



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 2, 2026 – 03:40 AM UTC

PDB ID : 2VYA / pdb\_00002vya  
Title : Crystal Structure of fatty acid amide hydrolase conjugated with the drug-like inhibitor PF-750  
Authors : Mileni, M.; Johnson, D.S.; Wang, Z.; Everdeen, D.S.; Liimatta, M.; Pabst, B.; Bhattacharya, K.; Nugent, R.A.; Kamtekar, S.; Cravatt, B.F.; Ahn, K.; Stevens, R.C.  
Deposited on : 2008-07-22  
Resolution : 2.75 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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The following versions of software and data (see [references](#) ①) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

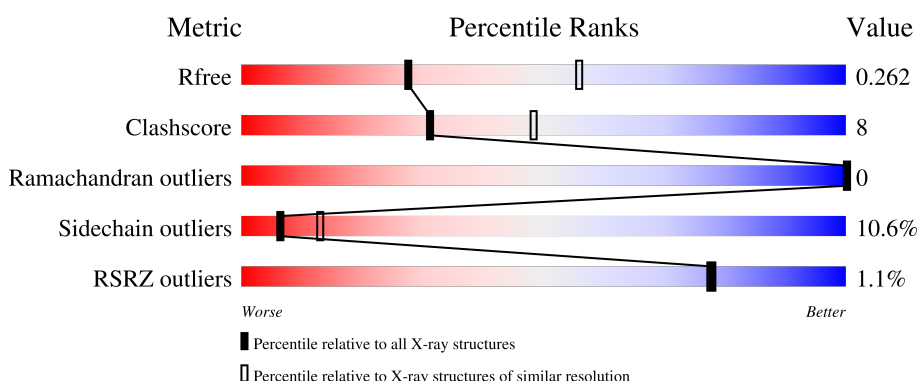
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.75 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
$R_{free}$	180053	1009 (2.76-2.76)
Clashscore	190562	1044 (2.76-2.76)
Ramachandran outliers	187476	1024 (2.76-2.76)
Sidechain outliers	187428	1024 (2.76-2.76)
RSRZ outliers	180081	1009 (2.76-2.76)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	587	<div> <div>2%</div> <div>75%</div> <div>14%</div> <div>7%</div> </div>
1	B	587	<div> <div>71%</div> <div>17%</div> <div>8%</div> </div>

## 2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 8492 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called FATTY-ACID AMIDE HYDROLASE 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	543	Total	C	N	O	S	0	0	0
			4189	2673	715	771	30			
1	B	541	Total	C	N	O	S	0	0	0
			4176	2666	712	768	30			

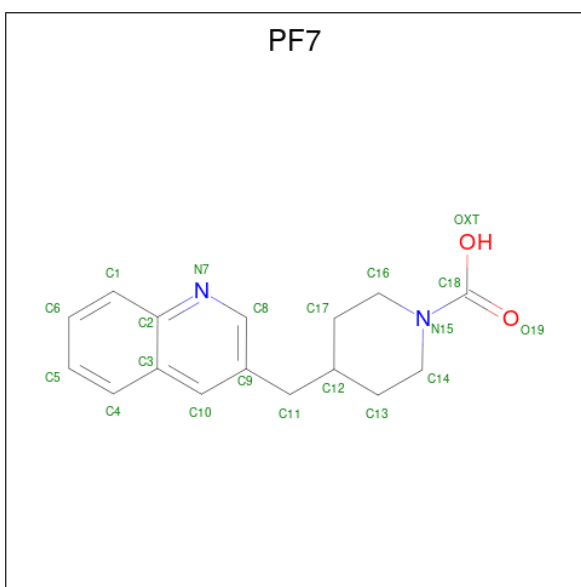
There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	192	PHE	LEU	engineered mutation	UNP P97612
A	194	TYR	PHE	engineered mutation	UNP P97612
A	377	THR	ALA	engineered mutation	UNP P97612
A	435	ASN	SER	engineered mutation	UNP P97612
A	491	VAL	ILE	engineered mutation	UNP P97612
A	495	MET	VAL	engineered mutation	UNP P97612
B	192	PHE	LEU	engineered mutation	UNP P97612
B	194	TYR	PHE	engineered mutation	UNP P97612
B	377	THR	ALA	engineered mutation	UNP P97612
B	435	ASN	SER	engineered mutation	UNP P97612
B	491	VAL	ILE	engineered mutation	UNP P97612
B	495	MET	VAL	engineered mutation	UNP P97612

- Molecule 2 is UNKNOWN ATOM OR ION (CCD ID: UNX) (formula: X).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	2	Total	X	2	0
			2	2		
2	B	2	Total	X	2	0
			2	2		

- Molecule 3 is 4-(quinolin-3-ylmethyl)piperidine-1-carboxylic acid (CCD ID: PF7) (formula: C<sub>16</sub>H<sub>18</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			19	16	2	1		
3	B	1	Total	C	N	O	0	0
			19	16	2	1		

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	1	Total	Cl	0	0
			1	1		

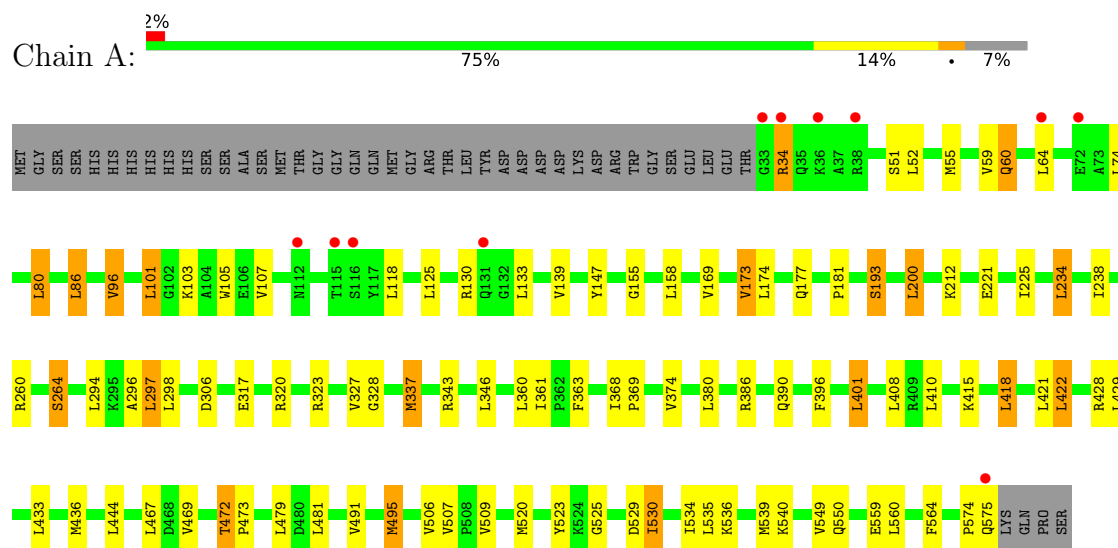
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	36	Total	O	0	0
			36	36		
5	B	48	Total	O	0	0
			48	48		

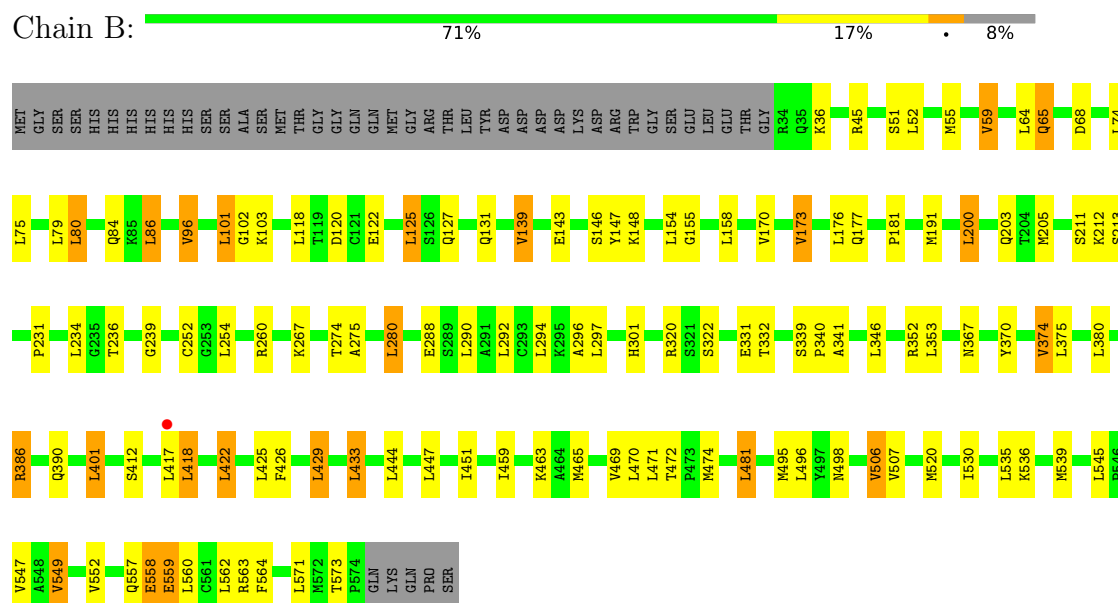
### 3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ( $RSRZ > 2$ ). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

#### • Molecule 1: FATTY-ACID AMIDE HYDROLASE 1



#### • Molecule 1: FATTY-ACID AMIDE HYDROLASE 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	103.69Å 103.69Å 253.87Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	38.26 – 2.75 38.26 – 2.75	Depositor EDS
% Data completeness (in resolution range)	95.7 (38.26-2.75) 95.0 (38.26-2.75)	Depositor EDS
$R_{merge}$	0.14	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.06 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.2.0019	Depositor
R, $R_{free}$	0.188 , 0.239 0.217 , 0.262	Depositor DCC
$R_{free}$ test set	2002 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	39.5	Xtriage
Anisotropy	0.028	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 47.0	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.47$ , $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.034 for -h,-k,l	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	8492	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.68% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality ⓘ

### 5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: CL, UNX, PF7

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 5$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z  > 5$	RMSZ	$\# Z  > 5$
1	A	0.72	1/4283 (0.0%)	0.92	3/5811 (0.1%)
1	B	0.75	1/4270 (0.0%)	0.92	1/5794 (0.0%)
All	All	0.74	2/8553 (0.0%)	0.92	4/11605 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	238	ILE	CA-CB	7.56	1.63	1.54
1	B	573	THR	CA-CB	5.60	1.60	1.53

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	306	ASP	CA-C-N	5.66	126.92	119.84
1	A	306	ASP	C-N-CA	5.66	126.92	119.84
1	B	367	ASN	N-CA-C	5.29	118.73	111.54
1	A	509	VAL	CB-CA-C	-5.08	105.86	110.63

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.



Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	4189	0	4239	61	0
1	B	4176	0	4227	77	0
2	A	2	0	0	0	0
2	B	2	0	0	0	0
3	A	19	0	17	0	0
3	B	19	0	17	0	0
4	B	1	0	0	0	0
5	A	36	0	0	1	0
5	B	48	0	0	4	0
All	All	8492	0	8500	138	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 8.

All (138) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:472:THR:HG21	1:A:550:GLN:HE21	1.30	0.95
1:B:418:LEU:HD22	1:B:422:LEU:HD22	1.55	0.87
1:B:203:GLN:HE21	1:B:205:MET:HE2	1.40	0.87
1:A:80:LEU:H	1:A:80:LEU:HD22	1.38	0.86
1:B:469:VAL:HG21	1:B:564:PHE:CD1	2.10	0.86
1:B:86:LEU:HD11	1:B:96:VAL:HG11	1.56	0.85
1:A:337:MET:HE2	1:A:525:GLY:H	1.41	0.84
1:A:535:LEU:HG	1:A:539:MET:HE2	1.58	0.83
1:A:86:LEU:HD11	1:A:96:VAL:HG11	1.60	0.83
1:A:52:LEU:HA	1:A:55:MET:HE2	1.59	0.83
1:A:380:LEU:HD11	1:A:495:MET:HE1	1.60	0.82
1:B:370:TYR:CD1	1:B:374:VAL:HG11	2.15	0.82
1:A:418:LEU:HD22	1:A:422:LEU:HD22	1.61	0.81
1:B:86:LEU:HD11	1:B:96:VAL:CG1	2.14	0.77
1:A:86:LEU:HD11	1:A:96:VAL:CG1	2.20	0.71
1:A:177:GLN:HG2	1:A:296:ALA:HB1	1.72	0.71
1:A:520:MET:CE	1:A:539:MET:HE3	2.20	0.71
1:B:203:GLN:NE2	1:B:205:MET:HE2	2.06	0.71
1:B:469:VAL:CG2	1:B:564:PHE:CD1	2.77	0.68
1:B:154:LEU:HD22	1:B:191:MET:HE2	1.75	0.68
1:A:472:THR:CG2	1:A:550:GLN:HE21	2.07	0.67
1:B:341:ALA:HB1	1:B:547:VAL:HG21	1.76	0.67
1:B:426:PHE:HB3	1:B:429:LEU:HD22	1.77	0.67
1:A:173:VAL:CG2	1:A:297:LEU:HD12	2.25	0.67
1:A:520:MET:HE1	1:A:539:MET:HE3	1.77	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:469:VAL:HG21	1:B:564:PHE:CG	2.33	0.63
1:B:239:GLY:HA3	1:B:495:MET:HE3	1.82	0.61
1:B:418:LEU:HD22	1:B:422:LEU:CD2	2.29	0.60
1:B:155:GLY:C	1:B:200:LEU:HD22	2.26	0.59
1:B:471:LEU:HD11	1:B:549:VAL:HG13	1.84	0.59
1:B:211:SER:C	1:B:481:LEU:HD22	2.28	0.59
1:B:353:LEU:HD23	1:B:571:LEU:HD12	1.84	0.59
1:A:34:ARG:HD3	1:A:396:PHE:CE2	2.38	0.58
1:A:80:LEU:H	1:A:80:LEU:CD2	2.13	0.58
1:A:491:VAL:HG12	1:A:495:MET:HB2	1.85	0.58
1:B:370:TYR:CD1	1:B:374:VAL:CG1	2.87	0.58
1:B:55:MET:HE3	1:B:101:LEU:HD22	1.86	0.57
5:A:2028:HOH:O	1:B:274:THR:HG22	2.04	0.56
1:B:418:LEU:HD13	1:B:433:LEU:HD11	1.88	0.56
1:A:520:MET:HE2	1:A:539:MET:HE3	1.87	0.55
1:B:80:LEU:HD12	1:B:288:GLU:HG2	1.88	0.55
1:A:80:LEU:HD22	1:A:80:LEU:N	2.16	0.55
1:B:239:GLY:CA	1:B:495:MET:HE3	2.37	0.55
1:B:535:LEU:HG	1:B:539:MET:HE2	1.88	0.55
1:A:155:GLY:C	1:A:200:LEU:HD22	2.31	0.55
1:A:520:MET:HE3	1:A:536:LYS:HA	1.89	0.54
1:B:471:LEU:HD11	1:B:549:VAL:CG1	2.37	0.54
1:B:375:LEU:HA	1:B:447:LEU:HD11	1.89	0.54
1:A:472:THR:HG22	1:A:473:PRO:O	2.08	0.54
1:B:254:LEU:HD22	1:B:562:LEU:HD21	1.89	0.54
1:A:174:LEU:HD11	1:A:234:LEU:HD22	1.89	0.54
1:A:491:VAL:HG12	1:A:491:VAL:O	2.07	0.54
1:B:469:VAL:HG23	1:B:552:VAL:O	2.08	0.53
1:A:363:PHE:CD2	1:A:467:LEU:HD11	2.43	0.53
1:B:86:LEU:CD1	1:B:96:VAL:HG11	2.33	0.53
1:A:139:VAL:O	1:A:181:PRO:HA	2.09	0.52
1:B:471:LEU:CD1	1:B:549:VAL:HG13	2.39	0.52
1:A:346:LEU:C	1:A:346:LEU:HD13	2.34	0.52
1:A:472:THR:HG22	1:A:550:GLN:HB3	1.92	0.52
1:B:380:LEU:HD11	1:B:495:MET:HE1	1.91	0.52
1:B:170:VAL:HG21	1:B:280:LEU:HD11	1.92	0.51
1:A:472:THR:HG21	1:A:550:GLN:NE2	2.11	0.51
1:B:559:GLU:HG2	5:B:2048:HOH:O	2.09	0.51
1:A:118:LEU:HD13	1:A:147:TYR:CD1	2.46	0.51
1:B:211:SER:O	1:B:481:LEU:HD22	2.10	0.51
1:B:370:TYR:O	1:B:374:VAL:CG1	2.59	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:34:ARG:HD3	1:A:396:PHE:CD2	2.46	0.50
1:A:60:GLN:O	1:A:64:LEU:HD13	2.11	0.50
1:B:370:TYR:O	1:B:374:VAL:HG13	2.11	0.50
1:B:520:MET:HE2	1:B:536:LYS:O	2.12	0.50
1:B:118:LEU:HD13	1:B:147:TYR:CD1	2.46	0.50
1:A:574:PRO:O	1:A:575:GLN:HB2	2.12	0.49
1:B:177:GLN:HG2	1:B:296:ALA:HB1	1.93	0.49
1:B:353:LEU:HD23	1:B:571:LEU:CD1	2.42	0.49
1:B:65:GLN:NE2	5:B:2002:HOH:O	2.46	0.49
1:B:55:MET:O	1:B:59:VAL:HG13	2.13	0.49
1:B:520:MET:HE1	1:B:536:LYS:HA	1.94	0.49
1:A:169:VAL:HG23	1:A:264:SER:HB3	1.95	0.48
1:B:55:MET:HE3	1:B:101:LEU:CD2	2.43	0.48
1:B:495:MET:O	1:B:496:LEU:C	2.56	0.48
1:B:122:GLU:HA	1:B:125:LEU:HB2	1.95	0.48
1:B:213:SER:HA	1:B:481:LEU:HD13	1.96	0.48
1:A:193:SER:HB2	1:A:401:LEU:HD12	1.94	0.48
1:A:103:LYS:O	1:A:107:VAL:HG13	2.14	0.48
1:B:139:VAL:O	1:B:181:PRO:HA	2.14	0.48
1:A:535:LEU:CG	1:A:539:MET:HE2	2.38	0.48
1:B:79:LEU:HD13	1:B:231:PRO:HB2	1.95	0.47
1:B:474:MET:HG2	1:B:506:VAL:HG21	1.96	0.47
1:A:472:THR:CG2	1:A:473:PRO:O	2.63	0.47
1:B:170:VAL:CG1	1:B:234:LEU:CD2	2.93	0.47
1:B:386:ARG:HH11	1:B:386:ARG:HG2	1.80	0.47
1:B:173:VAL:HG22	1:B:297:LEU:HD13	1.97	0.46
1:B:170:VAL:CG1	1:B:234:LEU:HD21	2.45	0.46
1:B:147:TYR:O	1:B:148:LYS:C	2.58	0.46
1:B:170:VAL:HG11	1:B:234:LEU:CD2	2.46	0.46
1:A:410:LEU:O	1:A:415:LYS:HE3	2.16	0.45
1:A:59:VAL:CG1	1:A:101:LEU:HD13	2.46	0.45
1:A:380:LEU:HD11	1:A:495:MET:CE	2.38	0.45
1:B:380:LEU:HD11	1:B:495:MET:CE	2.46	0.45
1:B:292:LEU:O	1:B:292:LEU:HD12	2.17	0.45
1:B:75:LEU:HD13	1:B:103:LYS:HD3	1.99	0.44
1:A:346:LEU:HD13	1:A:346:LEU:O	2.18	0.44
1:B:252:CYS:HB3	1:B:290:LEU:HD11	1.98	0.44
1:A:55:MET:O	1:A:59:VAL:HG13	2.17	0.44
1:B:370:TYR:HD1	1:B:374:VAL:HG11	1.77	0.44
1:A:86:LEU:HD21	1:A:96:VAL:HG11	1.98	0.44
1:A:52:LEU:HA	1:A:55:MET:CE	2.40	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:529:ASP:O	1:A:530:ILE:C	2.60	0.43
1:B:339:SER:O	1:B:340:PRO:C	2.61	0.43
1:A:174:LEU:HD11	1:A:234:LEU:CD2	2.48	0.43
1:B:260:ARG:NH2	1:B:558:GLU:HG2	2.33	0.43
1:B:557:GLN:HA	5:B:2048:HOH:O	2.19	0.43
1:A:294:LEU:HD23	1:A:294:LEU:HA	1.84	0.43
1:A:260:ARG:HG3	1:A:298:LEU:HD21	2.01	0.43
1:A:328:GLY:HA2	1:A:361:ILE:O	2.18	0.42
1:A:469:VAL:HG21	1:A:564:PHE:CD1	2.54	0.42
1:A:55:MET:HE3	1:A:105:TRP:HD1	1.83	0.42
1:A:368:ILE:N	1:A:369:PRO:CD	2.82	0.42
1:B:239:GLY:HA2	1:B:498:ASN:OD1	2.19	0.42
1:A:327:VAL:HG22	1:A:469:VAL:CG1	2.49	0.42
1:A:212:LYS:NZ	1:A:540:LYS:O	2.49	0.42
1:B:322:SER:HA	1:B:563:ARG:NH2	2.34	0.42
1:B:170:VAL:HG11	1:B:234:LEU:HD23	2.02	0.41
1:B:176:LEU:HD13	1:B:301:HIS:ND1	2.35	0.41
1:A:479:LEU:HD21	1:A:535:LEU:HD12	2.02	0.41
1:B:275:ALA:HB1	1:B:451:ILE:CD1	2.51	0.41
1:B:59:VAL:HG11	1:B:102:GLY:HA2	2.02	0.41
1:B:212:LYS:HG3	1:B:545:LEU:HD11	2.02	0.41
1:B:459:ILE:O	1:B:463:LYS:HG3	2.20	0.41
1:B:470:LEU:HB3	1:B:552:VAL:HB	2.02	0.41
1:A:408:LEU:HD21	1:A:436:MET:HE2	2.03	0.41
1:A:221:GLU:O	1:A:225:ILE:HD12	2.20	0.41
1:A:337:MET:HG2	1:A:523:TYR:CE2	2.55	0.41
1:B:401:LEU:HD12	1:B:401:LEU:HA	1.89	0.41
1:A:520:MET:CE	1:A:536:LYS:HA	2.51	0.41
1:B:465:MET:HE3	5:B:2036:HOH:O	2.19	0.40
1:B:346:LEU:HD13	1:B:346:LEU:C	2.46	0.40
1:A:173:VAL:HG21	1:A:297:LEU:HD12	1.98	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles ⓘ

### 5.3.1 Protein backbone ⓘ

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	541/587 (92%)	516 (95%)	25 (5%)	0	100	100
1	B	539/587 (92%)	514 (95%)	25 (5%)	0	100	100
All	All	1080/1174 (92%)	1030 (95%)	50 (5%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	461/499 (92%)	416 (90%)	45 (10%)	7	15
1	B	460/499 (92%)	407 (88%)	53 (12%)	5	10
All	All	921/998 (92%)	823 (89%)	98 (11%)	6	13

All (98) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	34	ARG
1	A	51	SER
1	A	60	GLN
1	A	74	LEU
1	A	80	LEU
1	A	86	LEU
1	A	96	VAL
1	A	101	LEU
1	A	125	LEU
1	A	130	ARG
1	A	133	LEU
1	A	158	LEU
1	A	173	VAL
1	A	193	SER
1	A	200	LEU

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Mol	Chain	Res	Type
1	A	234	LEU
1	A	264	SER
1	A	297	LEU
1	A	317	GLU
1	A	320	ARG
1	A	323	ARG
1	A	337	MET
1	A	343	ARG
1	A	360	LEU
1	A	374	VAL
1	A	386	ARG
1	A	390	GLN
1	A	401	LEU
1	A	418	LEU
1	A	421	LEU
1	A	422	LEU
1	A	428	ARG
1	A	429	LEU
1	A	433	LEU
1	A	444	LEU
1	A	472	THR
1	A	481	LEU
1	A	495	MET
1	A	506	VAL
1	A	507	VAL
1	A	530	ILE
1	A	534	ILE
1	A	549	VAL
1	A	559	GLU
1	A	560	LEU
1	B	36	LYS
1	B	45	ARG
1	B	51	SER
1	B	52	LEU
1	B	59	VAL
1	B	64	LEU
1	B	65	GLN
1	B	68	ASP
1	B	74	LEU
1	B	80	LEU
1	B	84	GLN
1	B	86	LEU

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Mol	Chain	Res	Type
1	B	96	VAL
1	B	101	LEU
1	B	120	ASP
1	B	125	LEU
1	B	127	GLN
1	B	131	GLN
1	B	139	VAL
1	B	143	GLU
1	B	146	SER
1	B	158	LEU
1	B	173	VAL
1	B	200	LEU
1	B	236	THR
1	B	267	LYS
1	B	280	LEU
1	B	294	LEU
1	B	320	ARG
1	B	331	GLU
1	B	332	THR
1	B	352	ARG
1	B	374	VAL
1	B	386	ARG
1	B	390	GLN
1	B	401	LEU
1	B	412	SER
1	B	417	LEU
1	B	418	LEU
1	B	422	LEU
1	B	425	LEU
1	B	429	LEU
1	B	433	LEU
1	B	444	LEU
1	B	472	THR
1	B	481	LEU
1	B	506	VAL
1	B	507	VAL
1	B	530	ILE
1	B	549	VAL
1	B	558	GLU
1	B	559	GLU
1	B	560	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such

sidechains are listed below:

Mol	Chain	Res	Type
1	A	391	ASN
1	A	449	HIS
1	A	482	ASN
1	A	550	GLN
1	A	570	GLN
1	B	65	GLN
1	B	203	GLN
1	B	351	GLN
1	B	358	HIS

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

## 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 7 ligands modelled in this entry, 4 are unknown and 1 is monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with  $|Z| > 2$  is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
3	PF7	B	1578	1	21,21,22	1.35	1 (4%)	26,28,30	1.61	6 (23%)
3	PF7	A	1578	1	21,21,22	1.37	1 (4%)	26,28,30	1.42	5 (19%)



In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	PF7	B	1578	1	-	1/6/16/18	0/3/3/3
3	PF7	A	1578	1	-	2/6/16/18	0/3/3/3

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	1578	PF7	C8-N7	5.18	1.40	1.31
3	B	1578	PF7	C8-N7	4.82	1.39	1.31

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1578	PF7	C14-N15-C16	4.24	121.12	113.97
3	A	1578	PF7	C10-C9-C8	3.40	119.90	116.88
3	B	1578	PF7	C9-C11-C12	2.78	119.56	114.45
3	B	1578	PF7	C16-N15-C18	-2.76	119.22	122.61
3	A	1578	PF7	C14-N15-C18	-2.50	119.54	122.61
3	B	1578	PF7	C14-N15-C18	-2.41	119.66	122.61
3	A	1578	PF7	C8-N7-C2	2.17	119.47	116.96
3	A	1578	PF7	C9-C11-C12	-2.08	110.64	114.45
3	A	1578	PF7	C9-C8-N7	-2.08	120.93	124.01
3	B	1578	PF7	C10-C9-C8	2.06	118.71	116.88
3	B	1578	PF7	C8-N7-C2	2.00	119.28	116.96

There are no chirality outliers.

All (3) torsion outliers are listed below:

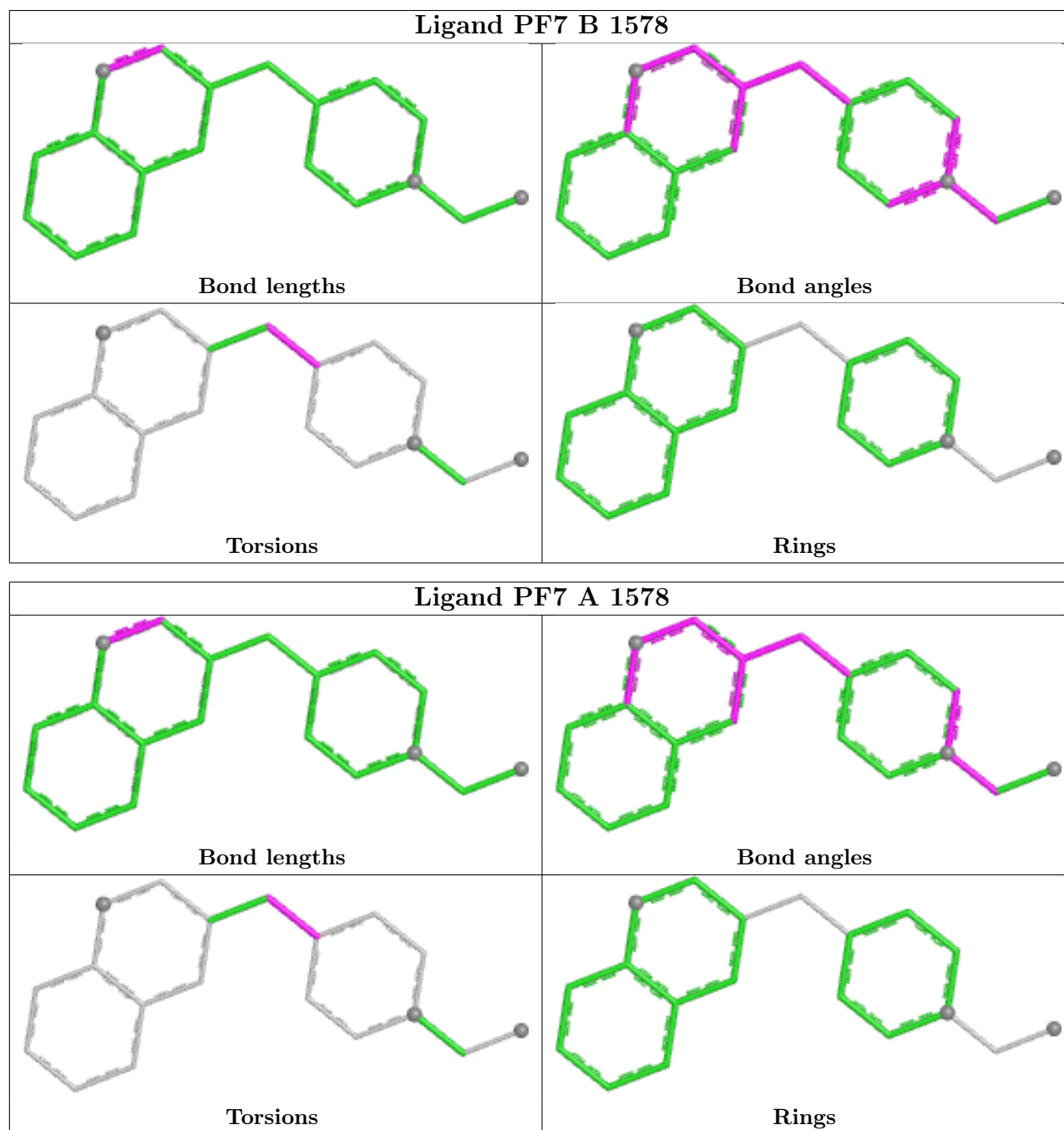
Mol	Chain	Res	Type	Atoms
3	A	1578	PF7	C9-C11-C12-C17
3	A	1578	PF7	C9-C11-C12-C13
3	B	1578	PF7	C9-C11-C12-C17

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will

also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95<sup>th</sup> percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	543/587 (92%)	0.09	11 (2%) 65 63	29, 37, 43, 45	0
1	B	541/587 (92%)	-0.13	1 (0%) 91 92	29, 37, 44, 50	0
All	All	1084/1174 (92%)	-0.02	12 (1%) 78 77	29, 37, 43, 50	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	38	ARG	3.8
1	A	33	GLY	3.0
1	A	36	LYS	2.7
1	B	417	LEU	2.6
1	A	72	GLU	2.4
1	A	34	ARG	2.4
1	A	575	GLN	2.3
1	A	116	SER	2.3
1	A	64	LEU	2.2
1	A	115	THR	2.2
1	A	112	ASN	2.1
1	A	131	GLN	2.1

### 6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

### 6.3 Carbohydrates [i](#)

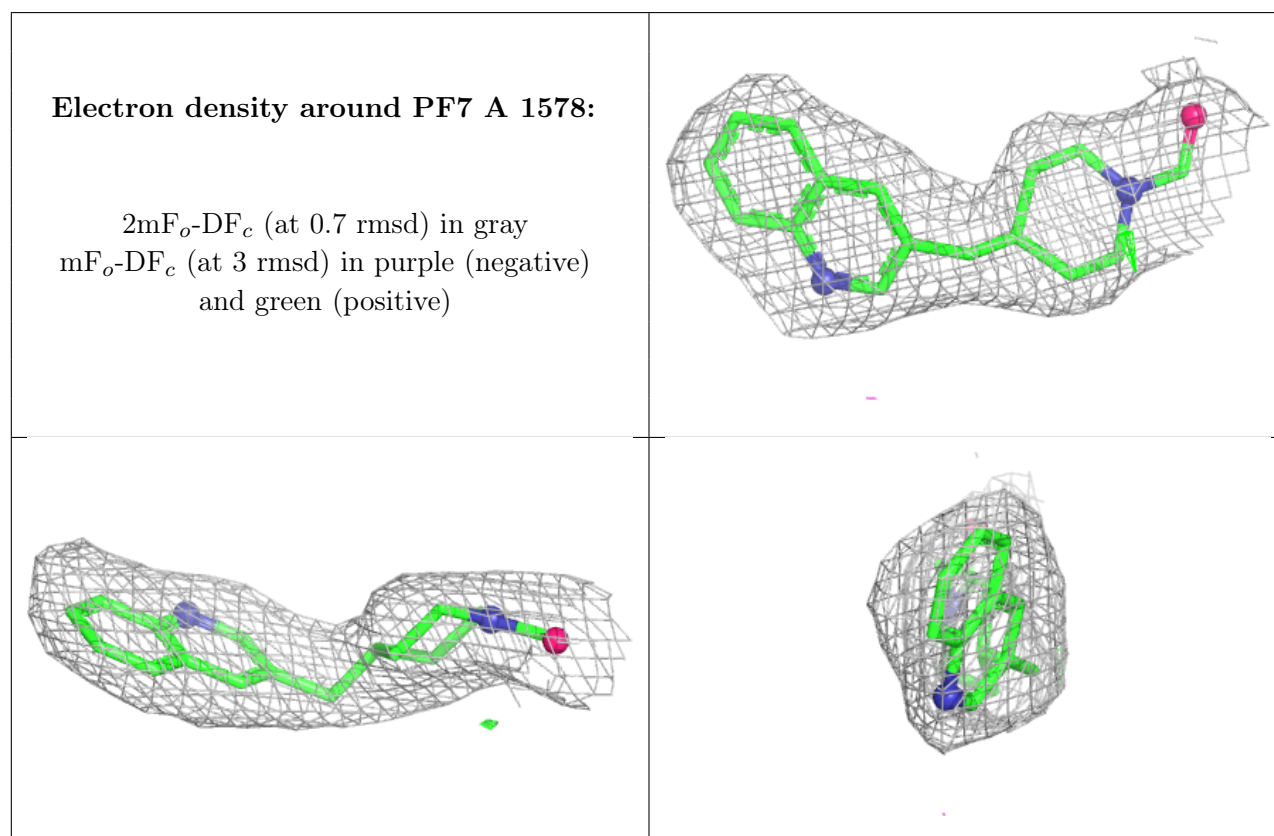
There are no oligosaccharides in this entry.

## 6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

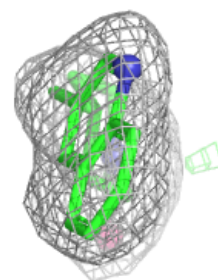
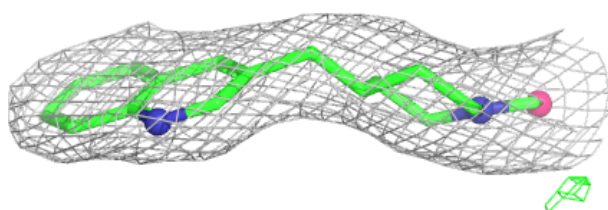
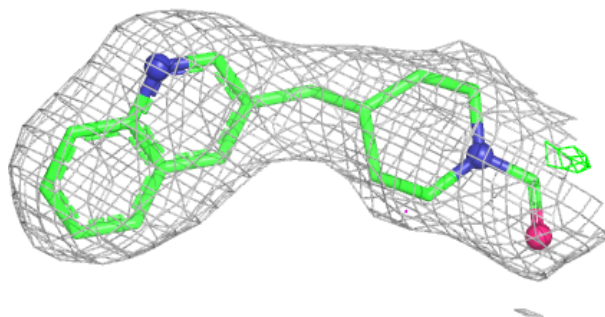
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
2	UNX	A	1576	1/1	-	-	30,30,30,30	1
2	UNX	A	1577	1/1	-	-	30,30,30,30	1
2	UNX	B	1575	1/1	-	-	30,30,30,30	1
2	UNX	B	1576	1/1	-	-	30,30,30,30	1
3	PF7	A	1578	19/20	0.95	0.08	31,31,33,34	0
4	CL	B	1577	1/1	0.97	0.10	21,21,21,21	0
3	PF7	B	1578	19/20	0.98	0.07	27,28,30,30	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.



**Electron density around PF7 B 1578:**

$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.