Electronic Supplementary Information (ESI)

C–H···F–C Hydrogen Bonding in 1,2,3,5-Tetrafluorobenzene and other Fluoroaromatic Compounds and the Crystal Structure of Alloxan Revisited

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Tables

Figures

Table S1 List of C–H···F contacts found in polyfluorobenzenes.

CSD refcode	C–H···F	C–H	H···F	C···F	C–H···F
FACFAQ	C2–H1···F1	0.93	2.60	3.376	142.5
	with normalized C–H distances	1.08	2.47	3.38	140.2
	C3–H2···F1	0.90	2.96	3.37	109.7
	with normalized C–H distances	1.08	2.90	3.37	106.4
FACFOE	C3–H1···F1	0.97	2.82	3.35	114.7
	with normalized C–H distances	1.08	2.78	3.35	112.7
	C4–H2···F2	0.93	2.94	3.71	140.7
	with normalized C–H distances	1.08	2.82	3.71	138.7
	C4–H2···F2	0.93	2.72	3.34	124.7
	with normalized C–H distances	1.08	2.64	3.34	122.0
	C5–H3···F1	0.89	2.74	3.52	147.2
	with normalized C–H distances	1.08	2.58	3.52	144.9
	C6–H4···F2	0.97	2.80	3.45	124.9
	with normalized C–H distances	1.08	2.74	3.45	122.9
FACGEV	C2–H1···F1	0.97	2.77	3.57	140.8
	with normalized C–H distances	1.08	2.68	3.57	139.2
	C3–H2···F1	0.95	2.61	3.46	150.0
	with normalized C–H distances	1.08	2.49	3.46	148.4
FACJAU	C3–H1···F1	0.93	2.84	3.32	112.7
	with normalized C–H distances	1.08	2.79	3.32	109.8
	C3–H1···F1	0.93	2.86	3.56	133.2
	with normalized C–H distances	1.08	2.75	3.56	130.9
	C3–H1···F2	0.93	2.50	3.38	158.1
	with normalized C–H distances	1.08	2.36	3.38	156.7
FACMOL	C12–H2···F4	0.90	2.79	3.57	145.7
	with normalized C–H distances	1.08	2.64	3.57	143.4
	C12–H2···F1	0.90	2.70	3.32	126.6
	with normalized C–H distances	1.08	2.60	3.32	123.3
	C6–H1···F7	0.90	2.79	3.64	157.0
	with normalized C–H distances	1.083	2.62	3.64	155.5
	C6–H1···F8	0.90	2.92	3.33	109.0
	with normalized C–H distances	1.08	2.87	3.33	105.6
PWAWA01	C2–H1···F1	0.93	2.72	3.40	130.4
	with normalized C–H distances	1.08	2.62	3.40	127.8
	C2–H1···F2	0.93	2.59	3.44	152.9
	with normalized C–H distances	1.08	2.45	3.44	151.2
	C4–H2···F2	0.91	2.64	3.42	144.9
	with normalized C–H distances	1.08	2.50	3.42	142.6
ZELDOJ01	C5–H1···F3	0.96	2.69	3.64	172.8
	with normalized C–H distances	1.08	2.56	3.64	172.4
	C6–H2···F2	0.94	2.66	3.35	130.4
	with normalized C–H distances	1.08	2.57	3.35	128.1
	C6–H2···F1	0.94	2.62	3.52	159.4
	with normalized C–H distances	1.08	2.49	3.52	158.2
ZELDOJ	C5–H1···F1	0.94	2.65	3.37	133.3
	with normalized C–H distances	1.08	2.56	3.37	131.1

	C5–H1···F3	0.94	2.75	3.51	138.2
	with normalized C–H distances	1.08	2.65	3.51	136.2
	C6–H2···F2	0.95	2.72	3.40	129.4
	with normalized C–H distances	1.08	2.64	3.40	126.1
	C6–H2···F4	0.95	2.63	3.56	165.3
	with normalized C–H distances	1.08	2.50	3.56	164.5
1,2,3,5-tetrafluorobenzene	C4–H4···F1	0.96	2.65	3.57	159.2
	with normalized C–H distances	1.08	2.54	3.57	158.3
	C4–H4···F3	0.96	2.77	3.48	131.5
	with normalized C–H distances	1.08	2.69	3.48	129.6
	C4–H4···F3	0.96	2.82	3.36	116.5
	with normalized C–H distances	1.08	2.77	3.36	114.3
	C6–H6···F2	0.96	2.71	3.55	146.6
	with normalized C–H distances	1.08	2.61	3.55	145.1
	C6–H6···F2	0.96	2.98	3.38	106.3
	with normalized C–H distances	1.08	2.95	3.38	104.0
	C6–H6···F5	0.96	2.71	3.45	135.3
	with normalized C–H distances	1.08	2.62	3.45	133.4
1,3-difluorobenzene	C2–H2···F12	0.96	2.72	3.38	126.2
	with normalized C–H distances	1.08	2.65	3.38	124.0
	C4–H4···F2	0.96	2.76	3.54	139.0
	with normalized C–H distances	1.08	2.67	3.54	137.3
	C5–H5···F11	0.95	2.71	3.30	120.5
	with normalized C–H distances	1.08	2.64	3.30	118.0
	C6–H6···F11	0.96	2.66	3.26	121.1
	with normalized C–H distances	1.08	2.60	3.26	118.8
	C6–H6···F1	0.96	2.82	3.58	137.0
	with normalized C–H distances	1.08	2.73	3.58	135.2
	C16–H16···F1	0.96	2.74	3.47	133.3
	with normalized C–H distances	1.08	2.66	3.47	131.4
	C12–H12···F1	0.96	2.70	3.39	129.9
	with normalized C–H distances	1.08	2.62	3.39	127.9
	C15–H15···F2	0.96	2.82	3.40	120.1
	with normalized C–H distances	1.08	2.76	3.40	117.9
	C14–H14···F2	0.96	2.72	3.34	123.3
	with normalized C–H distances	1.08	2.65	3.34	121.1
	C14–H14···F12	0.96	2.73	3.51	138.1
	with normalized C–H distances	1.08	2.64	3.51	136.3
	C16–H16···F11	0.96	2.75	3.56	142.4
	with normalized C–H distances	1.08	2.65	3.56	140.8
1,2,3-trifluorobenzene	C3–H3···F1	1.10	2.59	3.53	143.5
	with normalized C–H distances	1.08	2.60	3.53	143.7
	C4–H4···F2	1.00	2.60	3.44	141.8
	with normalized C–H distances	1.08	2.53	3.44	140.7
	C3–H3···F2	1.10	2.77	3.56	128.8
	with normalized C–H distances	1.08	2.78	3.56	129.0

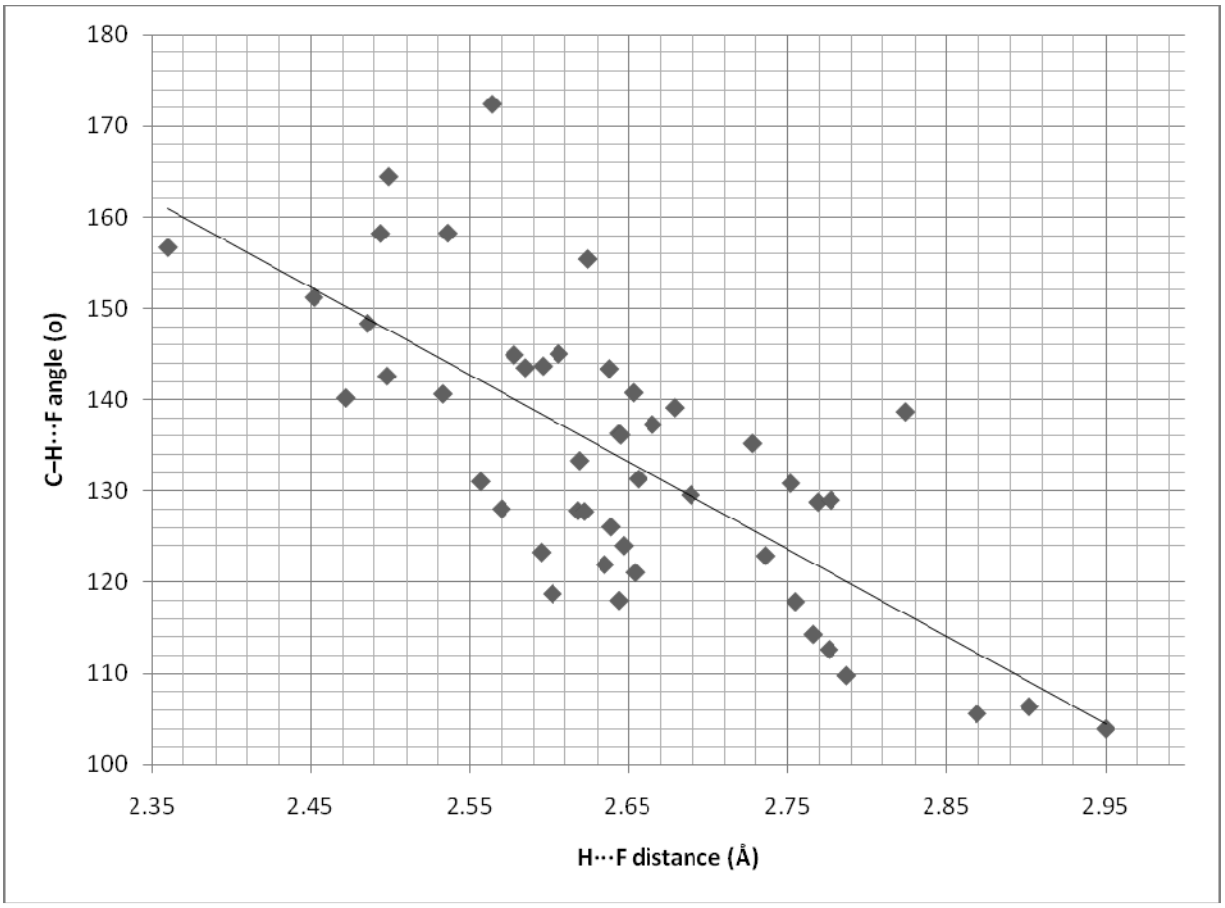
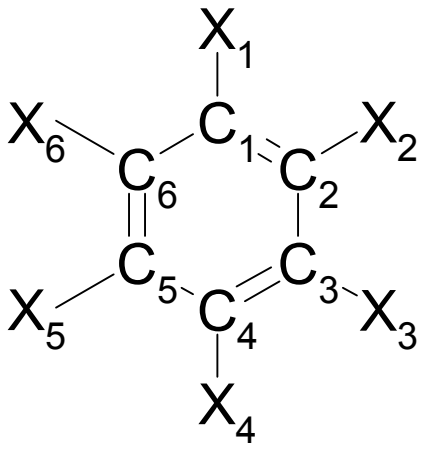


Figure S1 Distance vs. angle plot for the normalized C–H···F contacts found in the crystal structures of polyfluorobenzenes.

Table S2 ESPD atomic charges calculated for the optimized geometries at the B3LYP/6-31G++(d, p) level for polyfluorobenzenes.



(a) Monofluorobenzene

X	***ESPD charge q(X)***
C1	0.4049
C2	–0.2364
C3	–0.0166
C4	–0.1805
C5	–0.0166
C6	–0.2364
F1	–0.2695
H2	**0.1357**
H3	0.0856
H4	0.1086
H5	0.0856
H6	**0.1357**

(b) Difluorobenzenes

1,2-Difluorobenzene		*1,3-Difluorobenzene*		*1,4-Difluorobenzene*	
X	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***
C1	0.2587	C1	0.4380	C1	0.3429
C2	0.2587	C2	–0.3818	C2	–0.1953
C3	–0.1981	C3	0.4380	C3	–0.1953
C4	–0.0985	C4	–0.3049	C4	0.3429
C5	–0.0985	C5	0.0161	C5	–0.1953
C6	–0.1981	C6	–0.3049	C6	–0.1953
F1	–0.2142	F1	–0.2529	F1	–0.2527
F2	–0.2142	**H2**	**0.1939**	**H2**	**0.1502**
H3	**0.1456**	F3	–0.2529	**H3**	**0.1502**
H4	0.1066	H4	0.1571	F4	–0.2527
H5	0.1066	H5	0.0972	**H4**	**0.1502**
H6	**0.1456**	H6	0.1571	**H6**	**0.1502**

(c) Trifluorobenzenes

1,2,3-trifluorobenzene		*1,2,4-trifluorobenzene*		*1,3,5-trifluorobenzene*	
X	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***
C1	0.2726	C1	0.2179	C1	0.4726
C2	0.1383	C2	0.2885	C2	–0.4481
C3	0.2726	C3	–0.3604	C3	0.4582
C4	–0.2530	C4	0.3909	C4	–0.4213
C5	–0.0772	C5	–0.2536	C5	0.4582
C6	–0.2530	C6	–0.1796	C6	–0.4481
F1	–0.1918	F1	–0.2013	F1	–0.2380
F2	–0.1592	F2	–0.1970	**H2**	**0.2156**
F3	–0.1918	**H3**	**0.2005**	F3	–0.2350
H4	**0.1607**	F4	–0.2316	H4	0.2053
H5	0.1210	H5	0.1617	F5	–0.2350
H6	**0.1607**	H6	0.1642	**H6**	**0.2156**

(d) Tetrafluorobenzenes

1,2,3,4-tetrafluorobenzene		*1,2,3,5-tetrafluorobenzene*		*1,2,4,5-tetrafluorobenzene*	
X	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***	***X***	***ESPD charge q(X)***
C1	0.2444	C1	0.3072	C1	0.2425
C2	0.1408	C2	0.0842	C2	0.2425
C3	0.1408	C3	0.3072	C3	–0.3254
C4	0.2444	C4	–0.4067	C4	0.2425
C5	–0.2255	C5	0.4073	C5	0.2425
C6	–0.2255	C6	–0.4067	C6	–0.3254
F1	–0.1911	F1	–0.1781	F1	–0.1879
F2	–0.1467	F2	–0.1461	F2	–0.1879
F3	–0.1467	F3	–0.1781	**H3**	**0.2163**
F4	–0.1911	**H4**	**0.2154**	F4	–0.1879
H5	**0.1780**	F5	–0.2207	F5	–0.1879
H6	**0.1780**	**H6**	**0.2154**	**H6**	**0.2163**

(e) Pentafluorobenzene

X	***ESPD charge q(X)***
C1	0.2809
C2	0.0896
C3	0.1844
C4	0.0896
C5	0.2809
C6	–0.3825
F1	–0.1761
F2	–0.1415
F3	–0.1391
F4	–0.1415
F5	–0.1761
H6	**0.2314**

Table S3 Summary of shortest C–H···F contacts (with normalized H-atoms) found in the crystal structure of polyfluorobenzenes and comparison with the relative acidity of the corresponding H-atom involved (estimated based upon their respective ESPD atomic charges).

Compound	Reference	q(H1)	q(H2)	q(H3)	Shortest C–H···F	H-atom involved
1	FACFAQ	0.1357	0.0856	0.1086	2.47, 3.38, 140.2	H1
1,2	FACFOE	0.1456	0.1066	-	2.58, 3.52, 145.0	H2
1,3	*Ref. 11*	0.1939	0.1571	0.0972	2.60, 3.26, 118.8	H2
1,4	FACGEV	0.1502	-	-	2.49, 3.46, 148.4	H1
1,2,3	*Ref. 12*	0.1607	0.1210	-	2.60, 3.53, 143.7	H1
1,3,5	PWAWA01	0.2156	0.2053	-	2.50, 3.42, 142.7	H1
1,2,3,4	ZELDOJ	0.1780	-	-	2.50, 3.56, 164.5	H1
	ZELDOJ01	0.1780	-	-	2.50, 3.52, 158.3	H1
1,2,3,5	**1**	0.2154	-	-	2.54, 3.57, 158.3	H1
1,2,4,5	FACJAU	0.2163	-	-	2.36, 3.38, 156.7	H1
1,2,3,4,5	FACMOL	0.2314	-	-	2.62, 3.64, 155.5	H1

Table S4 Identification of common structural features in polyfluorobenzene crystal structures.

Compound	Reference	C–H···F synthon	Other interactions
1	FACFAQ	B	C–H···π
1,2	FACFOE	C–H···F	C–H···π
1,3	*Ref. 11*	B	C–H···π
1,4	FACGEV	A, B and C	Weak C–H···π
1,2,3	*Ref. 12*	D	Weak π···π
1,3,5	PWAWA01	A	Weak π···π
1,2,3,4	ZELDOJ	B and D	-
	ZELDOJ01	D	-
1,2,3,5	1	A	Weak π···π
1,2,4,5	FACJAU	C	-
1,2,3,4,5	FACMOL	C–H···F	Weak π···π

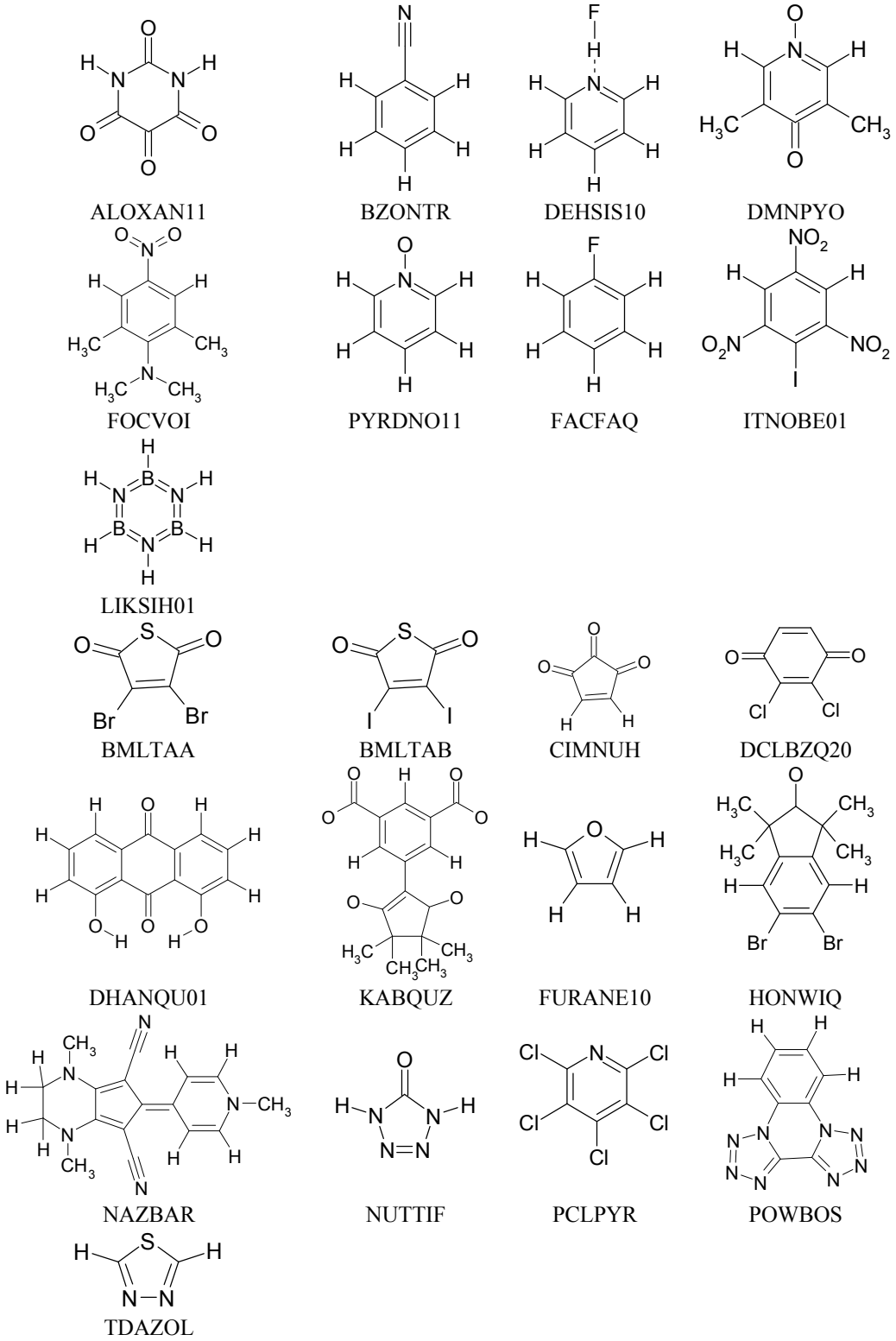


Figure S2 Chemical diagrams of molecules retrieved from the CSD adopting tetragonal space group $P4_12_12$/ $P4_32_12$ (discussed in Table 2 and Table S5).

Table S5 Analysis of the various structure directing interactions found in compounds that adopt the tetragonal $P4_12_12$/ $P4_32_12$ fluorobenzene crystal structure.

Sr. No.	Space group	CSD Refcode	Along the $4_1/4_3$ screw axis				⊥ to the $4_1/4_3$ screw axis	
			Type of contact	Contact distance	Type of contact	Contact distance	Type of contact	Contact distance
1	$P4_12_12$	BMLTAA	C–Br···O	Br···O = 3.08 C···O = 4.91 C–Br···O = 167.1	C=O···C=O	O···C = 2.91 C···C = 3.85 C–O···C2 = 134.1 O···C–O = 92.8	-	-
2	$P4_12_12$	BMLTAB	C–I···O	I···O = 3.18 C···O = 5.22 C–I···O = 167.7	C=O···C=O	O···C = 3.02 C···C = 3.93 C–O···C = 132.6 O···C–O = 90.4	-	-
3	$P4_12_12$	CIMNUH	C–H···O	H···O = 2.28 C···O = 3.35 C–H···O = 167.3	C=O···C=O	O···C = 2.95 C···C = 3.99 C–O···C2 = 144.6 O···C–O = 105.2	-	-
4	$P4_12_12$	DCLBZQ20	C–H···O C=O···C=O	H···O = 2.60 C···O = 3.53 C–H···O = 142.7 O···C = 3.18 C···C = 4.03 C–O···C = 127.1 O···C–O = 84.7	C–Cl···O=C	Cl···O = 3.01 C···O = 4.68 C–Cl···O = 164.8 Cl···O-C = 141.8	-	--
5	$P4_12_12$	DHANQU01	C–H···O	H···O = 2.46 C···O = 3.35 C–H···O = 139.5	C–H···π	H···π = 2.88 C···π = 3.80 C–H···π = 143.4	-	-
6	$P4_12_12$	KABQUZ	C–H···O	H···O = 2.27 C···O = 3.35 C–H···O = 173.0	C=O···O–N	O···O = 2.64 C···O = 3.35 O···N = 3.60 C–O···O = 112.0 O···O–N = 130.8	C–H···O C–H···O	H···O = 2.65 C···O = 3.53 C–H···O = 137.9 H···O = 2.69 C···O = 3.53 C–H···O = 134.3
7	$P4_12_12$	FURANE10	C–H···O	H···O = 2.49 C···O = 3.43 C–H···O = 143.5	C–H···π	H···π = 2.66 C···π = 3.56 C–H···π = 141.3	-	-
8	$P4_12_12$	HONWIQ	C–H···O	H···O = 2.40 C···O = 3.39 C–H···O = 151.0	C–H···O	H···O = 2.68 C···O = 3.65 C–H···O = 148.5	-	-
7	$P4_12_12$	NAZBAR	C–H···N	H···N = 2.53 C···N = 3.55 C–H···N = 156.5	C–H···π	H···π = 2.71 C···π = 3.26 C–H···π = 114.4	C–H···N	H···N = 2.64 C···N = 3.71 C–H···N = 172.6
8	$P4_12_12$	NUTTIF	N–H···O	H···O = 1.76 N···O = 2.76 N–H···O = 170.3	N···C=O	N···C = 3.12	-	-
9	$P4_12_12$	PCLPYR	Cl···Cl	Cl···Cl = 3.62 C–Cl···Cl = 132.8 Cl···Cl–C = 121.6	Cl···Cl	Cl···Cl = 3.68 C–Cl···Cl = 170.0 Cl···Cl–C = 120.6	C–Cl···N	Cl···N = 3.01 C–Cl···N = 180.0
10	$P4_12_12$	POWBOS	C–H···N C–H···N	H···N = 2.66 C···N = 3.36 N–H···N = 121.4 H···N = 2.70 C···N = 3.36 C–H···N = 118.9	N···N	N···N = 3.01	C–H···N	H···N = 2.51 C···N = 3.55 N–H···N = 159.8
11	$P4_12_12$	TDAZOL	C–H···N	H···N = 2.50 C···N = 3.39 C–H···N = 139.3	C–H···N	H···N = 2.50 C···N = 3.39 C–H···N = 139.3	-	-

Table S6 Occurrence of C–H···F synthons in the Cambridge Structural Database (with H···F distances < sum of vdW and C–H···F angle >110).

Synthon	All structures	Only organic	Only organic, no error, no disorder, non polymeric, non ionic and no powder structures
A	301	206	159
B	262	180	140
C	13	10	9
D	175	40	28

Table S7 Full CSD refcode list of structures possessing C–H···F synthons.

Synthon	CSD refcodes
A	ABOXEV AFBIPH AJEJEE AJIGIJ ALIGAD AREFUY ATOLIE ATOZOY BCFPLA BEDLUR BEXPIE BIGXOF BIHYOH BIJFUW BIJGAD BIXMUQ BONWUW BUNKOK12 CACRII CEHGOM CICTOY CILSUM COZNEK COZQAJ CUGMEW CUZCOP DAMWOE DAMWUK DEBKAW DECMAA DEHXUK DEHYAR DEVGIV DFNAPH10 DIFSAN DILKOZ DOVZUJ DRPRDL EDEMEG EGAFOH EGAFUN EGAGAU EGAGEY EJOPIC EMAWEU EQONON EQONUT ERAGEJ ERUHII ETAWAX ETIWUZ EVAQAT EWOHUT FAFWIS01 FAVTAX FAZWOT FEPLUI FEQWEE FICGOO FITLIE FLNAPH FNDMAN FOMBOY FOTPEJ FUVCII GENWOM GIJLAN GIJLER GIQBAK GIQPUS GIRXUA GIXVUF GIZMAE GUTMEN GUWZUT GUZMUJ HADHIE HALCUS01 HANGEI HECVUH HELFAF HICFEE HIJXIH HIKWUU HILCOV HURLEL HURLUB IDUPAZ IFADID IHENOY IKACAY IRINOM IVUQOF IWEJOJ IXOGIL JAJFUW JAPYAB JAPYEF JAPYIJ JEJPIX JIRXUE KAMCIK KAXXAJ KEKLAN KIDGIN KIQFEV KITSUC KOLJAW KONKAZ KUMTER LABREM LAVKIC LAWVOV LEHVOK LEJTOK LESWOV LIYYEY LORWOE LOTZOJ LUTLER MACZUM MADBAV MEBLIP MEJBAF MEKKUJ MEKNAS MEKNOG MIWHAB MIXYAU MONSAJ MONSAJ01 MOVBII NAFTAP NEBHEI NECMUD NELQIE NERQEH NEYREP NICKUG NICKUG04 NICKUG05 NICKUG06 NICKUG07 NICKUG08 NICKUG09 NIQHOK NUBDAP NUFJED NUMPUG OGETUP OGEVIF OGUWES OGUWES01 OGUWES02 OGUWES03 PAHCAD PENQIJ PENREG PEQPUX PFBZCY PILSUZ PUZDET PUZDIX PVVAWA01 QAQBEQ QAQBIU QAXZIY QAXZIY01 QERMUV QEZBON QOQXAV QORHOU QQQBNG01 RAHYOP RAHYUV RAKJOD RALJOE REFREZ RERMIL RERMOR REZWUO RIBFUD RIBVED RIBVON RIBVUT RICMIA RINVAM RINVEQ ROMJIM RUXRUX SASHEA SEJSAB01 SEWFUW SIBZAF SIRKEJ TAGZOR TAPZAL TARWAL TAYDUT TEHMEY01 TELJOJ TIFROP TITVAU TOYWIN VABXAX VAXBIG VETKUB VETWAT VIDHIA VIVTEA VUZZIZ WAFNEX WAGWAD WALYEO WAMBOC WANVEN WEFROP WEJBES WERXOG WESBIF WEWCAD WIBXUB WIBYAI WIFBAP WIQHIN WIQJEL WIYLEW WIYLIA WIYLOG WOGFUT WOYQIK WUGZUT WUTNAA XAMWUD XEXJOA XEZHIU XIJPUC XIPMEP XIPMIT XIQLIS XITNIY XODDUP XOLRUL XUKZEI YARKEH YEDWIO YEFVEL YEJWEP YIBGOG YIBGUM YIBXOX YIZCOZ YIZCOZ01 YUKNAT YUYTOB ZAQWUJ ZAWWAV ZUDDOR ZUSVEO HODZEG HOFVUU JIYVAP JODWAB KIYDAY PIYXUR QIYKEP QIYKOZ QOFGOI YIYPIG YIZDUH DOKXOR EGACEV EGACIZ EGIHOS GOLQUU GOLRUV HOKKOI HOKLUP KOKQOR KOMSIP TOHVUI TOQCUY WOLXOL WOMWAX BOPCIT BOSKEA FOQXUF FOSFOJ FOXBUQ HOTDEA HOTMOT NOQSES POSJAJ POSJEN POSJIR POTZOO QOPHEJ QOSBAC VONQOF YORDIT YOVDAP
B	AVIYUZ AZUQAN AZUQER BAKSUC BAWPUK BENAFP BENAFP01 BIKCII BIMCEF11 BINZAZ CADMUP CEJZUN CEXMAU COVJIG COWVOZ COZFIG CPFBUR CPFBUR01 CUYQUI CUYQUI01 CUYWAU DEBYOZ DEDQOT DEWYUA DIBCOH DIBGUR DIFRUG DIWYIS EABJAS EHEDOK EQOPAB EVUMAJ EWOHON EXAXEG EXAXIK EXEQAZ EXUHEK FACFAQ FACGEV FACJAU FACKAW FAFWIS02 FAJPOW FAPTUL FASNUJ FBENZA01 FEHYOG FERQEZ FIDCUR FLBIPC10 FOLXAF FOLYEK GAFZIX GATDIP GAVCOW GEFLOT GIJHAJ GIJLUH GISZIS GIZHON GOCRAR HAZXOV HECVOB HENXIH HERMIB HETQUS HILQOJ HILQOJ01 HIWNAD ICOHOX IDEXOE ILOJEY INOHUO ISAHEP IVOKOT IWODAZ JAVWIN JAVWIN01 JEMVIH JEWWOY JEYTAJ JIVGAW JUPYOI JUXJER KAHFEF KASBIQ KAWFUJ01 KEGPOC KEQYAH KERDIV KIQFAR KUNGIJ LAQBUB LEZVOB LIBTEV LIDQAR LIDQEV LIDQOF LIHQID LILKOH LIPFOG LIWTOB LUTLOB MASPUS MAZLUV MEJDIP MEKKAP MEKKIX MEKLUK MERZAL MERZEP METZIV METZOB METZUH MEVBAR MEVBEV MIMYOW MIWJAE NAXBOE NAZLUV NELSOM NEMHUI NEQMUS NERTIN NETXAL NEZREQ NICMOB NIPFUO NIPGAV NUFJAZ OCAKUZ OCUVEN ODUVIS PAXKAA PEDGUB PELROO PENQUV PENRAC PETNUY PEVMUZ PFBZAD01 PIKKOJ PUGPIQ QAHSUN QETXAP QETXIX QETXOD QETYEU QITSIW QITSUI QITTET QUMPUJ RAFQUL RALMIB RAPTOR RAWREN RAXFOM RAYTIU REBMIV REHDOY REQBUL REZZOL RICMOG RIVPIV RIWQUJ SAFWUS SATHOK SATMUW SIBZEJ SIGMUR SINZAQ SOFGEZ SUNXUU TAGQOH TAGZUX TASTAI TEDPOI TEHMIC TEJCUG TEJQUV TEKJUO TERSAL TEVLEM TIFHUM TIFJAU TITVAU01 TITXOK TOHDOJ TOHJEF TOHWES TOYWEJ TUNGAK VAVHEF VAZHUA VELNEG VIGDIZ VIHWUE VIVRAT WANXUF WAPYAO

	WAPYES WEBCIP WEBWUV WEGQAB WEMGAW01 WEMGAW02 WENZIZ WEWWAW WIHBUL WIQHOT WIQHUZ WIXQEA WOMFEJ WUNRAY XATWOF XEHVUB XEJLIH XEJLON XEJMAA XEZSUR XIBLEA XIFDAS XIKNEL XIYHAP YAPHED YAPYAQ YAVVOG YAVVOG10 YIFWEQ YILMUC YILNAJ YIQDOS YISWAY ZELDOJ ZELDOJ01 ZUZDUT ZZZAOS03 ZZZAOS04 HOCHEN HOFVOO JIYTUH JODQEZ YODPOX EGIJIO HOKMOK KOHRIJ POHCOF POKWUI QITSIW01 QOHWUG QOKPAI QOKPEM XONJOA BOPFOC BOSKAW FOPQOR LOSCOM MOSHAE NORHUY POSKEO QOSDIM QOSPIY
C	DEBYOZ EQOPAB FACGEV FACJAU FAFWIS02 FEHYOG LIPFOG NUFJAZ QUMPUJ VAVHEF WANXUF XIFDAS YODPOX
D	ACEDIV AJICOL ASIJER ASIKAO ASIKIW AZODEY AZODIC BENVOF BESGAI BEZSEF BIDHAY BIGXOF BIKXUO CABGAO CACPOL CETTAX CFPOTL COTDIY DAKSEO DAVKAN DAZFEP DAZFUF DEPFUA DISQIG01 EKOWIK ELEFOQ ERIDEO FACNIH FARPIY FAZFAN FAZFAN10 FIRYUB FIRZOW FOTREL GAMJIO GEFLUZ GEGXUM GERCUC GISQII GIVNUU GUFZOW HIMJOC HITCAO HIXSUD HIYBAT HIYFAX HOYTUK HUTYAW HUYNUK IDIBAY ILEJIS IMADUV IMAFAD IPABEG IQAJOZ IQAJOZ01 IRIFEU ITICET IVOCAX IXUKAN JALLAK JENHAM JIPFEU JORXAP KACVOA KAJKOW KEGBON KEGGUY KEKBAE KEQXUA KOYJEN LALXIG LAZFOI LAZFUO LEQZIR LIBDOQ LOTCUS MANYUV MEKQOJ MELBUA MELMOF MEMGOA MEMPUQ MERHOH MIHLIY MIKGOD MIVLUY MIVMIN MOBVAA MOHGUL MOHHAS MOHHOG MOXMOB MUGCIA NISXIX NISZAR NUWLIA NUWVIK OCEHEJ OCIHOY OHOYIT PAXMUW PEWGUU PIBJUG PICQAU PIJKOJ QAFYAX QALGOA QARHAS QEKSII QIDXEG QINKIH QINKON QIZPEU QOCSEG REBWUR REDMOD REWZOJ ROMFEE RUTWEI SAMWIN SAWQEN SERQOV SERTAK TAGZUX TEZXAX TOGNAE UBIPOK UCONOQ UCOVEN UDIYEL VAMLEA VAMLEA10 VATXET VAVKOT VAZXAW VELMIJ VEZXII VIHQUZ VIHRAG VUMSAX WANTEL XAHKAT XAJWIO XARTIT XAWBEC XAWHOS XIKSUG YAXHUB YAYHOW YAYHUC YECJEW YEQYIC YIDZEQ ZAQXAQ ZIMHIM ZODGOO ZZZGMW01 DOGRUN DOJZOS GOHYOS GOHZAF MOKGUP MOKHAW POFWIR QOHXIV YODXUL COMZOU COQGOF HORVOA HORVUG LOKXOZ QOSFUA QOSGOV SOTJUH