



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 08:24 AM UTC

PDB ID : 9NA4 / pdb_00009na4
Title : IRAK4 in Complex with Compound 18
Authors : Ferrao, R.; Lansdon, E.B.
Deposited on : 2025-02-11
Resolution : 2.33 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

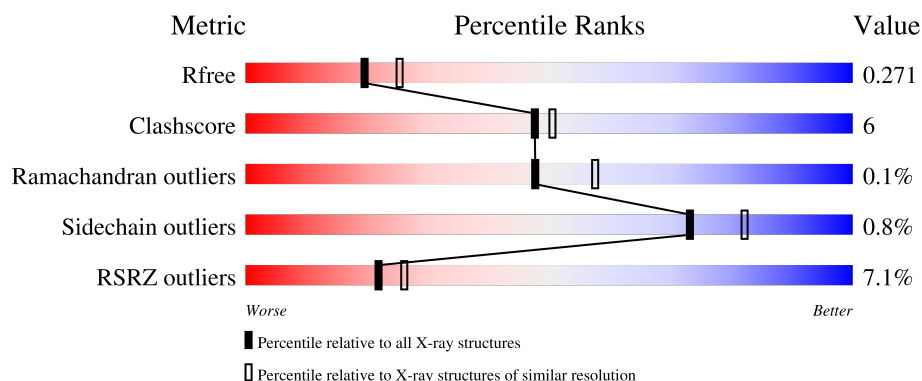
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.33 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	3031 (2.36-2.32)
Clashscore	190562	3127 (2.36-2.32)
Ramachandran outliers	187476	3095 (2.36-2.32)
Sidechain outliers	187428	3095 (2.36-2.32)
RSRZ outliers	180081	3033 (2.36-2.32)

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	304	7% 77% 16% 7%
1	B	304	10% 81% 12% 7%
1	C	304	5% 79% 14% 6%
1	D	304	5% 81% 12% 7%

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 9260 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.

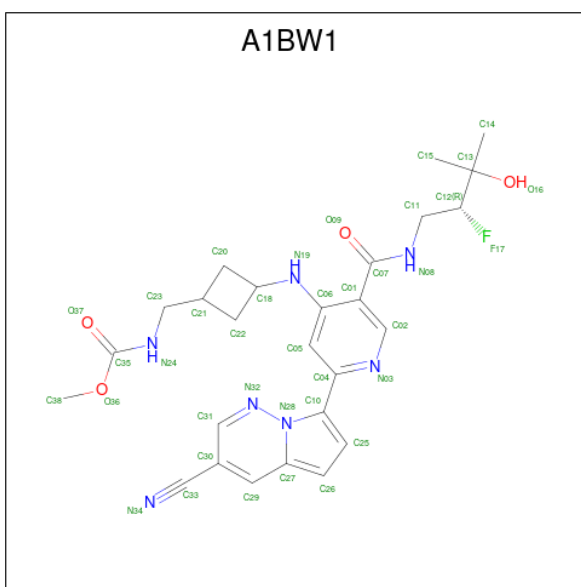
- Molecule 1 is a protein called Interleukin-1 receptor-associated kinase 4.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	283	Total	C	N	O	P	S	0	1	0
			2236	1403	377	438	3	15			
1	B	283	Total	C	N	O	P	S	0	0	0
			2216	1390	371	438	3	14			
1	C	285	Total	C	N	O	P	S	0	0	0
			2255	1414	379	445	3	14			
1	D	284	Total	C	N	O	P	S	0	0	0
			2237	1405	375	440	3	14			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	157	GLY	-	expression tag	UNP Q9NWZ3
A	158	ALA	-	expression tag	UNP Q9NWZ3
A	159	MET	-	expression tag	UNP Q9NWZ3
B	157	GLY	-	expression tag	UNP Q9NWZ3
B	158	ALA	-	expression tag	UNP Q9NWZ3
B	159	MET	-	expression tag	UNP Q9NWZ3
C	157	GLY	-	expression tag	UNP Q9NWZ3
C	158	ALA	-	expression tag	UNP Q9NWZ3
C	159	MET	-	expression tag	UNP Q9NWZ3
D	157	GLY	-	expression tag	UNP Q9NWZ3
D	158	ALA	-	expression tag	UNP Q9NWZ3
D	159	MET	-	expression tag	UNP Q9NWZ3

- Molecule 2 is methyl {[(1S,3s)-3-{[(2P)-2-[(8R)-3-cyanopyrrolo[1,2-b]pyridazin-7-yl]-5-{[(2S)-2-fluoro-3-hydroxy-3-methylbutyl]carbamoyl}]pyridin-4-yl]amino}cyclobutyl]methyl}carbamate (CCD ID: A1BW1) (formula: C₂₆H₃₀FN₇O₄) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 38	C 26	F 1	N 7	O 4	0	0
2	B	1	Total 38	C 26	F 1	N 7	O 4	0	0
2	C	1	Total 38	C 26	F 1	N 7	O 4	0	0
2	D	1	Total 38	C 26	F 1	N 7	O 4	0	0

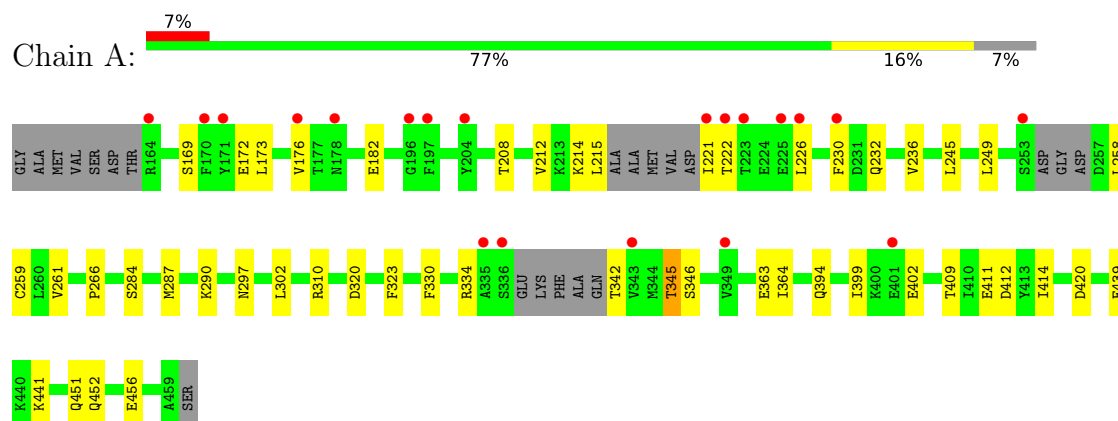
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	35	Total	O	0	0
			35	35		
3	B	41	Total	O	0	0
			41	41		
3	C	58	Total	O	0	0
			58	58		
3	D	30	Total	O	0	0
			30	30		

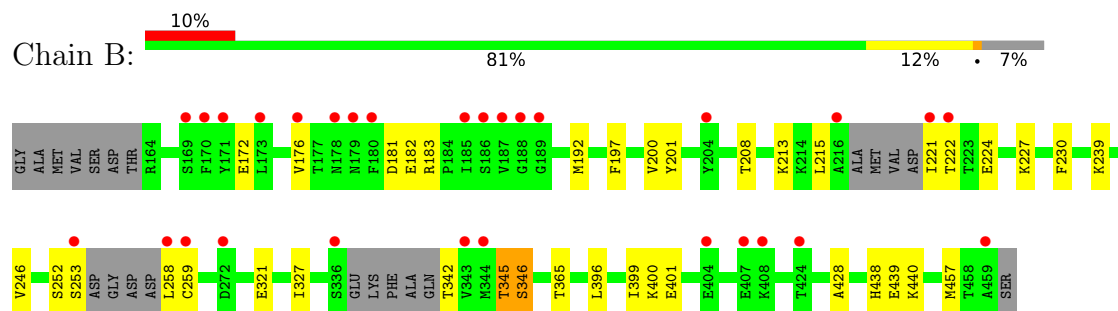
3 Residue-property plots [i](#)

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.

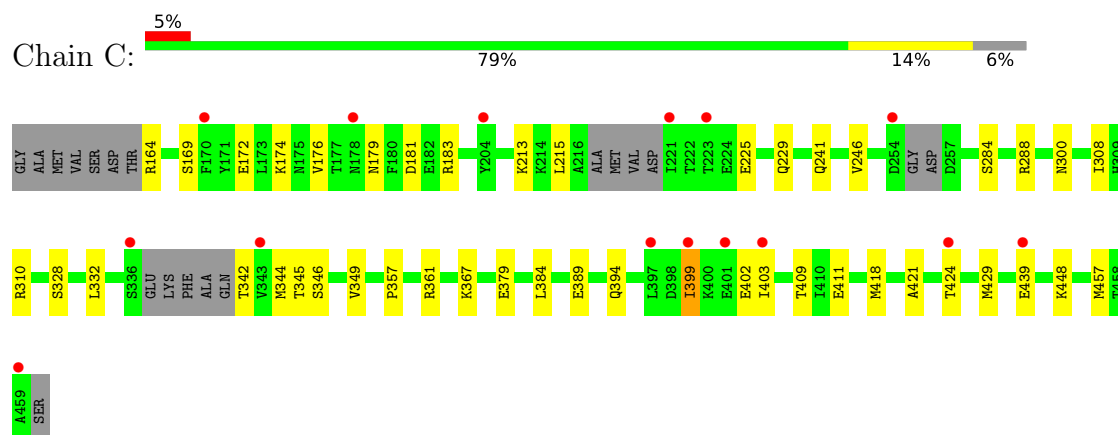
- Molecule 1: Interleukin-1 receptor-associated kinase 4



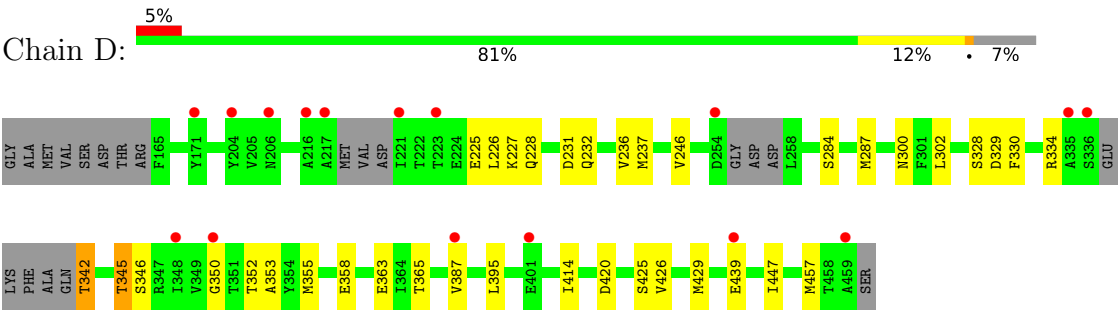
- Molecule 1: Interleukin-1 receptor-associated kinase 4



- Molecule 1: Interleukin-1 receptor-associated kinase 4



● Molecule 1: Interleukin-1 receptor-associated kinase 4



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	88.88Å 111.79Å 140.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.49 – 2.33 49.49 – 2.33	Depositor EDS
% Data completeness (in resolution range)	99.6 (49.49-2.33) 99.6 (49.49-2.33)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.31 (at 2.34Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.226 , 0.273 0.225 , 0.271	Depositor DCC
R_{free} test set	2000 reflections (3.31%)	wwPDB-VP
Wilson B-factor (Å ²)	44.0	Xtriage
Anisotropy	0.554	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 47.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.51$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	9260	wwPDB-VP
Average B, all atoms (Å ²)	61.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 32.75 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 8.9318e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: TPO, SEP, A1BW1

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	0.13	0/2241	0.33	0/3016
1	B	0.10	0/2218	0.30	0/2990
1	C	0.10	0/2258	0.28	0/3040
1	D	0.09	0/2240	0.29	0/3017
All	All	0.11	0/8957	0.30	0/12063

There are no bond length outliers.

There are no bond angle outliers.

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	2236	0	2212	32	0
1	B	2216	0	2171	20	0
1	C	2255	0	2224	29	0
1	D	2237	0	2208	22	0
2	A	38	0	0	0	0
2	B	38	0	0	0	0
2	C	38	0	0	0	0
2	D	38	0	0	0	0
3	A	35	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	41	0	0	0	0
3	C	58	0	0	0	0
3	D	30	0	0	0	0
All	All	9260	0	8815	100	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 6.

All (100) 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:D:284:SER:H	1:D:287:MET:HE3	1.33	0.94
1:A:411:GLU:HA	1:A:414:ILE:HD12	1.64	0.78
1:C:439:GLU:HG2	1:D:439:GLU:HB3	1.66	0.76
1:A:284:SER:H	1:A:287[B]:MET:HE3	1.51	0.76
1:D:429:MET:HE3	1:D:457:MET:HE1	1.70	0.73
1:C:164:ARG:HH22	1:C:241:GLN:HE21	1.36	0.73
1:C:411:GLU:OE2	1:C:411:GLU:N	2.21	0.72
1:A:363:GLU:OE1	1:A:441:LYS:NZ	2.22	0.72
1:C:174:LYS:HG3	1:C:179:ASN:HA	1.72	0.70
1:C:418:MET:HE3	1:C:421:ALA:HB2	1.77	0.65
1:A:394:GLN:OE1	1:A:394:GLN:N	2.26	0.64
1:C:357:PRO:HG3	1:C:439:GLU:HG3	1.79	0.64
1:A:221:ILE:HG22	1:A:222:THR:HG23	1.80	0.63
1:B:396:LEU:O	1:B:399:ILE:HG13	1.98	0.63
1:A:409:THR:HG23	1:A:411:GLU:H	1.63	0.63
1:A:182:GLU:OE1	1:A:182:GLU:N	2.30	0.60
1:C:429:MET:HE2	1:C:457:MET:HE1	1.82	0.60
1:A:215:LEU:HB3	1:A:226:LEU:HD11	1.82	0.60
1:B:252:SER:HB3	1:B:259:CYS:HB2	1.84	0.59
1:A:399:ILE:HA	1:A:402:GLU:HG3	1.84	0.59
1:B:438:HIS:HD2	1:B:440:LYS:H	1.51	0.58
1:D:353:ALA:HB2	1:D:387:VAL:HG13	1.86	0.58
1:A:182:GLU:H	1:A:182:GLU:CD	2.13	0.57
1:A:452:GLN:O	1:A:456:GLU:HG3	2.03	0.57
1:C:403:ILE:HG23	1:C:409:THR:HA	1.84	0.57
1:B:172:GLU:O	1:B:176:VAL:HG22	2.06	0.56
1:A:230:PHE:CD2	1:A:258:LEU:HB3	2.41	0.56
1:D:358:GLU:HB2	1:D:363:GLU:OE1	2.06	0.56
1:A:232:GLN:O	1:A:236:VAL:HG23	2.05	0.56
1:D:227:LYS:NZ	1:D:231:ASP:OD2	2.40	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:222:THR:HG22	1:B:224:GLU:H	1.71	0.55
1:B:439:GLU:CD	1:B:439:GLU:H	2.13	0.55
1:A:297:ASN:OD1	1:A:451:GLN:NE2	2.29	0.55
1:C:164:ARG:HH22	1:C:241:GLN:NE2	2.05	0.55
1:C:246:VAL:HG11	1:C:328:SER:HB3	1.88	0.55
1:D:342:TPO:HG22	1:D:365:THR:HB	1.89	0.54
1:B:345:TPO:OG1	1:B:346:SEP:N	2.40	0.53
1:C:300:ASN:OD1	1:C:448:LYS:HE3	2.09	0.53
1:A:334:ARG:HH22	1:A:345:TPO:P	2.32	0.53
1:A:212:VAL:HG22	1:A:261:VAL:HG22	1.92	0.52
1:A:334:ARG:NH2	1:A:345:TPO:O3P	2.42	0.52
1:B:197:PHE:HE1	1:B:221:ILE:HG12	1.75	0.52
1:B:253:SER:O	1:B:253:SER:OG	2.26	0.52
1:B:213:LYS:HE3	1:B:215:LEU:HD21	1.92	0.51
1:A:439:GLU:HG2	1:B:439:GLU:HB3	1.93	0.50
1:D:352:THR:HA	1:D:355:MET:HG3	1.92	0.50
1:D:414:ILE:HD11	1:D:426:VAL:HG11	1.93	0.50
1:B:181:ASP:C	1:B:183:ARG:H	2.19	0.50
1:D:334:ARG:NH2	1:D:345:TPO:O3P	2.45	0.49
1:D:232:GLN:O	1:D:236:VAL:HG12	2.12	0.49
1:D:425:SER:O	1:D:457:MET:HE3	2.12	0.48
1:A:249:LEU:HB2	1:A:261:VAL:HG12	1.95	0.48
1:C:399:ILE:HA	1:C:402:GLU:HG3	1.95	0.48
1:B:224:GLU:O	1:B:227:LYS:HE3	2.14	0.48
1:C:213:LYS:HE3	1:C:215:LEU:HD21	1.94	0.48
1:C:169:SER:H	1:C:172:GLU:CD	2.22	0.48
1:A:214:LYS:HG3	1:A:259:CYS:SG	2.54	0.47
1:A:169:SER:N	1:A:172:GLU:OE2	2.48	0.47
1:D:334:ARG:HH22	1:D:345:TPO:P	2.38	0.47
1:D:302:LEU:HD11	1:D:330:PHE:HE1	1.80	0.46
1:D:246:VAL:HG11	1:D:328:SER:HB3	1.97	0.46
1:A:173:LEU:HA	1:A:176:VAL:HG22	1.97	0.46
1:D:350:GLY:C	1:D:355:MET:HE2	2.41	0.45
1:C:344:MET:HE3	1:C:344:MET:HB3	1.88	0.45
1:A:287[A]:MET:HE1	1:A:290:LYS:HD3	1.99	0.45
1:D:225:GLU:O	1:D:228:GLN:HG3	2.16	0.45
1:D:237:MET:HA	1:D:237:MET:HE2	1.98	0.45
1:B:239:LYS:HD3	1:B:239:LYS:HA	1.62	0.45
1:C:361:ARG:HB3	1:D:395:LEU:HD11	1.99	0.45
1:A:409:THR:HG22	1:A:412:ASP:OD1	2.18	0.44
1:C:164:ARG:HD2	1:C:164:ARG:HA	1.86	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:169:SER:HB3	1:C:172:GLU:OE1	2.18	0.44
1:C:389:GLU:H	1:C:389:GLU:HG2	1.64	0.44
1:A:287[A]:MET:HE2	1:A:323:PHE:HB2	2.00	0.44
1:C:367:LYS:H	1:C:367:LYS:HG2	1.54	0.43
1:C:379:GLU:HG2	1:C:384:LEU:O	2.18	0.43
1:A:302:LEU:HD11	1:A:330:PHE:HE2	1.84	0.43
1:C:308:ILE:HG22	1:C:310:ARG:HG3	2.00	0.43
1:A:287[A]:MET:HE2	1:A:323:PHE:CB	2.49	0.43
1:C:332:LEU:HD13	1:C:349:VAL:HG13	2.01	0.42
1:A:245:LEU:HD22	1:A:330:PHE:HZ	1.83	0.42
1:B:192:MET:HE3	1:B:200:VAL:HG12	2.00	0.42
1:B:321:GLU:H	1:B:321:GLU:CD	2.27	0.42
1:B:230:PHE:CG	1:B:258:LEU:HD23	2.54	0.42
1:C:225:GLU:O	1:C:229:GLN:HG3	2.20	0.42
1:C:284:SER:O	1:C:288:ARG:HG3	2.20	0.42
1:D:300:ASN:HA	1:D:447:ILE:HG21	2.02	0.42
1:A:310:ARG:HD3	1:A:364:ILE:HD12	2.02	0.42
1:B:428:ALA:HB3	1:B:457:MET:HG3	2.01	0.41
1:A:266:PRO:HD2	1:A:320:ASP:HA	2.01	0.41
1:C:418:MET:HE2	1:C:418:MET:HB2	1.84	0.41
1:B:182:GLU:HA	1:B:201:TYR:HE1	1.85	0.41
1:B:399:ILE:HD12	1:B:400:LYS:N	2.35	0.41
1:A:420:ASP:OD2	1:A:420:ASP:N	2.52	0.41
1:C:181:ASP:OD1	1:C:183:ARG:HG3	2.22	0.40
1:C:389:GLU:HA	1:C:394:GLN:HG2	2.02	0.40
1:D:226:LEU:HD12	1:D:226:LEU:HA	1.91	0.40
1:A:214:LYS:HE2	1:A:214:LYS:HB3	1.86	0.40
1:C:172:GLU:O	1:C:176:VAL:HG13	2.21	0.40
1:D:420:ASP:OD2	1:D:420:ASP:N	2.52	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	274/304 (90%)	259 (94%)	15 (6%)	0	100	100
1	B	273/304 (90%)	260 (95%)	13 (5%)	0	100	100
1	C	275/304 (90%)	269 (98%)	6 (2%)	0	100	100
1	D	274/304 (90%)	265 (97%)	8 (3%)	1 (0%)	30	32
All	All	1096/1216 (90%)	1053 (96%)	42 (4%)	1 (0%)	48	57

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	329	ASP

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	244/260 (94%)	243 (100%)	1 (0%)	84	89
1	B	239/260 (92%)	234 (98%)	5 (2%)	47	60
1	C	246/260 (95%)	244 (99%)	2 (1%)	73	82
1	D	243/260 (94%)	243 (100%)	0	100	100
All	All	972/1040 (94%)	964 (99%)	8 (1%)	73	82

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	208	THR
1	B	208	THR
1	B	246	VAL
1	B	327	ILE
1	B	365	THR
1	B	401	GLU
1	C	399	ILE
1	C	424	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (16)

such sidechains are listed below:

Mol	Chain	Res	Type
1	A	438	HIS
1	A	452	GLN
1	A	455	GLN
1	B	305	ASN
1	B	438	HIS
1	C	207	ASN
1	C	241	GLN
1	C	390	HIS
1	C	394	GLN
1	C	435	GLN
1	C	451	GLN
1	D	229	GLN
1	D	232	GLN
1	D	267	ASN
1	D	394	GLN
1	D	438	HIS

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

12 non-standard protein/DNA/RNA residues 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	$\# Z > 2$
1	TPO	D	345	1	8,10,11	1.16	0	10,14,16	1.86	2 (20%)
1	SEP	B	346	1	8,9,10	1.63	1 (12%)	7,12,14	1.33	1 (14%)
1	TPO	B	345	1	8,10,11	1.11	0	10,14,16	1.95	2 (20%)
1	SEP	A	346	1	8,9,10	1.62	1 (12%)	7,12,14	1.22	1 (14%)
1	TPO	C	342	1	8,10,11	1.11	0	10,14,16	1.98	1 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	SEP	C	346	1	8,9,10	1.62	1 (12%)	7,12,14	1.54	1 (14%)
1	TPO	D	342	1	8,10,11	1.21	0	10,14,16	1.30	1 (10%)
1	SEP	D	346	1	8,9,10	1.64	1 (12%)	7,12,14	1.64	1 (14%)
1	TPO	A	345	1	8,10,11	1.14	0	10,14,16	1.89	2 (20%)
1	TPO	C	345	1	8,10,11	1.12	0	10,14,16	1.93	2 (20%)
1	TPO	A	342	1	8,10,11	1.12	0	10,14,16	1.92	1 (10%)
1	TPO	B	342	1	8,10,11	1.13	0	10,14,16	1.80	1 (10%)

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
1	TPO	D	345	1	-	3/9/11/13	-
1	SEP	B	346	1	-	0/6/8/10	-
1	TPO	B	345	1	-	1/9/11/13	-
1	SEP	A	346	1	-	2/6/8/10	-
1	TPO	C	342	1	-	1/9/11/13	-
1	SEP	C	346	1	-	3/6/8/10	-
1	TPO	D	342	1	-	5/9/11/13	-
1	SEP	D	346	1	-	5/6/8/10	-
1	TPO	A	345	1	-	3/9/11/13	-
1	TPO	C	345	1	-	2/9/11/13	-
1	TPO	A	342	1	-	2/9/11/13	-
1	TPO	B	342	1	-	2/9/11/13	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	346	SEP	P-O1P	3.57	1.61	1.50
1	D	346	SEP	P-O1P	3.56	1.61	1.50
1	A	346	SEP	P-O1P	3.54	1.61	1.50
1	C	346	SEP	P-O1P	3.53	1.61	1.50

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	342	TPO	P-OG1-CB	-5.58	108.16	123.33
1	C	342	TPO	P-OG1-CB	-5.57	108.18	123.33
1	B	345	TPO	P-OG1-CB	-5.36	108.77	123.33
1	C	345	TPO	P-OG1-CB	-5.27	109.02	123.33
1	A	345	TPO	P-OG1-CB	-5.09	109.50	123.33
1	D	345	TPO	P-OG1-CB	-4.93	109.92	123.33
1	B	342	TPO	P-OG1-CB	-4.78	110.33	123.33
1	D	346	SEP	OG-CB-CA	3.84	111.88	108.14
1	C	346	SEP	OG-CB-CA	3.53	111.58	108.14
1	B	346	SEP	OG-CB-CA	2.90	110.97	108.14
1	D	342	TPO	P-OG1-CB	-2.76	115.84	123.33
1	A	346	SEP	OG-CB-CA	2.56	110.64	108.14
1	D	345	TPO	CG2-CB-CA	-2.27	108.84	113.26
1	C	345	TPO	CG2-CB-CA	-2.22	108.93	113.26
1	A	345	TPO	CG2-CB-CA	-2.16	109.05	113.26
1	B	345	TPO	CG2-CB-CA	-2.11	109.14	113.26

There are no chirality outliers.

All (29) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	345	TPO	N-CA-CB-OG1
1	A	346	SEP	N-CA-CB-OG
1	A	346	SEP	C-CA-CB-OG
1	B	345	TPO	N-CA-CB-OG1
1	C	345	TPO	N-CA-CB-OG1
1	C	346	SEP	CB-OG-P-O1P
1	C	346	SEP	CB-OG-P-O2P
1	C	346	SEP	CB-OG-P-O3P
1	D	342	TPO	N-CA-CB-OG1
1	D	342	TPO	C-CA-CB-CG2
1	D	342	TPO	O-C-CA-CB
1	D	345	TPO	N-CA-CB-OG1
1	D	346	SEP	N-CA-CB-OG
1	D	346	SEP	C-CA-CB-OG
1	D	346	SEP	CB-OG-P-O1P
1	D	346	SEP	CB-OG-P-O2P
1	D	346	SEP	CB-OG-P-O3P
1	D	342	TPO	CG2-CB-OG1-P
1	A	342	TPO	C-CA-CB-CG2
1	B	342	TPO	CB-OG1-P-O1P
1	D	345	TPO	CA-CB-OG1-P
1	A	345	TPO	O-C-CA-CB

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Mol	Chain	Res	Type	Atoms
1	B	342	TPO	O-C-CA-CB
1	C	342	TPO	C-CA-CB-CG2
1	C	345	TPO	O-C-CA-CB
1	D	345	TPO	O-C-CA-CB
1	A	345	TPO	CB-OG1-P-O1P
1	A	342	TPO	N-CA-CB-CG2
1	D	342	TPO	N-CA-CB-CG2

There are no ring outliers.

5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	345	TPO	2	0
1	B	346	SEP	1	0
1	B	345	TPO	1	0
1	D	342	TPO	1	0
1	A	345	TPO	2	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	A1BW1	D	501	-	36,41,41	1.20	3 (8%)	49,59,59	1.20	5 (10%)
2	A1BW1	A	501	-	36,41,41	1.22	3 (8%)	49,59,59	1.14	4 (8%)
2	A1BW1	C	501	-	36,41,41	1.19	2 (5%)	49,59,59	1.14	4 (8%)
2	A1BW1	B	501	-	36,41,41	1.20	3 (8%)	49,59,59	1.18	3 (6%)

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	A1BW1	D	501	-	-	4/27/40/40	0/4/4/4
2	A1BW1	A	501	-	-	4/27/40/40	0/4/4/4
2	A1BW1	C	501	-	-	4/27/40/40	0/4/4/4
2	A1BW1	B	501	-	-	4/27/40/40	0/4/4/4

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	A1BW1	C31-C30	4.30	1.48	1.42
2	B	501	A1BW1	C31-C30	4.26	1.48	1.42
2	C	501	A1BW1	C31-C30	4.14	1.48	1.42
2	D	501	A1BW1	C31-C30	4.08	1.48	1.42
2	D	501	A1BW1	C07-N08	2.38	1.39	1.33
2	B	501	A1BW1	C07-N08	2.31	1.38	1.33
2	A	501	A1BW1	C07-N08	2.31	1.38	1.33
2	C	501	A1BW1	C07-N08	2.20	1.38	1.33
2	A	501	A1BW1	C29-C30	-2.06	1.34	1.38
2	B	501	A1BW1	C29-C30	-2.06	1.34	1.38
2	D	501	A1BW1	C29-C30	-2.00	1.34	1.38

All (16) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	A1BW1	C01-C06-N19	4.33	124.91	121.08
2	B	501	A1BW1	C21-C23-N24	-4.01	105.82	112.77
2	C	501	A1BW1	C21-C23-N24	-3.72	106.31	112.77
2	A	501	A1BW1	C21-C23-N24	-3.50	106.70	112.77
2	C	501	A1BW1	C01-C06-N19	2.92	123.66	121.08
2	D	501	A1BW1	C20-C18-N19	-2.74	112.67	117.76
2	A	501	A1BW1	C01-C06-N19	2.72	123.49	121.08
2	C	501	A1BW1	C20-C18-N19	-2.58	112.97	117.76
2	B	501	A1BW1	C20-C18-N19	-2.48	113.15	117.76
2	D	501	A1BW1	C05-C06-N19	-2.41	118.11	121.90
2	A	501	A1BW1	C20-C18-N19	-2.32	113.45	117.76
2	B	501	A1BW1	C22-C18-N19	-2.30	113.49	117.76
2	A	501	A1BW1	C22-C18-N19	-2.27	113.56	117.76
2	D	501	A1BW1	C21-C23-N24	-2.26	108.85	112.77
2	D	501	A1BW1	C23-N24-C35	2.17	124.78	121.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	A1BW1	C22-C18-N19	-2.13	113.81	117.76

There are no chirality outliers.

All (16) torsion outliers are listed below:

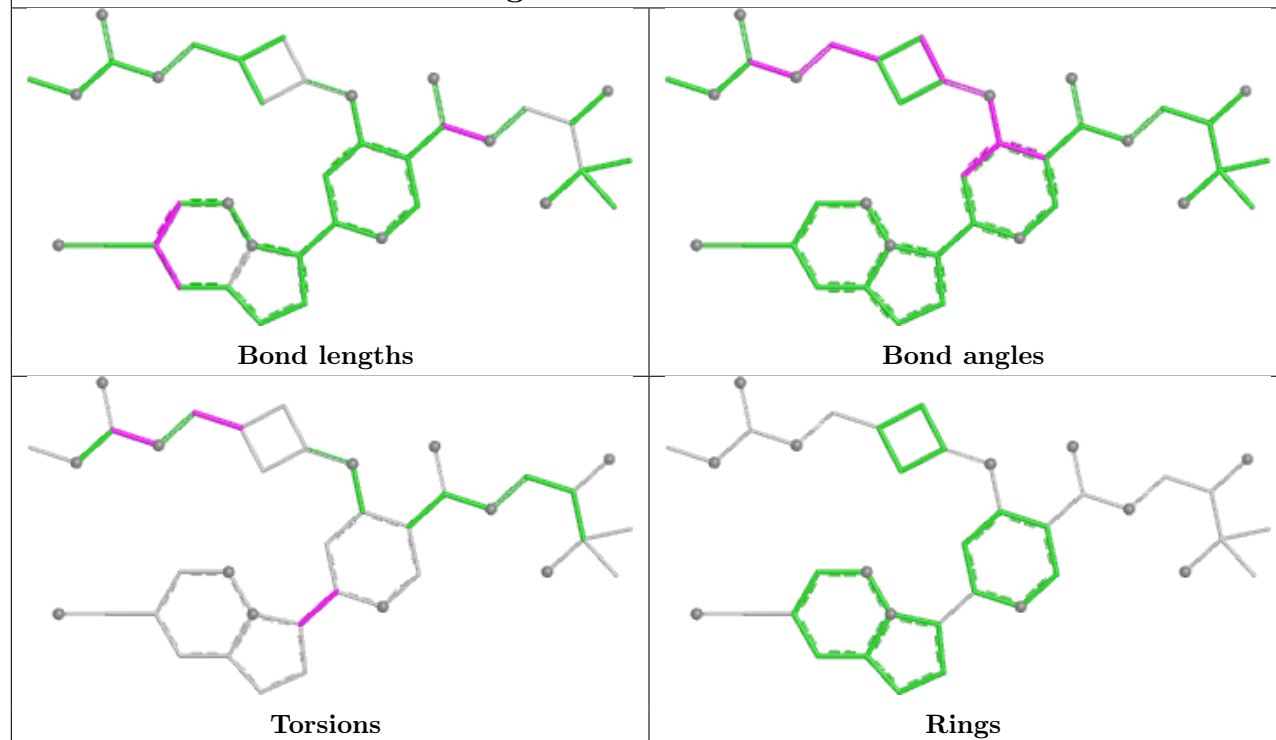
Mol	Chain	Res	Type	Atoms
2	D	501	A1BW1	C20-C21-C23-N24
2	D	501	A1BW1	O37-C35-N24-C23
2	D	501	A1BW1	O36-C35-N24-C23
2	A	501	A1BW1	C02-C01-C07-O09
2	B	501	A1BW1	C02-C01-C07-O09
2	C	501	A1BW1	C02-C01-C07-O09
2	B	501	A1BW1	C02-C01-C07-N08
2	A	501	A1BW1	C20-C18-N19-C06
2	A	501	A1BW1	C02-C01-C07-N08
2	C	501	A1BW1	C02-C01-C07-N08
2	A	501	A1BW1	C05-C04-C10-N28
2	C	501	A1BW1	C20-C18-N19-C06
2	B	501	A1BW1	C05-C04-C10-N28
2	C	501	A1BW1	C05-C04-C10-N28
2	D	501	A1BW1	C05-C04-C10-C25
2	B	501	A1BW1	O37-C35-O36-C38

There are no ring outliers.

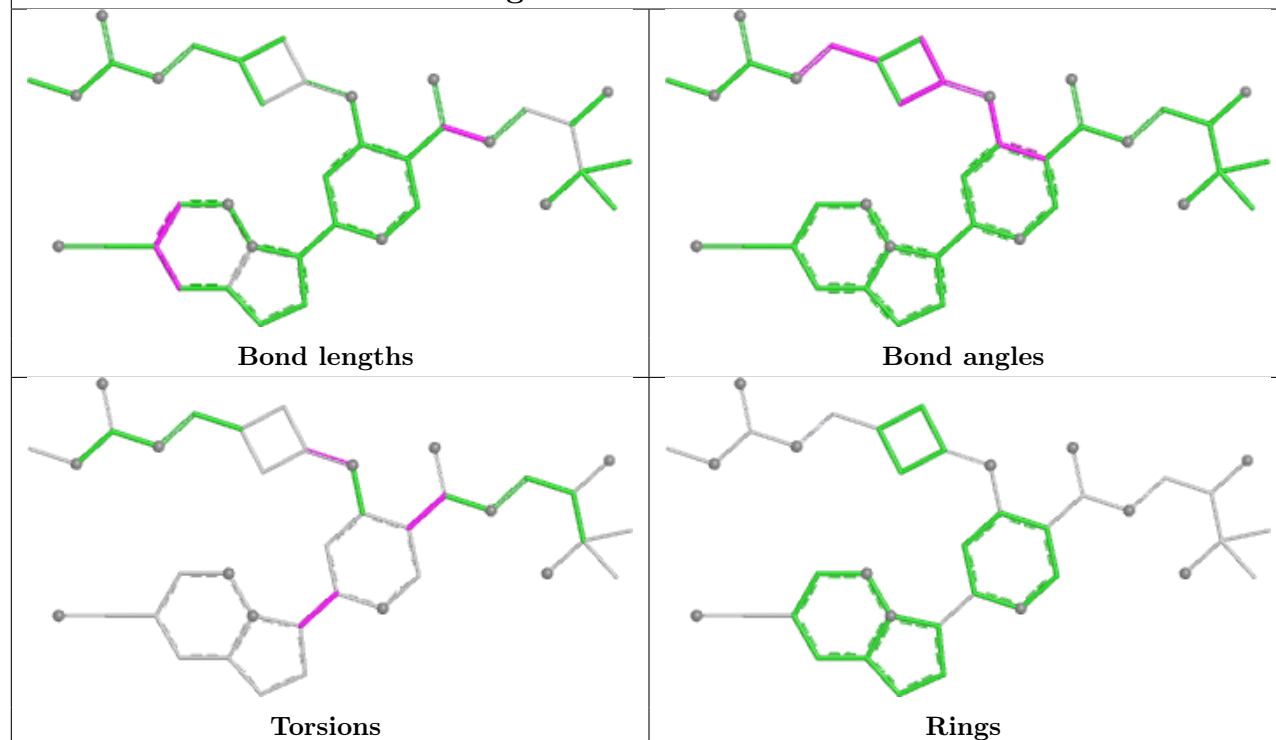
No monomer is involved in short contacts.

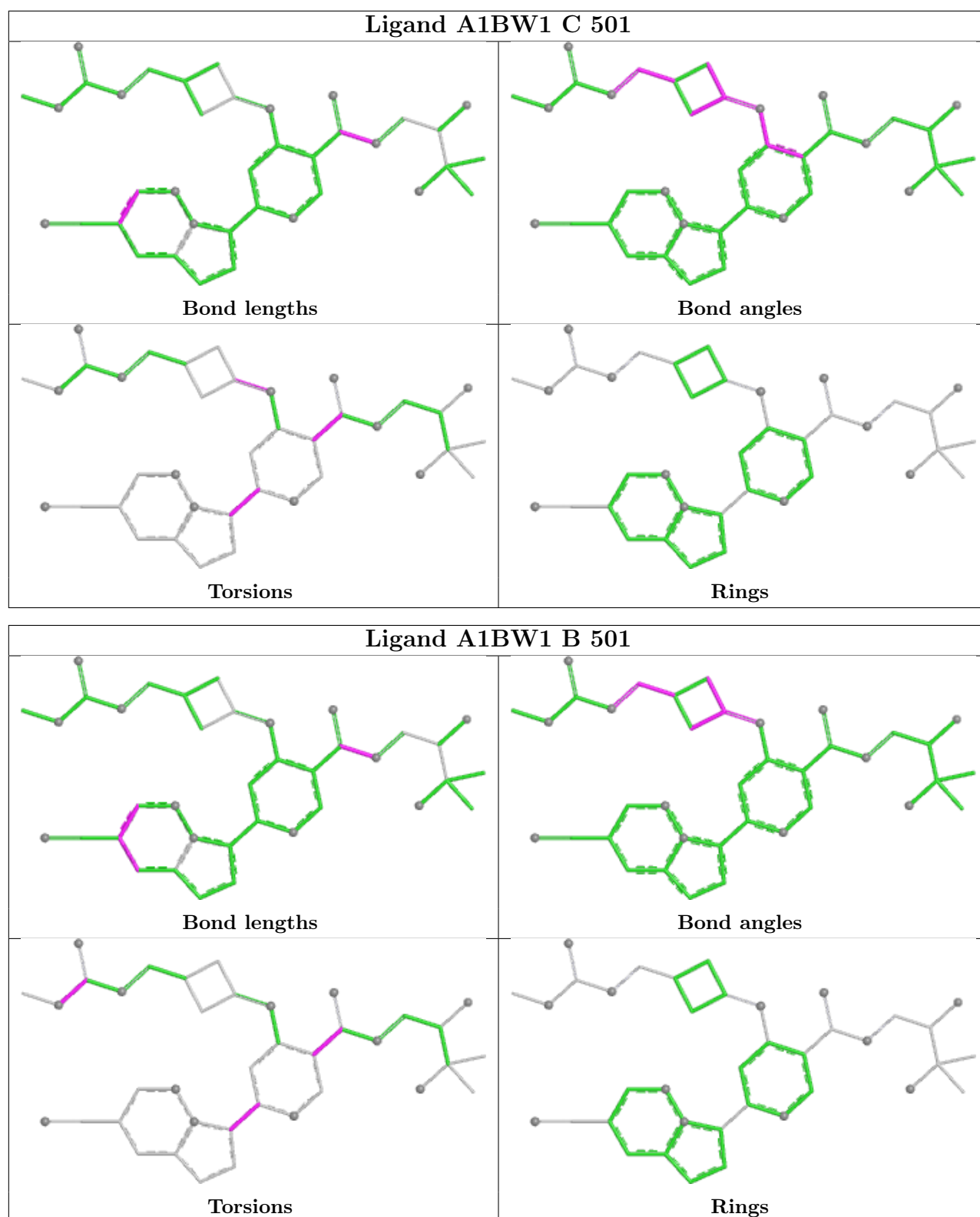
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

Ligand A1BW1 D 501



Ligand A1BW1 A 501





5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	280/304 (92%)	0.63	20 (7%)	22 26	26, 60, 104, 124	1 (0%)
1	B	280/304 (92%)	0.75	29 (10%)	11 14	37, 60, 97, 119	0
1	C	282/304 (92%)	0.51	15 (5%)	32 37	34, 54, 85, 124	0
1	D	281/304 (92%)	0.52	16 (5%)	29 34	33, 56, 90, 107	0
All	All	1123/1216 (92%)	0.60	80 (7%)	22 26	26, 57, 98, 124	1 (0%)

All (80) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	221	ILE	5.4
1	A	221	ILE	4.8
1	D	217	ALA	4.8
1	B	187	VAL	4.3
1	D	221	ILE	4.0
1	B	189	GLY	3.9
1	B	171	TYR	3.8
1	B	170	PHE	3.7
1	B	204	TYR	3.5
1	A	335	ALA	3.5
1	D	459	ALA	3.4
1	B	186	SER	3.4
1	C	170	PHE	3.4
1	C	204	TYR	3.3
1	A	197	PHE	3.2
1	A	196	GLY	3.2
1	A	253	SER	3.1
1	B	258	LEU	3.1
1	D	216	ALA	3.1
1	D	204	TYR	3.1
1	C	221	ILE	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	223	THR	3.0
1	A	343	VAL	2.9
1	A	171	TYR	2.9
1	A	170	PHE	2.8
1	A	222	THR	2.8
1	D	223	THR	2.8
1	B	253	SER	2.8
1	C	399	ILE	2.8
1	B	179	ASN	2.8
1	A	336	SER	2.8
1	D	171	TYR	2.8
1	B	216	ALA	2.8
1	B	459	ALA	2.8
1	B	176	VAL	2.7
1	B	178	ASN	2.7
1	D	387	VAL	2.7
1	D	254	ASP	2.6
1	A	226	LEU	2.6
1	B	173	LEU	2.6
1	B	424	THR	2.6
1	D	336	SER	2.6
1	B	343	VAL	2.6
1	C	397	LEU	2.6
1	C	459	ALA	2.5
1	C	401	GLU	2.5
1	C	254	ASP	2.5
1	B	222	THR	2.5
1	B	407	GLU	2.4
1	D	350	GLY	2.4
1	C	178	ASN	2.4
1	C	343	VAL	2.4
1	C	336	SER	2.4
1	B	272	ASP	2.3
1	B	180	PHE	2.3
1	D	206	ASN	2.3
1	A	225	GLU	2.3
1	D	348	ILE	2.3
1	A	178	ASN	2.2
1	B	188	GLY	2.2
1	B	169	SER	2.2
1	A	164	ARG	2.2
1	B	259	CYS	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	336	SER	2.2
1	B	344	MET	2.2
1	C	223	THR	2.2
1	D	335	ALA	2.2
1	B	185	ILE	2.1
1	B	404	GLU	2.1
1	A	230	PHE	2.1
1	B	408	LYS	2.1
1	C	439	GLU	2.1
1	A	176	VAL	2.1
1	A	349	VAL	2.1
1	D	439	GLU	2.1
1	C	403	ILE	2.1
1	C	424	THR	2.0
1	D	401	GLU	2.0
1	A	204	TYR	2.0
1	A	401	GLU	2.0

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

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(Å ²)	Q<0.9
1	TPO	B	342	11/12	0.55	0.21	75,94,111,114	0
1	SEP	D	346	10/11	0.66	0.13	73,90,110,121	0
1	TPO	C	342	11/12	0.68	0.19	84,97,116,118	0
1	SEP	C	346	10/11	0.69	0.12	87,94,115,122	0
1	TPO	A	342	11/12	0.69	0.18	77,92,109,114	0
1	SEP	A	346	10/11	0.70	0.11	81,92,123,130	0
1	TPO	D	342	11/12	0.72	0.16	65,85,98,100	0
1	SEP	B	346	10/11	0.80	0.12	75,92,105,112	0
1	TPO	C	345	11/12	0.90	0.10	67,82,88,95	0
1	TPO	B	345	11/12	0.91	0.09	69,78,81,85	0
1	TPO	A	345	11/12	0.93	0.08	63,78,82,85	0
1	TPO	D	345	11/12	0.94	0.10	58,70,77,85	0

6.3 Carbohydrates [i](#)

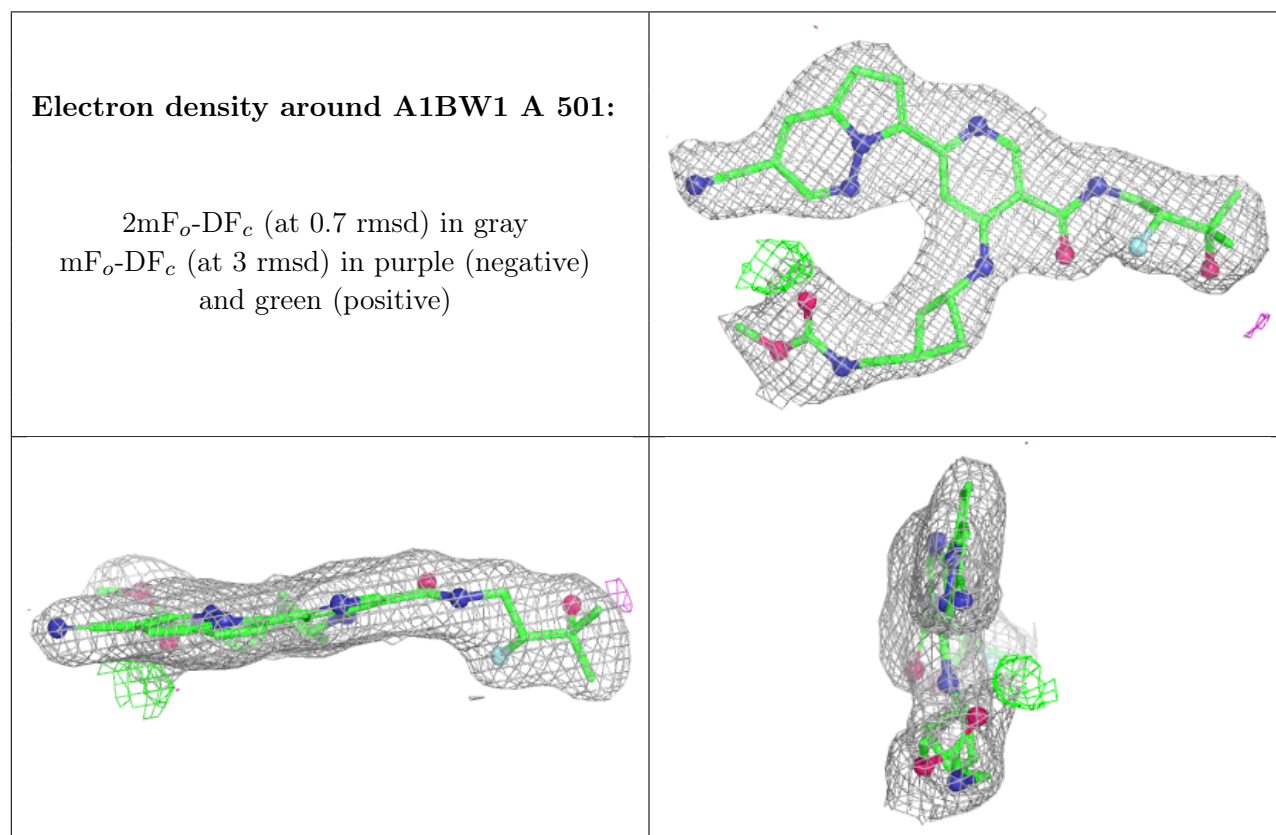
There are no oligosaccharides in this entry.

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.

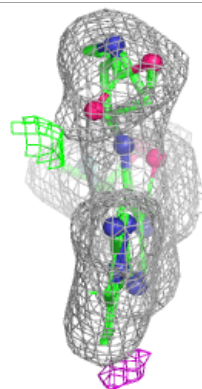
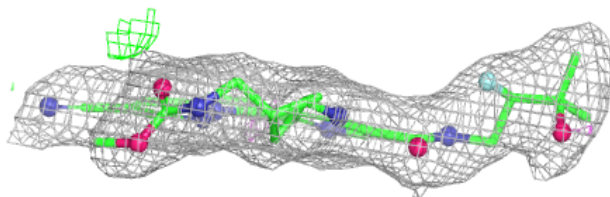
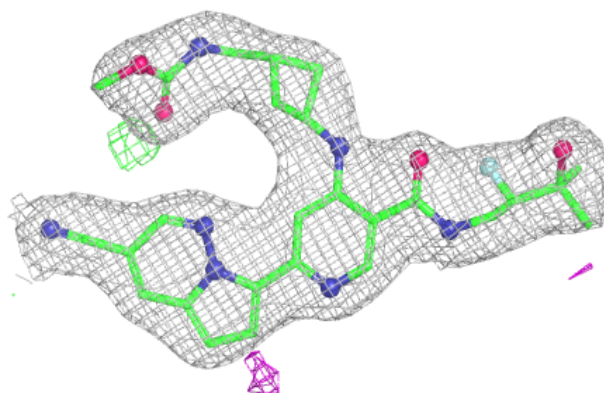
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	A1BW1	A	501	38/38	0.94	0.09	39,52,61,66	0
2	A1BW1	B	501	38/38	0.94	0.09	34,46,53,54	0
2	A1BW1	C	501	38/38	0.94	0.09	37,43,49,51	0
2	A1BW1	D	501	38/38	0.94	0.09	35,46,52,53	0

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.

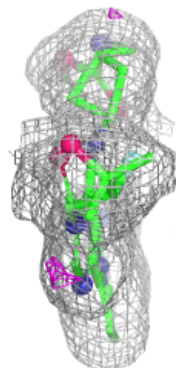
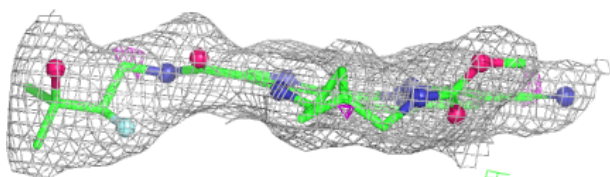
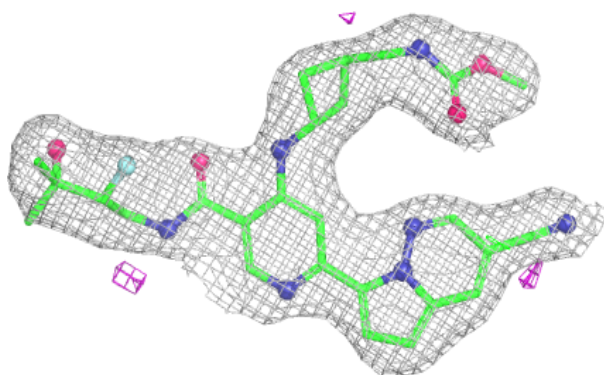


Electron density around A1BW1 B 501:

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

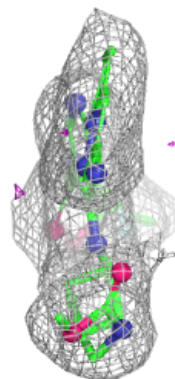
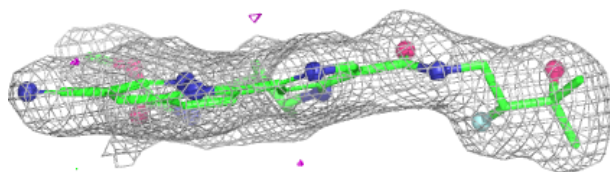
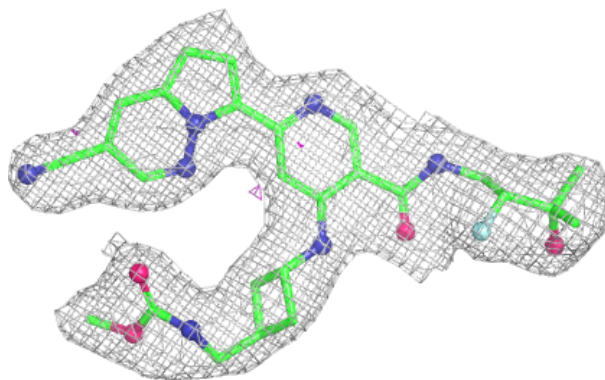
**Electron density around A1BW1 C 501:**

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



Electron density around A1BW1 D 501:

$2mF_o - DF_c$ (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.