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Supporting information for article:

Structural variety of clofaziminium salts: effect of the counter-ion on clofaziminium conformation and on crystal packing

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Supporting information

Table S1 Published and new structures implying clofazimine or clofaziminium.

Structure	Space Group	a, b, c (Å); α, β, γ (°); V (Å³)	Z	CSD refcode	reference
CFZ (I)	$P\bar{1}$	10.507(4), 12.852(12), 9.601(2); 95.95(4), 97.22(1), 69.73(6); 1204.0(13)	2	DAKXUI01	(Bannigan *et al.*, 2016)
CFZ (II)	$P2_1/a$	7.788(14), 22.960(13), 13.362(7); 90, 98.58(12), 90; 2363(5)	4	DAKXUI	(Bannigan *et al.*, 2016)
CFZ (III)	$Pbca$	23.2417(15), 8.1118(5), 25.5891(16); 90, 90, 90; 4824.4(5)	8	DAKXUI03	(Bannigan *et al.*, 2016)
CFZ (IV)	$P2_1/c$	12.9083, 23.3031, 8.3092; 90, 95.1697, 90; 2489.27	4	DAKXUI02	(Bannigan *et al.*, 2016)
CFZ-DMF	$P\bar{1}$	12.435(4), 12.807(5), 10.424(4); 111.74(3), 112.37(3), 90.90(3); 1402.0(10)	2	CEKTER	(Eggleston *et al.*, 1984)
CFZ-$(CH_3)_2CO$ (1:1)	$P\bar{1}$	10.0842(13), 12.0695(16), 12.6613(16); 75.278(2), 66.588(2), 69.051(2); 1309.3(3)	2	GESHIX	(Bolla & Nangia, 2012)
CFZ-NH^+-$H_2PO_4^-$-H_2O (1:1:0.25)	$P\bar{1}$	14.3064 (9), 15.1345 (9), 27.9096 (17); 96.495 (2), 92.025 (2), 110.640 (2); 5600.4(6)	8	-	(Bannigan *et al.*, 2017)
CFZ-NH^+-HSO_4^--MeOH (1:1:1)	$C2/c$	18.9579(11), 15.4754(9), 20.0404(12); 90, 100.360(2), 90; 5783.6(6)	8	-	(Bannigan *et al.*, 2017)
CFZ-NH^+-MSA^--H_2O (1:1:1)	$P\bar{1}$	9.5945(12), 11.0456(12), 14.4628(11); 110.173(9), 95.859(9), 94.929(9); 1419.1(3)	2	GESHET	(Bolla & Nangia, 2012)
CFZ-NH^+-2,4DHBA$^-$-MeOH (1:1:1)	$P\bar{1}$	9.4861(4), 12.5322(5), 15.3641(5); 98.415(3), 103.379(3), 110.450(4); 1612.40(11)	2	/	This work
CFZ-NH^+-$SACC^-$-MeCN (1:1:1.4)	$P\bar{1}$	7.9970(3), 13.5824(3), 16.6638(7); 80.214(3), 80.034(4), 83.036(3); 1748.87(11)	2	/	This work
CFZ-NH^+-$TRPTA^{2-}$-TRPTA-solvent (1:0.5:0.5:x)	$P\bar{1}$	11.7990(4), 12.0736(4), 14.6803(5); 72.472(3), 80.688(3), 72.030(3); 1891.44(12)	2	/	This work
CFZ-NH^+-Cl^--H_2O (1:1:0.13)	$Pbca$	10.2664(4), 19.8275(7), 24.1558(9); 90, 90, 90; 4917.1(3)	8	RAFHUE	(Horstman *et al.*, 2017)
CFZ-NH^+-Cl^- (1:1)	$Pbca$	10.74739(15), 19.1763(4), 24.2362(3); 90, 90, 90; 4994.96(14)	8	LABQUD	(Keswani *et al.*, 2015)
CFZ-NH^+-MSA^- (1:1)	$P2_1/n$	10.0229 (18), 17.772 (3), 15.592 (3); 90, 103.028 (4), 90; 2705.9(8)	4	GESGAO	(Bolla & Nangia, 2012)
CFZ-NH^+-MLE^- (1:1)	$P2_1/n$	11.2549(19), 20.816(3), 12.519(2); 90, 103.413(17), 90; 2853.0(8)	4	GESHAP	(Bolla & Nangia, 2012)
CFZ-NH^+-INA^- (1:1)	$P\bar{1}$	9.8153(9), 12.1738(10), 15.2122(10); 72.455(7), 77.844(7), 66.479(8); 1580.7(2)	2	GESGES	(Bolla & Nangia, 2012)
CFZ-NH^+-NA^- (1:1)	$P\bar{1}$	11.6032(13), 15.361(2), 18.733(3); 111.337(14), 91.280(11), 109.295(11); 2896.5(8)	4	GESGIW	(Bolla & Nangia, 2012)
CFZ-NH^+-MLN^- (1:1)	$P\bar{1}$	9.8401(8), 12.4069(10), 13.0576(10); 74.129(1), 70.300(1), 67.520(1); 1367.50(19)	2	GESGOC	(Bolla & Nangia, 2012)
CFZ-NH^+-SCL^- (1:1)	$P\bar{1}$	10.8702(6), 11.2066(6), 13.8272(8); 82.354(5), 88.960(5), 63.492(6); 1492.31(17)	2	GESGUI	(Bolla & Nangia, 2012)
CFZ-NH^+-CIT^- (1:1)	$P\bar{1}$	14.7409(6), 15.8211(6), 16.2514(7); 71.928(1), 63.041(1), 70.747(2); 3130.6(2)	4	-	(Bannigan *et al.*, 2017)
CFZ-NH^+-$TRPTA^{2-}$-TRPTA (1:0.5:0.5)	$P\bar{1}$	10.4028 (3), 10.8454 (3), 15.4229 (5); 71.183 (3), 73.984 (3), 76.148 (2); 1561.33 (9)	2	/	This work
CFZ-NH^+-$SACC^-$ (1:1)	$P\bar{1}$	8.2115 (7), 13.5327 (12), 14.325 (3); 89.04 (1), 88.864 (10), 83.781 (7)	2	/	This work
CFZ-NH^+-FA^- (1:1)	$P2_1/c$	7.47882(9), 26.0041(3), 14.78241(16); 90, 102.5075(12), 90; 2806.65(6)	4	/	this work
CFZ-NH^+-SA^- (1:1)	$P\bar{1}$	10.6455(6), 12.2850(5), 12.8049(8); 90.076 4), 113.218(6), 108.289(4); 1446.18(15)	2	/	this work

Table S2 Selected hydrogen-bond parameters.

D—H···*A*	*D*—H (Å)	H···*A* (Å)	*D*···*A* (Å)	*D*—H···*A* (°)
CFZ-NH$^+$-FA$^-$ (1:1)				
N3—H3···O2	0.83 (3)	2.48 (3)	3.003 (3)	122 (2)
N3—H3···O3$^-$	0.83 (3)	2.26 (3)	3.040 (3)	156 (3)
N4$^+$—H4···O3$^-$	0.84 (3)	2.17 (3)	2.972 (2)	160 (2)
O1—H1A···O3$^-$	0.94 (4)	1.62 (4)	2.550 (2)	176 (3)
CFZ-NH$^+$-SA$^-$ (1:1)				
N4$^+$—H4···O1$^-$	0.85 (3)	1.98 (3)	2.824 (3)	170 (2)
N3—H3···O1$^-$	0.83 (3)	2.11 (2)	2.871 (3)	152 (3)
O4—H4B···O2$^-$	0.94 (3)	1.56 (3)	2.497 (3)	177 (3)
C15—H15···O1$^-$	0.93	2.31	3.233 (3)	174.6
C29B—H29D···Cl2	0.97	2.80	3.416 (14)	122.2
CFZ-NH$^+$-SACC$^-$-MeCN (1:1:1.4)				
N3—H3···N5$^-$	0.87(3)	2.03(3)	2.893(3)	170(3)
N4$^+$—H4N···O3	0.85(4)	2.45(4)	3.264(3)	160(3)
C33—H33···O3	0.95	2.45	3.283(3)	146.0
C24—H24···O1	0.95	2.42	3.314(3)	157.3
CFZ-NH$^+$-SACC$^-$ (1:1)				
N4$^+$—H4···N5$^-$	0.79 (7)	2.22 (8)	2.99 (2)	163 (8)
N4$^+$—H4···N5A$^-$	0.79 (7)	2.25 (8)	3.04 (2)	174 (8)
N3—H3···N5$^-$	1.05 (7)	1.78 (7)	2.84 (2)	178 (5)
N3—H3···N5A$^-$	1.05 (7)	1.88 (7)	2.92 (2)	165 (5)
C24—H24···O1	0.93	2.48	3.40 (2)	167.9
C26—H26C···O2	0.96	2.55	3.49 (2)	166.1
C26—H26C···O2A	0.96	2.45	3.370 (18)	160.9
CFZ-NH$^+$-2,4DHBA$^-$-MeOH (1:1:1)				
N4$^+$—H4N···O1A$^-$	0.853 (19)	2.00 (2)	2.852 (10)	174.9 (17)
N4$^+$—H4N···O1B$^-$	0.853 (19)	2.00 (3)	2.854 (18)	176.2 (18)
N3—H3N···O1A$^-$	0.89 (2)	1.88 (3)	2.743 (13)	164 (2)
N3—H3N···O1B$^-$	0.89 (2)	1.86 (3)	2.73 (2)	169 (2)
O3A—H3OA···O2A$^-$	1.02	1.66	2.556 (15)	144.5
O4A—H4OA···O5A	0.82	2.02	2.786 (10)	155.2
O5A—H5OA···O3A	0.82	2.39	3.192 (12)	166.6
O3B—H3OB···O2B$^-$	1.02	1.42	2.33 (3)	146.4
O4B— H4OB···O5B	0.82	2.10	2.86 (2)	154.5
O5B—H5OB···O4B	0.82	2.17	2.64 (2)	116.1
C14—H14···O1A$^-$	0.93	2.45	3.346 (11)	161.4
C14—H14···O1B$^-$	0.93	2.57	3.467 (19)	162.1
C23—H23···O4A	0.93	2.50	3.207 (8)	132.8
C23—H23···O4B	0.93	2.41	3.204 (16)	143.3
CFZ-NH$^+$-TRPTA^{2-}-TRPTA-solvent (1:0.5:0.5:x)				
N4$^+$—H4···O1$^-$	0.841 (16)	2.071 (16)	2.8985 (13)	167.7 (15)
N3—H3···O1$^-$	0.866 (18)	1.947 (18)	2.7772 (14)	160.1 (16)
O1A—H3B···O1$^-$	0.91 (2)	1.64 (2)	2.5442 (13)	171 (2)
C15—H15···O2$^-$	0.95	2.44	3.3792 (17)	170.8

Table S2 continued.

CFZ-NH^+-$TRPTA^{2-}$-TRPTA (1:0.5:0.5)				
$N4^+$—H4···$O1^-$	0.86 (2)	1.98 (2)	2.8363 (19)	172.9 (18)
N3—H3···$O2^-$	0.85 (2)	2.17 (2)	2.976 (2)	159 (2)
N3—H3···$O1^-$	0.85 (2)	2.30 (2)	2.996 (2)	140 (2)
O1B—H3B···$O2^-$	0.95 (3)	1.66 (3)	2.5936 (19)	170 (3)
C14—H14···$O1^-$	0.93	2.40	3.276 (2)	156.7
C20—H20···$O2^-$	0.93	2.54	3.307 (2)	139.7
C26—H26C···O2B	0.96	2.55	3.502 (3)	171.5

Table S3 **T1**, **T2**, **T3**, **T4**, and **T5** torsions angles, C9-N4-C25 angle, and H-H distance between N3-H and N4-H in clofazimine/clofaziminium in published and new structures as well as in optimized structures. Data from structures presented in this work are written in italic. A, B, C and D annotations indicate different molecules in the asymmetric unit while 1 and 2 superscripts indicate the two positions observed in case of disorder. NA means that hydrogen is not present in cif file.

Structure	**T1** (°) (C8-N3-C19-C20)	**T2** (°) (C9-N4-C25-C27)	**T3** (°) (C12-N1-C13-C18)	**T4** (°) (H-N4-C9-C8)	**T5** (°) (H-N3-C8-C9)	Angle C9-N4-C25 (°)	H-H distance between N3-H and N4-H
CFZ (I)	154.9(7)	-154.8(8)	92.1(8)	/	-9.9	119.2(5)	/
CFZ (II)	149.4(3)	-157.1(3)	82.1(3)	/	-13(2)	120.7(2)	/
CFZ (III)	-163.1(3)	-152.5(2)	87.8(3)	/	9.6(4)	120.4(2)	/
CFZ (IV)	-146.83	-99.94	110.71	/	0.72	120.71	/
CFZ-DMF	-149.90	-138.45	99.44	/	NA	118.18	/
CFZ-(CH_3)$_2$CO (1:1)	-146.4(2)	-159.5(2)	97.0(2)	/	5.1	119.2(2)	/
CFZ-NH$^+$-$H_2PO_4^-$-H_2O (1:1:0.25)	A: 133.8(5) B:-133.6(5) C: 135.2(6) D: 130.7(5)	A: -78.2(5) B: -156.3(4) C: -95.9(6) D: -76.3(7)	A: 63.6(5) B: 93.3(5) C: 82.9(7) D: 91.1(7)	A:-14.4 B: -2.1 C: 1.1 D:-11.3	A: 2.4 B: -1.9 C: -2.1 D: 3.9	A: 125.3(3) B: 124.1(4) C: 127.6(5) D: 125.8(4)	A: 1.8565 B: 1.7934 C: 1.7794 D: 1.8702
CFZ-NH$^+$-HSO_4^--MeOH (1:1:1)	143.4(2)	-78.8(3)	81.1(3)	1.3	-14.2	124.7(2)	1.8226
CFZ-NH$^+$-MSA$^-$-H_2O (1:1:1)	174.9(2)	-154.3(3)	95.0(3)	-12(2)	-10.(2)	125.2(2)	1.83(4)
CFZ-NH$^+$-2,4DHBA$^-$-MeOH (1:1:1)	*-142.18(15)*	*-169.69(14)*	*106.25(15)*	*-1(1)*	*13(2)*	*126.25(13)*	*1.83(3)*
CFZ-NH$^+$-SACC$^-$-MeCN (1:1:1.4)	*-135.7(2)*	*-144.6(7)* ^{1} *-69.3(14))* ^{2}	*91(3)* ^{1} *99(3)* ^{2}	*-0(3)*	*38(2)*	*122.8(7)*^{1} *129.1(8)*^{2}	*2.01(4)*
CFZ-NH$^+$-SACC$^-$ (1:1)	*-137.0 (6)*	*-158.4 (6)*	*89.7 (7)*	*-12(7)*	*31 (4)*	*126.9 (6)*	*1.9 (1)*
CFZ-NH$^+$-TRPTA^{2-}-TRPTA-solvent (1:0.5:0.5:x)	*143.09(13)*	*-150.77(14)*	*83.78(14)*	*-3(1)*	*-28(1)*	*125.53(10)*	*1.91(3)*
CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)	*-148.7(2)*	*-166.14(17)*	*97.32(18)*	*7(2)*	*24(2)*	*124.72(14)*	*1.97(3)*
CFZ-NH$^+$-Cl$^-$-H_2O (1:1:0.13)	-149.1(2)	-92.2(3) ^{1} -137(1) ^{2}	76.0(2)	13(2)	11(2)	125.7(2) ^{1} 118.2(5) ^{2}	2.04(3)
CFZ-NH$^+$-Cl$^-$ (1:1)	145.9(9)	-149(1)	97(1)	-13(5)	-10(10)	123(1)	1.7(2)
CFZ-NH$^+$-MSA$^-$ (1:1)	146.5(3)	-71.6(4)	85.4(4)	2(2)	-19(2)	125.9(3)	1.83(4)
CFZ-NH$^+$-MLE$^-$ (1:1)	-147.2(5)	-100.9(6)	92.8(5)	7(4)	25(3)	125.0(4)	1.98(6)
CFZ-NH$^+$-INA$^-$ (1:1)	-138.5(4)	-168.5(3)	101.2(4)	-6(2)	21(2)	125.6(3)	1.72(4)
CFZ-NH$^+$-NA$^-$ (1:1)	A: 142.3(4) B: 150.3(4)	A: -75.8(5) B: -71.0(5)	A: 77.1(4) B: 81.4(4)	A:-10.8 B: -6.2	A: -5.5 B: -5	A: 110.5(3) B: 124.3(3)	A: 1.7938 B: 1.7956
CFZ-NH$^+$-MLN$^-$ (1:1)	-145.9(3)	-158.0(3)	102.1(3)	1(2)	32.86	125.0(2)	1.99(4)
CFZ-NH$^+$-SCL$^-$ (1:1)	175.5(2)	-153.5(3)	97.9(2)	-8(2)	-3(2)	125.1(2)	1.92(4)
CFZ-NH$^+$-CIT$^-$ (1:1)	A: 145.9(3) B: -133.7(3	A: -80.1(3) B:-160.6(3)	A: 89.6(3) B:108.1(3)	A: 5.0 B: 7.6	A:-10.0 B: 0.3	A: 125.6(2) B: 110.8(2)	A: 1.8315 B: 1.8583
CFZ-NH$^+$-FA$^-$ (1:1)	*-124.4(2)*	*-146.0(3)*	*76.1(2)*	*-8(2)*	*34(2)*	*126.02(18)*	*1.96(4)*
CFZ-NH$^+$-SA$^-$ (1:1)	*153.0(2)*	*-83.6(3)*	*86.3(2)*	*0(2)*	*-16(2)*	*125.5(2)*	*1.88(4)*
CFZ optimized	-151.32	-156.44	91.63	/	5.62	*121.01*	/
CFZ-NH$^+$ optimized	-122.86	-159.84	94.07	15.40	51.35	*125.71*	*2.106*
CFZ-NH$^+$-Cl$^-$ (1:1) optimized	147.26	-151.56	94.71	-3.41	-11.34	*125.56*	*1.793*

Table S4 Atomic coordinates of optimized clofazimine (DAKXUI03).

E (RM06): -2180.82541943 Hartree

center number	atomic number	atomic type	X (Å)	Y (Å)	Z (Å)
1	17	0	8.542442	0.704357	0.209214
2	17	0	-6.9481	-2.29036	0.301462
3	7	0	-2.14619	1.164776	-0.00064
4	7	0	0.140856	2.748417	-0.17926
5	7	0	2.923027	-1.14088	-0.07092
6	1	0	2.783777	-2.15045	-0.13693
7	6	0	-2.28458	2.547588	-0.08207
8	7	0	0.835378	-2.65978	-0.00311
9	6	0	-1.1053	3.314653	-0.17091
10	6	0	-3.85825	0.03082	1.308589
11	1	0	-3.3956	0.426814	2.209955
12	6	0	1.547901	0.863029	-0.11714
13	1	0	2.373254	1.560195	-0.21463
14	6	0	-0.7402	-0.79419	0.042316
15	1	0	-1.60785	-1.44215	0.100702
16	6	0	0.561329	-1.40182	0.001783
17	6	0	-4.9809	-0.77869	1.383768
18	1	0	-5.42362	-1.03208	2.34267
19	6	0	0.249921	1.451792	-0.10542
20	6	0	-2.44695	5.326122	-0.25025
21	1	0	-2.51705	6.408721	-0.31543
22	6	0	-3.31285	0.341952	0.072493
23	6	0	-3.53125	3.17529	-0.08004
24	1	0	-4.44065	2.583892	-0.01418
25	6	0	1.735017	-0.48293	-0.05268
26	6	0	6.878357	0.175384	0.133305
27	6	0	4.226038	-0.65292	-0.00281
28	6	0	5.89341	0.914076	0.766634
29	1	0	6.161099	1.809141	1.321564
30	6	0	-1.21549	4.708614	-0.25385
31	1	0	-0.28766	5.271267	-0.32133
32	6	0	-0.90753	0.555862	-0.01269
33	6	0	-5.53832	-1.26958	0.212642
34	6	0	-3.87643	-0.15388	-1.09399
35	1	0	-3.42727	0.09907	-2.05206
36	6	0	-4.9974	-0.96589	-1.0281
37	1	0	-5.45329	-1.36314	-1.93033
38	6	0	-0.2188	-3.65343	0.025556
39	1	0	-1.04819	-3.32944	0.68098
40	6	0	5.238034	-1.38892	-0.62419
41	1	0	4.975503	-2.28888	-1.17732
42	6	0	-3.60499	4.553147	-0.1635
43	1	0	-4.58073	5.032876	-0.16135
44	6	0	4.573377	0.499034	0.704977
45	1	0	3.814891	1.056259	1.245423
46	6	0	6.557893	-0.98367	-0.55595
47	1	0	7.339542	-1.55883	-1.04455
48	6	0	-0.76555	-3.87152	-1.37932
49	1	0	-1.20876	-2.95781	-1.79154
50	1	0	0.045264	-4.18105	-2.04986
51	1	0	-1.531	-4.65621	-1.38624
52	6	0	0.348687	-4.94272	0.588143
53	1	0	1.160856	-5.30783	-0.05236
54	1	0	0.759522	-4.78602	1.590701
55	1	0	-0.4186	-5.7233	0.648061

Table S5 Atomic coordinates of optimized geometry of clofaziminium without any counter-ion.

E(RM06): -2181.23130054 Hartree

center number	atomic number	atomic type	X (Å)	Y (Å)	Z (Å)
1	17	0	7.056535	-1.83325	-0.10889
2	17	0	-8.29076	0.831069	-0.25532
3	7	0	1.986052	1.21845	0.016537
4	7	0	-0.41207	2.611798	0.094537
5	7	0	-2.87044	-1.49724	0.280427
6	1	0	-2.8273	-2.2254	0.987232
7	7	0	-0.57662	-2.84764	-0.11481
8	1	0	-1.50507	-3.19261	-0.33617
9	6	0	3.202897	3.331344	0.012594
10	1	0	4.1611	2.821471	-0.00925
11	6	0	3.14538	4.704976	0.027658
12	1	0	4.072743	5.271274	0.015633
13	6	0	1.917066	5.389851	0.05962
14	1	0	1.906057	6.475633	0.069725
15	6	0	0.745516	4.685901	0.080842
16	1	0	-0.22634	5.17041	0.109056
17	6	0	0.759909	3.274028	0.06823
18	6	0	-0.40737	1.298616	0.083144
19	6	0	-1.64479	0.601186	0.163243
20	1	0	-2.54262	1.205452	0.256108
21	6	0	-1.69997	-0.75572	0.171512
22	6	0	-0.46629	-1.51892	0.014856
23	6	0	0.762381	-0.86201	0.002342
24	1	0	1.678887	-1.43236	-0.08841
25	6	0	0.813821	0.524543	0.038123
26	6	0	2.00929	2.598854	0.029963
27	6	0	3.230027	0.488114	-0.01457
28	6	0	3.827216	0.216216	-1.23502
29	1	0	3.366348	0.567761	-2.15574
30	6	0	5.012574	-0.50068	-1.26552
31	1	0	5.502925	-0.72341	-2.20855
32	6	0	5.576774	-0.935	-0.07274
33	6	0	4.976537	-0.65873	1.149448
34	1	0	5.440162	-1.00187	2.06956
35	6	0	3.792289	0.059804	1.17759
36	1	0	3.30424	0.290501	2.122241
37	6	0	-4.1561	-0.90832	0.167068
38	6	0	-4.5193	-0.24492	-1.0016
39	1	0	-3.8097	-0.16646	-1.82247
40	6	0	-5.78504	0.297301	-1.12814
41	1	0	-6.07633	0.81429	-2.03792
42	6	0	-6.69797	0.159085	-0.09073
43	6	0	-6.35278	-0.51263	1.070791
44	1	0	-7.07718	-0.61536	1.873451
45	6	0	-5.07632	-1.03648	1.200261
46	1	0	-4.79583	-1.54926	2.119174
47	6	0	0.536842	-3.78589	-0.29436
48	1	0	1.238437	-3.33726	-1.0157
49	6	0	-0.01156	-5.06698	-0.88611
50	1	0	-0.73028	-5.53593	-0.20219
51	1	0	0.794397	-5.78635	-1.05265
52	1	0	-0.50696	-4.89353	-1.84702
53	6	0	1.247951	-4.03899	1.023846
54	1	0	1.622656	-3.11914	1.485166
55	1	0	2.101326	-4.70757	0.872355
56	1	0	0.567728	-4.51828	1.736968

Table S6 Atomic coordinates of optimized geometry of clofaziminium with Cl^- counter-ion (LABQUD). E(RM06): -2641.64794122 Hartree

center number	atomic number	atomic type	X (Å)	Y (Å)	Z (Å)
1	17	0	-3.27379	-3.89917	-0.38225
2	7	0	0.095202	2.936519	-0.43037
3	6	0	3.757824	3.303799	-0.11117
4	1	0	4.649915	2.701454	0.035816
5	17	0	-8.09389	1.673677	0.586502
6	7	0	2.334504	1.319351	-0.09732
7	6	0	2.713893	5.464003	-0.40772
8	1	0	2.810042	6.543039	-0.49229
9	7	0	-0.533	-2.49977	-0.3261
10	17	0	7.031537	-2.22103	0.588543
11	6	0	1.477936	4.87299	-0.48096
12	1	0	0.566891	5.448656	-0.62117
13	7	0	-2.78412	-0.84749	-0.14344
14	6	0	1.337	3.476707	-0.37178
15	1	0	-2.91335	-1.87072	-0.25096
16	6	0	2.50132	2.695225	-0.19041
17	6	0	1.100736	0.741508	-0.17869
18	6	0	-0.04056	1.634336	-0.32635
19	6	0	0.909135	-0.61941	-0.14209
20	1	0	1.767179	-1.27377	-0.05894
21	6	0	-1.32675	1.055277	-0.34656
22	1	0	-2.15329	1.749207	-0.44986
23	6	0	-1.55473	-0.29498	-0.23405
24	6	0	-0.37642	-1.19263	-0.23385
25	6	0	-4.01235	-0.18451	0.028548
26	6	0	-5.13582	-0.75764	-0.56983
27	1	0	-5.0168	-1.66719	-1.15531
28	6	0	-6.38655	-0.19398	-0.39573
29	1	0	-7.26117	-0.63977	-0.86074
30	6	0	-6.51852	0.947152	0.379402
31	6	0	-4.16833	0.944026	0.832816
32	1	0	-3.31778	1.365247	1.360611
33	6	0	3.48509	0.476738	0.06962
34	6	0	3.867293	0.090829	1.344782
35	1	0	3.300615	0.441189	2.204705
36	6	0	4.962601	-0.74222	1.508536
37	1	0	5.27952	-1.05787	2.498183
38	6	0	5.657784	-1.17419	0.387891
39	6	0	4.181193	0.042924	-1.04758
40	1	0	3.8581	0.357686	-2.03754
41	6	0	-5.41897	1.513459	1.002824
42	1	0	-5.54386	2.391144	1.630882
43	6	0	5.278596	-0.78842	-0.89006
44	1	0	5.839203	-1.14029	-1.75107
45	6	0	0.54871	-3.4903	-0.33039
46	1	0	1.412921	-3.04428	-0.84218
47	6	0	0.917983	-3.84915	1.099768
48	1	0	1.246471	-2.97446	1.673051
49	1	0	1.724537	-4.59028	1.114467
50	1	0	0.048181	-4.28132	1.608237
51	6	0	0.103184	-4.70726	-1.11753
52	1	0	-0.18416	-4.43898	-2.13881
53	1	0	-0.7644	-5.18499	-0.65038
54	1	0	0.921459	-5.43324	-1.16594
55	6	0	3.85547	4.674	-0.21969
56	1	0	4.834138	5.142751	-0.1577
57	1	0	-1.47856	-2.94228	-0.34855

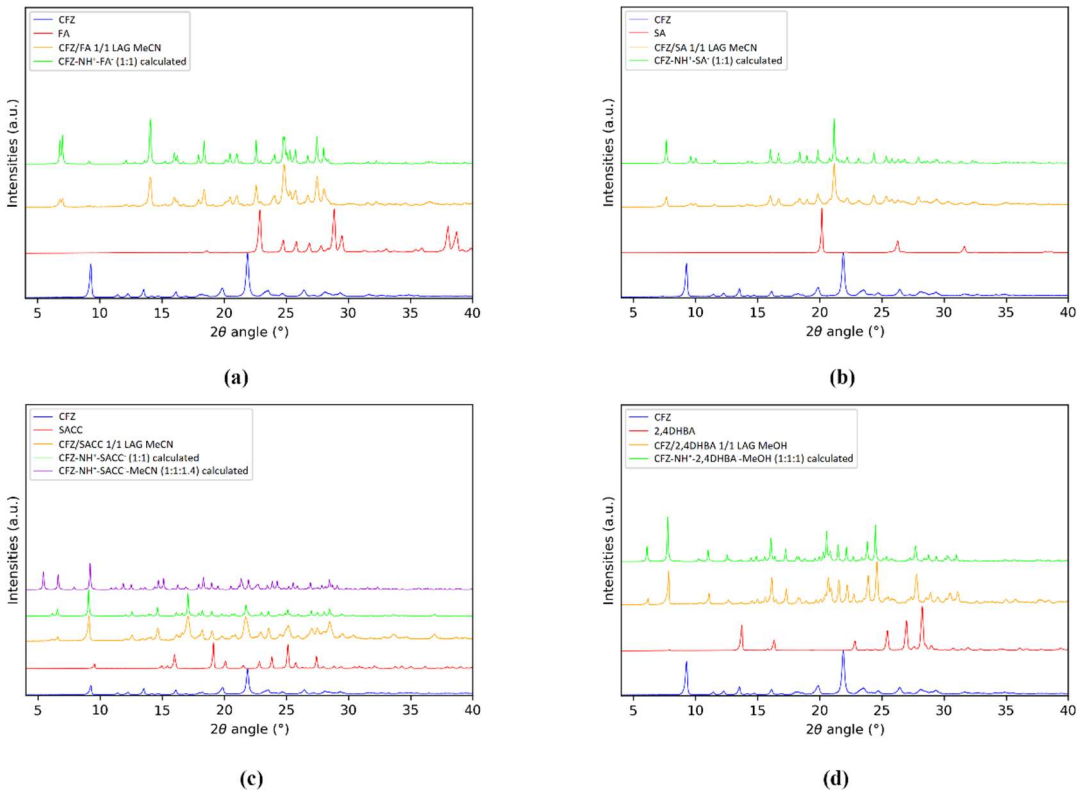

Figure S1 . Powder patterns of (a), from bottom to top, CFZ, FA, CFZ/FA LAG MeCN batch powder and **CFZ-NH$^+$FA$^-$ (1:1)** calculated pattern from SCXRD data, (b) CFZ, SA, CFZ/SA LAG MeCN batch powder and **CFZ-NH$^+$-SA$^-$ (1:1)** calculated pattern from SCXRD data, (c) CFZ, SACC, CFZ/SACC LAG MeCN batch powder and **CFZ-NH$^+$-SACC$^-$ (1:1)** and **CFZ-NH$^+$-SACC$^-$-MeCN (1:1:1.4)** calculated patterns from SCXRD data, (d) CFZ, 2,4-DHBA, CFZ/2,4-DHBA LAG MeOH batch powder and **CFZ-NH$^+$-2,4DHBA$^-$-MeOH (1:1:1)** calculated pattern from SCXRD data.

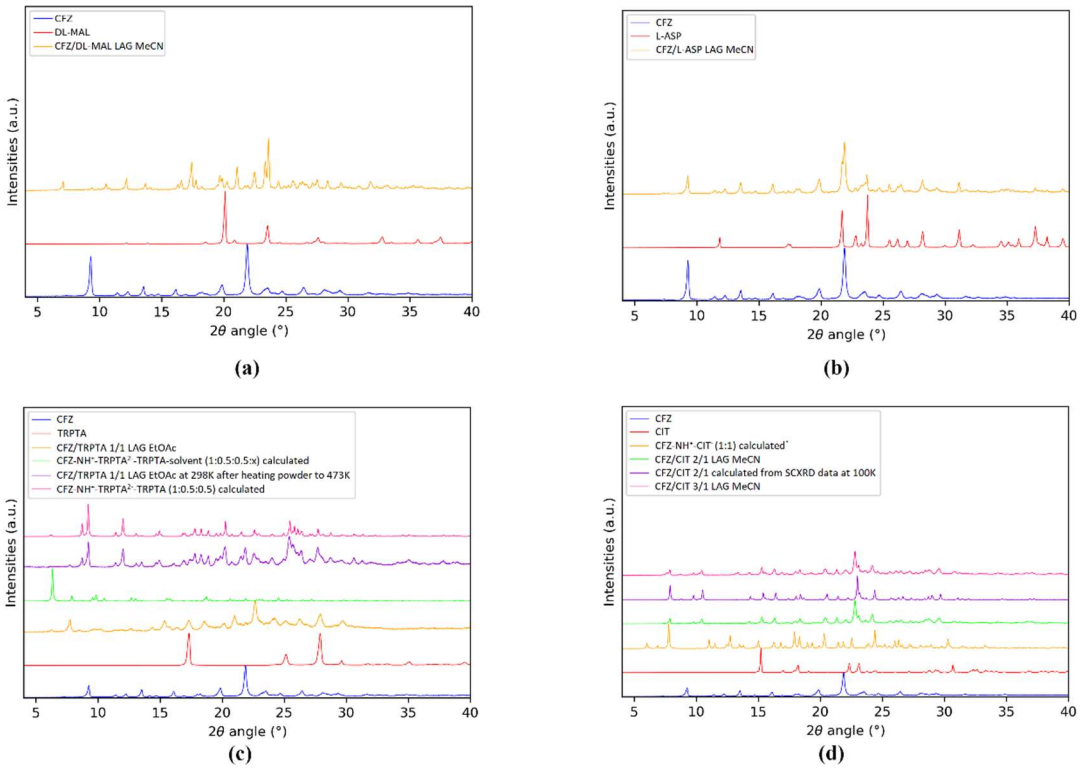

Figure S2 . Powder patterns of (a), CFZ, DL-MAL and CFZ/DL-MAL LAG MeCN batch powder, (b) CFZ, L-ASP, CFZ/L-ASP LAG MeCN batch powder, (c) CFZ, TRPTA, CFZ/TRPTA LAG EtOAc, **CFZ-NH^{+}-TRPTA^{2-}-TRPTA-solvent (1:0.5:0.5:x)** calculated pattern from SCXRD data, CFZ/TRPTA LAG EtOAc batch powder at 25°C after heating to 200°C and **CFZ-NH^{+}-TRPTA^{2-}-TRPTA (1:0.5:0.5)** calculated from SCXRD data, (d) CFZ, CIT, **CFZ-NH^{+}-CIT^{-} (1:1)** calculated from SCXRD data (Bannigan *et al.*, 2017), CFZ/CIT 2/1 LAG MeOH/MeCN 50/50, CFZ-CIT 2/1 calculated from SCXRD data obtained at 100K (structure intrinsically disordered) and CFZ/CIT 3/1 LAG MeOH/MeCN 50/50. * SCXRD data from cif file available in the publication of Bannigan et al. (Bannigan *et al.*, 2017).

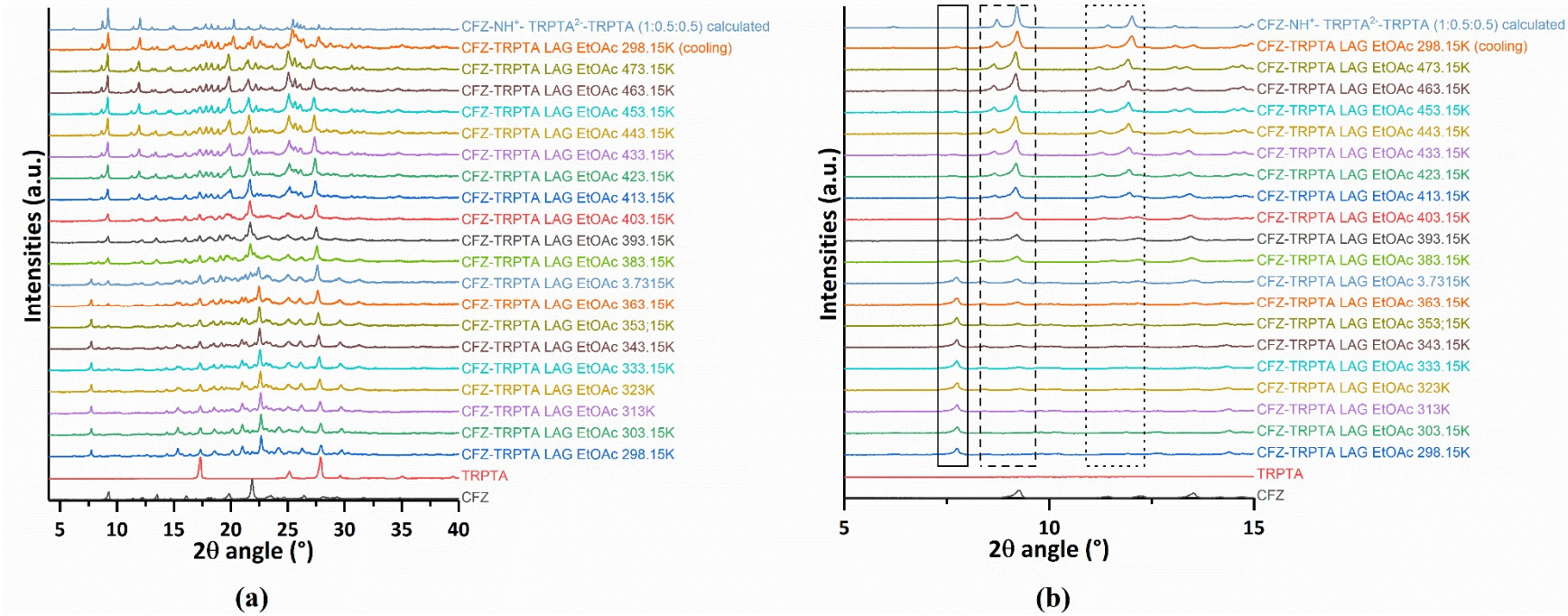

Figure S3 (a) Variable temperature powder X-ray diffraction of CFZ/TRPTA LAG EtOAc batch powder and comparison with calculated pattern of **CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)**. Desolvatation of a solvated crystalline powder occurred to give a non-solvated crystalline powder matching the calculated powder pattern of **CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)**. (b) Zoom on the 5-15° 2θ region, disappearing peak upon heating at 2θ value of 7.7° highlighted by plain line frame, appearing peaks upon heating at 2θ values of 8.8 and 9.2° (dashed frame) as well as 11.5 and 12.0° (dotted frame).

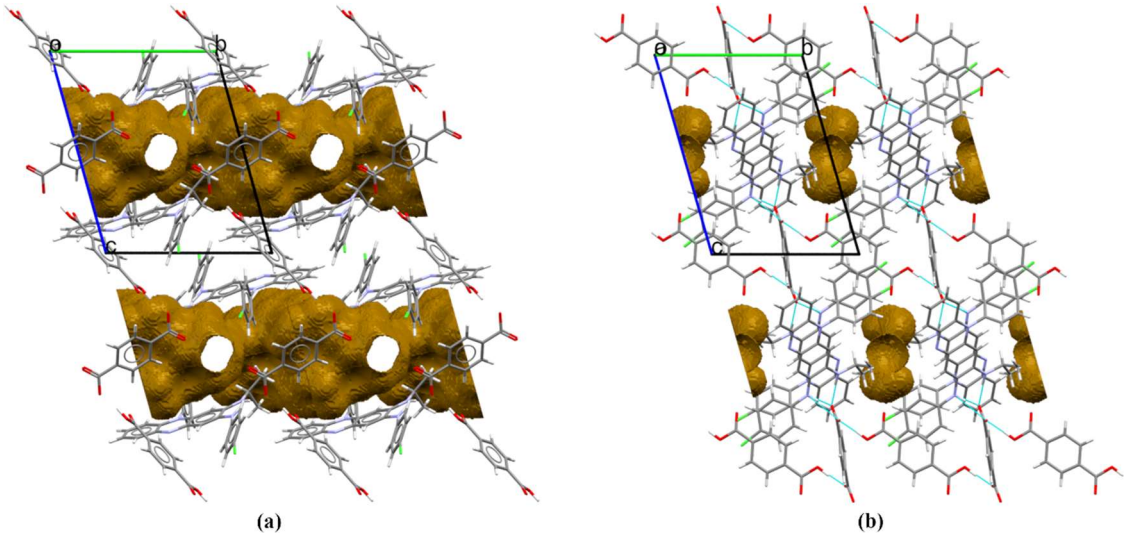

Figure S4 Channel arrangement and solvent accessible voids in the structure of **CFZ-NH$^+$-TRPTA^{2-}-TRPTA-solvent (1:0.5:0.5:x)** (view along a-axis) (a) and in the one of **CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)** (view along a-axis) (b).

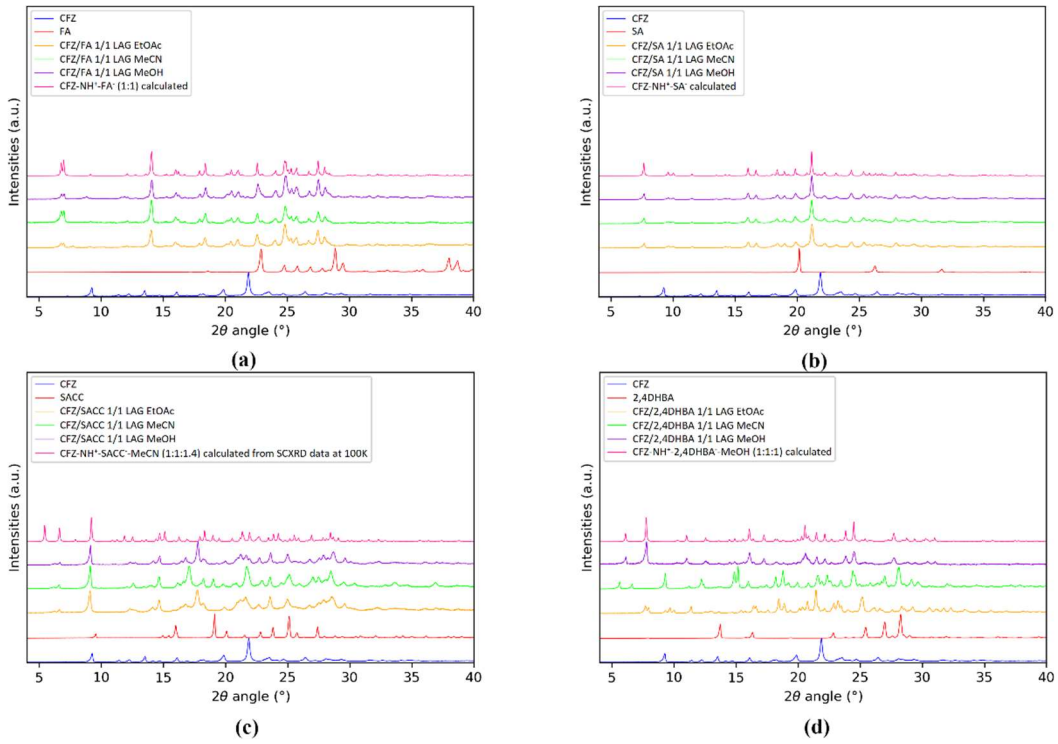

Figure S5 Effect of different solvents while grinding (a) CFZ with FA, (b) CFZ with SA, (c) CFZ with SACC.

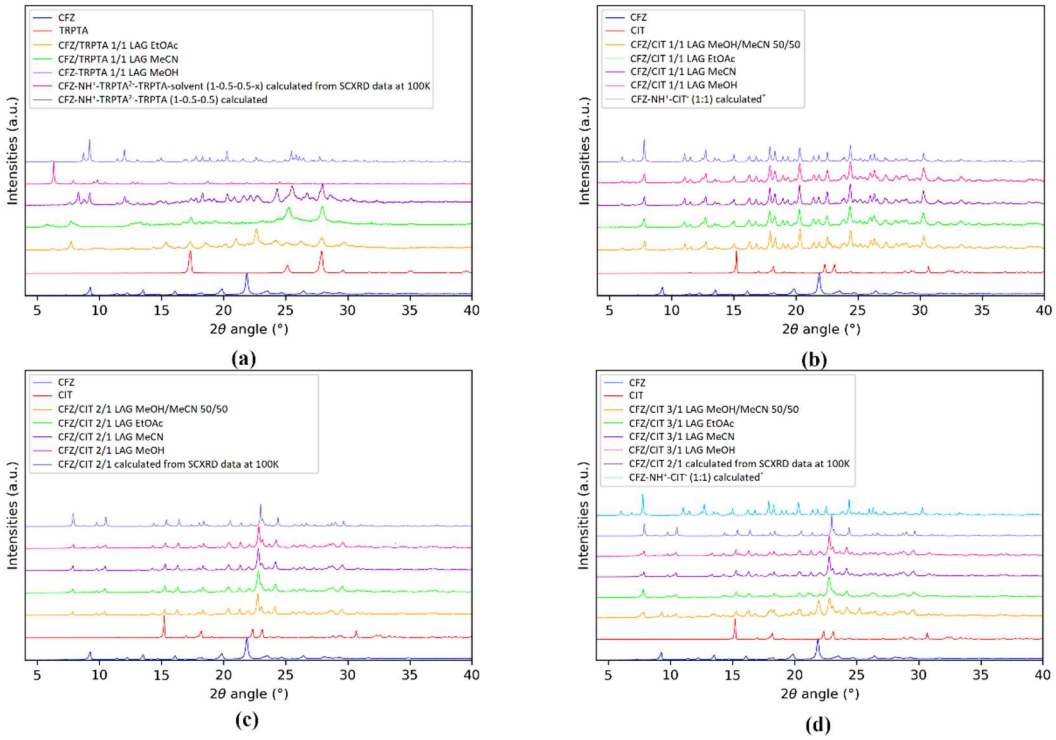

Figure S6 Effect of different solvents while grinding (a) CFZ with TRPTA, (b) CFZ with CIT in 1/1 molar ratio, (c) CFZ with CIT in 2/1 molar ratio and (d) CFZ with CIT in 3/1 molar ratio.

Liquid-assisted grinding experiments were performed in three solvents (MeCN, MeOH and EtOAc) for all combinations described in this paper. For the unsolvated salts, changing the solvent during grinding experiment does not affect the outcome of the reaction. Instead, for solvated salts, indeed, the powder pattern change in function of the solvent used during liquid-assisted grinding.

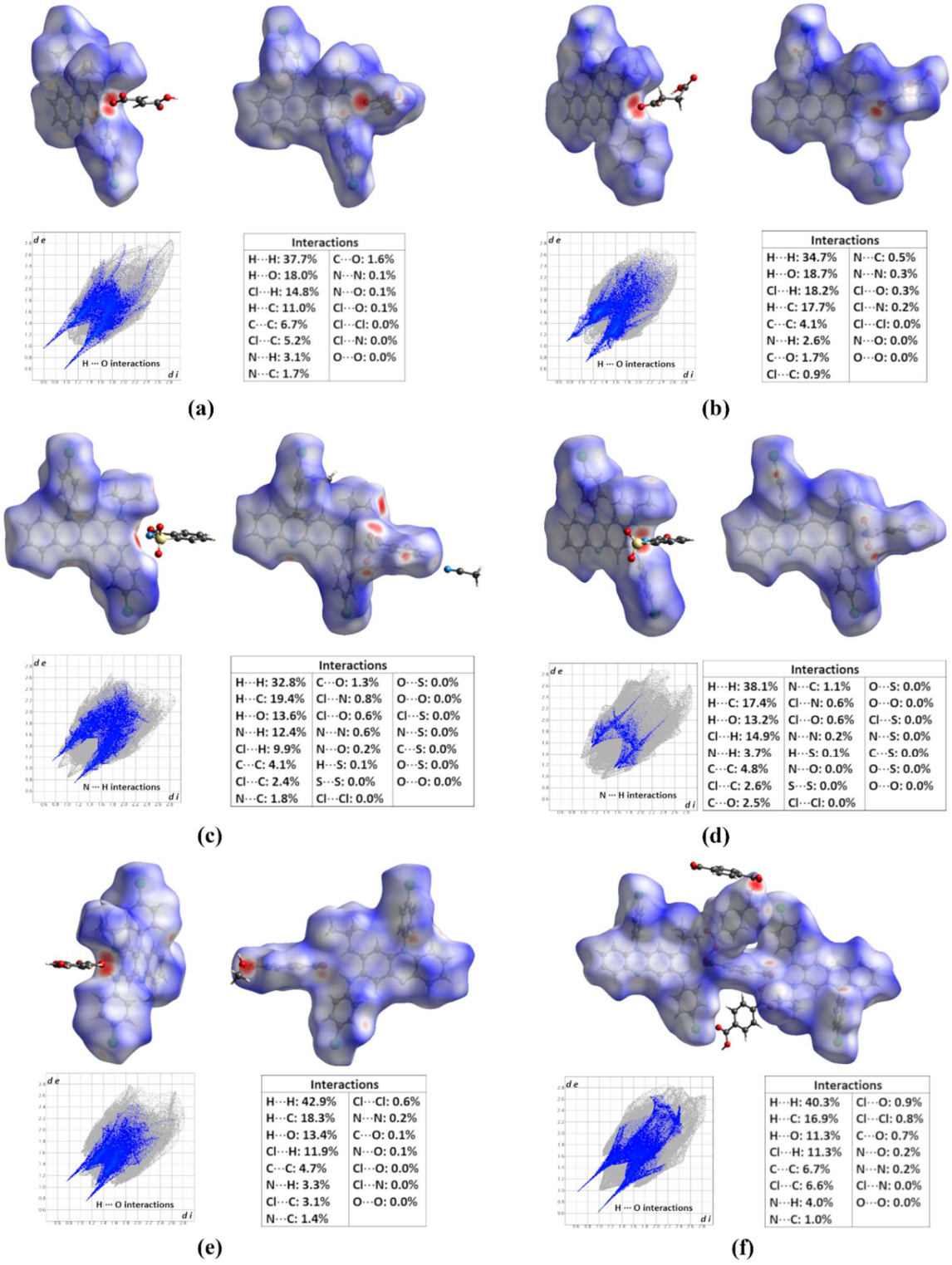

Figure S7 Hirshfeld surface analysis (red regions highlighting close contacts), 2D-fingerprint plots (based on the surface generated on the molecules/ions present in the asymmetric unit) and percentage contribution to the Hirshfeld surface area for the different close contacts in the structures of (a) **CFZ-NH$^+$-FA$^-$ (1:1)** (b) **CFZ-NH$^+$-SA$^-$ (1:1)**, (c) **CFZ-NH$^+$-SACC$^-$-MeCN (1:1:1.4)**, (d) **CFZ-NH$^+$-SACC$^-$(1:1)**, (e) **CFZ-NH$^+$-2,4DHBA$^-$-MeOH (1:1:1)** and (f) **CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)**.

Hirshfeld surfaces and fingerprint plots of d_e (distance from the surface to the nearest atoms outside the surface) *vs.* d_i (distance from the surface to the nearest atoms located inside the surface) were generated using CrystalExplorer (version 17.5) (Turner *et al.*, 2017; Spackman & Jayatilaka, 2009; Spackman & Mckinnon, 2002; Hirshfeld, 1977). Surfaces were generated using the normalized contact distance 'd_{norm}' descriptor (Mckinnon *et al.*, 2007). White surfaces correspond to contacts with distance around the sum of van der Waals radii while red and blue surfaces highlight shorter and longer contacts respectively (Mckinnon *et al.*, 2007). For the structure of **CFZ-NH$^+$-SA$^-$ (1:1)** disorder of SA$^-$ was removed (and occupancies of C29A, H29A, H29B, C30A, H30A and H30B were modified from 0.739 to 1) for surface and fingerprint plots generation. For the structure of **CFZ-NH$^+$2,4DHBA$^-$-MeOH (1:1:1)** 2,4DHBA$^-$ and MeOH disorder was removed and corresponding occupancies were modified to 1. Concerning the structure of **CFZ-NH$^+$-SACC$^-$-MeCN (1:1:1.4)** MeCN is disordered over three position, with positions of C37-C38-N7 being very close to the ones of C37A-C38A-N7A. In consequence, one MeCN molecule (C37A-H37D-H37E-H37F-C38A-N7A) was removed and occupancies of C37-H37A-H37B-H37C-C38-N7 were modified accordingly (occupancies of 0.464 modified to 0.953 (which is the sum of the occupancies of C37A-H37D-H37E-H37F-C38A-N7A and C37-H37A-H37B-H37C-C38-N7). Disorder of isopropyl of CFZ was also removed and occupancies of C25B-H25B-C26B-H26D-H26E-H26F-C27B-H27D-H27E-H27F were modified to 1 before Hirshfeld surface and 2D fingerprint plots generation. In the structure of **CFZ-NH$^+$-SACC$^-$ (1:1:)**, SACC$^-$ is disordered and second position of SACC was removed (and occupancies were modified to 1 for the remaining SACC position) prior Hirshfeld surface and 2D fingerprint plots generation. 2D-fingerprint plots shown on Figure S7 corresponds to the Hirshfeld surface generated by selecting all atoms from the unit cell (for **CFZ-NH$^+$-TRPTA^{2-}-TRPTA (1:0.5:0.5)**, Hirshfeld surface was generated on **CFZ-NH$^+$-TRPTA^{2-}-TRPTA-CFZ-NH$^+$ (1:1:1:1**) assembly which corresponds to a charge balanced assembly).

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