Supplementary Material for CrystEngComm

Similar modes of inclusion in complexes of β-cyclodextrin with sulfonylurea hypoglycemic drugs

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Supporting Information

Supplementary Material for CrystEngComm

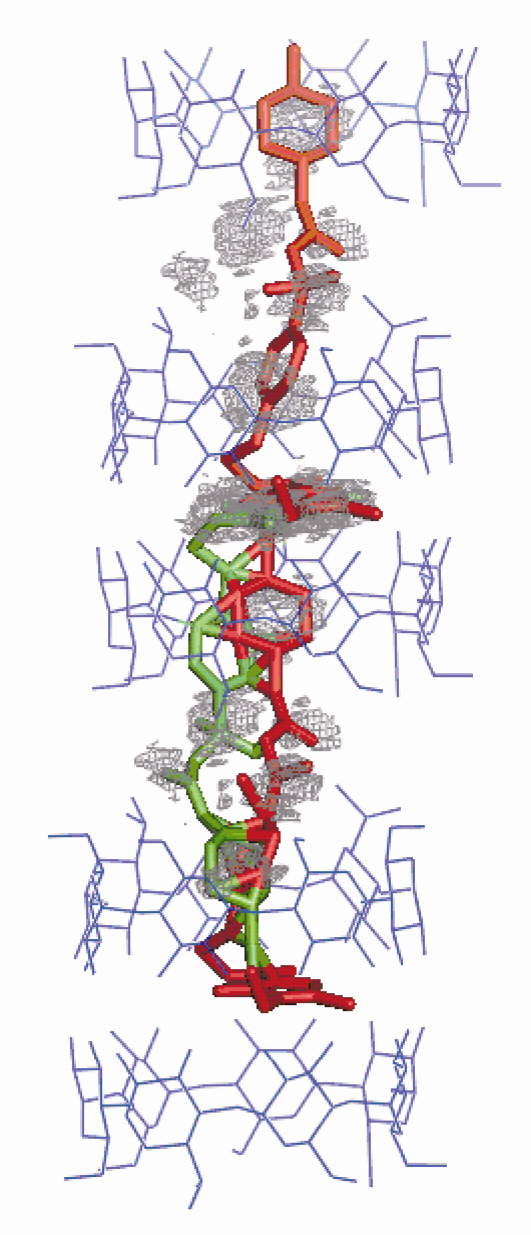

Figure S1. Fitting of the final GLP model (two disordered orientations, in red and green, are shown) into the difference electron density map (Fo-Fc) contoured at 2.5σ.

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Table S1a. Tolbutamide/βCD. Conformation of the macrocycles.

Glucose unit	D[i] (Å)	*Φ*[ii] (deg.)	d[iii](Å)	D_3[vi](Å)	Tilt angles[vii] (deg.)	O-5*n*-C-5*n*-C-6*n*-O6*n* (deg.)[viii]
G1A	4.40(1)	129.0(3)	-0.050(6)	2.74(1)	11.6(2)	a. -59(3) b. 25(8)
G2A	4.33(1)	128.0(3)	0.054(6)	2.83(1)	14.8(2)	-36(2)
G3A	4.38(1)	127.3(3)	0.029(6)	2.87(1)	8.0(2)	-60(1)
G4A	4.39(1)	130.0(3)	-0.073(6)	2.82(1)	10.1(2)	60(2)
G5A	4.40(1)	128.8(3)	0.011(6)	2.78(1)	11.9(4)	a. 71(2) b. -58(2)
G6A	4.26(1)	126.9(3)	0.060(6)	2.82(1)	10.7(5)	-62(2)
G7A	4.43(1)	129.8(3)	-0.032(6)	2.80(1)	5.3(2)	-66(2)

Table S1b. Tolazamide/βCD. Conformation of the macrocycles.

Glucose unit	D[i] (Å)	*Φ*[ii] (deg.)	d[iii](Å)	D_3[vi](Å)	Tilt angles[vii] (deg.)	O-5*n*-C-5*n*-C-6*n*-O6*n* (deg.)[viii]
G1A	4.26(1)	129.3(2)	-0.061(4)	2.71(1)	8.34(1)	a. -59.0(2) b. 10.6(9)
G2A	4.34(1)	124.9(2)	0.051(4)	2.81(1)	14.8(1)	a. -46.0(1) b. 66.0(1)
G3A	4.34(1)	130.2(2)	0.056(4)	2.85(1)	6.4(1)	a. -63.2(9) b. -179.0(5)
G4A	4.36(1)	129.9(2)	-0.092(4)	2.77(1)	8.7(1)	a. -70.9(8) b. 25.0(4)
G5A	4.27(1)	127.7(2)	0.000(4)	2.71(1)	11.4(3)	a. -58.6(9) b. 85.0(1)
G6A	4.27(1)	126.5(2)	0.085(4)	2.81(1)	8.3(3)	63.0(2)
G7A	4.44(1)	131.4(2)	-0.038(4)	2.73(1)	2.5(2)	-64.0(1)

Table S1c. Glimepiride/βCD. Conformation of the macrocycles.

Glucose unit	D[i] (Å)	*Φ*[ii] (deg.)	d[iii](Å)	D_3[vi](Å)	Tilt angles[vii] (deg.)	O-5*n*-C-5*n*-C-6*n*-O6*n* (deg.)[viii]
G1A_1	4.36(1)	126.1(3)	-0.008(7)	2.81(1)	8.8(3)	67.0(2)
G2A_1	4.43(1)	130.5(3)	-0.024(6)	2.76(1)	5.4(6)	-65.0(1)
G3A_1	4.29(1)	128.2(3)	0.034(6)	2.81(1)	11.10(4)	-70.0(1)
G4A_1	4.38(1)	128.0(3)	-0.015(7)	2.79(1)	8.1(4)	-63.0(1)
G5A_1	4.34(1)	128.7(3)	-0.00(0)	2.82(1)	11.4(8)	c. -70.0(2) d. 64.0(3)
G6A_1	4.40(1)	129.7(3)	-0.011(7)	2.78(1)	7.1(6)	-63.0(2)
G7A_1	4.34(1)	128.2(3)	0.024(7)	2.75(1)	6.0(4)	-60.0(1)
G1A_2	4.39(1)	130.0(0)	-0.027(6)	2.74(1)	6.1(5)	-61.0(1)
G2A_2	4.32(1)	127.0(3)	-0.006(7)	2.80(1)	10.1(4)	-65.0(1)
G3A_2	4.45(1)	129.2(3)	0.027(7)	2.81(1)	9.4(2)	-68.0(1)
G4A_2	4.32(1)	128.7(3)	-0.015(6)	2.84(1)	13.2(6)	a. -66.0(2) b. 38.0((5)
G5A_2	4.43(1)	128.3(3)	0.001(7)	2.79(1)	8.1(7)	-67.0(1)
G6A_2	4.34(1)	128.4(3)	-0.012(7)	2.83(1)	13.4(8)	a. -63.0(2) b. 70.0(3)
G7A_2	4.38(1)	128.4(3)	0.033(6)	2.78(1)	5.8(3)	-68.0(1)

[i] O-4*n*…O-4(*n*+1)
[ii] O-4(*n*-1)…O-4*n*…O-4(*n*+1) angles
[iii] Deviations (Å) from the least-squares optimum plane of O-4n atoms
[vi] Intramolecular H-bonds between O3*n*…O2(*n*-1)
[vii] Tilt angles between the optimum O-4*n* plane and the mean planes through atoms O-4(*n*-1), C-1*n*, C-4*n*, O-4*n* esds in parentheses
[viii] a, b, indicate the various orientations of the C-6*n*-O-6*n* bond

Table S2. Hydrogen-bond distances (Å) of the inclusion complexes[i]

a. Direct Hydrogen-bonds within dimers			
	Tolbutamide/βCD	Tolazamide/βCD	Glimepiride/βCD[ii]
O*mn*…O*m'n'*	O*mn*…O*m'n'* Å	O*mn*…O*m'n'* Å	O*mn*…O*m'n'* Å
O31_1…O37_1[1]	2.80(1)	2.74(1)	2.90(1)
O32_1…O36_1[1]	2.84(1)	2.80(1)	2.79(1)
O33_1…O35_1[1]	2.78(1)	2.71(1)	2.88(1)
O34_1…O34_1[1]	2.86(1)	2.85(1)	2.77(1)
O35_1…O33_1[1]	2.78(1)	2.71(1)	2.86(1)
O36_1…O32_1[1]	2.84(1)	2.80(1)	2.78(1)
O37_1…O31_1[1]	2.80(1)	2.74(1)	2.79(1)

b. Hydrogen-bonds between secondary OHs of *β*CD and water molecules				
	Tolbutamide/βCD	Tolazamide/βCD	Glimepiride/βCD	
O*mn*…O(W)*m'n'*	O*mn*…O*m'n'*Å	O*mn*…O*m'n'*Å	O*mn*…O*m'n'*Å[a]	
			RESI 1	RESI 2
O21_1... O21[7]	2.69(3)	2.67		
O21_1... O32B[7]	2.95(11)	-		
O22_1.. O34_1[7]	2.73(5)	2.75	O_W21B 2.67 O_W 13A 3.18 O_W 13B 3.14	O_W 21B 2.85 O_W 22A 2.90 O_W 26B 3.31
O32_1...O32A[7]	2.84(6)	2.83	-	-
O34_1..._ O34_2[1]	3.17(3)	2.99	-	O_W 13A 2.75 O_W 13B 2.89
O34_1... O34_1	2.86(4)	2.72		
O35_1…O21[1]	2.80(0)	2.81	-	O_W 17A 2.73 O_W 17B 2.92
O26_1…O26_1[10]	3.04(2)	3.12	-	O_W 20 3.19 O_W 17A 3.30
O26_1…O32B[6]	2.81(8)	2.90		
O36_1…O34_2[6]	2.91(4)	2.90	O_W 21B 2.70 O_W 21B 2.95	O_W 21B 2.79 O_W 21B 3.19
O37_1…O21[6]	3.19(3)	2.78	O_W 6A 2.80 O_W 6B 2.89	-

c. Hydrogen-bonds between primary OHs of *β*CD dimers and water molecules				
	Tolbutamide/βCD	Tolazamide/βCD	Glimepiride/βCD	
O*mn*…O*m'n'*	O*mn*…O*m'n'* Å	O*mn*…O*m'n'*Å	O*mn*…O*m'n'*Å	
			RESI 1	RESI 2
O61_1…O61[2]	2.71(6)	2.98	O_W 67B 2.71 O_W 676B 2.86	-
O62_1…O62A[8]	3.10(6)	3.05[b]	O_W 62A 2.75	O_W 64B 2.72

				O_W 64B 2.79
O62_1…O62B[2]	2.74(11)	2.91		O_W 61B 2.86
O62_1…O56[2]	2.82(3)	2.72		
O62_1…O53A[11]	2.78(4)	-		
O63_1...O63[9]	2.79(3)	2.80	O_W 67A 2.74	O_W 67A 2.68
			O_W 67A 2.86	O_W 67A 3.01
			O_W 62W 2.81	
O65B_1...O65[1]	2.78(5)	2.79	O_W O2 2.84	O_W 64B 2.73
			O_W 62A 2.92	O_W 64B 2.85
			O_W O1 2.82	O_W 66B 2.50
				O_W O1 2.94
				O_W 66B 2.95
O66_1…O66[6]	2.63(12)	-	O_W 63B 2.72	O_W 15 2.75
O66_1…O61[6]	3.06(7)	-	O_W 63B 2.84	
O67_1…O67A[7]	2.72(3)	2.87	O_W 66B 2.62	-
O67_1…O67B[2]	2.66(11)	2.49 [b]	O_W 67A 2.69	
O67_1…O63_2[2]	2.67(22)	-	O_W 67A 2.82	

d. Direct H-bonds between primary and/or secondary OHs between columns (channels)

	Tolbutamide/βCD	Tolazamide/βCD	Glimepiride/βCD	
O*mn*…O-*m'n*'	O*mn*…O*m'n*' Å	O*mn*…O*m'n'*Å	O*mn*…O*m'n'*Å	
O61A…O63[2]	2.80(3)	2.79(2)	O24_1…O21_2	2.77
O61B…O63[2]	2.60(7)	2.47(9)	O26_1…O26_2	2.77
O67…O63[3]	2.86(2)	2.79(1)	O64_1... O67_2	2.90
O25…O27[4]	2.77(1)	2.68(2)	O66_1…O62_1	2.76
			O62_2…O66_2	2.90

e. Direct H-bonds between primary OHs between dimers in the same column

Tolbutamide/βCD		Tolazamide/βCD		Glimepiride/βCD
O64…O65A[5]	2.73	O64A…O64A[11]	2.77	
O61…O66	3.48	O64A…O64B[11]	3.09	
		O64B…O65B	3.04	
		O63B…O65A	2.73	
		O63B…O65B	3.07	
		O62B…O66	2.83	

g. Hydrogen-bonds between guest and host

TBM/βCD		TLZ/βCD		GLP/βCD	
O65A[11]..N2	2.93	O66.....N2	3.05	O65B_1...O3_5	2.64
O65A[11]..N1	3.13	O66[11]....N1	2.39	O65B_2...O3_5	2.02
C66.....O3	3.19	O66[11]....O1	2.20	O65B_2...N1_5	2.62
O65A....C9	2.73	O65B[11]..O2	2.78		
		O65B[11]..N1	3.12	O67B_2..O1_4	2.63
		O65B....N3	3.60	O65B_1..O2_4	2.53
		O45…..C9	3.94	O65B_1...N1_4	2.02
		O41…..C11	3.85	O67B_2...O3_4	1.97

O43…..C12	3.63
O65B...C14	2.48
C64.....C14	3.91
C53.....C13	3.54

[i]A or B denote the two orientations of the host's disordered OH groups. [ii]Atoms denoted by _1 and _2 refer to the different βCD atoms of the asymmetric unit.
[a]Water molecules of GLP/βCD found in comparable positions to these of TBM/βCD and TLZ/βCD, but not having the same names.
[b]These two water was not named O62A and O67B as in TBM but O61 and O63 respectively

[1] –x+1, y,-z-1 ; [2] –x+1/2, y+1/2,-z ; [3] x+1/2, y+1/2, z ; [4] –x+1/2, y-1/2, -z+1 ;

[5]-x+1, y,- z ; [6]x+1/2, y+1/2, z ; [7] -x+1/2, y+1/2, -z+1 ;[8] x-1/2, y+1/2, z ; [9]x, y, z-1 ; [10]

x+1, y, z ; [11] -x, y,- z ;