WORLDWIDE wwPDB PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

May 22, 2025 – 05:11 PM EDT

PDB ID	:	9NA6 / pdb_00009na6
Title	:	IRAK4 in Complex with Compound 34
Authors	:	Ferrao, R.; Lansdon, E.B.
Deposited on	:	2025-02-11
Resolution	:	2.14 Å(reported)

The following versions of software and data (see references ⓘ) were used in the production of this report:

|		
MolProbity	:	4-5-2 with Phenix2.0rc1
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0rc1
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.006 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.43.1

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 2.14 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.
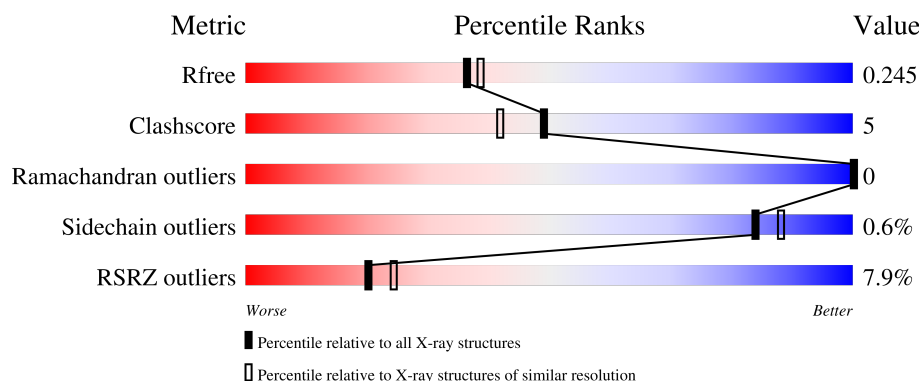
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	3336 (2.16-2.12)
Clashscore	180529	3585 (2.16-2.12)
Ramachandran outliers	177936	3554 (2.16-2.12)
Sidechain outliers	177891	3553 (2.16-2.12)
RSRZ outliers	164620	3337 (2.16-2.12)

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 <=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	4% / 76% / 17% / 6%
1	B	304	10% / 80% / 11% / 9%
1	C	304	6% / 82% / 12% / 6%
1	D	304	10% / 77% / 13% / · / 9%

2 Entry composition ⓘ

There are 4 unique types of molecules in this entry. The entry contains 9528 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	285	Total	C	N	O	P	S	0	0	0
			2256	1414	379	446	3	14			
1	B	276	Total	C	N	O	P	S	0	0	0
			2177	1360	365	436	3	13			
1	C	286	Total	C	N	O	P	S	0	0	0
			2259	1415	377	450	3	14			
1	D	277	Total	C	N	O	P	S	0	0	0
			2189	1371	366	436	3	13			

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 (6P)-4-{[(1S)-1-cyanoethyl]amino}-6-[(8S)-3-cyanopyrrolo[1,2-b]pyridazin-7-yl]-N-[(2S)-2-fluoro-3-hydroxy-3-methylbutyl]pyridine-3-carboxamide (CCD ID: A1BWZ) (formula: $C_{22}H_{22}FN_7O_2$) (labeled as "Ligand of Interest" by depositor).
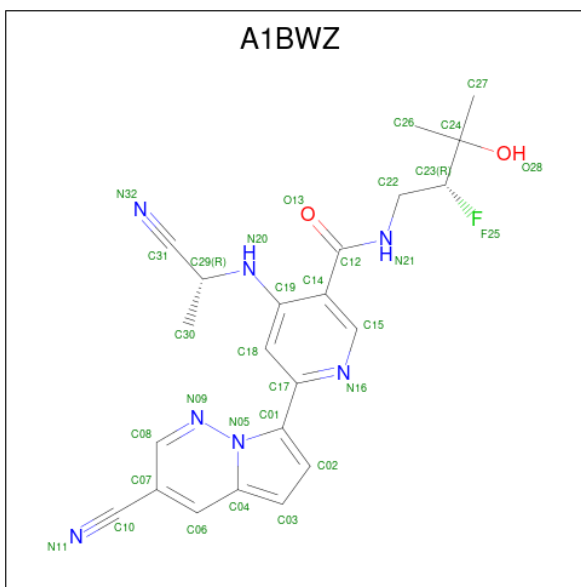
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			32	22	1	7	2		
2	B	1	Total	C	F	N	O	0	0
			32	22	1	7	2		
2	C	1	Total	C	F	N	O	0	0
			32	22	1	7	2		
2	D	1	Total	C	F	N	O	0	0
			32	22	1	7	2		

- Molecule 3 is SULFATE ION (CCD ID: SO4) (formula: O_4S).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total 5	O 4	S 1	0	0
3	B	1	Total 5	O 4	S 1	0	0
3	B	1	Total 5	O 4	S 1	0	0
3	C	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0
3	D	1	Total 5	O 4	S 1	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	143	Total 143	O 143	0	0
4	B	102	Total 102	O 102	0	0
4	C	132	Total 132	O 132	0	0
4	D	107	Total 107	O 107	0	0

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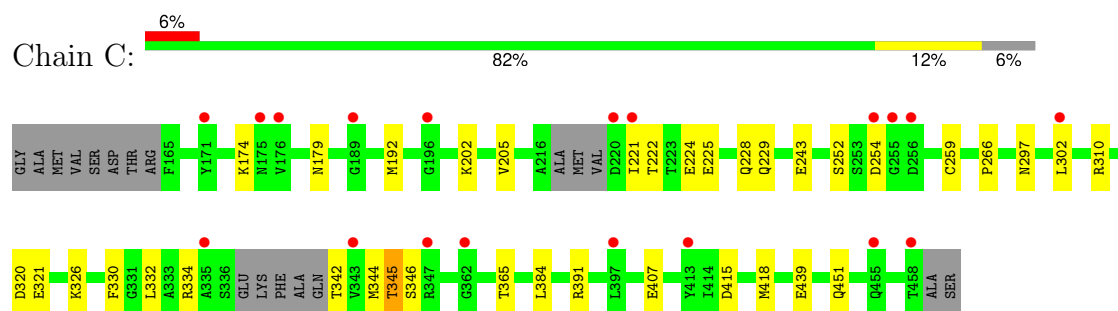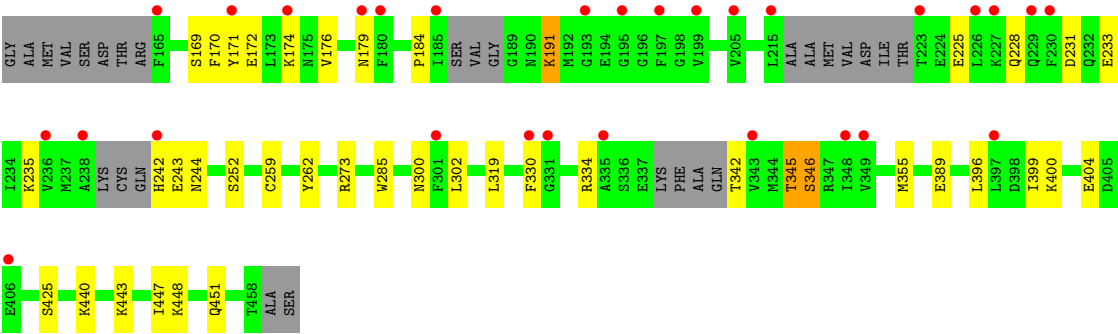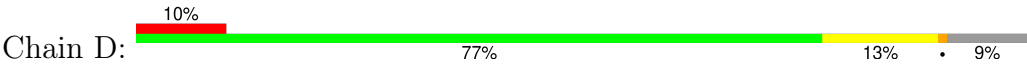
- Molecule 1: Interleukin-1 receptor-associated kinase 4
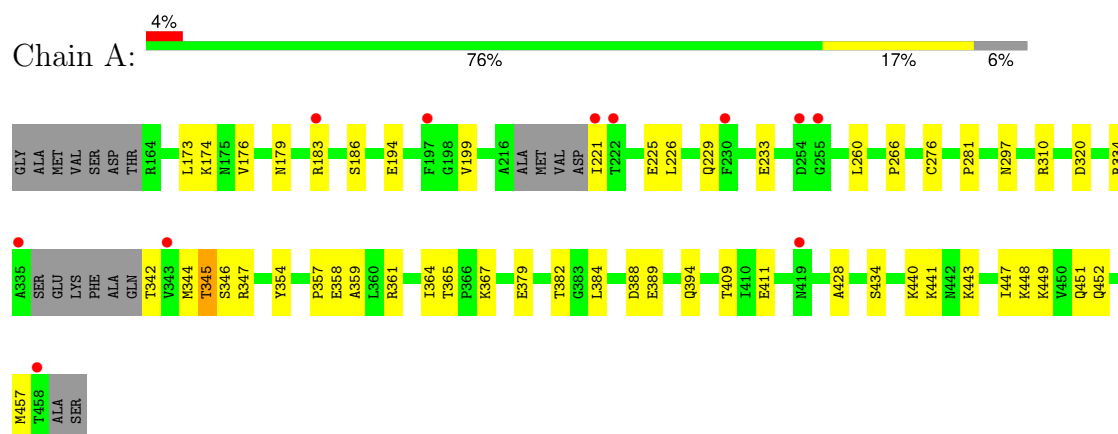
- Molecule 1: Interleukin-1 receptor-associated kinase 4

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

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

Chain D:
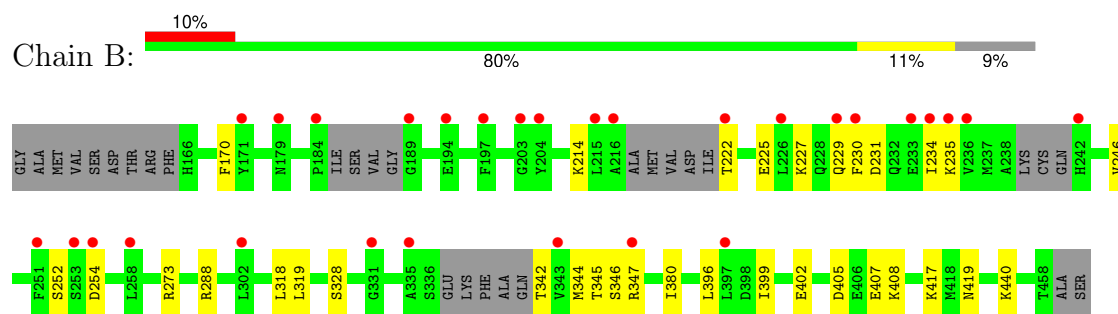
4 Data and refinement statistics (i)

Property	Value	Source
Space group	I 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	86.74Å 141.00Å 110.42Å 90.00° 93.38° 90.00°	Depositor
Resolution (Å)	48.27 – 2.14 48.27 – 2.14	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.27-2.14) 90.0 (48.27-2.14)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.01 (at 2.14Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.214 , 0.246 0.214 , 0.245	Depositor DCC
R_{free} test set	3916 reflections (4.84%)	wwPDB-VP
Wilson B-factor (Å^2)	29.2	Xtriage
Anisotropy	0.498	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 59.2	EDS
L-test for twinning[2]	$< \lvert L \rvert > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	9528	wwPDB-VP
Average B, all atoms (Å^2)	48.0	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 32.79 % 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 8.8765e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< \lvert L \rvert >$, $< L^2 >$ 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: TPO, SO4, A1BWZ, SEP

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	0.10	0/2260	0.27	0/3044
1	B	0.09	0/2177	0.27	0/2931
1	C	0.09	0/2263	0.28	0/3049
1	D	0.09	0/2190	0.28	0/2948
All	All	0.09	0/8890	0.27	0/11972

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 ⓘ

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	2256	0	2221	33	1
1	B	2177	0	2131	20	1
1	C	2259	0	2217	20	1
1	D	2189	0	2140	25	1
2	A	32	0	0	0	0
2	B	32	0	0	0	0
2	C	32	0	0	0	0
2	D	32	0	0	0	0
3	A	5	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	0	0	0
3	C	5	0	0	0	0
3	D	15	0	0	0	0
4	A	143	0	0	1	0
4	B	102	0	0	0	0
4	C	132	0	0	0	0
4	D	107	0	0	0	0
All	All	9528	0	8709	94	2

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 (94) 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:448:LYS:H	1:A:448:LYS:HE2	1.42	0.80
1:D:252:SER:HB3	1:D:259:CYS:HB2	1.75	0.68
1:D:242:HIS:CD2	1:D:244:ASN:H	2.15	0.65
1:D:448:LYS:NZ	1:D:451:GLN:OE1	2.29	0.64
1:D:440:LYS:HB2	1:D:443:LYS:HD2	1.80	0.63
1:C:415:ASP:HB3	1:C:418:MET:HE2	1.83	0.61
1:C:243:GLU:O	1:C:326:LYS:NZ	2.33	0.59
1:B:402:GLU:O	1:B:407:GLU:HG2	2.03	0.58
1:A:229:GLN:OE1	1:A:347:ARG:NH2	2.35	0.57
1:C:297:ASN:OD1	1:C:451:GLN:NE2	2.39	0.55
1:B:222:THR:HB	1:B:225:GLU:HG3	1.88	0.54
1:A:276:CYS:HB2	1:B:417:LYS:HD2	1.90	0.54
1:D:400:LYS:O	1:D:404:GLU:HG3	2.08	0.53
1:D:243:GLU:OE2	1:D:243:GLU:N	2.34	0.53
1:A:440:LYS:HD3	1:A:443:LYS:HE2	1.91	0.53
1:A:266:PRO:HD2	1:A:320:ASP:HA	1.91	0.52
1:A:428:ALA:HB3	1:A:457:MET:HG3	1.92	0.51
1:C:174:LYS:NZ	1:C:179:ASN:OD1	2.36	0.51
1:D:228:GLN:HE22	1:D:334:ARG:HH21	1.59	0.51
1:C:334:ARG:NH2	1:C:345:TPO:O1P	2.40	0.51
1:C:302:LEU:HD11	1:C:330:PHE:HE1	1.75	0.50
1:A:173:LEU:HA	1:A:176:VAL:HG22	1.93	0.50
1:A:354:TYR:OH	1:A:379:GLU:OE1	2.27	0.50
1:C:225:GLU:O	1:C:229:GLN:HG3	2.12	0.50
1:C:222:THR:HG23	1:C:225:GLU:H	1.78	0.49
1:C:266:PRO:HD2	1:C:320:ASP:HA	1.94	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:221:ILE:HD13	1:A:226:LEU:HG	1.94	0.49
1:B:227:LYS:HG3	1:B:231:ASP:OD2	2.13	0.49
1:A:409:THR:HG23	1:A:411:GLU:H	1.77	0.49
1:A:365:THR:OG1	1:A:367:LYS:HD2	2.13	0.49
1:D:170:PHE:O	1:D:174:LYS:HG3	2.13	0.49
1:A:281:PRO:HD3	1:C:321:GLU:HG3	1.96	0.48
1:B:246:VAL:HG11	1:B:328:SER:HB3	1.96	0.47
1:A:449:LYS:NZ	1:A:452:GLN:OE1	2.47	0.47
1:B:405:ASP:HB2	1:B:407:GLU:OE2	2.14	0.47
1:C:224:GLU:O	1:C:228:GLN:HG2	2.15	0.47
1:C:310:ARG:HD3	1:C:332:LEU:O	2.15	0.47
1:B:230:PHE:O	1:B:234:ILE:HG13	2.15	0.47
1:A:367:LYS:HD3	1:A:441:LYS:HD2	1.96	0.46
1:D:171:TYR:HD2	1:D:174:LYS:HD2	1.79	0.46
1:D:184:PRO:HD3	1:D:191:LYS:NZ	2.31	0.46
1:D:302:LEU:HD11	1:D:330:PHE:HE1	1.81	0.46
1:A:440:LYS:CD	1:A:443:LYS:HE2	2.45	0.46
1:D:273:ARG:HG3	1:D:319:LEU:HD12	1.98	0.46
1:D:225:GLU:H	1:D:225:GLU:HG2	1.53	0.45
1:C:344:MET:HE3	1:C:344:MET:HB3	1.78	0.45
1:A:357:PRO:O	1:A:361:ARG:HG3	2.16	0.45
1:D:389:GLU:H	1:D:389:GLU:CD	2.24	0.45
1:A:388:ASP:O	1:A:394:GLN:HG3	2.17	0.44
1:C:252:SER:HB3	1:C:259:CYS:HB2	1.99	0.44
1:A:194:GLU:HG3	1:A:199:VAL:HG22	2.00	0.44
1:A:225:GLU:O	1:A:229:GLN:HG3	2.18	0.44
1:C:384:LEU:HB3	1:C:391:ARG:NH1	2.32	0.44
1:D:233:GLU:OE2	1:D:262:TYR:OH	2.24	0.44
1:D:169:SER:OG	1:D:172:GLU:HG3	2.17	0.44
1:A:389:GLU:HA	1:A:394:GLN:NE2	2.33	0.44
1:C:192:MET:SD	1:C:202:LYS:HB2	2.57	0.44
1:C:254:ASP:OD2	1:C:254:ASP:N	2.50	0.44
1:A:344:MET:HE3	1:A:344:MET:HB3	1.94	0.43
1:A:447:ILE:HG23	1:A:448:LYS:HD3	1.99	0.43
1:B:227:LYS:O	1:B:230:PHE:N	2.52	0.43
1:D:228:GLN:HA	1:D:231:ASP:OD1	2.18	0.43
1:D:300:ASN:HA	1:D:447:ILE:HG21	2.01	0.43
1:A:457:MET:HE2	1:A:457:MET:HB3	1.85	0.43
1:D:396:LEU:O	1:D:399:ILE:HB	2.18	0.43
1:B:225:GLU:OE2	1:B:347:ARG:NH1	2.52	0.43
1:C:302:LEU:HD11	1:C:330:PHE:CE1	2.54	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:183:ARG:NH2	4:A:618:HOH:O	2.52	0.42
1:B:273:ARG:HG3	1:B:319:LEU:HD12	2.01	0.42
1:A:334:ARG:NH2	1:A:345:TPO:O1P	2.51	0.42
1:A:382:THR:HB	1:A:384:LEU:HD12	2.00	0.42
1:B:170:PHE:H	1:B:254:ASP:CG	2.28	0.42
1:B:396:LEU:O	1:B:399:ILE:HG12	2.20	0.42
1:B:407:GLU:C	1:B:408:LYS:HD3	2.44	0.42
1:C:221:ILE:H	1:C:221:ILE:HG13	1.73	0.42
1:D:171:TYR:CD2	1:D:174:LYS:HD2	2.54	0.42
1:B:344:MET:HE3	1:B:344:MET:HB3	1.78	0.42
1:D:285:TRP:NE1	1:D:425:SER:OG	2.51	0.41
1:A:233:GLU:HG2	1:A:260:LEU:HD13	2.01	0.41
1:B:214:LYS:HE2	1:B:214:LYS:HB3	1.89	0.41
1:A:358:GLU:HG2	1:A:359:ALA:N	2.35	0.41
1:B:225:GLU:O	1:B:229:GLN:HG2	2.21	0.41
1:A:281:PRO:HD3	1:C:321:GLU:CG	2.50	0.41
1:A:297:ASN:OD1	1:A:451:GLN:NE2	2.31	0.41
1:B:246:VAL:HG11	1:B:318:LEU:HD12	2.03	0.41
1:B:288:ARG:HB3	1:B:380:ILE:HG23	2.02	0.41
1:D:345:TPO:OG1	1:D:346:SEP:N	2.54	0.41
1:A:174:LYS:CD	1:A:179:ASN:HA	2.51	0.41
1:D:174:LYS:HB3	1:D:179:ASN:HA	2.03	0.41
1:B:235:LYS:N	1:B:235:LYS:HD3	2.36	0.40
1:D:231:ASP:O	1:D:235:LYS:HB2	2.22	0.40
1:A:186:SER:HB2	1:B:419:ASN:HB2	2.02	0.40
1:A:310:ARG:HD3	1:A:364:ILE:HD13	2.03	0.40
1:D:172:GLU:O	1:D:176:VAL:HG23	2.21	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:361:ARG:NH1	1:D:355:MET:O[4_655]	1.98	0.22
1:B:440:LYS:NZ	1:C:439:GLU:OE1[4_555]	2.18	0.02

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	277/304 (91%)	271 (98%)	6 (2%)	0	100	100
1	B	264/304 (87%)	257 (97%)	7 (3%)	0	100	100
1	C	278/304 (91%)	272 (98%)	6 (2%)	0	100	100
1	D	265/304 (87%)	260 (98%)	5 (2%)	0	100	100
All	All	1084/1216 (89%)	1060 (98%)	24 (2%)	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	246/260 (95%)	245 (100%)	1 (0%)	89	92
1	B	237/260 (91%)	236 (100%)	1 (0%)	89	92
1	C	247/260 (95%)	244 (99%)	3 (1%)	67	72
1	D	238/260 (92%)	237 (100%)	1 (0%)	89	92
All	All	968/1040 (93%)	962 (99%)	6 (1%)	84	88

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	434	SER
1	B	252	SER

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Mol	Chain	Res	Type
1	C	205	VAL
1	C	365	THR
1	C	407	GLU
1	D	191	LYS

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	455	GLN
1	B	166	HIS
1	B	190	ASN
1	D	242	HIS
1	D	306	HIS
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	A	342	1	8,10,11	1.17	0	10,14,16	1.38	2 (20%)
1	TPO	B	345	1	8,10,11	1.11	0	10,14,16	1.91	1 (10%)
1	TPO	D	345	1	8,10,11	1.10	0	10,14,16	1.96	1 (10%)
1	TPO	C	342	1	8,10,11	1.12	0	10,14,16	1.82	1 (10%)
1	TPO	C	345	1	8,10,11	1.11	0	10,14,16	1.96	1 (10%)
1	SEP	A	346	1	8,9,10	1.62	1 (12%)	7,12,14	1.25	1 (14%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
1	SEP	D	346	1	8,9,10	1.62	1 (12%)	7,12,14	1.34	1 (14%)
1	SEP	B	346	1	8,9,10	1.63	1 (12%)	7,12,14	1.36	1 (14%)
1	TPO	A	345	1	8,10,11	1.09	0	10,14,16	1.98	1 (10%)
1	SEP	C	346	1	8,9,10	1.62	1 (12%)	7,12,14	1.11	1 (14%)
1	TPO	D	342	1	8,10,11	1.18	0	10,14,16	1.63	2 (20%)
1	TPO	B	342	1	8,10,11	1.13	0	10,14,16	1.94	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	A	342	1	-	4/9/11/13	-
1	TPO	B	345	1	-	2/9/11/13	-
1	TPO	D	345	1	-	2/9/11/13	-
1	TPO	C	342	1	-	3/9/11/13	-
1	TPO	C	345	1	-	2/9/11/13	-
1	SEP	A	346	1	-	0/6/8/10	-
1	SEP	D	346	1	-	1/6/8/10	-
1	SEP	B	346	1	-	5/6/8/10	-
1	TPO	A	345	1	-	2/9/11/13	-
1	SEP	C	346	1	-	2/6/8/10	-
1	TPO	D	342	1	-	4/9/11/13	-
1	TPO	B	342	1	-	4/9/11/13	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	346	SEP	P-O1P	3.55	1.61	1.50
1	C	346	SEP	P-O1P	3.54	1.61	1.50
1	D	346	SEP	P-O1P	3.53	1.61	1.50
1	A	346	SEP	P-O1P	3.53	1.61	1.50

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	342	TPO	P-OG1-CB	-5.74	107.72	123.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	345	TPO	P-OG1-CB	-5.69	107.87	123.33
1	D	345	TPO	P-OG1-CB	-5.52	108.33	123.33
1	C	345	TPO	P-OG1-CB	-5.49	108.42	123.33
1	B	345	TPO	P-OG1-CB	-5.39	108.68	123.33
1	C	342	TPO	P-OG1-CB	-4.92	109.96	123.33
1	A	342	TPO	P-OG1-CB	-3.00	115.17	123.33
1	D	346	SEP	OG-CB-CA	2.93	110.99	108.14
1	B	346	SEP	OG-CB-CA	2.92	110.99	108.14
1	D	342	TPO	P-OG1-CB	-2.89	115.47	123.33
1	A	346	SEP	OG-CB-CA	2.63	110.70	108.14
1	C	346	SEP	OG-CB-CA	2.21	110.29	108.14
1	A	342	TPO	O3P-P-OG1	2.12	114.13	105.85
1	D	342	TPO	O3P-P-OG1	2.11	114.09	105.85

There are no chirality outliers.

All (31) torsion outliers are listed below:

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

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Full wwPDB X-ray Structure Validation Report

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

There are no ring outliers.

4 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	D	345	TPO	1	0
1	C	345	TPO	1	0
1	D	346	SEP	1	0
1	A	345	TPO	1	0

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

11 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	A1BWZ	D	501	-	27,34,34	1.16	1 (3%)	33,49,49	1.32	2 (6%)
3	SO4	D	503	-	4,4,4	0.24	0	6,6,6	0.08	0
3	SO4	A	502	-	4,4,4	0.23	0	6,6,6	0.09	0
2	A1BWZ	A	501	-	27,34,34	1.15	1 (3%)	33,49,49	1.36	2 (6%)
2	A1BWZ	B	501	-	27,34,34	1.15	1 (3%)	33,49,49	1.34	2 (6%)
3	SO4	B	502	-	4,4,4	0.24	0	6,6,6	0.08	0

Mol	Type	Chain	Res	Link	Bond lengths				Bond angles		
					Counts	RMSZ	#|Z| > 2		Counts	RMSZ	#|Z| > 2
3	SO4	C	502	-	4,4,4	0.25	0		6,6,6	0.07	0
3	SO4	D	502	-	4,4,4	0.24	0		6,6,6	0.08	0
3	SO4	D	504	-	4,4,4	0.24	0		6,6,6	0.07	0
2	A1BWZ	C	501	-	27,34,34	1.12	1 (3%)		33,49,49	1.31	2 (6%)
3	SO4	B	503	-	4,4,4	0.24	0		6,6,6	0.09	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
2	A1BWZ	D	501	-	-	3/22/27/27	0/3/3/3
2	A1BWZ	B	501	-	-	1/22/27/27	0/3/3/3
2	A1BWZ	C	501	-	-	6/22/27/27	0/3/3/3
2	A1BWZ	A	501	-	-	2/22/27/27	0/3/3/3

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	501	A1BWZ	F25-C23	-3.42	1.33	1.40
2	D	501	A1BWZ	F25-C23	-3.38	1.34	1.40
2	A	501	A1BWZ	F25-C23	-3.36	1.34	1.40
2	B	501	A1BWZ	F25-C23	-3.33	1.34	1.40

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	A1BWZ	C03-C02-C01	5.47	111.21	107.61
2	A	501	A1BWZ	C03-C02-C01	5.45	111.19	107.61
2	D	501	A1BWZ	C03-C02-C01	5.42	111.17	107.61
2	C	501	A1BWZ	C03-C02-C01	5.28	111.08	107.61
2	A	501	A1BWZ	F25-C23-C22	3.65	111.45	108.06
2	C	501	A1BWZ	F25-C23-C22	3.31	111.14	108.06
2	B	501	A1BWZ	F25-C23-C22	3.28	111.11	108.06
2	D	501	A1BWZ	F25-C23-C22	3.18	111.02	108.06

There are no chirality outliers.
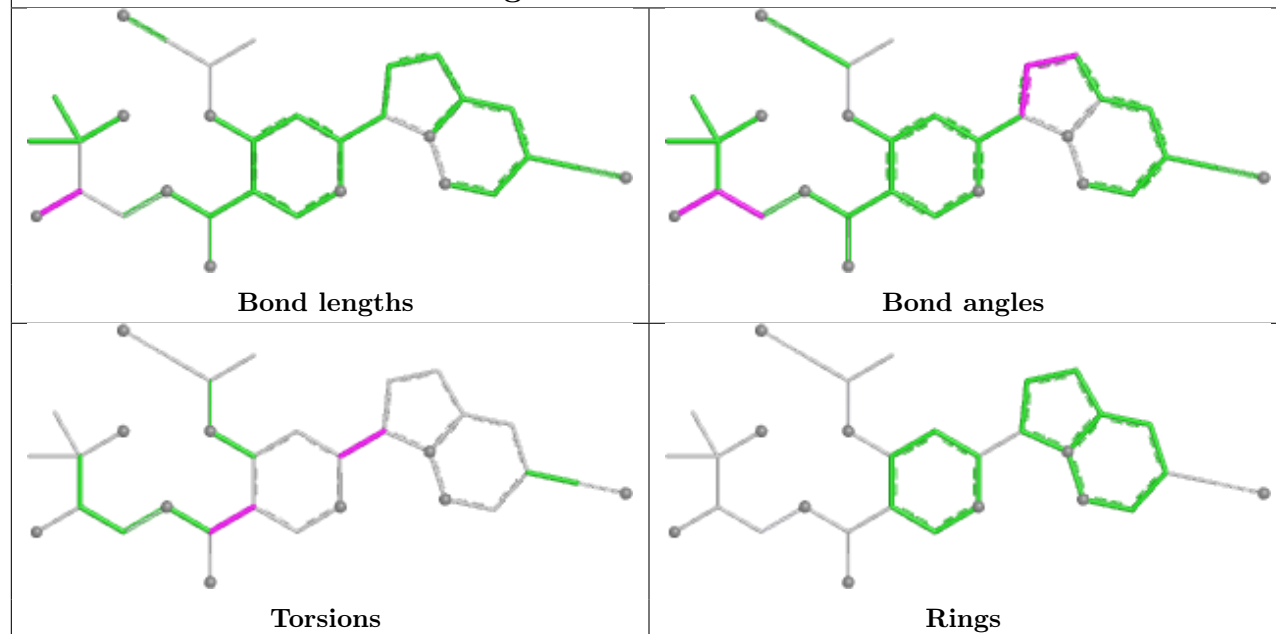
All (12) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	501	A1BWZ	O13-C12-C14-C15
2	C	501	A1BWZ	N21-C12-C14-C15
2	A	501	A1BWZ	O13-C12-C14-C15
2	A	501	A1BWZ	N21-C12-C14-C15
2	C	501	A1BWZ	C02-C01-C17-N16
2	C	501	A1BWZ	N05-C01-C17-N16
2	C	501	A1BWZ	N05-C01-C17-C18
2	D	501	A1BWZ	O13-C12-C14-C15
2	D	501	A1BWZ	C02-C01-C17-N16
2	B	501	A1BWZ	C02-C01-C17-C18
2	C	501	A1BWZ	C02-C01-C17-C18
2	D	501	A1BWZ	C02-C01-C17-C18

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 then 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 A1BWZ D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BWZ A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BWZ B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BWZ C 501

Bond lengths

Bond angles

Torsions

Rings
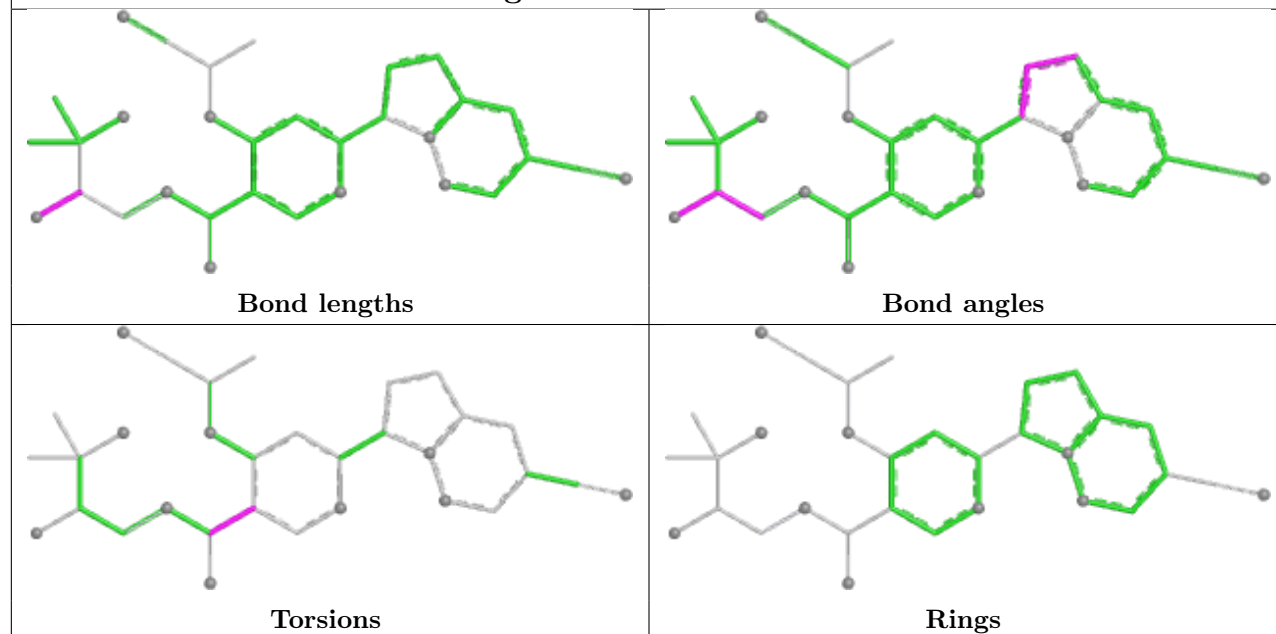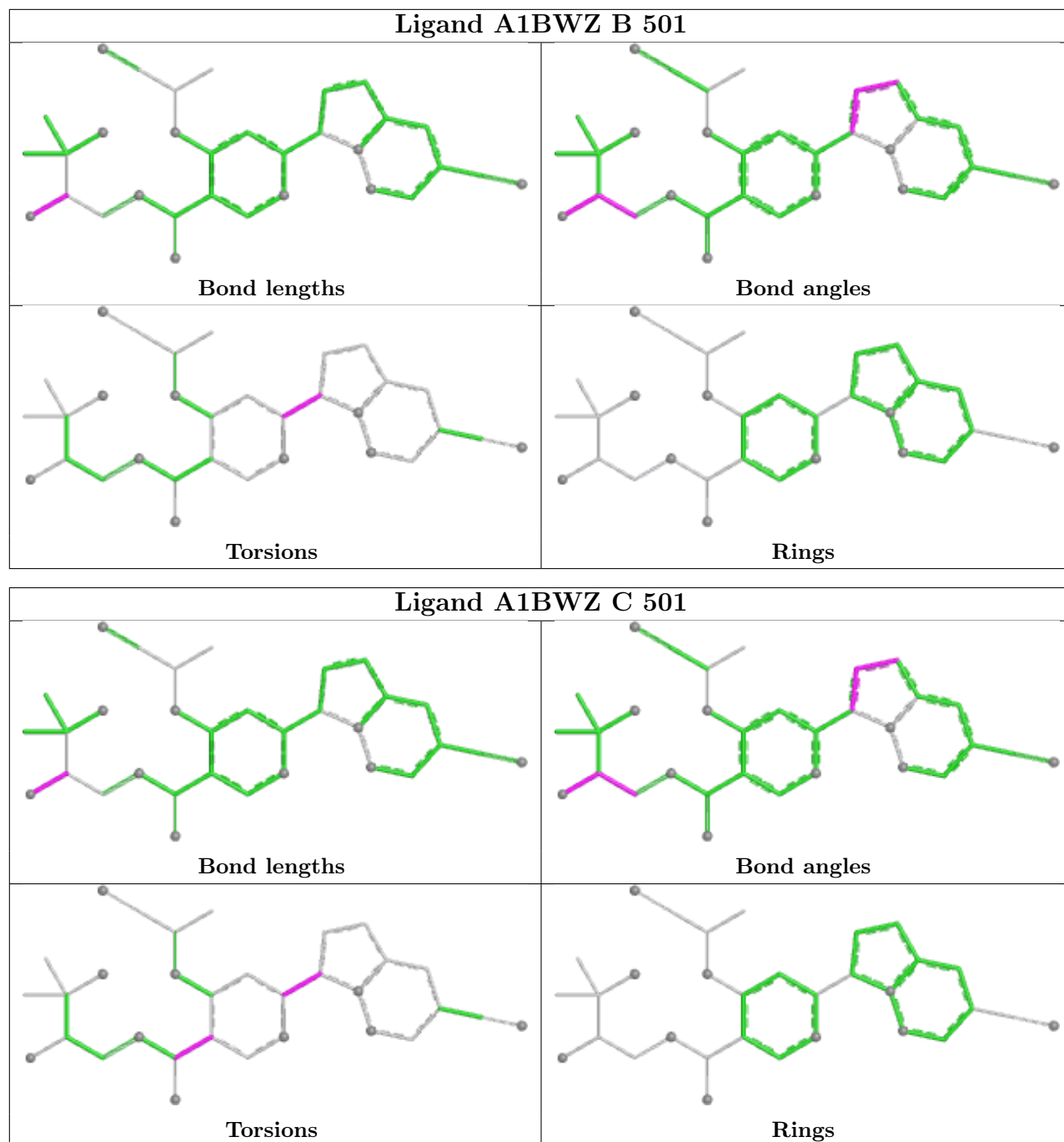
5.7 Other polymers ⓘ

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	282/304 (92%)	0.57	11 (3%)	44	49	22, 42, 71, 89	0
1	B	273/304 (89%)	0.90	29 (10%)	13	16	26, 50, 82, 106	0
1	C	283/304 (93%)	0.58	19 (6%)	25	30	24, 42, 74, 95	0
1	D	274/304 (90%)	0.80	29 (10%)	13	16	25, 47, 79, 106	0
All	All	1112/1216 (91%)	0.71	88 (7%)	20	24	22, 45, 77, 106	0

All (88) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	226	LEU	5.2
1	B	197	PHE	4.6
1	D	185	ILE	4.4
1	D	193	GLY	4.1
1	D	331	GLY	4.0
1	B	184	PRO	4.0
1	A	222	THR	3.9
1	D	335	ALA	3.8
1	A	221	ILE	3.7
1	C	343	VAL	3.6
1	B	189	GLY	3.4
1	B	236	VAL	3.4
1	B	343	VAL	3.3
1	D	397	LEU	3.3
1	B	229	GLN	3.2
1	D	205	VAL	3.2
1	C	413	TYR	3.2
1	B	397	LEU	3.1
1	D	238	ALA	3.1
1	D	343	VAL	3.1
1	B	230	PHE	3.0

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Mol	Chain	Res	Type	RSRZ
1	D	226	LEU	3.0
1	D	229	GLN	3.0
1	A	335	ALA	2.9
1	D	197	PHE	2.9
1	D	171	TYR	2.9
1	A	343	VAL	2.8
1	D	301	PHE	2.8
1	D	223	THR	2.8
1	D	165	PHE	2.7
1	C	221	ILE	2.7
1	B	216	ALA	2.6
1	B	242	HIS	2.6
1	C	175	ASN	2.6
1	D	230	PHE	2.6
1	B	253	SER	2.6
1	B	254	ASP	2.5
1	B	222	THR	2.5
1	D	215	LEU	2.5
1	B	179	ASN	2.5
1	B	234	ILE	2.5
1	B	194	GLU	2.5
1	C	220	ASP	2.5
1	C	176	VAL	2.5
1	D	330	PHE	2.5
1	D	242	HIS	2.4
1	B	335	ALA	2.4
1	C	255	GLY	2.4
1	D	199	VAL	2.4
1	D	349	VAL	2.4
1	D	174	LYS	2.3
1	B	171	TYR	2.3
1	D	406	GLU	2.3
1	B	258	LEU	2.3
1	D	236	VAL	2.3
1	B	331	GLY	2.3
1	C	455	GLN	2.3
1	D	227	LYS	2.3
1	C	458	THR	2.3
1	D	195	GLY	2.2
1	C	254	ASP	2.2
1	D	348	ILE	2.2
1	A	183	ARG	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	230	PHE	2.2
1	B	203	GLY	2.2
1	A	419	ASN	2.2
1	A	197	PHE	2.1
1	B	235	LYS	2.1
1	C	256	ASP	2.1
1	B	215	LEU	2.1
1	B	251	PHE	2.1
1	D	180	PHE	2.1
1	B	204	TYR	2.1
1	A	254	ASP	2.1
1	C	302	LEU	2.1
1	C	189	GLY	2.1
1	C	347	ARG	2.1
1	B	302	LEU	2.1
1	A	255	GLY	2.0
1	C	196	GLY	2.0
1	C	335	ALA	2.0
1	C	362	GLY	2.0
1	C	171	TYR	2.0
1	B	347	ARG	2.0
1	A	458	THR	2.0
1	C	397	LEU	2.0
1	B	233	GLU	2.0
1	D	179	ASN	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	D	342	11/12	0.63	0.17	68,78,97,100	0
1	SEP	D	346	10/11	0.65	0.15	80,90,107,114	0
1	TPO	A	342	11/12	0.66	0.22	73,79,92,95	0
1	TPO	C	342	11/12	0.66	0.22	75,80,90,114	0
1	SEP	B	346	10/11	0.67	0.13	69,79,102,112	0
1	SEP	C	346	10/11	0.72	0.13	66,77,106,113	0
1	SEP	A	346	10/11	0.73	0.13	73,79,106,113	0
1	TPO	B	342	11/12	0.80	0.15	66,73,84,85	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
1	TPO	B	345	11/12	0.81	0.13	57,66,77,79	0
1	TPO	A	345	11/12	0.85	0.12	67,73,81,84	0
1	TPO	D	345	11/12	0.87	0.14	78,84,89,94	0
1	TPO	C	345	11/12	0.87	0.12	53,69,81,81	0

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, 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
3	SO4	B	503	5/5	0.71	0.13	66,68,84,86	0
3	SO4	C	502	5/5	0.71	0.13	63,74,86,87	0
3	SO4	A	502	5/5	0.75	0.14	61,72,80,80	0
3	SO4	D	504	5/5	0.76	0.11	72,74,75,85	0
3	SO4	D	503	5/5	0.85	0.11	62,63,67,71	0
3	SO4	D	502	5/5	0.92	0.11	49,53,61,62	0
2	A1BWZ	A	501	32/32	0.93	0.09	20,27,31,34	0
2	A1BWZ	B	501	32/32	0.93	0.10	28,38,43,57	0
2	A1BWZ	D	501	32/32	0.93	0.09	25,31,41,48	0
3	SO4	B	502	5/5	0.94	0.10	48,50,57,60	0
2	A1BWZ	C	501	32/32	0.94	0.08	21,28,34,34	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 A1BWZ A 501:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
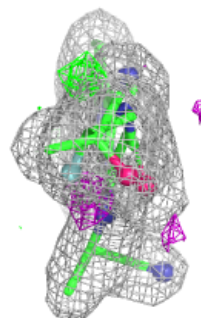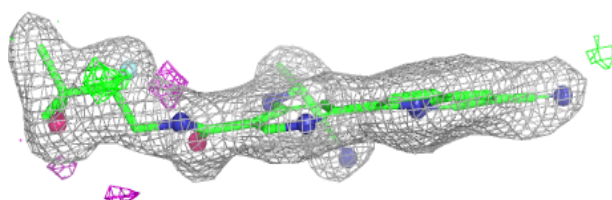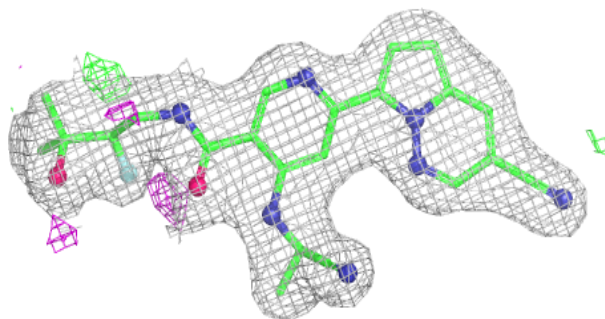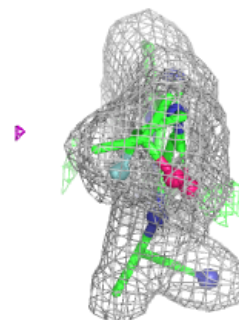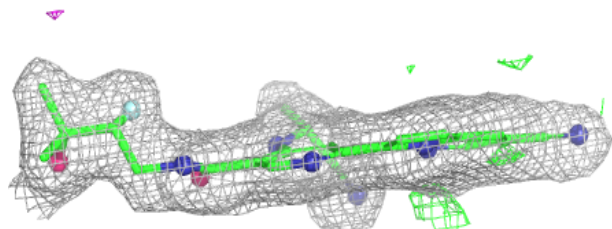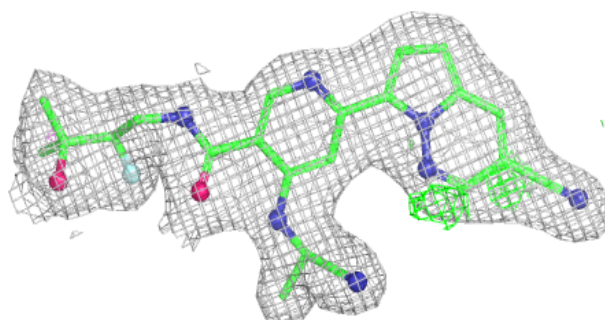and green (positive)
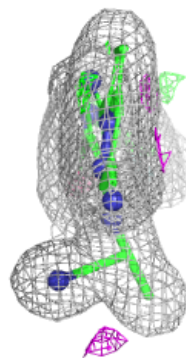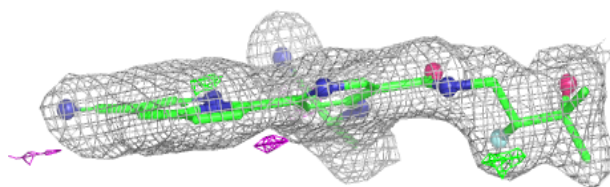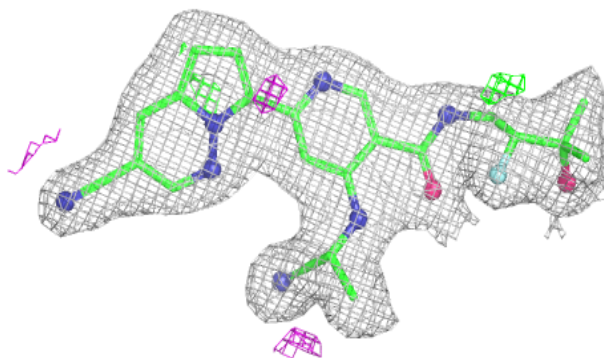
Electron density around A1BWZ B 501:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
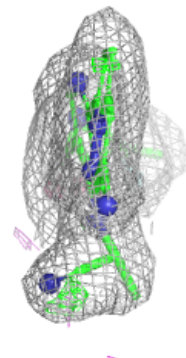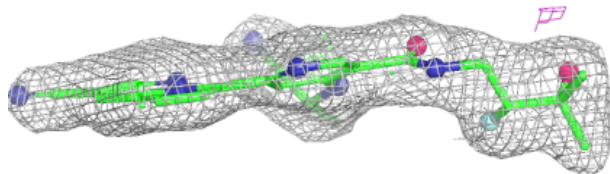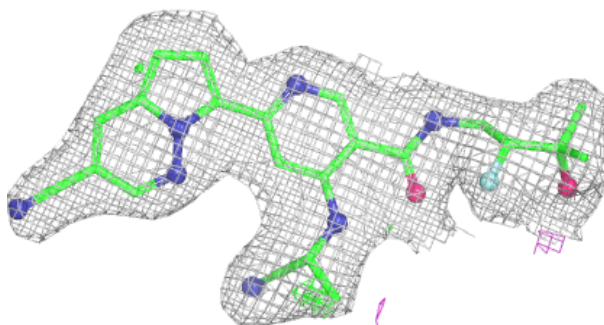
Electron density around A1BWZ D 501:

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

Electron density around A1BWZ 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)

6.5 Other polymers ⓘ

There are no such residues in this entry.