



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 08:31 AM UTC

PDB ID : 2F3F / pdb_00002f3f
Title : Crystal Structure of the Bace complex with BDF488, a macrocyclic inhibitor
Authors : Rondeau, J.-M.
Deposited on : 2005-11-21
Resolution : 2.30 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

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>.

The following versions of software and data (see [references ⓘ](#)) 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

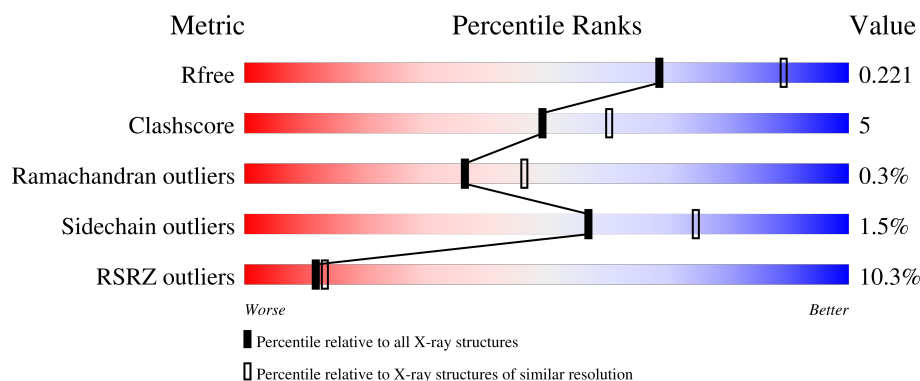
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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 ≥ 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	402	7% 81% 11% • 7%
1	B	402	13% 82% 10% • 6%
1	C	402	9% 81% 12% 6%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9495 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.

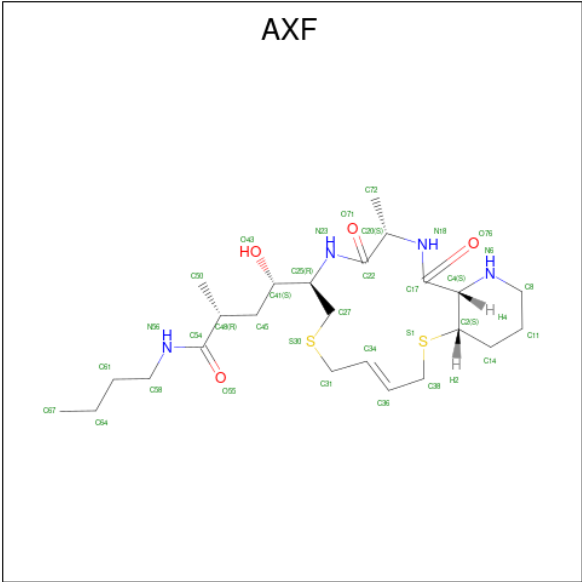
- Molecule 1 is a protein called Beta-secretase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	375	Total	C	N	O	S	0	0	0
			2953	1890	491	558	14			
1	B	377	Total	C	N	O	S	0	0	0
			2966	1898	493	561	14			
1	C	377	Total	C	N	O	S	0	0	0
			2966	1898	493	561	14			

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	33P	GLY	-	cloning artifact	UNP P56817
A	34P	PRO	-	cloning artifact	UNP P56817
B	33P	GLY	-	cloning artifact	UNP P56817
B	34P	PRO	-	cloning artifact	UNP P56817
C	33P	GLY	-	cloning artifact	UNP P56817
C	34P	PRO	-	cloning artifact	UNP P56817

- Molecule 2 is (2R,4S)-N-BUTYL-4-HYDROXY-2-METHYL- 4-((E)-(4AS,12R,15S,17AS)-15-METHYL -14,17-DIOXO-2,3,4,4A,6,9,11,12,13, 14,15,16,17,17A-TETRADECAHYDRO-1H-5 ,10-DITHIA-1,13,16-TRIAZA-BENZOCYCL OPENTADecen-12-yl)-BUTYRAMIDE (CCD ID: AXF) (formula: C₂₄H₄₂N₄O₄S₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	S	0	0
			34	24	4	4	2		
2	B	1	Total	C	N	O	S	0	0
			34	24	4	4	2		
2	C	1	Total	C	N	O	S	0	0
			34	24	4	4	2		

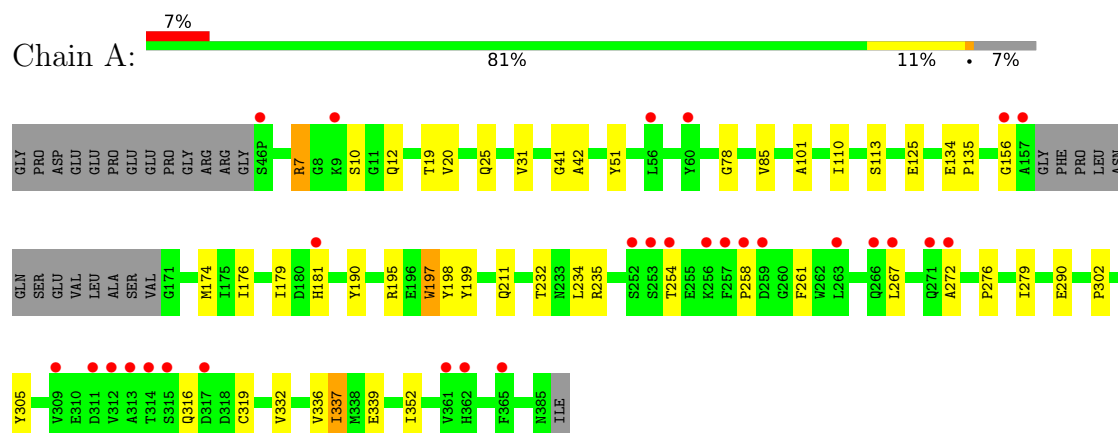
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	170	Total	O	0	0
			170	170		
3	B	159	Total	O	0	0
			159	159		
3	C	179	Total	O	0	0
			179	179		

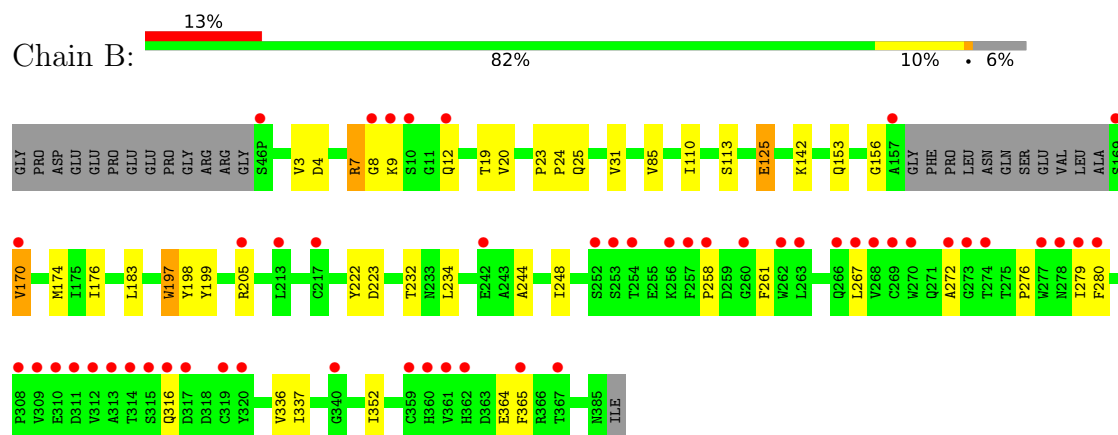
3 Residue-property plots [i](#)

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.

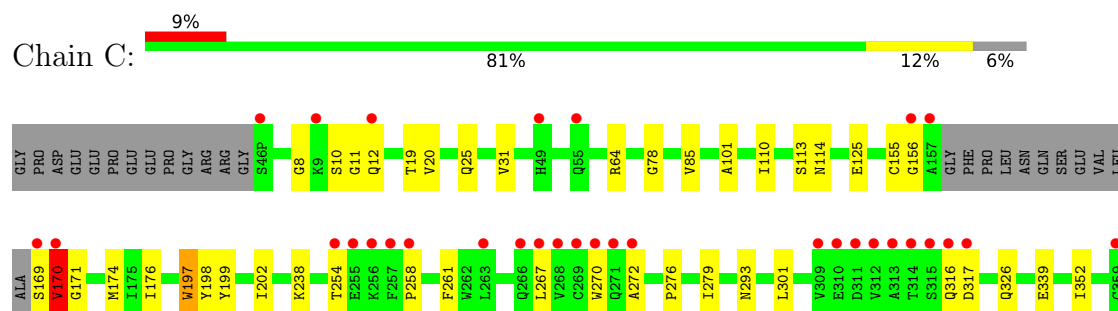
• Molecule 1: Beta-secretase 1



• Molecule 1: Beta-secretase 1



• Molecule 1: Beta-secretase 1





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	82.25Å 103.20Å 101.00Å 90.00° 103.03° 90.00°	Depositor
Resolution (Å)	63.29 – 2.30 63.29 – 2.31	Depositor EDS
% Data completeness (in resolution range)	99.3 (63.29-2.30) 99.4 (63.29-2.31)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.29 (at 2.32Å)	Xtriage
Refinement program	CNS, CNX 2005	Depositor
R, R_{free}	0.190 , 0.220 0.191 , 0.221	Depositor DCC
R_{free} test set	3670 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å ²)	42.1	Xtriage
Anisotropy	0.420	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 52.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9495	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.76% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: AXF

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	0.40	0/3028	0.72	0/4115
1	B	0.41	0/3041	0.75	2/4133 (0.0%)
1	C	0.39	0/3041	0.73	0/4133
All	All	0.40	0/9110	0.73	2/12381 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	280	PHE	CA-C-N	6.63	126.55	119.85
1	B	280	PHE	C-N-CA	6.63	126.55	119.85

There are no chirality outliers.

There are no planarity outliers.

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	2953	0	2861	31	0
1	B	2966	0	2875	30	0
1	C	2966	0	2875	36	0
2	A	34	0	42	0	0
2	B	34	0	42	0	0
2	C	34	0	42	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	170	0	0	1	0
3	B	159	0	0	1	0
3	C	179	0	0	4	0
All	All	9495	0	8737	96	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 5.

All (96) 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:267:LEU:H	1:A:267:LEU:HD23	1.48	0.79
1:B:267:LEU:H	1:B:267:LEU:HD23	1.48	0.76
1:C:267:LEU:HD23	1:C:267:LEU:H	1.50	0.73
1:B:8:GLY:O	1:B:170:VAL:HG23	1.89	0.73
1:A:7:ARG:HH11	1:A:7:ARG:HG2	1.54	0.72
1:B:156:GLY:C	1:B:170:VAL:HG11	2.16	0.70
1:C:155:CYS:O	1:C:170:VAL:HG13	1.95	0.66
1:B:142:LYS:HG2	3:B:711:HOH:O	1.97	0.65
1:C:170:VAL:HG12	1:C:171:GLY:N	2.13	0.64
1:B:276:PRO:O	1:B:279:ILE:HG12	1.98	0.63
1:C:10:SER:HB3	1:C:339:GLU:OE1	1.99	0.62
1:C:155:CYS:O	1:C:170:VAL:CG1	2.51	0.59
1:A:234:LEU:HD13	1:A:337:ILE:CD1	2.33	0.58
1:A:276:PRO:O	1:A:279:ILE:HG12	2.04	0.58
1:C:276:PRO:O	1:C:279:ILE:HG12	2.03	0.58
1:C:202:ILE:CD1	1:C:379:MET:HG3	2.34	0.57
1:B:7:ARG:HH11	1:B:7:ARG:HG2	1.69	0.57
1:C:20:VAL:HG12	1:C:85:VAL:HG22	1.88	0.56
1:A:7:ARG:HG2	1:A:7:ARG:NH1	2.20	0.55
1:A:197:TRP:CG	1:A:198:TYR:H	2.24	0.54
1:A:10:SER:HB2	1:A:339:GLU:OE1	2.07	0.54
1:B:364:GLU:HG3	1:B:365:PHE:CD1	2.43	0.54
1:C:11:GLY:O	2:C:603:AXF:H82	2.06	0.54
1:C:8:GLY:O	1:C:170:VAL:HB	2.08	0.53
1:C:197:TRP:CG	1:C:198:TYR:H	2.27	0.53
1:A:234:LEU:HD13	1:A:337:ILE:HD11	1.90	0.53
1:C:272:ALA:HB2	1:C:316:GLN:O	2.08	0.53
1:C:64:ARG:HG2	1:C:64:ARG:HH11	1.75	0.52
1:A:254:THR:HG21	1:C:254:THR:HG21	1.93	0.51
1:C:156:GLY:O	1:C:170:VAL:HG13	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:20:VAL:HG12	1:A:85:VAL:HG22	1.94	0.50
1:B:197:TRP:CG	1:B:198:TYR:H	2.30	0.50
1:A:19:THR:HA	1:A:25:GLN:O	2.13	0.49
1:B:20:VAL:HG12	1:B:85:VAL:HG22	1.94	0.49
1:C:363:ASP:HB3	1:C:366:ARG:O	2.12	0.49
1:C:110:ILE:HB	1:C:113:SER:HB3	1.95	0.49
1:A:272:ALA:HB2	1:A:316:GLN:O	2.13	0.49
1:B:125:GLU:HG2	1:B:197:TRP:HB3	1.95	0.48
1:C:270:TRP:O	1:C:317:ASP:HB3	2.13	0.48
1:B:272:ALA:HB2	1:B:316:GLN:O	2.13	0.48
1:C:267:LEU:HD23	1:C:267:LEU:N	2.26	0.47
1:C:293:ASN:HA	1:C:375:VAL:HA	1.96	0.47
1:C:8:GLY:HA2	3:C:722:HOH:O	2.14	0.47
1:A:110:ILE:HB	1:A:113:SER:HB3	1.97	0.47
1:B:125:GLU:HG2	1:B:197:TRP:CB	2.45	0.47
1:C:125:GLU:HG2	1:C:197:TRP:HB3	1.95	0.47
1:A:125:GLU:CD	1:A:195:ARG:HH21	2.23	0.47
1:B:174:MET:HE3	1:B:176:ILE:HD11	1.97	0.47
1:B:232:THR:O	1:B:336:VAL:HG13	2.16	0.46
1:A:267:LEU:HD23	1:A:267:LEU:N	2.24	0.46
1:A:190:TYR:HB2	1:A:290:GLU:CD	2.41	0.46
1:B:222:TYR:HA	1:B:223:ASP:HA	1.63	0.46
1:A:174:MET:HE3	1:A:176:ILE:HD11	1.97	0.46
1:B:31:VAL:O	1:B:31:VAL:HG23	2.16	0.45
1:B:110:ILE:HB	1:B:113:SER:HB3	1.98	0.45
1:B:267:LEU:HD23	1:B:267:LEU:N	2.25	0.45
1:C:19:THR:HA	1:C:25:GLN:O	2.16	0.45
1:B:258:PRO:O	1:B:261:PHE:HB3	2.17	0.45
1:B:125:GLU:O	1:B:125:GLU:HG3	2.17	0.45
1:A:181:HIS:HB3	3:A:763:HOH:O	2.17	0.44
1:C:258:PRO:O	1:C:261:PHE:HB3	2.17	0.44
1:A:267:LEU:HD12	1:A:319:CYS:HB3	2.00	0.44
1:A:179:ILE:HG22	1:A:181:HIS:HD2	1.82	0.44
1:C:169:SER:O	1:C:170:VAL:HG23	2.18	0.44
1:C:238:LYS:HG3	1:C:326:GLN:OE1	2.18	0.43
1:C:114:ASN:ND2	3:C:651:HOH:O	2.50	0.43
1:C:378:ASP:HB2	3:C:691:HOH:O	2.18	0.43
1:C:202:ILE:HD11	1:C:379:MET:HG3	1.99	0.43
1:A:234:LEU:HD13	1:A:337:ILE:HD12	2.00	0.43
1:B:153:GLN:OE1	1:B:183:LEU:HD22	2.19	0.43
1:C:31:VAL:O	1:C:31:VAL:HG23	2.18	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:258:PRO:O	1:A:261:PHE:HB3	2.18	0.43
1:B:3:VAL:O	1:B:4:ASP:HB2	2.19	0.42
1:B:234:LEU:HB2	1:B:337:ILE:HD11	2.01	0.42
1:A:232:THR:O	1:A:336:VAL:HG13	2.18	0.42
1:B:142:LYS:HE2	1:B:142:LYS:HB3	1.91	0.42
1:A:235:ARG:HB2	1:A:332:VAL:HB	2.02	0.42
1:B:19:THR:HA	1:B:25:GLN:O	2.19	0.42
1:B:156:GLY:O	1:B:170:VAL:HG11	2.20	0.42
1:A:199:TYR:HB3	1:A:352:ILE:HD11	2.02	0.41
1:B:199:TYR:HB3	1:B:352:ILE:HD11	2.02	0.41
1:C:376:THR:HB	3:C:639:HOH:O	2.20	0.41
1:A:31:VAL:HG23	1:A:31:VAL:O	2.19	0.41
1:A:42:ALA:CB	1:A:101:ALA:HB1	2.49	0.41
1:B:7:ARG:HG2	1:B:7:ARG:NH1	2.33	0.41
1:C:174:MET:HE3	1:C:176:ILE:HD11	2.02	0.41
1:C:301:LEU:HD12	1:C:361:VAL:CG2	2.50	0.41
1:B:244:ALA:O	1:B:248:ILE:HG13	2.20	0.41
1:A:134:GLU:HA	1:A:135:PRO:HD3	1.96	0.41
1:C:78:GLY:HA3	1:C:101:ALA:O	2.21	0.41
1:C:156:GLY:O	1:C:170:VAL:HG22	2.21	0.40
1:A:78:GLY:HA3	1:A:101:ALA:O	2.21	0.40
1:A:302:PRO:HA	1:A:305:TYR:CE2	2.56	0.40
1:A:41:GLY:O	1:A:51:TYR:HB2	2.22	0.40
1:B:23:PRO:HA	1:B:24:PRO:HD3	1.96	0.40
1:C:199:TYR:HB3	1:C:352:ILE:HD11	2.02	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	371/402 (92%)	357 (96%)	13 (4%)	1 (0%)	36 46

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	373/402 (93%)	358 (96%)	14 (4%)	1 (0%)	36	46
1	C	373/402 (93%)	358 (96%)	14 (4%)	1 (0%)	36	46
All	All	1117/1206 (93%)	1073 (96%)	41 (4%)	3 (0%)	36	46

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	156	GLY
1	C	170	VAL
1	B	9	LYS

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	320/342 (94%)	315 (98%)	5 (2%)	55	73
1	B	322/342 (94%)	316 (98%)	6 (2%)	50	69
1	C	322/342 (94%)	319 (99%)	3 (1%)	70	84
All	All	964/1026 (94%)	950 (98%)	14 (2%)	57	75

All (14) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	7	ARG
1	A	12	GLN
1	A	197	TRP
1	A	211	GLN
1	A	337	ILE
1	B	7	ARG
1	B	12	GLN
1	B	125	GLU
1	B	170	VAL
1	B	197	TRP
1	B	205	ARG

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Mol	Chain	Res	Type
1	C	12	GLN
1	C	170	VAL
1	C	197	TRP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	12	GLN
1	A	111	ASN
1	A	114	ASN
1	A	181	HIS
1	A	278	ASN
1	A	326	GLN
1	A	385	ASN
1	B	12	GLN
1	B	89	HIS
1	B	98	ASN
1	B	111	ASN
1	B	114	ASN
1	B	293	ASN
1	B	326	GLN
1	B	385	ASN
1	C	12	GLN
1	C	89	HIS
1	C	111	ASN
1	C	114	ASN
1	C	211	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry

3 ligands are modelled in this entry.

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
2	AXF	A	601	-	33,35,35	0.90	0	32,45,45	1.91	5 (15%)
2	AXF	C	603	-	33,35,35	0.94	1 (3%)	32,45,45	1.89	4 (12%)
2	AXF	B	602	-	33,35,35	1.00	1 (3%)	32,45,45	1.91	6 (18%)

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
2	AXF	A	601	-	-	5/43/54/54	0/1/2/2
2	AXF	C	603	-	-	5/43/54/54	0/1/2/2
2	AXF	B	602	-	-	5/43/54/54	0/1/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	603	AXF	C2-C4	2.20	1.56	1.53
2	B	602	AXF	C2-C4	2.10	1.56	1.53

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	601	AXF	C34-C31-S30	-8.25	101.05	113.59
2	B	602	AXF	C34-C31-S30	-8.23	101.08	113.59
2	C	603	AXF	C34-C31-S30	-7.89	101.60	113.59
2	C	603	AXF	C72-C20-C22	3.49	116.76	110.14
2	B	602	AXF	C22-C20-N18	-3.43	103.08	111.59
2	A	601	AXF	C22-C20-N18	-3.25	103.55	111.59

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	603	AXF	C22-C20-N18	-3.24	103.56	111.59
2	A	601	AXF	C72-C20-C22	3.10	116.02	110.14
2	B	602	AXF	C72-C20-C22	3.01	115.85	110.14
2	C	603	AXF	C41-C25-N23	2.50	114.66	109.97
2	A	601	AXF	C41-C25-N23	2.37	114.42	109.97
2	B	602	AXF	C25-N23-C22	-2.15	119.50	123.25
2	B	602	AXF	C41-C25-N23	2.11	113.93	109.97
2	B	602	AXF	C31-C34-C36	-2.03	119.94	125.05
2	A	601	AXF	C25-N23-C22	-2.02	119.73	123.25

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	601	AXF	N18-C17-C4-C2
2	C	603	AXF	N18-C17-C4-C2
2	A	601	AXF	O76-C17-C4-C2
2	B	602	AXF	N18-C17-C4-C2
2	B	602	AXF	O76-C17-C4-C2
2	C	603	AXF	O76-C17-C4-C2
2	C	603	AXF	C72-C20-C22-O71
2	B	602	AXF	C72-C20-C22-O71
2	C	603	AXF	C72-C20-C22-N23
2	A	601	AXF	C72-C20-C22-O71
2	A	601	AXF	C72-C20-C22-N23
2	B	602	AXF	C72-C20-C22-N23
2	C	603	AXF	N18-C20-C22-O71
2	B	602	AXF	N18-C20-C22-O71
2	A	601	AXF	N18-C20-C22-O71

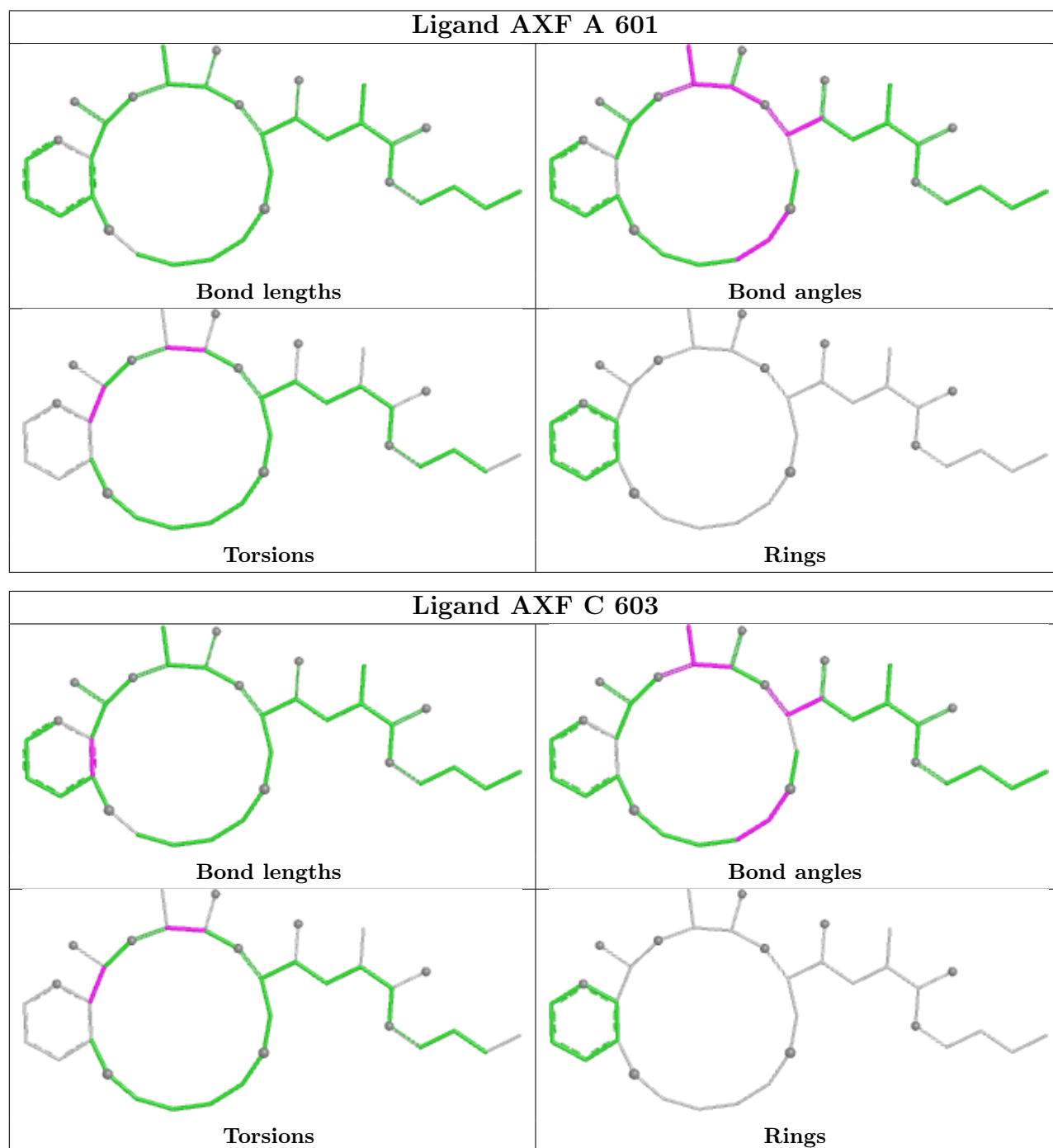
There are no ring outliers.

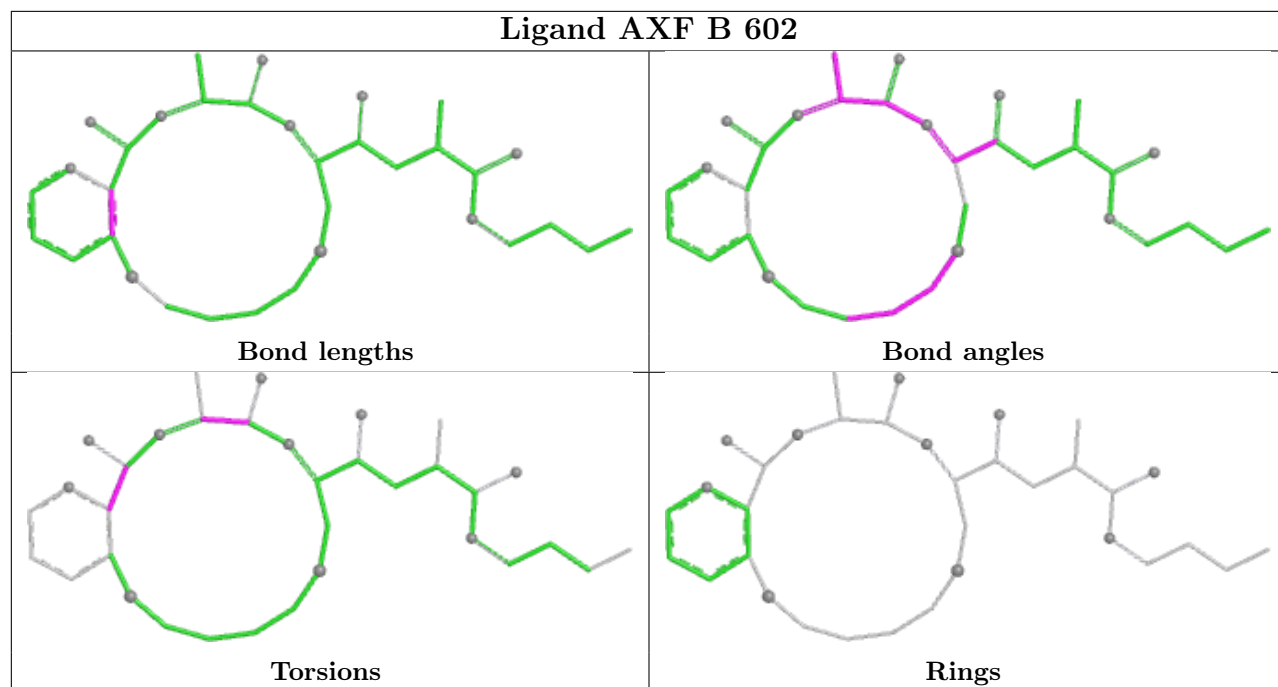
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	603	AXF	1	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, 95th 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 ²)	Q < 0.9
1	A	375/402 (93%)	0.42	29 (7%)	19 21	26, 47, 84, 118	0
1	B	377/402 (93%)	0.61	52 (13%)	6 7	24, 47, 91, 118	0
1	C	377/402 (93%)	0.39	35 (9%)	14 16	27, 45, 85, 116	0
All	All	1129/1206 (93%)	0.47	116 (10%)	12 13	24, 46, 87, 118	0

All (116) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	314	THR	6.6
1	B	9	LYS	6.2
1	B	10	SER	5.9
1	A	157	ALA	5.7
1	B	312	VAL	5.6
1	A	258	PRO	5.6
1	A	312	VAL	5.3
1	B	313	ALA	5.2
1	C	258	PRO	5.0
1	B	361	VAL	4.9
1	C	157	ALA	4.6
1	B	315	SER	4.6
1	C	365	PHE	4.5
1	A	313	ALA	4.2
1	A	314	THR	4.2
1	B	46(P)	SER	4.2
1	C	254	THR	4.1
1	A	254	THR	4.1
1	C	169	SER	4.0
1	B	365	PHE	4.0
1	B	309	VAL	3.9
1	B	360	HIS	3.9
1	A	266	GLN	3.8

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Mol	Chain	Res	Type	RSRZ
1	B	170	VAL	3.8
1	C	269	CYS	3.8
1	A	253	SER	3.8
1	B	267	LEU	3.8
1	B	8	GLY	3.8
1	A	365	PHE	3.8
1	B	217	CYS	3.7
1	C	314	THR	3.7
1	C	170	VAL	3.6
1	B	311	ASP	3.6
1	B	317	ASP	3.6
1	B	340	GLY	3.5
1	C	310	GLU	3.5
1	C	46(P)	SER	3.4
1	B	319	CYS	3.4
1	B	273	GLY	3.4
1	A	272	ALA	3.3
1	C	257	PHE	3.3
1	C	312	VAL	3.3
1	A	56	LEU	3.3
1	B	258	PRO	3.2
1	B	257	PHE	3.1
1	A	361	VAL	3.1
1	C	311	ASP	3.1
1	B	279	ILE	3.1
1	C	317	ASP	3.1
1	B	362	HIS	3.1
1	A	46(P)	SER	3.1
1	B	157	ALA	3.1
1	C	361	VAL	3.1
1	C	315	SER	3.0
1	C	271	GLN	3.0
1	C	268	VAL	3.0
1	B	254	THR	3.0
1	A	60	TYR	2.9
1	A	267	LEU	2.9
1	B	256	LYS	2.9
1	A	311	ASP	2.8
1	C	362	HIS	2.8
1	C	316	GLN	2.8
1	C	313	ALA	2.8
1	B	367	THR	2.8

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Mol	Chain	Res	Type	RSRZ
1	B	359	CYS	2.8
1	C	12	GLN	2.8
1	B	263	LEU	2.8
1	B	277	TRP	2.8
1	B	169	SER	2.8
1	B	262	TRP	2.7
1	B	320	TYR	2.7
1	A	252	SER	2.6
1	A	257	PHE	2.6
1	B	308	PRO	2.6
1	A	362	HIS	2.6
1	C	9	LYS	2.6
1	B	310	GLU	2.6
1	C	359	CYS	2.6
1	A	256	LYS	2.6
1	C	267	LEU	2.5
1	B	272	ALA	2.5
1	B	278	ASN	2.5
1	A	263	LEU	2.5
1	A	156	GLY	2.5
1	A	181	HIS	2.4
1	C	55	GLN	2.4
1	A	317	ASP	2.4
1	B	269	CYS	2.4
1	A	9	LYS	2.4
1	A	309	VAL	2.4
1	C	263	LEU	2.3
1	B	252	SER	2.3
1	A	271	GLN	2.3
1	B	270	TRP	2.3
1	C	270	TRP	2.3
1	B	205	ARG	2.2
1	B	274	THR	2.2
1	C	256	LYS	2.2
1	B	268	VAL	2.2
1	B	260	GLY	2.2
1	C	255	GLU	2.2
1	C	156	GLY	2.2
1	C	272	ALA	2.2
1	B	266	GLN	2.2
1	B	12	GLN	2.1
1	C	266	GLN	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	316	GLN	2.1
1	C	309	VAL	2.1
1	B	242	GLU	2.1
1	C	49	HIS	2.1
1	A	315	SER	2.0
1	A	259	ASP	2.0
1	B	213	LEU	2.0
1	B	280	PHE	2.0
1	B	253	SER	2.0

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 [i](#)

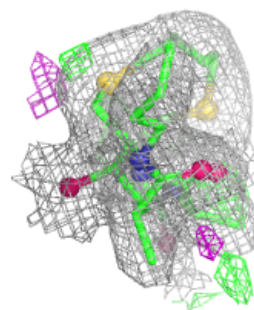
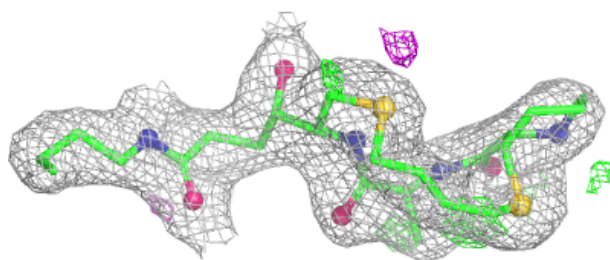
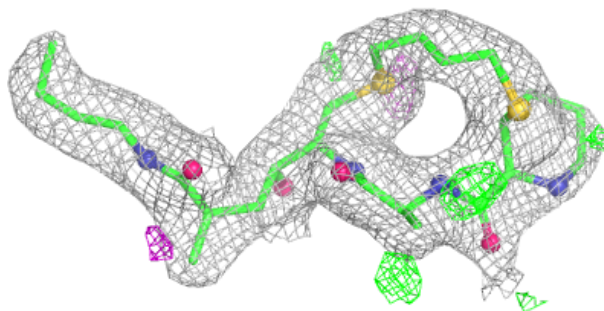
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	AXF	C	603	34/34	0.95	0.10	32,46,59,60	0
2	AXF	B	602	34/34	0.96	0.10	28,49,58,61	0
2	AXF	A	601	34/34	0.96	0.08	33,42,55,57	0

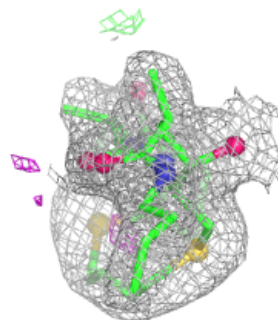
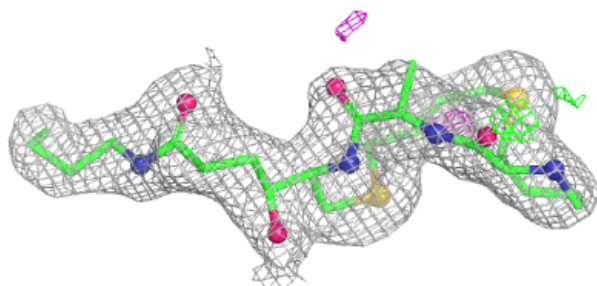
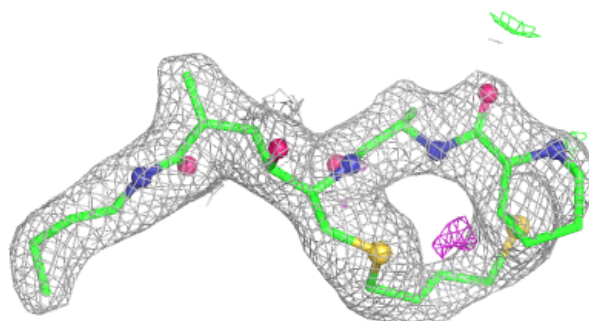
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

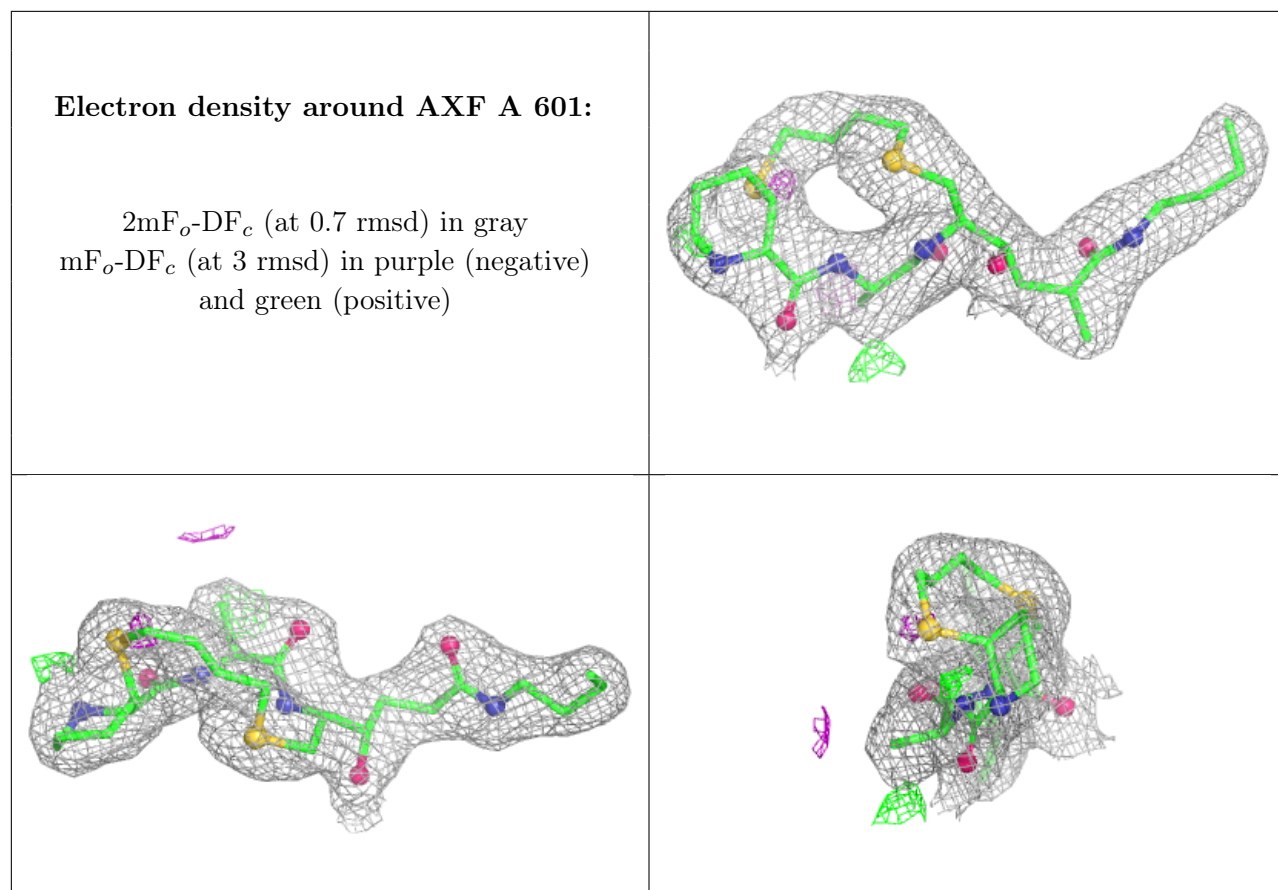
Electron density around AXF C 603:

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

**Electron density around AXF B 602:**

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





6.5 Other polymers ⓘ

There are no such residues in this entry.