



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 26, 2022 – 10:48 AM EDT

PDB ID : 7S4E  
Title : Crystal Structure of ligand ACBi1 in complex with bromodomain of human Smarca2 and pVHL:ElonginC:ElonginB complex  
Authors : MacPherson, D.J.; Sherman, W.  
Deposited on : 2021-09-08  
Resolution : 2.25 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 ⓘ](#)) were used in the production of this report:

MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.31.2
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

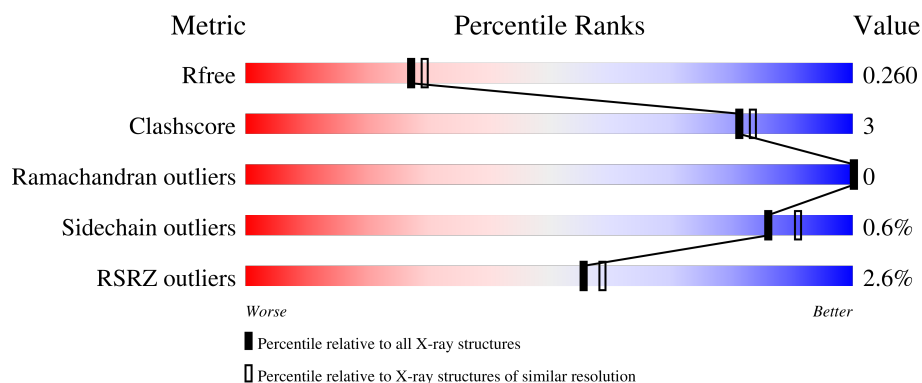
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.25 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))
$R_{free}$	130704	1377 (2.26-2.26)
Clashscore	141614	1487 (2.26-2.26)
Ramachandran outliers	138981	1449 (2.26-2.26)
Sidechain outliers	138945	1450 (2.26-2.26)
RSRZ outliers	127900	1356 (2.26-2.26)

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	125	<div> <div></div> <div>85%</div> <div>7%</div> <div>8%</div> </div>
1	E	125	<div> <div>6%</div> <div>86%</div> <div>6%</div> <div>8%</div> </div>
2	B	162	<div> <div>%</div> <div>83%</div> <div>9%</div> <div>8%</div> </div>
2	F	162	<div> <div>2%</div> <div>81%</div> <div>11%</div> <div>8%</div> </div>
3	C	96	<div> <div></div> <div>84%</div> <div>5%</div> <div>10%</div> </div>

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Mol	Chain	Length	Quality of chain
3	G	96	
4	D	104	
4	H	104	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	EDO	G	201	-	-	-	X
7	PEG	B	302	-	-	-	X

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 7652 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 Isoform Short of Probable global transcription activator SNF2L2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	115	Total	C	N	O	S	14	0	0
			944	601	166	174	3			
1	E	115	Total	C	N	O	S	11	1	0
			954	607	169	175	3			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1369	GLY	-	expression tag	UNP P51531-2
A	1370	SER	-	expression tag	UNP P51531-2
A	1371	GLY	-	expression tag	UNP P51531-2
A	1372	GLY	-	expression tag	UNP P51531-2
E	1369	GLY	-	expression tag	UNP P51531-2
E	1370	SER	-	expression tag	UNP P51531-2
E	1371	GLY	-	expression tag	UNP P51531-2
E	1372	GLY	-	expression tag	UNP P51531-2

- Molecule 2 is a protein called von Hippel-Lindau disease tumor suppressor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	149	Total	C	N	O	S	14	0	0
			1223	776	227	218	2			
2	F	149	Total	C	N	O	S	7	0	0
			1223	776	227	218	2			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	52	GLY	-	expression tag	UNP P40337
B	53	SER	-	expression tag	UNP P40337
F	52	GLY	-	expression tag	UNP P40337

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Chain	Residue	Modelled	Actual	Comment	Reference
F	53	SER	-	expression tag	UNP P40337

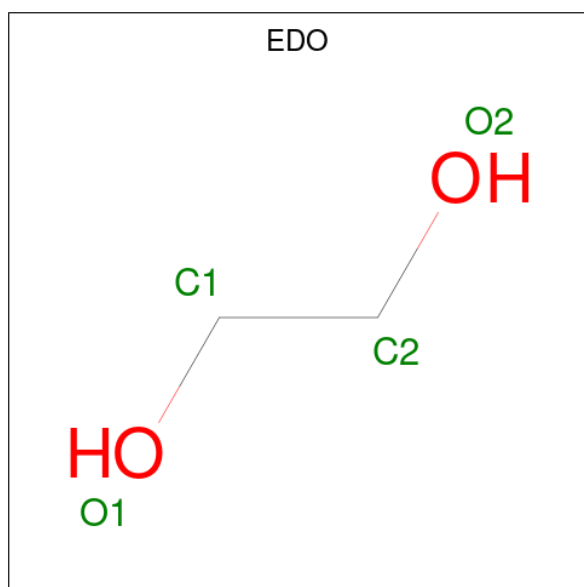
- Molecule 3 is a protein called Elongin-C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	C	86	Total	C	N	O	S	0	0	0
			688	444	110	128	6			
3	G	86	Total	C	N	O	S	0	0	0
			688	444	110	128	6			

- Molecule 4 is a protein called Elongin-B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	D	104	Total	C	N	O	S	8	0	0
			823	520	138	160	5			
4	H	104	Total	C	N	O	S	3	0	0
			823	520	138	160	5			

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: C<sub>2</sub>H<sub>6</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		

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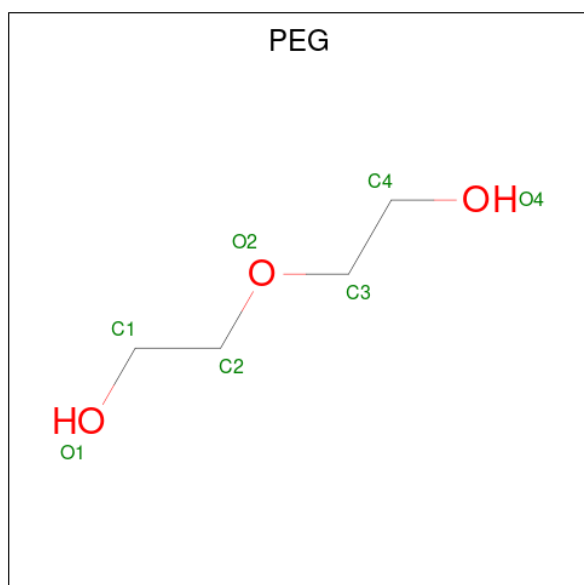
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0
5	D	1	Total C O 4 2 2	0	0
5	F	1	Total C O 4 2 2	0	0
5	G	1	Total C O 4 2 2	0	0

- Molecule 6 is SODIUM ION (three-letter code: NA) (formula: Na).

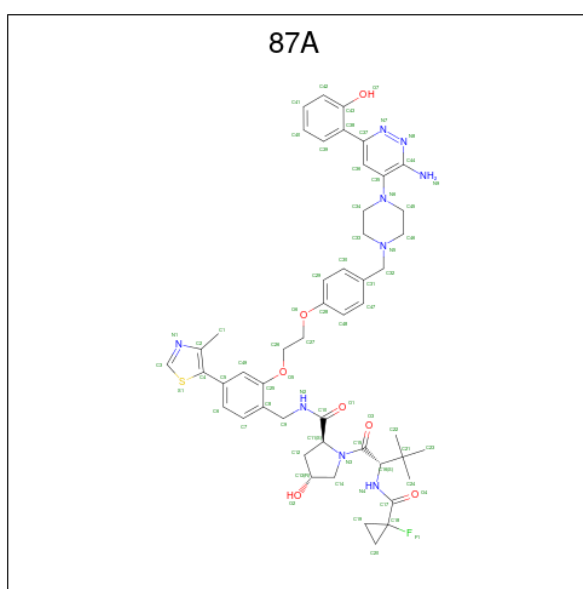
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total Na 1 1	0	0
6	B	3	Total Na 3 3	0	0
6	F	1	Total Na 1 1	0	0

- Molecule 7 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	B	1	Total C O 7 4 3	0	0
7	B	1	Total C O 7 4 3	0	0
7	F	1	Total C O 7 4 3	0	0

- Molecule 8 is N-(1-fluorocyclopropane-1-carbonyl)-3-methyl-L-valyl-(4R)-N-{[2-{2-[4-({4-[3-amino-6-(2-hydroxyphenyl)pyridazin-4-yl]piperazin-1-yl}methyl)phenoxy]ethoxy}-4-(4-methyl-1,3-thiazol-5-yl)phenyl]methyl}-4-hydroxy-L-prolinamide (three-letter code: 87A) (formula: C<sub>49</sub>H<sub>58</sub>FN<sub>9</sub>O<sub>7</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	B	1	Total C F N O S 67 49 1 9 7 1	0	0
8	F	1	Total C F N O S 67 49 1 9 7 1	0	0

- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	6	Total O 6 6	0	0
9	B	17	Total O 17 17	0	0
9	C	9	Total O 9 9	0	0

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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	D	25	Total 25	O 25	0	0
9	E	4	Total 4	O 4	0	0
9	F	11	Total 11	O 11	0	0
9	G	11	Total 11	O 11	0	0
9	H	7	Total 7	O 7	0	0



### 3 Residue-property plots [i](#)


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: Isoform Short of Probable global transcription activator SNF2L2

Chain A: 




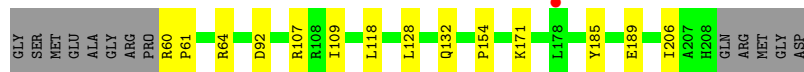
- Molecule 1: Isoform Short of Probable global transcription activator SNF2L2

Chain E: 




- Molecule 2: von Hippel-Lindau disease tumor suppressor

Chain B: 




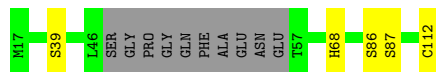
- Molecule 2: von Hippel-Lindau disease tumor suppressor

Chain F: 

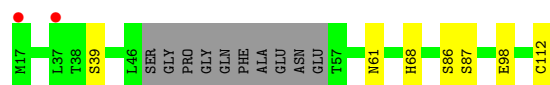
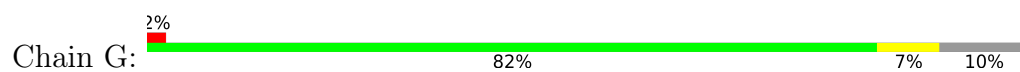


- Molecule 3: Elongin-C

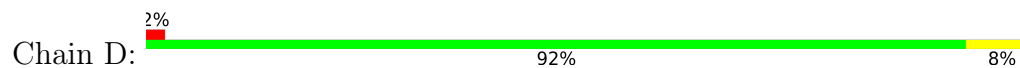
Chain C: 



- Molecule 3: Elongin-C



- Molecule 4: Elongin-B



- Molecule 4: Elongin-B



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	80.14Å 116.57Å 122.32Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	37.92 – 2.25 37.89 – 2.25	Depositor EDS
% Data completeness (in resolution range)	99.9 (37.92-2.25) 100.0 (37.89-2.25)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.27 (at 2.24Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.219 , 0.259 0.222 , 0.260	Depositor DCC
$R_{free}$ test set	2828 reflections (5.14%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	50.9	Xtriage
Anisotropy	0.416	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.32 , 37.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.000 for -h,l,k	Xtriage
$F_o, F_c$ correlation	0.96	EDS
Total number of atoms	7652	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	65.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 19.52% 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: 87A, NA, PEG, EDO

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	2.45	3/960 (0.3%)	1.13	5/1289 (0.4%)
1	E	0.70	0/971	0.81	0/1304
2	B	0.97	2/1255 (0.2%)	0.91	2/1712 (0.1%)
2	F	0.79	1/1255 (0.1%)	0.89	2/1712 (0.1%)
3	C	0.73	0/702	0.79	0/947
3	G	0.71	0/702	0.77	0/947
4	D	0.95	2/839 (0.2%)	1.31	4/1132 (0.4%)
4	H	0.72	1/839 (0.1%)	0.92	1/1132 (0.1%)
All	All	1.16	9/7523 (0.1%)	0.96	14/10175 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	F	0	1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1486	GLN	CG-CD	71.33	3.15	1.51
4	D	65	GLN	CG-CD	-17.56	1.10	1.51
2	B	171	LYS	CB-CG	-16.85	1.07	1.52
2	B	206	ILE	CA-CB	-13.69	1.23	1.54
1	A	1382	LYS	CB-CG	-10.01	1.25	1.52
2	F	182	ARG	CA-CB	7.78	1.71	1.53
1	A	1472	GLU	CG-CD	-7.52	1.40	1.51
4	H	104	LYS	CG-CD	-7.16	1.28	1.52
4	D	104	LYS	CA-CB	5.54	1.66	1.53

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	65	GLN	CG-CD-OE1	-21.32	78.95	121.60
1	A	1486	GLN	CB-CG-CD	-21.01	56.97	111.60
4	D	65	GLN	CG-CD-NE2	17.44	158.56	116.70
4	D	65	GLN	CB-CG-CD	16.13	153.55	111.60
4	H	104	LYS	CB-CG-CD	12.40	143.85	111.60
1	A	1472	GLU	CG-CD-OE2	-11.42	95.46	118.30
1	A	1472	GLU	CG-CD-OE1	11.24	140.78	118.30
1	A	1472	GLU	CB-CG-CD	-6.71	96.10	114.20
2	B	206	ILE	CB-CA-C	5.93	123.46	111.60
1	A	1426	ARG	CG-CD-NE	-5.83	99.55	111.80
2	F	182	ARG	CB-CA-C	-5.50	99.40	110.40
4	D	104	LYS	CB-CA-C	-5.35	99.71	110.40
2	F	79	ARG	NE-CZ-NH2	5.15	122.87	120.30
2	B	107	ARG	NE-CZ-NH2	-5.07	117.77	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	F	138	PRO	Peptide

## 5.2 Too-close contacts [i](#)

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	944	0	979	2	0
1	E	954	0	985	4	0
2	B	1223	0	1224	7	0
2	F	1223	0	1224	14	0
3	C	688	0	690	4	0
3	G	688	0	690	4	0
4	D	823	0	824	4	0
4	H	823	0	824	3	0
5	A	12	0	18	0	0
5	B	8	0	12	0	0
5	D	8	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	F	4	0	6	0	0
5	G	4	0	6	0	0
6	A	1	0	0	0	0
6	B	3	0	0	0	0
6	F	1	0	0	0	0
7	B	14	0	20	0	0
7	F	7	0	10	0	0
8	B	67	0	0	1	0
8	F	67	0	0	2	0
9	A	6	0	0	0	0
9	B	17	0	0	0	0
9	C	9	0	0	1	0
9	D	25	0	0	0	0
9	E	4	0	0	0	0
9	F	11	0	0	0	0
9	G	11	0	0	0	0
9	H	7	0	0	0	0
All	All	7652	0	7524	39	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 3.

All (39) 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)
2:B:132:GLN:NE2	3:C:86:SER:O	2.11	0.84
3:C:87:SER:HA	9:C:202:HOH:O	1.94	0.67
2:F:116:LEU:HD12	2:F:137:VAL:HG22	1.78	0.66
2:B:185:TYR:O	2:B:189:GLU:HG3	2.03	0.58
2:F:116:LEU:CD1	2:F:137:VAL:HG22	2.35	0.57
2:F:132:GLN:HE21	3:G:87:SER:HA	1.73	0.53
2:F:174:ASN:OD1	2:F:177:ARG:NH2	2.42	0.51
2:F:132:GLN:NE2	3:G:86:SER:O	2.45	0.49
2:F:107:ARG:NH1	8:F:304:87A:N1	2.60	0.49
2:F:116:LEU:CD1	2:F:137:VAL:CG2	2.91	0.49
2:B:60:ARG:NH1	2:B:92:ASP:OD1	2.47	0.48
2:F:116:LEU:HD12	2:F:137:VAL:CG2	2.43	0.48
2:F:89:LEU:HD12	2:F:116:LEU:HD23	1.97	0.47
2:B:128:LEU:HA	2:B:154:PRO:HD3	1.97	0.47
2:B:61:PRO:O	2:B:64:ARG:HD3	2.16	0.46
4:H:47:ASP:O	4:H:48:ASP:HB2	2.16	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
8:F:304:87A:N7	8:F:304:87A:O7	2.48	0.46
3:C:68:HIS:HB3	4:D:94:SER:O	2.16	0.45
8:B:308:87A:O7	8:B:308:87A:N7	2.49	0.45
4:D:47:ASP:O	4:D:48:ASP:HB2	2.17	0.45
1:E:1456:LEU:C	1:E:1456:LEU:HD23	2.37	0.45
1:E:1399:ASP:HB3	1:E:1405:LEU:HD11	1.98	0.44
1:A:1456:LEU:C	1:A:1456:LEU:HD23	2.37	0.44
1:E:1458[B]:HIS:CE1	1:E:1478:GLN:HE22	2.36	0.44
1:E:1454:MET:CE	1:E:1482:LYS:HE3	2.48	0.43
2:F:109:ILE:C	2:F:109:ILE:HD12	2.38	0.43
2:F:128:LEU:HA	2:F:154:PRO:HD3	2.00	0.43
1:A:1420:GLU:HA	1:A:1423:GLU:HG2	1.99	0.43
4:H:52:ASP:HB3	4:H:55:LYS:HD3	1.99	0.43
3:C:39:SER:HA	3:C:112:CYS:HB3	1.99	0.43
2:B:118:LEU:C	2:B:118:LEU:HD12	2.39	0.43
4:D:49:GLN:HA	4:D:49:GLN:OE1	2.19	0.43
2:B:109:ILE:C	2:B:109:ILE:HD12	2.40	0.43
2:F:61:PRO:O	2:F:64:ARG:HD3	2.19	0.42
2:F:116:LEU:HD12	2:F:116:LEU:HA	1.87	0.41
4:D:1:MET:HB3	4:D:2:ASP:H	1.76	0.41
3:G:39:SER:HA	3:G:112:CYS:HB3	2.02	0.41
3:G:68:HIS:HB3	4:H:94:SER:O	2.20	0.41
2:F:70:GLU:HB3	2:F:140:LEU:HD21	2.04	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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	113/125 (90%)	110 (97%)	3 (3%)	0	100	100
1	E	114/125 (91%)	111 (97%)	3 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	B	147/162 (91%)	141 (96%)	6 (4%)	0	100	100
2	F	147/162 (91%)	142 (97%)	5 (3%)	0	100	100
3	C	82/96 (85%)	81 (99%)	1 (1%)	0	100	100
3	G	82/96 (85%)	79 (96%)	3 (4%)	0	100	100
4	D	102/104 (98%)	99 (97%)	3 (3%)	0	100	100
4	H	102/104 (98%)	97 (95%)	5 (5%)	0	100	100
All	All	889/974 (91%)	860 (97%)	29 (3%)	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	108/114 (95%)	106 (98%)	2 (2%)	57	66
1	E	109/114 (96%)	109 (100%)	0	100	100
2	B	139/148 (94%)	139 (100%)	0	100	100
2	F	139/148 (94%)	138 (99%)	1 (1%)	84	90
3	C	78/85 (92%)	78 (100%)	0	100	100
3	G	78/85 (92%)	76 (97%)	2 (3%)	46	55
4	D	92/92 (100%)	92 (100%)	0	100	100
4	H	92/92 (100%)	92 (100%)	0	100	100
All	All	835/878 (95%)	830 (99%)	5 (1%)	86	91

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1451	LYS
1	A	1452	ASP
2	F	60	ARG
3	G	61	ASN

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Mol	Chain	Res	Type
3	G	98	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1458	HIS
1	A	1464	ASN
2	B	193	ASN
1	E	1404	GLN
2	F	132	GLN
2	F	193	ASN
3	G	85	ASN

### 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 monosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 19 ligands modelled in this entry, 5 are monoatomic - leaving 14 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	$\# Z  > 2$
8	87A	B	308	6	66,74,74	0.47	1 (1%)	86,108,108	0.81	4 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	G	201	-	3,3,3	0.29	0	2,2,2	0.53	0
5	EDO	F	302	-	3,3,3	0.11	0	2,2,2	0.11	0
5	EDO	A	1502	-	3,3,3	0.19	0	2,2,2	0.14	0
8	87A	F	304	-	66,74,74	0.52	1 (1%)	86,108,108	0.93	5 (5%)
5	EDO	D	201	-	3,3,3	0.24	0	2,2,2	0.15	0
7	PEG	F	301	-	6,6,6	0.38	0	5,5,5	0.16	0
5	EDO	B	301	-	3,3,3	0.15	0	2,2,2	0.38	0
5	EDO	D	202	-	3,3,3	0.16	0	2,2,2	0.28	0
7	PEG	B	304	-	6,6,6	0.34	0	5,5,5	0.29	0
5	EDO	B	303	-	3,3,3	0.43	0	2,2,2	0.82	0
7	PEG	B	302	-	6,6,6	0.55	0	5,5,5	0.37	0
5	EDO	A	1503	-	3,3,3	0.22	0	2,2,2	0.32	0
5	EDO	A	1501	-	3,3,3	0.52	0	2,2,2	0.61	0

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
8	87A	B	308	6	-	2/54/82/82	0/8/8/8
5	EDO	G	201	-	-	1/1/1/1	-
5	EDO	F	302	-	-	0/1/1/1	-
5	EDO	A	1502	-	-	1/1/1/1	-
8	87A	F	304	-	-	5/54/82/82	0/8/8/8
5	EDO	D	201	-	-	0/1/1/1	-
7	PEG	F	301	-	-	3/4/4/4	-
5	EDO	B	301	-	-	1/1/1/1	-
5	EDO	D	202	-	-	1/1/1/1	-
7	PEG	B	304	-	-	3/4/4/4	-
5	EDO	B	303	-	-	1/1/1/1	-
7	PEG	B	302	-	-	3/4/4/4	-
5	EDO	A	1503	-	-	1/1/1/1	-
5	EDO	A	1501	-	-	0/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	F	304	87A	C35-C44	2.42	1.43	1.41
8	B	308	87A	C35-C44	2.16	1.43	1.41

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	F	304	87A	C21-C16-C15	3.18	117.47	113.40
8	F	304	87A	C34-N6-C35	2.80	122.91	116.27
8	F	304	87A	C46-C45-N6	2.55	115.65	110.70
8	F	304	87A	C45-N6-C35	2.52	122.25	116.27
8	B	308	87A	C34-N6-C35	2.40	121.96	116.27
8	B	308	87A	C45-N6-C35	2.20	121.48	116.27
8	B	308	87A	C21-C16-N4	-2.05	109.27	111.84
8	F	304	87A	C45-C46-N5	2.03	114.81	110.64
8	B	308	87A	C19-C18-C17	2.01	120.30	116.20

There are no chirality outliers.

All (22) torsion outliers are listed below:

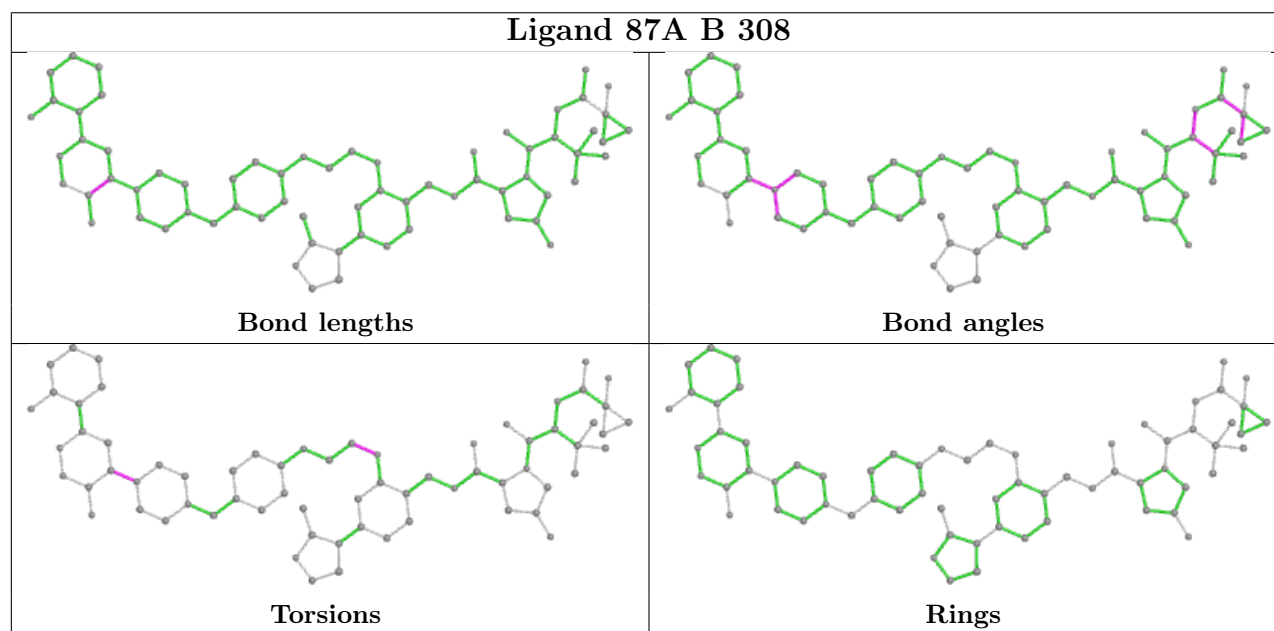
Mol	Chain	Res	Type	Atoms
7	F	301	PEG	O1-C1-C2-O2
5	A	1503	EDO	O1-C1-C2-O2
7	B	304	PEG	O2-C3-C4-O4
7	B	302	PEG	O1-C1-C2-O2
5	A	1502	EDO	O1-C1-C2-O2
5	B	303	EDO	O1-C1-C2-O2
5	D	202	EDO	O1-C1-C2-O2
7	B	302	PEG	C1-C2-O2-C3
7	F	301	PEG	O2-C3-C4-O4
8	F	304	87A	C36-C35-N6-C45
8	F	304	87A	C29-C28-O6-C27
8	F	304	87A	C48-C28-O6-C27
8	F	304	87A	C27-C26-O5-C25
5	B	301	EDO	O1-C1-C2-O2
5	G	201	EDO	O1-C1-C2-O2
7	B	304	PEG	C4-C3-O2-C2
7	B	304	PEG	O1-C1-C2-O2
8	B	308	87A	C27-C26-O5-C25
7	B	302	PEG	C4-C3-O2-C2
7	F	301	PEG	C4-C3-O2-C2
8	B	308	87A	C44-C35-N6-C34
8	F	304	87A	C44-C35-N6-C45

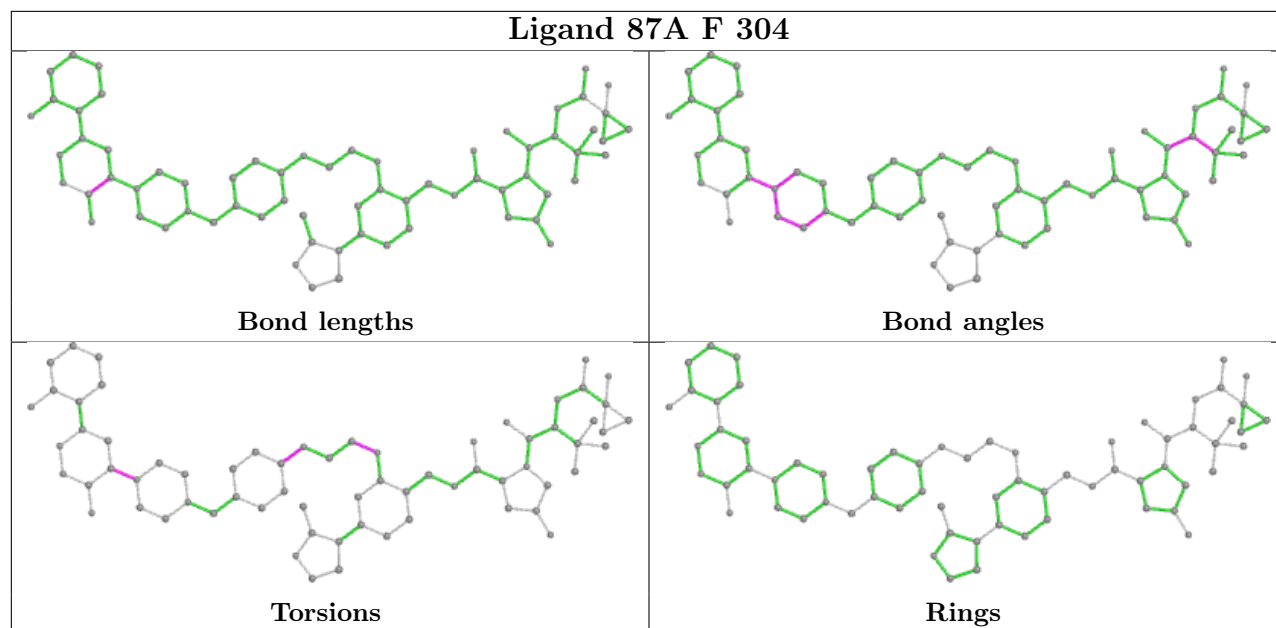
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	308	87A	1	0
8	F	304	87A	2	0

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 ⓘ

### 6.1 Protein, DNA and RNA chains ⓘ

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	115/125 (92%)	0.24	0 100 100	39, 66, 102, 113	4 (3%)
1	E	115/125 (92%)	0.49	7 (6%) 21 23	54, 77, 106, 130	3 (2%)
2	B	149/162 (91%)	0.07	1 (0%) 87 88	38, 53, 92, 131	3 (2%)
2	F	149/162 (91%)	0.19	4 (2%) 54 57	40, 59, 104, 125	1 (0%)
3	C	86/96 (89%)	0.14	0 100 100	43, 60, 87, 100	0
3	G	86/96 (89%)	0.15	2 (2%) 60 63	44, 61, 94, 106	0
4	D	104/104 (100%)	0.01	2 (1%) 66 69	41, 53, 91, 107	2 (1%)
4	H	104/104 (100%)	0.45	8 (7%) 13 14	49, 70, 102, 122	1 (0%)
All	All	908/974 (93%)	0.21	24 (2%) 56 59	38, 62, 100, 131	14 (1%)

All (24) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
4	H	103	MET	5.2
4	D	104	LYS	4.3
2	B	178	LEU	4.1
4	H	82	ASP	4.0
4	H	100	PRO	3.7
4	H	101	ASP	3.5
4	H	99	LEU	3.4
1	E	1396	ASN	3.1
2	F	140	LEU	3.1
2	F	139	SER	3.0
4	H	85	PHE	2.9
1	E	1395	ILE	2.6
3	G	37	LEU	2.5
1	E	1486	GLN	2.5
1	E	1397	TYR	2.4
4	D	101	ASP	2.3

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Mol	Chain	Res	Type	RSRZ
3	G	17	MET	2.2
4	H	104	LYS	2.1
2	F	178	LEU	2.1
1	E	1487	LYS	2.1
1	E	1480	VAL	2.1
1	E	1392	ASP	2.1
2	F	60	ARG	2.1
4	H	49	GLN	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 6.3 Carbohydrates ⓘ

There are no monosaccharides 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
5	EDO	A	1501	4/4	0.63	0.40	72,80,82,83	0
5	EDO	G	201	4/4	0.66	0.43	84,87,88,91	0
5	EDO	B	303	4/4	0.67	0.23	62,70,70,75	0
7	PEG	B	304	7/7	0.70	0.28	81,92,95,95	0
7	PEG	B	302	7/7	0.79	0.42	63,72,80,80	0
5	EDO	D	201	4/4	0.81	0.17	75,77,77,78	0
6	NA	B	306	1/1	0.85	0.19	63,63,63,63	0
7	PEG	F	301	7/7	0.85	0.17	74,78,80,81	0
5	EDO	D	202	4/4	0.86	0.15	77,78,79,79	0
5	EDO	A	1502	4/4	0.88	0.12	77,80,81,82	0
5	EDO	A	1503	4/4	0.88	0.20	62,64,67,68	0
5	EDO	B	301	4/4	0.90	0.18	63,66,67,69	0
5	EDO	F	302	4/4	0.91	0.15	71,75,76,76	0
6	NA	F	303	1/1	0.92	0.23	56,56,56,56	0
6	NA	B	307	1/1	0.93	0.13	58,58,58,58	0

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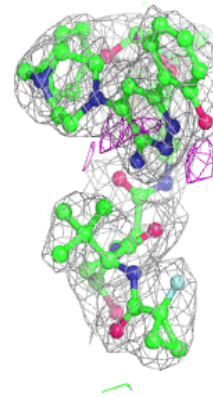
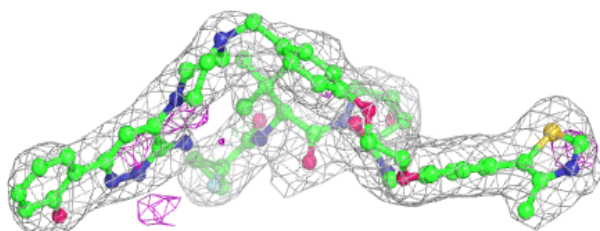
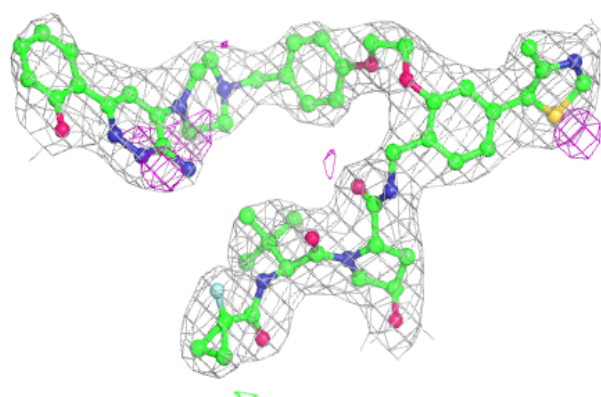
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
6	NA	B	305	1/1	0.94	0.25	54,54,54,54	0
8	87A	F	304	67/67	0.94	0.14	44,54,69,71	0
8	87A	B	308	67/67	0.96	0.13	34,41,47,49	0
6	NA	A	1504	1/1	0.99	0.53	59,59,59,59	0

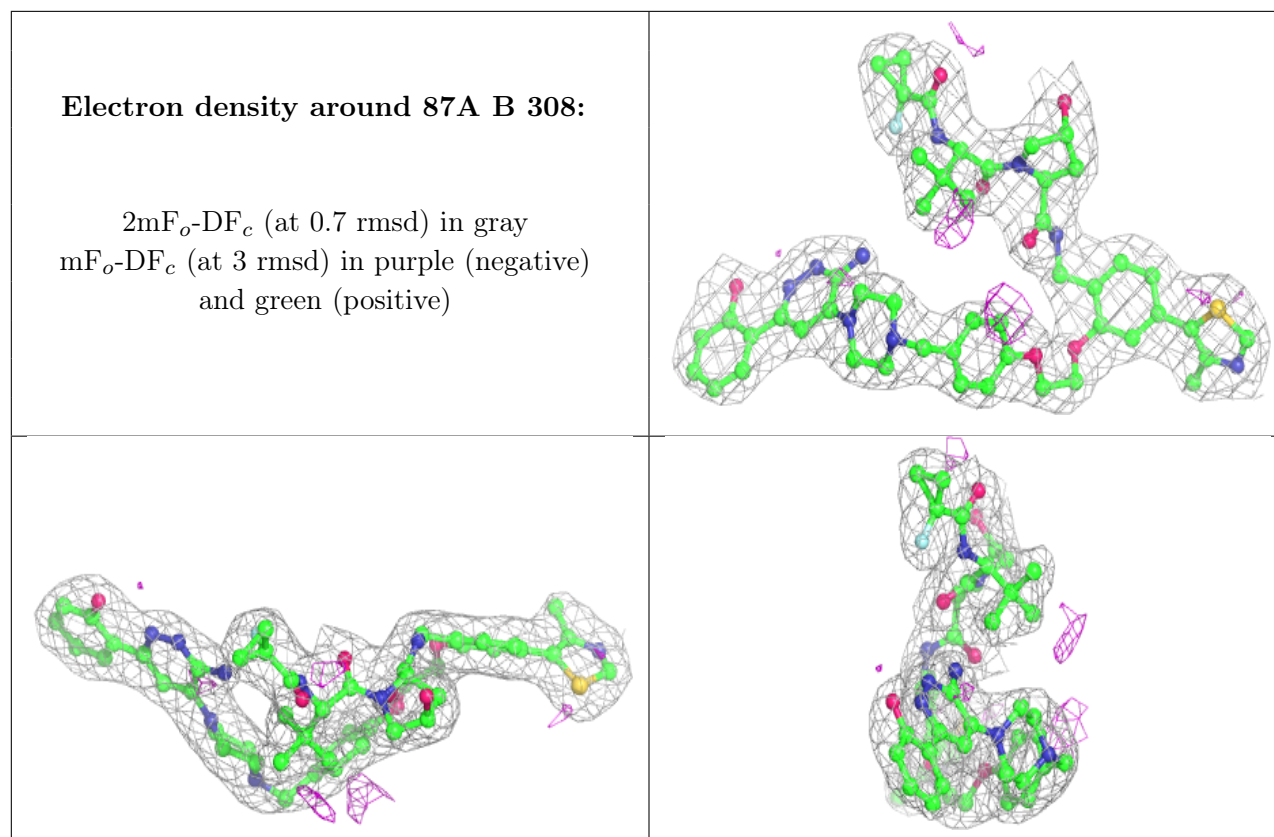
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 87A F 304:**

2mF<sub>o</sub>-DF<sub>c</sub> (at 0.7 rmsd) in gray  
mF<sub>o</sub>-DF<sub>c</sub> (at 3 rmsd) in purple (negative)  
and green (positive)







## 6.5 Other polymers [i](#)

There are no such residues in this entry.