16(16)	H(24A)-C(24)-H(24C)	109.5
C(20)-C(19)-C(18)	121.19(18)	H(24B)-C(24)-H(24C)	109.5
C(20)-C(19)-H(19)	119.4	C(8)-O(3)-S(1)	119.72(11)
C(18)-C(19)-H(19)	119.4	O(2)-S(1)-O(1)	119.72(8)
C(19)-C(20)-C(21)	119.09(18)	O(2)-S(1)-O(3)	108.28(7)
C(19)-C(20)-H(20)	120.5	O(1)-S(1)-O(3)	106.67(8)
C(21)-C(20)-H(20)	120.5	O(2)-S(1)-C(1)	111.10(9)
C(22)-C(21)-C(20)	120.29(19)	O(1)-S(1)-C(1)	108.46(8)
C(22)-C(21)-H(21)	119.9	O(3)-S(1)-C(1)	100.86(8)
C(20)-C(21)-H(21)	119.9		

Symmetry transformations used to generate equivalent atoms:

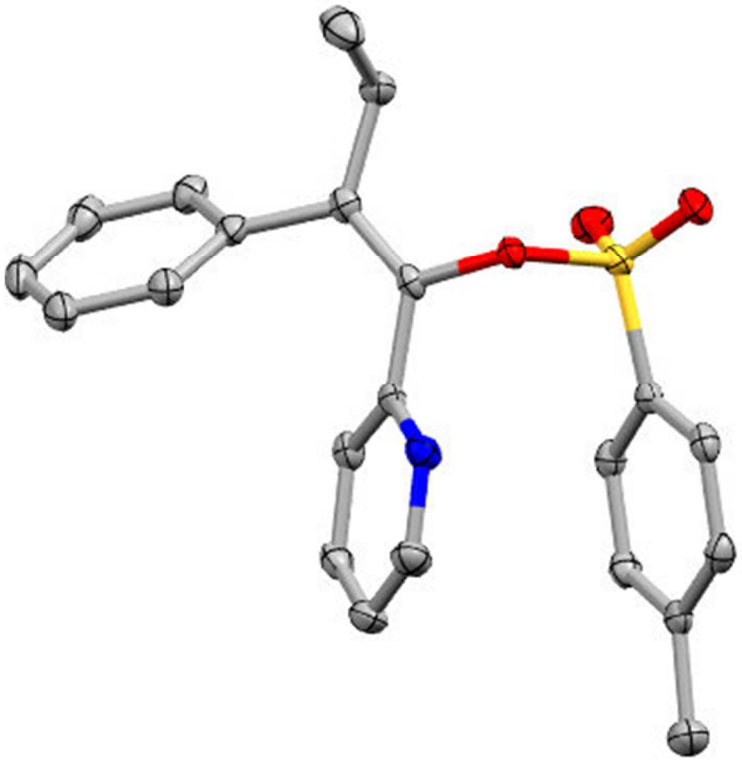
Table S44. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2i**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	17(1)	13(1)	15(1)	0(1)	6(1)	-3(1)
C(2)	18(1)	16(1)	21(1)	0(1)	9(1)	1(1)
C(3)	16(1)	17(1)	22(1)	3(1)	5(1)	1(1)
C(4)	18(1)	13(1)	17(1)	1(1)	6(1)	-4(1)
C(5)	19(1)	17(1)	19(1)	-3(1)	10(1)	-1(1)
C(6)	14(1)	15(1)	20(1)	0(1)	6(1)	0(1)
C(7)	23(1)	23(1)	18(1)	2(1)	6(1)	-3(1)
C(8)	18(1)	12(1)	19(1)	-2(1)	11(1)	-2(1)
C(9)	16(1)	12(1)	21(1)	2(1)	8(1)	-3(1)
C(10)	17(1)	17(1)	22(1)	-2(1)	2(1)	2(1)
C(11)	18(1)	23(1)	31(1)	-1(1)	6(1)	2(1)
C(12)	11(1)	19(1)	16(1)	-1(1)	4(1)	-4(1)
C(13)	19(1)	18(1)	19(1)	4(1)	6(1)	-1(1)
C(14)	19(1)	29(1)	15(1)	0(1)	7(1)	-3(1)
C(15)	17(1)	27(1)	20(1)	-7(1)	8(1)	-1(1)
C(16)	15(1)	19(1)	23(1)	0(1)	5(1)	1(1)
C(17)	17(1)	18(1)	15(1)	1(1)	4(1)	-2(1)
C(18)	16(1)	13(1)	15(1)	-4(1)	4(1)	-2(1)
C(19)	19(1)	18(1)	18(1)	-3(1)	7(1)	-3(1)
C(20)	25(1)	18(1)	16(1)	1(1)	3(1)	-2(1)
C(21)	18(1)	18(1)	22(1)	-4(1)	0(1)	2(1)
C(22)	15(1)	17(1)	24(1)	-7(1)	6(1)	-1(1)
C(23)	18(1)	16(1)	16(1)	-5(1)	5(1)	-3(1)
C(24)	19(1)	23(1)	20(1)	-2(1)	8(1)	-2(1)
O(1)	21(1)	19(1)	17(1)	2(1)	5(1)	4(1)
O(2)	22(1)	19(1)	19(1)	-1(1)	10(1)	-4(1)
O(3)	20(1)	16(1)	18(1)	-4(1)	11(1)	-2(1)
S(1)	17(1)	14(1)	15(1)	0(1)	6(1)	0(1)

Table S45. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2i**.

	x	y	z	U(eq)
H(2)	4403	5269	6774	21
H(3)	5066	5307	8099	23
H(5)	2783	8267	8103	21
H(6)	2103	8236	6782	20
H(7A)	4069	5677	9251	33
H(7B)	4246	7785	9290	33
H(7C)	5093	6461	9283	33
H(10A)	865	5202	3579	24
H(10B)	892	5401	4420	24
H(11A)	-186	2751	3357	38
H(11B)	-654	4386	3640	38
H(11C)	-115	2811	4214	38
H(13)	1317	3379	2828	23
H(14)	1366	1130	2011	25
H(15)	1894	-1720	2475	25
H(16)	2384	-2298	3773	24
H(17)	2317	-60	4594	21
H(19)	3018	1599	6250	22
H(20)	4483	95	6904	25
H(21)	5740	192	6446	26
H(22)	5534	1775	5355	23
H(24A)	3635	2877	3966	31
H(24B)	4687	3775	4394	31
H(24C)	3720	4745	4390	31

(*E*)-2-phenyl-1-(pyridin-2-yl)but-1-en-1-yl 4-methylbenzenesulfonate (2j)



Crystals were used as received. A colorless blade 0.070 x 0.050 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 70887 reflections were collected covering the indices, -13<=*h*<=13, -24<=*k*<=24, -10<=*l*<=10. 3621 reflections were found to be symmetry independent, with an R_{int} of 0.0381. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S46. Crystal data and structure refinement for tosylate **2j**.

X-ray ID	gene870	
Sample/notebook ID	68706-019	
Empirical formula	C22 H21 N O3 S	
Formula weight	379.46	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 11.5316(7) Å	α= 90°.
	b = 19.9422(13) Å	β= 108.879(2)°.
	c = 9.0447(6) Å	γ = 90°.
Volume	1968.1(2) $Å^3$	
Z	4	
Density (calculated)	1.281 Mg/m^3	
Absorption coefficient	0.186 mm^{-1}	
F(000)	800	
Crystal size	0.070 x 0.050 x 0.030 mm^3	
Theta range for data collection	1.866 to 25.408°.	
Index ranges	-13<=h<=13, -24<=k<=24, -10<=l<=10	
Reflections collected	70887	
Independent reflections	3621 [R(int) = 0.0381]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.900	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3621 / 0 / 246	
Goodness-of-fit on F^2	1.042	
Final R indices [I>2sigma(I)]	R1 = 0.0374, wR2 = 0.0879	
R indices (all data)	R1 = 0.0440, wR2 = 0.0919	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.338 and -0.434 $e.Å^{-3}$	

Table S47. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2j**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	0(1)	3679(1)	5011(2)	17(1)
C(2)	126(1)	3203(1)	3948(2)	19(1)
C(3)	-480(1)	3304(1)	2371(2)	20(1)
C(4)	-1218(1)	3866(1)	1843(2)	19(1)
C(5)	-1372(1)	4319(1)	2941(2)	20(1)
C(6)	-757(1)	4235(1)	4524(2)	19(1)
C(7)	-1814(2)	3980(1)	119(2)	28(1)
C(8)	3024(1)	3820(1)	6597(2)	16(1)
C(9)	4040(2)	3574(1)	7632(2)	18(1)
C(10)	4170(2)	3475(1)	9337(2)	21(1)
C(11)	4823(2)	4057(1)	10351(2)	35(1)
C(12)	5134(1)	3416(1)	7158(2)	20(1)
C(13)	5627(2)	3892(1)	6397(2)	23(1)
C(14)	6638(2)	3739(1)	5944(2)	28(1)
C(15)	7171(2)	3110(1)	6251(2)	31(1)
C(16)	6707(2)	2640(1)	7027(2)	29(1)
C(17)	5696(2)	2789(1)	7482(2)	23(1)
C(18)	2745(1)	3911(1)	4887(2)	16(1)
C(19)	2967(2)	3402(1)	3967(2)	20(1)
C(20)	2637(2)	3500(1)	2371(2)	24(1)
C(21)	2106(2)	4100(1)	1743(2)	26(1)
C(22)	1916(2)	4579(1)	2749(2)	24(1)
N(1)	2224(1)	4499(1)	4299(2)	20(1)
O(1)	311(1)	3956(1)	7929(1)	30(1)
O(2)	1285(1)	2933(1)	7318(1)	26(1)
O(3)	2084(1)	4062(1)	7165(1)	17(1)
S(1)	891(1)	3611(1)	6979(1)	19(1)

Table S48. Bond lengths [Å] and angles [°] for tosylate **2j**.

C(1)-C(6)	1.392(2)	C(11)-H(11C)	0.9800
C(1)-C(2)	1.392(2)	C(12)-C(17)	1.396(2)
C(1)-S(1)	1.7492(16)	C(12)-C(13)	1.397(2)
C(2)-C(3)	1.385(2)	C(13)-C(14)	1.389(2)
C(2)-H(2)	0.9500	C(13)-H(13)	0.9500
C(3)-C(4)	1.396(2)	C(14)-C(15)	1.384(3)
C(3)-H(3)	0.9500	C(14)-H(14)	0.9500
C(4)-C(5)	1.394(2)	C(15)-C(16)	1.380(3)
C(4)-C(7)	1.504(2)	C(15)-H(15)	0.9500
C(5)-C(6)	1.387(2)	C(16)-C(17)	1.388(2)
C(5)-H(5)	0.9500	C(16)-H(16)	0.9500
C(6)-H(6)	0.9500	C(17)-H(17)	0.9500
C(7)-H(7A)	0.9800	C(18)-N(1)	1.347(2)
C(7)-H(7B)	0.9800	C(18)-C(19)	1.387(2)
C(7)-H(7C)	0.9800	C(19)-C(20)	1.382(2)
C(8)-C(9)	1.334(2)	C(19)-H(19)	0.9500
C(8)-O(3)	1.4262(18)	C(20)-C(21)	1.379(3)
C(8)-C(18)	1.485(2)	C(20)-H(20)	0.9500
C(9)-C(12)	1.492(2)	C(21)-C(22)	1.385(3)
C(9)-C(10)	1.513(2)	C(21)-H(21)	0.9500
C(10)-C(11)	1.519(2)	C(22)-N(1)	1.339(2)
C(10)-H(10A)	0.9900	C(22)-H(22)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.4249(12)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.4269(13)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.6068(11)
C(6)-C(1)-C(2)	121.35(15)	C(8)-C(9)-C(10)	122.59(15)
C(6)-C(1)-S(1)	119.05(12)	C(12)-C(9)-C(10)	116.85(14)
C(2)-C(1)-S(1)	119.45(12)	C(9)-C(10)-C(11)	112.51(14)
C(3)-C(2)-C(1)	118.74(15)	C(9)-C(10)-H(10A)	109.1
C(3)-C(2)-H(2)	120.6	C(11)-C(10)-H(10A)	109.1
C(1)-C(2)-H(2)	120.6	C(9)-C(10)-H(10B)	109.1
C(2)-C(3)-C(4)	121.20(15)	C(11)-C(10)-H(10B)	109.1
C(2)-C(3)-H(3)	119.4	H(10A)-C(10)-H(10B)	107.8
C(4)-C(3)-H(3)	119.4	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(3)	118.72(15)	C(10)-C(11)-H(11B)	109.5
C(5)-C(4)-C(7)	121.35(15)	H(11A)-C(11)-H(11B)	109.5
C(3)-C(4)-C(7)	119.93(15)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-C(4)	121.13(15)	H(11A)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.4	H(11B)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.4	C(17)-C(12)-C(13)	118.55(15)
C(5)-C(6)-C(1)	118.75(15)	C(17)-C(12)-C(9)	120.44(15)
C(5)-C(6)-H(6)	120.6	C(13)-C(12)-C(9)	121.01(15)
C(1)-C(6)-H(6)	120.6	C(14)-C(13)-C(12)	120.65(17)
C(4)-C(7)-H(7A)	109.5	C(14)-C(13)-H(13)	119.7
C(4)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.7
H(7A)-C(7)-H(7B)	109.5	C(15)-C(14)-C(13)	120.06(17)
C(4)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	120.0
H(7A)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	120.0
H(7B)-C(7)-H(7C)	109.5	C(16)-C(15)-C(14)	119.82(16)
C(9)-C(8)-O(3)	117.92(14)	C(16)-C(15)-H(15)	120.1
C(9)-C(8)-C(18)	128.45(15)	C(14)-C(15)-H(15)	120.1
O(3)-C(8)-C(18)	113.56(13)	C(15)-C(16)-C(17)	120.48(17)
C(8)-C(9)-C(12)	120.48(15)	C(15)-C(16)-H(16)	119.8

C(17)-C(16)-H(16)	119.8	C(20)-C(21)-H(21)	120.9
C(16)-C(17)-C(12)	120.42(17)	C(22)-C(21)-H(21)	120.9
C(16)-C(17)-H(17)	119.8	N(1)-C(22)-C(21)	124.07(16)
C(12)-C(17)-H(17)	119.8	N(1)-C(22)-H(22)	118.0
N(1)-C(18)-C(19)	122.99(15)	C(21)-C(22)-H(22)	118.0
N(1)-C(18)-C(8)	115.93(13)	C(22)-N(1)-C(18)	116.79(14)
C(19)-C(18)-C(8)	121.02(14)	C(8)-O(3)-S(1)	119.86(9)
C(20)-C(19)-C(18)	118.83(15)	O(1)-S(1)-O(2)	120.49(8)
C(20)-C(19)-H(19)	120.6	O(1)-S(1)-O(3)	102.69(7)
C(18)-C(19)-H(19)	120.6	O(2)-S(1)-O(3)	107.74(6)
C(21)-C(20)-C(19)	119.15(16)	O(1)-S(1)-C(1)	109.89(8)
C(21)-C(20)-H(20)	120.4	O(2)-S(1)-C(1)	109.49(7)
C(19)-C(20)-H(20)	120.4	O(3)-S(1)-C(1)	105.31(7)
C(20)-C(21)-C(22)	118.17(15)		

Symmetry transformations used to generate equivalent atoms:

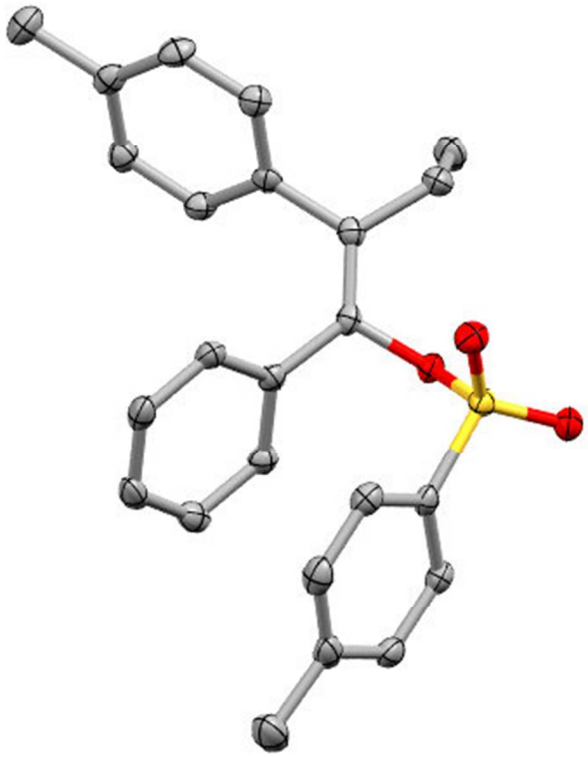
Table S49. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2j**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	14(1)	20(1)	18(1)	1(1)	7(1)	-3(1)
C(2)	17(1)	16(1)	24(1)	0(1)	8(1)	0(1)
C(3)	19(1)	20(1)	22(1)	-5(1)	9(1)	-2(1)
C(4)	15(1)	23(1)	21(1)	2(1)	7(1)	-4(1)
C(5)	16(1)	18(1)	27(1)	3(1)	7(1)	2(1)
C(6)	18(1)	19(1)	24(1)	-4(1)	11(1)	-2(1)
C(7)	26(1)	34(1)	23(1)	4(1)	6(1)	1(1)
C(8)	18(1)	14(1)	20(1)	-1(1)	10(1)	-1(1)
C(9)	19(1)	15(1)	21(1)	0(1)	8(1)	-2(1)
C(10)	20(1)	24(1)	19(1)	2(1)	6(1)	1(1)
C(11)	38(1)	43(1)	27(1)	-9(1)	16(1)	-12(1)
C(12)	15(1)	26(1)	17(1)	-3(1)	3(1)	-1(1)
C(13)	20(1)	29(1)	22(1)	0(1)	7(1)	-1(1)
C(14)	21(1)	41(1)	24(1)	-4(1)	9(1)	-7(1)
C(15)	17(1)	45(1)	32(1)	-13(1)	10(1)	-2(1)
C(16)	21(1)	31(1)	32(1)	-10(1)	5(1)	3(1)
C(17)	21(1)	24(1)	23(1)	-2(1)	4(1)	-1(1)
C(18)	13(1)	18(1)	19(1)	1(1)	7(1)	-2(1)
C(19)	19(1)	21(1)	23(1)	-1(1)	10(1)	0(1)
C(20)	24(1)	28(1)	22(1)	-6(1)	13(1)	-4(1)
C(21)	26(1)	35(1)	17(1)	2(1)	8(1)	-3(1)
C(22)	28(1)	24(1)	22(1)	7(1)	9(1)	4(1)
N(1)	24(1)	19(1)	20(1)	3(1)	10(1)	2(1)
O(1)	22(1)	50(1)	21(1)	-5(1)	12(1)	-1(1)
O(2)	26(1)	23(1)	26(1)	7(1)	4(1)	-5(1)
O(3)	16(1)	19(1)	18(1)	-1(1)	8(1)	0(1)
S(1)	17(1)	24(1)	17(1)	2(1)	8(1)	-2(1)

Table S50. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2j**.

	x	y	z	U(eq)
H(2)	618	2815	4297	23
H(3)	-391	2985	1635	24
H(5)	-1907	4690	2599	24
H(6)	-851	4552	5262	23
H(7A)	-2229	4415	-52	42
H(7B)	-2414	3624	-315	42
H(7C)	-1187	3974	-398	42
H(10A)	4633	3057	9717	25
H(10B)	3345	3423	9439	25
H(11A)	5626	4124	10220	52
H(11B)	4933	3957	11449	52
H(11C)	4332	4465	10039	52
H(13)	5267	4325	6188	28
H(14)	6963	4066	5422	34
H(15)	7855	3003	5928	37
H(16)	7081	2211	7252	34
H(17)	5385	2461	8018	28
H(19)	3340	2995	4425	24
H(20)	2774	3158	1715	28
H(21)	1877	4182	652	31
H(22)	1543	4990	2312	29

(*E*)-1-phenyl-2-(*p*-tolyl)but-1-en-1-yl 4-methylbenzenesulfonate (2k)



Crystals were used as received. A colorless prism 0.060 x 0.050 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 42437 reflections were collected covering the indices, -13<=*h*<=13, -17<=*k*<=17, -15<=*l*<=15. 3751 reflections were found to be symmetry independent, with an R_{int} of 0.0573. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S51. Crystal data and structure refinement for tosylate **2k**.

X-ray ID	gene797	
Sample/notebook ID	71462-70	
Empirical formula	C24 H24 O3 S	
Formula weight	392.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 11.2228(11) Å	α= 90°.
	b = 14.2515(14) Å	β= 93.122(2)°.
	c = 12.8006(12) Å	γ = 90°.
Volume	2044.3(3) $Å^3$	
Z	4	
Density (calculated)	1.275 Mg/m^3	
Absorption coefficient	0.180 mm^{-1}	
F(000)	832	
Crystal size	0.060 x 0.050 x 0.040 mm^3	
Theta range for data collection	1.817 to 25.387°.	
Index ranges	-13<=h<=13, -17<=k<=17, -15<=l<=15	
Reflections collected	42437	
Independent reflections	3751 [R(int) = 0.0573]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.843	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3751 / 0 / 256	
Goodness-of-fit on F^2	1.055	
Final R indices [I>2sigma(I)]	R1 = 0.0453, wR2 = 0.1081	
R indices (all data)	R1 = 0.0606, wR2 = 0.1187	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.397 and -0.305 $e.Å^{-3}$	

Table S52. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2k**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5307(2)	6272(1)	1682(2)	20(1)
C(2)	5152(2)	6210(1)	600(2)	22(1)
C(3)	4412(2)	6846(2)	69(2)	26(1)
C(4)	3837(2)	7554(1)	602(2)	27(1)
C(5)	3987(2)	7587(2)	1687(2)	28(1)
C(6)	4719(2)	6952(2)	2230(2)	24(1)
C(7)	3107(2)	8284(2)	9(2)	38(1)
C(8)	8096(2)	6720(1)	2676(2)	18(1)
C(9)	8975(2)	6549(1)	3394(2)	20(1)
C(10)	9365(2)	5568(1)	3707(2)	23(1)
C(11)	10564(2)	5314(2)	3281(2)	30(1)
C(12)	9682(2)	7338(1)	3886(2)	19(1)
C(13)	10196(2)	8023(1)	3278(2)	22(1)
C(14)	10874(2)	8740(2)	3735(2)	24(1)
C(15)	11046(2)	8810(2)	4814(2)	23(1)
C(16)	10547(2)	8124(2)	5420(2)	26(1)
C(17)	9890(2)	7391(2)	4968(2)	22(1)
C(18)	11761(2)	9604(2)	5312(2)	30(1)
C(19)	7551(2)	7620(1)	2334(2)	19(1)
C(20)	7321(2)	7797(1)	1269(2)	21(1)
C(21)	6767(2)	8622(2)	931(2)	26(1)
C(22)	6423(2)	9271(2)	1658(2)	27(1)
C(23)	6632(2)	9101(2)	2719(2)	26(1)
C(24)	7200(2)	8283(1)	3052(2)	22(1)
O(1)	6189(1)	5600(1)	3447(1)	26(1)
O(2)	6314(1)	4632(1)	1852(1)	25(1)
O(3)	7615(1)	5929(1)	2099(1)	20(1)
S(1)	6329(1)	5526(1)	2350(1)	20(1)

Table S53. Bond lengths [Å] and angles [°] for tosylate **2k**.

C(1)-C(6)	1.385(3)	C(12)-C(17)	1.393(3)
C(1)-C(2)	1.389(3)	C(13)-C(14)	1.385(3)
C(1)-S(1)	1.753(2)	C(13)-H(13)	0.9500
C(2)-C(3)	1.383(3)	C(14)-C(15)	1.388(3)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.396(3)	C(15)-C(16)	1.385(3)
C(3)-H(3)	0.9500	C(15)-C(18)	1.508(3)
C(4)-C(5)	1.390(3)	C(16)-C(17)	1.387(3)
C(4)-C(7)	1.504(3)	C(16)-H(16)	0.9500
C(5)-C(6)	1.383(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-H(18A)	0.9800
C(6)-H(6)	0.9500	C(18)-H(18B)	0.9800
C(7)-H(7A)	0.9800	C(18)-H(18C)	0.9800
C(7)-H(7B)	0.9800	C(19)-C(24)	1.390(3)
C(7)-H(7C)	0.9800	C(19)-C(20)	1.395(3)
C(8)-C(9)	1.334(3)	C(20)-C(21)	1.389(3)
C(8)-O(3)	1.437(2)	C(20)-H(20)	0.9500
C(8)-C(19)	1.477(3)	C(21)-C(22)	1.381(3)
C(9)-C(12)	1.496(3)	C(21)-H(21)	0.9500
C(9)-C(10)	1.512(3)	C(22)-C(23)	1.386(3)
C(10)-C(11)	1.522(3)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-C(24)	1.385(3)
C(10)-H(10B)	0.9900	C(23)-H(23)	0.9500
C(11)-H(11A)	0.9800	C(24)-H(24)	0.9500
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4245(15)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4254(15)
C(12)-C(13)	1.393(3)	O(3)-S(1)	1.6017(14)
C(6)-C(1)-C(2)	120.87(19)	O(3)-C(8)-C(19)	113.00(15)
C(6)-C(1)-S(1)	119.60(16)	C(8)-C(9)-C(12)	120.57(18)
C(2)-C(1)-S(1)	119.41(15)	C(8)-C(9)-C(10)	122.97(18)
C(3)-C(2)-C(1)	119.13(19)	C(12)-C(9)-C(10)	116.36(16)
C(3)-C(2)-H(2)	120.4	C(9)-C(10)-C(11)	111.97(17)
C(1)-C(2)-H(2)	120.4	C(9)-C(10)-H(10A)	109.2
C(2)-C(3)-C(4)	121.0(2)	C(11)-C(10)-H(10A)	109.2
C(2)-C(3)-H(3)	119.5	C(9)-C(10)-H(10B)	109.2
C(4)-C(3)-H(3)	119.5	C(11)-C(10)-H(10B)	109.2
C(5)-C(4)-C(3)	118.6(2)	H(10A)-C(10)-H(10B)	107.9
C(5)-C(4)-C(7)	121.0(2)	C(10)-C(11)-H(11A)	109.5
C(3)-C(4)-C(7)	120.4(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.1(2)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.4	C(10)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.4	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.3(2)	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.4	C(13)-C(12)-C(17)	117.77(18)
C(1)-C(6)-H(6)	120.4	C(13)-C(12)-C(9)	121.16(18)
C(4)-C(7)-H(7A)	109.5	C(17)-C(12)-C(9)	121.02(18)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	121.03(19)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.5
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.5
H(7A)-C(7)-H(7C)	109.5	C(13)-C(14)-C(15)	121.17(19)
H(7B)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	119.4
C(9)-C(8)-O(3)	116.99(17)	C(15)-C(14)-H(14)	119.4
C(9)-C(8)-C(19)	129.95(18)	C(16)-C(15)-C(14)	117.84(19)

C(16)-C(15)-C(18)	121.06(19)	C(22)-C(21)-C(20)	119.5(2)
C(14)-C(15)-C(18)	121.10(19)	C(22)-C(21)-H(21)	120.2
C(15)-C(16)-C(17)	121.38(19)	C(20)-C(21)-H(21)	120.2
C(15)-C(16)-H(16)	119.3	C(21)-C(22)-C(23)	120.3(2)
C(17)-C(16)-H(16)	119.3	C(21)-C(22)-H(22)	119.9
C(16)-C(17)-C(12)	120.75(19)	C(23)-C(22)-H(22)	119.9
C(16)-C(17)-H(17)	119.6	C(24)-C(23)-C(22)	120.0(2)
C(12)-C(17)-H(17)	119.6	C(24)-C(23)-H(23)	120.0
C(15)-C(18)-H(18A)	109.5	C(22)-C(23)-H(23)	120.0
C(15)-C(18)-H(18B)	109.5	C(23)-C(24)-C(19)	120.67(19)
H(18A)-C(18)-H(18B)	109.5	C(23)-C(24)-H(24)	119.7
C(15)-C(18)-H(18C)	109.5	C(19)-C(24)-H(24)	119.7
H(18A)-C(18)-H(18C)	109.5	C(8)-O(3)-S(1)	119.69(12)
H(18B)-C(18)-H(18C)	109.5	O(1)-S(1)-O(2)	120.52(9)
C(24)-C(19)-C(20)	118.62(18)	O(1)-S(1)-O(3)	108.71(8)
C(24)-C(19)-C(8)	121.42(18)	O(2)-S(1)-O(3)	102.69(8)
C(20)-C(19)-C(8)	119.87(18)	O(1)-S(1)-C(1)	109.38(9)
C(21)-C(20)-C(19)	120.90(19)	O(2)-S(1)-C(1)	109.39(9)
C(21)-C(20)-H(20)	119.5	O(3)-S(1)-C(1)	104.92(8)
C(19)-C(20)-H(20)	119.5		

Symmetry transformations used to generate equivalent atoms:

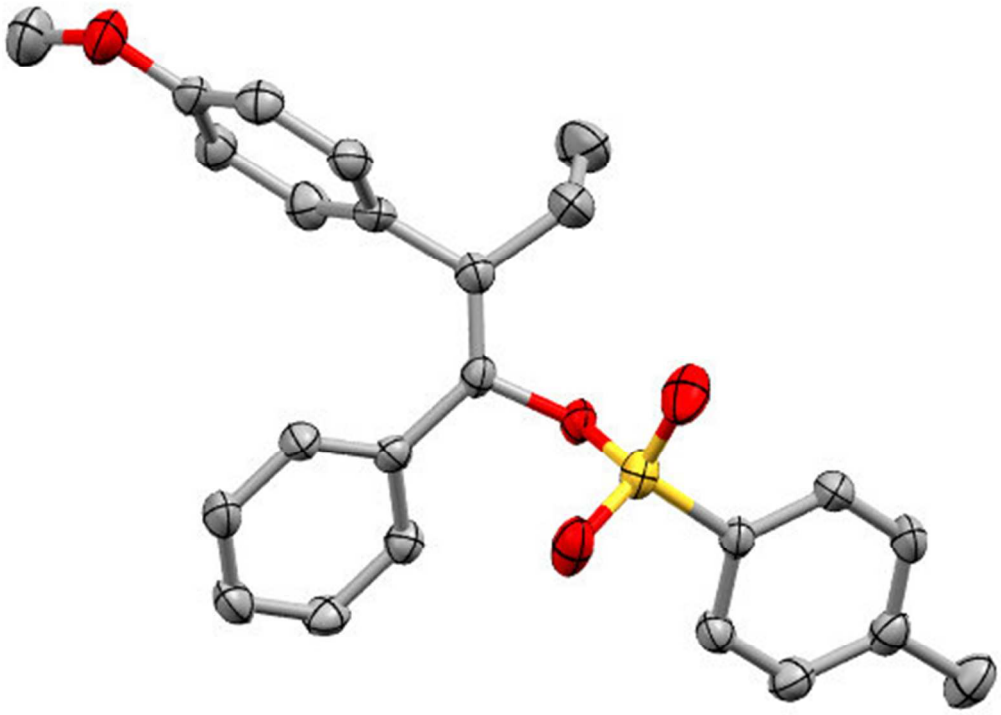
Table S54. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2k**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(1)	17(1)	24(1)	-2(1)	1(1)	-4(1)
C(2)	24(1)	19(1)	23(1)	-5(1)	1(1)	-3(1)
C(3)	28(1)	24(1)	25(1)	0(1)	-5(1)	-7(1)
C(4)	20(1)	20(1)	39(1)	1(1)	-4(1)	-4(1)
C(5)	22(1)	24(1)	37(1)	-7(1)	4(1)	0(1)
C(6)	21(1)	26(1)	23(1)	-4(1)	3(1)	-3(1)
C(7)	30(1)	31(1)	52(2)	8(1)	-6(1)	2(1)
C(8)	19(1)	17(1)	19(1)	-3(1)	4(1)	-2(1)
C(9)	20(1)	20(1)	20(1)	1(1)	3(1)	-1(1)
C(10)	24(1)	22(1)	24(1)	2(1)	-3(1)	1(1)
C(11)	26(1)	24(1)	41(1)	-1(1)	-2(1)	3(1)
C(12)	15(1)	20(1)	23(1)	1(1)	-1(1)	3(1)
C(13)	22(1)	25(1)	19(1)	2(1)	-1(1)	0(1)
C(14)	21(1)	22(1)	28(1)	2(1)	2(1)	-1(1)
C(15)	16(1)	25(1)	27(1)	-5(1)	1(1)	1(1)
C(16)	24(1)	35(1)	19(1)	-2(1)	1(1)	-2(1)
C(17)	19(1)	25(1)	22(1)	2(1)	3(1)	-1(1)
C(18)	27(1)	32(1)	32(1)	-10(1)	2(1)	-5(1)
C(19)	14(1)	19(1)	23(1)	0(1)	0(1)	-3(1)
C(20)	18(1)	22(1)	22(1)	1(1)	1(1)	-4(1)
C(21)	21(1)	28(1)	27(1)	10(1)	-2(1)	-5(1)
C(22)	21(1)	19(1)	41(1)	6(1)	-5(1)	1(1)
C(23)	20(1)	20(1)	37(1)	-6(1)	-1(1)	-1(1)
C(24)	20(1)	22(1)	23(1)	-2(1)	-3(1)	-2(1)
O(1)	26(1)	30(1)	22(1)	1(1)	3(1)	-4(1)
O(2)	27(1)	19(1)	29(1)	-1(1)	0(1)	-1(1)
O(3)	19(1)	18(1)	23(1)	-3(1)	1(1)	-2(1)
S(1)	21(1)	18(1)	20(1)	-1(1)	0(1)	-3(1)

Table S55. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2k**.

	x	y	z	U(eq)
H(2)	5550	5737	229	26
H(3)	4293	6801	-670	31
H(5)	3580	8052	2061	33
H(6)	4818	6983	2971	28
H(7A)	3627	8801	-186	57
H(7B)	2490	8525	451	57
H(7C)	2730	8003	-624	57
H(10A)	8755	5113	3441	28
H(10B)	9424	5522	4479	28
H(11A)	10501	5339	2515	46
H(11B)	10789	4678	3508	46
H(11C)	11172	5760	3546	46
H(13)	10079	7997	2538	27
H(14)	11226	9192	3303	29
H(16)	10656	8156	6160	31
H(17)	9578	6919	5401	27
H(18A)	11234	10140	5420	45
H(18B)	12389	9791	4852	45
H(18C)	12124	9398	5987	45
H(20)	7547	7347	770	25
H(21)	6625	8740	204	31
H(22)	6043	9836	1430	32
H(23)	6385	9545	3216	31
H(24)	7352	8174	3779	26

(*E*)-2-(4-methoxyphenyl)-1-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2l)



Crystals were used as received. A colorless prism 0.070 x 0.070 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 200(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 15929 reflections were collected covering the indices, -9<=*h*<=9, -7<=*k*<=7, -26<=*l*<=26. 3617 reflections were found to be symmetry independent, with an R_{int} of 0.0506. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S56. Crystal data and structure refinement for tosylate **2l**.

X-ray ID	gene767	
Sample/notebook ID	71462-057	
Empirical formula	C24 H24 O4 S	
Formula weight	408.49	
Temperature	200(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 7.8872(7) Å	α= 90°.
	b = 6.0338(5) Å	β= 91.418(2)°.
	c = 21.8424(19) Å	γ = 90°.
Volume	1039.16(16) $Å^3$	
Z	2	
Density (calculated)	1.306 Mg/m^3	
Absorption coefficient	0.183 mm^{-1}	
F(000)	432	
Crystal size	0.070 x 0.070 x 0.040 mm^3	
Theta range for data collection	1.865 to 25.347°.	
Index ranges	-9<=h<=9, -7<=k<=7, -26<=l<=26	
Reflections collected	15929	
Independent reflections	3617 [R(int) = 0.0506]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.811	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3617 / 1 / 265	
Goodness-of-fit on F^2	1.045	
Final R indices [I>2sigma(I)]	R1 = 0.0495, wR2 = 0.1043	
R indices (all data)	R1 = 0.0616, wR2 = 0.1094	
Absolute structure parameter	-0.11(7)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.295 and -0.173 $e.Å^{-3}$	

Table S57. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2l**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4399(4)	4947(8)	8861(2)	30(1)
C(2)	6016(4)	5843(8)	8871(2)	34(1)
C(3)	7319(5)	4659(9)	9144(2)	41(1)
C(4)	7042(5)	2615(9)	9405(2)	36(1)
C(5)	5393(5)	1783(8)	9400(2)	38(1)
C(6)	4074(5)	2932(8)	9126(2)	32(1)
C(7)	8501(5)	1289(12)	9670(2)	51(1)
C(8)	1345(4)	5488(7)	7421(2)	28(1)
C(9)	1605(5)	6884(7)	6964(2)	32(1)
C(10)	3238(6)	8185(11)	6898(2)	55(2)
C(11)	4337(6)	7259(12)	6409(2)	69(2)
C(12)	-112(5)	4014(7)	7546(2)	27(1)
C(13)	154(5)	1984(7)	7835(2)	31(1)
C(14)	-1170(5)	577(8)	7950(2)	34(1)
C(15)	-2812(5)	1169(9)	7779(2)	40(1)
C(16)	-3095(5)	3182(9)	7496(2)	39(1)
C(17)	-1770(5)	4609(8)	7379(2)	32(1)
C(18)	355(5)	7186(7)	6445(2)	31(1)
C(19)	28(5)	5529(8)	6025(2)	36(1)
C(20)	-1093(5)	5844(8)	5527(2)	36(1)
C(21)	-1877(5)	7871(8)	5451(2)	33(1)
C(22)	-1545(5)	9554(8)	5862(2)	35(1)
C(23)	-428(5)	9220(8)	6350(2)	35(1)
C(24)	-3517(6)	6668(11)	4591(2)	59(2)
O(1)	1180(3)	6017(7)	8766(1)	48(1)
O(2)	3264(4)	8635(6)	8384(2)	51(1)
O(3)	2755(3)	5113(5)	7843(1)	32(1)
O(4)	-3008(4)	8383(6)	4985(1)	49(1)
S(1)	2753(1)	6403(2)	8483(1)	34(1)

Table S58. Bond lengths [Å] and angles [°] for tosylate **2l**.

C(1)-C(6)	1.374(6)	C(13)-C(14)	1.374(6)
C(1)-C(2)	1.385(5)	C(13)-H(13)	0.9500
C(1)-S(1)	1.756(4)	C(14)-C(15)	1.386(6)
C(2)-C(3)	1.375(6)	C(14)-H(14)	0.9500
C(2)-H(2)	0.9500	C(15)-C(16)	1.379(7)
C(3)-C(4)	1.379(7)	C(15)-H(15)	0.9500
C(3)-H(3)	0.9500	C(16)-C(17)	1.383(6)
C(4)-C(5)	1.394(6)	C(16)-H(16)	0.9500
C(4)-C(7)	1.506(6)	C(17)-H(17)	0.9500
C(5)-C(6)	1.375(6)	C(18)-C(19)	1.376(6)
C(5)-H(5)	0.9500	C(18)-C(23)	1.388(6)
C(6)-H(6)	0.9500	C(19)-C(20)	1.398(6)
C(7)-H(7A)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7B)	0.9800	C(20)-C(21)	1.379(7)
C(7)-H(7C)	0.9800	C(20)-H(20)	0.9500
C(8)-C(9)	1.327(5)	C(21)-O(4)	1.373(5)
C(8)-O(3)	1.445(4)	C(21)-C(22)	1.376(6)
C(8)-C(12)	1.483(5)	C(22)-C(23)	1.381(6)
C(9)-C(18)	1.494(5)	C(22)-H(22)	0.9500
C(9)-C(10)	1.518(6)	C(23)-H(23)	0.9500
C(10)-C(11)	1.500(7)	C(24)-O(4)	1.397(6)
C(10)-H(10A)	0.9900	C(24)-H(24A)	0.9800
C(10)-H(10B)	0.9900	C(24)-H(24B)	0.9800
C(11)-H(11A)	0.9800	C(24)-H(24C)	0.9800
C(11)-H(11B)	0.9800	O(1)-S(1)	1.418(3)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.424(4)
C(12)-C(13)	1.392(6)	O(3)-S(1)	1.599(3)
C(12)-C(17)	1.396(5)		

C(6)-C(1)-C(2)	121.3(4)	C(9)-C(8)-C(12)	130.8(3)
C(6)-C(1)-S(1)	119.9(3)	O(3)-C(8)-C(12)	112.1(3)
C(2)-C(1)-S(1)	118.9(3)	C(8)-C(9)-C(18)	122.5(3)
C(3)-C(2)-C(1)	118.9(4)	C(8)-C(9)-C(10)	123.1(4)
C(3)-C(2)-H(2)	120.6	C(18)-C(9)-C(10)	114.3(3)
C(1)-C(2)-H(2)	120.6	C(11)-C(10)-C(9)	112.4(5)
C(2)-C(3)-C(4)	121.3(4)	C(11)-C(10)-H(10A)	109.1
C(2)-C(3)-H(3)	119.4	C(9)-C(10)-H(10A)	109.1
C(4)-C(3)-H(3)	119.4	C(11)-C(10)-H(10B)	109.1
C(3)-C(4)-C(5)	118.5(4)	C(9)-C(10)-H(10B)	109.1
C(3)-C(4)-C(7)	120.5(4)	H(10A)-C(10)-H(10B)	107.9
C(5)-C(4)-C(7)	121.0(5)	C(10)-C(11)-H(11A)	109.5
C(6)-C(5)-C(4)	121.1(4)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.4	H(11A)-C(11)-H(11B)	109.5
C(4)-C(5)-H(5)	119.4	C(10)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.9(4)	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.5	H(11B)-C(11)-H(11C)	109.5
C(1)-C(6)-H(6)	120.5	C(13)-C(12)-C(17)	118.3(4)
C(4)-C(7)-H(7A)	109.5	C(13)-C(12)-C(8)	120.2(3)
C(4)-C(7)-H(7B)	109.5	C(17)-C(12)-C(8)	121.5(4)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	121.3(4)
C(4)-C(7)-H(7C)	109.5	C(14)-C(13)-H(13)	119.3
H(7A)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.3
H(7B)-C(7)-H(7C)	109.5	C(13)-C(14)-C(15)	120.1(4)
C(9)-C(8)-O(3)	116.7(3)	C(13)-C(14)-H(14)	120.0

C(15)-C(14)-H(14)	120.0	C(22)-C(21)-C(20)	119.9(4)
C(16)-C(15)-C(14)	119.2(4)	C(21)-C(22)-C(23)	120.2(4)
C(16)-C(15)-H(15)	120.4	C(21)-C(22)-H(22)	119.9
C(14)-C(15)-H(15)	120.4	C(23)-C(22)-H(22)	119.9
C(15)-C(16)-C(17)	121.1(4)	C(22)-C(23)-C(18)	121.2(4)
C(15)-C(16)-H(16)	119.4	C(22)-C(23)-H(23)	119.4
C(17)-C(16)-H(16)	119.4	C(18)-C(23)-H(23)	119.4
C(16)-C(17)-C(12)	120.0(4)	O(4)-C(24)-H(24A)	109.5
C(16)-C(17)-H(17)	120.0	O(4)-C(24)-H(24B)	109.5
C(12)-C(17)-H(17)	120.0	H(24A)-C(24)-H(24B)	109.5
C(19)-C(18)-C(23)	117.9(4)	O(4)-C(24)-H(24C)	109.5
C(19)-C(18)-C(9)	121.7(4)	H(24A)-C(24)-H(24C)	109.5
C(23)-C(18)-C(9)	120.2(4)	H(24B)-C(24)-H(24C)	109.5
C(18)-C(19)-C(20)	121.6(4)	C(8)-O(3)-S(1)	117.6(2)
C(18)-C(19)-H(19)	119.2	C(21)-O(4)-C(24)	117.5(4)
C(20)-C(19)-H(19)	119.2	O(1)-S(1)-O(2)	118.4(2)
C(21)-C(20)-C(19)	119.2(4)	O(1)-S(1)-O(3)	108.69(16)
C(21)-C(20)-H(20)	120.4	O(2)-S(1)-O(3)	108.77(19)
C(19)-C(20)-H(20)	120.4	O(1)-S(1)-C(1)	110.96(19)
O(4)-C(21)-C(22)	115.3(4)	O(2)-S(1)-C(1)	109.6(2)
O(4)-C(21)-C(20)	124.7(4)	O(3)-S(1)-C(1)	98.65(17)

Symmetry transformations used to generate equivalent atoms:

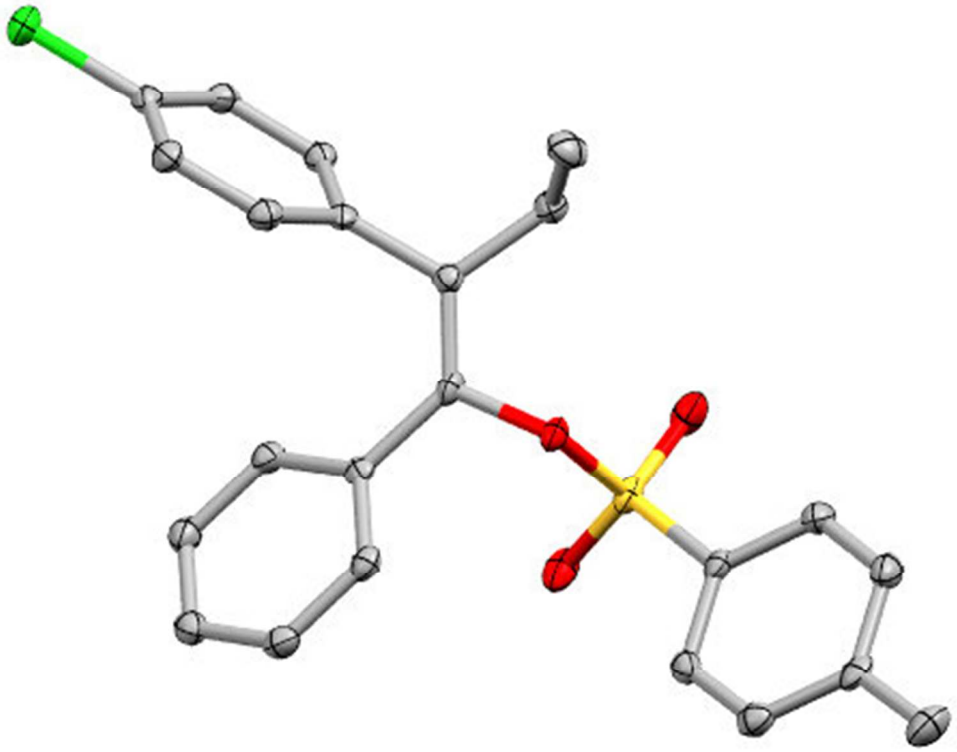
Table S59. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2l**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	23(2)	38(3)	28(2)	-2(2)	-3(1)	-2(2)
C(2)	31(2)	38(3)	34(2)	8(2)	-2(2)	-7(2)
C(3)	23(2)	59(4)	41(2)	4(2)	-3(2)	-7(2)
C(4)	35(2)	45(3)	26(2)	-2(2)	-2(2)	5(2)
C(5)	45(2)	35(3)	33(2)	4(2)	-4(2)	0(2)
C(6)	29(2)	32(3)	35(2)	-2(2)	0(2)	-7(2)
C(7)	46(2)	63(4)	43(2)	5(3)	-8(2)	14(3)
C(8)	21(2)	37(3)	26(2)	-2(2)	-3(1)	2(2)
C(9)	27(2)	36(3)	31(2)	0(2)	0(2)	-4(2)
C(10)	45(3)	75(4)	46(3)	19(3)	-6(2)	-24(3)
C(11)	33(2)	106(6)	69(3)	30(3)	9(2)	-2(3)
C(12)	30(2)	30(3)	22(2)	-1(2)	0(1)	-2(2)
C(13)	29(2)	31(3)	33(2)	-1(2)	-2(2)	2(2)
C(14)	46(2)	24(3)	33(2)	4(2)	-3(2)	-1(2)
C(15)	38(2)	42(3)	39(2)	0(2)	2(2)	-17(2)
C(16)	25(2)	54(4)	37(2)	3(2)	-3(2)	-5(2)
C(17)	30(2)	31(3)	33(2)	5(2)	-3(2)	-1(2)
C(18)	31(2)	36(3)	27(2)	9(2)	3(2)	-4(2)
C(19)	33(2)	38(3)	39(2)	-2(2)	2(2)	1(2)
C(20)	35(2)	41(3)	33(2)	-5(2)	0(2)	-6(2)
C(21)	26(2)	48(3)	27(2)	7(2)	2(2)	-2(2)
C(22)	38(2)	31(3)	37(2)	2(2)	2(2)	3(2)
C(23)	41(2)	34(3)	30(2)	-2(2)	1(2)	-9(2)
C(24)	54(3)	76(5)	45(2)	-4(3)	-11(2)	-13(3)
O(1)	29(1)	79(3)	36(1)	-12(2)	-2(1)	7(2)
O(2)	55(2)	33(2)	63(2)	1(2)	-21(2)	6(2)
O(3)	20(1)	45(2)	30(1)	1(1)	-3(1)	1(1)
O(4)	44(2)	65(3)	37(2)	-2(2)	-11(1)	-4(2)
S(1)	28(1)	38(1)	35(1)	-4(1)	-6(1)	3(1)

Table S60. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2l**.

	x	y	z	U(eq)
H(2)	6222	7250	8693	41
H(3)	8433	5261	9152	49
H(5)	5177	397	9590	45
H(6)	2957	2342	9121	39
H(7A)	9492	1468	9412	76
H(7B)	8184	-281	9685	76
H(7C)	8777	1815	10085	76
H(10A)	2959	9746	6799	66
H(10B)	3877	8169	7294	66
H(11A)	4702	5759	6524	104
H(11B)	5335	8207	6364	104
H(11C)	3693	7205	6020	104
H(13)	1274	1564	7956	37
H(14)	-959	-804	8146	41
H(15)	-3732	199	7856	47
H(16)	-4219	3595	7379	47
H(17)	-1988	5993	7186	38
H(19)	577	4137	6075	44
H(20)	-1313	4676	5245	43
H(22)	-2086	10950	5810	42
H(23)	-192	10404	6626	42
H(24A)	-2516	5991	4411	88
H(24B)	-4260	7264	4265	88
H(24C)	-4133	5546	4822	88

(*E*)-2-(4-chlorophenyl)-1-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2m)



Crystals were used as received. A colorless prism 0.040 x 0.040 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 60 mm and exposure time was 1 seconds per frame using a scan width of 2.0°. Data collection was 98.1% complete to 67.000° in θ. A total of 13379 reflections were collected covering the indices, -9<=*h*<=9, -7<=*k*<=7, -16<=*l*<=24. 3474 reflections were found to be symmetry independent, with an R_{int} of 0.0303. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S61. Crystal data and structure refinement for tosylate **2m**.

X-ray ID	gene754	
Sample/notebook ID	71462-052	
Empirical formula	C23 H21 Cl O3 S	
Formula weight	412.91	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 7.8225(8) Å	α= 90°.
	b = 6.0641(7) Å	β= 93.480(4)°.
	c = 20.897(2) Å	γ = 90°.
Volume	989.45(18) $Å^3$	
Z	2	
Density (calculated)	1.386 Mg/m^3	
Absorption coefficient	2.871 mm^{-1}	
F(000)	432	
Crystal size	0.040 x 0.040 x 0.040 mm^3	
Theta range for data collection	5.666 to 68.351°.	
Index ranges	-9<=h<=9, -7<=k<=7, -16<=l<=24	
Reflections collected	13379	
Independent reflections	3474 [R(int) = 0.0303]	
Completeness to theta = 67.000°	98.1 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.753 and 0.671	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3474 / 1 / 255	
Goodness-of-fit on F^2	1.067	
Final R indices [I>2sigma(I)]	R1 = 0.0239, wR2 = 0.0614	
R indices (all data)	R1 = 0.0242, wR2 = 0.0615	
Absolute structure parameter	0.106(4)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.238 and -0.245 e.$Å^{-3}$	

Table S62. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2m**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	692(3)	4945(4)	1166(1)	16(1)
C(2)	-961(3)	4090(4)	1155(1)	20(1)
C(3)	-2296(3)	5323(4)	877(1)	23(1)
C(4)	-2006(3)	7397(4)	612(1)	20(1)
C(5)	-325(3)	8170(4)	615(1)	21(1)
C(6)	1024(3)	6968(4)	892(1)	18(1)
C(7)	-3488(3)	8770(5)	348(1)	28(1)
C(8)	3857(3)	4306(4)	2678(1)	15(1)
C(9)	3699(3)	2829(3)	3149(1)	16(1)
C(10)	2176(3)	1308(4)	3180(1)	20(1)
C(11)	876(3)	2163(5)	3639(1)	25(1)
C(12)	5268(3)	5860(4)	2559(1)	15(1)
C(13)	6982(3)	5322(4)	2727(1)	17(1)
C(14)	8281(3)	6786(4)	2608(1)	21(1)
C(15)	7913(3)	8798(4)	2316(1)	21(1)
C(16)	6224(3)	9339(4)	2140(1)	19(1)
C(17)	4914(3)	7876(3)	2260(1)	17(1)
C(18)	4982(3)	2686(4)	3706(1)	16(1)
C(19)	5245(3)	4473(4)	4124(1)	18(1)
C(20)	6411(3)	4330(4)	4652(1)	19(1)
C(21)	7311(3)	2391(4)	4758(1)	18(1)
C(22)	7057(3)	579(4)	4360(1)	18(1)
C(23)	5880(3)	737(4)	3835(1)	17(1)
O(1)	1854(2)	1196(3)	1618(1)	26(1)
O(2)	3946(2)	3891(3)	1273(1)	25(1)
O(3)	2384(2)	4599(3)	2241(1)	16(1)
S(1)	2365(1)	3448(1)	1552(1)	17(1)
CL1	8794(1)	2200(1)	5412(1)	25(1)

Table S63. Bond lengths [Å] and angles [°] for tosylate **2m**.

C(1)-C(6)	1.385(3)	C(12)-C(17)	1.392(3)
C(1)-C(2)	1.392(3)	C(12)-C(13)	1.404(3)
C(1)-S(1)	1.749(2)	C(13)-C(14)	1.384(3)
C(2)-C(3)	1.383(3)	C(13)-H(13)	0.9500
C(2)-H(2)	0.9500	C(14)-C(15)	1.386(3)
C(3)-C(4)	1.399(4)	C(14)-H(14)	0.9500
C(3)-H(3)	0.9500	C(15)-C(16)	1.389(3)
C(4)-C(5)	1.396(3)	C(15)-H(15)	0.9500
C(4)-C(7)	1.505(3)	C(16)-C(17)	1.389(3)
C(5)-C(6)	1.380(3)	C(16)-H(16)	0.9500
C(5)-H(5)	0.9500	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-C(23)	1.393(3)
C(7)-H(7A)	0.9800	C(18)-C(19)	1.398(3)
C(7)-H(7B)	0.9800	C(19)-C(20)	1.391(3)
C(7)-H(7C)	0.9800	C(19)-H(19)	0.9500
C(8)-C(9)	1.342(3)	C(20)-C(21)	1.381(3)
C(8)-O(3)	1.437(2)	C(20)-H(20)	0.9500
C(8)-C(12)	1.484(3)	C(21)-C(22)	1.386(3)
C(9)-C(18)	1.493(3)	C(21)-CL1	1.742(2)
C(9)-C(10)	1.511(3)	C(22)-C(23)	1.391(3)
C(10)-C(11)	1.529(3)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-H(23)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.4318(19)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.4246(17)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.6000(16)
C(11)-H(11C)	0.9800		
C(6)-C(1)-C(2)	121.4(2)	C(8)-C(9)-C(18)	121.53(19)
C(6)-C(1)-S(1)	119.76(17)	C(8)-C(9)-C(10)	123.2(2)
C(2)-C(1)-S(1)	118.86(18)	C(18)-C(9)-C(10)	115.17(18)
C(3)-C(2)-C(1)	118.8(2)	C(9)-C(10)-C(11)	112.1(2)
C(3)-C(2)-H(2)	120.6	C(9)-C(10)-H(10A)	109.2
C(1)-C(2)-H(2)	120.6	C(11)-C(10)-H(10A)	109.2
C(2)-C(3)-C(4)	121.1(2)	C(9)-C(10)-H(10B)	109.2
C(2)-C(3)-H(3)	119.5	C(11)-C(10)-H(10B)	109.2
C(4)-C(3)-H(3)	119.5	H(10A)-C(10)-H(10B)	107.9
C(5)-C(4)-C(3)	118.4(2)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	121.4(2)	C(10)-C(11)-H(11B)	109.5
C(3)-C(4)-C(7)	120.2(2)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.3(2)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.3	H(11A)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.3	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.9(2)	C(17)-C(12)-C(13)	118.5(2)
C(5)-C(6)-H(6)	120.5	C(17)-C(12)-C(8)	120.24(19)
C(1)-C(6)-H(6)	120.5	C(13)-C(12)-C(8)	121.2(2)
C(4)-C(7)-H(7A)	109.5	C(14)-C(13)-C(12)	120.4(2)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.8
H(7A)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.8
C(4)-C(7)-H(7C)	109.5	C(13)-C(14)-C(15)	120.6(2)
H(7A)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	119.7
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.7
C(9)-C(8)-O(3)	116.24(18)	C(14)-C(15)-C(16)	119.5(2)
C(9)-C(8)-C(12)	130.55(19)	C(14)-C(15)-H(15)	120.2
O(3)-C(8)-C(12)	112.98(18)	C(16)-C(15)-H(15)	120.2

C(17)-C(16)-C(15)	120.1(2)	C(20)-C(21)-CL1	119.44(18)
C(17)-C(16)-H(16)	119.9	C(22)-C(21)-CL1	118.89(18)
C(15)-C(16)-H(16)	119.9	C(21)-C(22)-C(23)	118.9(2)
C(16)-C(17)-C(12)	120.8(2)	C(21)-C(22)-H(22)	120.6
C(16)-C(17)-H(17)	119.6	C(23)-C(22)-H(22)	120.6
C(12)-C(17)-H(17)	119.6	C(22)-C(23)-C(18)	120.8(2)
C(23)-C(18)-C(19)	118.9(2)	C(22)-C(23)-H(23)	119.6
C(23)-C(18)-C(9)	120.49(19)	C(18)-C(23)-H(23)	119.6
C(19)-C(18)-C(9)	120.5(2)	C(8)-O(3)-S(1)	118.78(13)
C(20)-C(19)-C(18)	120.7(2)	O(2)-S(1)-O(1)	118.30(11)
C(20)-C(19)-H(19)	119.6	O(2)-S(1)-O(3)	109.00(9)
C(18)-C(19)-H(19)	119.6	O(1)-S(1)-O(3)	108.42(10)
C(21)-C(20)-C(19)	118.9(2)	O(2)-S(1)-C(1)	110.95(11)
C(21)-C(20)-H(20)	120.5	O(1)-S(1)-C(1)	109.51(10)
C(19)-C(20)-H(20)	120.5	O(3)-S(1)-C(1)	98.86(9)
C(20)-C(21)-C(22)	121.7(2)		

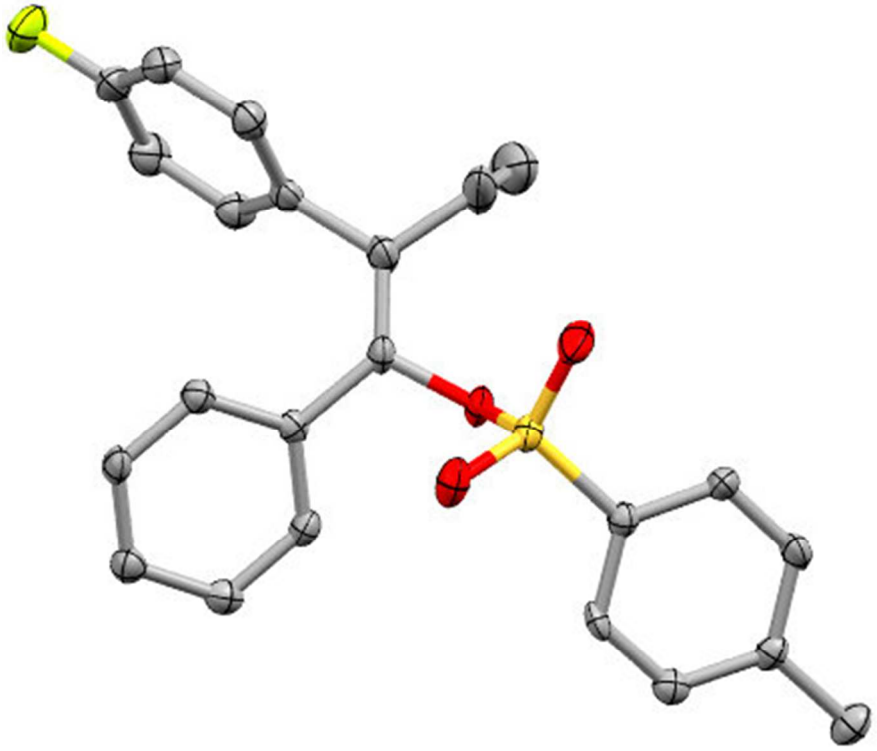
Table S64. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2m**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	16(1)	22(1)	11(1)	-2(1)	-3(1)	1(1)
C(2)	19(1)	25(1)	16(1)	4(1)	0(1)	-3(1)
C(3)	16(1)	35(1)	19(1)	2(1)	-1(1)	-3(1)
C(4)	22(1)	28(1)	9(1)	-2(1)	-1(1)	3(1)
C(5)	26(1)	20(1)	15(1)	-1(1)	0(1)	0(1)
C(6)	19(1)	20(1)	16(1)	-2(1)	0(1)	-5(1)
C(7)	28(1)	36(2)	20(1)	3(1)	-4(1)	7(1)
C(8)	11(1)	20(1)	13(1)	-3(1)	-2(1)	3(1)
C(9)	16(1)	19(1)	14(1)	-1(1)	1(1)	-2(1)
C(10)	20(1)	26(1)	16(1)	1(1)	0(1)	-5(1)
C(11)	18(1)	30(1)	28(1)	6(1)	6(1)	-1(1)
C(12)	17(1)	18(1)	9(1)	-2(1)	1(1)	-1(1)
C(13)	18(1)	19(1)	13(1)	1(1)	1(1)	1(1)
C(14)	16(1)	27(1)	18(1)	0(1)	-1(1)	-1(1)
C(15)	23(1)	23(1)	16(1)	-1(1)	2(1)	-7(1)
C(16)	26(1)	17(1)	15(1)	1(1)	0(1)	1(1)
C(17)	18(1)	21(1)	13(1)	-3(1)	-1(1)	2(1)
C(18)	16(1)	21(1)	11(1)	2(1)	3(1)	-3(1)
C(19)	19(1)	19(1)	16(1)	1(1)	3(1)	0(1)
C(20)	22(1)	21(1)	13(1)	-2(1)	1(1)	-4(1)
C(21)	16(1)	26(1)	12(1)	2(1)	1(1)	-5(1)
C(22)	18(1)	20(1)	18(1)	5(1)	3(1)	1(1)
C(23)	18(1)	19(1)	14(1)	-1(1)	2(1)	-3(1)
O(1)	30(1)	22(1)	23(1)	-3(1)	-9(1)	4(1)
O(2)	17(1)	42(1)	17(1)	-5(1)	1(1)	4(1)
O(3)	13(1)	23(1)	13(1)	-2(1)	-2(1)	1(1)
S(1)	16(1)	21(1)	13(1)	-3(1)	-3(1)	2(1)
CL1	23(1)	31(1)	20(1)	4(1)	-7(1)	-4(1)

Table S65. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2m**.

	x	y	z	U(eq)
H(2)	-1168	2683	1335	24
H(3)	-3429	4752	866	28
H(5)	-104	9551	422	25
H(6)	2161	7519	895	22
H(7A)	-3959	8121	-54	42
H(7B)	-3094	10273	268	42
H(7C)	-4378	8810	659	42
H(10A)	2578	-169	3323	24
H(10B)	1609	1153	2746	24
H(11A)	1428	2302	4070	38
H(11B)	-84	1127	3647	38
H(11C)	450	3609	3492	38
H(13)	7251	3943	2924	20
H(14)	9436	6408	2727	25
H(15)	8810	9800	2238	25
H(16)	5964	10711	1938	23
H(17)	3763	8255	2136	20
H(19)	4621	5800	4045	21
H(20)	6585	5546	4935	23
H(22)	7677	-748	4443	22
H(23)	5686	-501	3562	20

(*E*)-2-(4-fluorophenyl)-1-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2n)



Crystals were used as received. A colorless rod 0.120 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 15652 reflections were collected covering the indices, -9<=*h*<=9, -7<=*k*<=7, -24<=*l*<=24. 3513 reflections were found to be symmetry independent, with an R_{int} of 0.0630. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S66. Crystal data and structure refinement for tosylate **2n**.

X-ray ID	gene755	
Sample/notebook ID	71462-051	
Empirical formula	C23 H21 F O3 S	
Formula weight	396.46	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 7.8407(8) Å	α= 90°.
	b = 5.9578(6) Å	β= 94.566(2)°.
	c = 20.722(2) Å	γ = 90°.
Volume	964.91(17) $Å^3$	
Z	2	
Density (calculated)	1.365 Mg/m^3	
Absorption coefficient	0.199 mm^{-1}	
F(000)	416	
Crystal size	0.120 x 0.050 x 0.050 mm^3	
Theta range for data collection	1.972 to 25.384°.	
Index ranges	-9<=h<=9, -7<=k<=7, -24<=l<=24	
Reflections collected	15652	
Independent reflections	3513 [R(int) = 0.0630]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.814	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3513 / 1 / 255	
Goodness-of-fit on F^2	1.038	
Final R indices [I>2sigma(I)]	R1 = 0.0516, wR2 = 0.1186	
R indices (all data)	R1 = 0.0632, wR2 = 0.1254	
Absolute structure parameter	-0.10(6)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.715 and -0.259 $e.Å^{-3}$	

Table S67. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2n**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	9281(5)	5095(8)	8802(2)	19(1)
C(2)	10940(5)	5946(8)	8808(2)	22(1)
C(3)	12268(6)	4698(9)	9100(2)	24(1)
C(4)	11975(6)	2624(9)	9376(2)	21(1)
C(5)	10290(5)	1849(9)	9377(2)	23(1)
C(6)	8955(5)	3067(8)	9090(2)	20(1)
C(7)	13456(6)	1229(10)	9659(2)	29(1)
C(8)	6006(5)	5666(8)	7282(2)	20(1)
C(9)	6165(6)	7105(8)	6801(2)	25(1)
C(10)	7721(7)	8560(14)	6729(3)	53(2)
C(11)	8860(8)	7690(14)	6286(3)	58(2)
C(12)	4577(6)	4151(8)	7414(2)	18(1)
C(13)	4898(5)	2126(8)	7729(2)	20(1)
C(14)	3600(6)	655(8)	7849(2)	23(1)
C(15)	1902(6)	1222(9)	7662(2)	23(1)
C(16)	1565(6)	3248(9)	7359(2)	23(1)
C(17)	2868(6)	4711(8)	7235(2)	22(1)
C(18)	4834(6)	7279(8)	6238(2)	23(1)
C(19)	4588(6)	5518(9)	5803(2)	27(1)
C(20)	3418(7)	5689(9)	5271(2)	33(1)
C(21)	2471(7)	7617(10)	5194(2)	32(1)
C(22)	2671(6)	9395(9)	5605(2)	29(1)
C(23)	3873(6)	9238(9)	6131(2)	25(1)
O(1)	8133(4)	8863(6)	8303(2)	36(1)
O(2)	6046(4)	6265(7)	8697(1)	30(1)
O(3)	7491(4)	5334(6)	7722(1)	23(1)
F(1)	1287(4)	7771(6)	4675(2)	51(1)
S(1)	7597(1)	6610(2)	8403(1)	22(1)

Table S68. Bond lengths [Å] and angles [°] for tosylate **2n**.

C(1)-C(6)	1.381(6)	C(12)-C(13)	1.385(6)
C(1)-C(2)	1.395(6)	C(12)-C(17)	1.401(6)
C(1)-S(1)	1.752(5)	C(13)-C(14)	1.381(6)
C(2)-C(3)	1.379(6)	C(13)-H(13)	0.9500
C(2)-H(2)	0.9500	C(14)-C(15)	1.398(6)
C(3)-C(4)	1.388(7)	C(14)-H(14)	0.9500
C(3)-H(3)	0.9500	C(15)-C(16)	1.377(7)
C(4)-C(5)	1.400(6)	C(15)-H(15)	0.9500
C(4)-C(7)	1.508(6)	C(16)-C(17)	1.383(6)
C(5)-C(6)	1.370(6)	C(16)-H(16)	0.9500
C(5)-H(5)	0.9500	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-C(19)	1.387(7)
C(7)-H(7A)	0.9800	C(18)-C(23)	1.397(7)
C(7)-H(7B)	0.9800	C(19)-C(20)	1.380(7)
C(7)-H(7C)	0.9800	C(19)-H(19)	0.9500
C(8)-C(9)	1.329(6)	C(20)-C(21)	1.370(8)
C(8)-O(3)	1.434(5)	C(20)-H(20)	0.9500
C(8)-C(12)	1.481(6)	C(21)-C(22)	1.361(7)
C(9)-C(18)	1.506(6)	C(21)-F(1)	1.366(5)
C(9)-C(10)	1.514(7)	C(22)-C(23)	1.386(6)
C(10)-C(11)	1.428(9)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-H(23)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.426(4)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.418(3)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.598(3)
C(11)-H(11C)	0.9800		
C(6)-C(1)-C(2)	121.3(4)	C(8)-C(9)-C(18)	121.7(4)
C(6)-C(1)-S(1)	119.8(3)	C(8)-C(9)-C(10)	124.6(4)
C(2)-C(1)-S(1)	118.9(4)	C(18)-C(9)-C(10)	113.5(4)
C(3)-C(2)-C(1)	118.6(4)	C(11)-C(10)-C(9)	113.9(7)
C(3)-C(2)-H(2)	120.7	C(11)-C(10)-H(10A)	108.8
C(1)-C(2)-H(2)	120.7	C(9)-C(10)-H(10A)	108.8
C(2)-C(3)-C(4)	121.1(4)	C(11)-C(10)-H(10B)	108.8
C(2)-C(3)-H(3)	119.4	C(9)-C(10)-H(10B)	108.8
C(4)-C(3)-H(3)	119.4	H(10A)-C(10)-H(10B)	107.7
C(3)-C(4)-C(5)	118.8(4)	C(10)-C(11)-H(11A)	109.5
C(3)-C(4)-C(7)	120.2(4)	C(10)-C(11)-H(11B)	109.5
C(5)-C(4)-C(7)	121.0(5)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	120.9(5)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.6	H(11A)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.6	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.3(4)	C(13)-C(12)-C(17)	117.8(4)
C(5)-C(6)-H(6)	120.3	C(13)-C(12)-C(8)	120.4(4)
C(1)-C(6)-H(6)	120.3	C(17)-C(12)-C(8)	121.8(4)
C(4)-C(7)-H(7A)	109.5	C(14)-C(13)-C(12)	121.9(4)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.0
H(7A)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.0
C(4)-C(7)-H(7C)	109.5	C(13)-C(14)-C(15)	119.7(4)
H(7A)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	120.1
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	120.1
C(9)-C(8)-O(3)	116.5(4)	C(16)-C(15)-C(14)	118.8(4)
C(9)-C(8)-C(12)	130.4(4)	C(16)-C(15)-H(15)	120.6
O(3)-C(8)-C(12)	112.8(4)	C(14)-C(15)-H(15)	120.6

C(15)-C(16)-C(17)	121.3(4)	C(22)-C(21)-C(20)	123.0(4)
C(15)-C(16)-H(16)	119.3	F(1)-C(21)-C(20)	118.4(5)
C(17)-C(16)-H(16)	119.3	C(21)-C(22)-C(23)	118.5(5)
C(16)-C(17)-C(12)	120.4(4)	C(21)-C(22)-H(22)	120.8
C(16)-C(17)-H(17)	119.8	C(23)-C(22)-H(22)	120.8
C(12)-C(17)-H(17)	119.8	C(22)-C(23)-C(18)	120.3(5)
C(19)-C(18)-C(23)	118.9(4)	C(22)-C(23)-H(23)	119.8
C(19)-C(18)-C(9)	120.2(4)	C(18)-C(23)-H(23)	119.8
C(23)-C(18)-C(9)	120.8(4)	C(8)-O(3)-S(1)	118.6(3)
C(20)-C(19)-C(18)	120.8(5)	O(2)-S(1)-O(1)	118.1(2)
C(20)-C(19)-H(19)	119.6	O(2)-S(1)-O(3)	108.89(18)
C(18)-C(19)-H(19)	119.6	O(1)-S(1)-O(3)	108.4(2)
C(21)-C(20)-C(19)	118.3(5)	O(2)-S(1)-C(1)	111.2(2)
C(21)-C(20)-H(20)	120.8	O(1)-S(1)-C(1)	109.5(2)
C(19)-C(20)-H(20)	120.8	O(3)-S(1)-C(1)	99.00(19)
C(22)-C(21)-F(1)	118.5(5)		

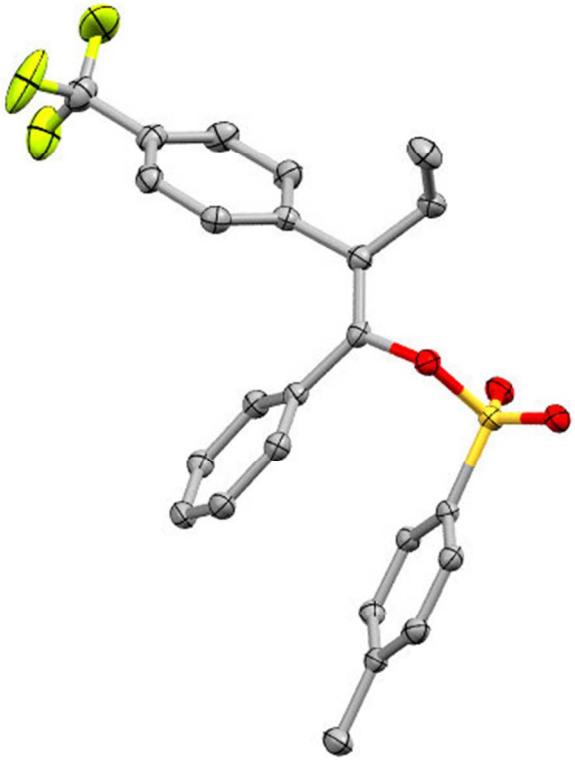
Table S69. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2n**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	17(2)	22(3)	19(2)	-1(2)	2(2)	0(2)
C(2)	20(2)	24(3)	20(2)	4(2)	-2(2)	-2(2)
C(3)	17(2)	32(3)	24(2)	2(2)	3(2)	-6(2)
C(4)	21(2)	25(2)	16(2)	-2(2)	1(2)	3(2)
C(5)	25(2)	21(3)	22(2)	-1(2)	2(2)	0(2)
C(6)	14(2)	18(3)	26(2)	-5(2)	2(2)	-7(2)
C(7)	27(3)	32(3)	29(2)	0(2)	0(2)	9(2)
C(8)	13(2)	28(3)	20(2)	-2(2)	0(2)	-2(2)
C(9)	20(2)	33(3)	22(2)	2(2)	2(2)	-7(2)
C(10)	29(3)	96(6)	33(3)	24(3)	-9(2)	-25(3)
C(11)	33(3)	75(5)	65(4)	24(4)	6(3)	2(3)
C(12)	20(2)	19(2)	14(2)	-5(2)	0(2)	-3(2)
C(13)	17(2)	26(3)	18(2)	-1(2)	-2(2)	3(2)
C(14)	30(3)	20(3)	19(2)	-1(2)	2(2)	-2(2)
C(15)	22(2)	28(3)	21(2)	1(2)	3(2)	-2(2)
C(16)	13(2)	32(3)	23(2)	1(2)	0(2)	-1(2)
C(17)	20(2)	23(3)	22(2)	2(2)	2(2)	1(2)
C(18)	21(2)	27(3)	21(2)	3(2)	4(2)	-6(2)
C(19)	29(3)	27(3)	24(2)	1(2)	3(2)	0(2)
C(20)	44(3)	29(3)	24(3)	-5(2)	-5(2)	-9(3)
C(21)	35(3)	36(3)	22(2)	7(2)	-7(2)	-11(3)
C(22)	27(3)	29(3)	30(3)	7(2)	0(2)	-1(2)
C(23)	26(3)	29(3)	21(2)	-3(2)	2(2)	-5(2)
O(1)	31(2)	26(2)	47(2)	2(2)	-15(2)	2(2)
O(2)	20(2)	45(2)	25(2)	-8(2)	0(1)	4(2)
O(3)	14(2)	35(2)	21(2)	-1(2)	-2(1)	0(1)
F(1)	53(2)	52(2)	42(2)	11(2)	-28(2)	-11(2)
S(1)	17(1)	24(1)	24(1)	-3(1)	-4(1)	1(1)

Table S70. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2n**.

	x	y	z	U(eq)
H(2)	11151	7355	8614	26
H(3)	13402	5267	9112	29
H(5)	10069	461	9580	27
H(6)	7816	2521	9089	23
H(7A)	14271	994	9330	44
H(7B)	13031	-227	9797	44
H(7C)	14026	2011	10032	44
H(10A)	7335	10070	6581	64
H(10B)	8354	8734	7159	64
H(11A)	9297	6228	6441	87
H(11B)	9818	8731	6256	87
H(11C)	8247	7514	5859	87
H(13)	6045	1739	7866	24
H(14)	3860	-736	8058	27
H(15)	997	227	7743	28
H(16)	414	3649	7232	28
H(17)	2605	6103	7027	26
H(19)	5234	4178	5871	32
H(20)	3273	4499	4966	39
H(22)	2001	10714	5534	35
H(23)	4046	10469	6420	30

(*E*)-1-phenyl-2-(4-(trifluoromethyl)phenyl)but-1-en-1-yl 4-methylbenzenesulfonate (2o)



Crystals were used as received. A colorless prism 0.050 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 44627 reflections were collected covering the indices, -26<=*h*<=26, -12<=*k*<=12, -23<=*l*<=23. 3967 reflections were found to be symmetry independent, with an R_{int} of 0.0557. Indexing and unit cell refinement indicated a C-centered, monoclinic lattice. The space group was found to be C 2/c (No. 15). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S71. Crystal data and structure refinement for tosylate **2o**.

X-ray ID	gene780	
Sample/notebook ID	71462-64	
Empirical formula	C24 H21 F3 O3 S	
Formula weight	446.47	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	C 2/c	
Unit cell dimensions	a = 22.047(2) Å	α= 90°.
	b = 10.2379(10) Å	β= 100.020(2)°.
	c = 19.341(2) Å	γ = 90°.
Volume	4299.1(8) $Å^3$	
Z	8	
Density (calculated)	1.380 Mg/m^3	
Absorption coefficient	0.200 mm^{-1}	
F(000)	1856	
Crystal size	0.050 x 0.050 x 0.050 mm^3	
Theta range for data collection	1.876 to 25.380°.	
Index ranges	-26<=h<=26, -12<=k<=12, -23<=l<=23	
Reflections collected	44627	
Independent reflections	3967 [R(int) = 0.0557]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.838	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3967 / 0 / 282	
Goodness-of-fit on F^2	1.035	
Final R indices [I>2sigma(I)]	R1 = 0.0465, wR2 = 0.1125	
R indices (all data)	R1 = 0.0591, wR2 = 0.1232	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.754 and -0.578 $e.Å^{-3}$	

Table S72. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2o**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2931(1)	882(2)	7298(1)	19(1)
C(2)	2668(1)	1807(2)	7678(1)	20(1)
C(3)	2685(1)	1606(2)	8391(1)	22(1)
C(4)	2954(1)	484(2)	8719(1)	22(1)
C(5)	3216(1)	-426(2)	8322(1)	23(1)
C(6)	3210(1)	-238(2)	7616(1)	21(1)
C(7)	2970(1)	244(2)	9491(1)	30(1)
C(8)	3755(1)	3032(2)	6538(1)	19(1)
C(9)	3796(1)	3815(2)	5997(1)	21(1)
C(10)	3633(1)	3379(2)	5238(1)	26(1)
C(11)	4205(1)	3019(3)	4937(1)	36(1)
C(12)	4052(1)	5162(2)	6111(1)	21(1)
C(13)	4631(1)	5378(2)	6514(1)	23(1)
C(14)	4881(1)	6622(2)	6583(1)	25(1)
C(15)	4553(1)	7671(2)	6261(1)	24(1)
C(16)	3970(1)	7478(2)	5863(1)	29(1)
C(17)	3728(1)	6229(2)	5784(1)	27(1)
C(18)	4809(1)	9018(2)	6335(1)	34(1)
C(19)	3868(1)	3316(2)	7299(1)	19(1)
C(20)	3617(1)	4424(2)	7561(1)	22(1)
C(21)	3690(1)	4642(2)	8276(1)	25(1)
C(22)	4018(1)	3759(2)	8744(1)	26(1)
C(23)	4273(1)	2655(2)	8491(1)	24(1)
C(24)	4200(1)	2436(2)	7775(1)	22(1)
O(1)	2928(1)	-91(2)	6062(1)	28(1)
O(2)	2495(1)	2122(2)	6146(1)	26(1)
O(3)	3610(1)	1690(1)	6374(1)	21(1)
F(1)	4687(1)	9701(2)	5742(1)	84(1)
F(2)	5410(1)	9050(2)	6557(1)	68(1)
F(3)	4566(1)	9728(2)	6794(1)	53(1)
S(1)	2936(1)	1141(1)	6404(1)	21(1)

Table S73. Bond lengths [Å] and angles [°] for tosylate **2o**.

C(1)-C(2)	1.388(3)	C(12)-C(17)	1.396(3)
C(1)-C(6)	1.392(3)	C(13)-C(14)	1.385(3)
C(1)-S(1)	1.751(2)	C(13)-H(13)	0.9500
C(2)-C(3)	1.388(3)	C(14)-C(15)	1.381(3)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.393(3)	C(15)-C(16)	1.393(3)
C(3)-H(3)	0.9500	C(15)-C(18)	1.488(3)
C(4)-C(5)	1.395(3)	C(16)-C(17)	1.384(3)
C(4)-C(7)	1.507(3)	C(16)-H(16)	0.9500
C(5)-C(6)	1.378(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-F(2)	1.319(3)
C(6)-H(6)	0.9500	C(18)-F(3)	1.329(3)
C(7)-H(7A)	0.9800	C(18)-F(1)	1.331(3)
C(7)-H(7B)	0.9800	C(19)-C(20)	1.396(3)
C(7)-H(7C)	0.9800	C(19)-C(24)	1.400(3)
C(8)-C(9)	1.334(3)	C(20)-C(21)	1.383(3)
C(8)-O(3)	1.433(2)	C(20)-H(20)	0.9500
C(8)-C(19)	1.478(3)	C(21)-C(22)	1.390(3)
C(9)-C(12)	1.491(3)	C(21)-H(21)	0.9500
C(9)-C(10)	1.517(3)	C(22)-C(23)	1.389(3)
C(10)-C(11)	1.524(3)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-C(24)	1.385(3)
C(10)-H(10B)	0.9900	C(23)-H(23)	0.9500
C(11)-H(11A)	0.9800	C(24)-H(24)	0.9500
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4237(16)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4254(16)
C(12)-C(13)	1.392(3)	O(3)-S(1)	1.5997(15)
C(2)-C(1)-C(6)	121.43(19)	O(3)-C(8)-C(19)	113.68(17)
C(2)-C(1)-S(1)	119.63(16)	C(8)-C(9)-C(12)	121.07(19)
C(6)-C(1)-S(1)	118.91(16)	C(8)-C(9)-C(10)	123.0(2)
C(3)-C(2)-C(1)	118.9(2)	C(12)-C(9)-C(10)	115.79(18)
C(3)-C(2)-H(2)	120.6	C(9)-C(10)-C(11)	111.55(19)
C(1)-C(2)-H(2)	120.6	C(9)-C(10)-H(10A)	109.3
C(2)-C(3)-C(4)	120.8(2)	C(11)-C(10)-H(10A)	109.3
C(2)-C(3)-H(3)	119.6	C(9)-C(10)-H(10B)	109.3
C(4)-C(3)-H(3)	119.6	C(11)-C(10)-H(10B)	109.3
C(3)-C(4)-C(5)	118.94(19)	H(10A)-C(10)-H(10B)	108.0
C(3)-C(4)-C(7)	121.4(2)	C(10)-C(11)-H(11A)	109.5
C(5)-C(4)-C(7)	119.7(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-C(4)	121.2(2)	H(11A)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.4	C(10)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.4	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	118.7(2)	H(11B)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.6	C(13)-C(12)-C(17)	118.5(2)
C(1)-C(6)-H(6)	120.6	C(13)-C(12)-C(9)	121.08(19)
C(4)-C(7)-H(7A)	109.5	C(17)-C(12)-C(9)	120.39(19)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	120.8(2)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.6
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.6
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	120.2(2)
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.9
C(9)-C(8)-O(3)	116.50(18)	C(13)-C(14)-H(14)	119.9
C(9)-C(8)-C(19)	129.7(2)	C(14)-C(15)-C(16)	120.0(2)

C(14)-C(15)-C(18)	121.2(2)	C(20)-C(21)-C(22)	120.2(2)
C(16)-C(15)-C(18)	118.9(2)	C(20)-C(21)-H(21)	119.9
C(17)-C(16)-C(15)	119.6(2)	C(22)-C(21)-H(21)	119.9
C(17)-C(16)-H(16)	120.2	C(23)-C(22)-C(21)	119.7(2)
C(15)-C(16)-H(16)	120.2	C(23)-C(22)-H(22)	120.1
C(16)-C(17)-C(12)	121.0(2)	C(21)-C(22)-H(22)	120.1
C(16)-C(17)-H(17)	119.5	C(24)-C(23)-C(22)	120.1(2)
C(12)-C(17)-H(17)	119.5	C(24)-C(23)-H(23)	120.0
F(2)-C(18)-F(3)	105.5(2)	C(22)-C(23)-H(23)	120.0
F(2)-C(18)-F(1)	108.0(2)	C(23)-C(24)-C(19)	120.7(2)
F(3)-C(18)-F(1)	104.1(2)	C(23)-C(24)-H(24)	119.7
F(2)-C(18)-C(15)	113.3(2)	C(19)-C(24)-H(24)	119.7
F(3)-C(18)-C(15)	112.4(2)	C(8)-O(3)-S(1)	120.10(12)
F(1)-C(18)-C(15)	112.8(2)	O(1)-S(1)-O(2)	120.59(9)
C(20)-C(19)-C(24)	118.63(19)	O(1)-S(1)-O(3)	103.32(9)
C(20)-C(19)-C(8)	120.85(19)	O(2)-S(1)-O(3)	108.75(9)
C(24)-C(19)-C(8)	120.42(19)	O(1)-S(1)-C(1)	108.84(10)
C(21)-C(20)-C(19)	120.7(2)	O(2)-S(1)-C(1)	109.37(9)
C(21)-C(20)-H(20)	119.7	O(3)-S(1)-C(1)	104.74(9)
C(19)-C(20)-H(20)	119.7		

Symmetry transformations used to generate equivalent atoms:

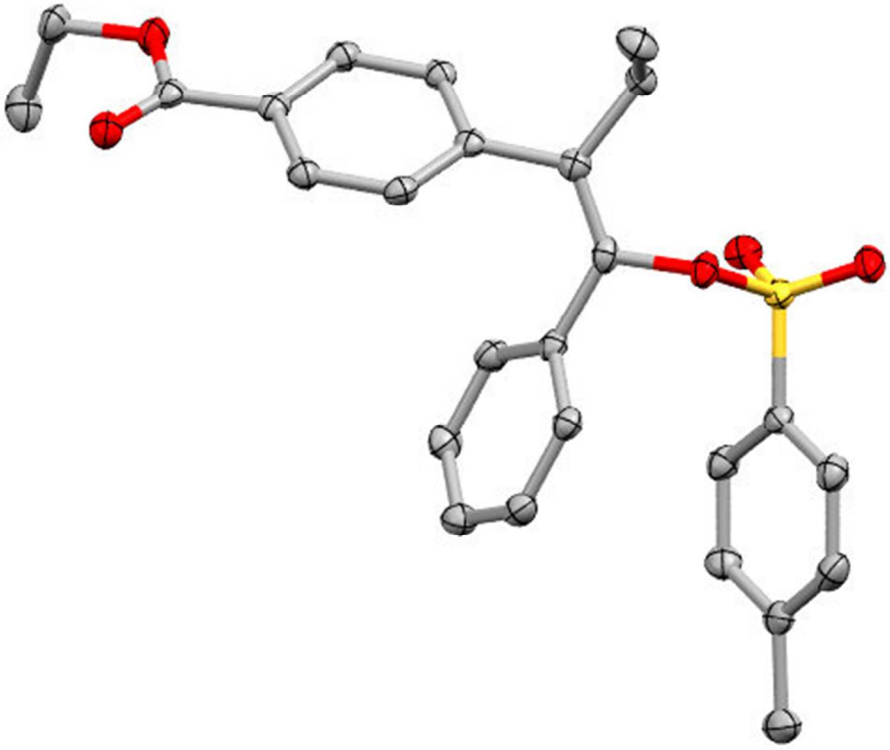
Table S74. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2o**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(1)	23(1)	16(1)	1(1)	2(1)	-5(1)
C(2)	20(1)	20(1)	21(1)	1(1)	4(1)	-2(1)
C(3)	20(1)	26(1)	22(1)	-4(1)	4(1)	-3(1)
C(4)	18(1)	29(1)	19(1)	0(1)	2(1)	-6(1)
C(5)	20(1)	25(1)	24(1)	5(1)	2(1)	-2(1)
C(6)	21(1)	20(1)	24(1)	-1(1)	5(1)	-3(1)
C(7)	30(1)	40(1)	20(1)	2(1)	4(1)	-4(1)
C(8)	17(1)	18(1)	24(1)	-2(1)	5(1)	-2(1)
C(9)	19(1)	23(1)	21(1)	0(1)	4(1)	0(1)
C(10)	32(1)	26(1)	20(1)	2(1)	3(1)	-5(1)
C(11)	43(2)	40(2)	26(1)	-5(1)	7(1)	4(1)
C(12)	23(1)	23(1)	17(1)	1(1)	5(1)	0(1)
C(13)	23(1)	22(1)	23(1)	2(1)	5(1)	3(1)
C(14)	20(1)	29(1)	25(1)	-3(1)	4(1)	-3(1)
C(15)	26(1)	22(1)	28(1)	-2(1)	11(1)	-1(1)
C(16)	27(1)	24(1)	35(1)	7(1)	6(1)	6(1)
C(17)	22(1)	28(1)	29(1)	5(1)	0(1)	-1(1)
C(18)	36(1)	26(1)	41(1)	-4(1)	9(1)	-2(1)
C(19)	18(1)	21(1)	20(1)	0(1)	5(1)	-3(1)
C(20)	21(1)	21(1)	24(1)	1(1)	4(1)	0(1)
C(21)	23(1)	25(1)	28(1)	-6(1)	8(1)	-3(1)
C(22)	27(1)	32(1)	19(1)	-3(1)	4(1)	-7(1)
C(23)	24(1)	26(1)	22(1)	4(1)	0(1)	-3(1)
C(24)	20(1)	20(1)	25(1)	-1(1)	4(1)	-2(1)
O(1)	40(1)	26(1)	19(1)	-4(1)	7(1)	-7(1)
O(2)	26(1)	31(1)	19(1)	4(1)	1(1)	0(1)
O(3)	25(1)	19(1)	21(1)	-2(1)	7(1)	-1(1)
F(1)	149(2)	43(1)	54(1)	13(1)	2(1)	-47(1)
F(2)	28(1)	32(1)	144(2)	-17(1)	15(1)	-9(1)
F(3)	45(1)	34(1)	82(1)	-26(1)	12(1)	1(1)
S(1)	25(1)	22(1)	16(1)	-1(1)	3(1)	-4(1)

Table S75. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2o**.

	x	y	z	U(eq)
H(2)	2478	2566	7454	24
H(3)	2513	2240	8658	27
H(5)	3403	-1190	8543	28
H(6)	3392	-861	7350	26
H(7A)	2686	-467	9551	45
H(7B)	2845	1040	9710	45
H(7C)	3389	2	9713	45
H(10A)	3410	4091	4954	31
H(10B)	3355	2613	5207	31
H(11A)	4493	3757	4994	54
H(11B)	4087	2812	4437	54
H(11C)	4404	2257	5187	54
H(13)	4856	4665	6744	27
H(14)	5280	6754	6852	29
H(16)	3740	8199	5648	34
H(17)	3334	6096	5502	32
H(20)	3394	5035	7244	26
H(21)	3515	5398	8448	30
H(22)	4067	3910	9235	31
H(23)	4497	2050	8809	29
H(24)	4378	1682	7605	26

Ethyl (*E*)-4-(1-phenyl-1-(tosyloxy)but-1-en-2-yl)benzoate (2p)



Crystals were used as received. A colorless blade 0.080 x 0.050 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 40780 reflections were collected covering the indices, -8<=*h*<=8, -16<=*k*<=16, -28<=*l*<=28. 4187 reflections were found to be symmetry independent, with an R_{int} of 0.0517. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S76. Crystal data and structure refinement for tosylate **2p**.

X-ray ID	gene869	
Sample/notebook ID	71452-089	
Empirical formula	C26 H26 O5 S	
Formula weight	450.53	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 7.2960(4) Å	α= 90°.
	b = 13.4620(7) Å	β= 95.558(2)°.
	c = 23.3477(12) Å	γ = 90°.
Volume	2282.4(2) $Å^3$	
Z	4	
Density (calculated)	1.311 Mg/m^3	
Absorption coefficient	0.177 mm^{-1}	
F(000)	952	
Crystal size	0.080 x 0.050 x 0.030 mm^3	
Theta range for data collection	1.748 to 25.372°.	
Index ranges	-8<=h<=8, -16<=k<=16, -28<=l<=28	
Reflections collected	40780	
Independent reflections	4187 [R(int) = 0.0517]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.812	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	4187 / 0 / 292	
Goodness-of-fit on F^2	1.055	
Final R indices [I>2sigma(I)]	R1 = 0.0410, wR2 = 0.0955	
R indices (all data)	R1 = 0.0543, wR2 = 0.1027	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.284 and -0.368 $e.Å^{-3}$	

Table S77. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2p**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6446(2)	5852(1)	3327(1)	20(1)
C(2)	6296(2)	6261(1)	3867(1)	23(1)
C(3)	5851(3)	7254(2)	3905(1)	26(1)
C(4)	5580(2)	7848(1)	3418(1)	24(1)
C(5)	5716(3)	7417(2)	2883(1)	28(1)
C(6)	6142(3)	6423(1)	2833(1)	25(1)
C(7)	5201(3)	8944(2)	3474(1)	32(1)
C(8)	4070(2)	3697(1)	3566(1)	20(1)
C(9)	4119(2)	2721(1)	3667(1)	20(1)
C(10)	5295(3)	2018(1)	3354(1)	22(1)
C(11)	4174(3)	1501(2)	2855(1)	31(1)
C(12)	3080(2)	4497(1)	3841(1)	19(1)
C(13)	2125(2)	5215(1)	3500(1)	21(1)
C(14)	1225(2)	5979(1)	3750(1)	24(1)
C(15)	1267(3)	6043(2)	4342(1)	27(1)
C(16)	2219(3)	5341(1)	4687(1)	26(1)
C(17)	3127(3)	4569(1)	4438(1)	23(1)
C(18)	2922(2)	2273(1)	4079(1)	19(1)
C(19)	1042(2)	2494(1)	4051(1)	20(1)
C(20)	-47(3)	2107(1)	4451(1)	21(1)
C(21)	722(2)	1481(1)	4886(1)	20(1)
C(22)	2582(2)	1231(1)	4905(1)	21(1)
C(23)	3666(3)	1624(1)	4506(1)	21(1)
C(24)	-456(3)	1122(1)	5329(1)	22(1)
C(25)	-405(3)	322(2)	6241(1)	27(1)
C(26)	-521(3)	1170(2)	6659(1)	32(1)
O(1)	7944(2)	4458(1)	2769(1)	29(1)
O(2)	7762(2)	4223(1)	3813(1)	26(1)
O(3)	5066(2)	4047(1)	3107(1)	22(1)
O(4)	-2096(2)	1262(1)	5317(1)	27(1)
O(5)	544(2)	633(1)	5753(1)	25(1)
S(1)	7007(1)	4591(1)	3270(1)	21(1)

Table S78. Bond lengths [Å] and angles [°] for tosylate **2p**.

C(1)-C(6)	1.385(3)	C(14)-C(15)	1.382(3)
C(1)-C(2)	1.388(3)	C(14)-H(14)	0.9500
C(1)-S(1)	1.7552(19)	C(15)-C(16)	1.385(3)
C(2)-C(3)	1.382(3)	C(15)-H(15)	0.9500
C(2)-H(2)	0.9500	C(16)-C(17)	1.388(3)
C(3)-C(4)	1.388(3)	C(16)-H(16)	0.9500
C(3)-H(3)	0.9500	C(17)-H(17)	0.9500
C(4)-C(5)	1.390(3)	C(18)-C(23)	1.397(3)
C(4)-C(7)	1.510(3)	C(18)-C(19)	1.399(2)
C(5)-C(6)	1.381(3)	C(19)-C(20)	1.387(3)
C(5)-H(5)	0.9500	C(19)-H(19)	0.9500
C(6)-H(6)	0.9500	C(20)-C(21)	1.394(3)
C(7)-H(7A)	0.9800	C(20)-H(20)	0.9500
C(7)-H(7B)	0.9800	C(21)-C(22)	1.395(3)
C(7)-H(7C)	0.9800	C(21)-C(24)	1.489(3)
C(8)-C(9)	1.335(3)	C(22)-C(23)	1.384(3)
C(8)-O(3)	1.432(2)	C(22)-H(22)	0.9500
C(8)-C(12)	1.477(3)	C(23)-H(23)	0.9500
C(9)-C(18)	1.488(2)	C(24)-O(4)	1.209(2)
C(9)-C(10)	1.511(3)	C(24)-O(5)	1.343(2)
C(10)-C(11)	1.526(3)	C(25)-O(5)	1.451(2)
C(10)-H(10A)	0.9900	C(25)-C(26)	1.509(3)
C(10)-H(10B)	0.9900	C(25)-H(25A)	0.9900
C(11)-H(11A)	0.9800	C(25)-H(25B)	0.9900
C(11)-H(11B)	0.9800	C(26)-H(26A)	0.9800
C(11)-H(11C)	0.9800	C(26)-H(26B)	0.9800
C(12)-C(13)	1.395(3)	C(26)-H(26C)	0.9800
C(12)-C(17)	1.396(2)	O(1)-S(1)	1.4217(13)
C(13)-C(14)	1.380(3)	O(2)-S(1)	1.4226(14)
C(13)-H(13)	0.9500	O(3)-S(1)	1.6056(13)
C(6)-C(1)-C(2)	121.01(18)	H(7B)-C(7)-H(7C)	109.5
C(6)-C(1)-S(1)	119.51(14)	C(9)-C(8)-O(3)	116.69(16)
C(2)-C(1)-S(1)	119.49(14)	C(9)-C(8)-C(12)	130.37(17)
C(3)-C(2)-C(1)	118.84(18)	O(3)-C(8)-C(12)	112.90(15)
C(3)-C(2)-H(2)	120.6	C(8)-C(9)-C(18)	120.32(16)
C(1)-C(2)-H(2)	120.6	C(8)-C(9)-C(10)	122.61(17)
C(2)-C(3)-C(4)	121.29(18)	C(18)-C(9)-C(10)	117.00(16)
C(2)-C(3)-H(3)	119.4	C(9)-C(10)-C(11)	111.54(15)
C(4)-C(3)-H(3)	119.4	C(9)-C(10)-H(10A)	109.3
C(3)-C(4)-C(5)	118.64(18)	C(11)-C(10)-H(10A)	109.3
C(3)-C(4)-C(7)	120.26(18)	C(9)-C(10)-H(10B)	109.3
C(5)-C(4)-C(7)	121.07(18)	C(11)-C(10)-H(10B)	109.3
C(6)-C(5)-C(4)	121.05(18)	H(10A)-C(10)-H(10B)	108.0
C(6)-C(5)-H(5)	119.5	C(10)-C(11)-H(11A)	109.5
C(4)-C(5)-H(5)	119.5	C(10)-C(11)-H(11B)	109.5
C(5)-C(6)-C(1)	119.15(18)	H(11A)-C(11)-H(11B)	109.5
C(5)-C(6)-H(6)	120.4	C(10)-C(11)-H(11C)	109.5
C(1)-C(6)-H(6)	120.4	H(11A)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7A)	109.5	H(11B)-C(11)-H(11C)	109.5
C(4)-C(7)-H(7B)	109.5	C(13)-C(12)-C(17)	118.96(17)
H(7A)-C(7)-H(7B)	109.5	C(13)-C(12)-C(8)	119.75(16)
C(4)-C(7)-H(7C)	109.5	C(17)-C(12)-C(8)	121.26(16)
H(7A)-C(7)-H(7C)	109.5	C(14)-C(13)-C(12)	120.50(17)

C(14)-C(13)-H(13)	119.8	C(21)-C(22)-H(22)	119.9
C(12)-C(13)-H(13)	119.8	C(22)-C(23)-C(18)	120.79(17)
C(13)-C(14)-C(15)	120.26(18)	C(22)-C(23)-H(23)	119.6
C(13)-C(14)-H(14)	119.9	C(18)-C(23)-H(23)	119.6
C(15)-C(14)-H(14)	119.9	O(4)-C(24)-O(5)	123.96(16)
C(14)-C(15)-C(16)	120.01(18)	O(4)-C(24)-C(21)	124.75(17)
C(14)-C(15)-H(15)	120.0	O(5)-C(24)-C(21)	111.28(15)
C(16)-C(15)-H(15)	120.0	O(5)-C(25)-C(26)	110.52(16)
C(15)-C(16)-C(17)	120.07(18)	O(5)-C(25)-H(25A)	109.5
C(15)-C(16)-H(16)	120.0	C(26)-C(25)-H(25A)	109.5
C(17)-C(16)-H(16)	120.0	O(5)-C(25)-H(25B)	109.5
C(16)-C(17)-C(12)	120.19(18)	C(26)-C(25)-H(25B)	109.5
C(16)-C(17)-H(17)	119.9	H(25A)-C(25)-H(25B)	108.1
C(12)-C(17)-H(17)	119.9	C(25)-C(26)-H(26A)	109.5
C(23)-C(18)-C(19)	118.59(16)	C(25)-C(26)-H(26B)	109.5
C(23)-C(18)-C(9)	120.24(16)	H(26A)-C(26)-H(26B)	109.5
C(19)-C(18)-C(9)	121.17(16)	C(25)-C(26)-H(26C)	109.5
C(20)-C(19)-C(18)	120.77(17)	H(26A)-C(26)-H(26C)	109.5
C(20)-C(19)-H(19)	119.6	H(26B)-C(26)-H(26C)	109.5
C(18)-C(19)-H(19)	119.6	C(8)-O(3)-S(1)	118.29(11)
C(19)-C(20)-C(21)	120.10(17)	C(24)-O(5)-C(25)	117.00(14)
C(19)-C(20)-H(20)	119.9	O(1)-S(1)-O(2)	120.99(8)
C(21)-C(20)-H(20)	119.9	O(1)-S(1)-O(3)	103.43(7)
C(20)-C(21)-C(22)	119.45(16)	O(2)-S(1)-O(3)	107.97(7)
C(20)-C(21)-C(24)	118.92(16)	O(1)-S(1)-C(1)	108.58(8)
C(22)-C(21)-C(24)	121.60(17)	O(2)-S(1)-C(1)	109.93(8)
C(23)-C(22)-C(21)	120.23(17)	O(3)-S(1)-C(1)	104.58(8)
C(23)-C(22)-H(22)	119.9		

Symmetry transformations used to generate equivalent atoms:

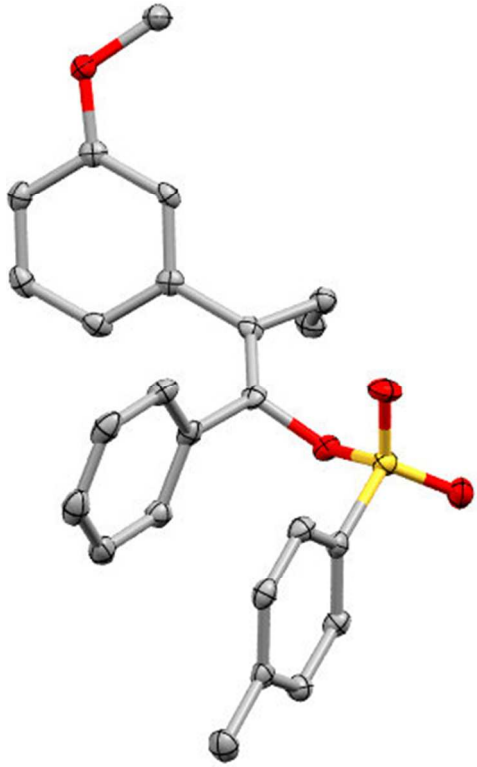
Table S79. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2p**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	20(1)	18(1)	24(1)	-2(1)	4(1)	-3(1)
C(2)	26(1)	23(1)	21(1)	0(1)	1(1)	-4(1)
C(3)	29(1)	24(1)	26(1)	-6(1)	4(1)	-4(1)
C(4)	16(1)	21(1)	36(1)	-1(1)	4(1)	-3(1)
C(5)	29(1)	26(1)	29(1)	8(1)	3(1)	-4(1)
C(6)	28(1)	26(1)	21(1)	-2(1)	5(1)	-5(1)
C(7)	26(1)	23(1)	47(1)	0(1)	5(1)	0(1)
C(8)	21(1)	24(1)	14(1)	0(1)	2(1)	-4(1)
C(9)	21(1)	21(1)	18(1)	-2(1)	0(1)	-2(1)
C(10)	24(1)	21(1)	22(1)	-1(1)	6(1)	0(1)
C(11)	35(1)	30(1)	27(1)	-8(1)	4(1)	4(1)
C(12)	20(1)	17(1)	19(1)	-1(1)	2(1)	-5(1)
C(13)	21(1)	21(1)	20(1)	0(1)	2(1)	-4(1)
C(14)	22(1)	21(1)	28(1)	4(1)	0(1)	-1(1)
C(15)	29(1)	21(1)	32(1)	-4(1)	6(1)	0(1)
C(16)	35(1)	26(1)	19(1)	-3(1)	6(1)	-2(1)
C(17)	28(1)	21(1)	20(1)	2(1)	2(1)	-1(1)
C(18)	23(1)	16(1)	19(1)	-3(1)	3(1)	-2(1)
C(19)	25(1)	16(1)	20(1)	0(1)	0(1)	-1(1)
C(20)	21(1)	21(1)	22(1)	-3(1)	3(1)	-2(1)
C(21)	26(1)	16(1)	18(1)	-4(1)	2(1)	-3(1)
C(22)	25(1)	18(1)	20(1)	-1(1)	0(1)	-1(1)
C(23)	20(1)	20(1)	23(1)	-4(1)	3(1)	-1(1)
C(24)	28(1)	16(1)	21(1)	-3(1)	4(1)	-3(1)
C(25)	31(1)	29(1)	22(1)	7(1)	7(1)	-2(1)
C(26)	30(1)	43(1)	25(1)	-4(1)	4(1)	-8(1)
O(1)	34(1)	26(1)	30(1)	-6(1)	16(1)	-5(1)
O(2)	27(1)	22(1)	28(1)	0(1)	1(1)	0(1)
O(3)	26(1)	23(1)	16(1)	-2(1)	5(1)	-6(1)
O(4)	26(1)	29(1)	28(1)	2(1)	6(1)	-2(1)
O(5)	27(1)	27(1)	21(1)	5(1)	6(1)	-1(1)
S(1)	23(1)	19(1)	23(1)	-2(1)	6(1)	-3(1)

Table S80. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2p**.

	x	y	z	U(eq)
H(2)	6497	5864	4203	28
H(3)	5727	7537	4272	31
H(5)	5513	7812	2546	34
H(6)	6225	6134	2466	30
H(7A)	6370	9303	3546	48
H(7B)	4457	9054	3796	48
H(7C)	4531	9188	3118	48
H(10A)	5838	1511	3628	27
H(10B)	6316	2393	3206	27
H(11A)	3133	1151	2998	46
H(11B)	4957	1023	2676	46
H(11C)	3712	1997	2569	46
H(13)	2094	5178	3093	25
H(14)	573	6463	3514	28
H(15)	642	6569	4512	32
H(16)	2253	5387	5093	32
H(17)	3781	4089	4676	28
H(19)	506	2915	3754	24
H(20)	-1319	2269	4430	26
H(22)	3106	788	5193	25
H(23)	4933	1450	4524	25
H(25A)	264	-241	6438	32
H(25B)	-1661	93	6105	32
H(26A)	719	1423	6775	48
H(26B)	-1079	934	6999	48
H(26C)	-1279	1702	6474	48

(*E*)-2-(3-methoxyphenyl)-1-phenylbut-1-en-1-yl 4-methylbenzenesulfonate (2q)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 1.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 19646 reflections were collected covering the indices, -8<=*h*<=8, -9<=*k*<=9, -23<=*l*<=23. 3954 reflections were found to be symmetry independent, with an R_{int} of 0.0373. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S81. Crystal data and structure refinement for tosylate **2q**.

X-ray ID	gene798	
Sample/notebook ID	71462-71	
Empirical formula	C24 H24 O4 S	
Formula weight	408.49	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 16.2361(11) Å	α= 90°.
	b = 7.3738(5) Å	β= 107.5910(10)°.
	c = 17.5467(12) Å	γ = 90°.
Volume	2002.5(2) $Å^3$	
Z	4	
Density (calculated)	1.355 Mg/m^3	
Absorption coefficient	0.190 mm^{-1}	
F(000)	864	
Crystal size	0.060 x 0.050 x 0.050 mm^3	
Theta range for data collection	1.498 to 25.371°.	
Index ranges	-19<=h<=19, -8<=k<=8, -20<=l<=21	
Reflections collected	27159	
Independent reflections	3671 [R(int) = 0.0684]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.799	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3671 / 0 / 265	
Goodness-of-fit on F^2	1.055	
Final R indices [I>2sigma(I)]	R1 = 0.0441, wR2 = 0.1020	
R indices (all data)	R1 = 0.0625, wR2 = 0.1125	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.350 and -0.358 $e.Å^{-3}$	

Table S82. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2q**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2826(1)	3005(3)	6746(1)	18(1)
C(2)	2715(1)	3772(3)	7432(1)	19(1)
C(3)	3350(1)	3544(3)	8153(1)	20(1)
C(4)	4102(1)	2563(3)	8210(1)	19(1)
C(5)	4193(1)	1814(3)	7511(1)	20(1)
C(6)	3569(1)	2024(3)	6784(1)	20(1)
C(7)	4785(1)	2289(3)	9000(1)	26(1)
C(8)	2655(1)	6053(3)	5250(1)	17(1)
C(9)	2343(1)	6802(3)	4526(1)	16(1)
C(10)	1388(1)	6823(3)	4084(1)	19(1)
C(11)	986(1)	8668(3)	4147(1)	24(1)
C(12)	2929(1)	7849(3)	4174(1)	17(1)
C(13)	3484(1)	9152(3)	4628(1)	19(1)
C(14)	4019(1)	10149(3)	4303(1)	21(1)
C(15)	4004(1)	9881(3)	3521(1)	20(1)
C(16)	3432(1)	8626(3)	3051(1)	17(1)
C(17)	2895(1)	7609(3)	3373(1)	17(1)
C(18)	2764(1)	7562(3)	1717(1)	23(1)
C(19)	3560(1)	5897(3)	5767(1)	18(1)
C(20)	3812(1)	6692(3)	6526(1)	20(1)
C(21)	4641(1)	6472(3)	7026(1)	24(1)
C(22)	5232(2)	5439(3)	6783(1)	28(1)
C(23)	4988(1)	4642(3)	6036(1)	25(1)
C(24)	4154(1)	4874(3)	5529(1)	22(1)
O(1)	2236(1)	2260(2)	5232(1)	25(1)
O(2)	1194(1)	3087(2)	5954(1)	26(1)
O(3)	2040(1)	5399(2)	5623(1)	18(1)
O(4)	3450(1)	8521(2)	2275(1)	22(1)
S(1)	2016(1)	3289(1)	5831(1)	19(1)

Table S83. Bond lengths [Å] and angles [°] for tosylate **2q**.

C(1)-C(2)	1.390(3)	C(13)-C(14)	1.386(3)
C(1)-C(6)	1.390(3)	C(13)-H(13)	0.9500
C(1)-S(1)	1.753(2)	C(14)-C(15)	1.379(3)
C(2)-C(3)	1.379(3)	C(14)-H(14)	0.9500
C(2)-H(2)	0.9500	C(15)-C(16)	1.391(3)
C(3)-C(4)	1.396(3)	C(15)-H(15)	0.9500
C(3)-H(3)	0.9500	C(16)-O(4)	1.374(2)
C(4)-C(5)	1.393(3)	C(16)-C(17)	1.392(3)
C(4)-C(7)	1.504(3)	C(17)-H(17)	0.9500
C(5)-C(6)	1.378(3)	C(18)-O(4)	1.428(3)
C(5)-H(5)	0.9500	C(18)-H(18A)	0.9800
C(6)-H(6)	0.9500	C(18)-H(18B)	0.9800
C(7)-H(7A)	0.9800	C(18)-H(18C)	0.9800
C(7)-H(7B)	0.9800	C(19)-C(24)	1.385(3)
C(7)-H(7C)	0.9800	C(19)-C(20)	1.399(3)
C(8)-C(9)	1.337(3)	C(20)-C(21)	1.376(3)
C(8)-O(3)	1.432(2)	C(20)-H(20)	0.9500
C(8)-C(19)	1.479(3)	C(21)-C(22)	1.390(3)
C(9)-C(12)	1.496(3)	C(21)-H(21)	0.9500
C(9)-C(10)	1.510(3)	C(22)-C(23)	1.380(3)
C(10)-C(11)	1.527(3)	C(22)-H(22)	0.9500
C(10)-H(10A)	0.9900	C(23)-C(24)	1.388(3)
C(10)-H(10B)	0.9900	C(23)-H(23)	0.9500
C(11)-H(11A)	0.9800	C(24)-H(24)	0.9500
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4265(15)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4232(15)
C(12)-C(13)	1.391(3)	O(3)-S(1)	1.6008(15)
C(12)-C(17)	1.401(3)		

C(2)-C(1)-C(6)	120.5(2)	C(9)-C(8)-C(19)	129.44(19)
C(2)-C(1)-S(1)	119.14(16)	O(3)-C(8)-C(19)	113.23(17)
C(6)-C(1)-S(1)	120.36(17)	C(8)-C(9)-C(12)	120.05(19)
C(3)-C(2)-C(1)	119.2(2)	C(8)-C(9)-C(10)	121.84(19)
C(3)-C(2)-H(2)	120.4	C(12)-C(9)-C(10)	117.70(18)
C(1)-C(2)-H(2)	120.4	C(9)-C(10)-C(11)	111.50(17)
C(2)-C(3)-C(4)	121.6(2)	C(9)-C(10)-H(10A)	109.3
C(2)-C(3)-H(3)	119.2	C(11)-C(10)-H(10A)	109.3
C(4)-C(3)-H(3)	119.2	C(9)-C(10)-H(10B)	109.3
C(5)-C(4)-C(3)	117.7(2)	C(11)-C(10)-H(10B)	109.3
C(5)-C(4)-C(7)	120.9(2)	H(10A)-C(10)-H(10B)	108.0
C(3)-C(4)-C(7)	121.4(2)	C(10)-C(11)-H(11A)	109.5
C(6)-C(5)-C(4)	121.8(2)	C(10)-C(11)-H(11B)	109.5
C(6)-C(5)-H(5)	119.1	H(11A)-C(11)-H(11B)	109.5
C(4)-C(5)-H(5)	119.1	C(10)-C(11)-H(11C)	109.5
C(5)-C(6)-C(1)	119.2(2)	H(11A)-C(11)-H(11C)	109.5
C(5)-C(6)-H(6)	120.4	H(11B)-C(11)-H(11C)	109.5
C(1)-C(6)-H(6)	120.4	C(13)-C(12)-C(17)	118.93(19)
C(4)-C(7)-H(7A)	109.5	C(13)-C(12)-C(9)	120.17(18)
C(4)-C(7)-H(7B)	109.5	C(17)-C(12)-C(9)	120.80(18)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	120.6(2)
C(4)-C(7)-H(7C)	109.5	C(14)-C(13)-H(13)	119.7
H(7A)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.7
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	120.5(2)
C(9)-C(8)-O(3)	117.19(18)	C(15)-C(14)-H(14)	119.7

C(13)-C(14)-H(14)	119.7	C(19)-C(20)-H(20)	119.8
C(14)-C(15)-C(16)	119.5(2)	C(20)-C(21)-C(22)	120.1(2)
C(14)-C(15)-H(15)	120.2	C(20)-C(21)-H(21)	119.9
C(16)-C(15)-H(15)	120.2	C(22)-C(21)-H(21)	119.9
O(4)-C(16)-C(17)	125.12(19)	C(23)-C(22)-C(21)	119.9(2)
O(4)-C(16)-C(15)	114.48(18)	C(23)-C(22)-H(22)	120.1
C(17)-C(16)-C(15)	120.40(19)	C(21)-C(22)-H(22)	120.1
C(16)-C(17)-C(12)	119.92(19)	C(22)-C(23)-C(24)	120.0(2)
C(16)-C(17)-H(17)	120.0	C(22)-C(23)-H(23)	120.0
C(12)-C(17)-H(17)	120.0	C(24)-C(23)-H(23)	120.0
O(4)-C(18)-H(18A)	109.5	C(19)-C(24)-C(23)	120.5(2)
O(4)-C(18)-H(18B)	109.5	C(19)-C(24)-H(24)	119.7
H(18A)-C(18)-H(18B)	109.5	C(23)-C(24)-H(24)	119.7
O(4)-C(18)-H(18C)	109.5	C(8)-O(3)-S(1)	119.95(12)
H(18A)-C(18)-H(18C)	109.5	C(16)-O(4)-C(18)	117.47(16)
H(18B)-C(18)-H(18C)	109.5	O(2)-S(1)-O(1)	120.72(10)
C(24)-C(19)-C(20)	119.0(2)	O(2)-S(1)-O(3)	102.98(9)
C(24)-C(19)-C(8)	120.78(19)	O(1)-S(1)-O(3)	108.68(8)
C(20)-C(19)-C(8)	120.10(19)	O(2)-S(1)-C(1)	109.07(9)
C(21)-C(20)-C(19)	120.4(2)	O(1)-S(1)-C(1)	109.01(10)
C(21)-C(20)-H(20)	119.8	O(3)-S(1)-C(1)	105.21(9)

Symmetry transformations used to generate equivalent atoms:

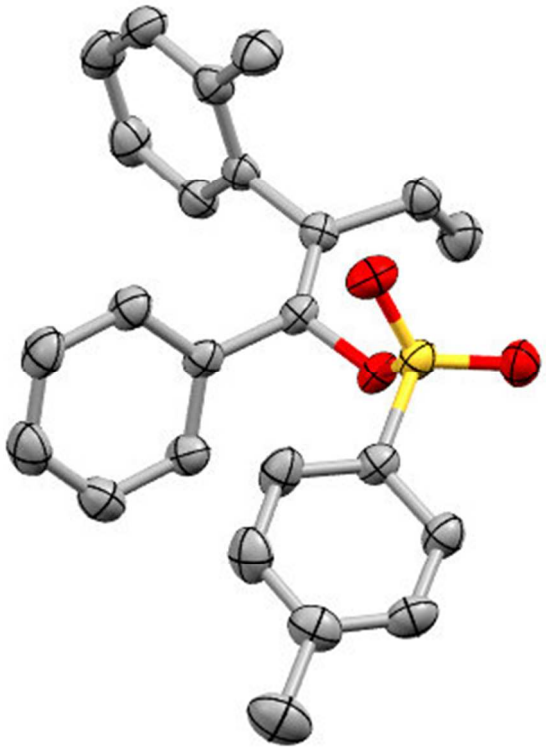
Table S84. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2q**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	20(1)	16(1)	18(1)	1(1)	7(1)	-4(1)
C(2)	20(1)	18(1)	20(1)	3(1)	8(1)	2(1)
C(3)	25(1)	16(1)	19(1)	-1(1)	8(1)	-2(1)
C(4)	20(1)	16(1)	21(1)	3(1)	6(1)	-4(1)
C(5)	19(1)	17(1)	26(1)	4(1)	10(1)	1(1)
C(6)	24(1)	17(1)	20(1)	0(1)	11(1)	0(1)
C(7)	24(1)	26(1)	25(1)	5(1)	1(1)	-1(1)
C(8)	20(1)	16(1)	20(1)	-3(1)	11(1)	0(1)
C(9)	19(1)	12(1)	17(1)	-2(1)	5(1)	0(1)
C(10)	20(1)	19(1)	18(1)	1(1)	5(1)	-1(1)
C(11)	19(1)	29(1)	23(1)	-2(1)	4(1)	3(1)
C(12)	17(1)	14(1)	18(1)	2(1)	4(1)	5(1)
C(13)	23(1)	16(1)	16(1)	1(1)	2(1)	2(1)
C(14)	19(1)	16(1)	24(1)	-1(1)	0(1)	-1(1)
C(15)	18(1)	18(1)	25(1)	4(1)	7(1)	0(1)
C(16)	18(1)	14(1)	19(1)	2(1)	5(1)	5(1)
C(17)	17(1)	13(1)	18(1)	-1(1)	1(1)	-1(1)
C(18)	30(1)	23(1)	17(1)	-1(1)	8(1)	-4(1)
C(19)	20(1)	16(1)	19(1)	6(1)	7(1)	1(1)
C(20)	23(1)	19(1)	20(1)	1(1)	7(1)	-1(1)
C(21)	25(1)	25(1)	21(1)	5(1)	3(1)	-6(1)
C(22)	19(1)	30(1)	31(1)	12(1)	5(1)	-1(1)
C(23)	21(1)	28(1)	30(1)	13(1)	12(1)	6(1)
C(24)	26(1)	22(1)	22(1)	4(1)	12(1)	3(1)
O(1)	36(1)	21(1)	18(1)	-4(1)	7(1)	-1(1)
O(2)	20(1)	31(1)	24(1)	4(1)	5(1)	-6(1)
O(3)	20(1)	18(1)	18(1)	2(1)	7(1)	1(1)
O(4)	26(1)	23(1)	19(1)	-1(1)	9(1)	-6(1)
S(1)	22(1)	18(1)	17(1)	1(1)	5(1)	-2(1)

Table S85. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2q**.

	x	y	z	U(eq)
H(2)	2208	4445	7405	23
H(3)	3274	4067	8622	23
H(5)	4700	1141	7537	24
H(6)	3644	1504	6314	24
H(7A)	4681	1139	9236	39
H(7B)	4762	3289	9361	39
H(7C)	5355	2259	8917	39
H(10A)	1095	5878	4308	23
H(10B)	1299	6533	3514	23
H(11A)	1127	9018	4711	37
H(11B)	358	8594	3913	37
H(11C)	1217	9577	3858	37
H(13)	3496	9360	5165	23
H(14)	4399	11025	4621	25
H(15)	4381	10548	3305	24
H(17)	2506	6754	3049	20
H(18A)	2798	6273	1859	35
H(18B)	2814	7704	1178	35
H(18C)	2207	8051	1732	35
H(20)	3408	7387	6698	24
H(21)	4809	7028	7539	29
H(22)	5803	5282	7130	33
H(23)	5392	3935	5870	30
H(24)	3990	4326	5015	26

(*E*)-1-phenyl-2-(*o*-tolyl)but-1-en-1-yl 4-methylbenzenesulfonate (2r)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 200(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 32056 reflections were collected covering the indices, -12<=*h*<=12, -13<=*k*<=13, -13<=*l*<=13. 3814 reflections were found to be symmetry independent, with an R_{int} of 0.0335. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S86. Crystal data and structure refinement for tosylate **2r**.

X-ray ID	gene765	
Sample/notebook ID	71462-058	
Empirical formula	C24 H24 O3 S	
Formula weight	392.49	
Temperature	200(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 10.3876(11) Å	α= 106.350(2)°.
	b = 11.2894(12) Å	β= 105.817(2)°.
	c = 11.3219(12) Å	γ = 114.671(2)°.
Volume	1035.43(19) $Å^3$	
Z	2	
Density (calculated)	1.259 Mg/m^3	
Absorption coefficient	0.178 mm^{-1}	
F(000)	416	
Crystal size	0.070 x 0.050 x 0.050 mm^3	
Theta range for data collection	2.096 to 25.393°.	
Index ranges	-12<=h<=12, -13<=k<=13, -13<=l<=13	
Reflections collected	32056	
Independent reflections	3814 [R(int) = 0.0335]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.849	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3814 / 0 / 256	
Goodness-of-fit on F^2	1.048	
Final R indices [I>2sigma(I)]	R1 = 0.0426, wR2 = 0.1114	
R indices (all data)	R1 = 0.0518, wR2 = 0.1217	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.284 and -0.294 $e.Å^{-3}$	

Table S87. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2r**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	9562(2)	4498(2)	7853(2)	33(1)
C(2)	10985(2)	5676(2)	8927(2)	39(1)
C(3)	12059(2)	5424(2)	9675(2)	46(1)
C(4)	11740(2)	4021(2)	9347(2)	44(1)
C(5)	10299(3)	2862(2)	8266(2)	48(1)
C(6)	9194(2)	3080(2)	7516(2)	43(1)
C(7)	12923(3)	3746(3)	10130(3)	64(1)
C(8)	7004(2)	3195(2)	4277(2)	29(1)
C(9)	5875(2)	3283(2)	3483(2)	30(1)
C(10)	5870(2)	4670(2)	3816(2)	37(1)
C(11)	6738(3)	5569(2)	3201(2)	50(1)
C(12)	7214(2)	1947(2)	4072(2)	31(1)
C(13)	8666(2)	2141(2)	4188(2)	37(1)
C(14)	8913(2)	1012(2)	4059(2)	45(1)
C(15)	7724(3)	-320(2)	3817(2)	50(1)
C(16)	6271(3)	-533(2)	3693(2)	48(1)
C(17)	6018(2)	597(2)	3822(2)	38(1)
C(18)	4578(2)	2010(2)	2140(2)	30(1)
C(19)	4864(2)	1675(2)	995(2)	36(1)
C(20)	3661(2)	562(2)	-282(2)	43(1)
C(21)	2150(2)	-245(2)	-422(2)	46(1)
C(22)	1856(2)	66(2)	701(2)	43(1)
C(23)	3043(2)	1192(2)	1998(2)	35(1)
C(24)	2679(2)	1505(2)	3204(2)	47(1)
O(1)	6625(2)	3743(2)	6640(1)	43(1)
O(2)	8752(2)	6318(1)	7559(1)	45(1)
O(3)	8285(1)	4506(1)	5491(1)	33(1)
S(1)	8178(1)	4801(1)	6919(1)	34(1)

Table S88. Bond lengths [Å] and angles [°] for tosylate **2r**.

C(1)-C(2)	1.379(3)	C(12)-C(13)	1.393(3)
C(1)-C(6)	1.385(3)	C(13)-C(14)	1.379(3)
C(1)-S(1)	1.7566(18)	C(13)-H(13)	0.9500
C(2)-C(3)	1.389(3)	C(14)-C(15)	1.376(3)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.385(3)	C(15)-C(16)	1.386(3)
C(3)-H(3)	0.9500	C(15)-H(15)	0.9500
C(4)-C(5)	1.384(3)	C(16)-C(17)	1.383(3)
C(4)-C(7)	1.507(3)	C(16)-H(16)	0.9500
C(5)-C(6)	1.386(3)	C(17)-H(17)	0.9500
C(5)-H(5)	0.9500	C(18)-C(19)	1.392(3)
C(6)-H(6)	0.9500	C(18)-C(23)	1.403(2)
C(7)-H(7A)	0.9800	C(19)-C(20)	1.383(3)
C(7)-H(7B)	0.9800	C(19)-H(19)	0.9500
C(7)-H(7C)	0.9800	C(20)-C(21)	1.382(3)
C(8)-C(9)	1.328(2)	C(20)-H(20)	0.9500
C(8)-O(3)	1.4369(19)	C(21)-C(22)	1.372(3)
C(8)-C(12)	1.480(2)	C(21)-H(21)	0.9500
C(9)-C(18)	1.494(2)	C(22)-C(23)	1.395(3)
C(9)-C(10)	1.507(2)	C(22)-H(22)	0.9500
C(10)-C(11)	1.518(3)	C(23)-C(24)	1.501(3)
C(10)-H(10A)	0.9900	C(24)-H(24A)	0.9800
C(10)-H(10B)	0.9900	C(24)-H(24B)	0.9800
C(11)-H(11A)	0.9800	C(24)-H(24C)	0.9800
C(11)-H(11B)	0.9800	O(1)-S(1)	1.4245(13)
C(11)-H(11C)	0.9800	O(2)-S(1)	1.4236(14)
C(12)-C(17)	1.389(2)	O(3)-S(1)	1.6007(13)
C(2)-C(1)-C(6)	121.12(18)	O(3)-C(8)-C(12)	112.73(14)
C(2)-C(1)-S(1)	119.35(14)	C(8)-C(9)-C(18)	120.89(15)
C(6)-C(1)-S(1)	119.52(14)	C(8)-C(9)-C(10)	123.16(16)
C(1)-C(2)-C(3)	118.92(19)	C(18)-C(9)-C(10)	115.82(14)
C(1)-C(2)-H(2)	120.5	C(9)-C(10)-C(11)	111.53(16)
C(3)-C(2)-H(2)	120.5	C(9)-C(10)-H(10A)	109.3
C(4)-C(3)-C(2)	121.38(19)	C(11)-C(10)-H(10A)	109.3
C(4)-C(3)-H(3)	119.3	C(9)-C(10)-H(10B)	109.3
C(2)-C(3)-H(3)	119.3	C(11)-C(10)-H(10B)	109.3
C(5)-C(4)-C(3)	118.28(18)	H(10A)-C(10)-H(10B)	108.0
C(5)-C(4)-C(7)	120.2(2)	C(10)-C(11)-H(11A)	109.5
C(3)-C(4)-C(7)	121.5(2)	C(10)-C(11)-H(11B)	109.5
C(4)-C(5)-C(6)	121.55(19)	H(11A)-C(11)-H(11B)	109.5
C(4)-C(5)-H(5)	119.2	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.2	H(11A)-C(11)-H(11C)	109.5
C(1)-C(6)-C(5)	118.73(18)	H(11B)-C(11)-H(11C)	109.5
C(1)-C(6)-H(6)	120.6	C(17)-C(12)-C(13)	118.98(17)
C(5)-C(6)-H(6)	120.6	C(17)-C(12)-C(8)	121.57(16)
C(4)-C(7)-H(7A)	109.5	C(13)-C(12)-C(8)	119.40(15)
C(4)-C(7)-H(7B)	109.5	C(14)-C(13)-C(12)	120.46(18)
H(7A)-C(7)-H(7B)	109.5	C(14)-C(13)-H(13)	119.8
C(4)-C(7)-H(7C)	109.5	C(12)-C(13)-H(13)	119.8
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-C(13)	120.2(2)
H(7B)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.9
C(9)-C(8)-O(3)	117.39(15)	C(13)-C(14)-H(14)	119.9
C(9)-C(8)-C(12)	129.78(15)	C(14)-C(15)-C(16)	120.0(2)

C(14)-C(15)-H(15)	120.0	C(21)-C(22)-C(23)	121.98(18)
C(16)-C(15)-H(15)	120.0	C(21)-C(22)-H(22)	119.0
C(17)-C(16)-C(15)	119.96(19)	C(23)-C(22)-H(22)	119.0
C(17)-C(16)-H(16)	120.0	C(22)-C(23)-C(18)	118.12(17)
C(15)-C(16)-H(16)	120.0	C(22)-C(23)-C(24)	120.57(17)
C(16)-C(17)-C(12)	120.35(19)	C(18)-C(23)-C(24)	121.30(16)
C(16)-C(17)-H(17)	119.8	C(23)-C(24)-H(24A)	109.5
C(12)-C(17)-H(17)	119.8	C(23)-C(24)-H(24B)	109.5
C(19)-C(18)-C(23)	119.38(16)	H(24A)-C(24)-H(24B)	109.5
C(19)-C(18)-C(9)	120.03(16)	C(23)-C(24)-H(24C)	109.5
C(23)-C(18)-C(9)	120.49(15)	H(24A)-C(24)-H(24C)	109.5
C(20)-C(19)-C(18)	121.28(18)	H(24B)-C(24)-H(24C)	109.5
C(20)-C(19)-H(19)	119.4	C(8)-O(3)-S(1)	118.70(10)
C(18)-C(19)-H(19)	119.4	O(2)-S(1)-O(1)	120.17(9)
C(21)-C(20)-C(19)	119.37(18)	O(2)-S(1)-O(3)	104.82(8)
C(21)-C(20)-H(20)	120.3	O(1)-S(1)-O(3)	108.22(7)
C(19)-C(20)-H(20)	120.3	O(2)-S(1)-C(1)	108.67(8)
C(22)-C(21)-C(20)	119.86(18)	O(1)-S(1)-C(1)	109.74(8)
C(22)-C(21)-H(21)	120.1	O(3)-S(1)-C(1)	103.94(8)
C(20)-C(21)-H(21)	120.1		

Symmetry transformations used to generate equivalent atoms:

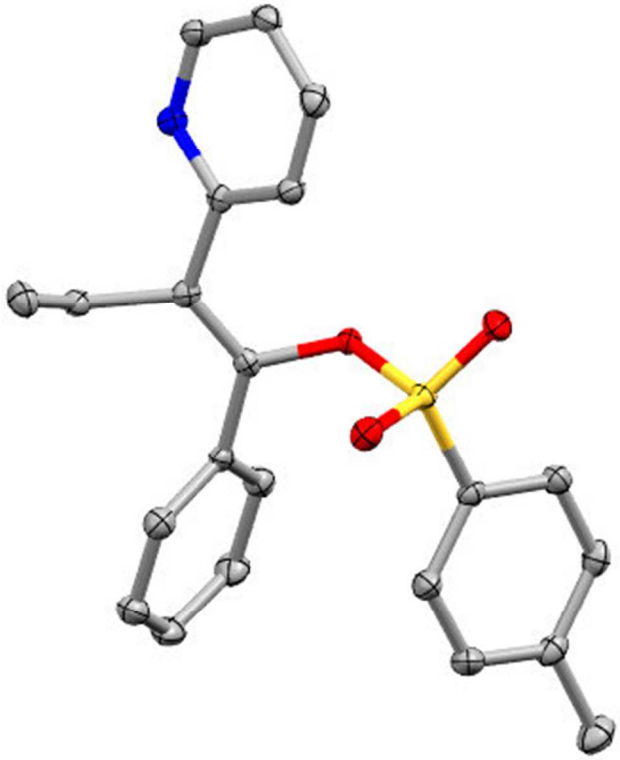
Table S89. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2r**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	32(1)	34(1)	29(1)	16(1)	12(1)	15(1)
C(2)	37(1)	36(1)	34(1)	14(1)	11(1)	16(1)
C(3)	35(1)	52(1)	37(1)	19(1)	9(1)	18(1)
C(4)	49(1)	59(1)	38(1)	30(1)	22(1)	34(1)
C(5)	66(1)	42(1)	43(1)	25(1)	22(1)	32(1)
C(6)	47(1)	34(1)	34(1)	16(1)	9(1)	15(1)
C(7)	68(2)	90(2)	61(2)	45(1)	29(1)	55(2)
C(8)	27(1)	26(1)	26(1)	11(1)	10(1)	9(1)
C(9)	31(1)	30(1)	28(1)	14(1)	14(1)	16(1)
C(10)	41(1)	34(1)	31(1)	11(1)	11(1)	22(1)
C(11)	46(1)	36(1)	62(1)	25(1)	17(1)	19(1)
C(12)	31(1)	30(1)	25(1)	13(1)	8(1)	14(1)
C(13)	33(1)	38(1)	40(1)	22(1)	14(1)	17(1)
C(14)	44(1)	51(1)	48(1)	25(1)	19(1)	31(1)
C(15)	62(1)	43(1)	52(1)	26(1)	20(1)	34(1)
C(16)	50(1)	32(1)	50(1)	23(1)	16(1)	16(1)
C(17)	36(1)	35(1)	39(1)	21(1)	14(1)	15(1)
C(18)	32(1)	29(1)	29(1)	14(1)	10(1)	18(1)
C(19)	37(1)	38(1)	34(1)	15(1)	15(1)	24(1)
C(20)	55(1)	45(1)	30(1)	13(1)	15(1)	31(1)
C(21)	45(1)	38(1)	33(1)	10(1)	2(1)	18(1)
C(22)	31(1)	39(1)	46(1)	20(1)	8(1)	13(1)
C(23)	34(1)	36(1)	37(1)	19(1)	13(1)	20(1)
C(24)	42(1)	48(1)	50(1)	23(1)	25(1)	21(1)
O(1)	32(1)	47(1)	37(1)	17(1)	13(1)	14(1)
O(2)	46(1)	34(1)	38(1)	8(1)	8(1)	21(1)
O(3)	29(1)	27(1)	28(1)	11(1)	7(1)	7(1)
S(1)	31(1)	31(1)	29(1)	11(1)	9(1)	13(1)

Table S90. Hydrogen coordinates (x 10^4) and isotropic displacement parameters (Å^{2}x 10^3) for tosylate **2r**.

	x	y	z	U(eq)
H(2)	11227	6645	9151	47
H(3)	13033	6230	10427	55
H(5)	10061	1893	8032	58
H(6)	8203	2273	6785	51
H(7A)	13403	3460	9561	97
H(7B)	12385	2961	10359	97
H(7C)	13751	4640	10980	97
H(10A)	6381	5258	4828	44
H(10B)	4762	4423	3452	44
H(11A)	7863	5910	3638	75
H(11B)	6625	6412	3359	75
H(11C)	6287	4964	2210	75
H(13)	9493	3058	4356	45
H(14)	9906	1153	4138	54
H(15)	7900	-1094	3734	60
H(16)	5448	-1454	3520	57
H(17)	5022	450	3740	45
H(19)	5906	2223	1093	43
H(20)	3872	353	-1056	52
H(21)	1315	-1014	-1294	56
H(22)	814	-503	592	52
H(24A)	2117	2016	3135	70
H(24B)	3670	2120	4059	70
H(24C)	2013	584	3205	70

(*Z*)-1-phenyl-2-(pyridin-2-yl)but-1-en-1-yl 4-methylbenzenesulfonate (2s')



Crystals were used as received. A colorless prism 0.070 x 0.060 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 19286 reflections were collected covering the indices, -15<=*h*<=15, -11<=*k*<=11, -20<=*l*<=20. 3489 reflections were found to be symmetry independent, with an R_{int} of 0.0535. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S91. Crystal data and structure refinement for tosylate **2s'**.

X-ray ID	gene893	
Sample/notebook ID	71452-126	
Empirical formula	C22 H21 N O3 S	
Formula weight	379.46	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 12.5238(8) Å	α= 90°.
	b = 9.4922(6) Å	β= 107.6580(10)°.
	c = 16.7995(11) Å	γ = 90°.
Volume	1903.0(2) $Å^3$	
Z	4	
Density (calculated)	1.324 Mg/m^3	
Absorption coefficient	0.192 mm^{-1}	
F(000)	800	
Crystal size	0.070 x 0.060 x 0.050 mm^3	
Theta range for data collection	1.706 to 25.369°.	
Index ranges	-15<=h<=15, -11<=k<=11, -20<=l<=20	
Reflections collected	19286	
Independent reflections	3489 [R(int) = 0.0535]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.836	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3489 / 0 / 246	
Goodness-of-fit on F^2	1.036	
Final R indices [I>2sigma(I)]	R1 = 0.0394, wR2 = 0.0902	
R indices (all data)	R1 = 0.0509, wR2 = 0.0971	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.306 and -0.385 $e.Å^{-3}$	

Table S92. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2s'**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2804(2)	4741(2)	4710(1)	15(1)
C(2)	3692(2)	4043(2)	5273(1)	19(1)
C(3)	3540(2)	2669(2)	5493(1)	21(1)
C(4)	2518(2)	1983(2)	5164(1)	20(1)
C(5)	1641(2)	2716(2)	4606(1)	23(1)
C(6)	1775(2)	4087(2)	4378(1)	21(1)
C(7)	2355(2)	496(2)	5409(1)	28(1)
C(8)	2668(1)	6574(2)	2829(1)	14(1)
C(9)	2739(1)	7725(2)	2389(1)	14(1)
C(10)	2122(2)	7836(2)	1465(1)	17(1)
C(11)	1303(2)	9066(2)	1255(1)	24(1)
C(12)	1989(2)	5293(2)	2532(1)	16(1)
C(13)	2511(2)	3980(2)	2622(1)	19(1)
C(14)	1895(2)	2781(2)	2309(1)	23(1)
C(15)	750(2)	2880(2)	1912(1)	24(1)
C(16)	217(2)	4170(2)	1842(1)	22(1)
C(17)	834(2)	5376(2)	2150(1)	19(1)
C(18)	3486(1)	8940(2)	2745(1)	14(1)
C(19)	3532(2)	9583(2)	3503(1)	18(1)
C(20)	4222(2)	10738(2)	3767(1)	21(1)
C(21)	4836(2)	11244(2)	3268(1)	20(1)
C(22)	4722(2)	10560(2)	2521(1)	19(1)
N(1)	4071(1)	9434(2)	2253(1)	18(1)
O(1)	1906(1)	7174(1)	4194(1)	19(1)
O(2)	3887(1)	7094(1)	5084(1)	20(1)
O(3)	3435(1)	6439(1)	3653(1)	14(1)
S(1)	2975(1)	6497(1)	4450(1)	15(1)

Table S93. Bond lengths [Å] and angles [°] for tosylate **2s'**.

C(1)-C(6)	1.386(3)	C(11)-H(11C)	0.9800
C(1)-C(2)	1.390(3)	C(12)-C(13)	1.395(3)
C(1)-S(1)	1.753(2)	C(12)-C(17)	1.396(3)
C(2)-C(3)	1.384(3)	C(13)-C(14)	1.386(3)
C(2)-H(2)	0.9500	C(13)-H(13)	0.9500
C(3)-C(4)	1.392(3)	C(14)-C(15)	1.388(3)
C(3)-H(3)	0.9500	C(14)-H(14)	0.9500
C(4)-C(5)	1.395(3)	C(15)-C(16)	1.383(3)
C(4)-C(7)	1.501(3)	C(15)-H(15)	0.9500
C(5)-C(6)	1.381(3)	C(16)-C(17)	1.390(3)
C(5)-H(5)	0.9500	C(16)-H(16)	0.9500
C(6)-H(6)	0.9500	C(17)-H(17)	0.9500
C(7)-H(7A)	0.9800	C(18)-N(1)	1.346(2)
C(7)-H(7B)	0.9800	C(18)-C(19)	1.396(3)
C(7)-H(7C)	0.9800	C(19)-C(20)	1.383(3)
C(8)-C(9)	1.337(3)	C(19)-H(19)	0.9500
C(8)-O(3)	1.431(2)	C(20)-C(21)	1.385(3)
C(8)-C(12)	1.481(3)	C(20)-H(20)	0.9500
C(9)-C(18)	1.491(3)	C(21)-C(22)	1.380(3)
C(9)-C(10)	1.514(2)	C(21)-H(21)	0.9500
C(10)-C(11)	1.523(3)	C(22)-N(1)	1.338(2)
C(10)-H(10A)	0.9900	C(22)-H(22)	0.9500
C(10)-H(10B)	0.9900	O(1)-S(1)	1.4285(13)
C(11)-H(11A)	0.9800	O(2)-S(1)	1.4219(13)
C(11)-H(11B)	0.9800	O(3)-S(1)	1.6105(12)
C(6)-C(1)-C(2)	121.00(18)	C(8)-C(9)-C(10)	121.65(17)
C(6)-C(1)-S(1)	119.60(15)	C(18)-C(9)-C(10)	114.89(16)
C(2)-C(1)-S(1)	119.36(14)	C(9)-C(10)-C(11)	112.87(15)
C(3)-C(2)-C(1)	118.95(18)	C(9)-C(10)-H(10A)	109.0
C(3)-C(2)-H(2)	120.5	C(11)-C(10)-H(10A)	109.0
C(1)-C(2)-H(2)	120.5	C(9)-C(10)-H(10B)	109.0
C(2)-C(3)-C(4)	121.30(18)	C(11)-C(10)-H(10B)	109.0
C(2)-C(3)-H(3)	119.4	H(10A)-C(10)-H(10B)	107.8
C(4)-C(3)-H(3)	119.4	C(10)-C(11)-H(11A)	109.5
C(3)-C(4)-C(5)	118.36(18)	C(10)-C(11)-H(11B)	109.5
C(3)-C(4)-C(7)	121.13(18)	H(11A)-C(11)-H(11B)	109.5
C(5)-C(4)-C(7)	120.51(18)	C(10)-C(11)-H(11C)	109.5
C(6)-C(5)-C(4)	121.29(19)	H(11A)-C(11)-H(11C)	109.5
C(6)-C(5)-H(5)	119.4	H(11B)-C(11)-H(11C)	109.5
C(4)-C(5)-H(5)	119.4	C(13)-C(12)-C(17)	119.11(18)
C(5)-C(6)-C(1)	119.10(18)	C(13)-C(12)-C(8)	119.67(16)
C(5)-C(6)-H(6)	120.5	C(17)-C(12)-C(8)	121.21(18)
C(1)-C(6)-H(6)	120.5	C(14)-C(13)-C(12)	120.24(18)
C(4)-C(7)-H(7A)	109.5	C(14)-C(13)-H(13)	119.9
C(4)-C(7)-H(7B)	109.5	C(12)-C(13)-H(13)	119.9
H(7A)-C(7)-H(7B)	109.5	C(13)-C(14)-C(15)	120.2(2)
C(4)-C(7)-H(7C)	109.5	C(13)-C(14)-H(14)	119.9
H(7A)-C(7)-H(7C)	109.5	C(15)-C(14)-H(14)	119.9
H(7B)-C(7)-H(7C)	109.5	C(16)-C(15)-C(14)	120.14(19)
C(9)-C(8)-O(3)	118.06(16)	C(16)-C(15)-H(15)	119.9
C(9)-C(8)-C(12)	127.77(16)	C(14)-C(15)-H(15)	119.9
O(3)-C(8)-C(12)	113.60(15)	C(15)-C(16)-C(17)	119.84(18)
C(8)-C(9)-C(18)	123.31(16)	C(15)-C(16)-H(16)	120.1

C(17)-C(16)-H(16)	120.1	C(22)-C(21)-H(21)	121.2
C(16)-C(17)-C(12)	120.46(19)	C(20)-C(21)-H(21)	121.2
C(16)-C(17)-H(17)	119.8	N(1)-C(22)-C(21)	124.51(17)
C(12)-C(17)-H(17)	119.8	N(1)-C(22)-H(22)	117.7
N(1)-C(18)-C(19)	121.92(17)	C(21)-C(22)-H(22)	117.7
N(1)-C(18)-C(9)	114.52(15)	C(22)-N(1)-C(18)	117.46(16)
C(19)-C(18)-C(9)	123.45(16)	C(8)-O(3)-S(1)	119.74(10)
C(20)-C(19)-C(18)	119.25(17)	O(2)-S(1)-O(1)	120.86(8)
C(20)-C(19)-H(19)	120.4	O(2)-S(1)-O(3)	103.13(7)
C(18)-C(19)-H(19)	120.4	O(1)-S(1)-O(3)	107.75(7)
C(19)-C(20)-C(21)	119.18(17)	O(2)-S(1)-C(1)	108.83(8)
C(19)-C(20)-H(20)	120.4	O(1)-S(1)-C(1)	109.19(8)
C(21)-C(20)-H(20)	120.4	O(3)-S(1)-C(1)	106.01(7)
C(22)-C(21)-C(20)	117.66(18)		

Symmetry transformations used to generate equivalent atoms:

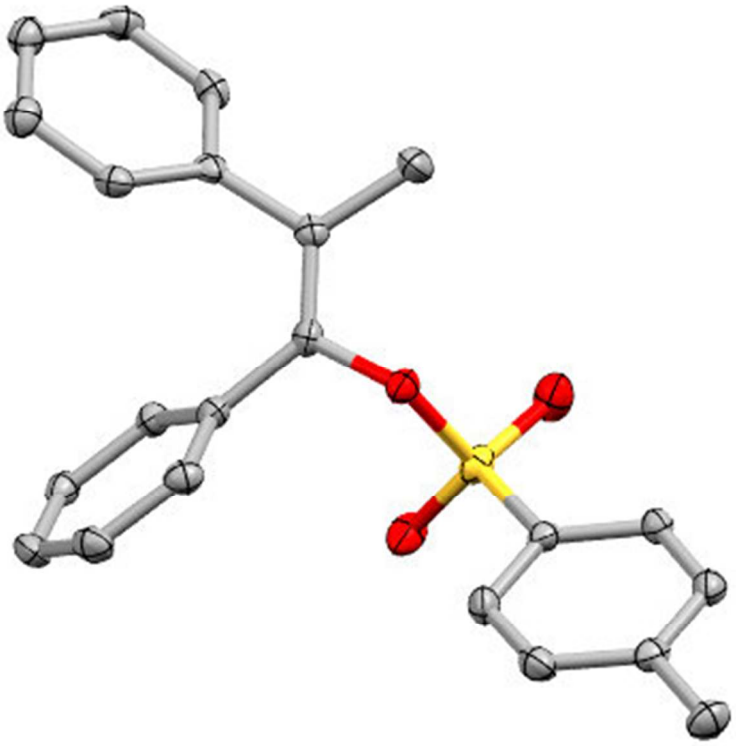
Table S94. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2s'**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(1)	16(1)	14(1)	0(1)	8(1)	-1(1)
C(2)	16(1)	22(1)	18(1)	1(1)	4(1)	-1(1)
C(3)	23(1)	20(1)	19(1)	4(1)	6(1)	6(1)
C(4)	29(1)	17(1)	17(1)	0(1)	11(1)	0(1)
C(5)	21(1)	24(1)	23(1)	2(1)	6(1)	-6(1)
C(6)	19(1)	20(1)	21(1)	4(1)	3(1)	-2(1)
C(7)	41(1)	18(1)	27(1)	2(1)	13(1)	-1(1)
C(8)	13(1)	17(1)	13(1)	-2(1)	4(1)	1(1)
C(9)	15(1)	14(1)	15(1)	-2(1)	7(1)	1(1)
C(10)	19(1)	15(1)	15(1)	-1(1)	5(1)	-2(1)
C(11)	22(1)	24(1)	21(1)	1(1)	1(1)	3(1)
C(12)	18(1)	18(1)	12(1)	0(1)	6(1)	-3(1)
C(13)	19(1)	20(1)	19(1)	0(1)	5(1)	0(1)
C(14)	30(1)	15(1)	23(1)	0(1)	7(1)	-1(1)
C(15)	30(1)	20(1)	22(1)	-3(1)	7(1)	-10(1)
C(16)	20(1)	24(1)	23(1)	-2(1)	5(1)	-5(1)
C(17)	22(1)	17(1)	19(1)	0(1)	8(1)	0(1)
C(18)	13(1)	12(1)	17(1)	2(1)	2(1)	2(1)
C(19)	19(1)	17(1)	18(1)	1(1)	7(1)	-2(1)
C(20)	25(1)	19(1)	17(1)	-3(1)	6(1)	0(1)
C(21)	16(1)	17(1)	22(1)	0(1)	2(1)	-3(1)
C(22)	16(1)	21(1)	21(1)	2(1)	6(1)	-3(1)
N(1)	17(1)	18(1)	18(1)	1(1)	6(1)	-1(1)
O(1)	19(1)	18(1)	22(1)	3(1)	9(1)	5(1)
O(2)	23(1)	20(1)	16(1)	-3(1)	4(1)	-5(1)
O(3)	14(1)	16(1)	13(1)	1(1)	4(1)	0(1)
S(1)	16(1)	14(1)	14(1)	0(1)	5(1)	0(1)

Table S95. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2s'**.

	x	y	z	U(eq)
H(2)	4393	4501	5503	22
H(3)	4145	2185	5875	25
H(5)	938	2264	4378	27
H(6)	1170	4575	3999	25
H(7A)	1993	503	5850	42
H(7B)	3084	27	5613	42
H(7C)	1881	-12	4921	42
H(10A)	1706	6949	1275	20
H(10B)	2675	7947	1155	20
H(11A)	794	9008	1596	35
H(11B)	868	9027	662	35
H(11C)	1719	9955	1372	35
H(13)	3293	3907	2898	23
H(14)	2256	1891	2367	28
H(15)	333	2059	1688	29
H(16)	-570	4232	1585	27
H(17)	467	6262	2100	23
H(19)	3095	9230	3832	21
H(20)	4273	11179	4285	25
H(21)	5318	12034	3433	23
H(22)	5136	10914	2175	23

(*E*)-3-cyclopropyl-1,2-diphenylprop-1-en-1-yl 4-methylbenzenesulfonate (2t)



Crystals were used as received. A colorless prism 0.060 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 1.0°. Data collection was 99.8% complete to 25.000° in θ. A total of 14474 reflections were collected covering the indices, -7<=*h*<=7, -8<=*k*<=9, -23<=*l*<=23. 3317 reflections were found to be symmetry independent, with an R_{int} of 0.0445. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2014). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2014.

Table S96. Crystal data and structure refinement for tosylate **2t**.

X-ray ID	gene768	
Sample/notebook ID	71462-055	
Empirical formula	C22 H20 O3 S	
Formula weight	364.44	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 6.1836(3) Å	α= 90°.
	b = 7.6778(4) Å	β= 90.4540(10)°.
	c = 19.3378(9) Å	γ = 90°.
Volume	918.06(8) $Å^3$	
Z	2	
Density (calculated)	1.318 Mg/m^3	
Absorption coefficient	0.195 mm^{-1}	
F(000)	384	
Crystal size	0.060 x 0.050 x 0.050 mm^3	
Theta range for data collection	1.053 to 25.402°.	
Index ranges	-7<=h<=7, -8<=k<=9, -23<=l<=23	
Reflections collected	14474	
Independent reflections	3317 [R(int) = 0.0445]	
Completeness to theta = 25.000°	99.8 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.817	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3317 / 1 / 237	
Goodness-of-fit on F^2	1.157	
Final R indices [I>2sigma(I)]	R1 = 0.0387, wR2 = 0.0922	
R indices (all data)	R1 = 0.0439, wR2 = 0.1036	
Absolute structure parameter	0.00(4)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.375 and -0.249 $e.Å^{-3}$	

Table S97. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2t**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6638(5)	5506(5)	4372(2)	18(1)
C(2)	8638(6)	6323(5)	4421(2)	23(1)
C(3)	9663(6)	6415(5)	5056(2)	23(1)
C(4)	8708(5)	5704(5)	5648(2)	21(1)
C(5)	6697(6)	4913(5)	5584(2)	21(1)
C(6)	5645(5)	4791(5)	4948(2)	19(1)
C(7)	9861(6)	5799(5)	6337(2)	27(1)
C(8)	6952(5)	4243(5)	2424(2)	17(1)
C(9)	6126(5)	2870(4)	2101(2)	19(1)
C(10)	4958(6)	1427(5)	2471(2)	26(1)
C(11)	6427(5)	2611(4)	1338(2)	17(1)
C(12)	4746(5)	1990(5)	923(2)	21(1)
C(13)	5059(6)	1599(5)	234(2)	24(1)
C(14)	7063(6)	1838(5)	-59(2)	25(1)
C(15)	8748(6)	2482(5)	341(2)	24(1)
C(16)	8442(6)	2852(5)	1032(2)	20(1)
C(17)	8070(5)	5774(5)	2128(2)	18(1)
C(18)	7109(5)	6733(5)	1596(2)	19(1)
C(19)	8187(6)	8140(5)	1309(2)	22(1)
C(20)	10230(6)	8581(5)	1547(2)	26(1)
C(21)	11193(6)	7643(5)	2083(2)	24(1)
C(22)	10105(5)	6248(5)	2374(2)	21(1)
O(1)	3320(4)	4510(4)	3635(1)	29(1)
O(2)	5279(4)	7101(3)	3247(1)	28(1)
O(3)	6986(4)	4215(3)	3166(1)	19(1)
S(1)	5310(1)	5428(1)	3568(1)	21(1)

Table S98. Bond lengths [Å] and angles [°] for tosylate **2t**.

C(1)-C(6)	1.389(5)	C(11)-C(16)	1.396(5)
C(1)-C(2)	1.390(5)	C(12)-C(13)	1.380(5)
C(1)-S(1)	1.753(3)	C(12)-H(12)	0.9500
C(2)-C(3)	1.380(5)	C(13)-C(14)	1.379(5)
C(2)-H(2)	0.9500	C(13)-H(13)	0.9500
C(3)-C(4)	1.402(5)	C(14)-C(15)	1.384(5)
C(3)-H(3)	0.9500	C(14)-H(14)	0.9500
C(4)-C(5)	1.388(5)	C(15)-C(16)	1.380(5)
C(4)-C(7)	1.508(4)	C(15)-H(15)	0.9500
C(5)-C(6)	1.390(5)	C(16)-H(16)	0.9500
C(5)-H(5)	0.9500	C(17)-C(22)	1.390(5)
C(6)-H(6)	0.9500	C(17)-C(18)	1.394(5)
C(7)-H(7A)	0.9800	C(18)-C(19)	1.388(5)
C(7)-H(7B)	0.9800	C(18)-H(18)	0.9500
C(7)-H(7C)	0.9800	C(19)-C(20)	1.383(5)
C(8)-C(9)	1.326(5)	C(19)-H(19)	0.9500
C(8)-O(3)	1.434(4)	C(20)-C(21)	1.391(5)
C(8)-C(17)	1.481(5)	C(20)-H(20)	0.9500
C(9)-C(11)	1.502(5)	C(21)-C(22)	1.387(5)
C(9)-C(10)	1.507(5)	C(21)-H(21)	0.9500
C(10)-H(10A)	0.9800	C(22)-H(22)	0.9500
C(10)-H(10B)	0.9800	O(1)-S(1)	1.425(3)
C(10)-H(10C)	0.9800	O(2)-S(1)	1.427(3)
C(11)-C(12)	1.392(5)	O(3)-S(1)	1.599(2)

C(6)-C(1)-C(2)	121.5(3)	C(11)-C(9)-C(10)	115.7(3)
C(6)-C(1)-S(1)	119.4(3)	C(9)-C(10)-H(10A)	109.5
C(2)-C(1)-S(1)	119.1(3)	C(9)-C(10)-H(10B)	109.5
C(3)-C(2)-C(1)	119.1(3)	H(10A)-C(10)-H(10B)	109.5
C(3)-C(2)-H(2)	120.5	C(9)-C(10)-H(10C)	109.5
C(1)-C(2)-H(2)	120.5	H(10A)-C(10)-H(10C)	109.5
C(2)-C(3)-C(4)	120.9(3)	H(10B)-C(10)-H(10C)	109.5
C(2)-C(3)-H(3)	119.6	C(12)-C(11)-C(16)	117.8(3)
C(4)-C(3)-H(3)	119.6	C(12)-C(11)-C(9)	120.9(3)
C(5)-C(4)-C(3)	118.7(3)	C(16)-C(11)-C(9)	121.1(3)
C(5)-C(4)-C(7)	121.1(3)	C(13)-C(12)-C(11)	121.4(3)
C(3)-C(4)-C(7)	120.2(3)	C(13)-C(12)-H(12)	119.3
C(4)-C(5)-C(6)	121.4(3)	C(11)-C(12)-H(12)	119.3
C(4)-C(5)-H(5)	119.3	C(14)-C(13)-C(12)	120.1(3)
C(6)-C(5)-H(5)	119.3	C(14)-C(13)-H(13)	120.0
C(1)-C(6)-C(5)	118.4(3)	C(12)-C(13)-H(13)	120.0
C(1)-C(6)-H(6)	120.8	C(13)-C(14)-C(15)	119.5(3)
C(5)-C(6)-H(6)	120.8	C(13)-C(14)-H(14)	120.2
C(4)-C(7)-H(7A)	109.5	C(15)-C(14)-H(14)	120.2
C(4)-C(7)-H(7B)	109.5	C(16)-C(15)-C(14)	120.4(3)
H(7A)-C(7)-H(7B)	109.5	C(16)-C(15)-H(15)	119.8
C(4)-C(7)-H(7C)	109.5	C(14)-C(15)-H(15)	119.8
H(7A)-C(7)-H(7C)	109.5	C(15)-C(16)-C(11)	120.8(3)
H(7B)-C(7)-H(7C)	109.5	C(15)-C(16)-H(16)	119.6
C(9)-C(8)-O(3)	117.6(3)	C(11)-C(16)-H(16)	119.6
C(9)-C(8)-C(17)	128.9(3)	C(22)-C(17)-C(18)	119.6(3)
O(3)-C(8)-C(17)	113.3(3)	C(22)-C(17)-C(8)	120.0(3)
C(8)-C(9)-C(11)	121.3(3)	C(18)-C(17)-C(8)	120.5(3)
C(8)-C(9)-C(10)	123.0(3)	C(19)-C(18)-C(17)	120.2(3)

C(19)-C(18)-H(18)	119.9	C(21)-C(22)-C(17)	120.3(3)
C(17)-C(18)-H(18)	119.9	C(21)-C(22)-H(22)	119.9
C(20)-C(19)-C(18)	119.8(3)	C(17)-C(22)-H(22)	119.9
C(20)-C(19)-H(19)	120.1	C(8)-O(3)-S(1)	118.23(19)
C(18)-C(19)-H(19)	120.1	O(1)-S(1)-O(2)	118.40(16)
C(19)-C(20)-C(21)	120.4(3)	O(1)-S(1)-O(3)	108.65(15)
C(19)-C(20)-H(20)	119.8	O(2)-S(1)-O(3)	108.63(14)
C(21)-C(20)-H(20)	119.8	O(1)-S(1)-C(1)	109.61(16)
C(22)-C(21)-C(20)	119.7(3)	O(2)-S(1)-C(1)	111.06(17)
C(22)-C(21)-H(21)	120.1	O(3)-S(1)-C(1)	98.63(14)
C(20)-C(21)-H(21)	120.1		

Symmetry transformations used to generate equivalent atoms:

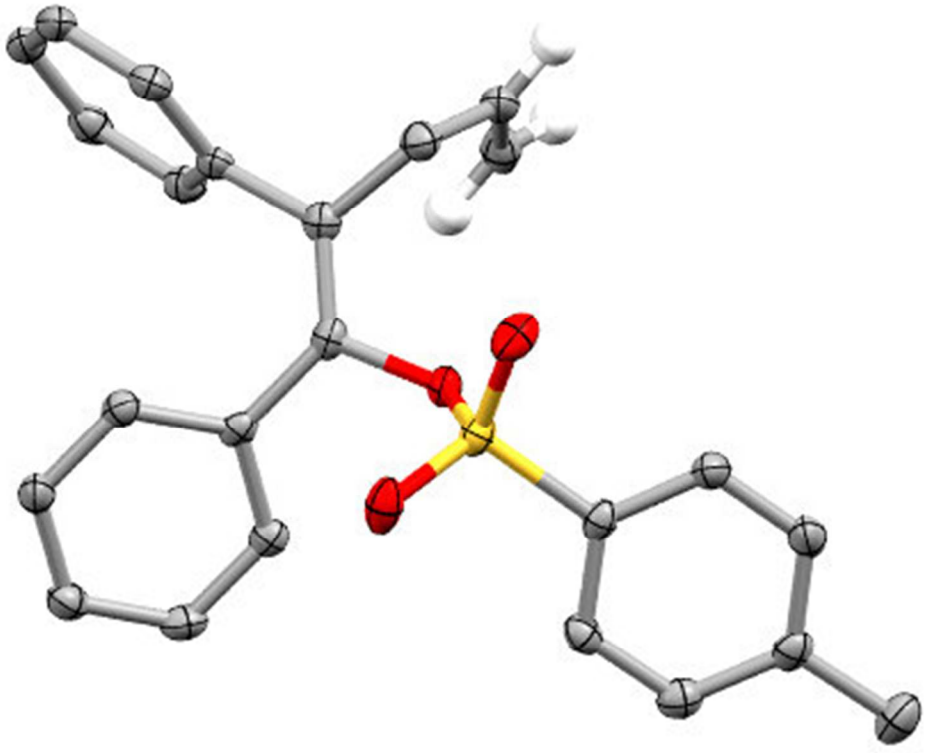
Table S99. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2t**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	23(2)	15(2)	15(2)	-2(1)	0(1)	1(2)
C(2)	25(2)	24(2)	19(2)	3(1)	5(2)	-2(2)
C(3)	21(2)	19(2)	29(2)	-1(2)	2(2)	-4(2)
C(4)	27(2)	17(2)	18(2)	-1(1)	-1(1)	2(2)
C(5)	25(2)	19(2)	20(2)	1(1)	4(1)	1(2)
C(6)	18(2)	19(2)	20(2)	0(1)	1(1)	-1(1)
C(7)	31(2)	30(3)	21(2)	-3(2)	-4(2)	1(2)
C(8)	16(2)	21(2)	15(2)	1(1)	2(1)	1(1)
C(9)	18(2)	18(2)	20(2)	2(1)	1(1)	2(2)
C(10)	36(2)	20(2)	23(2)	1(2)	3(2)	-9(2)
C(11)	20(2)	11(2)	21(2)	-1(1)	1(1)	1(1)
C(12)	17(2)	20(2)	25(2)	4(2)	1(1)	-1(2)
C(13)	26(2)	20(2)	25(2)	-1(2)	-9(2)	-1(2)
C(14)	31(2)	24(2)	20(2)	1(2)	0(2)	1(2)
C(15)	23(2)	25(2)	24(2)	1(2)	2(1)	3(2)
C(16)	19(2)	16(2)	25(2)	-3(2)	-1(1)	-1(2)
C(17)	21(2)	19(2)	16(2)	-3(1)	2(1)	0(1)
C(18)	20(2)	19(2)	18(2)	-2(1)	0(1)	0(2)
C(19)	32(2)	18(2)	16(2)	1(1)	2(2)	4(2)
C(20)	32(2)	17(2)	29(2)	-1(2)	7(2)	-8(2)
C(21)	18(2)	23(2)	32(2)	-4(2)	1(2)	-4(2)
C(22)	22(2)	20(2)	22(2)	-2(1)	-2(2)	2(2)
O(1)	20(1)	44(2)	24(1)	-2(1)	-1(1)	-2(1)
O(2)	41(2)	23(2)	20(1)	3(1)	3(1)	13(1)
O(3)	23(1)	18(1)	16(1)	0(1)	1(1)	3(1)
S(1)	22(1)	22(1)	18(1)	0(1)	0(1)	4(1)

Table S100. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2t**.

	x	y	z	U(eq)
H(2)	9291	6813	4022	27
H(3)	11034	6967	5093	28
H(5)	6026	4446	5983	26
H(6)	4279	4233	4908	22
H(7A)	9641	6953	6541	41
H(7B)	11410	5598	6271	41
H(7C)	9279	4907	6646	41
H(10A)	5027	1632	2971	39
H(10B)	5644	310	2364	39
H(10C)	3443	1401	2319	39
H(12)	3355	1831	1118	25
H(13)	3893	1165	-38	28
H(14)	7285	1564	-532	30
H(15)	10124	2669	139	28
H(16)	9617	3277	1303	24
H(18)	5712	6421	1430	23
H(19)	7524	8799	949	26
H(20)	10980	9529	1344	31
H(21)	12590	7958	2248	29
H(22)	10753	5614	2743	25

(*E*)-3-cyclopropyl-1,2-diphenylprop-1-en-1-yl 4-methylbenzenesulfonate (2v)



Crystals were used as received. A colorless blade 0.080 x 0.050 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 60 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 67.000° in θ. A total of 26244 reflections were collected covering the indices, -9<=*h*<=9, -7<=*k*<=6, -24<=*l*<=24. 3451 reflections were found to be symmetry independent, with an R_{int} of 0.0297. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S101. Crystal data and structure refinement for tosylate **2v**.

X-ray ID	gene781	
Sample/notebook ID	71462-61	
Empirical formula	C24 H22 O3 S	
Formula weight	390.47	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 7.8618(4) Å	α= 90°.
	b = 6.0592(3) Å	β= 95.509(2)°.
	c = 20.5577(9) Å	γ = 90°.
Volume	974.77(8) $Å^3$	
Z	2	
Density (calculated)	1.330 Mg/m^3	
Absorption coefficient	1.652 mm^{-1}	
F(000)	412	
Crystal size	0.080 x 0.050 x 0.030 mm^3	
Theta range for data collection	2.159 to 68.462°.	
Index ranges	-9<=h<=9, -7<=k<=6, -24<=l<=24	
Reflections collected	26244	
Independent reflections	3451 [R(int) = 0.0297]	
Completeness to theta = 67.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.929 and 0.749	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3451 / 1 / 254	
Goodness-of-fit on F^2	1.179	
Final R indices [I>2sigma(I)]	R1 = 0.0321, wR2 = 0.0932	
R indices (all data)	R1 = 0.0323, wR2 = 0.0933	
Absolute structure parameter	0.026(12)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.208 and -0.326 e.$Å^{-3}$	

Table S102. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2v**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	795(4)	5311(5)	1188(1)	19(1)
C(2)	-843(4)	6178(6)	1177(2)	23(1)
C(3)	-2208(4)	4949(6)	893(2)	26(1)
C(4)	-1943(4)	2879(6)	625(1)	22(1)
C(5)	-278(4)	2094(6)	626(1)	24(1)
C(6)	1096(4)	3278(5)	909(2)	21(1)
C(7)	-3456(4)	1511(7)	357(2)	32(1)
C(8)	4122(4)	5894(5)	2729(1)	18(1)
C(9)	4047(4)	7326(5)	3217(1)	19(1)
C(10)	2612(4)	8971(6)	3248(2)	23(1)
C(11)	1181(4)	8195(6)	3631(2)	24(1)
C(12)	964(4)	6172(6)	3841(2)	28(1)
C(13)	5355(4)	7302(5)	3799(1)	19(1)
C(14)	5531(4)	5425(6)	4193(2)	22(1)
C(15)	6663(4)	5415(6)	4759(2)	25(1)
C(16)	7631(4)	7269(6)	4927(2)	27(1)
C(17)	7467(4)	9140(6)	4539(2)	26(1)
C(18)	6331(4)	9168(6)	3977(2)	22(1)
C(19)	5492(4)	4327(5)	2595(1)	18(1)
C(20)	5097(4)	2297(5)	2295(1)	19(1)
C(21)	6380(4)	836(6)	2171(2)	23(1)
C(22)	8078(4)	1361(6)	2337(1)	23(1)
C(23)	8488(4)	3396(6)	2626(2)	22(1)
C(24)	7216(4)	4862(6)	2754(1)	20(1)
O(1)	4051(3)	6343(4)	1294(1)	30(1)
O(2)	2016(3)	9055(4)	1644(1)	30(1)
O(3)	2596(3)	5674(4)	2285(1)	20(1)
S(1)	2512(1)	6801(1)	1578(1)	21(1)

Table S103. Bond lengths [Å] and angles [°] for tosylate **2v**.

C(1)-C(6)	1.389(5)	C(12)-H(12B)	0.9500
C(1)-C(2)	1.389(4)	C(13)-C(14)	1.395(4)
C(1)-S(1)	1.753(3)	C(13)-C(18)	1.396(5)
C(2)-C(3)	1.388(5)	C(14)-C(15)	1.395(4)
C(2)-H(2)	0.9500	C(14)-H(14)	0.9500
C(3)-C(4)	1.395(5)	C(15)-C(16)	1.382(5)
C(3)-H(3)	0.9500	C(15)-H(15)	0.9500
C(4)-C(5)	1.392(5)	C(16)-C(17)	1.384(5)
C(4)-C(7)	1.510(4)	C(16)-H(16)	0.9500
C(5)-C(6)	1.378(5)	C(17)-C(18)	1.392(4)
C(5)-H(5)	0.9500	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-H(18)	0.9500
C(7)-H(7A)	0.9800	C(19)-C(20)	1.398(4)
C(7)-H(7B)	0.9800	C(19)-C(24)	1.402(4)
C(7)-H(7C)	0.9800	C(20)-C(21)	1.384(5)
C(8)-C(9)	1.333(4)	C(20)-H(20)	0.9500
C(8)-O(3)	1.442(3)	C(21)-C(22)	1.382(5)
C(8)-C(19)	1.482(4)	C(21)-H(21)	0.9500
C(9)-C(13)	1.501(4)	C(22)-C(23)	1.393(5)
C(9)-C(10)	1.511(4)	C(22)-H(22)	0.9500
C(10)-C(11)	1.509(4)	C(23)-C(24)	1.382(4)
C(10)-H(10A)	0.9900	C(23)-H(23)	0.9500
C(10)-H(10B)	0.9900	C(24)-H(24)	0.9500
C(11)-C(12)	1.316(5)	O(1)-S(1)	1.421(2)
C(11)-H(11)	0.9500	O(2)-S(1)	1.430(3)
C(12)-H(12A)	0.9500	O(3)-S(1)	1.602(2)

C(6)-C(1)-C(2)	121.5(3)	C(8)-C(9)-C(13)	121.2(3)
C(6)-C(1)-S(1)	119.5(2)	C(8)-C(9)-C(10)	123.2(3)
C(2)-C(1)-S(1)	119.0(2)	C(13)-C(9)-C(10)	115.5(3)
C(3)-C(2)-C(1)	118.8(3)	C(11)-C(10)-C(9)	114.4(3)
C(3)-C(2)-H(2)	120.6	C(11)-C(10)-H(10A)	108.7
C(1)-C(2)-H(2)	120.6	C(9)-C(10)-H(10A)	108.7
C(2)-C(3)-C(4)	120.7(3)	C(11)-C(10)-H(10B)	108.7
C(2)-C(3)-H(3)	119.7	C(9)-C(10)-H(10B)	108.7
C(4)-C(3)-H(3)	119.7	H(10A)-C(10)-H(10B)	107.6
C(5)-C(4)-C(3)	118.8(3)	C(12)-C(11)-C(10)	126.0(3)
C(5)-C(4)-C(7)	121.4(3)	C(12)-C(11)-H(11)	117.0
C(3)-C(4)-C(7)	119.7(3)	C(10)-C(11)-H(11)	117.0
C(6)-C(5)-C(4)	121.5(3)	C(11)-C(12)-H(12A)	120.0
C(6)-C(5)-H(5)	119.3	C(11)-C(12)-H(12B)	120.0
C(4)-C(5)-H(5)	119.3	H(12A)-C(12)-H(12B)	120.0
C(5)-C(6)-C(1)	118.6(3)	C(14)-C(13)-C(18)	119.2(3)
C(5)-C(6)-H(6)	120.7	C(14)-C(13)-C(9)	119.5(3)
C(1)-C(6)-H(6)	120.7	C(18)-C(13)-C(9)	121.2(3)
C(4)-C(7)-H(7A)	109.5	C(13)-C(14)-C(15)	120.5(3)
C(4)-C(7)-H(7B)	109.5	C(13)-C(14)-H(14)	119.8
H(7A)-C(7)-H(7B)	109.5	C(15)-C(14)-H(14)	119.8
C(4)-C(7)-H(7C)	109.5	C(16)-C(15)-C(14)	119.8(3)
H(7A)-C(7)-H(7C)	109.5	C(16)-C(15)-H(15)	120.1
H(7B)-C(7)-H(7C)	109.5	C(14)-C(15)-H(15)	120.1
C(9)-C(8)-O(3)	116.3(3)	C(15)-C(16)-C(17)	120.2(3)
C(9)-C(8)-C(19)	130.0(3)	C(15)-C(16)-H(16)	119.9
O(3)-C(8)-C(19)	113.5(2)	C(17)-C(16)-H(16)	119.9

C(16)-C(17)-C(18)	120.3(3)	C(21)-C(22)-H(22)	120.4
C(16)-C(17)-H(17)	119.8	C(23)-C(22)-H(22)	120.4
C(18)-C(17)-H(17)	119.8	C(24)-C(23)-C(22)	120.6(3)
C(17)-C(18)-C(13)	120.0(3)	C(24)-C(23)-H(23)	119.7
C(17)-C(18)-H(18)	120.0	C(22)-C(23)-H(23)	119.7
C(13)-C(18)-H(18)	120.0	C(23)-C(24)-C(19)	120.5(3)
C(20)-C(19)-C(24)	118.4(3)	C(23)-C(24)-H(24)	119.7
C(20)-C(19)-C(8)	120.8(3)	C(19)-C(24)-H(24)	119.7
C(24)-C(19)-C(8)	120.8(3)	C(8)-O(3)-S(1)	119.63(18)
C(21)-C(20)-C(19)	120.6(3)	O(1)-S(1)-O(2)	118.46(15)
C(21)-C(20)-H(20)	119.7	O(1)-S(1)-O(3)	109.09(12)
C(19)-C(20)-H(20)	119.7	O(2)-S(1)-O(3)	107.96(13)
C(22)-C(21)-C(20)	120.8(3)	O(1)-S(1)-C(1)	111.10(14)
C(22)-C(21)-H(21)	119.6	O(2)-S(1)-C(1)	109.31(15)
C(20)-C(21)-H(21)	119.6	O(3)-S(1)-C(1)	99.14(13)
C(21)-C(22)-C(23)	119.1(3)		

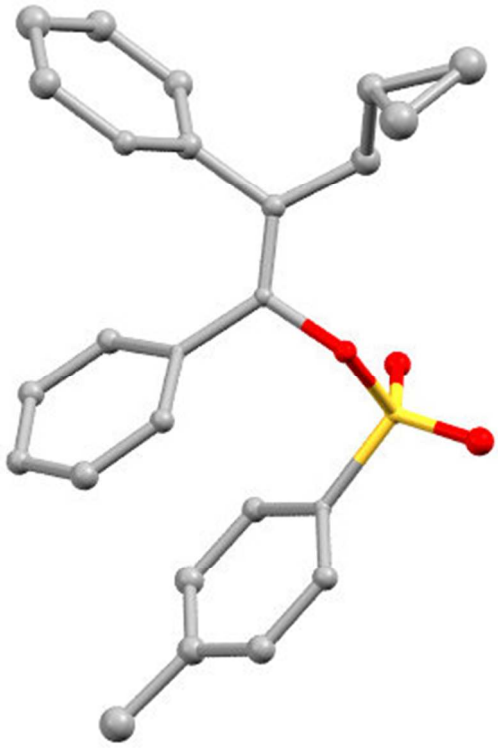
Table S104. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for tosylate **2v**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(1)	23(2)	16(1)	2(1)	0(1)	-3(1)
C(2)	23(2)	24(2)	21(1)	-4(1)	0(1)	3(1)
C(3)	20(2)	36(2)	22(2)	-2(1)	1(1)	5(1)
C(4)	25(2)	28(2)	14(1)	1(1)	-1(1)	-1(1)
C(5)	30(2)	22(2)	20(1)	1(1)	2(1)	0(1)
C(6)	22(2)	21(2)	20(1)	4(1)	3(1)	6(1)
C(7)	31(2)	38(2)	25(2)	-1(2)	-3(1)	-8(2)
C(8)	17(1)	20(2)	17(1)	4(1)	0(1)	-3(1)
C(9)	19(1)	20(2)	18(1)	3(1)	3(1)	-1(1)
C(10)	24(2)	21(2)	22(2)	-2(1)	2(1)	0(1)
C(11)	20(2)	31(2)	21(2)	-6(1)	1(1)	3(1)
C(12)	21(2)	39(2)	23(2)	1(1)	4(1)	0(1)
C(13)	19(1)	24(2)	16(1)	-4(1)	4(1)	3(1)
C(14)	24(2)	23(2)	21(1)	-2(1)	5(1)	0(1)
C(15)	27(2)	29(2)	18(2)	2(1)	4(1)	8(1)
C(16)	24(1)	37(2)	19(1)	-8(1)	-1(1)	7(1)
C(17)	22(2)	31(2)	25(2)	-12(1)	3(1)	1(1)
C(18)	24(2)	21(2)	22(2)	-3(1)	6(1)	3(1)
C(19)	20(1)	21(2)	12(1)	1(1)	1(1)	-2(1)
C(20)	21(1)	21(2)	16(1)	2(1)	2(1)	-2(1)
C(21)	32(2)	18(2)	19(1)	-3(1)	2(1)	0(1)
C(22)	26(2)	24(2)	21(1)	-1(1)	2(1)	7(1)
C(23)	18(2)	29(2)	20(2)	-2(1)	1(1)	2(1)
C(24)	21(2)	21(2)	18(1)	-2(1)	2(1)	-2(1)
O(1)	21(1)	45(2)	21(1)	8(1)	-1(1)	-6(1)
O(2)	35(1)	21(1)	30(1)	4(1)	-10(1)	-4(1)
O(3)	17(1)	23(1)	19(1)	1(1)	-1(1)	-1(1)
S(1)	20(1)	23(1)	18(1)	4(1)	-2(1)	-3(1)

Table S105. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2v**.

	x	y	z	U(eq)
H(2)	-1026	7588	1360	27
H(3)	-3334	5525	882	31
H(5)	-85	712	428	29
H(6)	2224	2715	913	25
H(7A)	-4290	1434	681	48
H(7B)	-3072	18	260	48
H(7C)	-3988	2193	-45	48
H(10A)	3089	10353	3447	27
H(10B)	2132	9318	2797	27
H(11)	362	9265	3731	29
H(12A)	1751	5045	3754	33
H(12B)	20	5838	4080	33
H(14)	4875	4145	4075	26
H(15)	6769	4138	5027	30
H(16)	8412	7259	5309	32
H(17)	8133	10411	4658	31
H(18)	6221	10458	3714	26
H(20)	3937	1917	2174	23
H(21)	6091	-544	1971	27
H(22)	8954	347	2254	28
H(23)	9652	3779	2735	27
H(24)	7513	6244	2952	24

(*E*)-3-cyclopropyl-1,2-diphenylprop-1-en-1-yl 4-methylbenzenesulfonate (2w)



Crystals were used as received. A colorless plate 0.080 x 0.080 x 0.080 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 34395 reflections were collected covering the indices, -53<=*h*<=52, -12<=*k*<=12, -11<=*l*<=10. 7595 reflections were found to be symmetry independent, with an R_{int} of 0.0789. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined isotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S106. Crystal data and structure refinement for tosylate **2w**.

X-ray ID	gene766	
Sample/notebook ID	71462-062	
Empirical formula	C25 H24 O3 S	
Formula weight	404.50	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 44.237(10) Å	α= 90°.
	b = 10.331(2) Å	β= 95.834(4)°.
	c = 9.158(2) Å	γ = 90°.
Volume	4163.7(17) $Å^3$	
Z	8	
Density (calculated)	1.291 Mg/m^3	
Absorption coefficient	0.179 mm^{-1}	
F(000)	1712	
Crystal size	0.080 x 0.080 x 0.080 mm^3	
Theta range for data collection	1.388 to 25.478°.	
Index ranges	-53<=h<=52, -12<=k<=12, -11<=l<=10	
Reflections collected	34395	
Independent reflections	7595 [R(int) = 0.0789]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.745 and 0.594	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	7595 / 0 / 236	
Goodness-of-fit on F^2	1.067	
Final R indices [I>2sigma(I)]	R1 = 0.1169, wR2 = 0.2951	
R indices (all data)	R1 = 0.1296, wR2 = 0.3037	
Extinction coefficient	n/a	
Largest diff. peak and hole	1.485 and -0.844 $e.Å^{-3}$	

Table S107. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2w**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	9434(2)	4917(6)	5674(8)	8(1)
C(2)	9577(2)	3793(7)	5260(9)	14(2)
C(3)	9725(2)	3776(8)	4003(9)	19(2)
C(4)	9727(2)	4884(8)	3118(10)	19(2)
C(5)	9586(2)	6014(8)	3539(10)	20(2)
C(6)	9440(2)	6048(7)	4818(9)	14(2)
C(7)	9869(2)	4855(9)	1687(11)	28(2)
C(8)	8679(2)	4943(7)	5514(8)	10(2)
C(9)	8436(2)	5395(7)	6075(9)	14(2)
C(10)	8391(2)	5307(8)	7670(10)	20(2)
C(11)	8111(2)	4510(8)	7876(10)	21(2)
C(12)	8100(2)	3786(8)	9316(11)	31(2)
C(13)	8134(2)	3068(9)	7912(11)	34(2)
C(14)	8174(2)	5949(7)	5068(9)	17(2)
C(15)	8030(2)	5227(7)	3945(9)	14(2)
C(16)	7779(2)	5735(8)	3003(10)	23(2)
C(17)	7669(2)	6995(8)	3266(10)	27(2)
C(18)	7816(2)	7700(8)	4430(10)	22(2)
C(19)	8061(2)	7188(8)	5347(9)	19(2)
C(20)	8756(2)	5001(6)	3982(8)	6(1)
C(21)	8722(2)	6156(7)	3166(9)	15(2)
C(22)	8805(2)	6246(7)	1772(9)	16(2)
C(23)	8924(2)	5153(7)	1142(9)	15(2)
C(24)	8962(2)	4003(7)	1899(10)	18(2)
C(25)	8876(2)	3917(7)	3295(9)	13(2)
C(26)	5561(2)	5050(8)	6289(11)	25(2)
C(27)	5562(2)	3967(8)	5360(11)	28(2)
C(28)	5417(2)	4073(9)	3924(12)	33(2)
C(29)	5274(2)	5216(9)	3402(12)	32(2)
C(30)	5273(2)	6257(9)	4384(10)	26(2)
C(31)	5418(2)	6211(8)	5769(11)	26(2)
C(32)	5132(2)	5314(10)	1874(12)	38(2)
C(33)	6320(2)	5047(8)	7030(11)	26(2)
C(34)	6574(2)	4641(8)	7902(10)	24(2)
C(35)	6598(2)	4658(9)	9528(10)	25(2)
C(36)	6718(2)	5981(8)	10114(10)	23(2)
C(37)	7059(2)	6182(10)	10357(12)	35(2)
C(38)	6878(2)	6026(10)	11698(11)	32(2)
C(39)	6846(2)	4209(8)	7191(10)	23(2)
C(40)	6974(2)	5039(9)	6274(11)	31(2)
C(41)	7236(2)	4676(9)	5589(11)	30(2)
C(42)	7367(2)	3478(8)	5950(10)	27(2)
C(43)	7248(2)	2665(9)	6930(10)	27(2)
C(44)	6987(2)	3028(9)	7579(11)	27(2)
C(45)	6255(2)	5044(8)	5389(10)	24(2)
C(46)	6123(2)	6135(8)	4684(10)	22(2)
C(47)	6042(2)	6076(9)	3192(11)	27(2)
C(48)	6086(2)	4946(9)	2380(12)	32(2)
C(49)	6219(2)	3872(9)	3119(11)	33(2)
C(50)	6299(2)	3917(8)	4611(10)	24(2)

O(1)	9338(1)	3932(5)	8192(6)	18(1)
O(2)	9157(1)	6175(5)	7596(6)	15(1)
O(3)	8901(1)	4219(5)	6465(6)	12(1)
O(4)	5837(2)	3704(6)	8461(8)	32(2)
O(5)	5648(2)	5905(6)	8979(8)	32(2)
O(6)	6095(1)	5698(5)	7796(7)	24(1)
S(1)	9216(1)	4878(2)	7135(2)	9(1)
S(2)	5776(1)	5017(2)	8047(3)	29(1)

Table S108. Bond lengths [Å] and angles [°] for tosylate **2w**.

C(1)-C(2)	1.393(10)	C(26)-C(31)	1.415(12)
C(1)-C(6)	1.409(10)	C(26)-S(2)	1.785(10)
C(1)-S(1)	1.727(8)	C(27)-C(28)	1.409(14)
C(2)-C(3)	1.382(12)	C(27)-H(27)	0.9500
C(2)-H(2)	0.9500	C(28)-C(29)	1.400(14)
C(3)-C(4)	1.403(11)	C(28)-H(28)	0.9500
C(3)-H(3)	0.9500	C(29)-C(30)	1.402(13)
C(4)-C(5)	1.396(11)	C(29)-C(32)	1.478(15)
C(4)-C(7)	1.510(13)	C(30)-C(31)	1.362(13)
C(5)-C(6)	1.396(12)	C(30)-H(30)	0.9500
C(5)-H(5)	0.9500	C(31)-H(31)	0.9500
C(6)-H(6)	0.9500	C(32)-H(32A)	0.9800
C(7)-H(7A)	0.9800	C(32)-H(32B)	0.9800
C(7)-H(7B)	0.9800	C(32)-H(32C)	0.9800
C(7)-H(7C)	0.9800	C(33)-C(34)	1.376(12)
C(8)-C(9)	1.322(11)	C(33)-O(6)	1.441(11)
C(8)-O(3)	1.453(9)	C(33)-C(45)	1.501(13)
C(8)-C(20)	1.478(11)	C(34)-C(35)	1.482(13)
C(9)-C(10)	1.497(12)	C(34)-C(39)	1.493(12)
C(9)-C(14)	1.517(11)	C(35)-C(36)	1.543(12)
C(10)-C(11)	1.513(11)	C(35)-H(35A)	0.9900
C(10)-H(10A)	0.9900	C(35)-H(35B)	0.9900
C(10)-H(10B)	0.9900	C(36)-C(37)	1.517(13)
C(11)-C(13)	1.493(12)	C(36)-C(38)	1.548(13)
C(11)-C(12)	1.521(13)	C(36)-H(36)	1.0000
C(11)-H(11)	1.0000	C(37)-C(38)	1.542(14)
C(12)-C(13)	1.505(14)	C(37)-H(37A)	0.9900
C(12)-H(12A)	0.9900	C(37)-H(37B)	0.9900
C(12)-H(12B)	0.9900	C(38)-H(38A)	0.9900
C(13)-H(13A)	0.9900	C(38)-H(38B)	0.9900
C(13)-H(13B)	0.9900	C(39)-C(40)	1.364(13)
C(14)-C(15)	1.374(11)	C(39)-C(44)	1.400(12)
C(14)-C(19)	1.408(11)	C(40)-C(41)	1.420(13)
C(15)-C(16)	1.433(11)	C(40)-H(40)	0.9500
C(15)-H(15)	0.9500	C(41)-C(42)	1.392(12)
C(16)-C(17)	1.419(12)	C(41)-H(41)	0.9500
C(16)-H(16)	0.9500	C(42)-C(43)	1.372(13)
C(17)-C(18)	1.396(12)	C(42)-H(42)	0.9500
C(17)-H(17)	0.9500	C(43)-C(44)	1.405(12)
C(18)-C(19)	1.405(11)	C(43)-H(43)	0.9500
C(18)-H(18)	0.9500	C(44)-H(44)	0.9500
C(19)-H(19)	0.9500	C(45)-C(50)	1.389(12)
C(20)-C(21)	1.408(10)	C(45)-C(46)	1.395(12)
C(20)-C(25)	1.414(10)	C(46)-C(47)	1.378(13)
C(21)-C(22)	1.367(11)	C(46)-H(46)	0.9500
C(21)-H(21)	0.9500	C(47)-C(48)	1.408(13)
C(22)-C(23)	1.396(10)	C(47)-H(47)	0.9500
C(22)-H(22)	0.9500	C(48)-C(49)	1.399(13)
C(23)-C(24)	1.378(11)	C(48)-H(48)	0.9500
C(23)-H(23)	0.9500	C(49)-C(50)	1.376(14)
C(24)-C(25)	1.374(12)	C(49)-H(49)	0.9500
C(24)-H(24)	0.9500	C(50)-H(50)	0.9500
C(25)-H(25)	0.9500	O(1)-S(1)	1.442(6)
C(26)-C(27)	1.406(13)	O(2)-S(1)	1.436(5)

O(3)-S(1)	1.615(5)	O(5)-S(2)	1.409(7)
O(4)-S(2)	1.427(7)	O(6)-S(2)	1.613(6)

C(2)-C(1)-C(6)	120.4(7)	H(13A)-C(13)-H(13B)	114.8
C(2)-C(1)-S(1)	119.7(6)	C(15)-C(14)-C(19)	118.9(7)
C(6)-C(1)-S(1)	119.6(5)	C(15)-C(14)-C(9)	121.2(7)
C(3)-C(2)-C(1)	120.3(7)	C(19)-C(14)-C(9)	119.8(7)
C(3)-C(2)-H(2)	119.9	C(14)-C(15)-C(16)	121.6(7)
C(1)-C(2)-H(2)	119.9	C(14)-C(15)-H(15)	119.2
C(2)-C(3)-C(4)	120.2(8)	C(16)-C(15)-H(15)	119.2
C(2)-C(3)-H(3)	119.9	C(17)-C(16)-C(15)	119.4(8)
C(4)-C(3)-H(3)	119.9	C(17)-C(16)-H(16)	120.3
C(5)-C(4)-C(3)	119.5(8)	C(15)-C(16)-H(16)	120.3
C(5)-C(4)-C(7)	119.6(8)	C(18)-C(17)-C(16)	117.9(8)
C(3)-C(4)-C(7)	120.9(8)	C(18)-C(17)-H(17)	121.1
C(6)-C(5)-C(4)	120.8(8)	C(16)-C(17)-H(17)	121.1
C(6)-C(5)-H(5)	119.6	C(17)-C(18)-C(19)	122.0(8)
C(4)-C(5)-H(5)	119.6	C(17)-C(18)-H(18)	119.0
C(5)-C(6)-C(1)	118.9(7)	C(19)-C(18)-H(18)	119.0
C(5)-C(6)-H(6)	120.6	C(18)-C(19)-C(14)	120.1(8)
C(1)-C(6)-H(6)	120.6	C(18)-C(19)-H(19)	120.0
C(4)-C(7)-H(7A)	109.5	C(14)-C(19)-H(19)	120.0
C(4)-C(7)-H(7B)	109.5	C(21)-C(20)-C(25)	117.4(7)
H(7A)-C(7)-H(7B)	109.5	C(21)-C(20)-C(8)	121.0(6)
C(4)-C(7)-H(7C)	109.5	C(25)-C(20)-C(8)	121.6(6)
H(7A)-C(7)-H(7C)	109.5	C(22)-C(21)-C(20)	122.0(7)
H(7B)-C(7)-H(7C)	109.5	C(22)-C(21)-H(21)	119.0
C(9)-C(8)-O(3)	118.4(7)	C(20)-C(21)-H(21)	119.0
C(9)-C(8)-C(20)	129.0(7)	C(21)-C(22)-C(23)	118.7(7)
O(3)-C(8)-C(20)	112.5(6)	C(21)-C(22)-H(22)	120.7
C(8)-C(9)-C(10)	123.5(7)	C(23)-C(22)-H(22)	120.7
C(8)-C(9)-C(14)	119.8(7)	C(24)-C(23)-C(22)	121.4(8)
C(10)-C(9)-C(14)	116.5(7)	C(24)-C(23)-H(23)	119.3
C(9)-C(10)-C(11)	110.3(7)	C(22)-C(23)-H(23)	119.3
C(9)-C(10)-H(10A)	109.6	C(25)-C(24)-C(23)	119.5(8)
C(11)-C(10)-H(10A)	109.6	C(25)-C(24)-H(24)	120.2
C(9)-C(10)-H(10B)	109.6	C(23)-C(24)-H(24)	120.2
C(11)-C(10)-H(10B)	109.6	C(24)-C(25)-C(20)	121.1(7)
H(10A)-C(10)-H(10B)	108.1	C(24)-C(25)-H(25)	119.5
C(13)-C(11)-C(10)	119.3(8)	C(20)-C(25)-H(25)	119.5
C(13)-C(11)-C(12)	59.9(6)	C(27)-C(26)-C(31)	120.0(9)
C(10)-C(11)-C(12)	118.3(8)	C(27)-C(26)-S(2)	119.7(7)
C(13)-C(11)-H(11)	115.9	C(31)-C(26)-S(2)	119.9(7)
C(10)-C(11)-H(11)	115.9	C(26)-C(27)-C(28)	118.3(9)
C(12)-C(11)-H(11)	115.9	C(26)-C(27)-H(27)	120.9
C(13)-C(12)-C(11)	59.1(6)	C(28)-C(27)-H(27)	120.9
C(13)-C(12)-H(12A)	117.9	C(29)-C(28)-C(27)	122.1(9)
C(11)-C(12)-H(12A)	117.9	C(29)-C(28)-H(28)	118.9
C(13)-C(12)-H(12B)	117.9	C(27)-C(28)-H(28)	118.9
C(11)-C(12)-H(12B)	117.9	C(28)-C(29)-C(30)	117.3(9)
H(12A)-C(12)-H(12B)	115.0	C(28)-C(29)-C(32)	120.9(9)
C(11)-C(13)-C(12)	61.0(6)	C(30)-C(29)-C(32)	121.8(9)
C(11)-C(13)-H(13A)	117.7	C(31)-C(30)-C(29)	122.6(9)
C(12)-C(13)-H(13A)	117.7	C(31)-C(30)-H(30)	118.7
C(11)-C(13)-H(13B)	117.7	C(29)-C(30)-H(30)	118.7
C(12)-C(13)-H(13B)	117.7	C(30)-C(31)-C(26)	119.6(9)

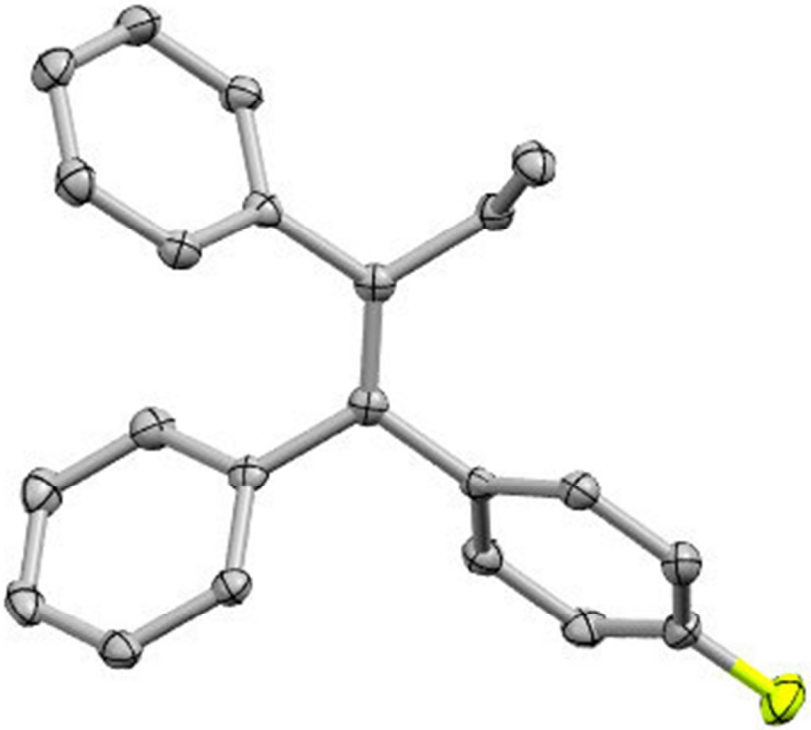
C(30)-C(31)-H(31)	120.2	C(42)-C(41)-C(40)	117.9(9)
C(26)-C(31)-H(31)	120.2	C(42)-C(41)-H(41)	121.1
C(29)-C(32)-H(32A)	109.5	C(40)-C(41)-H(41)	121.1
C(29)-C(32)-H(32B)	109.5	C(43)-C(42)-C(41)	121.5(9)
H(32A)-C(32)-H(32B)	109.5	C(43)-C(42)-H(42)	119.3
C(29)-C(32)-H(32C)	109.5	C(41)-C(42)-H(42)	119.3
H(32A)-C(32)-H(32C)	109.5	C(42)-C(43)-C(44)	119.9(8)
H(32B)-C(32)-H(32C)	109.5	C(42)-C(43)-H(43)	120.0
C(34)-C(33)-O(6)	115.0(8)	C(44)-C(43)-H(43)	120.0
C(34)-C(33)-C(45)	130.0(9)	C(39)-C(44)-C(43)	119.4(8)
O(6)-C(33)-C(45)	114.6(7)	C(39)-C(44)-H(44)	120.3
C(33)-C(34)-C(35)	123.4(9)	C(43)-C(44)-H(44)	120.3
C(33)-C(34)-C(39)	119.0(8)	C(50)-C(45)-C(46)	120.9(9)
C(35)-C(34)-C(39)	117.6(8)	C(50)-C(45)-C(33)	119.5(8)
C(34)-C(35)-C(36)	110.3(8)	C(46)-C(45)-C(33)	119.3(8)
C(34)-C(35)-H(35A)	109.6	C(47)-C(46)-C(45)	118.5(8)
C(36)-C(35)-H(35A)	109.6	C(47)-C(46)-H(46)	120.8
C(34)-C(35)-H(35B)	109.6	C(45)-C(46)-H(46)	120.8
C(36)-C(35)-H(35B)	109.6	C(46)-C(47)-C(48)	121.6(9)
H(35A)-C(35)-H(35B)	108.1	C(46)-C(47)-H(47)	119.2
C(37)-C(36)-C(35)	118.4(8)	C(48)-C(47)-H(47)	119.2
C(37)-C(36)-C(38)	60.4(6)	C(49)-C(48)-C(47)	118.4(9)
C(35)-C(36)-C(38)	117.5(8)	C(49)-C(48)-H(48)	120.8
C(37)-C(36)-H(36)	116.3	C(47)-C(48)-H(48)	120.8
C(35)-C(36)-H(36)	116.3	C(50)-C(49)-C(48)	120.4(9)
C(38)-C(36)-H(36)	116.3	C(50)-C(49)-H(49)	119.8
C(36)-C(37)-C(38)	60.8(6)	C(48)-C(49)-H(49)	119.8
C(36)-C(37)-H(37A)	117.7	C(49)-C(50)-C(45)	120.2(9)
C(38)-C(37)-H(37A)	117.7	C(49)-C(50)-H(50)	119.9
C(36)-C(37)-H(37B)	117.7	C(45)-C(50)-H(50)	119.9
C(38)-C(37)-H(37B)	117.7	C(8)-O(3)-S(1)	121.1(4)
H(37A)-C(37)-H(37B)	114.8	C(33)-O(6)-S(2)	121.5(5)
C(37)-C(38)-C(36)	58.8(6)	O(2)-S(1)-O(1)	120.1(3)
C(37)-C(38)-H(38A)	117.9	O(2)-S(1)-O(3)	109.3(3)
C(36)-C(38)-H(38A)	117.9	O(1)-S(1)-O(3)	102.7(3)
C(37)-C(38)-H(38B)	117.9	O(2)-S(1)-C(1)	109.7(3)
C(36)-C(38)-H(38B)	117.9	O(1)-S(1)-C(1)	109.6(3)
H(38A)-C(38)-H(38B)	115.0	O(3)-S(1)-C(1)	104.1(3)
C(40)-C(39)-C(44)	120.0(8)	O(5)-S(2)-O(4)	122.3(4)
C(40)-C(39)-C(34)	119.1(8)	O(5)-S(2)-O(6)	102.3(4)
C(44)-C(39)-C(34)	120.5(8)	O(4)-S(2)-O(6)	107.9(4)
C(39)-C(40)-C(41)	121.0(9)	O(5)-S(2)-C(26)	108.9(4)
C(39)-C(40)-H(40)	119.5	O(4)-S(2)-C(26)	109.1(4)
C(41)-C(40)-H(40)	119.5	O(6)-S(2)-C(26)	104.9(4)

Symmetry transformations used to generate equivalent atoms:

Table S109. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for tosylate **2w**.

	x	y	z	U(eq)
H(2)	9572	3035	5845	17
H(3)	9825	3012	3737	22
H(5)	9590	6769	2949	24
H(6)	9345	6820	5106	17
H(7A)	9710	4898	866	43
H(7B)	9985	4051	1624	43
H(7C)	10006	5597	1643	43
H(10A)	8367	6187	8071	25
H(10B)	8571	4902	8213	25
H(11)	7913	4871	7426	26
H(12A)	8280	3843	10052	38
H(12B)	7902	3729	9729	38
H(13A)	8335	2678	7792	41
H(13B)	7958	2565	7470	41
H(15)	8098	4370	3789	16
H(16)	7688	5232	2209	27
H(17)	7501	7347	2669	32
H(18)	7748	8553	4608	27
H(19)	8150	7679	6156	23
H(21)	8638	6894	3597	18
H(22)	8782	7037	1243	19
H(23)	8981	5204	170	18
H(24)	9047	3273	1459	22
H(25)	8897	3117	3806	16
H(27)	5658	3184	5693	34
H(28)	5416	3346	3288	40
H(30)	5167	7024	4072	31
H(31)	5423	6954	6383	31
H(32A)	4995	6062	1783	56
H(32B)	5016	4523	1614	56
H(32C)	5291	5422	1210	56
H(35A)	6737	3963	9921	31
H(35B)	6396	4492	9864	31
H(36)	6594	6755	9785	28
H(37A)	7139	7053	10158	42
H(37B)	7192	5455	10116	42
H(38A)	6848	6805	12296	38
H(38B)	6900	5205	12254	38
H(40)	6888	5872	6091	37
H(41)	7318	5234	4907	36
H(42)	7542	3217	5507	32
H(43)	7343	1857	7170	32
H(44)	6906	2477	8275	32
H(46)	6090	6900	5221	26
H(47)	5954	6815	2700	32
H(48)	6027	4915	1354	38
H(49)	6255	3106	2589	39
H(50)	6384	3176	5110	29

(*E*)-(1-(4-fluorophenyl)but-1-ene-1,2-diyl)dibenzene (4a)



Crystals were used as received. A colorless prism 0.050 x 0.040 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 60 mm and exposure time was 1 seconds per frame using a scan width of 2.0°. Data collection was 99.0% complete to 67.000° in θ. A total of 18657 reflections were collected covering the indices, -14<=*h*<=14, -10<=*k*<=8, -18<=*l*<=18. 3024 reflections were found to be symmetry independent, with an R_{int} of 0.0297. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S110. Crystal data and structure refinement for olefin **4a**.

X-ray ID	gene891	
Sample/notebook ID	71452-122A	
Empirical formula	C22 H19 F	
Formula weight	302.37	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 12.2957(5) Å	α= 90°.
	b = 8.7030(4) Å	β= 92.233(2)°.
	c = 15.5509(6) Å	γ = 90°.
Volume	1662.83(12) $Å^3$	
Z	4	
Density (calculated)	1.208 Mg/m^3	
Absorption coefficient	0.599 mm^{-1}	
F(000)	640	
Crystal size	0.050 x 0.040 x 0.030 mm^3	
Theta range for data collection	4.500 to 68.339°.	
Index ranges	-14<=h<=14, -10<=k<=8, -18<=l<=18	
Reflections collected	18657	
Independent reflections	3024 [R(int) = 0.0297]	
Completeness to theta = 67.000°	99.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.929 and 0.875	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3024 / 0 / 209	
Goodness-of-fit on F^2	1.046	
Final R indices [I>2sigma(I)]	R1 = 0.0337, wR2 = 0.0861	
R indices (all data)	R1 = 0.0363, wR2 = 0.0888	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.244 and -0.198 $e.Å^{-3}$	

Table S111. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **4a**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4811(1)	2375(1)	6197(1)	16(1)
C(2)	4330(1)	2193(1)	5404(1)	16(1)
C(3)	4960(1)	1830(1)	4611(1)	18(1)
C(4)	4919(1)	3113(1)	3941(1)	25(1)
C(5)	3126(1)	2326(1)	5246(1)	17(1)
C(6)	2547(1)	3568(1)	5565(1)	20(1)
C(7)	1428(1)	3691(1)	5428(1)	24(1)
C(8)	862(1)	2581(2)	4953(1)	26(1)
C(9)	1426(1)	1353(2)	4619(1)	27(1)
C(10)	2544(1)	1227(1)	4763(1)	22(1)
C(11)	4184(1)	2552(1)	6996(1)	17(1)
C(12)	4446(1)	3722(1)	7584(1)	19(1)
C(13)	3864(1)	3906(1)	8325(1)	24(1)
C(14)	3021(1)	2907(2)	8496(1)	27(1)
C(15)	2763(1)	1731(2)	7924(1)	27(1)
C(16)	3343(1)	1549(1)	7183(1)	22(1)
C(17)	6016(1)	2340(1)	6360(1)	17(1)
C(18)	6723(1)	3283(1)	5915(1)	19(1)
C(19)	7843(1)	3229(1)	6078(1)	22(1)
C(20)	8245(1)	2213(1)	6690(1)	23(1)
C(21)	7581(1)	1275(1)	7155(1)	24(1)
C(22)	6465(1)	1359(1)	6992(1)	21(1)
F(1)	9339(1)	2136(1)	6838(1)	34(1)

Table S112. Bond lengths [Å] and angles [°] for olefin **4a**.

C(1)-C(2)	1.3557(15)	C(11)-C(16)	1.3922(15)
C(1)-C(17)	1.4936(14)	C(11)-C(12)	1.3978(15)
C(1)-C(11)	1.4956(14)	C(12)-C(13)	1.3894(15)
C(2)-C(5)	1.4964(14)	C(12)-H(12)	0.9500
C(2)-C(3)	1.5159(14)	C(13)-C(14)	1.3860(17)
C(3)-C(4)	1.5266(15)	C(13)-H(13)	0.9500
C(3)-H(3A)	0.9900	C(14)-C(15)	1.3844(18)
C(3)-H(3B)	0.9900	C(14)-H(14)	0.9500
C(4)-H(4A)	0.9800	C(15)-C(16)	1.3875(16)
C(4)-H(4B)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4C)	0.9800	C(16)-H(16)	0.9500
C(5)-C(10)	1.3958(15)	C(17)-C(18)	1.3986(15)
C(5)-C(6)	1.3961(15)	C(17)-C(22)	1.3988(15)
C(6)-C(7)	1.3879(15)	C(18)-C(19)	1.3903(15)
C(6)-H(6)	0.9500	C(18)-H(18)	0.9500
C(7)-C(8)	1.3864(17)	C(19)-C(20)	1.3772(16)
C(7)-H(7)	0.9500	C(19)-H(19)	0.9500
C(8)-C(9)	1.3860(17)	C(20)-F(1)	1.3568(12)
C(8)-H(8)	0.9500	C(20)-C(21)	1.3789(17)
C(9)-C(10)	1.3893(16)	C(21)-C(22)	1.3875(15)
C(9)-H(9)	0.9500	C(21)-H(21)	0.9500
C(10)-H(10)	0.9500	C(22)-H(22)	0.9500
C(2)-C(1)-C(17)	123.12(9)	C(8)-C(9)-H(9)	119.8
C(2)-C(1)-C(11)	123.16(10)	C(10)-C(9)-H(9)	119.8
C(17)-C(1)-C(11)	113.66(8)	C(9)-C(10)-C(5)	121.04(10)
C(1)-C(2)-C(5)	122.28(9)	C(9)-C(10)-H(10)	119.5
C(1)-C(2)-C(3)	123.13(10)	C(5)-C(10)-H(10)	119.5
C(5)-C(2)-C(3)	114.59(9)	C(16)-C(11)-C(12)	118.37(10)
C(2)-C(3)-C(4)	113.46(9)	C(16)-C(11)-C(1)	121.33(10)
C(2)-C(3)-H(3A)	108.9	C(12)-C(11)-C(1)	120.29(9)
C(4)-C(3)-H(3A)	108.9	C(13)-C(12)-C(11)	120.80(10)
C(2)-C(3)-H(3B)	108.9	C(13)-C(12)-H(12)	119.6
C(4)-C(3)-H(3B)	108.9	C(11)-C(12)-H(12)	119.6
H(3A)-C(3)-H(3B)	107.7	C(14)-C(13)-C(12)	120.04(11)
C(3)-C(4)-H(4A)	109.5	C(14)-C(13)-H(13)	120.0
C(3)-C(4)-H(4B)	109.5	C(12)-C(13)-H(13)	120.0
H(4A)-C(4)-H(4B)	109.5	C(15)-C(14)-C(13)	119.65(10)
C(3)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	120.2
H(4A)-C(4)-H(4C)	109.5	C(13)-C(14)-H(14)	120.2
H(4B)-C(4)-H(4C)	109.5	C(14)-C(15)-C(16)	120.35(11)
C(10)-C(5)-C(6)	117.66(10)	C(14)-C(15)-H(15)	119.8
C(10)-C(5)-C(2)	121.23(9)	C(16)-C(15)-H(15)	119.8
C(6)-C(5)-C(2)	121.10(9)	C(15)-C(16)-C(11)	120.76(11)
C(7)-C(6)-C(5)	121.40(10)	C(15)-C(16)-H(16)	119.6
C(7)-C(6)-H(6)	119.3	C(11)-C(16)-H(16)	119.6
C(5)-C(6)-H(6)	119.3	C(18)-C(17)-C(22)	117.97(10)
C(8)-C(7)-C(6)	120.15(10)	C(18)-C(17)-C(1)	122.40(9)
C(8)-C(7)-H(7)	119.9	C(22)-C(17)-C(1)	119.61(9)
C(6)-C(7)-H(7)	119.9	C(19)-C(18)-C(17)	121.37(10)
C(9)-C(8)-C(7)	119.26(10)	C(19)-C(18)-H(18)	119.3
C(9)-C(8)-H(8)	120.4	C(17)-C(18)-H(18)	119.3
C(7)-C(8)-H(8)	120.4	C(20)-C(19)-C(18)	118.30(10)
C(8)-C(9)-C(10)	120.46(11)	C(20)-C(19)-H(19)	120.8

C(18)-C(19)-H(19)	120.8	C(20)-C(21)-H(21)	120.8
F(1)-C(20)-C(19)	118.44(10)	C(22)-C(21)-H(21)	120.8
F(1)-C(20)-C(21)	118.99(10)	C(21)-C(22)-C(17)	121.44(10)
C(19)-C(20)-C(21)	122.57(10)	C(21)-C(22)-H(22)	119.3
C(20)-C(21)-C(22)	118.31(10)	C(17)-C(22)-H(22)	119.3

Symmetry transformations used to generate equivalent atoms:

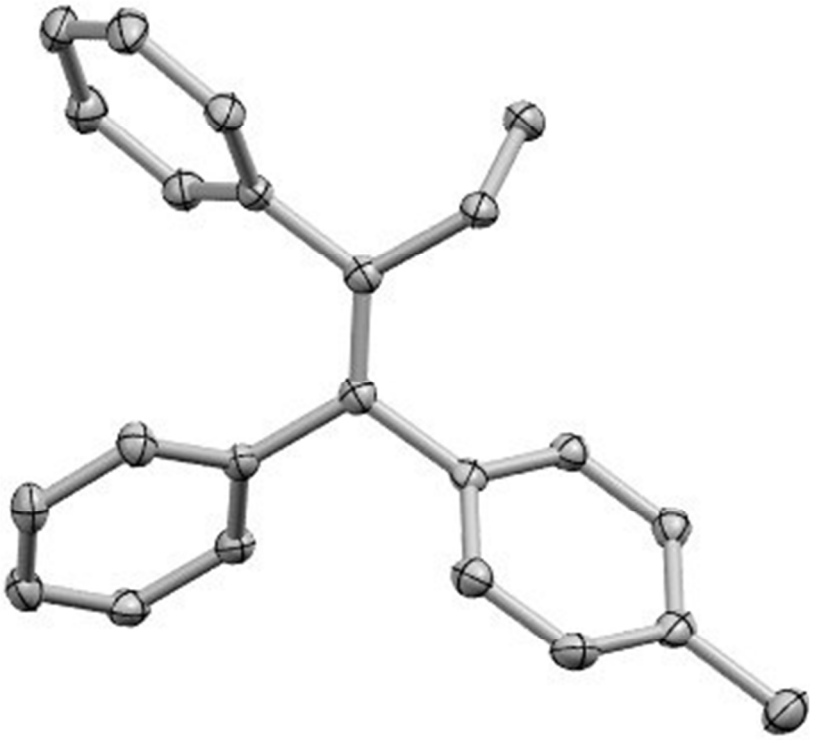
Table S113. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **4a**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	19(1)	12(1)	18(1)	1(1)	1(1)	1(1)
C(2)	19(1)	12(1)	19(1)	1(1)	0(1)	1(1)
C(3)	18(1)	19(1)	18(1)	-2(1)	0(1)	2(1)
C(4)	25(1)	30(1)	19(1)	4(1)	2(1)	4(1)
C(5)	20(1)	18(1)	14(1)	2(1)	0(1)	1(1)
C(6)	23(1)	19(1)	19(1)	1(1)	0(1)	0(1)
C(7)	23(1)	23(1)	25(1)	1(1)	3(1)	5(1)
C(8)	18(1)	33(1)	28(1)	1(1)	-2(1)	3(1)
C(9)	23(1)	30(1)	27(1)	-6(1)	-5(1)	-1(1)
C(10)	23(1)	23(1)	21(1)	-4(1)	-2(1)	3(1)
C(11)	17(1)	18(1)	17(1)	3(1)	-2(1)	3(1)
C(12)	17(1)	22(1)	20(1)	1(1)	-2(1)	1(1)
C(13)	22(1)	30(1)	18(1)	-3(1)	-3(1)	7(1)
C(14)	23(1)	40(1)	17(1)	7(1)	4(1)	7(1)
C(15)	24(1)	33(1)	25(1)	11(1)	3(1)	-3(1)
C(16)	24(1)	21(1)	21(1)	4(1)	-2(1)	-3(1)
C(17)	19(1)	16(1)	15(1)	-4(1)	1(1)	1(1)
C(18)	21(1)	19(1)	18(1)	0(1)	0(1)	2(1)
C(19)	20(1)	24(1)	21(1)	-1(1)	3(1)	-2(1)
C(20)	16(1)	31(1)	22(1)	-3(1)	-2(1)	3(1)
C(21)	24(1)	28(1)	19(1)	3(1)	-3(1)	4(1)
C(22)	22(1)	23(1)	17(1)	1(1)	0(1)	0(1)
F(1)	17(1)	51(1)	34(1)	6(1)	-3(1)	3(1)

Table S114. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for gene891.

	x	y	z	U(eq)
H(3A)	4661	879	4343	22
H(3B)	5729	1630	4787	22
H(4A)	4159	3330	3768	37
H(4B)	5315	2793	3437	37
H(4C)	5256	4042	4189	37
H(6)	2926	4346	5883	24
H(7)	1049	4537	5659	28
H(8)	96	2661	4858	32
H(9)	1044	592	4289	32
H(10)	2919	379	4529	27
H(12)	5031	4400	7475	23
H(13)	4043	4716	8714	28
H(14)	2623	3029	9003	32
H(15)	2186	1045	8040	32
H(16)	3165	729	6799	27
H(18)	6433	3975	5493	23
H(19)	8317	3875	5774	26
H(21)	7880	588	7576	28
H(22)	5997	736	7316	25

(*E*)-(1-(*p*-tolyl)but-1-ene-1,2-diyl)dibenzene (4b)



X-ray quality crystals were used as received. A colorless block 0.150 x 0.120 x 0.120 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 45 mm and exposure time was 8 seconds per frame using a scan width of 2°. Data collection was 98.3% complete to 67.000° in θ. A total of 11127 reflections were collected covering the indices, -11<=*h*<=11, -11<=*k*<=11, -12<=*l*<=12. 3104 reflections were found to be symmetry independent, with an R_{int} of 0.0317. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S115. Crystal data and structure refinement for olefin **4b**.

X-ray ID	gene962	
Sample/notebook ID	71452-153	
Empirical formula	C23 H22	
Formula weight	298.40	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 9.3948(3) Å	α= 113.0060(10)°.
	b = 9.4545(3) Å	β= 90.5330(10)°.
	c = 10.5713(4) Å	γ = 93.7970(10)°.
Volume	861.76(5) $Å^3$	
Z	2	
Density (calculated)	1.150 Mg/m^3	
Absorption coefficient	0.483 mm^{-1}	
F(000)	320	
Crystal size	0.150 x 0.120 x 0.120 mm^3	
Theta range for data collection	4.547 to 68.248°.	
Index ranges	-11<=h<=11, -11<=k<=11, -12<=l<=12	
Reflections collected	11127	
Independent reflections	3104 [R(int) = 0.0317]	
Completeness to theta = 67.000°	98.3 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.754 and 0.701	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3104 / 0 / 210	
Goodness-of-fit on F^2	1.044	
Final R indices [I>2sigma(I)]	R1 = 0.0399, wR2 = 0.1048	
R indices (all data)	R1 = 0.0416, wR2 = 0.1068	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.183 and -0.199 $e.Å^{-3}$	

Table S116. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **4b**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4662(1)	2933(1)	2477(1)	18(1)
C(2)	4994(1)	1858(1)	2955(1)	18(1)
C(3)	3949(1)	545(1)	2914(1)	20(1)
C(4)	4386(1)	-1031(1)	1935(1)	25(1)
C(5)	6436(1)	1845(1)	3561(1)	19(1)
C(6)	7677(1)	1896(1)	2857(1)	23(1)
C(7)	9010(1)	1818(1)	3394(1)	28(1)
C(8)	9126(1)	1673(2)	4647(1)	31(1)
C(9)	7908(1)	1636(2)	5367(1)	30(1)
C(10)	6573(1)	1718(1)	4830(1)	24(1)
C(11)	5647(1)	4306(1)	2627(1)	18(1)
C(12)	5853(1)	4720(1)	1505(1)	20(1)
C(13)	6768(1)	5984(1)	1617(1)	23(1)
C(14)	7471(1)	6879(1)	2864(1)	25(1)
C(15)	7259(1)	6495(1)	3992(1)	25(1)
C(16)	6360(1)	5218(1)	3873(1)	22(1)
C(17)	3244(1)	2866(1)	1786(1)	18(1)
C(18)	2736(1)	1590(1)	624(1)	19(1)
C(19)	1424(1)	1555(1)	-8(1)	22(1)
C(20)	570(1)	2789(1)	496(1)	22(1)
C(21)	1070(1)	4063(1)	1661(1)	25(1)
C(22)	2388(1)	4110(1)	2287(1)	22(1)
C(23)	-833(1)	2741(2)	-231(1)	32(1)

Table S117. Bond lengths [Å] and angles [°] for olefin **4b**.

C(1)-C(2)	1.3514(16)	C(12)-C(13)	1.3904(16)
C(1)-C(11)	1.4978(15)	C(12)-H(12)	0.9500
C(1)-C(17)	1.4983(14)	C(13)-C(14)	1.3879(17)
C(2)-C(5)	1.4961(15)	C(13)-H(13)	0.9500
C(2)-C(3)	1.5174(15)	C(14)-C(15)	1.3886(18)
C(3)-C(4)	1.5309(16)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.3895(16)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4B)	0.9800	C(17)-C(18)	1.3948(16)
C(4)-H(4C)	0.9800	C(17)-C(22)	1.3997(16)
C(5)-C(6)	1.3973(17)	C(18)-C(19)	1.3892(15)
C(5)-C(10)	1.3984(16)	C(18)-H(18)	0.9500
C(6)-C(7)	1.3885(16)	C(19)-C(20)	1.3912(17)
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.3877(18)	C(20)-C(21)	1.3942(17)
C(7)-H(7)	0.9500	C(20)-C(23)	1.5085(15)
C(8)-C(9)	1.3860(19)	C(21)-C(22)	1.3879(16)
C(8)-H(8)	0.9500	C(21)-H(21)	0.9500
C(9)-C(10)	1.3909(16)	C(22)-H(22)	0.9500
C(9)-H(9)	0.9500	C(23)-H(23A)	0.9800
C(10)-H(10)	0.9500	C(23)-H(23B)	0.9800
C(11)-C(16)	1.3957(16)	C(23)-H(23C)	0.9800
C(11)-C(12)	1.3978(16)		

C(2)-C(1)-C(11)	123.35(10)	C(7)-C(8)-H(8)	120.2
C(2)-C(1)-C(17)	122.15(10)	C(8)-C(9)-C(10)	120.40(11)
C(11)-C(1)-C(17)	114.47(9)	C(8)-C(9)-H(9)	119.8
C(1)-C(2)-C(5)	122.94(10)	C(10)-C(9)-H(9)	119.8
C(1)-C(2)-C(3)	123.29(10)	C(9)-C(10)-C(5)	120.71(11)
C(5)-C(2)-C(3)	113.77(9)	C(9)-C(10)-H(10)	119.6
C(2)-C(3)-C(4)	112.57(9)	C(5)-C(10)-H(10)	119.6
C(2)-C(3)-H(3A)	109.1	C(16)-C(11)-C(12)	118.16(10)
C(4)-C(3)-H(3A)	109.1	C(16)-C(11)-C(1)	121.87(10)
C(2)-C(3)-H(3B)	109.1	C(12)-C(11)-C(1)	119.96(9)
C(4)-C(3)-H(3B)	109.1	C(13)-C(12)-C(11)	120.99(10)
H(3A)-C(3)-H(3B)	107.8	C(13)-C(12)-H(12)	119.5
C(3)-C(4)-H(4A)	109.5	C(11)-C(12)-H(12)	119.5
C(3)-C(4)-H(4B)	109.5	C(14)-C(13)-C(12)	120.17(11)
H(4A)-C(4)-H(4B)	109.5	C(14)-C(13)-H(13)	119.9
C(3)-C(4)-H(4C)	109.5	C(12)-C(13)-H(13)	119.9
H(4A)-C(4)-H(4C)	109.5	C(13)-C(14)-C(15)	119.42(10)
H(4B)-C(4)-H(4C)	109.5	C(13)-C(14)-H(14)	120.3
C(6)-C(5)-C(10)	118.05(10)	C(15)-C(14)-H(14)	120.3
C(6)-C(5)-C(2)	121.29(10)	C(14)-C(15)-C(16)	120.36(11)
C(10)-C(5)-C(2)	120.61(10)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-C(5)	121.25(11)	C(16)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.4	C(15)-C(16)-C(11)	120.88(11)
C(5)-C(6)-H(6)	119.4	C(15)-C(16)-H(16)	119.6
C(8)-C(7)-C(6)	119.97(11)	C(11)-C(16)-H(16)	119.6
C(8)-C(7)-H(7)	120.0	C(18)-C(17)-C(22)	117.62(10)
C(6)-C(7)-H(7)	120.0	C(18)-C(17)-C(1)	121.99(10)
C(9)-C(8)-C(7)	119.61(11)	C(22)-C(17)-C(1)	120.38(10)
C(9)-C(8)-H(8)	120.2	C(19)-C(18)-C(17)	121.10(10)

C(19)-C(18)-H(18)	119.4	C(20)-C(21)-H(21)	119.4
C(17)-C(18)-H(18)	119.4	C(21)-C(22)-C(17)	121.06(10)
C(18)-C(19)-C(20)	121.23(10)	C(21)-C(22)-H(22)	119.5
C(18)-C(19)-H(19)	119.4	C(17)-C(22)-H(22)	119.5
C(20)-C(19)-H(19)	119.4	C(20)-C(23)-H(23A)	109.5
C(19)-C(20)-C(21)	117.85(10)	C(20)-C(23)-H(23B)	109.5
C(19)-C(20)-C(23)	120.22(11)	H(23A)-C(23)-H(23B)	109.5
C(21)-C(20)-C(23)	121.91(11)	C(20)-C(23)-H(23C)	109.5
C(22)-C(21)-C(20)	121.12(10)	H(23A)-C(23)-H(23C)	109.5
C(22)-C(21)-H(21)	119.4	H(23B)-C(23)-H(23C)	109.5

Symmetry transformations used to generate equivalent atoms:

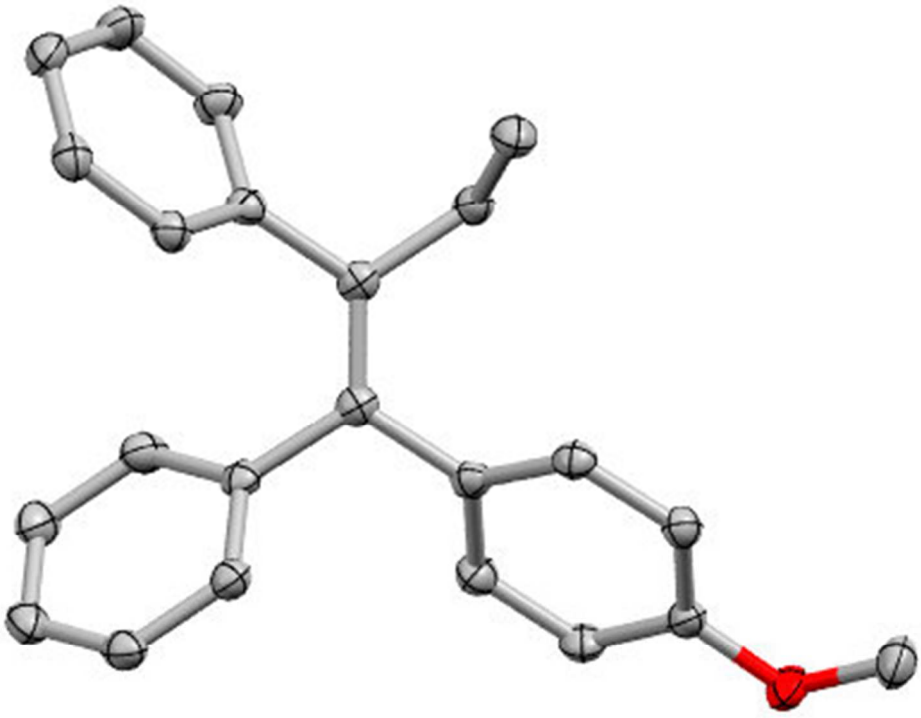
Table S118. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **4b**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	19(1)	18(1)	16(1)	7(1)	1(1)	0(1)
C(2)	20(1)	18(1)	17(1)	7(1)	1(1)	0(1)
C(3)	19(1)	20(1)	23(1)	12(1)	-2(1)	-1(1)
C(4)	23(1)	20(1)	33(1)	12(1)	-1(1)	0(1)
C(5)	21(1)	15(1)	21(1)	8(1)	-3(1)	-1(1)
C(6)	24(1)	24(1)	22(1)	11(1)	-1(1)	0(1)
C(7)	21(1)	31(1)	33(1)	15(1)	-1(1)	-2(1)
C(8)	21(1)	36(1)	39(1)	22(1)	-12(1)	-7(1)
C(9)	29(1)	35(1)	30(1)	21(1)	-10(1)	-8(1)
C(10)	23(1)	26(1)	26(1)	15(1)	-3(1)	-4(1)
C(11)	16(1)	17(1)	21(1)	8(1)	0(1)	2(1)
C(12)	21(1)	19(1)	21(1)	9(1)	-1(1)	2(1)
C(13)	22(1)	24(1)	29(1)	17(1)	2(1)	3(1)
C(14)	20(1)	21(1)	36(1)	13(1)	1(1)	-3(1)
C(15)	22(1)	24(1)	25(1)	5(1)	-2(1)	-4(1)
C(16)	21(1)	24(1)	20(1)	9(1)	1(1)	-1(1)
C(17)	19(1)	19(1)	19(1)	12(1)	1(1)	-1(1)
C(18)	20(1)	19(1)	21(1)	10(1)	1(1)	1(1)
C(19)	21(1)	23(1)	21(1)	11(1)	-2(1)	-3(1)
C(20)	18(1)	29(1)	27(1)	18(1)	1(1)	0(1)
C(21)	25(1)	24(1)	29(1)	14(1)	4(1)	7(1)
C(22)	26(1)	19(1)	21(1)	8(1)	0(1)	1(1)
C(23)	22(1)	40(1)	39(1)	23(1)	-4(1)	3(1)

Table S119. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **4b**.

	x	y	z	U(eq)
H(3A)	2991	707	2620	23
H(3B)	3883	556	3852	23
H(4A)	4340	-1093	988	37
H(4B)	3734	-1844	2014	37
H(4C)	5363	-1164	2178	37
H(6)	7607	1986	1995	27
H(7)	9842	1864	2904	33
H(8)	10034	1600	5009	37
H(9)	7986	1555	6232	35
H(10)	5746	1687	5331	29
H(12)	5360	4128	653	24
H(13)	6913	6235	839	28
H(14)	8092	7747	2944	30
H(15)	7731	7108	4850	30
H(16)	6229	4962	4651	26
H(18)	3297	730	259	23
H(19)	1103	671	-798	26
H(21)	499	4913	2034	30
H(22)	2713	5001	3068	27
H(23A)	-660	3020	-1020	48
H(23B)	-1446	3473	407	48
H(23C)	-1305	1699	-551	48

(*E*)-(1-(4-methoxyphenyl)but-1-ene-1,2-diyl)dibenzene (4c)



X-ray quality crystals were used as received. A colorless block 0.220 x 0.180 x 0.180 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 45 mm and exposure time was 2 seconds per frame using a scan width of 1.25°. Data collection was 100.0% complete to 67.000° in θ. A total of 22220 reflections were collected covering the indices, -15<=*h*<=15, -10<=*k*<=10, -18<=*l*<=18. 3219 reflections were found to be symmetry independent, with an R_{int} of 0.0531. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S120. Crystal data and structure refinement for olefin **4c**.

X-ray ID	gene958	
Sample/notebook ID	71452-146	
Empirical formula	C23 H22 O	
Formula weight	314.40	
Temperature	100(2) K	
Wavelength	1.54178 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 12.8187(5) Å	α= 90°.
	b = 8.7228(4) Å	β= 93.9290(10)°.
	c = 15.7048(6) Å	γ = 90°.
Volume	1751.90(12) $Å^3$	
Z	4	
Density (calculated)	1.192 Mg/m^3	
Absorption coefficient	0.545 mm^{-1}	
F(000)	672	
Crystal size	0.220 x 0.180 x 0.180 mm^3	
Theta range for data collection	4.310 to 68.304°.	
Index ranges	-15<=h<=15, -10<=k<=10, -18<=l<=18	
Reflections collected	22220	
Independent reflections	3219 [R(int) = 0.0531]	
Completeness to theta = 67.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.753 and 0.682	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3219 / 0 / 219	
Goodness-of-fit on F^2	1.042	
Final R indices [I>2sigma(I)]	R1 = 0.0343, wR2 = 0.0886	
R indices (all data)	R1 = 0.0357, wR2 = 0.0901	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.207 and -0.158 $e.Å^{-3}$	

Table S121. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **4c**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5215(1)	2274(1)	3793(1)	19(1)
C(2)	5648(1)	2177(1)	4604(1)	19(1)
C(3)	5023(1)	1861(1)	5370(1)	22(1)
C(4)	4993(1)	3222(1)	5982(1)	28(1)
C(5)	6790(1)	2410(1)	4827(1)	20(1)
C(6)	7316(1)	3687(1)	4531(1)	21(1)
C(7)	8358(1)	3961(1)	4785(1)	24(1)
C(8)	8897(1)	2976(1)	5351(1)	27(1)
C(9)	8391(1)	1694(1)	5645(1)	30(1)
C(10)	7351(1)	1413(1)	5386(1)	26(1)
C(11)	5850(1)	2380(1)	3030(1)	20(1)
C(12)	5601(1)	3462(1)	2392(1)	22(1)
C(13)	6171(1)	3544(1)	1670(1)	25(1)
C(14)	6992(1)	2540(1)	1570(1)	28(1)
C(15)	7240(1)	1451(1)	2195(1)	30(1)
C(16)	6673(1)	1368(1)	2916(1)	26(1)
C(17)	4061(1)	2199(1)	3583(1)	19(1)
C(18)	3354(1)	3082(1)	4006(1)	21(1)
C(19)	2279(1)	2964(1)	3826(1)	22(1)
C(20)	1892(1)	1946(1)	3199(1)	21(1)
C(21)	2584(1)	1082(1)	2748(1)	25(1)
C(22)	3650(1)	1217(1)	2937(1)	24(1)
C(23)	122(1)	2522(1)	3455(1)	33(1)
O(1)	853(1)	1711(1)	2983(1)	29(1)

Table S122. Bond lengths [Å] and angles [°] for olefin **4c**.

C(1)-C(2)	1.3574(14)	C(12)-C(13)	1.3915(15)
C(1)-C(17)	1.4943(13)	C(12)-H(12)	0.9500
C(1)-C(11)	1.4971(13)	C(13)-C(14)	1.3866(16)
C(2)-C(5)	1.4957(13)	C(13)-H(13)	0.9500
C(2)-C(3)	1.5160(13)	C(14)-C(15)	1.3870(17)
C(3)-C(4)	1.5295(15)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.3880(16)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4B)	0.9800	C(17)-C(18)	1.3915(14)
C(4)-H(4C)	0.9800	C(17)-C(22)	1.4035(14)
C(5)-C(6)	1.3986(14)	C(18)-C(19)	1.3923(14)
C(5)-C(10)	1.3991(14)	C(18)-H(18)	0.9500
C(6)-C(7)	1.3875(14)	C(19)-C(20)	1.3912(14)
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.3871(15)	C(20)-O(1)	1.3670(12)
C(7)-H(7)	0.9500	C(20)-C(21)	1.3931(15)
C(8)-C(9)	1.3876(16)	C(21)-C(22)	1.3831(14)
C(8)-H(8)	0.9500	C(21)-H(21)	0.9500
C(9)-C(10)	1.3881(15)	C(22)-H(22)	0.9500
C(9)-H(9)	0.9500	C(23)-O(1)	1.4233(13)
C(10)-H(10)	0.9500	C(23)-H(23A)	0.9800
C(11)-C(16)	1.3960(14)	C(23)-H(23B)	0.9800
C(11)-C(12)	1.3975(14)	C(23)-H(23C)	0.9800
C(2)-C(1)-C(17)	122.60(9)	C(9)-C(8)-H(8)	120.4
C(2)-C(1)-C(11)	123.05(9)	C(8)-C(9)-C(10)	120.45(10)
C(17)-C(1)-C(11)	114.27(8)	C(8)-C(9)-H(9)	119.8
C(1)-C(2)-C(5)	122.85(9)	C(10)-C(9)-H(9)	119.8
C(1)-C(2)-C(3)	123.51(9)	C(9)-C(10)-C(5)	121.04(10)
C(5)-C(2)-C(3)	113.63(8)	C(9)-C(10)-H(10)	119.5
C(2)-C(3)-C(4)	113.28(8)	C(5)-C(10)-H(10)	119.5
C(2)-C(3)-H(3A)	108.9	C(16)-C(11)-C(12)	118.23(9)
C(4)-C(3)-H(3A)	108.9	C(16)-C(11)-C(1)	121.36(9)
C(2)-C(3)-H(3B)	108.9	C(12)-C(11)-C(1)	120.35(9)
C(4)-C(3)-H(3B)	108.9	C(13)-C(12)-C(11)	120.76(9)
H(3A)-C(3)-H(3B)	107.7	C(13)-C(12)-H(12)	119.6
C(3)-C(4)-H(4A)	109.5	C(11)-C(12)-H(12)	119.6
C(3)-C(4)-H(4B)	109.5	C(14)-C(13)-C(12)	120.31(10)
H(4A)-C(4)-H(4B)	109.5	C(14)-C(13)-H(13)	119.8
C(3)-C(4)-H(4C)	109.5	C(12)-C(13)-H(13)	119.8
H(4A)-C(4)-H(4C)	109.5	C(13)-C(14)-C(15)	119.41(10)
H(4B)-C(4)-H(4C)	109.5	C(13)-C(14)-H(14)	120.3
C(6)-C(5)-C(10)	117.72(9)	C(15)-C(14)-H(14)	120.3
C(6)-C(5)-C(2)	121.11(9)	C(14)-C(15)-C(16)	120.39(10)
C(10)-C(5)-C(2)	121.04(9)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-C(5)	121.20(9)	C(16)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.4	C(15)-C(16)-C(11)	120.89(10)
C(5)-C(6)-H(6)	119.4	C(15)-C(16)-H(16)	119.6
C(8)-C(7)-C(6)	120.35(10)	C(11)-C(16)-H(16)	119.6
C(8)-C(7)-H(7)	119.8	C(18)-C(17)-C(22)	117.26(9)
C(6)-C(7)-H(7)	119.8	C(18)-C(17)-C(1)	122.54(9)
C(7)-C(8)-C(9)	119.23(9)	C(22)-C(17)-C(1)	120.20(9)
C(7)-C(8)-H(8)	120.4	C(17)-C(18)-C(19)	122.03(9)

C(17)-C(18)-H(18)	119.0	C(21)-C(22)-C(17)	121.55(9)
C(19)-C(18)-H(18)	119.0	C(21)-C(22)-H(22)	119.2
C(20)-C(19)-C(18)	119.38(9)	C(17)-C(22)-H(22)	119.2
C(20)-C(19)-H(19)	120.3	O(1)-C(23)-H(23A)	109.5
C(18)-C(19)-H(19)	120.3	O(1)-C(23)-H(23B)	109.5
O(1)-C(20)-C(19)	124.41(9)	H(23A)-C(23)-H(23B)	109.5
O(1)-C(20)-C(21)	115.84(9)	O(1)-C(23)-H(23C)	109.5
C(19)-C(20)-C(21)	119.75(9)	H(23A)-C(23)-H(23C)	109.5
C(22)-C(21)-C(20)	119.95(9)	H(23B)-C(23)-H(23C)	109.5
C(22)-C(21)-H(21)	120.0	C(20)-O(1)-C(23)	117.46(8)
C(20)-C(21)-H(21)	120.0		

Symmetry transformations used to generate equivalent atoms:

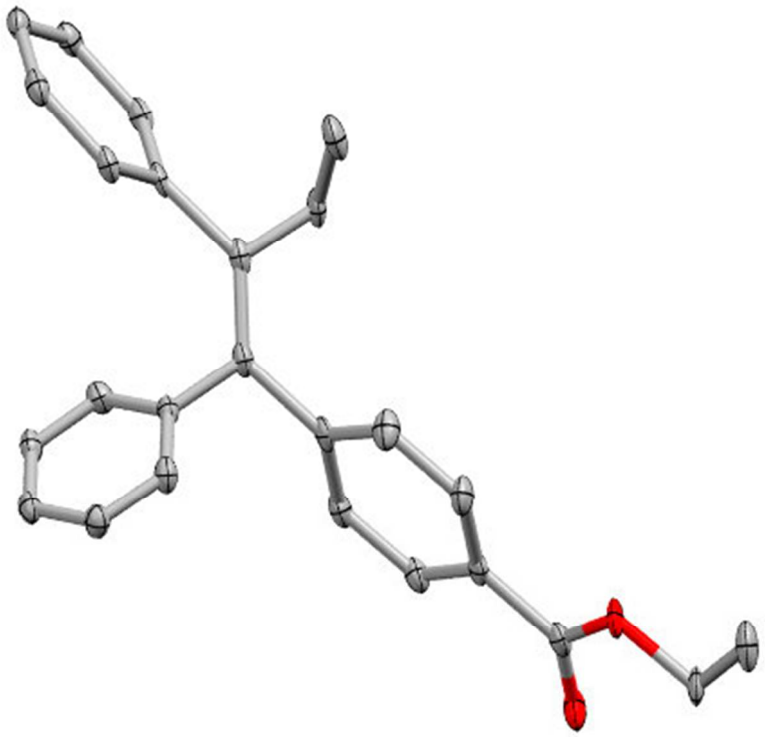
Table S123. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **4c**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	21(1)	15(1)	21(1)	-1(1)	0(1)	1(1)
C(2)	21(1)	15(1)	22(1)	0(1)	0(1)	0(1)
C(3)	21(1)	24(1)	21(1)	3(1)	-1(1)	-2(1)
C(4)	26(1)	37(1)	22(1)	-4(1)	2(1)	-3(1)
C(5)	21(1)	21(1)	18(1)	-2(1)	1(1)	1(1)
C(6)	22(1)	21(1)	20(1)	-1(1)	2(1)	2(1)
C(7)	22(1)	24(1)	26(1)	-3(1)	6(1)	-2(1)
C(8)	18(1)	35(1)	27(1)	-3(1)	-1(1)	-1(1)
C(9)	25(1)	35(1)	29(1)	7(1)	-5(1)	2(1)
C(10)	26(1)	27(1)	27(1)	6(1)	-2(1)	-2(1)
C(11)	18(1)	21(1)	20(1)	-3(1)	-2(1)	-2(1)
C(12)	19(1)	23(1)	22(1)	-1(1)	-2(1)	0(1)
C(13)	25(1)	28(1)	21(1)	1(1)	-1(1)	-4(1)
C(14)	25(1)	39(1)	22(1)	-7(1)	4(1)	-4(1)
C(15)	27(1)	38(1)	26(1)	-8(1)	1(1)	9(1)
C(16)	28(1)	27(1)	22(1)	-2(1)	-2(1)	6(1)
C(17)	20(1)	19(1)	18(1)	3(1)	0(1)	-1(1)
C(18)	23(1)	19(1)	19(1)	-2(1)	-1(1)	-2(1)
C(19)	22(1)	22(1)	21(1)	-1(1)	2(1)	1(1)
C(20)	19(1)	25(1)	20(1)	2(1)	-1(1)	-2(1)
C(21)	26(1)	29(1)	21(1)	-7(1)	-2(1)	-3(1)
C(22)	24(1)	26(1)	21(1)	-4(1)	2(1)	2(1)
C(23)	19(1)	40(1)	38(1)	-6(1)	3(1)	-1(1)
O(1)	18(1)	40(1)	28(1)	-7(1)	-1(1)	-3(1)

Table S124. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **4c**.

	x	y	z	U(eq)
H(3A)	5331	967	5684	26
H(3B)	4298	1589	5168	26
H(4A)	5706	3470	6206	42
H(4B)	4568	2957	6456	42
H(4C)	4686	4111	5677	42
H(6)	6954	4379	4148	25
H(7)	8703	4829	4570	29
H(8)	9605	3177	5536	32
H(9)	8759	1003	6025	36
H(10)	7016	529	5592	32
H(12)	5035	4149	2451	26
H(13)	5996	4291	1244	30
H(14)	7382	2597	1078	34
H(15)	7801	759	2130	36
H(16)	6846	611	3337	31
H(18)	3614	3786	4431	25
H(19)	1813	3572	4128	26
H(21)	2324	401	2312	30
H(22)	4115	632	2620	28
H(23A)	226	2248	4060	49
H(23B)	-590	2250	3242	49
H(23C)	227	3628	3388	49

ethyl (*E*)-4-(1,2-diphenylbut-1-en-1-yl)benzoate (4d)



X-ray quality crystals were used as received. A colorless block 0.320 x 0.300 x 0.300 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 35 mm and exposure time was 1 seconds per frame using a scan width of 1.8°. Data collection was 96.0% complete to 25.000° in θ. A total of 9574 reflections were collected covering the indices, -20<=*h*<=20, -6<=*k*<=5, -21<=*l*<=21. 3329 reflections were found to be symmetry independent, with an R_{int} of 0.0704. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S125. Crystal data and structure refinement for olefin **4d**.

X-ray ID	gene963	
Sample/notebook ID	71452-154	
Empirical formula	C25 H24 O2	
Formula weight	356.44	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 17.5541(7) Å	α= 90°.
	b = 5.6300(2) Å	β= 99.807(2)°.
	c = 20.2320(9) Å	γ = 90°.
Volume	1970.30(14) $Å^3$	
Z	4	
Density (calculated)	1.202 Mg/m^3	
Absorption coefficient	0.075 mm^{-1}	
F(000)	760	
Crystal size	0.320 x 0.300 x 0.300 mm^3	
Theta range for data collection	2.043 to 25.025°.	
Index ranges	-20<=h<=20, -6<=k<=5, -21<=l<=21	
Reflections collected	9574	
Independent reflections	3329 [R(int) = 0.0704]	
Completeness to theta = 25.000°	96.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.745 and 0.594	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3329 / 0 / 247	
Goodness-of-fit on F^2	1.040	
Final R indices [I>2sigma(I)]	R1 = 0.0696, wR2 = 0.1859	
R indices (all data)	R1 = 0.0881, wR2 = 0.2070	
Extinction coefficient	0.012(3)	
Largest diff. peak and hole	0.358 and -0.369 $e.Å^{-3}$	

Table S126. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **4d**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2143(1)	4453(4)	3194(1)	17(1)
C(2)	2328(1)	4085(4)	2503(1)	17(1)
C(3)	3054(1)	3956(5)	2396(1)	21(1)
C(4)	3259(1)	6098(5)	1955(2)	29(1)
C(5)	1842(1)	3794(4)	1765(1)	17(1)
C(6)	1375(1)	5541(5)	1491(1)	19(1)
C(7)	961(1)	5295(5)	778(1)	22(1)
C(8)	1005(1)	3287(5)	333(1)	21(1)
C(9)	1458(1)	1523(5)	604(1)	21(1)
C(10)	1879(1)	1782(4)	1309(1)	20(1)
C(11)	1427(1)	4572(4)	3316(1)	15(1)
C(12)	1215(1)	6511(4)	3707(1)	18(1)
C(13)	555(1)	6691(5)	3819(1)	19(1)
C(14)	100(1)	4912(5)	3558(1)	19(1)
C(15)	306(1)	2956(5)	3181(1)	20(1)
C(16)	966(1)	2787(4)	3061(1)	18(1)
C(17)	2654(1)	4717(4)	3919(1)	17(1)
C(18)	3093(1)	6640(5)	4041(1)	24(1)
C(19)	3581(1)	6780(5)	4692(1)	24(1)
C(20)	3639(1)	4983(5)	5245(1)	18(1)
C(21)	3196(1)	3102(5)	5139(1)	21(1)
C(22)	2705(1)	2978(5)	4487(1)	21(1)
C(23)	4164(1)	5041(5)	5953(1)	20(1)
C(24)	5106(1)	7141(5)	6626(1)	25(1)
C(25)	5520(1)	9242(5)	6476(2)	32(1)
O(1)	4206(1)	3628(3)	6477(1)	28(1)
O(2)	4589(1)	6868(3)	5946(1)	24(1)

Table S127. Bond lengths [Å] and angles [°] for olefin **4d**.

C(1)-C(11)	1.323(3)	C(13)-H(13)	0.9500
C(1)-C(2)	1.502(4)	C(14)-C(15)	1.421(4)
C(1)-C(17)	1.591(3)	C(14)-H(14)	0.9500
C(2)-C(3)	1.331(3)	C(15)-C(16)	1.228(3)
C(2)-C(5)	1.598(3)	C(15)-H(15)	0.9500
C(3)-C(4)	1.577(4)	C(16)-H(16)	0.9500
C(3)-H(3A)	0.9900	C(17)-C(18)	1.327(4)
C(3)-H(3B)	0.9900	C(17)-C(22)	1.500(4)
C(4)-H(4A)	0.9800	C(18)-C(19)	1.445(4)
C(4)-H(4B)	0.9800	C(18)-H(18)	0.9500
C(4)-H(4C)	0.9800	C(19)-C(20)	1.499(4)
C(5)-C(6)	1.338(3)	C(19)-H(19)	0.9500
C(5)-C(10)	1.469(4)	C(20)-C(21)	1.310(4)
C(6)-C(7)	1.507(4)	C(20)-C(23)	1.566(3)
C(6)-H(6)	0.9500	C(21)-C(22)	1.449(4)
C(7)-C(8)	1.455(4)	C(21)-H(21)	0.9500
C(7)-H(7)	0.9500	C(22)-H(22)	0.9500
C(8)-C(9)	1.330(4)	C(23)-O(2)	1.271(3)
C(8)-H(8)	0.9500	C(23)-O(1)	1.318(3)
C(9)-C(10)	1.498(4)	C(24)-C(25)	1.447(4)
C(9)-H(9)	0.9500	C(24)-O(2)	1.521(3)
C(10)-H(10)	0.9500	C(24)-H(24A)	0.9900
C(11)-C(16)	1.337(3)	C(24)-H(24B)	0.9900
C(11)-C(12)	1.435(4)	C(25)-H(25A)	0.9800
C(12)-C(13)	1.222(3)	C(25)-H(25B)	0.9800
C(12)-H(12)	0.9500	C(25)-H(25C)	0.9800
C(13)-C(14)	1.332(4)		

C(11)-C(1)-C(2)	122.9(2)	C(6)-C(7)-H(7)	116.7
C(11)-C(1)-C(17)	103.2(2)	C(9)-C(8)-C(7)	114.6(2)
C(2)-C(1)-C(17)	133.89(18)	C(9)-C(8)-H(8)	122.7
C(3)-C(2)-C(1)	121.6(2)	C(7)-C(8)-H(8)	122.7
C(3)-C(2)-C(5)	102.5(2)	C(8)-C(9)-C(10)	118.8(2)
C(1)-C(2)-C(5)	135.92(19)	C(8)-C(9)-H(9)	120.6
C(2)-C(3)-C(4)	111.5(2)	C(10)-C(9)-H(9)	120.6
C(2)-C(3)-H(3A)	109.3	C(5)-C(10)-C(9)	127.3(2)
C(4)-C(3)-H(3A)	109.3	C(5)-C(10)-H(10)	116.4
C(2)-C(3)-H(3B)	109.3	C(9)-C(10)-H(10)	116.4
C(4)-C(3)-H(3B)	109.3	C(1)-C(11)-C(16)	115.0(2)
H(3A)-C(3)-H(3B)	108.0	C(1)-C(11)-C(12)	119.0(2)
C(3)-C(4)-H(4A)	109.5	C(16)-C(11)-C(12)	126.0(2)
C(3)-C(4)-H(4B)	109.5	C(13)-C(12)-C(11)	120.5(2)
H(4A)-C(4)-H(4B)	109.5	C(13)-C(12)-H(12)	119.7
C(3)-C(4)-H(4C)	109.5	C(11)-C(12)-H(12)	119.7
H(4A)-C(4)-H(4C)	109.5	C(12)-C(13)-C(14)	112.8(3)
H(4B)-C(4)-H(4C)	109.5	C(12)-C(13)-H(13)	123.6
C(6)-C(5)-C(10)	113.4(2)	C(14)-C(13)-H(13)	123.6
C(6)-C(5)-C(2)	120.2(2)	C(13)-C(14)-C(15)	127.2(2)
C(10)-C(5)-C(2)	126.3(2)	C(13)-C(14)-H(14)	116.4
C(5)-C(6)-C(7)	119.4(2)	C(15)-C(14)-H(14)	116.4
C(5)-C(6)-H(6)	120.3	C(16)-C(15)-C(14)	120.1(2)
C(7)-C(6)-H(6)	120.3	C(16)-C(15)-H(15)	119.9
C(8)-C(7)-C(6)	126.5(2)	C(14)-C(15)-H(15)	119.9
C(8)-C(7)-H(7)	116.7	C(15)-C(16)-C(11)	113.2(2)

C(15)-C(16)-H(16)	123.4	C(21)-C(22)-H(22)	116.0
C(11)-C(16)-H(16)	123.4	C(17)-C(22)-H(22)	116.0
C(18)-C(17)-C(22)	115.7(2)	O(2)-C(23)-O(1)	123.0(2)
C(18)-C(17)-C(1)	117.7(2)	O(2)-C(23)-C(20)	105.2(2)
C(22)-C(17)-C(1)	126.6(2)	O(1)-C(23)-C(20)	131.8(2)
C(17)-C(18)-C(19)	116.6(2)	C(25)-C(24)-O(2)	97.9(2)
C(17)-C(18)-H(18)	121.7	C(25)-C(24)-H(24A)	112.2
C(19)-C(18)-H(18)	121.7	O(2)-C(24)-H(24A)	112.2
C(18)-C(19)-C(20)	126.8(2)	C(25)-C(24)-H(24B)	112.2
C(18)-C(19)-H(19)	116.6	O(2)-C(24)-H(24B)	112.2
C(20)-C(19)-H(19)	116.6	H(24A)-C(24)-H(24B)	109.8
C(21)-C(20)-C(19)	117.4(2)	C(24)-C(25)-H(25A)	109.5
C(21)-C(20)-C(23)	114.0(2)	C(24)-C(25)-H(25B)	109.5
C(19)-C(20)-C(23)	128.6(2)	H(25A)-C(25)-H(25B)	109.5
C(20)-C(21)-C(22)	115.6(2)	C(24)-C(25)-H(25C)	109.5
C(20)-C(21)-H(21)	122.2	H(25A)-C(25)-H(25C)	109.5
C(22)-C(21)-H(21)	122.2	H(25B)-C(25)-H(25C)	109.5
C(21)-C(22)-C(17)	127.9(2)	C(23)-O(2)-C(24)	109.5(2)

Symmetry transformations used to generate equivalent atoms:

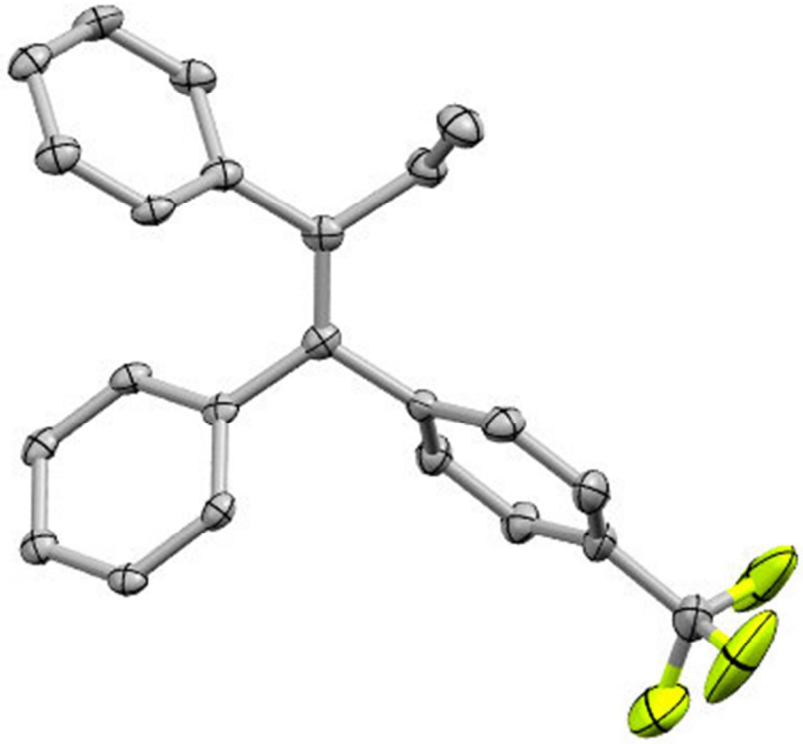
Table S128. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **4d**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	9(1)	14(1)	27(2)	-1(1)	1(1)	0(1)
C(2)	9(1)	11(1)	31(2)	1(1)	1(1)	0(1)
C(3)	7(1)	24(1)	32(2)	-4(1)	-1(1)	1(1)
C(4)	10(1)	28(2)	47(2)	-5(1)	5(1)	-4(1)
C(5)	5(1)	17(1)	28(2)	0(1)	4(1)	-2(1)
C(6)	9(1)	18(1)	30(2)	-1(1)	4(1)	-1(1)
C(7)	10(1)	24(1)	31(2)	4(1)	2(1)	1(1)
C(8)	11(1)	26(2)	24(2)	1(1)	1(1)	-4(1)
C(9)	13(1)	20(1)	31(2)	-5(1)	6(1)	-4(1)
C(10)	12(1)	18(1)	32(2)	1(1)	5(1)	2(1)
C(11)	9(1)	16(1)	18(1)	3(1)	0(1)	0(1)
C(12)	11(1)	16(1)	26(2)	0(1)	-1(1)	0(1)
C(13)	13(1)	19(1)	24(2)	-2(1)	1(1)	3(1)
C(14)	10(1)	22(1)	23(2)	5(1)	0(1)	1(1)
C(15)	11(1)	22(1)	25(2)	2(1)	1(1)	-4(1)
C(16)	14(1)	15(1)	23(2)	1(1)	4(1)	0(1)
C(17)	7(1)	17(1)	27(2)	-1(1)	3(1)	2(1)
C(18)	17(1)	20(1)	32(2)	7(1)	-3(1)	-3(1)
C(19)	13(1)	23(2)	32(2)	1(1)	-3(1)	-5(1)
C(20)	7(1)	20(1)	27(2)	-3(1)	2(1)	2(1)
C(21)	11(1)	22(1)	29(2)	4(1)	2(1)	0(1)
C(22)	10(1)	20(1)	32(2)	-2(1)	4(1)	-3(1)
C(23)	9(1)	23(1)	28(2)	0(1)	4(1)	1(1)
C(24)	7(1)	34(2)	30(2)	2(1)	-5(1)	-4(1)
C(25)	11(1)	28(2)	52(2)	-1(2)	-6(1)	-3(1)
O(1)	11(1)	33(1)	39(1)	9(1)	-3(1)	-5(1)
O(2)	8(1)	27(1)	34(1)	3(1)	-3(1)	-6(1)

Table S129. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **4d**.

	x	y	z	U(eq)
H(3A)	3129	2443	2166	26
H(3B)	3410	3964	2832	26
H(4A)	2890	6145	1533	43
H(4B)	3783	5891	1859	43
H(4C)	3230	7589	2200	43
H(6)	1306	6923	1743	23
H(7)	639	6580	601	26
H(8)	732	3239	-114	25
H(9)	1514	124	354	25
H(10)	2206	502	1481	24
H(12)	1591	7665	3881	22
H(13)	384	7963	4065	23
H(14)	-420	4957	3632	22
H(15)	-68	1778	3022	23
H(16)	1133	1515	2812	21
H(18)	3087	7862	3716	29
H(19)	3896	8153	4778	28
H(21)	3196	1897	5468	25
H(22)	2376	1633	4409	25
H(24A)	4805	7418	6991	29
H(24B)	5454	5761	6738	29
H(25A)	5785	8916	6097	47
H(25B)	5900	9682	6870	47
H(25C)	5154	10552	6360	47

(*E*)-(1-(4-(trifluoromethyl)phenyl)but-1-ene-1,2-diyl)dibenzene (4e)



X-ray quality crystals were used as received. A colorless prism 0.150 x 0.120 x 0.100 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 35 mm and exposure time was 5 seconds per frame using a scan width of 1.0°. Data collection was 99.8% complete to 25.000° in θ. A total of 11120 reflections were collected covering the indices, -11<=*h*<=14, -6<=*k*<=6, -16<=*l*<=15. 3321 reflections were found to be symmetry independent, with an R_{int} of 0.0342. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21 (No. 4). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S130. Crystal data and structure refinement for olefin **4e**.

X-ray ID	gene965	
Sample/notebook ID	71452-162	
Empirical formula	C23 H19 F3	
Formula weight	352.38	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21	
Unit cell dimensions	a = 11.9658(10) Å	α= 90°.
	b = 5.5651(5) Å	β= 96.528(3)°.
	c = 13.7040(13) Å	γ = 90°.
Volume	906.64(14) $Å^3$	
Z	2	
Density (calculated)	1.291 Mg/m^3	
Absorption coefficient	0.095 mm^{-1}	
F(000)	368	
Crystal size	0.150 x 0.120 x 0.100 mm^3	
Theta range for data collection	1.496 to 25.445°.	
Index ranges	-11<=h<=14, -6<=k<=6, -16<=l<=15	
Reflections collected	11120	
Independent reflections	3321 [R(int) = 0.0342]	
Completeness to theta = 25.000°	99.8 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.745 and 0.669	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3321 / 1 / 236	
Goodness-of-fit on F^2	1.067	
Final R indices [I>2sigma(I)]	R1 = 0.0588, wR2 = 0.1458	
R indices (all data)	R1 = 0.0705, wR2 = 0.1545	
Absolute structure parameter	0.0(4)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.864 and -0.499 $e.Å^{-3}$	

Table S131. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **4e**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2758(3)	4357(7)	2774(3)	20(1)
C(2)	1726(3)	3918(7)	2301(3)	19(1)
C(3)	1503(4)	3809(9)	1190(3)	25(1)
C(4)	747(4)	5848(9)	753(4)	32(1)
C(5)	732(3)	3495(8)	2842(3)	21(1)
C(6)	443(3)	5113(8)	3548(3)	20(1)
C(7)	-473(4)	4700(8)	4061(3)	26(1)
C(8)	-1113(4)	2658(9)	3880(3)	24(1)
C(9)	-849(4)	1025(9)	3171(4)	29(1)
C(10)	58(4)	1457(8)	2654(3)	24(1)
C(11)	3047(3)	4299(8)	3864(3)	17(1)
C(12)	3688(3)	6165(8)	4323(3)	19(1)
C(13)	4024(3)	6122(8)	5334(3)	19(1)
C(14)	3723(3)	4180(8)	5894(3)	21(1)
C(15)	3097(3)	2328(8)	5448(3)	21(1)
C(16)	2758(3)	2382(8)	4441(3)	20(1)
C(17)	3756(3)	4925(8)	2246(3)	19(1)
C(18)	3835(4)	7007(8)	1696(3)	25(1)
C(19)	4811(4)	7567(9)	1291(3)	29(1)
C(20)	5734(4)	6038(9)	1437(3)	27(1)
C(21)	5667(4)	3927(9)	1973(3)	27(1)
C(22)	4684(4)	3402(8)	2369(3)	23(1)
C(23)	6812(4)	6652(10)	1028(4)	36(1)
F(1)	6919(4)	8909(8)	816(4)	96(2)
F(2)	7007(4)	5369(9)	293(3)	96(2)
F(3)	7710(3)	6324(12)	1686(3)	103(2)

Table S132. Bond lengths [Å] and angles [°] for olefin **4e**.

C(1)-C(2)	1.350(6)	C(12)-C(13)	1.397(6)
C(1)-C(11)	1.496(6)	C(12)-H(12)	0.9500
C(1)-C(17)	1.498(6)	C(13)-C(14)	1.397(6)
C(2)-C(5)	1.491(6)	C(13)-H(13)	0.9500
C(2)-C(3)	1.517(6)	C(14)-C(15)	1.376(6)
C(3)-C(4)	1.530(6)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.394(6)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4B)	0.9800	C(17)-C(18)	1.391(6)
C(4)-H(4C)	0.9800	C(17)-C(22)	1.392(6)
C(5)-C(6)	1.393(6)	C(18)-C(19)	1.384(6)
C(5)-C(10)	1.398(6)	C(18)-H(18)	0.9500
C(6)-C(7)	1.387(6)	C(19)-C(20)	1.391(7)
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.378(7)	C(20)-C(21)	1.392(7)
C(7)-H(7)	0.9500	C(20)-C(23)	1.502(7)
C(8)-C(9)	1.393(7)	C(21)-C(22)	1.382(6)
C(8)-H(8)	0.9500	C(21)-H(21)	0.9500
C(9)-C(10)	1.383(7)	C(22)-H(22)	0.9500
C(9)-H(9)	0.9500	C(23)-F(2)	1.278(6)
C(10)-H(10)	0.9500	C(23)-F(1)	1.299(7)
C(11)-C(16)	1.394(6)	C(23)-F(3)	1.335(7)
C(11)-C(12)	1.398(6)		

C(2)-C(1)-C(11)	124.8(4)	C(9)-C(8)-H(8)	120.1
C(2)-C(1)-C(17)	122.8(4)	C(10)-C(9)-C(8)	119.8(4)
C(11)-C(1)-C(17)	112.4(3)	C(10)-C(9)-H(9)	120.1
C(1)-C(2)-C(5)	121.9(4)	C(8)-C(9)-H(9)	120.1
C(1)-C(2)-C(3)	122.5(4)	C(9)-C(10)-C(5)	121.1(4)
C(5)-C(2)-C(3)	115.7(4)	C(9)-C(10)-H(10)	119.4
C(2)-C(3)-C(4)	113.1(4)	C(5)-C(10)-H(10)	119.4
C(2)-C(3)-H(3A)	109.0	C(16)-C(11)-C(12)	118.2(4)
C(4)-C(3)-H(3A)	109.0	C(16)-C(11)-C(1)	122.6(4)
C(2)-C(3)-H(3B)	109.0	C(12)-C(11)-C(1)	119.1(4)
C(4)-C(3)-H(3B)	109.0	C(13)-C(12)-C(11)	121.0(4)
H(3A)-C(3)-H(3B)	107.8	C(13)-C(12)-H(12)	119.5
C(3)-C(4)-H(4A)	109.5	C(11)-C(12)-H(12)	119.5
C(3)-C(4)-H(4B)	109.5	C(14)-C(13)-C(12)	119.6(4)
H(4A)-C(4)-H(4B)	109.5	C(14)-C(13)-H(13)	120.2
C(3)-C(4)-H(4C)	109.5	C(12)-C(13)-H(13)	120.2
H(4A)-C(4)-H(4C)	109.5	C(15)-C(14)-C(13)	119.8(4)
H(4B)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	120.1
C(6)-C(5)-C(10)	118.0(4)	C(13)-C(14)-H(14)	120.1
C(6)-C(5)-C(2)	121.2(4)	C(14)-C(15)-C(16)	120.4(4)
C(10)-C(5)-C(2)	120.8(4)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-C(5)	121.1(4)	C(16)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.4	C(15)-C(16)-C(11)	121.0(4)
C(5)-C(6)-H(6)	119.4	C(15)-C(16)-H(16)	119.5
C(8)-C(7)-C(6)	120.1(4)	C(11)-C(16)-H(16)	119.5
C(8)-C(7)-H(7)	120.0	C(18)-C(17)-C(22)	118.0(4)
C(6)-C(7)-H(7)	120.0	C(18)-C(17)-C(1)	123.0(4)
C(7)-C(8)-C(9)	119.9(4)	C(22)-C(17)-C(1)	118.8(4)
C(7)-C(8)-H(8)	120.1	C(19)-C(18)-C(17)	121.2(4)

C(19)-C(18)-H(18)	119.4	C(20)-C(21)-H(21)	120.4
C(17)-C(18)-H(18)	119.4	C(21)-C(22)-C(17)	121.8(4)
C(18)-C(19)-C(20)	119.8(4)	C(21)-C(22)-H(22)	119.1
C(18)-C(19)-H(19)	120.1	C(17)-C(22)-H(22)	119.1
C(20)-C(19)-H(19)	120.1	F(2)-C(23)-F(1)	109.4(5)
C(19)-C(20)-C(21)	119.9(4)	F(2)-C(23)-F(3)	104.5(6)
C(19)-C(20)-C(23)	120.6(4)	F(1)-C(23)-F(3)	101.0(5)
C(21)-C(20)-C(23)	119.5(4)	F(2)-C(23)-C(20)	114.1(4)
C(22)-C(21)-C(20)	119.3(4)	F(1)-C(23)-C(20)	114.5(5)
C(22)-C(21)-H(21)	120.4	F(3)-C(23)-C(20)	112.1(4)

Symmetry transformations used to generate equivalent atoms:

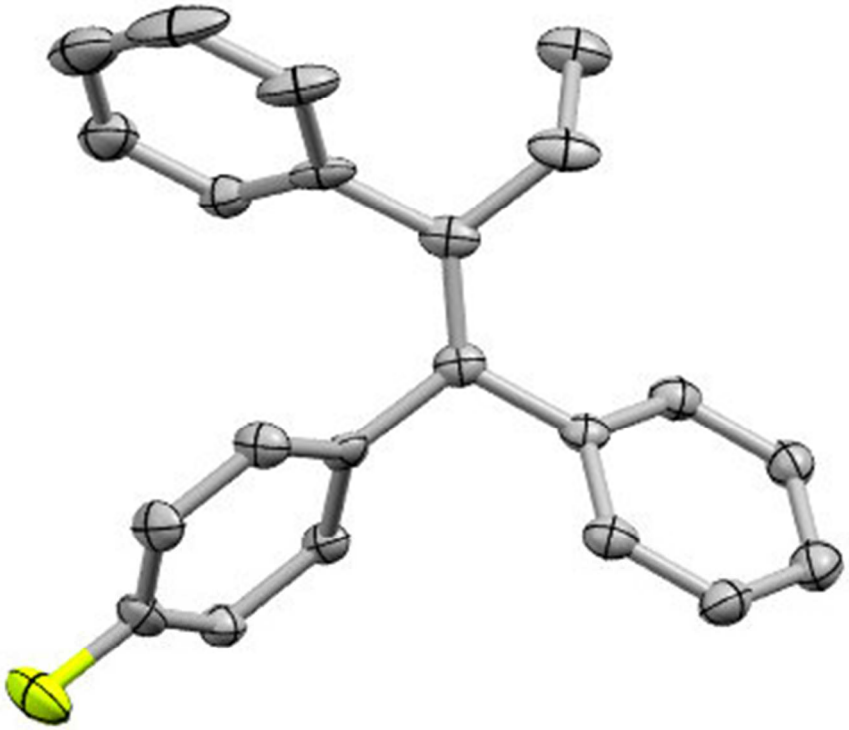
Table S133. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **4e**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(2)	16(2)	25(2)	1(2)	3(2)	1(2)
C(2)	19(2)	14(2)	25(2)	-5(2)	2(2)	4(2)
C(3)	22(2)	31(2)	23(2)	-2(2)	2(2)	2(2)
C(4)	29(3)	38(3)	29(2)	1(2)	-4(2)	4(2)
C(5)	17(2)	21(2)	26(2)	1(2)	-1(2)	2(2)
C(6)	14(2)	16(2)	30(2)	-2(2)	1(2)	1(2)
C(7)	20(2)	24(2)	33(2)	-2(2)	3(2)	3(2)
C(8)	16(2)	23(2)	34(2)	3(2)	4(2)	2(2)
C(9)	20(2)	24(2)	42(3)	-1(2)	1(2)	-6(2)
C(10)	23(2)	20(2)	30(2)	-7(2)	1(2)	2(2)
C(11)	11(2)	19(2)	22(2)	-2(2)	4(2)	4(2)
C(12)	16(2)	17(2)	25(2)	3(2)	7(2)	1(2)
C(13)	13(2)	20(2)	23(2)	-2(2)	0(2)	3(2)
C(14)	15(2)	24(2)	23(2)	0(2)	4(2)	4(2)
C(15)	13(2)	20(2)	30(2)	4(2)	7(2)	4(2)
C(16)	14(2)	17(2)	29(2)	0(2)	1(2)	0(2)
C(17)	17(2)	24(2)	17(2)	-4(2)	1(2)	-1(2)
C(18)	20(2)	26(2)	29(2)	3(2)	0(2)	1(2)
C(19)	34(3)	28(2)	25(2)	6(2)	3(2)	-6(2)
C(20)	26(2)	34(3)	23(2)	-2(2)	9(2)	-8(2)
C(21)	22(2)	32(3)	29(2)	-4(2)	8(2)	1(2)
C(22)	22(2)	24(2)	24(2)	1(2)	5(2)	2(2)
C(23)	38(3)	44(3)	29(3)	-3(2)	11(2)	-10(2)
F(1)	91(3)	49(3)	166(5)	-1(3)	93(3)	-18(2)
F(2)	82(3)	112(4)	108(3)	-75(3)	76(3)	-64(3)
F(3)	44(2)	189(6)	75(3)	22(3)	7(2)	-45(3)

Table S134. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **4e**.

	x	y	z	U(eq)
H(3A)	1143	2252	997	30
H(3B)	2229	3879	910	30
H(4A)	15	5754	1007	48
H(4B)	641	5701	36	48
H(4C)	1101	7397	936	48
H(6)	881	6524	3679	24
H(7)	-658	5827	4538	31
H(8)	-1734	2364	4238	29
H(9)	-1291	-383	3043	35
H(10)	226	352	2163	29
H(12)	3898	7483	3943	23
H(13)	4456	7407	5638	22
H(14)	3950	4138	6581	25
H(15)	2895	1003	5828	25
H(16)	2324	1093	4143	24
H(18)	3209	8063	1597	30
H(19)	4849	8991	914	35
H(21)	6290	2860	2064	33
H(22)	4641	1964	2736	28

(*Z*)-(1-(4-fluorophenyl)but-1-ene-1,2-diyl)dibenzene (5a)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 12255 reflections were collected covering the indices, -12<=*h*<=12, -10<=*k*<=10, -22<=*l*<=17. 3076 reflections were found to be symmetry independent, with an R_{int} of 0.0700. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/n (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S135. Crystal data and structure refinement for olefin **5a**.

X-ray ID	gene919	
Sample/notebook ID	71452-128	
Empirical formula	C22 H19 F	
Formula weight	302.37	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/n	
Unit cell dimensions	a = 10.102(3) Å	α= 90°.
	b = 8.912(3) Å	β= 95.274(7)°.
	c = 18.500(6) Å	γ = 90°.
Volume	1658.4(9) $Å^3$	
Z	4	
Density (calculated)	1.211 Mg/m^3	
Absorption coefficient	0.076 mm^{-1}	
F(000)	640	
Crystal size	0.070 x 0.050 x 0.050 mm^3	
Theta range for data collection	2.211 to 25.480°.	
Index ranges	-12<=h<=12, -10<=k<=10, -22<=l<=17	
Reflections collected	12255	
Independent reflections	3076 [R(int) = 0.0700]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.782	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3076 / 0 / 209	
Goodness-of-fit on F^2	1.188	
Final R indices [I>2sigma(I)]	R1 = 0.0809, wR2 = 0.1758	
R indices (all data)	R1 = 0.1212, wR2 = 0.1905	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.284 and -0.307 $e.Å^{-3}$	

Table S136. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5a**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	3224(4)	4382(4)	6153(2)	22(1)
C(2)	4507(4)	4717(5)	6344(2)	26(1)
C(3)	5627(4)	3594(6)	6306(2)	34(1)
C(4)	6653(4)	4052(6)	5782(2)	38(1)
C(5)	4924(3)	6230(5)	6628(2)	28(1)
C(6)	4503(4)	7551(5)	6272(2)	28(1)
C(7)	4889(4)	8944(6)	6542(2)	40(1)
C(8)	5711(4)	9056(7)	7173(3)	51(1)
C(9)	6142(5)	7778(8)	7530(3)	62(2)
C(10)	5769(4)	6353(6)	7267(2)	42(1)
C(11)	2769(3)	2906(5)	5832(2)	23(1)
C(12)	3299(4)	2280(5)	5233(2)	26(1)
C(13)	2843(4)	909(5)	4948(2)	28(1)
C(14)	1855(4)	145(5)	5260(2)	34(1)
C(15)	1301(4)	768(5)	5855(2)	31(1)
C(16)	1742(4)	2137(5)	6133(2)	26(1)
C(17)	2119(3)	5428(4)	6293(2)	21(1)
C(18)	1141(3)	5782(4)	5740(2)	22(1)
C(19)	96(4)	6735(5)	5862(2)	24(1)
C(20)	48(4)	7302(5)	6543(2)	28(1)
C(21)	985(4)	6982(5)	7105(2)	30(1)
C(22)	2018(4)	6030(5)	6980(2)	28(1)
F(1)	-982(2)	8247(3)	6667(1)	45(1)

Table S137. Bond lengths [Å] and angles [°] for olefin **5a**.

C(1)-C(2)	1.346(5)	C(11)-C(12)	1.392(5)
C(1)-C(17)	1.496(5)	C(11)-C(16)	1.399(5)
C(1)-C(11)	1.498(5)	C(12)-C(13)	1.392(6)
C(2)-C(5)	1.493(6)	C(12)-H(12)	0.9500
C(2)-C(3)	1.517(6)	C(13)-C(14)	1.378(6)
C(3)-C(4)	1.538(5)	C(13)-H(13)	0.9500
C(3)-H(3A)	0.9900	C(14)-C(15)	1.394(6)
C(3)-H(3B)	0.9900	C(14)-H(14)	0.9500
C(4)-H(4A)	0.9800	C(15)-C(16)	1.382(6)
C(4)-H(4B)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4C)	0.9800	C(16)-H(16)	0.9500
C(5)-C(6)	1.396(6)	C(17)-C(18)	1.391(5)
C(5)-C(10)	1.397(5)	C(17)-C(22)	1.392(5)
C(6)-C(7)	1.380(6)	C(18)-C(19)	1.390(5)
C(6)-H(6)	0.9500	C(18)-H(18)	0.9500
C(7)-C(8)	1.372(6)	C(19)-C(20)	1.362(5)
C(7)-H(7)	0.9500	C(19)-H(19)	0.9500
C(8)-C(9)	1.367(8)	C(20)-C(21)	1.370(5)
C(8)-H(8)	0.9500	C(20)-F(1)	1.374(4)
C(9)-C(10)	1.399(8)	C(21)-C(22)	1.381(5)
C(9)-H(9)	0.9500	C(21)-H(21)	0.9500
C(10)-H(10)	0.9500	C(22)-H(22)	0.9500
C(2)-C(1)-C(17)	122.2(4)	C(8)-C(9)-H(9)	119.2
C(2)-C(1)-C(11)	123.5(4)	C(10)-C(9)-H(9)	119.2
C(17)-C(1)-C(11)	114.2(3)	C(5)-C(10)-C(9)	119.3(5)
C(1)-C(2)-C(5)	121.8(4)	C(5)-C(10)-H(10)	120.3
C(1)-C(2)-C(3)	123.1(4)	C(9)-C(10)-H(10)	120.3
C(5)-C(2)-C(3)	115.1(3)	C(12)-C(11)-C(16)	118.3(4)
C(2)-C(3)-C(4)	113.7(4)	C(12)-C(11)-C(1)	122.7(3)
C(2)-C(3)-H(3A)	108.8	C(16)-C(11)-C(1)	119.0(3)
C(4)-C(3)-H(3A)	108.8	C(11)-C(12)-C(13)	121.0(4)
C(2)-C(3)-H(3B)	108.8	C(11)-C(12)-H(12)	119.5
C(4)-C(3)-H(3B)	108.8	C(13)-C(12)-H(12)	119.5
H(3A)-C(3)-H(3B)	107.7	C(14)-C(13)-C(12)	120.2(4)
C(3)-C(4)-H(4A)	109.5	C(14)-C(13)-H(13)	119.9
C(3)-C(4)-H(4B)	109.5	C(12)-C(13)-H(13)	119.9
H(4A)-C(4)-H(4B)	109.5	C(13)-C(14)-C(15)	119.5(4)
C(3)-C(4)-H(4C)	109.5	C(13)-C(14)-H(14)	120.3
H(4A)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	120.3
H(4B)-C(4)-H(4C)	109.5	C(16)-C(15)-C(14)	120.4(4)
C(6)-C(5)-C(10)	117.9(4)	C(16)-C(15)-H(15)	119.8
C(6)-C(5)-C(2)	122.1(3)	C(14)-C(15)-H(15)	119.8
C(10)-C(5)-C(2)	119.9(4)	C(15)-C(16)-C(11)	120.7(4)
C(7)-C(6)-C(5)	121.6(4)	C(15)-C(16)-H(16)	119.7
C(7)-C(6)-H(6)	119.2	C(11)-C(16)-H(16)	119.7
C(5)-C(6)-H(6)	119.2	C(18)-C(17)-C(22)	118.6(4)
C(8)-C(7)-C(6)	120.1(5)	C(18)-C(17)-C(1)	120.3(3)
C(8)-C(7)-H(7)	119.9	C(22)-C(17)-C(1)	121.1(3)
C(6)-C(7)-H(7)	119.9	C(19)-C(18)-C(17)	121.2(3)
C(9)-C(8)-C(7)	119.4(5)	C(19)-C(18)-H(18)	119.4
C(9)-C(8)-H(8)	120.3	C(17)-C(18)-H(18)	119.4
C(7)-C(8)-H(8)	120.3	C(20)-C(19)-C(18)	118.0(3)
C(8)-C(9)-C(10)	121.6(4)	C(20)-C(19)-H(19)	121.0

C(18)-C(19)-H(19)	121.0	C(20)-C(21)-H(21)	120.6
C(19)-C(20)-C(21)	122.9(4)	C(22)-C(21)-H(21)	120.6
C(19)-C(20)-F(1)	118.3(3)	C(21)-C(22)-C(17)	120.6(4)
C(21)-C(20)-F(1)	118.8(3)	C(21)-C(22)-H(22)	119.7
C(20)-C(21)-C(22)	118.7(4)	C(17)-C(22)-H(22)	119.7

Symmetry transformations used to generate equivalent atoms:

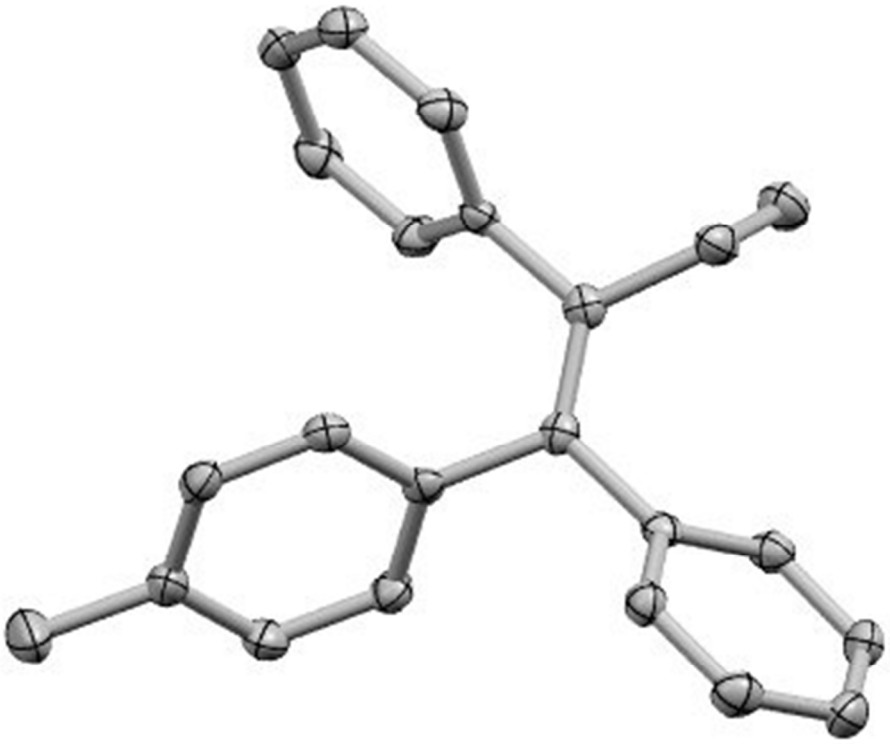
Table S138. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for gene919. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	22(2)	29(2)	15(2)	4(2)	-1(2)	-2(2)
C(2)	20(2)	41(3)	15(2)	5(2)	1(2)	-2(2)
C(3)	21(2)	55(3)	25(2)	15(2)	-3(2)	0(2)
C(4)	25(2)	59(3)	31(2)	11(2)	3(2)	0(2)
C(5)	15(2)	51(3)	19(2)	0(2)	3(2)	-12(2)
C(6)	23(2)	35(3)	25(2)	-5(2)	3(2)	-4(2)
C(7)	27(2)	47(3)	46(3)	-13(2)	8(2)	-6(2)
C(8)	30(3)	70(4)	56(3)	-23(3)	15(2)	-19(3)
C(9)	31(3)	124(6)	31(3)	-12(3)	-3(2)	-36(3)
C(10)	26(2)	70(4)	30(2)	6(2)	-4(2)	-21(2)
C(11)	18(2)	28(2)	21(2)	2(2)	-2(2)	1(2)
C(12)	22(2)	30(3)	27(2)	5(2)	1(2)	2(2)
C(13)	27(2)	29(3)	28(2)	-3(2)	1(2)	3(2)
C(14)	32(2)	32(3)	37(2)	-4(2)	-4(2)	1(2)
C(15)	27(2)	29(3)	36(2)	3(2)	-2(2)	-6(2)
C(16)	23(2)	34(3)	22(2)	3(2)	1(2)	1(2)
C(17)	19(2)	22(2)	23(2)	1(2)	5(2)	-7(2)
C(18)	21(2)	29(2)	17(2)	-4(2)	4(2)	-4(2)
C(19)	20(2)	27(2)	26(2)	1(2)	-1(2)	-1(2)
C(20)	20(2)	33(3)	33(2)	-4(2)	10(2)	1(2)
C(21)	29(2)	40(3)	22(2)	-10(2)	7(2)	-1(2)
C(22)	24(2)	38(3)	21(2)	-1(2)	3(2)	-1(2)
F(1)	32(1)	61(2)	44(2)	-7(1)	9(1)	16(1)

Table S139. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5a**.

	x	y	z	U(eq)
H(3A)	5243	2610	6152	41
H(3B)	6088	3468	6798	41
H(4A)	6206	4183	5293	58
H(4B)	7332	3268	5773	58
H(4C)	7075	4998	5945	58
H(6)	3937	7490	5833	33
H(7)	4584	9826	6291	48
H(8)	5979	10012	7360	62
H(9)	6709	7860	7967	75
H(10)	6087	5478	7520	51
H(12)	3982	2796	5014	31
H(13)	3213	498	4538	34
H(14)	1553	-799	5072	41
H(15)	616	248	6070	38
H(16)	1345	2560	6531	32
H(18)	1189	5365	5270	27
H(19)	-565	6984	5482	29
H(21)	925	7406	7572	36
H(22)	2667	5783	7366	33

(*Z*)-(1-(*p*-tolyl)but-1-ene-1,2-diyl)dibenzene (5b)



Crystals were used as received. A colorless prism 0.060 x 0.060 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 19782 reflections were collected covering the indices, -6<=*h*<=6, -19<=*k*<=19, -22<=*l*<=22. 3177 reflections were found to be symmetry independent, with an R_{int} of 0.0944. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S140. Crystal data and structure refinement for olefin **5b**.

X-ray ID	gene903	
Sample/notebook ID	71452-123	
Empirical formula	C23 H22	
Formula weight	298.40	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 5.721(3) Å	α= 90°.
	b = 16.056(9) Å	β= 91.068(11)°.
	c = 18.916(11) Å	γ = 90°.
Volume	1737.2(18) $Å^3$	
Z	4	
Density (calculated)	1.141 Mg/m^3	
Absorption coefficient	0.064 mm^{-1}	
F(000)	640	
Crystal size	0.060 x 0.060 x 0.050 mm^3	
Theta range for data collection	1.664 to 25.361°.	
Index ranges	-6<=h<=6, -19<=k<=19, -22<=l<=22	
Reflections collected	19782	
Independent reflections	3177 [R(int) = 0.0944]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.822	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3177 / 0 / 210	
Goodness-of-fit on F^2	1.031	
Final R indices [I>2sigma(I)]	R1 = 0.0496, wR2 = 0.1109	
R indices (all data)	R1 = 0.0769, wR2 = 0.1237	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.240 and -0.203 $e.Å^{-3}$	

Table S141. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5b**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	2276(3)	7056(1)	3428(1)	18(1)
C(2)	2194(3)	6411(1)	3881(1)	19(1)
C(3)	1807(3)	6504(1)	4666(1)	24(1)
C(4)	-548(4)	6176(1)	4906(1)	31(1)
C(5)	2552(3)	5535(1)	3636(1)	18(1)
C(6)	1022(3)	5164(1)	3151(1)	23(1)
C(7)	1359(3)	4354(1)	2916(1)	25(1)
C(8)	3272(3)	3901(1)	3161(1)	24(1)
C(9)	4809(3)	4263(1)	3644(1)	24(1)
C(10)	4432(3)	5063(1)	3885(1)	24(1)
C(11)	1786(3)	7938(1)	3634(1)	18(1)
C(12)	3406(3)	8558(1)	3488(1)	21(1)
C(13)	3012(3)	9379(1)	3662(1)	26(1)
C(14)	946(3)	9603(1)	3982(1)	26(1)
C(15)	-697(3)	9004(1)	4124(1)	25(1)
C(16)	-295(3)	8176(1)	3951(1)	23(1)
C(17)	2987(3)	6947(1)	2677(1)	18(1)
C(18)	1548(3)	7213(1)	2121(1)	22(1)
C(19)	2185(3)	7095(1)	1424(1)	26(1)
C(20)	4301(3)	6727(1)	1258(1)	25(1)
C(21)	5767(3)	6490(1)	1814(1)	22(1)
C(22)	5128(3)	6593(1)	2510(1)	20(1)
C(23)	5006(4)	6595(2)	499(1)	43(1)

Table S142. Bond lengths [Å] and angles [°] for olefin **5b**.

C(1)-C(2)	1.345(3)	C(12)-C(13)	1.378(3)
C(1)-C(17)	1.496(3)	C(12)-H(12)	0.9500
C(1)-C(11)	1.497(3)	C(13)-C(14)	1.386(3)
C(2)-C(5)	1.496(3)	C(13)-H(13)	0.9500
C(2)-C(3)	1.512(3)	C(14)-C(15)	1.375(3)
C(3)-C(4)	1.524(3)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.388(3)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4B)	0.9800	C(17)-C(18)	1.391(3)
C(4)-H(4C)	0.9800	C(17)-C(22)	1.392(3)
C(5)-C(6)	1.390(3)	C(18)-C(19)	1.387(3)
C(5)-C(10)	1.392(3)	C(18)-H(18)	0.9500
C(6)-C(7)	1.388(3)	C(19)-C(20)	1.389(3)
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.386(3)	C(20)-C(21)	1.386(3)
C(7)-H(7)	0.9500	C(20)-C(23)	1.513(3)
C(8)-C(9)	1.383(3)	C(21)-C(22)	1.382(3)
C(8)-H(8)	0.9500	C(21)-H(21)	0.9500
C(9)-C(10)	1.382(3)	C(22)-H(22)	0.9500
C(9)-H(9)	0.9500	C(23)-H(23A)	0.9800
C(10)-H(10)	0.9500	C(23)-H(23B)	0.9800
C(11)-C(12)	1.391(3)	C(23)-H(23C)	0.9800
C(11)-C(16)	1.397(3)		
C(2)-C(1)-C(17)	121.88(16)	C(7)-C(8)-H(8)	120.4
C(2)-C(1)-C(11)	123.67(16)	C(10)-C(9)-C(8)	120.46(18)
C(17)-C(1)-C(11)	114.39(14)	C(10)-C(9)-H(9)	119.8
C(1)-C(2)-C(5)	121.25(16)	C(8)-C(9)-H(9)	119.8
C(1)-C(2)-C(3)	123.80(16)	C(9)-C(10)-C(5)	121.26(18)
C(5)-C(2)-C(3)	114.92(15)	C(9)-C(10)-H(10)	119.4
C(2)-C(3)-C(4)	113.88(15)	C(5)-C(10)-H(10)	119.4
C(2)-C(3)-H(3A)	108.8	C(12)-C(11)-C(16)	117.80(17)
C(4)-C(3)-H(3A)	108.8	C(12)-C(11)-C(1)	119.78(15)
C(2)-C(3)-H(3B)	108.8	C(16)-C(11)-C(1)	122.38(16)
C(4)-C(3)-H(3B)	108.8	C(13)-C(12)-C(11)	121.61(17)
H(3A)-C(3)-H(3B)	107.7	C(13)-C(12)-H(12)	119.2
C(3)-C(4)-H(4A)	109.5	C(11)-C(12)-H(12)	119.2
C(3)-C(4)-H(4B)	109.5	C(12)-C(13)-C(14)	119.83(17)
H(4A)-C(4)-H(4B)	109.5	C(12)-C(13)-H(13)	120.1
C(3)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	120.1
H(4A)-C(4)-H(4C)	109.5	C(15)-C(14)-C(13)	119.67(18)
H(4B)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	120.2
C(6)-C(5)-C(10)	117.58(17)	C(13)-C(14)-H(14)	120.2
C(6)-C(5)-C(2)	121.34(16)	C(14)-C(15)-C(16)	120.46(17)
C(10)-C(5)-C(2)	121.08(17)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-C(5)	121.54(18)	C(16)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.2	C(15)-C(16)-C(11)	120.62(17)
C(5)-C(6)-H(6)	119.2	C(15)-C(16)-H(16)	119.7
C(8)-C(7)-C(6)	119.86(18)	C(11)-C(16)-H(16)	119.7
C(8)-C(7)-H(7)	120.1	C(18)-C(17)-C(22)	117.66(17)
C(6)-C(7)-H(7)	120.1	C(18)-C(17)-C(1)	120.99(16)
C(9)-C(8)-C(7)	119.26(18)	C(22)-C(17)-C(1)	121.34(16)
C(9)-C(8)-H(8)	120.4	C(19)-C(18)-C(17)	120.95(17)

C(19)-C(18)-H(18)	119.5	C(20)-C(21)-H(21)	119.3
C(17)-C(18)-H(18)	119.5	C(21)-C(22)-C(17)	121.02(18)
C(18)-C(19)-C(20)	121.25(18)	C(21)-C(22)-H(22)	119.5
C(18)-C(19)-H(19)	119.4	C(17)-C(22)-H(22)	119.5
C(20)-C(19)-H(19)	119.4	C(20)-C(23)-H(23A)	109.5
C(21)-C(20)-C(19)	117.57(17)	C(20)-C(23)-H(23B)	109.5
C(21)-C(20)-C(23)	120.88(17)	H(23A)-C(23)-H(23B)	109.5
C(19)-C(20)-C(23)	121.54(18)	C(20)-C(23)-H(23C)	109.5
C(22)-C(21)-C(20)	121.47(17)	H(23A)-C(23)-H(23C)	109.5
C(22)-C(21)-H(21)	119.3	H(23B)-C(23)-H(23C)	109.5

Symmetry transformations used to generate equivalent atoms:

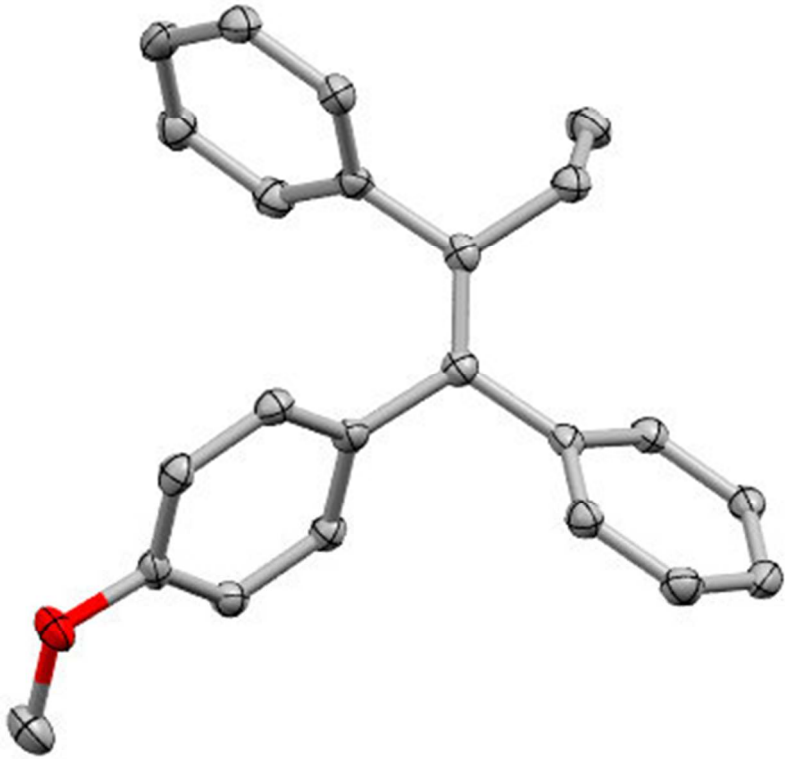
Table S143. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5b**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	15(1)	21(1)	20(1)	-2(1)	0(1)	0(1)
C(2)	15(1)	21(1)	19(1)	-1(1)	-1(1)	-2(1)
C(3)	34(1)	18(1)	19(1)	-1(1)	-2(1)	-2(1)
C(4)	39(1)	27(1)	27(1)	3(1)	7(1)	-4(1)
C(5)	21(1)	18(1)	16(1)	4(1)	1(1)	-2(1)
C(6)	23(1)	22(1)	23(1)	0(1)	-3(1)	2(1)
C(7)	28(1)	26(1)	21(1)	-3(1)	-5(1)	-4(1)
C(8)	33(1)	18(1)	21(1)	0(1)	5(1)	1(1)
C(9)	27(1)	23(1)	24(1)	4(1)	-1(1)	4(1)
C(10)	25(1)	24(1)	22(1)	1(1)	-5(1)	-2(1)
C(11)	21(1)	20(1)	14(1)	4(1)	-2(1)	1(1)
C(12)	20(1)	23(1)	21(1)	-1(1)	2(1)	2(1)
C(13)	28(1)	21(1)	28(1)	1(1)	0(1)	-4(1)
C(14)	35(1)	19(1)	25(1)	-2(1)	1(1)	4(1)
C(15)	26(1)	24(1)	24(1)	-1(1)	6(1)	5(1)
C(16)	23(1)	23(1)	22(1)	3(1)	2(1)	-1(1)
C(17)	21(1)	13(1)	20(1)	1(1)	1(1)	-3(1)
C(18)	20(1)	20(1)	24(1)	0(1)	1(1)	4(1)
C(19)	34(1)	25(1)	20(1)	3(1)	-2(1)	6(1)
C(20)	33(1)	20(1)	21(1)	0(1)	5(1)	3(1)
C(21)	21(1)	18(1)	28(1)	-1(1)	6(1)	2(1)
C(22)	20(1)	17(1)	23(1)	2(1)	-1(1)	0(1)
C(23)	54(2)	49(2)	26(1)	5(1)	11(1)	21(1)

Table S144. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5b**.

	x	y	z	U(eq)
H(3A)	1931	7101	4793	28
H(3B)	3066	6204	4926	28
H(4A)	-1804	6518	4700	47
H(4B)	-613	6202	5423	47
H(4C)	-741	5598	4751	47
H(6)	-286	5471	2976	27
H(7)	281	4111	2589	30
H(8)	3525	3349	2999	29
H(9)	6133	3958	3810	29
H(10)	5477	5295	4228	29
H(12)	4818	8411	3262	25
H(13)	4154	9790	3562	31
H(14)	666	10168	4103	32
H(15)	-2117	9156	4342	30
H(16)	-1447	7768	4049	27
H(18)	109	7480	2220	26
H(19)	1153	7269	1054	32
H(21)	7244	6250	1715	26
H(22)	6166	6421	2879	24
H(23A)	3612	6477	207	64
H(23B)	6091	6124	475	64
H(23C)	5772	7099	325	64

(*Z*)-(1-(4-methoxyphenyl)but-1-ene-1,2-diyl)dibenzene (5c)



Crystals were used as received. A colorless plate 0.050 x 0.050 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 30 seconds per frame using a scan width of 2.0°. Data collection was 99.0% complete to 25.000° in θ. A total of 13691 reflections were collected covering the indices, -11<=*h*<=11, -12<=*k*<=11, -12<=*l*<=12. 3142 reflections were found to be symmetry independent, with an R_{int} of 0.0633. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S145. Crystal data and structure refinement for olefin **5c**.

X-ray ID	gene892	
Sample/notebook ID	71452-124	
Empirical formula	C23 H22 O	
Formula weight	314.40	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 9.5989(13) Å	α= 78.416(2)°.
	b = 9.9930(13) Å	β= 65.919(2)°.
	c = 10.2627(14) Å	γ = 75.486(2)°.
Volume	864.6(2) $Å^3$	
Z	2	
Density (calculated)	1.208 Mg/m^3	
Absorption coefficient	0.072 mm^{-1}	
F(000)	336	
Crystal size	0.050 x 0.050 x 0.030 mm^3	
Theta range for data collection	2.118 to 25.385°.	
Index ranges	-11<=h<=11, -12<=k<=11, -12<=l<=12	
Reflections collected	13691	
Independent reflections	3142 [R(int) = 0.0633]	
Completeness to theta = 25.000°	99.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.834	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3142 / 0 / 219	
Goodness-of-fit on F^2	1.033	
Final R indices [I>2sigma(I)]	R1 = 0.0485, wR2 = 0.1011	
R indices (all data)	R1 = 0.0856, wR2 = 0.1176	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.265 and -0.210 $e.Å^{-3}$	

Table S146. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5c**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6722(2)	6805(2)	3238(2)	19(1)
C(2)	5450(2)	7615(2)	3064(2)	20(1)
C(3)	4681(2)	8997(2)	3660(2)	23(1)
C(4)	4810(3)	10237(2)	2501(2)	31(1)
C(5)	4648(2)	7224(2)	2250(2)	20(1)
C(6)	5403(2)	7021(2)	799(2)	24(1)
C(7)	4630(2)	6718(2)	52(2)	27(1)
C(8)	3080(2)	6603(2)	736(2)	27(1)
C(9)	2312(2)	6808(2)	2165(2)	25(1)
C(10)	3081(2)	7127(2)	2916(2)	23(1)
C(11)	7567(2)	7228(2)	3991(2)	20(1)
C(12)	8086(2)	8488(2)	3617(2)	21(1)
C(13)	8869(2)	8838(2)	4337(2)	23(1)
C(14)	9153(2)	7928(2)	5454(2)	26(1)
C(15)	8663(2)	6663(2)	5828(2)	25(1)
C(16)	7893(2)	6314(2)	5101(2)	22(1)
C(17)	7377(2)	5370(2)	2770(2)	19(1)
C(18)	8950(2)	4993(2)	1980(2)	20(1)
C(19)	9615(2)	3663(2)	1556(2)	20(1)
C(20)	8688(2)	2677(2)	1958(2)	20(1)
C(21)	7106(2)	3019(2)	2778(2)	22(1)
C(22)	6466(2)	4354(2)	3169(2)	21(1)
C(23)	10844(3)	929(2)	807(3)	35(1)
O(1)	9220(2)	1332(1)	1604(2)	28(1)

Table S147. Bond lengths [Å] and angles [°] for olefin **5c**.

C(1)-C(2)	1.342(3)	C(12)-C(13)	1.387(3)
C(1)-C(11)	1.500(3)	C(12)-H(12)	0.9500
C(1)-C(17)	1.504(3)	C(13)-C(14)	1.389(3)
C(2)-C(5)	1.500(3)	C(13)-H(13)	0.9500
C(2)-C(3)	1.512(3)	C(14)-C(15)	1.386(3)
C(3)-C(4)	1.527(3)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.382(3)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4B)	0.9800	C(17)-C(18)	1.385(3)
C(4)-H(4C)	0.9800	C(17)-C(22)	1.396(3)
C(5)-C(10)	1.395(3)	C(18)-C(19)	1.394(3)
C(5)-C(6)	1.396(3)	C(18)-H(18)	0.9500
C(6)-C(7)	1.379(3)	C(19)-C(20)	1.382(3)
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.385(3)	C(20)-O(1)	1.378(2)
C(7)-H(7)	0.9500	C(20)-C(21)	1.394(3)
C(8)-C(9)	1.378(3)	C(21)-C(22)	1.386(3)
C(8)-H(8)	0.9500	C(21)-H(21)	0.9500
C(9)-C(10)	1.386(3)	C(22)-H(22)	0.9500
C(9)-H(9)	0.9500	C(23)-O(1)	1.428(2)
C(10)-H(10)	0.9500	C(23)-H(23A)	0.9800
C(11)-C(12)	1.395(3)	C(23)-H(23B)	0.9800
C(11)-C(16)	1.400(3)	C(23)-H(23C)	0.9800
C(2)-C(1)-C(11)	122.60(17)	C(7)-C(8)-H(8)	120.2
C(2)-C(1)-C(17)	123.31(16)	C(8)-C(9)-C(10)	120.3(2)
C(11)-C(1)-C(17)	114.01(15)	C(8)-C(9)-H(9)	119.8
C(1)-C(2)-C(5)	122.67(17)	C(10)-C(9)-H(9)	119.8
C(1)-C(2)-C(3)	124.05(17)	C(9)-C(10)-C(5)	120.82(19)
C(5)-C(2)-C(3)	113.28(16)	C(9)-C(10)-H(10)	119.6
C(2)-C(3)-C(4)	113.43(17)	C(5)-C(10)-H(10)	119.6
C(2)-C(3)-H(3A)	108.9	C(12)-C(11)-C(16)	117.66(17)
C(4)-C(3)-H(3A)	108.9	C(12)-C(11)-C(1)	123.05(18)
C(2)-C(3)-H(3B)	108.9	C(16)-C(11)-C(1)	119.27(18)
C(4)-C(3)-H(3B)	108.9	C(13)-C(12)-C(11)	121.26(19)
H(3A)-C(3)-H(3B)	107.7	C(13)-C(12)-H(12)	119.4
C(3)-C(4)-H(4A)	109.5	C(11)-C(12)-H(12)	119.4
C(3)-C(4)-H(4B)	109.5	C(12)-C(13)-C(14)	120.1(2)
H(4A)-C(4)-H(4B)	109.5	C(12)-C(13)-H(13)	119.9
C(3)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.9
H(4A)-C(4)-H(4C)	109.5	C(15)-C(14)-C(13)	119.37(18)
H(4B)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	120.3
C(10)-C(5)-C(6)	117.92(17)	C(13)-C(14)-H(14)	120.3
C(10)-C(5)-C(2)	120.14(18)	C(16)-C(15)-C(14)	120.37(19)
C(6)-C(5)-C(2)	121.86(18)	C(16)-C(15)-H(15)	119.8
C(7)-C(6)-C(5)	121.08(19)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.5	C(15)-C(16)-C(11)	121.19(19)
C(5)-C(6)-H(6)	119.5	C(15)-C(16)-H(16)	119.4
C(6)-C(7)-C(8)	120.2(2)	C(11)-C(16)-H(16)	119.4
C(6)-C(7)-H(7)	119.9	C(18)-C(17)-C(22)	117.59(18)
C(8)-C(7)-H(7)	119.9	C(18)-C(17)-C(1)	120.02(17)
C(9)-C(8)-C(7)	119.58(18)	C(22)-C(17)-C(1)	122.30(18)
C(9)-C(8)-H(8)	120.2	C(17)-C(18)-C(19)	122.04(19)

C(17)-C(18)-H(18)	119.0	C(21)-C(22)-C(17)	121.38(19)
C(19)-C(18)-H(18)	119.0	C(21)-C(22)-H(22)	119.3
C(20)-C(19)-C(18)	119.28(18)	C(17)-C(22)-H(22)	119.3
C(20)-C(19)-H(19)	120.4	O(1)-C(23)-H(23A)	109.5
C(18)-C(19)-H(19)	120.4	O(1)-C(23)-H(23B)	109.5
O(1)-C(20)-C(19)	124.27(18)	H(23A)-C(23)-H(23B)	109.5
O(1)-C(20)-C(21)	115.81(17)	O(1)-C(23)-H(23C)	109.5
C(19)-C(20)-C(21)	119.91(17)	H(23A)-C(23)-H(23C)	109.5
C(22)-C(21)-C(20)	119.77(19)	H(23B)-C(23)-H(23C)	109.5
C(22)-C(21)-H(21)	120.1	C(20)-O(1)-C(23)	117.40(16)
C(20)-C(21)-H(21)	120.1		

Symmetry transformations used to generate equivalent atoms:

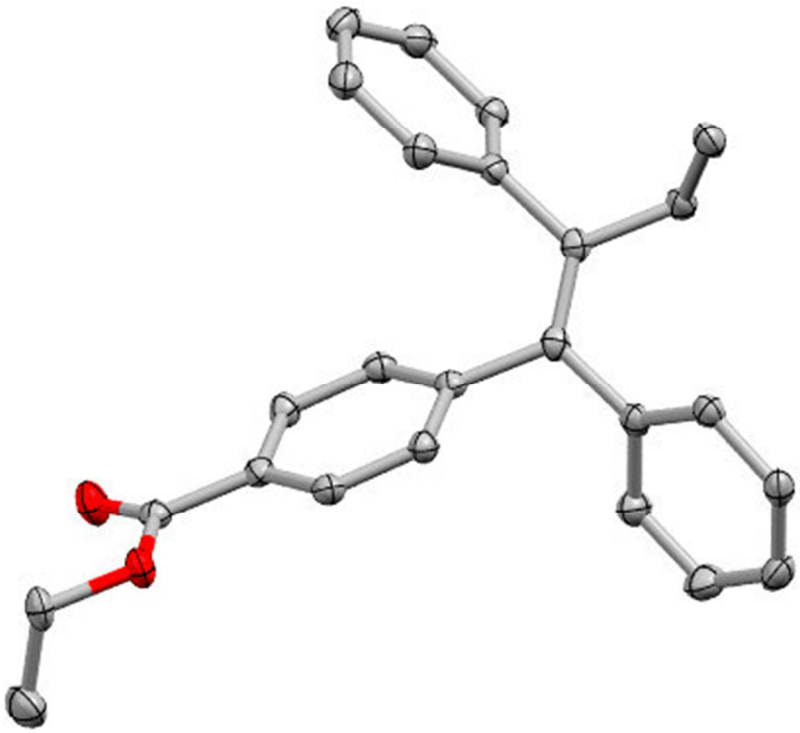
Table S148. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5c**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(1)	20(1)	20(1)	-1(1)	-6(1)	-6(1)
C(2)	20(1)	18(1)	19(1)	-2(1)	-4(1)	-6(1)
C(3)	19(1)	22(1)	29(1)	-6(1)	-9(1)	-2(1)
C(4)	28(1)	20(1)	44(2)	-5(1)	-15(1)	-1(1)
C(5)	19(1)	16(1)	26(1)	-1(1)	-11(1)	-1(1)
C(6)	21(1)	23(1)	26(1)	-4(1)	-6(1)	-3(1)
C(7)	31(1)	27(1)	22(1)	-4(1)	-10(1)	-3(1)
C(8)	34(1)	24(1)	32(1)	-4(1)	-23(1)	-2(1)
C(9)	19(1)	25(1)	32(1)	-5(1)	-10(1)	-2(1)
C(10)	23(1)	22(1)	25(1)	-7(1)	-10(1)	-1(1)
C(11)	16(1)	20(1)	22(1)	-8(1)	-5(1)	0(1)
C(12)	19(1)	20(1)	23(1)	-5(1)	-7(1)	-1(1)
C(13)	19(1)	21(1)	30(1)	-9(1)	-6(1)	-4(1)
C(14)	21(1)	32(1)	30(1)	-12(1)	-12(1)	-2(1)
C(15)	25(1)	25(1)	24(1)	-2(1)	-12(1)	0(1)
C(16)	23(1)	18(1)	27(1)	-4(1)	-9(1)	-4(1)
C(17)	19(1)	19(1)	19(1)	-1(1)	-10(1)	-2(1)
C(18)	21(1)	21(1)	21(1)	-2(1)	-9(1)	-6(1)
C(19)	19(1)	22(1)	20(1)	-3(1)	-9(1)	0(1)
C(20)	28(1)	15(1)	19(1)	-3(1)	-12(1)	-2(1)
C(21)	24(1)	21(1)	23(1)	-1(1)	-10(1)	-9(1)
C(22)	17(1)	24(1)	21(1)	-2(1)	-7(1)	-4(1)
C(23)	34(1)	26(1)	39(2)	-12(1)	-9(1)	3(1)
O(1)	31(1)	18(1)	32(1)	-7(1)	-9(1)	-2(1)

Table S149. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5c**.

	x	y	z	U(eq)
H(3A)	5162	9118	4307	28
H(3B)	3568	8983	4240	28
H(4A)	5907	10289	1954	46
H(4B)	4265	11095	2952	46
H(4C)	4340	10124	1852	46
H(6)	6466	7094	319	28
H(7)	5161	6587	-935	32
H(8)	2551	6385	224	32
H(9)	1249	6730	2638	30
H(10)	2534	7282	3896	27
H(12)	7901	9119	2853	25
H(13)	9211	9703	4067	28
H(14)	9678	8169	5958	31
H(15)	8858	6034	6588	30
H(16)	7579	5437	5359	27
H(18)	9595	5661	1720	24
H(19)	10694	3438	997	25
H(21)	6469	2339	3067	26
H(22)	5385	4582	3719	25
H(23A)	11140	1510	-118	52
H(23B)	11076	-49	642	52
H(23C)	11431	1050	1351	52

Ethyl (*Z*)-4-(1,2-diphenylbut-1-en-1-yl)benzoate (5d)



A yellow prism 0.060 x 0.050 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 16642 reflections were collected covering the indices, -11<=*h*<=11, -12<=*k*<=12, -12<=*l*<=12. 3550 reflections were found to be symmetry independent, with an R_{int} of 0.0332. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT 2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S150. Crystal data and structure refinement for gene904.

X-ray ID	gene904	
Sample/notebook ID	71452-129	
Empirical formula	C25 H24 O2	
Formula weight	356.44	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 9.7277(5) Å	α= 78.543(2)°.
	b = 10.2705(5) Å	β= 80.516(2)°.
	c = 10.7975(5) Å	γ = 66.907(2)°.
Volume	968.02(8) $Å^3$	
Z	2	
Density (calculated)	1.223 Mg/m^3	
Absorption coefficient	0.076 mm^{-1}	
F(000)	380	
Crystal size	0.060 x 0.050 x 0.040 mm^3	
Theta range for data collection	1.933 to 25.412°.	
Index ranges	-11<=h<=11, -12<=k<=12, -12<=l<=12	
Reflections collected	16642	
Independent reflections	3550 [R(int) = 0.0332]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.893	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3550 / 0 / 246	
Goodness-of-fit on F^2	1.067	
Final R indices [I>2sigma(I)]	R1 = 0.0447, wR2 = 0.1118	
R indices (all data)	R1 = 0.0619, wR2 = 0.1224	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.252 and -0.203 $e.Å^{-3}$	

Table S151. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5d**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6511(2)	3528(2)	6962(1)	19(1)
C(2)	5277(2)	3365(2)	7639(1)	19(1)
C(3)	4585(2)	3956(2)	8869(1)	21(1)
C(4)	4861(2)	2793(2)	10030(1)	25(1)
C(5)	4472(2)	2566(2)	7221(1)	20(1)
C(6)	5192(2)	1147(2)	7014(1)	24(1)
C(7)	4416(2)	433(2)	6634(2)	28(1)
C(8)	2911(2)	1130(2)	6450(2)	30(1)
C(9)	2178(2)	2533(2)	6660(1)	27(1)
C(10)	2949(2)	3241(2)	7050(1)	23(1)
C(11)	7351(2)	4295(2)	7371(1)	19(1)
C(12)	7925(2)	3932(2)	8546(1)	20(1)
C(13)	8736(2)	4653(2)	8856(1)	22(1)
C(14)	8979(2)	5757(2)	8006(2)	27(1)
C(15)	8416(2)	6131(2)	6833(2)	31(1)
C(16)	7625(2)	5401(2)	6516(2)	26(1)
C(17)	7158(2)	2983(2)	5725(1)	19(1)
C(18)	8698(2)	2221(2)	5539(1)	19(1)
C(19)	9362(2)	1711(2)	4408(1)	19(1)
C(20)	8492(2)	1986(2)	3413(1)	19(1)
C(21)	6954(2)	2758(2)	3577(1)	20(1)
C(22)	6297(2)	3245(2)	4721(1)	20(1)
C(23)	9163(2)	1443(2)	2184(1)	20(1)
C(24)	11399(2)	7(2)	1069(1)	24(1)
C(25)	11853(2)	1028(2)	51(2)	37(1)
O(1)	8466(1)	1663(1)	1287(1)	29(1)
O(2)	10640(1)	668(1)	2194(1)	24(1)

Table S152. Bond lengths [Å] and angles [°] for olefin **5d**.

C(1)-C(2)	1.351(2)	C(13)-H(13)	0.9500
C(1)-C(17)	1.495(2)	C(14)-C(15)	1.387(2)
C(1)-C(11)	1.498(2)	C(14)-H(14)	0.9500
C(2)-C(5)	1.503(2)	C(15)-C(16)	1.383(2)
C(2)-C(3)	1.513(2)	C(15)-H(15)	0.9500
C(3)-C(4)	1.528(2)	C(16)-H(16)	0.9500
C(3)-H(3A)	0.9900	C(17)-C(18)	1.393(2)
C(3)-H(3B)	0.9900	C(17)-C(22)	1.398(2)
C(4)-H(4A)	0.9800	C(18)-C(19)	1.383(2)
C(4)-H(4B)	0.9800	C(18)-H(18)	0.9500
C(4)-H(4C)	0.9800	C(19)-C(20)	1.393(2)
C(5)-C(6)	1.394(2)	C(19)-H(19)	0.9500
C(5)-C(10)	1.394(2)	C(20)-C(21)	1.391(2)
C(6)-C(7)	1.390(2)	C(20)-C(23)	1.490(2)
C(6)-H(6)	0.9500	C(21)-C(22)	1.385(2)
C(7)-C(8)	1.383(2)	C(21)-H(21)	0.9500
C(7)-H(7)	0.9500	C(22)-H(22)	0.9500
C(8)-C(9)	1.381(2)	C(23)-O(1)	1.2084(17)
C(8)-H(8)	0.9500	C(23)-O(2)	1.3422(18)
C(9)-C(10)	1.386(2)	C(24)-O(2)	1.4561(18)
C(9)-H(9)	0.9500	C(24)-C(25)	1.500(2)
C(10)-H(10)	0.9500	C(24)-H(24A)	0.9900
C(11)-C(12)	1.394(2)	C(24)-H(24B)	0.9900
C(11)-C(16)	1.397(2)	C(25)-H(25A)	0.9800
C(12)-C(13)	1.387(2)	C(25)-H(25B)	0.9800
C(12)-H(12)	0.9500	C(25)-H(25C)	0.9800
C(13)-C(14)	1.382(2)		
C(2)-C(1)-C(17)	123.42(13)	C(6)-C(7)-H(7)	119.9
C(2)-C(1)-C(11)	123.07(13)	C(9)-C(8)-C(7)	119.71(15)
C(17)-C(1)-C(11)	113.50(13)	C(9)-C(8)-H(8)	120.1
C(1)-C(2)-C(5)	122.04(13)	C(7)-C(8)-H(8)	120.1
C(1)-C(2)-C(3)	123.77(13)	C(8)-C(9)-C(10)	120.11(16)
C(5)-C(2)-C(3)	114.19(13)	C(8)-C(9)-H(9)	119.9
C(2)-C(3)-C(4)	112.74(13)	C(10)-C(9)-H(9)	119.9
C(2)-C(3)-H(3A)	109.0	C(9)-C(10)-C(5)	121.11(15)
C(4)-C(3)-H(3A)	109.0	C(9)-C(10)-H(10)	119.4
C(2)-C(3)-H(3B)	109.0	C(5)-C(10)-H(10)	119.4
C(4)-C(3)-H(3B)	109.0	C(12)-C(11)-C(16)	117.87(14)
H(3A)-C(3)-H(3B)	107.8	C(12)-C(11)-C(1)	123.49(13)
C(3)-C(4)-H(4A)	109.5	C(16)-C(11)-C(1)	118.59(13)
C(3)-C(4)-H(4B)	109.5	C(13)-C(12)-C(11)	120.89(14)
H(4A)-C(4)-H(4B)	109.5	C(13)-C(12)-H(12)	119.6
C(3)-C(4)-H(4C)	109.5	C(11)-C(12)-H(12)	119.6
H(4A)-C(4)-H(4C)	109.5	C(14)-C(13)-C(12)	120.52(14)
H(4B)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.7
C(6)-C(5)-C(10)	118.05(14)	C(12)-C(13)-H(13)	119.7
C(6)-C(5)-C(2)	122.12(14)	C(13)-C(14)-C(15)	119.28(15)
C(10)-C(5)-C(2)	119.82(14)	C(13)-C(14)-H(14)	120.4
C(7)-C(6)-C(5)	120.85(15)	C(15)-C(14)-H(14)	120.4
C(7)-C(6)-H(6)	119.6	C(16)-C(15)-C(14)	120.27(15)
C(5)-C(6)-H(6)	119.6	C(16)-C(15)-H(15)	119.9
C(8)-C(7)-C(6)	120.16(16)	C(14)-C(15)-H(15)	119.9
C(8)-C(7)-H(7)	119.9	C(15)-C(16)-C(11)	121.16(14)

C(15)-C(16)-H(16)	119.4	C(21)-C(22)-H(22)	119.5
C(11)-C(16)-H(16)	119.4	C(17)-C(22)-H(22)	119.5
C(18)-C(17)-C(22)	117.99(13)	O(1)-C(23)-O(2)	123.78(14)
C(18)-C(17)-C(1)	118.89(13)	O(1)-C(23)-C(20)	124.32(14)
C(22)-C(17)-C(1)	123.08(14)	O(2)-C(23)-C(20)	111.90(12)
C(19)-C(18)-C(17)	121.46(14)	O(2)-C(24)-C(25)	111.73(13)
C(19)-C(18)-H(18)	119.3	O(2)-C(24)-H(24A)	109.3
C(17)-C(18)-H(18)	119.3	C(25)-C(24)-H(24A)	109.3
C(18)-C(19)-C(20)	119.92(14)	O(2)-C(24)-H(24B)	109.3
C(18)-C(19)-H(19)	120.0	C(25)-C(24)-H(24B)	109.3
C(20)-C(19)-H(19)	120.0	H(24A)-C(24)-H(24B)	107.9
C(21)-C(20)-C(19)	119.41(14)	C(24)-C(25)-H(25A)	109.5
C(21)-C(20)-C(23)	119.03(13)	C(24)-C(25)-H(25B)	109.5
C(19)-C(20)-C(23)	121.55(14)	H(25A)-C(25)-H(25B)	109.5
C(22)-C(21)-C(20)	120.19(14)	C(24)-C(25)-H(25C)	109.5
C(22)-C(21)-H(21)	119.9	H(25A)-C(25)-H(25C)	109.5
C(20)-C(21)-H(21)	119.9	H(25B)-C(25)-H(25C)	109.5
C(21)-C(22)-C(17)	121.02(14)	C(23)-O(2)-C(24)	116.77(11)

Symmetry transformations used to generate equivalent atoms:

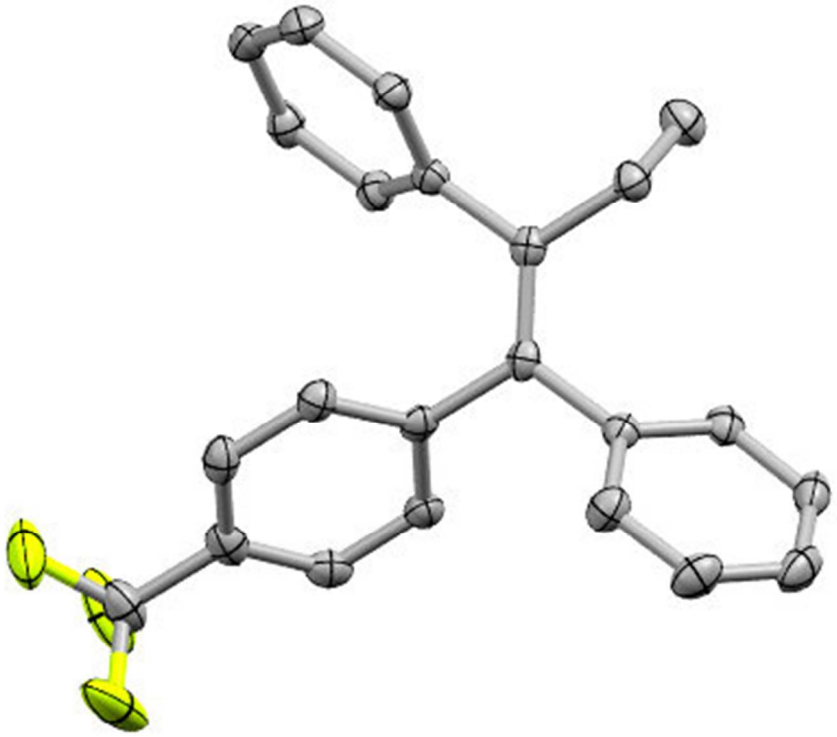
Table S153. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5d**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	21(1)	18(1)	16(1)	-2(1)	-5(1)	-6(1)
C(2)	19(1)	19(1)	17(1)	-3(1)	-4(1)	-5(1)
C(3)	17(1)	26(1)	21(1)	-8(1)	0(1)	-8(1)
C(4)	23(1)	31(1)	20(1)	-9(1)	2(1)	-10(1)
C(5)	22(1)	25(1)	14(1)	-3(1)	0(1)	-12(1)
C(6)	25(1)	29(1)	21(1)	-6(1)	-1(1)	-13(1)
C(7)	37(1)	29(1)	23(1)	-7(1)	0(1)	-17(1)
C(8)	39(1)	40(1)	23(1)	-4(1)	-4(1)	-27(1)
C(9)	25(1)	39(1)	21(1)	-2(1)	-2(1)	-18(1)
C(10)	22(1)	29(1)	19(1)	-4(1)	1(1)	-13(1)
C(11)	16(1)	21(1)	20(1)	-7(1)	0(1)	-5(1)
C(12)	18(1)	21(1)	21(1)	-6(1)	1(1)	-6(1)
C(13)	19(1)	26(1)	21(1)	-10(1)	-2(1)	-6(1)
C(14)	26(1)	29(1)	33(1)	-11(1)	-3(1)	-15(1)
C(15)	35(1)	31(1)	32(1)	-1(1)	-3(1)	-20(1)
C(16)	29(1)	31(1)	20(1)	-2(1)	-5(1)	-14(1)
C(17)	21(1)	19(1)	18(1)	-2(1)	-1(1)	-10(1)
C(18)	22(1)	22(1)	17(1)	-2(1)	-3(1)	-11(1)
C(19)	19(1)	21(1)	21(1)	-3(1)	-1(1)	-9(1)
C(20)	24(1)	17(1)	19(1)	-4(1)	0(1)	-10(1)
C(21)	24(1)	22(1)	17(1)	-2(1)	-4(1)	-10(1)
C(22)	19(1)	21(1)	21(1)	-2(1)	-2(1)	-8(1)
C(23)	22(1)	19(1)	19(1)	-2(1)	-2(1)	-10(1)
C(24)	24(1)	25(1)	20(1)	-10(1)	-1(1)	-3(1)
C(25)	36(1)	37(1)	34(1)	-12(1)	10(1)	-12(1)
O(1)	27(1)	37(1)	19(1)	-8(1)	-4(1)	-6(1)
O(2)	22(1)	28(1)	19(1)	-9(1)	-1(1)	-5(1)

Table S154. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5d**.

	x	y	z	U(eq)
H(3A)	3490	4465	8829	25
H(3B)	5009	4659	8966	25
H(4A)	4631	1998	9868	37
H(4B)	4215	3189	10768	37
H(4C)	5916	2445	10197	37
H(6)	6227	661	7135	29
H(7)	4921	-535	6501	34
H(8)	2384	646	6180	36
H(9)	1143	3014	6537	32
H(10)	2431	4202	7203	27
H(12)	7760	3181	9143	24
H(13)	9126	4386	9658	26
H(14)	9527	6255	8223	33
H(15)	8574	6892	6244	37
H(16)	7262	5655	5703	31
H(18)	9305	2048	6204	23
H(19)	10411	1173	4309	23
H(21)	6354	2952	2903	24
H(22)	5245	3766	4825	24
H(24A)	10722	-324	736	29
H(24B)	12303	-840	1304	29
H(25A)	10954	1788	-283	55
H(25B)	12485	513	-637	55
H(25C)	12416	1451	408	55

(*Z*)-(1-(4-(trifluoromethyl)phenyl)but-1-ene-1,2-diyl)dibenzene (5e)



Crystals were used as received. A colorless prism 0.070 x 0.050 x 0.050 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 99.8% complete to 25.000° in θ. A total of 14709 reflections were collected covering the indices, -11<=*h*<=11, -12<=*k*<=12, -12<=*l*<=12. 3334 reflections were found to be symmetry independent, with an R_{int} of 0.0669. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S155. Crystal data and structure refinement for olefin **5e**.

X-ray ID	gene920	
Sample/notebook ID	71452-142	
Empirical formula	C23 H19 F3	
Formula weight	352.38	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 9.585(3) Å	α= 63.143(4)°.
	b = 10.156(3) Å	β= 79.594(4)°.
	c = 10.675(3) Å	γ = 81.521(4)°.
Volume	909.3(4) $Å^3$	
Z	2	
Density (calculated)	1.287 Mg/m^3	
Absorption coefficient	0.095 mm^{-1}	
F(000)	368	
Crystal size	0.070 x 0.050 x 0.050 mm^3	
Theta range for data collection	2.157 to 25.416°.	
Index ranges	-11<=h<=11, -12<=k<=12, -12<=l<=12	
Reflections collected	14709	
Independent reflections	3334 [R(int) = 0.0669]	
Completeness to theta = 25.000°	99.8 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.742	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3334 / 0 / 264	
Goodness-of-fit on F^2	1.021	
Final R indices [I>2sigma(I)]	R1 = 0.0470, wR2 = 0.1115	
R indices (all data)	R1 = 0.0670, wR2 = 0.1255	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.183 and -0.241 $e.Å^{-3}$	

Table S156. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5e**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5856(2)	6596(2)	6053(2)	21(1)
C(2)	4514(2)	6700(2)	6676(2)	20(1)
C(3)	4099(2)	6062(2)	8263(2)	25(1)
C(4)	3667(2)	7268(2)	8769(2)	33(1)
C(5)	3307(2)	7487(2)	5841(2)	22(1)
C(6)	3336(2)	8956(2)	4822(2)	24(1)
C(7)	2205(2)	9652(2)	4067(2)	26(1)
C(8)	1013(2)	8908(2)	4310(2)	27(1)
C(9)	957(2)	7464(2)	5325(2)	28(1)
C(10)	2087(2)	6763(2)	6087(2)	25(1)
C(11)	7080(2)	5828(2)	6871(2)	22(1)
C(12)	7455(2)	6203(2)	7867(2)	24(1)
C(13)	8605(2)	5468(2)	8584(2)	30(1)
C(14)	9393(2)	4328(2)	8352(2)	34(1)
C(15)	9039(2)	3950(2)	7368(2)	34(1)
C(16)	7909(2)	4700(2)	6622(2)	29(1)
C(17)	6237(2)	7215(2)	4478(2)	21(1)
C(18)	7355(2)	8134(2)	3826(2)	24(1)
C(19)	7717(2)	8762(2)	2371(2)	27(1)
C(20)	6982(2)	8450(2)	1546(2)	27(1)
C(21)	5889(2)	7512(2)	2179(2)	27(1)
C(22)	5525(2)	6897(2)	3635(2)	24(1)
C(23)	7353(2)	9149(2)	-29(2)	35(1)
F(1)	6319(4)	9028(5)	-720(3)	63(1)
F(2)	7431(6)	10575(3)	-589(3)	61(2)
F(3)	8481(5)	8598(6)	-509(3)	73(2)
F(1A)	6555(9)	10128(10)	-661(4)	127(5)
F(2A)	8698(7)	9686(11)	-400(4)	99(3)
F(3A)	7626(10)	8141(5)	-475(4)	86(3)

Table S157. Bond lengths [Å] and angles [°] for olefin **5e**.

C(1)-C(2)	1.350(2)	C(12)-H(12)	0.9500
C(1)-C(11)	1.494(2)	C(13)-C(14)	1.380(3)
C(1)-C(17)	1.498(2)	C(13)-H(13)	0.9500
C(2)-C(5)	1.493(2)	C(14)-C(15)	1.378(3)
C(2)-C(3)	1.513(2)	C(14)-H(14)	0.9500
C(3)-C(4)	1.526(3)	C(15)-C(16)	1.381(3)
C(3)-H(3A)	0.9900	C(15)-H(15)	0.9500
C(3)-H(3B)	0.9900	C(16)-H(16)	0.9500
C(4)-H(4A)	0.9800	C(17)-C(22)	1.390(2)
C(4)-H(4B)	0.9800	C(17)-C(18)	1.394(2)
C(4)-H(4C)	0.9800	C(18)-C(19)	1.384(2)
C(5)-C(10)	1.394(2)	C(18)-H(18)	0.9500
C(5)-C(6)	1.395(2)	C(19)-C(20)	1.384(3)
C(6)-C(7)	1.379(2)	C(19)-H(19)	0.9500
C(6)-H(6)	0.9500	C(20)-C(21)	1.385(2)
C(7)-C(8)	1.383(2)	C(20)-C(23)	1.496(2)
C(7)-H(7)	0.9500	C(21)-C(22)	1.385(2)
C(8)-C(9)	1.376(2)	C(21)-H(21)	0.9500
C(8)-H(8)	0.9500	C(22)-H(22)	0.9500
C(9)-C(10)	1.382(2)	C(23)-F(1A)	1.178(4)
C(9)-H(9)	0.9500	C(23)-F(3)	1.275(3)
C(10)-H(10)	0.9500	C(23)-F(3A)	1.288(5)
C(11)-C(16)	1.394(2)	C(23)-F(2)	1.302(3)
C(11)-C(12)	1.395(2)	C(23)-F(1)	1.387(3)
C(12)-C(13)	1.380(2)	C(23)-F(2A)	1.394(4)
C(2)-C(1)-C(11)	123.02(14)	C(9)-C(8)-H(8)	120.3
C(2)-C(1)-C(17)	122.68(14)	C(7)-C(8)-H(8)	120.3
C(11)-C(1)-C(17)	114.28(13)	C(8)-C(9)-C(10)	120.14(16)
C(1)-C(2)-C(5)	122.27(14)	C(8)-C(9)-H(9)	119.9
C(1)-C(2)-C(3)	123.65(15)	C(10)-C(9)-H(9)	119.9
C(5)-C(2)-C(3)	114.07(13)	C(9)-C(10)-C(5)	121.24(16)
C(2)-C(3)-C(4)	112.05(14)	C(9)-C(10)-H(10)	119.4
C(2)-C(3)-H(3A)	109.2	C(5)-C(10)-H(10)	119.4
C(4)-C(3)-H(3A)	109.2	C(16)-C(11)-C(12)	117.89(15)
C(2)-C(3)-H(3B)	109.2	C(16)-C(11)-C(1)	119.12(15)
C(4)-C(3)-H(3B)	109.2	C(12)-C(11)-C(1)	122.98(15)
H(3A)-C(3)-H(3B)	107.9	C(13)-C(12)-C(11)	120.68(17)
C(3)-C(4)-H(4A)	109.5	C(13)-C(12)-H(12)	119.7
C(3)-C(4)-H(4B)	109.5	C(11)-C(12)-H(12)	119.7
H(4A)-C(4)-H(4B)	109.5	C(12)-C(13)-C(14)	120.75(18)
C(3)-C(4)-H(4C)	109.5	C(12)-C(13)-H(13)	119.6
H(4A)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.6
H(4B)-C(4)-H(4C)	109.5	C(15)-C(14)-C(13)	119.18(17)
C(10)-C(5)-C(6)	117.80(15)	C(15)-C(14)-H(14)	120.4
C(10)-C(5)-C(2)	120.09(14)	C(13)-C(14)-H(14)	120.4
C(6)-C(5)-C(2)	122.10(14)	C(14)-C(15)-C(16)	120.50(18)
C(7)-C(6)-C(5)	120.73(15)	C(14)-C(15)-H(15)	119.8
C(7)-C(6)-H(6)	119.6	C(16)-C(15)-H(15)	119.8
C(5)-C(6)-H(6)	119.6	C(15)-C(16)-C(11)	120.96(18)
C(6)-C(7)-C(8)	120.59(16)	C(15)-C(16)-H(16)	119.5
C(6)-C(7)-H(7)	119.7	C(11)-C(16)-H(16)	119.5
C(8)-C(7)-H(7)	119.7	C(22)-C(17)-C(18)	118.27(15)
C(9)-C(8)-C(7)	119.48(16)	C(22)-C(17)-C(1)	122.47(15)

C(18)-C(17)-C(1)	119.26(15)	C(21)-C(22)-H(22)	119.6
C(19)-C(18)-C(17)	121.13(16)	C(17)-C(22)-H(22)	119.6
C(19)-C(18)-H(18)	119.4	F(1A)-C(23)-F(3A)	113.8(5)
C(17)-C(18)-H(18)	119.4	F(3)-C(23)-F(2)	107.8(3)
C(18)-C(19)-C(20)	119.75(16)	F(3)-C(23)-F(1)	103.1(3)
C(18)-C(19)-H(19)	120.1	F(2)-C(23)-F(1)	102.0(3)
C(20)-C(19)-H(19)	120.1	F(1A)-C(23)-F(2A)	107.6(5)
C(19)-C(20)-C(21)	119.90(16)	F(3A)-C(23)-F(2A)	98.7(4)
C(19)-C(20)-C(23)	119.88(16)	F(1A)-C(23)-C(20)	115.4(2)
C(21)-C(20)-C(23)	120.21(17)	F(3)-C(23)-C(20)	115.91(19)
C(22)-C(21)-C(20)	120.01(17)	F(3A)-C(23)-C(20)	109.9(2)
C(22)-C(21)-H(21)	120.0	F(2)-C(23)-C(20)	113.9(2)
C(20)-C(21)-H(21)	120.0	F(1)-C(23)-C(20)	112.69(18)
C(21)-C(22)-C(17)	120.89(16)	F(2A)-C(23)-C(20)	110.1(2)

Symmetry transformations used to generate equivalent atoms:

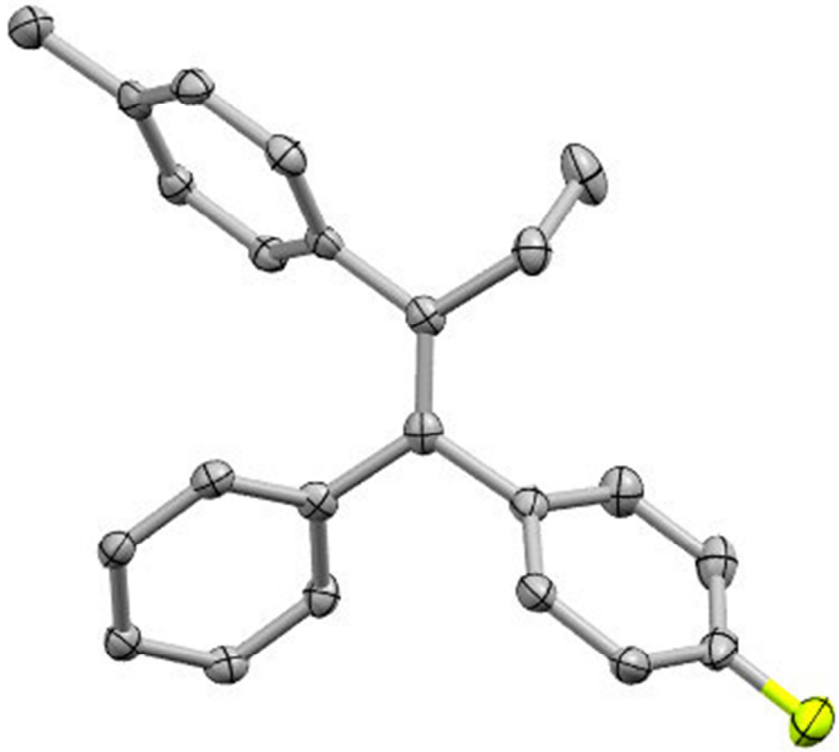
Table S158. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5e**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	25(1)	18(1)	21(1)	-8(1)	-7(1)	-3(1)
C(2)	25(1)	17(1)	20(1)	-7(1)	-6(1)	-3(1)
C(3)	24(1)	24(1)	22(1)	-7(1)	-4(1)	-3(1)
C(4)	38(1)	32(1)	26(1)	-12(1)	-1(1)	-2(1)
C(5)	22(1)	24(1)	20(1)	-11(1)	-2(1)	0(1)
C(6)	24(1)	24(1)	25(1)	-12(1)	-4(1)	-3(1)
C(7)	33(1)	23(1)	21(1)	-7(1)	-6(1)	1(1)
C(8)	23(1)	34(1)	25(1)	-15(1)	-7(1)	6(1)
C(9)	20(1)	35(1)	30(1)	-14(1)	-2(1)	-3(1)
C(10)	23(1)	26(1)	22(1)	-7(1)	-2(1)	-2(1)
C(11)	21(1)	22(1)	21(1)	-7(1)	-3(1)	-4(1)
C(12)	25(1)	25(1)	20(1)	-7(1)	-1(1)	-7(1)
C(13)	29(1)	37(1)	22(1)	-7(1)	-7(1)	-10(1)
C(14)	26(1)	32(1)	32(1)	-2(1)	-12(1)	-1(1)
C(15)	28(1)	27(1)	43(1)	-13(1)	-10(1)	3(1)
C(16)	29(1)	28(1)	33(1)	-15(1)	-9(1)	0(1)
C(17)	20(1)	19(1)	23(1)	-9(1)	-6(1)	4(1)
C(18)	19(1)	27(1)	25(1)	-13(1)	-4(1)	2(1)
C(19)	23(1)	25(1)	31(1)	-13(1)	0(1)	0(1)
C(20)	33(1)	22(1)	24(1)	-11(1)	-3(1)	5(1)
C(21)	34(1)	26(1)	25(1)	-14(1)	-10(1)	3(1)
C(22)	25(1)	22(1)	25(1)	-10(1)	-6(1)	0(1)
C(23)	46(1)	31(1)	26(1)	-14(1)	-1(1)	2(1)
F(1)	71(2)	93(3)	25(1)	-17(2)	-10(1)	-32(2)
F(2)	125(5)	29(2)	24(1)	-6(1)	-1(2)	-21(2)
F(3)	66(2)	79(3)	27(1)	-3(2)	9(2)	46(2)
F(1A)	114(6)	144(9)	24(2)	11(4)	0(3)	110(6)
F(2A)	89(4)	172(7)	33(2)	-31(3)	18(2)	-77(5)
F(3A)	172(8)	63(3)	28(2)	-29(2)	20(3)	-32(4)

Table S159. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5e**.

	x	y	z	U(eq)
H(3A)	4911	5426	8740	30
H(3B)	3296	5435	8535	30
H(4A)	4458	7894	8499	49
H(4B)	3429	6810	9801	49
H(4C)	2837	7874	8331	49
H(6)	4146	9483	4646	29
H(7)	2243	10652	3373	32
H(8)	240	9390	3781	32
H(9)	139	6948	5502	34
H(10)	2032	5770	6792	30
H(12)	6913	6972	8052	29
H(13)	8857	5749	9245	36
H(14)	10170	3811	8865	40
H(15)	9576	3168	7201	40
H(16)	7693	4444	5929	35
H(18)	7877	8334	4390	28
H(19)	8468	9404	1941	32
H(21)	5388	7292	1614	32
H(22)	4780	6248	4062	29

(*E*)-1-fluoro-4-(1-phenyl-2-(*p*-tolyl)but-1-en-1-yl)benzene (5i)



Crystal were used as received. A colorless blade 0.070 x 0.050 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 20 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 21428 reflections were collected covering the indices, -38<=*h*<=38, -6<=*k*<=6, -11<=*l*<=11. 3180 reflections were found to be symmetry independent, with an R_{int} of 0.0614. Indexing and unit cell refinement indicated a primitive, orthorhombic lattice. The space group was found to be P 21 21 21 (No. 19). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S160. Crystal data and structure refinement for olefin **5i**.

X-ray ID	gene917	
Sample/notebook ID	71452-147	
Empirical formula	C23 H21 F	
Formula weight	316.40	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P 21 21 21	
Unit cell dimensions	a = 31.553(3) Å	α= 90°.
	b = 5.6570(4) Å	β= 90°.
	c = 9.6179(7) Å	γ = 90°.
Volume	1716.7(2) $Å^3$	
Z	4	
Density (calculated)	1.224 Mg/m^3	
Absorption coefficient	0.077 mm^{-1}	
F(000)	672	
Crystal size	0.070 x 0.050 x 0.030 mm^3	
Theta range for data collection	1.291 to 25.440°.	
Index ranges	-38<=h<=38, -6<=k<=6, -11<=l<=11	
Reflections collected	21428	
Independent reflections	3180 [R(int) = 0.0614]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.818	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3180 / 0 / 219	
Goodness-of-fit on F^2	1.116	
Final R indices [I>2sigma(I)]	R1 = 0.0516, wR2 = 0.1012	
R indices (all data)	R1 = 0.0584, wR2 = 0.1032	
Absolute structure parameter	0.0(5)	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.219 and -0.169 e.$Å^{-3}$	

Table S161. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5i**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6319(1)	4948(6)	3501(4)	21(1)
C(2)	6511(1)	5677(6)	2320(3)	20(1)
C(3)	6989(1)	5869(7)	2191(4)	25(1)
C(4)	7180(1)	4151(8)	1147(4)	38(1)
C(5)	6271(1)	6318(6)	1040(3)	20(1)
C(6)	5970(1)	4772(6)	484(4)	21(1)
C(7)	5751(1)	5319(7)	-720(4)	22(1)
C(8)	5820(1)	7443(6)	-1427(4)	23(1)
C(9)	6128(1)	8945(7)	-893(4)	24(1)
C(10)	6351(1)	8404(7)	304(4)	24(1)
C(11)	5567(1)	8104(8)	-2692(4)	31(1)
C(12)	5851(1)	5029(6)	3745(3)	20(1)
C(13)	5650(1)	3169(6)	4428(3)	22(1)
C(14)	5220(1)	3238(7)	4735(4)	22(1)
C(15)	4982(1)	5210(6)	4369(3)	23(1)
C(16)	5175(1)	7077(7)	3698(3)	22(1)
C(17)	5605(1)	6994(6)	3386(3)	21(1)
C(18)	6558(1)	3914(7)	4698(4)	22(1)
C(19)	6794(1)	1833(7)	4543(4)	30(1)
C(20)	6994(1)	791(7)	5674(4)	34(1)
C(21)	6953(1)	1832(7)	6948(4)	30(1)
C(22)	6725(1)	3887(7)	7155(4)	28(1)
C(23)	6528(1)	4884(7)	6015(4)	26(1)
F(1)	7146(1)	813(5)	8075(2)	42(1)

Table S162. Bond lengths [Å] and angles [°] for olefin **5i**.

C(1)-C(2)	1.352(5)	C(11)-H(11C)	0.9800
C(1)-C(18)	1.496(5)	C(12)-C(13)	1.392(5)
C(1)-C(12)	1.497(4)	C(12)-C(17)	1.399(5)
C(2)-C(5)	1.490(5)	C(13)-C(14)	1.390(5)
C(2)-C(3)	1.518(4)	C(13)-H(13)	0.9500
C(3)-C(4)	1.521(5)	C(14)-C(15)	1.390(5)
C(3)-H(3A)	0.9900	C(14)-H(14)	0.9500
C(3)-H(3B)	0.9900	C(15)-C(16)	1.379(5)
C(4)-H(4A)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4B)	0.9800	C(16)-C(17)	1.391(5)
C(4)-H(4C)	0.9800	C(16)-H(16)	0.9500
C(5)-C(6)	1.397(5)	C(17)-H(17)	0.9500
C(5)-C(10)	1.399(5)	C(18)-C(23)	1.383(5)
C(6)-C(7)	1.383(5)	C(18)-C(19)	1.400(5)
C(6)-H(6)	0.9500	C(19)-C(20)	1.389(5)
C(7)-C(8)	1.398(5)	C(19)-H(19)	0.9500
C(7)-H(7)	0.9500	C(20)-C(21)	1.366(5)
C(8)-C(9)	1.390(5)	C(20)-H(20)	0.9500
C(8)-C(11)	1.502(5)	C(21)-F(1)	1.369(4)
C(9)-C(10)	1.384(5)	C(21)-C(22)	1.383(5)
C(9)-H(9)	0.9500	C(22)-C(23)	1.380(5)
C(10)-H(10)	0.9500	C(22)-H(22)	0.9500
C(11)-H(11A)	0.9800	C(23)-H(23)	0.9500
C(11)-H(11B)	0.9800		

C(2)-C(1)-C(18)	122.7(3)	C(7)-C(8)-C(11)	121.7(3)
C(2)-C(1)-C(12)	124.4(3)	C(10)-C(9)-C(8)	121.9(3)
C(18)-C(1)-C(12)	112.9(3)	C(10)-C(9)-H(9)	119.0
C(1)-C(2)-C(5)	122.7(3)	C(8)-C(9)-H(9)	119.0
C(1)-C(2)-C(3)	122.4(3)	C(9)-C(10)-C(5)	121.0(3)
C(5)-C(2)-C(3)	114.8(3)	C(9)-C(10)-H(10)	119.5
C(2)-C(3)-C(4)	113.7(3)	C(5)-C(10)-H(10)	119.5
C(2)-C(3)-H(3A)	108.8	C(8)-C(11)-H(11A)	109.5
C(4)-C(3)-H(3A)	108.8	C(8)-C(11)-H(11B)	109.5
C(2)-C(3)-H(3B)	108.8	H(11A)-C(11)-H(11B)	109.5
C(4)-C(3)-H(3B)	108.8	C(8)-C(11)-H(11C)	109.5
H(3A)-C(3)-H(3B)	107.7	H(11A)-C(11)-H(11C)	109.5
C(3)-C(4)-H(4A)	109.5	H(11B)-C(11)-H(11C)	109.5
C(3)-C(4)-H(4B)	109.5	C(13)-C(12)-C(17)	117.7(3)
H(4A)-C(4)-H(4B)	109.5	C(13)-C(12)-C(1)	119.9(3)
C(3)-C(4)-H(4C)	109.5	C(17)-C(12)-C(1)	122.2(3)
H(4A)-C(4)-H(4C)	109.5	C(14)-C(13)-C(12)	121.5(3)
H(4B)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.3
C(6)-C(5)-C(10)	117.2(3)	C(12)-C(13)-H(13)	119.3
C(6)-C(5)-C(2)	120.6(3)	C(15)-C(14)-C(13)	119.8(3)
C(10)-C(5)-C(2)	122.1(3)	C(15)-C(14)-H(14)	120.1
C(7)-C(6)-C(5)	121.3(3)	C(13)-C(14)-H(14)	120.1
C(7)-C(6)-H(6)	119.3	C(16)-C(15)-C(14)	119.7(3)
C(5)-C(6)-H(6)	119.3	C(16)-C(15)-H(15)	120.2
C(6)-C(7)-C(8)	121.5(3)	C(14)-C(15)-H(15)	120.2
C(6)-C(7)-H(7)	119.3	C(15)-C(16)-C(17)	120.3(3)
C(8)-C(7)-H(7)	119.3	C(15)-C(16)-H(16)	119.8
C(9)-C(8)-C(7)	117.0(3)	C(17)-C(16)-H(16)	119.8
C(9)-C(8)-C(11)	121.3(3)	C(16)-C(17)-C(12)	121.0(3)

C(16)-C(17)-H(17)	119.5	C(19)-C(20)-H(20)	120.7
C(12)-C(17)-H(17)	119.5	C(20)-C(21)-F(1)	119.2(4)
C(23)-C(18)-C(19)	117.9(3)	C(20)-C(21)-C(22)	122.7(3)
C(23)-C(18)-C(1)	121.0(3)	F(1)-C(21)-C(22)	118.1(4)
C(19)-C(18)-C(1)	120.9(3)	C(23)-C(22)-C(21)	117.7(4)
C(20)-C(19)-C(18)	121.0(4)	C(23)-C(22)-H(22)	121.2
C(20)-C(19)-H(19)	119.5	C(21)-C(22)-H(22)	121.2
C(18)-C(19)-H(19)	119.5	C(22)-C(23)-C(18)	122.3(3)
C(21)-C(20)-C(19)	118.5(4)	C(22)-C(23)-H(23)	118.9
C(21)-C(20)-H(20)	120.7	C(18)-C(23)-H(23)	118.9

Symmetry transformations used to generate equivalent atoms:

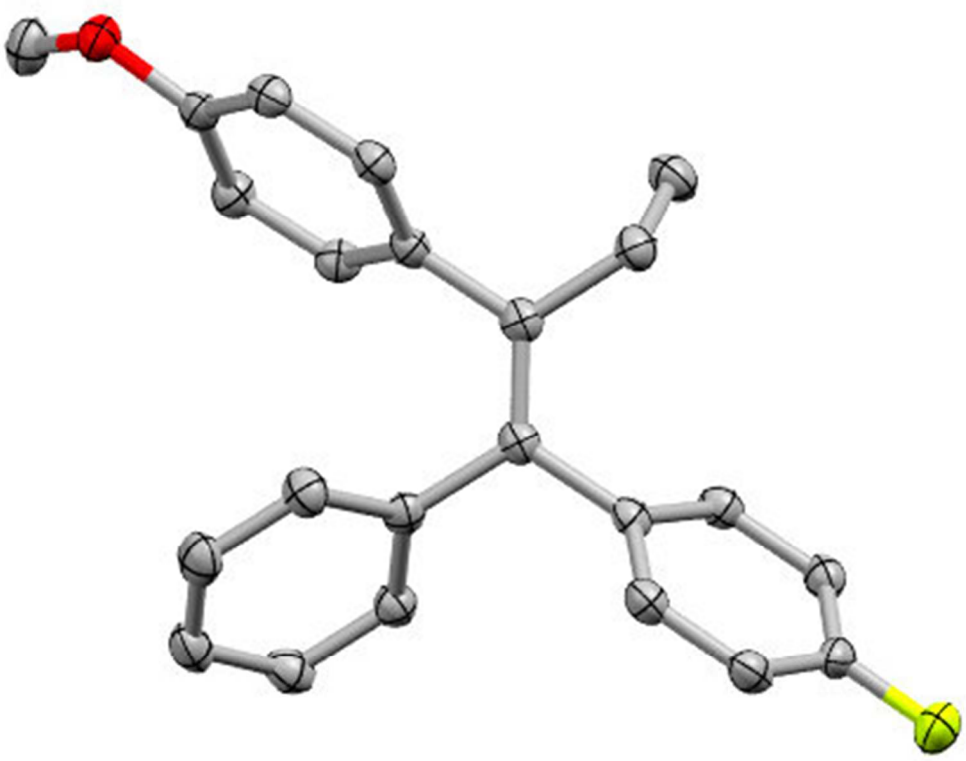
Table S163. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5i**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	22(2)	17(2)	25(2)	-5(2)	-3(1)	1(2)
C(2)	19(2)	18(2)	22(2)	-5(2)	0(1)	-2(1)
C(3)	21(2)	25(2)	30(2)	-1(2)	-4(2)	-2(2)
C(4)	21(2)	42(3)	51(3)	-15(2)	-1(2)	2(2)
C(5)	17(2)	22(2)	21(2)	-2(2)	6(1)	3(2)
C(6)	20(2)	17(2)	25(2)	2(2)	5(1)	1(1)
C(7)	19(2)	24(2)	23(2)	-4(2)	2(1)	1(1)
C(8)	21(2)	24(2)	23(2)	0(2)	5(2)	6(1)
C(9)	26(2)	21(2)	24(2)	5(2)	6(1)	2(2)
C(10)	20(2)	23(2)	29(2)	-2(2)	3(2)	-3(2)
C(11)	32(2)	37(2)	24(2)	2(2)	1(2)	6(2)
C(12)	22(2)	19(2)	20(2)	-5(2)	0(1)	-2(2)
C(13)	23(2)	16(2)	25(2)	1(2)	-3(1)	1(1)
C(14)	26(2)	20(2)	21(2)	0(2)	0(1)	-5(2)
C(15)	20(2)	28(2)	20(2)	-3(2)	-2(1)	-1(2)
C(16)	25(2)	21(2)	19(2)	0(2)	-2(1)	4(2)
C(17)	26(2)	19(2)	18(2)	1(2)	-1(1)	-1(2)
C(18)	19(2)	23(2)	25(2)	4(2)	1(1)	-1(2)
C(19)	29(2)	28(2)	32(2)	-3(2)	-3(2)	2(2)
C(20)	30(2)	27(2)	44(3)	3(2)	-6(2)	5(2)
C(21)	21(2)	36(2)	35(2)	17(2)	-3(2)	-4(2)
C(22)	22(2)	40(2)	21(2)	2(2)	2(2)	-2(2)
C(23)	20(2)	29(2)	28(2)	4(2)	5(1)	2(2)
F(1)	35(1)	52(2)	39(1)	18(1)	-8(1)	1(1)

Table S164. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5i**.

	x	y	z	U(eq)
H(3A)	7118	5578	3114	30
H(3B)	7063	7502	1909	30
H(4A)	7039	4338	247	57
H(4B)	7141	2528	1480	57
H(4C)	7483	4479	1042	57
H(6)	5915	3317	942	25
H(7)	5550	4226	-1075	26
H(9)	6187	10385	-1362	28
H(10)	6562	9465	631	29
H(11A)	5706	9421	-3172	47
H(11B)	5281	8579	-2411	47
H(11C)	5549	6742	-3319	47
H(13)	5812	1822	4690	26
H(14)	5089	1941	5192	27
H(15)	4688	5272	4581	27
H(16)	5013	8426	3446	26
H(17)	5733	8292	2923	25
H(19)	6817	1123	3651	36
H(20)	7155	-615	5563	41
H(22)	6704	4589	8050	33
H(23)	6366	6284	6139	31

(*E*)-1-fluoro-4-(2-(4-methoxyphenyl)-1-phenylbut-1-en-1-yl)benzene (5j)



Crystals were used as received. A colorless prism 0.060 x 0.050 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 32041 reflections were collected covering the indices, -6<=*h*<=6, -11<=*k*<=11, -20<=*l*<=20. 3338 reflections were found to be symmetry independent, with an R_{int} of 0.0289. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S165. Crystal data and structure refinement for olefin **5j**.

X-ray ID	gene905	
Sample/notebook ID	71452-132	
Empirical formula	C23 H21 F O	
Formula weight	332.40	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 5.5523(2) Å	α= 102.928(2)°.
	b = 9.9458(3) Å	β= 91.667(2)°.
	c = 17.2211(6) Å	γ = 100.473(2)°.
Volume	909.02(5) $Å^3$	
Z	2	
Density (calculated)	1.214 Mg/m^3	
Absorption coefficient	0.080 mm^{-1}	
F(000)	352	
Crystal size	0.060 x 0.050 x 0.040 mm^3	
Theta range for data collection	1.216 to 25.368°.	
Index ranges	-6<=h<=6, -11<=k<=11, -20<=l<=20	
Reflections collected	32041	
Independent reflections	3338 [R(int) = 0.0289]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.895	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3338 / 0 / 228	
Goodness-of-fit on F^2	1.085	
Final R indices [I>2sigma(I)]	R1 = 0.0428, wR2 = 0.1052	
R indices (all data)	R1 = 0.0533, wR2 = 0.1129	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.195 and -0.222 $e.Å^{-3}$	

Table S166. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5j**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5072(3)	4021(2)	7764(1)	21(1)
C(2)	5684(3)	5390(2)	8148(1)	22(1)
C(3)	5680(3)	5904(2)	9045(1)	26(1)
C(4)	8267(3)	6490(2)	9452(1)	33(1)
C(5)	6478(3)	6511(2)	7713(1)	22(1)
C(6)	8445(3)	6460(2)	7231(1)	25(1)
C(7)	9220(3)	7488(2)	6815(1)	25(1)
C(8)	8004(3)	8607(2)	6880(1)	23(1)
C(9)	6034(3)	8684(2)	7361(1)	25(1)
C(10)	5307(3)	7655(2)	7775(1)	24(1)
C(11)	10698(3)	9694(2)	6047(1)	34(1)
C(12)	4924(3)	3531(2)	6872(1)	22(1)
C(13)	6081(3)	2439(2)	6521(1)	25(1)
C(14)	6012(3)	1975(2)	5698(1)	30(1)
C(15)	4762(3)	2586(2)	5206(1)	32(1)
C(16)	3553(3)	3647(2)	5546(1)	33(1)
C(17)	3621(3)	4114(2)	6369(1)	28(1)
C(18)	4500(3)	2871(2)	8197(1)	22(1)
C(19)	6223(3)	2643(2)	8737(1)	24(1)
C(20)	5685(3)	1566(2)	9131(1)	26(1)
C(21)	3394(3)	717(2)	8977(1)	26(1)
C(22)	1645(3)	884(2)	8445(1)	27(1)
C(23)	2220(3)	1960(2)	8051(1)	25(1)
O(1)	8609(2)	9694(1)	6510(1)	28(1)
F(1)	2827(2)	-347(1)	9358(1)	38(1)

Table S167. Bond lengths [Å] and angles [°] for olefin **5j**.

C(1)-C(2)	1.350(2)	C(11)-H(11B)	0.9800
C(1)-C(18)	1.493(2)	C(11)-H(11C)	0.9800
C(1)-C(12)	1.498(2)	C(12)-C(13)	1.393(2)
C(2)-C(5)	1.487(2)	C(12)-C(17)	1.398(2)
C(2)-C(3)	1.515(2)	C(13)-C(14)	1.385(2)
C(3)-C(4)	1.532(2)	C(13)-H(13)	0.9500
C(3)-H(3A)	0.9900	C(14)-C(15)	1.384(2)
C(3)-H(3B)	0.9900	C(14)-H(14)	0.9500
C(4)-H(4A)	0.9800	C(15)-C(16)	1.382(3)
C(4)-H(4B)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4C)	0.9800	C(16)-C(17)	1.386(2)
C(5)-C(6)	1.393(2)	C(16)-H(16)	0.9500
C(5)-C(10)	1.396(2)	C(17)-H(17)	0.9500
C(6)-C(7)	1.388(2)	C(18)-C(23)	1.396(2)
C(6)-H(6)	0.9500	C(18)-C(19)	1.398(2)
C(7)-C(8)	1.389(2)	C(19)-C(20)	1.384(2)
C(7)-H(7)	0.9500	C(19)-H(19)	0.9500
C(8)-O(1)	1.3701(18)	C(20)-C(21)	1.375(2)
C(8)-C(9)	1.394(2)	C(20)-H(20)	0.9500
C(9)-C(10)	1.382(2)	C(21)-F(1)	1.3605(17)
C(9)-H(9)	0.9500	C(21)-C(22)	1.373(2)
C(10)-H(10)	0.9500	C(22)-C(23)	1.386(2)
C(11)-O(1)	1.426(2)	C(22)-H(22)	0.9500
C(11)-H(11A)	0.9800	C(23)-H(23)	0.9500
C(2)-C(1)-C(18)	122.43(13)	C(7)-C(8)-C(9)	119.68(14)
C(2)-C(1)-C(12)	122.98(13)	C(10)-C(9)-C(8)	120.10(14)
C(18)-C(1)-C(12)	114.59(12)	C(10)-C(9)-H(9)	120.0
C(1)-C(2)-C(5)	121.72(13)	C(8)-C(9)-H(9)	120.0
C(1)-C(2)-C(3)	123.37(14)	C(9)-C(10)-C(5)	121.40(14)
C(5)-C(2)-C(3)	114.89(13)	C(9)-C(10)-H(10)	119.3
C(2)-C(3)-C(4)	112.73(13)	C(5)-C(10)-H(10)	119.3
C(2)-C(3)-H(3A)	109.0	O(1)-C(11)-H(11A)	109.5
C(4)-C(3)-H(3A)	109.0	O(1)-C(11)-H(11B)	109.5
C(2)-C(3)-H(3B)	109.0	H(11A)-C(11)-H(11B)	109.5
C(4)-C(3)-H(3B)	109.0	O(1)-C(11)-H(11C)	109.5
H(3A)-C(3)-H(3B)	107.8	H(11A)-C(11)-H(11C)	109.5
C(3)-C(4)-H(4A)	109.5	H(11B)-C(11)-H(11C)	109.5
C(3)-C(4)-H(4B)	109.5	C(13)-C(12)-C(17)	117.85(14)
H(4A)-C(4)-H(4B)	109.5	C(13)-C(12)-C(1)	119.73(13)
C(3)-C(4)-H(4C)	109.5	C(17)-C(12)-C(1)	122.41(14)
H(4A)-C(4)-H(4C)	109.5	C(14)-C(13)-C(12)	121.16(14)
H(4B)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.4
C(6)-C(5)-C(10)	117.39(14)	C(12)-C(13)-H(13)	119.4
C(6)-C(5)-C(2)	120.91(13)	C(15)-C(14)-C(13)	120.33(15)
C(10)-C(5)-C(2)	121.69(13)	C(15)-C(14)-H(14)	119.8
C(7)-C(6)-C(5)	122.15(14)	C(13)-C(14)-H(14)	119.8
C(7)-C(6)-H(6)	118.9	C(16)-C(15)-C(14)	119.23(15)
C(5)-C(6)-H(6)	118.9	C(16)-C(15)-H(15)	120.4
C(6)-C(7)-C(8)	119.26(14)	C(14)-C(15)-H(15)	120.4
C(6)-C(7)-H(7)	120.4	C(15)-C(16)-C(17)	120.58(15)
C(8)-C(7)-H(7)	120.4	C(15)-C(16)-H(16)	119.7
O(1)-C(8)-C(7)	124.82(14)	C(17)-C(16)-H(16)	119.7
O(1)-C(8)-C(9)	115.49(13)	C(16)-C(17)-C(12)	120.81(15)

C(16)-C(17)-H(17)	119.6	F(1)-C(21)-C(22)	118.11(14)
C(12)-C(17)-H(17)	119.6	F(1)-C(21)-C(20)	119.15(14)
C(23)-C(18)-C(19)	118.04(14)	C(22)-C(21)-C(20)	122.73(14)
C(23)-C(18)-C(1)	120.11(13)	C(21)-C(22)-C(23)	118.35(14)
C(19)-C(18)-C(1)	121.82(13)	C(21)-C(22)-H(22)	120.8
C(20)-C(19)-C(18)	121.42(14)	C(23)-C(22)-H(22)	120.8
C(20)-C(19)-H(19)	119.3	C(22)-C(23)-C(18)	121.24(14)
C(18)-C(19)-H(19)	119.3	C(22)-C(23)-H(23)	119.4
C(21)-C(20)-C(19)	118.20(14)	C(18)-C(23)-H(23)	119.4
C(21)-C(20)-H(20)	120.9	C(8)-O(1)-C(11)	117.20(12)
C(19)-C(20)-H(20)	120.9		

Symmetry transformations used to generate equivalent atoms:

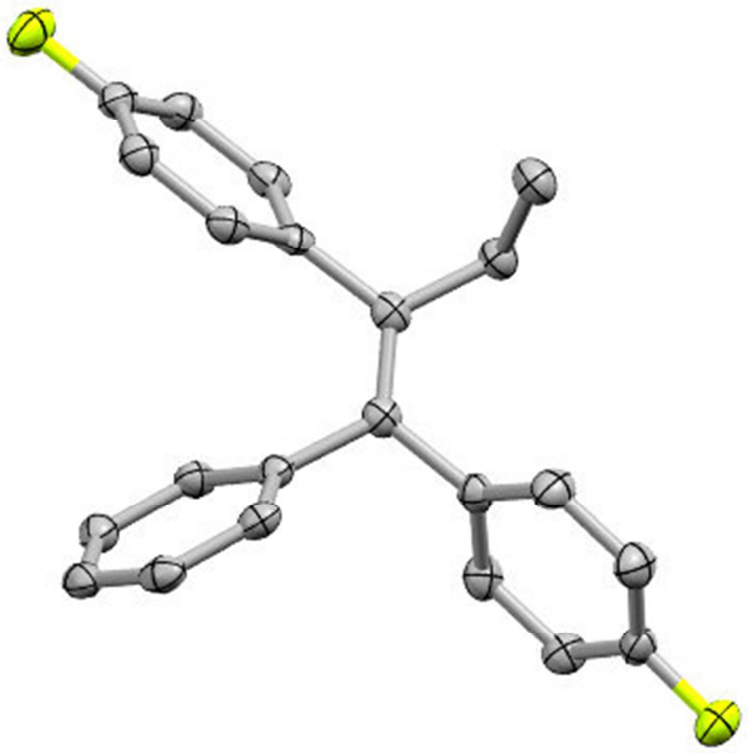
Table S168. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5j**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	17(1)	26(1)	21(1)	5(1)	2(1)	6(1)
C(2)	18(1)	26(1)	23(1)	6(1)	2(1)	6(1)
C(3)	28(1)	26(1)	24(1)	5(1)	5(1)	6(1)
C(4)	36(1)	34(1)	25(1)	2(1)	-2(1)	2(1)
C(5)	20(1)	24(1)	21(1)	3(1)	0(1)	3(1)
C(6)	23(1)	24(1)	27(1)	4(1)	2(1)	7(1)
C(7)	21(1)	30(1)	25(1)	6(1)	5(1)	5(1)
C(8)	24(1)	24(1)	20(1)	5(1)	-4(1)	0(1)
C(9)	24(1)	25(1)	24(1)	3(1)	-1(1)	7(1)
C(10)	22(1)	27(1)	21(1)	3(1)	1(1)	6(1)
C(11)	31(1)	39(1)	32(1)	16(1)	3(1)	2(1)
C(12)	19(1)	24(1)	24(1)	7(1)	2(1)	0(1)
C(13)	24(1)	26(1)	24(1)	6(1)	2(1)	4(1)
C(14)	29(1)	31(1)	26(1)	1(1)	6(1)	5(1)
C(15)	33(1)	38(1)	20(1)	4(1)	3(1)	-1(1)
C(16)	33(1)	39(1)	27(1)	11(1)	-5(1)	5(1)
C(17)	27(1)	31(1)	28(1)	7(1)	1(1)	7(1)
C(18)	23(1)	24(1)	18(1)	2(1)	4(1)	6(1)
C(19)	21(1)	26(1)	23(1)	3(1)	2(1)	4(1)
C(20)	29(1)	29(1)	21(1)	5(1)	0(1)	7(1)
C(21)	35(1)	21(1)	22(1)	6(1)	8(1)	3(1)
C(22)	26(1)	28(1)	23(1)	1(1)	4(1)	-1(1)
C(23)	24(1)	29(1)	21(1)	2(1)	1(1)	4(1)
O(1)	30(1)	27(1)	27(1)	10(1)	2(1)	3(1)
F(1)	46(1)	33(1)	33(1)	15(1)	3(1)	-2(1)

Table S169. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5j**.

	x	y	z	U(eq)
H(3A)	4894	5116	9272	31
H(3B)	4685	6648	9163	31
H(4A)	9256	5756	9343	50
H(4B)	8164	6798	10029	50
H(4C)	9036	7291	9242	50
H(6)	9285	5698	7184	29
H(7)	10567	7427	6490	30
H(9)	5189	9444	7405	30
H(10)	3983	7729	8110	28
H(11A)	12137	9668	6382	50
H(11B)	11002	10548	5842	50
H(11C)	10390	8866	5598	50
H(13)	6933	2005	6851	30
H(14)	6826	1235	5470	36
H(15)	4735	2279	4642	38
H(16)	2669	4060	5212	39
H(17)	2772	4840	6593	34
H(19)	7797	3239	8836	29
H(20)	6866	1418	9497	31
H(22)	80	278	8349	32
H(23)	1041	2080	7674	30

(*E*)-4,4'-(1-phenylbut-1-ene-1,2-diyl)bis(fluorobenzene) (5k)



Crystals were used as received. A colorless prism 0.050 x 0.040 x 0.040 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 10 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 29392 reflections were collected covering the indices, -11<=*h*<=11, -12<=*k*<=12, -21<=*l*<=21. 3090 reflections were found to be symmetry independent, with an R_{int} of 0.0383. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S170. Crystal data and structure refinement for olefin **5k**.

X-ray ID	gene918	
Sample/notebook ID	71452-131B	
Empirical formula	C22 H18 F2	
Formula weight	320.36	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 9.3346(4) Å	α= 90°.
	b = 10.3434(4) Å	β= 99.825(2)°.
	c = 17.6498(7) Å	γ = 90°.
Volume	1679.12(12) $Å^3$	
Z	4	
Density (calculated)	1.267 Mg/m^3	
Absorption coefficient	0.087 mm^{-1}	
F(000)	672	
Crystal size	0.050 x 0.040 x 0.040 mm^3	
Theta range for data collection	2.214 to 25.375°.	
Index ranges	-11<=h<=11, -12<=k<=12, -21<=l<=21	
Reflections collected	29392	
Independent reflections	3090 [R(int) = 0.0383]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.745 and 0.699	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3090 / 0 / 218	
Goodness-of-fit on F^2	1.063	
Final R indices [I>2sigma(I)]	R1 = 0.0426, wR2 = 0.1027	
R indices (all data)	R1 = 0.0580, wR2 = 0.1125	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.238 and -0.221 $e.Å^{-3}$	

Table S171. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5k**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6204(2)	4022(2)	3520(1)	23(1)
C(2)	5876(2)	3454(2)	4154(1)	23(1)
C(3)	6933(2)	3380(2)	4907(1)	26(1)
C(4)	7527(2)	2005(2)	5071(1)	31(1)
C(5)	4441(2)	2803(2)	4151(1)	23(1)
C(6)	3952(2)	1816(2)	3631(1)	25(1)
C(7)	2638(2)	1190(2)	3641(1)	27(1)
C(8)	1816(2)	1570(2)	4177(1)	27(1)
C(9)	2241(2)	2536(2)	4701(1)	28(1)
C(10)	3563(2)	3146(2)	4689(1)	25(1)
C(11)	5153(2)	4130(2)	2779(1)	22(1)
C(12)	5518(2)	3617(2)	2105(1)	26(1)
C(13)	4577(2)	3749(2)	1409(1)	28(1)
C(14)	3279(2)	4402(2)	1378(1)	29(1)
C(15)	2915(2)	4937(2)	2037(1)	28(1)
C(16)	3852(2)	4798(2)	2733(1)	25(1)
C(17)	7629(2)	4664(2)	3485(1)	23(1)
C(18)	8914(2)	3981(2)	3483(1)	31(1)
C(19)	10190(2)	4616(2)	3399(1)	33(1)
C(20)	10155(2)	5934(2)	3316(1)	25(1)
C(21)	8918(2)	6650(2)	3318(1)	27(1)
C(22)	7654(2)	6001(2)	3395(1)	27(1)
F(1)	523(1)	959(1)	4186(1)	39(1)
F(2)	11396(1)	6567(1)	3225(1)	34(1)

Table S172. Bond lengths [Å] and angles [°] for olefin **5k**.

C(1)-C(2)	1.344(2)	C(11)-C(16)	1.388(2)
C(1)-C(17)	1.497(2)	C(11)-C(12)	1.397(2)
C(1)-C(11)	1.499(2)	C(12)-C(13)	1.389(2)
C(2)-C(5)	1.499(2)	C(12)-H(12)	0.9500
C(2)-C(3)	1.516(2)	C(13)-C(14)	1.380(2)
C(3)-C(4)	1.536(2)	C(13)-H(13)	0.9500
C(3)-H(3A)	0.9900	C(14)-C(15)	1.382(2)
C(3)-H(3B)	0.9900	C(14)-H(14)	0.9500
C(4)-H(4A)	0.9800	C(15)-C(16)	1.389(2)
C(4)-H(4B)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4C)	0.9800	C(16)-H(16)	0.9500
C(5)-C(6)	1.396(2)	C(17)-C(22)	1.392(2)
C(5)-C(10)	1.402(2)	C(17)-C(18)	1.393(2)
C(6)-C(7)	1.391(2)	C(18)-C(19)	1.390(2)
C(6)-H(6)	0.9500	C(18)-H(18)	0.9500
C(7)-C(8)	1.373(2)	C(19)-C(20)	1.371(2)
C(7)-H(7)	0.9500	C(19)-H(19)	0.9500
C(8)-F(1)	1.3647(19)	C(20)-F(2)	1.3644(18)
C(8)-C(9)	1.374(2)	C(20)-C(21)	1.372(2)
C(9)-C(10)	1.389(2)	C(21)-C(22)	1.384(2)
C(9)-H(9)	0.9500	C(21)-H(21)	0.9500
C(10)-H(10)	0.9500	C(22)-H(22)	0.9500
C(2)-C(1)-C(17)	123.95(14)	C(8)-C(9)-H(9)	120.8
C(2)-C(1)-C(11)	123.37(14)	C(10)-C(9)-H(9)	120.8
C(17)-C(1)-C(11)	112.63(13)	C(9)-C(10)-C(5)	121.29(16)
C(1)-C(2)-C(5)	121.62(14)	C(9)-C(10)-H(10)	119.4
C(1)-C(2)-C(3)	123.05(15)	C(5)-C(10)-H(10)	119.4
C(5)-C(2)-C(3)	115.29(13)	C(16)-C(11)-C(12)	118.50(15)
C(2)-C(3)-C(4)	111.84(14)	C(16)-C(11)-C(1)	121.58(14)
C(2)-C(3)-H(3A)	109.2	C(12)-C(11)-C(1)	119.80(14)
C(4)-C(3)-H(3A)	109.2	C(13)-C(12)-C(11)	120.47(15)
C(2)-C(3)-H(3B)	109.2	C(13)-C(12)-H(12)	119.8
C(4)-C(3)-H(3B)	109.2	C(11)-C(12)-H(12)	119.8
H(3A)-C(3)-H(3B)	107.9	C(14)-C(13)-C(12)	120.10(15)
C(3)-C(4)-H(4A)	109.5	C(14)-C(13)-H(13)	119.9
C(3)-C(4)-H(4B)	109.5	C(12)-C(13)-H(13)	119.9
H(4A)-C(4)-H(4B)	109.5	C(13)-C(14)-C(15)	120.17(16)
C(3)-C(4)-H(4C)	109.5	C(13)-C(14)-H(14)	119.9
H(4A)-C(4)-H(4C)	109.5	C(15)-C(14)-H(14)	119.9
H(4B)-C(4)-H(4C)	109.5	C(14)-C(15)-C(16)	119.70(16)
C(6)-C(5)-C(10)	117.85(15)	C(14)-C(15)-H(15)	120.2
C(6)-C(5)-C(2)	121.49(14)	C(16)-C(15)-H(15)	120.2
C(10)-C(5)-C(2)	120.63(15)	C(11)-C(16)-C(15)	121.05(15)
C(7)-C(6)-C(5)	121.50(15)	C(11)-C(16)-H(16)	119.5
C(7)-C(6)-H(6)	119.3	C(15)-C(16)-H(16)	119.5
C(5)-C(6)-H(6)	119.3	C(22)-C(17)-C(18)	118.17(15)
C(8)-C(7)-C(6)	118.26(16)	C(22)-C(17)-C(1)	118.53(14)
C(8)-C(7)-H(7)	120.9	C(18)-C(17)-C(1)	123.14(15)
C(6)-C(7)-H(7)	120.9	C(19)-C(18)-C(17)	120.98(16)
F(1)-C(8)-C(7)	118.39(15)	C(19)-C(18)-H(18)	119.5
F(1)-C(8)-C(9)	118.85(14)	C(17)-C(18)-H(18)	119.5
C(7)-C(8)-C(9)	122.76(16)	C(20)-C(19)-C(18)	118.42(16)
C(8)-C(9)-C(10)	118.34(15)	C(20)-C(19)-H(19)	120.8

C(18)-C(19)-H(19)	120.8	C(20)-C(21)-H(21)	121.0
F(2)-C(20)-C(19)	118.98(15)	C(22)-C(21)-H(21)	121.0
F(2)-C(20)-C(21)	118.27(15)	C(21)-C(22)-C(17)	121.63(15)
C(19)-C(20)-C(21)	122.75(16)	C(21)-C(22)-H(22)	119.2
C(20)-C(21)-C(22)	118.04(15)	C(17)-C(22)-H(22)	119.2

Symmetry transformations used to generate equivalent atoms:

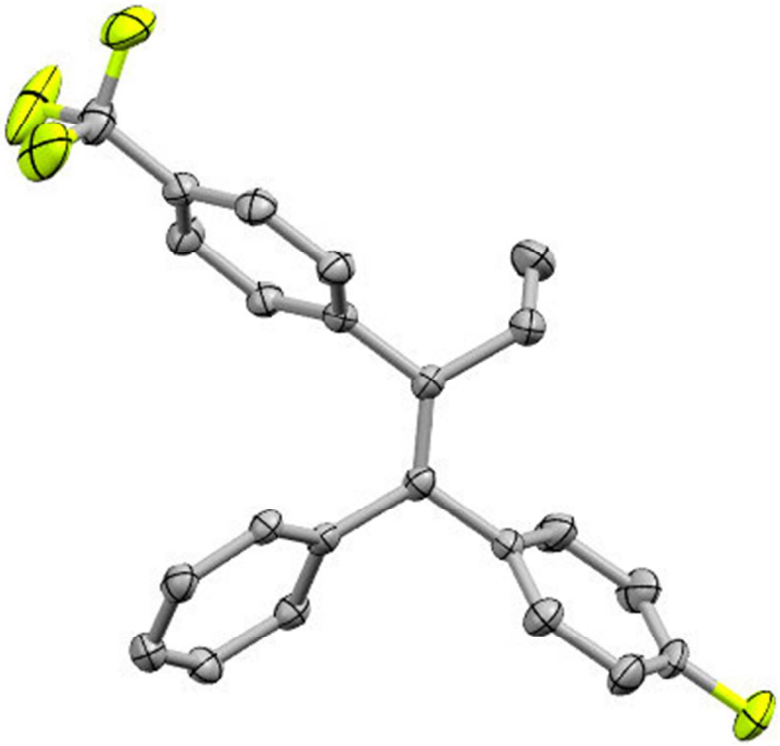
Table S173. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5k**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	23(1)	20(1)	25(1)	-2(1)	5(1)	4(1)
C(2)	25(1)	20(1)	25(1)	-1(1)	5(1)	6(1)
C(3)	27(1)	25(1)	24(1)	-1(1)	3(1)	1(1)
C(4)	33(1)	31(1)	28(1)	1(1)	2(1)	5(1)
C(5)	27(1)	20(1)	23(1)	6(1)	5(1)	6(1)
C(6)	26(1)	24(1)	25(1)	3(1)	8(1)	5(1)
C(7)	26(1)	25(1)	29(1)	1(1)	4(1)	4(1)
C(8)	22(1)	27(1)	32(1)	8(1)	6(1)	3(1)
C(9)	26(1)	32(1)	27(1)	5(1)	11(1)	8(1)
C(10)	29(1)	25(1)	21(1)	4(1)	4(1)	7(1)
C(11)	21(1)	20(1)	26(1)	2(1)	5(1)	-3(1)
C(12)	26(1)	22(1)	31(1)	-1(1)	10(1)	-4(1)
C(13)	36(1)	24(1)	25(1)	-3(1)	8(1)	-9(1)
C(14)	34(1)	26(1)	26(1)	5(1)	1(1)	-9(1)
C(15)	24(1)	26(1)	34(1)	6(1)	4(1)	-1(1)
C(16)	25(1)	26(1)	25(1)	2(1)	8(1)	-1(1)
C(17)	22(1)	26(1)	21(1)	-2(1)	3(1)	1(1)
C(18)	28(1)	24(1)	42(1)	7(1)	7(1)	4(1)
C(19)	23(1)	32(1)	44(1)	6(1)	7(1)	7(1)
C(20)	21(1)	30(1)	23(1)	-1(1)	5(1)	-3(1)
C(21)	30(1)	22(1)	31(1)	-3(1)	7(1)	1(1)
C(22)	24(1)	26(1)	31(1)	-3(1)	4(1)	5(1)
F(1)	26(1)	40(1)	53(1)	3(1)	14(1)	-2(1)
F(2)	27(1)	34(1)	42(1)	-1(1)	9(1)	-5(1)

Table S174. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5k**.

	x	y	z	U(eq)
H(3A)	6435	3660	5331	31
H(3B)	7753	3979	4888	31
H(4A)	6714	1400	5054	47
H(4B)	8134	1978	5582	47
H(4C)	8111	1760	4682	47
H(6)	4530	1568	3262	30
H(7)	2317	516	3287	32
H(9)	1645	2782	5063	33
H(10)	3878	3808	5052	30
H(12)	6415	3175	2122	31
H(13)	4828	3390	954	34
H(14)	2634	4484	902	35
H(15)	2028	5397	2014	34
H(16)	3598	5166	3186	30
H(18)	8919	3068	3541	38
H(19)	11065	4147	3397	39
H(21)	8929	7564	3267	33
H(22)	6783	6479	3386	32

(*E*)-1-fluoro-4-(1-phenyl-2-(4-(trifluoromethyl)phenyl)but-1-en-1-yl)benzene (5l)



Crystals were used as received. A colorless prism 0.050 x 0.040 x 0.030 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 5 seconds per frame using a scan width of 2.0°. Data collection was 98.5% complete to 25.000° in θ. A total of 17470 reflections were collected covering the indices, -11<=*h*<=8, -11<=*k*<=10, -18<=*l*<=24. 3342 reflections were found to be symmetry independent, with an R_{int} of 0.0431. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S175. Crystal data and structure refinement for olefin **5l**.

X-ray ID	gene915	
Sample/notebook ID	71452-148	
Empirical formula	C23 H18 F4	
Formula weight	370.37	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 9.7278(14) Å	α= 90°.
	b = 9.3897(14) Å	β= 97.634(5)°.
	c = 20.371(3) Å	γ = 90°.
Volume	1844.2(5) $Å^3$	
Z	4	
Density (calculated)	1.334 Mg/m^3	
Absorption coefficient	0.104 mm^{-1}	
F(000)	768	
Crystal size	0.050 x 0.040 x 0.030 mm^3	
Theta range for data collection	2.017 to 25.423°.	
Index ranges	-11<=h<=8, -11<=k<=10, -18<=l<=24	
Reflections collected	17470	
Independent reflections	3342 [R(int) = 0.0431]	
Completeness to theta = 25.000°	98.5 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.927 and 0.867	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3342 / 0 / 245	
Goodness-of-fit on F^2	1.050	
Final R indices [I>2sigma(I)]	R1 = 0.0602, wR2 = 0.1503	
R indices (all data)	R1 = 0.0884, wR2 = 0.1698	
Extinction coefficient	n/a	
Largest diff. peak and hole	1.006 and -0.586 $e.Å^{-3}$	

Table S176. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5l**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	3557(3)	5725(3)	6884(1)	21(1)
C(2)	2291(3)	5496(3)	7062(1)	22(1)
C(3)	954(3)	5760(3)	6609(1)	33(1)
C(4)	222(3)	4378(4)	6370(2)	46(1)
C(5)	2083(2)	4931(3)	7729(1)	23(1)
C(6)	2474(3)	3561(3)	7919(1)	25(1)
C(7)	2236(3)	3038(3)	8530(1)	28(1)
C(8)	1614(3)	3894(3)	8959(1)	25(1)
C(9)	1230(3)	5276(3)	8777(1)	28(1)
C(10)	1442(3)	5777(3)	8163(1)	27(1)
C(11)	1356(3)	3362(3)	9616(1)	36(1)
C(12)	4875(3)	5584(3)	7346(1)	21(1)
C(13)	6021(3)	4888(3)	7144(1)	25(1)
C(14)	7255(3)	4777(3)	7561(1)	29(1)
C(15)	7396(3)	5385(3)	8185(1)	32(1)
C(16)	6283(3)	6103(3)	8388(1)	28(1)
C(17)	5037(3)	6198(3)	7975(1)	22(1)
C(18)	3722(2)	6219(3)	6202(1)	22(1)
C(19)	3348(3)	5369(3)	5651(1)	34(1)
C(20)	3485(3)	5859(4)	5022(1)	40(1)
C(21)	3996(3)	7200(3)	4959(1)	35(1)
C(22)	4401(3)	8060(3)	5486(1)	36(1)
C(23)	4262(3)	7558(3)	6115(1)	29(1)
F(1)	1987(2)	4110(3)	10112(1)	73(1)
F(2)	1682(3)	1993(2)	9714(1)	85(1)
F(3)	11(2)	3408(2)	9696(1)	54(1)
F(4)	4130(2)	7680(2)	4340(1)	55(1)

Table S177. Bond lengths [Å] and angles [°] for olefin **5l**.

C(1)-C(2)	1.346(3)	C(11)-F(3)	1.340(3)
C(1)-C(12)	1.491(4)	C(12)-C(17)	1.395(3)
C(1)-C(18)	1.494(3)	C(12)-C(13)	1.401(3)
C(2)-C(5)	1.499(3)	C(13)-C(14)	1.379(4)
C(2)-C(3)	1.511(4)	C(13)-H(13)	0.9500
C(3)-C(4)	1.529(4)	C(14)-C(15)	1.384(4)
C(3)-H(3A)	0.9900	C(14)-H(14)	0.9500
C(3)-H(3B)	0.9900	C(15)-C(16)	1.384(4)
C(4)-H(4A)	0.9800	C(15)-H(15)	0.9500
C(4)-H(4B)	0.9800	C(16)-C(17)	1.383(4)
C(4)-H(4C)	0.9800	C(16)-H(16)	0.9500
C(5)-C(6)	1.382(4)	C(17)-H(17)	0.9500
C(5)-C(10)	1.395(3)	C(18)-C(23)	1.383(4)
C(6)-C(7)	1.386(4)	C(18)-C(19)	1.387(4)
C(6)-H(6)	0.9500	C(19)-C(20)	1.384(4)
C(7)-C(8)	1.383(4)	C(19)-H(19)	0.9500
C(7)-H(7)	0.9500	C(20)-C(21)	1.366(4)
C(8)-C(9)	1.387(4)	C(20)-H(20)	0.9500
C(8)-C(11)	1.482(4)	C(21)-C(22)	1.360(4)
C(9)-C(10)	1.377(4)	C(21)-F(4)	1.363(3)
C(9)-H(9)	0.9500	C(22)-C(23)	1.389(4)
C(10)-H(10)	0.9500	C(22)-H(22)	0.9500
C(11)-F(1)	1.312(4)	C(23)-H(23)	0.9500
C(11)-F(2)	1.332(3)		

C(2)-C(1)-C(12)	123.9(2)	C(9)-C(8)-C(11)	119.0(2)
C(2)-C(1)-C(18)	121.0(2)	C(10)-C(9)-C(8)	119.7(2)
C(12)-C(1)-C(18)	115.1(2)	C(10)-C(9)-H(9)	120.2
C(1)-C(2)-C(5)	122.6(2)	C(8)-C(9)-H(9)	120.2
C(1)-C(2)-C(3)	123.7(2)	C(9)-C(10)-C(5)	120.9(2)
C(5)-C(2)-C(3)	113.8(2)	C(9)-C(10)-H(10)	119.5
C(2)-C(3)-C(4)	112.4(2)	C(5)-C(10)-H(10)	119.5
C(2)-C(3)-H(3A)	109.1	F(1)-C(11)-F(2)	108.9(3)
C(4)-C(3)-H(3A)	109.1	F(1)-C(11)-F(3)	104.7(2)
C(2)-C(3)-H(3B)	109.1	F(2)-C(11)-F(3)	103.3(3)
C(4)-C(3)-H(3B)	109.1	F(1)-C(11)-C(8)	113.3(3)
H(3A)-C(3)-H(3B)	107.8	F(2)-C(11)-C(8)	113.3(2)
C(3)-C(4)-H(4A)	109.5	F(3)-C(11)-C(8)	112.5(2)
C(3)-C(4)-H(4B)	109.5	C(17)-C(12)-C(13)	117.7(2)
H(4A)-C(4)-H(4B)	109.5	C(17)-C(12)-C(1)	121.7(2)
C(3)-C(4)-H(4C)	109.5	C(13)-C(12)-C(1)	120.5(2)
H(4A)-C(4)-H(4C)	109.5	C(14)-C(13)-C(12)	121.1(2)
H(4B)-C(4)-H(4C)	109.5	C(14)-C(13)-H(13)	119.5
C(6)-C(5)-C(10)	118.8(2)	C(12)-C(13)-H(13)	119.5
C(6)-C(5)-C(2)	121.2(2)	C(13)-C(14)-C(15)	120.4(2)
C(10)-C(5)-C(2)	119.9(2)	C(13)-C(14)-H(14)	119.8
C(5)-C(6)-C(7)	120.6(2)	C(15)-C(14)-H(14)	119.8
C(5)-C(6)-H(6)	119.7	C(16)-C(15)-C(14)	119.3(3)
C(7)-C(6)-H(6)	119.7	C(16)-C(15)-H(15)	120.4
C(8)-C(7)-C(6)	120.0(2)	C(14)-C(15)-H(15)	120.4
C(8)-C(7)-H(7)	120.0	C(17)-C(16)-C(15)	120.5(2)
C(6)-C(7)-H(7)	120.0	C(17)-C(16)-H(16)	119.8
C(7)-C(8)-C(9)	120.0(2)	C(15)-C(16)-H(16)	119.8
C(7)-C(8)-C(11)	121.0(2)	C(16)-C(17)-C(12)	121.0(2)

C(16)-C(17)-H(17)	119.5	C(19)-C(20)-H(20)	120.8
C(12)-C(17)-H(17)	119.5	C(22)-C(21)-F(4)	118.8(3)
C(23)-C(18)-C(19)	118.9(2)	C(22)-C(21)-C(20)	123.0(2)
C(23)-C(18)-C(1)	119.4(2)	F(4)-C(21)-C(20)	118.2(3)
C(19)-C(18)-C(1)	121.7(2)	C(21)-C(22)-C(23)	118.3(3)
C(20)-C(19)-C(18)	120.7(3)	C(21)-C(22)-H(22)	120.8
C(20)-C(19)-H(19)	119.6	C(23)-C(22)-H(22)	120.8
C(18)-C(19)-H(19)	119.6	C(18)-C(23)-C(22)	120.8(3)
C(21)-C(20)-C(19)	118.3(3)	C(18)-C(23)-H(23)	119.6
C(21)-C(20)-H(20)	120.8	C(22)-C(23)-H(23)	119.6

Symmetry transformations used to generate equivalent atoms:

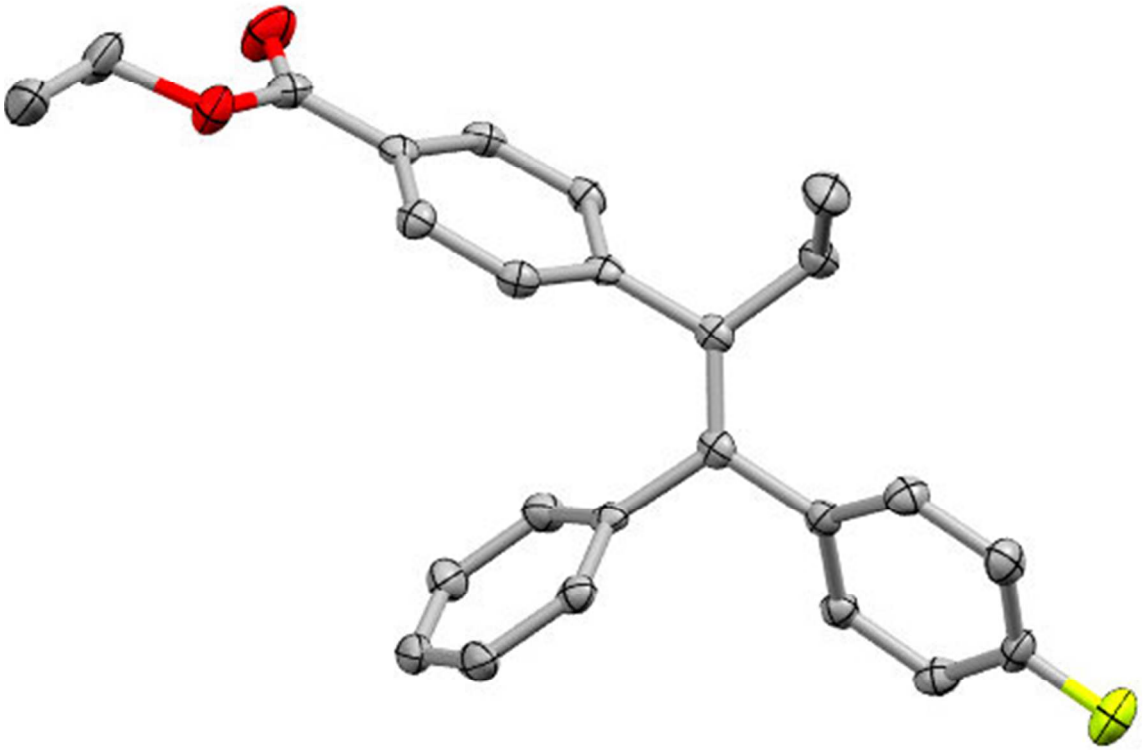
Table S178. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5l**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	25(1)	19(1)	18(1)	-1(1)	4(1)	-3(1)
C(2)	25(1)	22(1)	20(1)	3(1)	4(1)	0(1)
C(3)	24(2)	46(2)	28(1)	10(1)	3(1)	-1(1)
C(4)	31(2)	66(2)	40(2)	7(2)	-4(1)	-13(2)
C(5)	18(1)	26(1)	23(1)	1(1)	3(1)	-1(1)
C(6)	25(1)	29(2)	21(1)	-1(1)	6(1)	2(1)
C(7)	33(2)	27(2)	26(1)	4(1)	7(1)	4(1)
C(8)	23(1)	31(2)	23(1)	2(1)	5(1)	0(1)
C(9)	27(2)	32(2)	27(1)	-1(1)	10(1)	3(1)
C(10)	26(2)	26(2)	32(1)	4(1)	9(1)	4(1)
C(11)	45(2)	39(2)	25(1)	4(1)	10(1)	10(1)
C(12)	23(1)	19(1)	21(1)	3(1)	5(1)	-2(1)
C(13)	28(2)	25(1)	22(1)	1(1)	8(1)	0(1)
C(14)	23(2)	30(2)	35(2)	5(1)	7(1)	7(1)
C(15)	25(2)	40(2)	30(2)	8(1)	1(1)	2(1)
C(16)	32(2)	33(2)	19(1)	1(1)	2(1)	-5(1)
C(17)	26(1)	22(1)	19(1)	1(1)	6(1)	0(1)
C(18)	18(1)	28(1)	20(1)	3(1)	2(1)	1(1)
C(19)	37(2)	41(2)	24(1)	0(1)	6(1)	-11(1)
C(20)	41(2)	61(2)	18(1)	-3(1)	2(1)	-14(2)
C(21)	31(2)	57(2)	18(1)	15(1)	5(1)	4(1)
C(22)	41(2)	35(2)	35(2)	14(1)	11(1)	1(1)
C(23)	34(2)	30(2)	23(1)	2(1)	8(1)	-1(1)
F(1)	82(2)	112(2)	20(1)	5(1)	-6(1)	-36(1)
F(2)	145(2)	67(2)	54(1)	36(1)	55(1)	53(2)
F(3)	51(1)	80(2)	36(1)	6(1)	21(1)	-12(1)
F(4)	57(1)	82(2)	26(1)	24(1)	12(1)	2(1)

Table S179. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5l**.

	x	y	z	U(eq)
H(3A)	1157	6318	6221	39
H(3B)	325	6334	6848	39
H(4A)	772	3880	6071	70
H(4B)	-697	4599	6133	70
H(4C)	122	3769	6751	70
H(6)	2909	2972	7629	30
H(7)	2499	2092	8655	34
H(9)	823	5874	9074	34
H(10)	1147	6711	8033	33
H(13)	5947	4485	6713	30
H(14)	8013	4281	7418	35
H(15)	8247	5310	8472	38
H(16)	6376	6534	8813	34
H(17)	4280	6688	8122	26
H(19)	2994	4439	5705	40
H(20)	3230	5278	4644	48
H(22)	4769	8981	5426	44
H(23)	4541	8142	6491	34

ethyl (*E*)-4-(1-(4-fluorophenyl)-1-phenylbut-1-en-2-yl)benzoate (5m)



X-ray quality crystals were used as received. A colorless block 0.330 x 0.300 x 0.280 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 15 seconds per frame using a scan width of 1.0°. Data collection was 99.9% complete to 25.000° in θ. A total of 14580 reflections were collected covering the indices, -12<=*h*<=9, -20<=*k*<=13, -26<=*l*<=25. 3597 reflections were found to be symmetry independent, with an R_{int} of 0.0674. Indexing and unit cell refinement indicated a primitive, orthorhombic lattice. The space group was found to be P b c a (No. 61). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S180. Crystal data and structure refinement for olefin **5m**.

X-ray ID	gene959	
Sample/notebook ID	71452-149	
Empirical formula	C25 H23 F O2	
Formula weight	374.43	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Orthorhombic	
Space group	P b c a	
Unit cell dimensions	a = 10.6254(10) Å	α= 90°.
	b = 17.428(2) Å	β= 90°.
	c = 21.959(2) Å	γ = 90°.
Volume	4066.4(8) $Å^3$	
Z	8	
Density (calculated)	1.223 Mg/m^3	
Absorption coefficient	0.082 mm^{-1}	
F(000)	1584	
Crystal size	0.330 x 0.300 x 0.280 mm^3	
Theta range for data collection	1.855 to 25.027°.	
Index ranges	-12<=h<=9, -20<=k<=13, -26<=l<=25	
Reflections collected	14580	
Independent reflections	3597 [R(int) = 0.0674]	
Completeness to theta = 25.000°	99.9 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.746 and 0.645	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3597 / 0 / 255	
Goodness-of-fit on F^2	1.014	
Final R indices [I>2sigma(I)]	R1 = 0.0493, wR2 = 0.1142	
R indices (all data)	R1 = 0.1000, wR2 = 0.1493	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.336 and -0.229 $e.Å^{-3}$	

Table S181. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5m**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	5910(2)	6474(1)	5557(1)	19(1)
C(2)	6505(2)	5806(1)	5434(1)	19(1)
C(3)	6586(2)	5129(2)	5867(1)	25(1)
C(4)	7912(3)	5007(2)	6118(1)	36(1)
C(5)	7138(2)	5675(1)	4833(1)	18(1)
C(6)	8137(2)	6130(1)	4640(1)	20(1)
C(7)	8715(2)	6004(2)	4081(1)	22(1)
C(8)	8285(2)	5421(1)	3702(1)	20(1)
C(9)	7292(2)	4958(1)	3890(1)	22(1)
C(10)	6738(2)	5078(1)	4453(1)	21(1)
C(11)	8805(2)	5292(2)	3083(1)	26(1)
C(12)	10278(3)	5723(2)	2345(1)	41(1)
C(13)	11174(3)	6376(2)	2276(1)	51(1)
C(14)	5812(2)	7102(1)	5095(1)	19(1)
C(15)	6301(2)	7826(2)	5220(1)	23(1)
C(16)	6208(2)	8423(2)	4800(1)	30(1)
C(17)	5591(3)	8305(2)	4252(1)	31(1)
C(18)	5071(2)	7597(2)	4126(1)	30(1)
C(19)	5183(2)	6999(2)	4541(1)	26(1)
C(20)	5259(2)	6640(1)	6146(1)	20(1)
C(21)	5801(2)	6496(2)	6713(1)	24(1)
C(22)	5162(2)	6657(2)	7248(1)	27(1)
C(23)	3981(2)	6966(2)	7211(1)	25(1)
C(24)	3405(2)	7125(2)	6668(1)	25(1)
C(25)	4054(2)	6963(1)	6134(1)	21(1)
O(1)	8421(2)	4818(1)	2727(1)	41(1)
O(2)	9742(2)	5785(1)	2953(1)	31(1)
F(1)	3369(1)	7141(1)	7738(1)	39(1)

Table S182. Bond lengths [Å] and angles [°] for olefin **5m**.

C(1)-C(2)	1.352(3)	C(12)-H(12B)	0.9900
C(1)-C(20)	1.495(3)	C(13)-H(13A)	0.9800
C(1)-C(14)	1.495(3)	C(13)-H(13B)	0.9800
C(2)-C(5)	1.501(3)	C(13)-H(13C)	0.9800
C(2)-C(3)	1.517(3)	C(14)-C(15)	1.392(3)
C(3)-C(4)	1.528(3)	C(14)-C(19)	1.400(3)
C(3)-H(3A)	0.9900	C(15)-C(16)	1.394(4)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-H(4A)	0.9800	C(16)-C(17)	1.385(4)
C(4)-H(4B)	0.9800	C(16)-H(16)	0.9500
C(4)-H(4C)	0.9800	C(17)-C(18)	1.381(4)
C(5)-C(6)	1.391(3)	C(17)-H(17)	0.9500
C(5)-C(10)	1.399(3)	C(18)-C(19)	1.388(4)
C(6)-C(7)	1.390(3)	C(18)-H(18)	0.9500
C(6)-H(6)	0.9500	C(19)-H(19)	0.9500
C(7)-C(8)	1.391(3)	C(20)-C(21)	1.395(3)
C(7)-H(7)	0.9500	C(20)-C(25)	1.398(3)
C(8)-C(9)	1.391(3)	C(21)-C(22)	1.386(4)
C(8)-C(11)	1.484(4)	C(21)-H(21)	0.9500
C(9)-C(10)	1.384(3)	C(22)-C(23)	1.368(4)
C(9)-H(9)	0.9500	C(22)-H(22)	0.9500
C(10)-H(10)	0.9500	C(23)-F(1)	1.363(3)
C(11)-O(1)	1.208(3)	C(23)-C(24)	1.368(3)
C(11)-O(2)	1.345(3)	C(24)-C(25)	1.390(3)
C(12)-O(2)	1.455(3)	C(24)-H(24)	0.9500
C(12)-C(13)	1.491(4)	C(25)-H(25)	0.9500
C(12)-H(12A)	0.9900		

C(2)-C(1)-C(20)	123.7(2)	C(8)-C(7)-H(7)	120.0
C(2)-C(1)-C(14)	121.8(2)	C(9)-C(8)-C(7)	119.6(2)
C(20)-C(1)-C(14)	114.4(2)	C(9)-C(8)-C(11)	117.9(2)
C(1)-C(2)-C(5)	121.1(2)	C(7)-C(8)-C(11)	122.5(2)
C(1)-C(2)-C(3)	124.9(2)	C(10)-C(9)-C(8)	120.1(2)
C(5)-C(2)-C(3)	114.0(2)	C(10)-C(9)-H(9)	120.0
C(2)-C(3)-C(4)	112.8(2)	C(8)-C(9)-H(9)	120.0
C(2)-C(3)-H(3A)	109.0	C(9)-C(10)-C(5)	121.0(2)
C(4)-C(3)-H(3A)	109.0	C(9)-C(10)-H(10)	119.5
C(2)-C(3)-H(3B)	109.0	C(5)-C(10)-H(10)	119.5
C(4)-C(3)-H(3B)	109.0	O(1)-C(11)-O(2)	123.4(2)
H(3A)-C(3)-H(3B)	107.8	O(1)-C(11)-C(8)	124.7(2)
C(3)-C(4)-H(4A)	109.5	O(2)-C(11)-C(8)	111.9(2)
C(3)-C(4)-H(4B)	109.5	O(2)-C(12)-C(13)	106.7(2)
H(4A)-C(4)-H(4B)	109.5	O(2)-C(12)-H(12A)	110.4
C(3)-C(4)-H(4C)	109.5	C(13)-C(12)-H(12A)	110.4
H(4A)-C(4)-H(4C)	109.5	O(2)-C(12)-H(12B)	110.4
H(4B)-C(4)-H(4C)	109.5	C(13)-C(12)-H(12B)	110.4
C(6)-C(5)-C(10)	118.3(2)	H(12A)-C(12)-H(12B)	108.6
C(6)-C(5)-C(2)	121.5(2)	C(12)-C(13)-H(13A)	109.5
C(10)-C(5)-C(2)	120.2(2)	C(12)-C(13)-H(13B)	109.5
C(7)-C(6)-C(5)	120.9(2)	H(13A)-C(13)-H(13B)	109.5
C(7)-C(6)-H(6)	119.5	C(12)-C(13)-H(13C)	109.5
C(5)-C(6)-H(6)	119.5	H(13A)-C(13)-H(13C)	109.5
C(6)-C(7)-C(8)	120.0(2)	H(13B)-C(13)-H(13C)	109.5
C(6)-C(7)-H(7)	120.0	C(15)-C(14)-C(19)	117.7(2)

C(15)-C(14)-C(1)	120.2(2)	C(21)-C(20)-C(1)	123.1(2)
C(19)-C(14)-C(1)	122.0(2)	C(25)-C(20)-C(1)	119.0(2)
C(14)-C(15)-C(16)	121.3(2)	C(22)-C(21)-C(20)	121.2(2)
C(14)-C(15)-H(15)	119.4	C(22)-C(21)-H(21)	119.4
C(16)-C(15)-H(15)	119.4	C(20)-C(21)-H(21)	119.4
C(17)-C(16)-C(15)	119.9(3)	C(23)-C(22)-C(21)	118.6(2)
C(17)-C(16)-H(16)	120.1	C(23)-C(22)-H(22)	120.7
C(15)-C(16)-H(16)	120.1	C(21)-C(22)-H(22)	120.7
C(18)-C(17)-C(16)	119.7(3)	F(1)-C(23)-C(22)	118.4(2)
C(18)-C(17)-H(17)	120.1	F(1)-C(23)-C(24)	118.8(2)
C(16)-C(17)-H(17)	120.1	C(22)-C(23)-C(24)	122.9(2)
C(17)-C(18)-C(19)	120.3(3)	C(23)-C(24)-C(25)	118.1(2)
C(17)-C(18)-H(18)	119.8	C(23)-C(24)-H(24)	120.9
C(19)-C(18)-H(18)	119.8	C(25)-C(24)-H(24)	120.9
C(18)-C(19)-C(14)	121.0(3)	C(24)-C(25)-C(20)	121.3(2)
C(18)-C(19)-H(19)	119.5	C(24)-C(25)-H(25)	119.3
C(14)-C(19)-H(19)	119.5	C(20)-C(25)-H(25)	119.3
C(21)-C(20)-C(25)	117.8(2)	C(11)-O(2)-C(12)	115.9(2)

Symmetry transformations used to generate equivalent atoms:

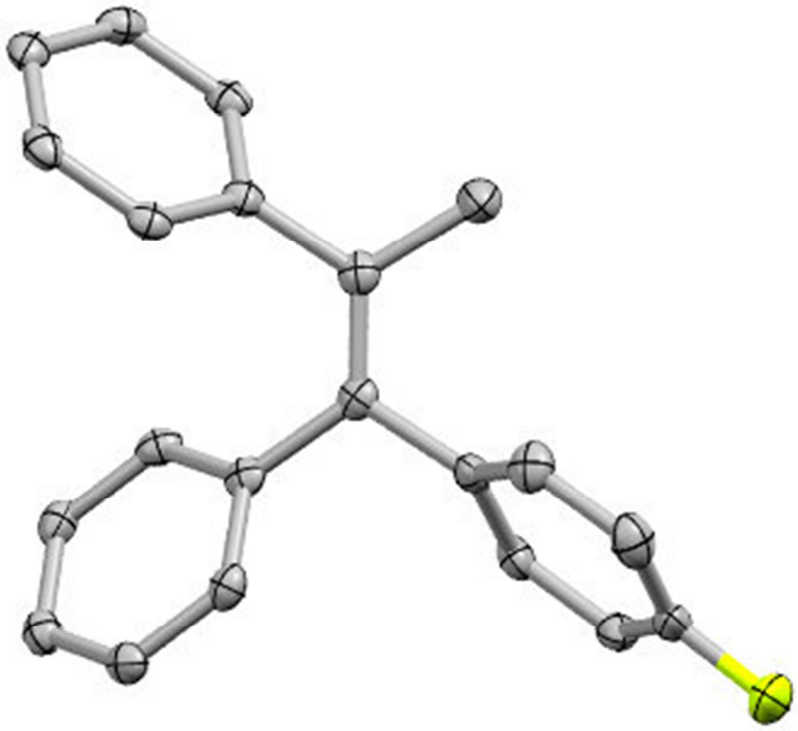
Table S183. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5m**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	14(1)	19(1)	23(1)	1(1)	-2(1)	-3(1)
C(2)	15(1)	19(1)	24(1)	2(1)	-3(1)	-3(1)
C(3)	27(2)	21(2)	28(2)	1(1)	2(1)	1(1)
C(4)	36(2)	38(2)	34(2)	7(1)	-1(1)	11(2)
C(5)	14(1)	17(1)	24(1)	2(1)	-4(1)	4(1)
C(6)	19(1)	18(1)	24(2)	-2(1)	-4(1)	-2(1)
C(7)	16(1)	23(2)	26(2)	1(1)	1(1)	-1(1)
C(8)	20(1)	17(1)	23(1)	2(1)	-2(1)	5(1)
C(9)	24(2)	16(1)	26(2)	-2(1)	-6(1)	2(1)
C(10)	19(1)	18(1)	25(2)	3(1)	-3(1)	-2(1)
C(11)	26(2)	23(2)	29(2)	-4(1)	0(1)	5(1)
C(12)	45(2)	46(2)	31(2)	-13(2)	19(1)	-5(2)
C(13)	67(2)	35(2)	49(2)	2(2)	32(2)	5(2)
C(14)	15(1)	19(2)	24(1)	-2(1)	4(1)	2(1)
C(15)	19(1)	23(2)	27(2)	-2(1)	5(1)	-2(1)
C(16)	30(2)	20(2)	39(2)	2(1)	12(1)	-2(1)
C(17)	33(2)	26(2)	33(2)	9(1)	15(1)	7(1)
C(18)	34(2)	31(2)	25(2)	3(1)	0(1)	7(1)
C(19)	29(2)	22(2)	27(2)	-2(1)	-2(1)	1(1)
C(20)	21(1)	18(2)	22(1)	0(1)	1(1)	-3(1)
C(21)	21(1)	27(2)	25(2)	-2(1)	-2(1)	2(1)
C(22)	32(2)	29(2)	21(2)	-1(1)	-4(1)	-1(1)
C(23)	27(2)	26(2)	21(2)	-6(1)	7(1)	-5(1)
C(24)	18(1)	25(2)	33(2)	-4(1)	1(1)	0(1)
C(25)	23(1)	18(1)	22(1)	-1(1)	-1(1)	-1(1)
O(1)	46(1)	41(1)	38(1)	-20(1)	9(1)	-10(1)
O(2)	30(1)	36(1)	25(1)	-6(1)	8(1)	-6(1)
F(1)	36(1)	52(1)	29(1)	-8(1)	10(1)	-1(1)

Table S184. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5m**.

	x	y	z	U(eq)
H(3A)	6316	4659	5650	30
H(3B)	5999	5213	6211	30
H(4A)	8511	4971	5780	54
H(4B)	7936	4531	6356	54
H(4C)	8141	5441	6380	54
H(6)	8429	6534	4895	24
H(7)	9404	6315	3959	26
H(9)	6994	4560	3633	26
H(10)	6077	4750	4583	25
H(12A)	9607	5754	2034	49
H(12B)	10724	5228	2298	49
H(13A)	10737	6859	2361	76
H(13B)	11499	6385	1858	76
H(13C)	11874	6313	2562	76
H(15)	6705	7915	5600	27
H(16)	6568	8909	4889	35
H(17)	5527	8710	3965	37
H(18)	4633	7518	3754	36
H(19)	4828	6514	4447	31
H(21)	6623	6284	6733	29
H(22)	5535	6555	7633	33
H(24)	2584	7341	6657	30
H(25)	3671	7073	5753	25

(*E*)-(1-(4-fluorophenyl)prop-1-ene-1,2-diyl)dibenzene (5o)



Crystals were used as received. A colorless prism 0.100 x 0.080 x 0.070 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 50 mm and exposure time was 20 seconds per frame using a scan width of 1.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 16378 reflections were collected covering the indices, -10<=*h*<=10, -6<=*k*<=6, -38<=*l*<=38. 2772 reflections were found to be symmetry independent, with an R_{int} of 0.0448. Indexing and unit cell refinement indicated a primitive, monoclinic lattice. The space group was found to be P 21/c (No. 14). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S185. Crystal data and structure refinement for olefin **5o**.

X-ray ID	gene906	
Sample/notebook ID	71452-138	
Empirical formula	C21 H17 F	
Formula weight	288.35	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Monoclinic	
Space group	P 21/c	
Unit cell dimensions	a = 8.5739(16) Å	α= 90°.
	b = 5.6098(10) Å	β= 96.311(4)°.
	c = 31.566(6) Å	γ = 90°.
Volume	1509.0(5) $Å^3$	
Z	4	
Density (calculated)	1.269 Mg/m^3	
Absorption coefficient	0.080 mm^{-1}	
F(000)	608	
Crystal size	0.100 x 0.080 x 0.070 mm^3	
Theta range for data collection	1.298 to 25.401°.	
Index ranges	-10<=h<=10, -6<=k<=6, -38<=l<=38	
Reflections collected	16378	
Independent reflections	2772 [R(int) = 0.0448]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.928 and 0.799	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2772 / 0 / 200	
Goodness-of-fit on F^2	1.248	
Final R indices [I>2sigma(I)]	R1 = 0.0711, wR2 = 0.1273	
R indices (all data)	R1 = 0.0843, wR2 = 0.1315	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.261 and -0.232 $e.Å^{-3}$	

Table S186. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5o**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	6298(3)	6856(5)	3848(1)	18(1)
C(2)	5004(3)	7601(5)	4017(1)	21(1)
C(3)	4910(4)	7638(6)	4494(1)	30(1)
C(4)	3539(3)	8335(5)	3750(1)	20(1)
C(5)	2871(3)	6821(5)	3430(1)	21(1)
C(6)	1473(3)	7393(6)	3189(1)	23(1)
C(7)	717(3)	9509(6)	3262(1)	23(1)
C(8)	1355(3)	11046(5)	3577(1)	23(1)
C(9)	2750(3)	10435(5)	3822(1)	21(1)
C(10)	6546(3)	7052(5)	3387(1)	19(1)
C(11)	7326(3)	5232(5)	3195(1)	20(1)
C(12)	7623(3)	5380(5)	2772(1)	21(1)
C(13)	7168(3)	7380(5)	2534(1)	22(1)
C(14)	6396(3)	9215(6)	2719(1)	22(1)
C(15)	6097(3)	9054(5)	3142(1)	20(1)
C(16)	7641(3)	5729(5)	4117(1)	19(1)
C(17)	7464(4)	3573(6)	4327(1)	25(1)
C(18)	8728(4)	2444(6)	4555(1)	28(1)
C(19)	10171(4)	3494(6)	4563(1)	24(1)
C(20)	10409(3)	5628(6)	4363(1)	24(1)
C(21)	9133(3)	6716(6)	4136(1)	22(1)
F(1)	11442(2)	2390(4)	4778(1)	37(1)

Table S187. Bond lengths [Å] and angles [°] for olefin **5o**.

C(1)-C(2)	1.349(4)	C(11)-C(12)	1.387(4)
C(1)-C(16)	1.494(4)	C(11)-H(11)	0.9500
C(1)-C(10)	1.499(4)	C(12)-C(13)	1.383(4)
C(2)-C(4)	1.491(4)	C(12)-H(12)	0.9500
C(2)-C(3)	1.517(4)	C(13)-C(14)	1.387(4)
C(3)-H(3A)	0.9800	C(13)-H(13)	0.9500
C(3)-H(3B)	0.9800	C(14)-C(15)	1.389(4)
C(3)-H(3C)	0.9800	C(14)-H(14)	0.9500
C(4)-C(9)	1.390(4)	C(15)-H(15)	0.9500
C(4)-C(5)	1.394(4)	C(16)-C(21)	1.388(4)
C(5)-C(6)	1.385(4)	C(16)-C(17)	1.396(4)
C(5)-H(5)	0.9500	C(17)-C(18)	1.386(4)
C(6)-C(7)	1.384(4)	C(17)-H(17)	0.9500
C(6)-H(6)	0.9500	C(18)-C(19)	1.368(4)
C(7)-C(8)	1.383(4)	C(18)-H(18)	0.9500
C(7)-H(7)	0.9500	C(19)-F(1)	1.367(3)
C(8)-C(9)	1.394(4)	C(19)-C(20)	1.379(4)
C(8)-H(8)	0.9500	C(20)-C(21)	1.382(4)
C(9)-H(9)	0.9500	C(20)-H(20)	0.9500
C(10)-C(15)	1.394(4)	C(21)-H(21)	0.9500
C(10)-C(11)	1.396(4)		

C(2)-C(1)-C(16)	121.6(2)	C(11)-C(10)-C(1)	119.7(3)
C(2)-C(1)-C(10)	124.9(3)	C(12)-C(11)-C(10)	121.4(3)
C(16)-C(1)-C(10)	113.6(2)	C(12)-C(11)-H(11)	119.3
C(1)-C(2)-C(4)	122.7(2)	C(10)-C(11)-H(11)	119.3
C(1)-C(2)-C(3)	122.1(3)	C(13)-C(12)-C(11)	120.1(3)
C(4)-C(2)-C(3)	115.1(2)	C(13)-C(12)-H(12)	120.0
C(2)-C(3)-H(3A)	109.5	C(11)-C(12)-H(12)	120.0
C(2)-C(3)-H(3B)	109.5	C(12)-C(13)-C(14)	119.5(3)
H(3A)-C(3)-H(3B)	109.5	C(12)-C(13)-H(13)	120.2
C(2)-C(3)-H(3C)	109.5	C(14)-C(13)-H(13)	120.2
H(3A)-C(3)-H(3C)	109.5	C(13)-C(14)-C(15)	120.2(3)
H(3B)-C(3)-H(3C)	109.5	C(13)-C(14)-H(14)	119.9
C(9)-C(4)-C(5)	117.8(3)	C(15)-C(14)-H(14)	119.9
C(9)-C(4)-C(2)	122.4(3)	C(14)-C(15)-C(10)	121.2(3)
C(5)-C(4)-C(2)	119.7(3)	C(14)-C(15)-H(15)	119.4
C(6)-C(5)-C(4)	121.3(3)	C(10)-C(15)-H(15)	119.4
C(6)-C(5)-H(5)	119.4	C(21)-C(16)-C(17)	118.2(3)
C(4)-C(5)-H(5)	119.4	C(21)-C(16)-C(1)	120.3(3)
C(7)-C(6)-C(5)	120.0(3)	C(17)-C(16)-C(1)	121.3(3)
C(7)-C(6)-H(6)	120.0	C(18)-C(17)-C(16)	121.5(3)
C(5)-C(6)-H(6)	120.0	C(18)-C(17)-H(17)	119.3
C(8)-C(7)-C(6)	120.0(3)	C(16)-C(17)-H(17)	119.3
C(8)-C(7)-H(7)	120.0	C(19)-C(18)-C(17)	117.8(3)
C(6)-C(7)-H(7)	120.0	C(19)-C(18)-H(18)	121.1
C(7)-C(8)-C(9)	119.5(3)	C(17)-C(18)-H(18)	121.1
C(7)-C(8)-H(8)	120.2	F(1)-C(19)-C(18)	118.9(3)
C(9)-C(8)-H(8)	120.2	F(1)-C(19)-C(20)	118.1(3)
C(4)-C(9)-C(8)	121.4(3)	C(18)-C(19)-C(20)	123.0(3)
C(4)-C(9)-H(9)	119.3	C(19)-C(20)-C(21)	118.1(3)
C(8)-C(9)-H(9)	119.3	C(19)-C(20)-H(20)	120.9
C(15)-C(10)-C(11)	117.6(2)	C(21)-C(20)-H(20)	120.9
C(15)-C(10)-C(1)	122.6(3)	C(20)-C(21)-C(16)	121.3(3)

C(20)-C(21)-H(21)	119.4	C(16)-C(21)-H(21)	119.4

Symmetry transformations used to generate equivalent atoms:

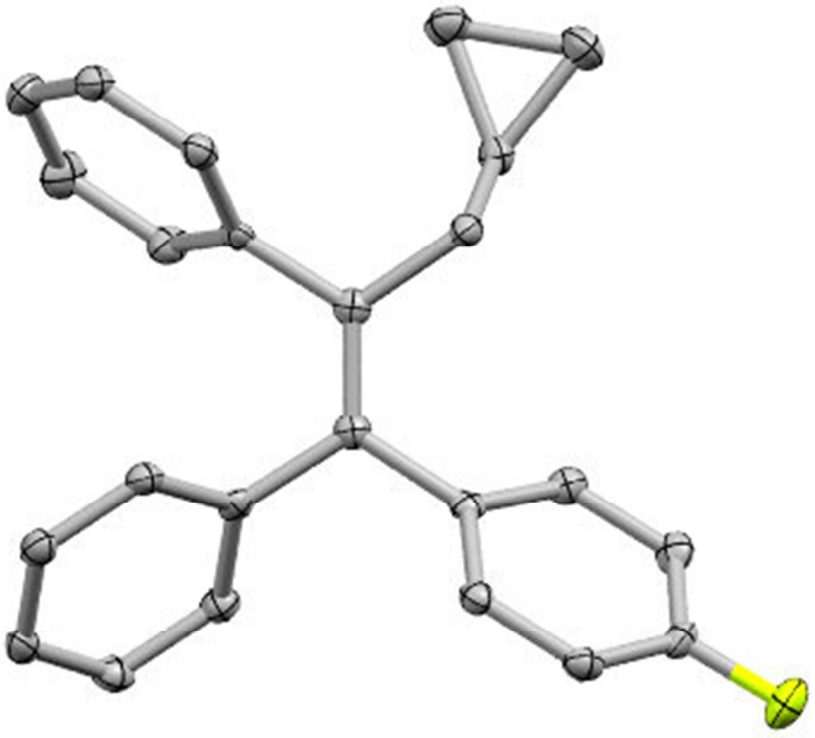
Table S188. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5o**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	18(2)	14(2)	22(1)	-1(1)	0(1)	-4(1)
C(2)	21(2)	20(2)	22(1)	1(1)	1(1)	-5(1)
C(3)	23(2)	42(2)	24(2)	0(2)	2(1)	2(2)
C(4)	19(2)	23(2)	19(1)	2(1)	6(1)	-2(1)
C(5)	21(2)	20(2)	22(1)	2(1)	8(1)	-3(1)
C(6)	23(2)	29(2)	18(1)	0(1)	5(1)	-7(1)
C(7)	19(2)	29(2)	22(1)	5(1)	5(1)	-1(1)
C(8)	24(2)	20(2)	27(2)	3(1)	11(1)	2(1)
C(9)	20(2)	23(2)	22(1)	-4(1)	7(1)	-6(1)
C(10)	15(1)	18(2)	22(1)	-2(1)	0(1)	-5(1)
C(11)	20(2)	17(2)	23(1)	2(1)	-3(1)	-2(1)
C(12)	19(2)	21(2)	23(1)	-5(1)	2(1)	-2(1)
C(13)	21(2)	25(2)	20(1)	0(1)	0(1)	-6(1)
C(14)	18(2)	23(2)	24(1)	6(1)	-2(1)	-3(1)
C(15)	15(2)	17(2)	28(2)	0(1)	4(1)	-2(1)
C(16)	21(2)	22(2)	16(1)	-3(1)	4(1)	0(1)
C(17)	25(2)	23(2)	27(2)	0(1)	0(1)	-7(1)
C(18)	39(2)	22(2)	23(2)	3(1)	2(1)	0(2)
C(19)	25(2)	31(2)	17(1)	-2(1)	2(1)	10(1)
C(20)	18(2)	36(2)	20(1)	-1(1)	5(1)	-3(1)
C(21)	27(2)	24(2)	15(1)	0(1)	5(1)	-3(1)
F(1)	34(1)	49(1)	28(1)	6(1)	-1(1)	17(1)

Table S189. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5o**.

	x	y	z	U(eq)
H(3A)	4287	6277	4574	44
H(3B)	4412	9123	4572	44
H(3C)	5970	7537	4645	44
H(5)	3385	5369	3376	25
H(6)	1033	6332	2973	27
H(7)	-239	9906	3095	28
H(8)	846	12509	3626	28
H(9)	3170	11476	4043	26
H(11)	7661	3861	3356	24
H(12)	8139	4107	2646	26
H(13)	7383	7497	2246	27
H(14)	6071	10587	2556	26
H(15)	5577	10330	3265	24
H(17)	6454	2864	4314	30
H(18)	8597	989	4701	34
H(20)	11422	6331	4380	29
H(21)	9278	8168	3991	26

(*E*)-(3-cyclopropyl-1-(4-fluorophenyl)prop-1-ene-1,2-diyl)dibenzene (5q)



X-ray quality crystals were used as received. A colorless block 0.300 x 0.300 x 0.280 mm in size was mounted on a Cryoloop with Paratone oil. Data were collected in a nitrogen gas stream at 100(2) K using and scans. Crystal-to-detector distance was 40 mm and exposure time was 2 seconds per frame using a scan width of 2.0°. Data collection was 100.0% complete to 25.000° in θ. A total of 11352 reflections were collected covering the indices, -11<=*h*<=11, -10<=*k*<=11, -12<=*l*<=12. 3140 reflections were found to be symmetry independent, with an R_{int} of 0.0518. Indexing and unit cell refinement indicated a primitive, triclinic lattice. The space group was found to be P -1 (No. 2). The data were integrated using the Bruker SAINT software program and scaled using the SADABS software program. Solution by iterative methods (SHELXT-2014) produced a complete heavy-atom phasing model consistent with the proposed structure. All non-hydrogen atoms were refined anisotropically by full-matrix least-squares (SHELXL-2016). All hydrogen atoms were placed using a riding model. Their positions were constrained relative to their parent atom using the appropriate HFIX command in SHELXL-2016.

Table S190. Crystal data and structure refinement for olefin **5q**.

X-ray ID	gene961	
Sample/notebook ID	71452-151	
Empirical formula	C24 H21 F	
Formula weight	328.41	
Temperature	100(2) K	
Wavelength	0.71073 Å	
Crystal system	Triclinic	
Space group	P -1	
Unit cell dimensions	a = 9.4458(4) Å	α= 74.2220(10)°.
	b = 9.8045(4) Å	β= 80.9000(10)°.
	c = 10.2876(4) Å	γ = 76.8520(10)°.
Volume	888.09(6) $Å^3$	
Z	2	
Density (calculated)	1.228 Mg/m^3	
Absorption coefficient	0.077 mm^{-1}	
F(000)	348	
Crystal size	0.300 x 0.300 x 0.280 mm^3	
Theta range for data collection	2.068 to 25.025°.	
Index ranges	-11<=h<=11, -10<=k<=11, -12<=l<=12	
Reflections collected	11352	
Independent reflections	3140 [R(int) = 0.0518]	
Completeness to theta = 25.000°	100.0 %	
Absorption correction	Semi-empirical from equivalents	
Max. and min. transmission	0.746 and 0.656	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	3140 / 0 / 226	
Goodness-of-fit on F^2	1.062	
Final R indices [I>2sigma(I)]	R1 = 0.0446, wR2 = 0.1110	
R indices (all data)	R1 = 0.0519, wR2 = 0.1178	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.376 and -0.237 $e.Å^{-3}$	

Table S191. Atomic coordinates (x 10^4) and equivalent isotropic displacement parameters ($Å^2$x 10^3) for olefin **5q**. U(eq) is defined as one third of the trace of the orthogonalized U^{ij} tensor.

	x	y	z	U(eq)
C(1)	4711(2)	6210(2)	7152(2)	14(1)
C(2)	4553(2)	4864(2)	7192(1)	15(1)
C(3)	5697(2)	3800(2)	6567(2)	16(1)
C(4)	6329(2)	2477(2)	7610(2)	18(1)
C(5)	5658(2)	1153(2)	7967(2)	24(1)
C(6)	7125(2)	1147(2)	7160(2)	27(1)
C(7)	3213(2)	4293(2)	7866(2)	15(1)
C(8)	2804(2)	4155(2)	9251(2)	20(1)
C(9)	1578(2)	3591(2)	9876(2)	25(1)
C(10)	737(2)	3159(2)	9133(2)	23(1)
C(11)	1133(2)	3280(2)	7760(2)	19(1)
C(12)	2367(2)	3832(2)	7135(2)	17(1)
C(13)	3478(2)	7302(2)	7602(1)	15(1)
C(14)	3690(2)	8123(2)	8444(2)	18(1)
C(15)	2553(2)	9166(2)	8825(2)	19(1)
C(16)	1197(2)	9409(2)	8359(2)	18(1)
C(17)	981(2)	8615(2)	7504(2)	18(1)
C(18)	2112(2)	7575(2)	7128(2)	16(1)
C(19)	6080(2)	6767(2)	6558(2)	15(1)
C(20)	7456(2)	6008(2)	6923(2)	17(1)
C(21)	8715(2)	6524(2)	6314(2)	19(1)
C(22)	8583(2)	7808(2)	5340(2)	18(1)
C(23)	7249(2)	8614(2)	4961(2)	17(1)
C(24)	6004(2)	8087(2)	5585(2)	16(1)
F(1)	9819(1)	8293(1)	4726(1)	27(1)

Table S192. Bond lengths [Å] and angles [°] for olefin **5q**.

C(1)-C(2)	1.351(2)	C(11)-H(11)	0.9500
C(1)-C(19)	1.495(2)	C(12)-H(12)	0.9500
C(1)-C(13)	1.499(2)	C(13)-C(18)	1.395(2)
C(2)-C(7)	1.493(2)	C(13)-C(14)	1.395(2)
C(2)-C(3)	1.517(2)	C(14)-C(15)	1.392(2)
C(3)-C(4)	1.511(2)	C(14)-H(14)	0.9500
C(3)-H(3A)	0.9900	C(15)-C(16)	1.386(2)
C(3)-H(3B)	0.9900	C(15)-H(15)	0.9500
C(4)-C(6)	1.501(2)	C(16)-C(17)	1.387(2)
C(4)-C(5)	1.504(2)	C(16)-H(16)	0.9500
C(4)-H(4)	1.0000	C(17)-C(18)	1.385(2)
C(5)-C(6)	1.498(2)	C(17)-H(17)	0.9500
C(5)-H(5A)	0.9900	C(18)-H(18)	0.9500
C(5)-H(5B)	0.9900	C(19)-C(20)	1.395(2)
C(6)-H(6A)	0.9900	C(19)-C(24)	1.400(2)
C(6)-H(6B)	0.9900	C(20)-C(21)	1.389(2)
C(7)-C(8)	1.394(2)	C(20)-H(20)	0.9500
C(7)-C(12)	1.396(2)	C(21)-C(22)	1.373(2)
C(8)-C(9)	1.386(2)	C(21)-H(21)	0.9500
C(8)-H(8)	0.9500	C(22)-F(1)	1.3576(17)
C(9)-C(10)	1.384(2)	C(22)-C(23)	1.377(2)
C(9)-H(9)	0.9500	C(23)-C(24)	1.386(2)
C(10)-C(11)	1.382(2)	C(23)-H(23)	0.9500
C(10)-H(10)	0.9500	C(24)-H(24)	0.9500
C(11)-C(12)	1.387(2)		

C(2)-C(1)-C(19)	122.88(13)	C(4)-C(6)-H(6B)	117.8
C(2)-C(1)-C(13)	122.23(14)	H(6A)-C(6)-H(6B)	114.9
C(19)-C(1)-C(13)	114.72(12)	C(8)-C(7)-C(12)	118.15(14)
C(1)-C(2)-C(7)	122.19(13)	C(8)-C(7)-C(2)	120.99(14)
C(1)-C(2)-C(3)	123.87(14)	C(12)-C(7)-C(2)	120.81(13)
C(7)-C(2)-C(3)	113.94(12)	C(9)-C(8)-C(7)	120.64(15)
C(4)-C(3)-C(2)	112.89(12)	C(9)-C(8)-H(8)	119.7
C(4)-C(3)-H(3A)	109.0	C(7)-C(8)-H(8)	119.7
C(2)-C(3)-H(3A)	109.0	C(10)-C(9)-C(8)	120.50(15)
C(4)-C(3)-H(3B)	109.0	C(10)-C(9)-H(9)	119.7
C(2)-C(3)-H(3B)	109.0	C(8)-C(9)-H(9)	119.7
H(3A)-C(3)-H(3B)	107.8	C(11)-C(10)-C(9)	119.59(15)
C(6)-C(4)-C(5)	59.82(11)	C(11)-C(10)-H(10)	120.2
C(6)-C(4)-C(3)	119.35(14)	C(9)-C(10)-H(10)	120.2
C(5)-C(4)-C(3)	119.79(14)	C(10)-C(11)-C(12)	120.00(15)
C(6)-C(4)-H(4)	115.5	C(10)-C(11)-H(11)	120.0
C(5)-C(4)-H(4)	115.5	C(12)-C(11)-H(11)	120.0
C(3)-C(4)-H(4)	115.5	C(11)-C(12)-C(7)	121.09(14)
C(6)-C(5)-C(4)	59.98(11)	C(11)-C(12)-H(12)	119.5
C(6)-C(5)-H(5A)	117.8	C(7)-C(12)-H(12)	119.5
C(4)-C(5)-H(5A)	117.8	C(18)-C(13)-C(14)	118.39(14)
C(6)-C(5)-H(5B)	117.8	C(18)-C(13)-C(1)	120.64(13)
C(4)-C(5)-H(5B)	117.8	C(14)-C(13)-C(1)	120.88(13)
H(5A)-C(5)-H(5B)	114.9	C(15)-C(14)-C(13)	120.66(14)
C(5)-C(6)-C(4)	60.20(11)	C(15)-C(14)-H(14)	119.7
C(5)-C(6)-H(6A)	117.8	C(13)-C(14)-H(14)	119.7
C(4)-C(6)-H(6A)	117.8	C(16)-C(15)-C(14)	120.12(14)
C(5)-C(6)-H(6B)	117.8	C(16)-C(15)-H(15)	119.9

C(14)-C(15)-H(15)	119.9	C(21)-C(20)-H(20)	119.4
C(15)-C(16)-C(17)	119.69(14)	C(19)-C(20)-H(20)	119.4
C(15)-C(16)-H(16)	120.2	C(22)-C(21)-C(20)	118.64(14)
C(17)-C(16)-H(16)	120.2	C(22)-C(21)-H(21)	120.7
C(18)-C(17)-C(16)	120.13(14)	C(20)-C(21)-H(21)	120.7
C(18)-C(17)-H(17)	119.9	F(1)-C(22)-C(21)	118.42(13)
C(16)-C(17)-H(17)	119.9	F(1)-C(22)-C(23)	119.03(14)
C(17)-C(18)-C(13)	120.99(14)	C(21)-C(22)-C(23)	122.55(14)
C(17)-C(18)-H(18)	119.5	C(22)-C(23)-C(24)	118.06(14)
C(13)-C(18)-H(18)	119.5	C(22)-C(23)-H(23)	121.0
C(20)-C(19)-C(24)	117.90(14)	C(24)-C(23)-H(23)	121.0
C(20)-C(19)-C(1)	122.46(13)	C(23)-C(24)-C(19)	121.67(14)
C(24)-C(19)-C(1)	119.64(13)	C(23)-C(24)-H(24)	119.2
C(21)-C(20)-C(19)	121.15(14)	C(19)-C(24)-H(24)	119.2

Symmetry transformations used to generate equivalent atoms:

Table S193. Anisotropic displacement parameters ($Å^2 x\ 10^3$)for olefin **5q**. The anisotropic displacement factor exponent takes the form: $-2\pi^2[\ h^2 a^{*2} U^{11} + ... + 2\ h\ k\ a^*\ b^*\ U^{12}\ ]$

	U^{11}	U^{22}	U^{33}	U^{23}	U^{13}	U^{12}
C(1)	16(1)	15(1)	12(1)	-3(1)	-3(1)	-3(1)
C(2)	17(1)	16(1)	12(1)	-2(1)	-4(1)	-3(1)
C(3)	16(1)	16(1)	17(1)	-5(1)	1(1)	-6(1)
C(4)	16(1)	18(1)	20(1)	-5(1)	-2(1)	-2(1)
C(5)	25(1)	17(1)	29(1)	0(1)	-6(1)	-5(1)
C(6)	24(1)	19(1)	36(1)	-8(1)	-4(1)	2(1)
C(7)	16(1)	9(1)	17(1)	-2(1)	-1(1)	0(1)
C(8)	22(1)	22(1)	18(1)	-6(1)	-2(1)	-7(1)
C(9)	31(1)	29(1)	16(1)	-5(1)	5(1)	-11(1)
C(10)	22(1)	21(1)	25(1)	-4(1)	5(1)	-10(1)
C(11)	20(1)	15(1)	23(1)	-5(1)	-2(1)	-5(1)
C(12)	19(1)	14(1)	16(1)	-3(1)	0(1)	-2(1)
C(13)	17(1)	13(1)	12(1)	0(1)	1(1)	-5(1)
C(14)	18(1)	18(1)	18(1)	-4(1)	-3(1)	-6(1)
C(15)	25(1)	18(1)	17(1)	-7(1)	0(1)	-5(1)
C(16)	19(1)	15(1)	18(1)	-3(1)	5(1)	-3(1)
C(17)	17(1)	16(1)	21(1)	-1(1)	-2(1)	-4(1)
C(18)	19(1)	14(1)	16(1)	-4(1)	-1(1)	-7(1)
C(19)	18(1)	15(1)	14(1)	-7(1)	-1(1)	-4(1)
C(20)	19(1)	17(1)	15(1)	-3(1)	-3(1)	-5(1)
C(21)	15(1)	23(1)	20(1)	-6(1)	-5(1)	-4(1)
C(22)	16(1)	24(1)	17(1)	-7(1)	1(1)	-10(1)
C(23)	22(1)	14(1)	15(1)	-3(1)	-1(1)	-5(1)
C(24)	16(1)	15(1)	17(1)	-6(1)	-2(1)	-2(1)
F(1)	20(1)	34(1)	28(1)	-3(1)	1(1)	-13(1)

Table S194. Hydrogen coordinates (x 10^4) and isotropic displacement parameters ($Å^2$x 10^3) for olefin **5q**.

	x	y	z	U(eq)
H(3A)	5251	3494	5911	19
H(3B)	6498	4290	6058	19
H(4)	6723	2671	8374	22
H(5A)	5623	584	8923	29
H(5B)	4817	1183	7488	29
H(6A)	7188	1173	6184	32
H(6B)	7993	573	7619	32
H(8)	3371	4449	9772	24
H(9)	1314	3500	10822	30
H(10)	-107	2783	9564	28
H(11)	561	2985	7245	23
H(12)	2641	3896	6194	20
H(14)	4619	7969	8761	21
H(15)	2707	9712	9406	23
H(16)	419	10115	8624	22
H(17)	56	8784	7175	22
H(18)	1954	7040	6538	19
H(20)	7533	5123	7601	20
H(21)	9649	5999	6565	23
H(23)	7186	9504	4292	21
H(24)	5074	8637	5347	19