



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 16, 2026 – 04:42 pm BST

PDB ID : 9SE9 / pdb_00009se9
Title : Crystal structure of ULK2 in complex with inhibitor SBP-5147
Authors : Chaikuad, A.; Layng, F.I.A.L.; Ren, H.; Cosford, N.D.P.; Knapp, S.; Structural Genomics Consortium (SGC)
Deposited on : 2025-08-15
Resolution : 1.97 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	:	1.8.4, CSD as541be (2020)
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	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

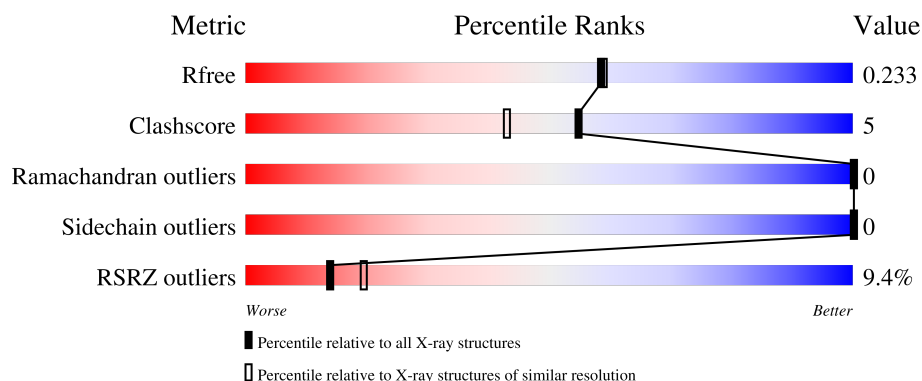
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.97 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	1506 (1.98-1.98)
Clashscore	190562	1534 (1.98-1.98)
Ramachandran outliers	187476	1518 (1.98-1.98)
Sidechain outliers	187428	1518 (1.98-1.98)
RSRZ outliers	180081	1506 (1.98-1.98)

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	280	5% 85% 9% 6%
1	B	280	10% 85% 10% •
1	C	280	7% 82% 10% 8%
1	D	280	13% 81% 13% • 5%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	EDO	C	305	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 8960 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.

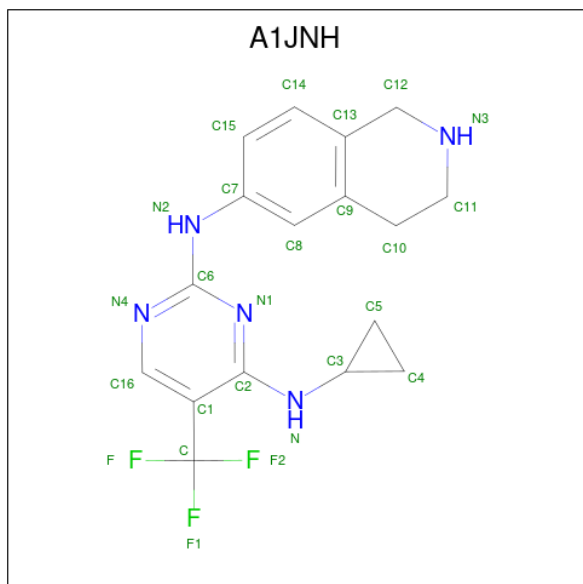
- Molecule 1 is a protein called Serine/threonine-protein kinase ULK2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	264	Total	C	N	O	S	0	6	0
			2140	1378	367	384	11			
1	B	268	Total	C	N	O	S	0	3	0
			2114	1362	362	379	11			
1	C	257	Total	C	N	O	S	0	2	0
			2048	1318	351	368	11			
1	D	265	Total	C	N	O	S	0	3	0
			2107	1357	360	378	12			

There are 20 discrepancies between the modelled and reference sequences:

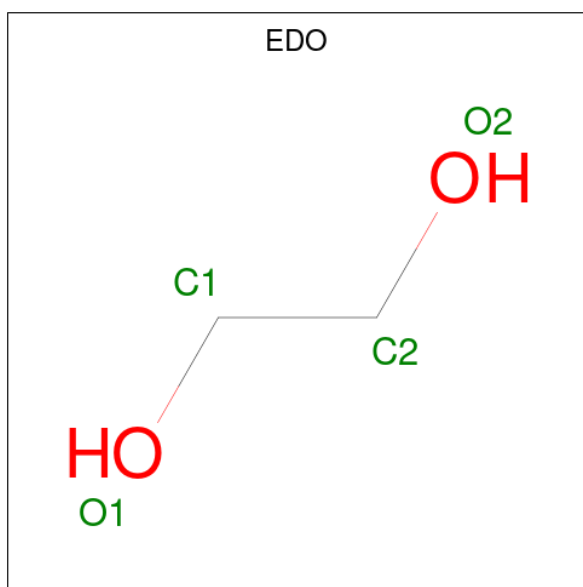
Chain	Residue	Modelled	Actual	Comment	Reference
A	-3	GLY	-	expression tag	UNP Q8IYT8
A	-2	GLY	-	expression tag	UNP Q8IYT8
A	-1	GLY	-	expression tag	UNP Q8IYT8
A	0	SER	-	expression tag	UNP Q8IYT8
A	173	ASP	THR	conflict	UNP Q8IYT8
B	-3	GLY	-	expression tag	UNP Q8IYT8
B	-2	GLY	-	expression tag	UNP Q8IYT8
B	-1	GLY	-	expression tag	UNP Q8IYT8
B	0	SER	-	expression tag	UNP Q8IYT8
B	173	ASP	THR	conflict	UNP Q8IYT8
C	-3	GLY	-	expression tag	UNP Q8IYT8
C	-2	GLY	-	expression tag	UNP Q8IYT8
C	-1	GLY	-	expression tag	UNP Q8IYT8
C	0	SER	-	expression tag	UNP Q8IYT8
C	173	ASP	THR	conflict	UNP Q8IYT8
D	-3	GLY	-	expression tag	UNP Q8IYT8
D	-2	GLY	-	expression tag	UNP Q8IYT8
D	-1	GLY	-	expression tag	UNP Q8IYT8
D	0	SER	-	expression tag	UNP Q8IYT8
D	173	ASP	THR	conflict	UNP Q8IYT8

- Molecule 2 is {N}4-cyclopropyl- {N}2-(1,2,3,4-tetrahydroisoquinolin-6-yl)-5-(trifluoromethyl)pyrimidine-2,4-diamine (CCD ID: A1JNH) (formula: C₁₇H₁₈F₃N₅) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	F	N	0	0
			25	17	3	5		
2	B	1	Total	C	F	N	0	0
			25	17	3	5		
2	C	1	Total	C	F	N	0	0
			25	17	3	5		
2	D	1	Total	C	F	N	0	0
			25	17	3	5		

- Molecule 3 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



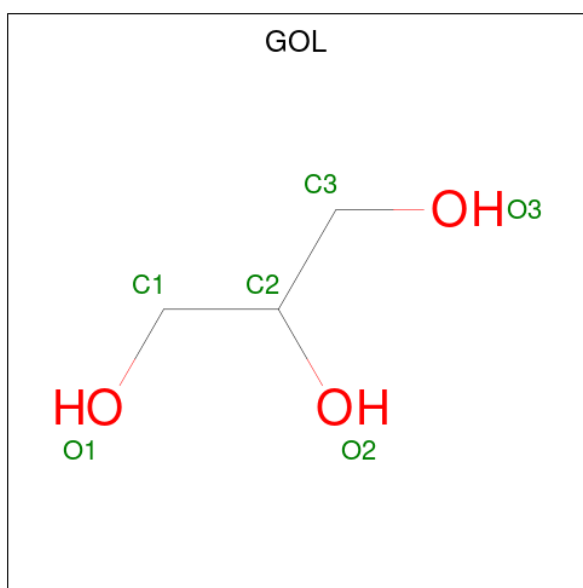
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total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

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	C	1	Total C O 4 2 2	0	0
3	C	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0
3	D	1	Total C O 4 2 2	0	0

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



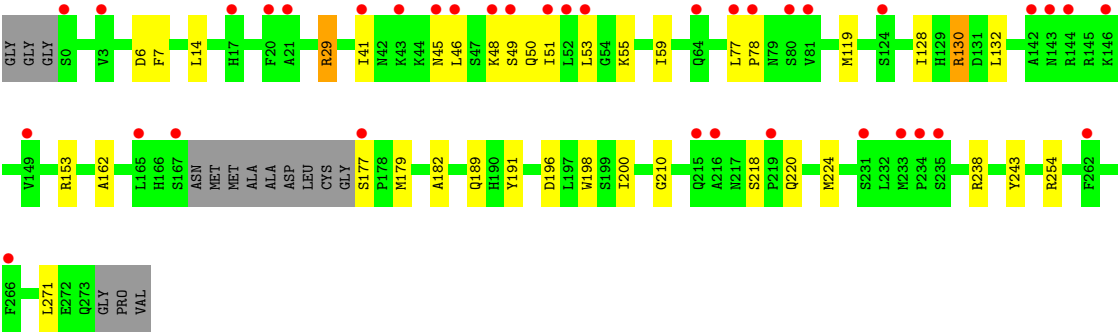
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 6 3 3	0	0
4	B	1	Total C O 12 6 6	0	1
4	C	1	Total C O 6 3 3	0	0

- Molecule 5 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	1	Total 1	Mg 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	118	Total 118	O 118	0	0
6	B	113	Total 113	O 113	0	0
6	C	53	Total 53	O 53	0	0
6	D	60	Total 60	O 60	0	0



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	76.55Å 78.08Å 94.22Å 90.00° 98.76° 90.00°	Depositor
Resolution (Å)	63.67 – 1.97 63.67 – 1.97	Depositor EDS
% Data completeness (in resolution range)	100.0 (63.67-1.97) 100.0 (63.67-1.97)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.82 (at 1.97Å)	Xtriage
Refinement program	REFMAC 5.8.0230	Depositor
R, R_{free}	0.193 , 0.230 0.199 , 0.233	Depositor DCC
R_{free} test set	3842 reflections (4.95%)	wwPDB-VP
Wilson B-factor (Å ²)	33.8	Xtriage
Anisotropy	0.336	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 51.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8960	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.32% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, GOL, MG, A1JNH

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	1.10	4/2205 (0.2%)	0.99	1/2974 (0.0%)
1	B	1.07	5/2169 (0.2%)	0.97	1/2929 (0.0%)
1	C	0.97	1/2099 (0.0%)	0.92	0/2836
1	D	0.95	1/2162 (0.0%)	0.94	0/2923
All	All	1.03	11/8635 (0.1%)	0.96	2/11662 (0.0%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	3
1	C	0	4
1	D	0	4
All	All	0	14

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	234	PRO	C-O	-6.76	1.16	1.23
1	A	14	LEU	C-O	-6.11	1.16	1.24
1	B	15	VAL	C-O	-5.96	1.18	1.24
1	B	64	GLN	N-CA	-5.79	1.39	1.47
1	D	218	SER	N-CA	5.70	1.51	1.45
1	A	136	ASN	N-CA	5.65	1.53	1.46
1	C	64	GLN	N-CA	-5.57	1.39	1.46
1	B	46	LEU	C-O	-5.30	1.17	1.24
1	A	132	LEU	C-O	5.13	1.30	1.23
1	B	22	VAL	N-CA	-5.13	1.40	1.46

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	5	GLY	C-O	-5.06	1.16	1.24

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	113	HIS	CA-CB-CG	5.16	118.96	113.80
1	B	42	ASN	CA-CB-CG	5.07	117.67	112.60

There are no chirality outliers.

All (14) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	120	ARG	Sidechain
1	A	223	ARG	Sidechain
1	A	238	ARG	Sidechain
1	B	12	ARG	Sidechain
1	B	120	ARG	Sidechain
1	B	254	ARG	Sidechain
1	C	130	ARG	Sidechain
1	C	238	ARG	Sidechain
1	C	254	ARG	Sidechain
1	C	29	ARG	Sidechain
1	D	130	ARG	Sidechain
1	D	153	ARG	Sidechain
1	D	238	ARG	Sidechain
1	D	29	ARG	Sidechain

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	2140	0	2154	19	0
1	B	2114	0	2096	18	0
1	C	2048	0	2025	18	1
1	D	2107	0	2087	28	1
2	A	25	0	0	1	0
2	B	25	0	0	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	C	25	0	0	1	0
2	D	25	0	0	0	0
3	A	24	0	36	3	0
3	B	32	0	48	2	0
3	C	8	0	12	4	0
3	D	12	0	18	2	0
4	B	24	0	32	2	0
4	C	6	0	8	0	0
5	C	1	0	0	0	0
6	A	118	0	0	2	0
6	B	113	0	0	2	0
6	C	53	0	0	1	0
6	D	60	0	0	2	0
All	All	8960	0	8516	83	1

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 (83) 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:132:LEU:HD13	1:D:200[B]:ILE:HD11	1.62	0.82
1:A:186:ILE:HG22	1:A:187:MET:HE2	1.62	0.79
1:A:179:MET:HG3	1:A:181:MET:H	1.48	0.78
1:B:132:LEU:HD13	1:B:200[B]:ILE:HD11	1.66	0.77
1:C:157:ALA:HB1	3:C:305:EDO:H11	1.69	0.73
1:A:120:ARG:NH2	6:A:402:HOH:O	2.22	0.72
1:D:220:GLN:O	1:D:224:MET:HG3	1.91	0.71
3:C:305:EDO:O1	6:C:401:HOH:O	2.10	0.70
1:B:238:ARG:HA	4:B:303:GOL:H12	1.77	0.67
1:B:119[B]:MET:SD	1:B:200[B]:ILE:HG13	2.35	0.66
1:C:77:LEU:HB3	1:C:78:PRO:HD2	1.78	0.65
1:B:20:PHE:CD1	1:B:45:ASN:HB3	2.31	0.65
1:A:17[A]:HIS:ND1	1:A:18:GLY:O	2.30	0.64
3:A:307:EDO:O1	6:A:401:HOH:O	2.01	0.64
1:B:30:GLN:NE2	6:B:403:HOH:O	2.32	0.62
1:A:77:LEU:HG	1:A:82:PHE:HE1	1.65	0.62
1:A:220:GLN:H	1:A:220:GLN:CD	2.08	0.61
1:B:15:VAL:HG12	6:B:413:HOH:O	2.01	0.60
1:C:165:LEU:O	1:C:166:HIS:C	2.45	0.59
1:D:128:ILE:HG22	1:D:130:ARG:HG2	1.85	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:157:ALA:HB1	3:A:307:EDO:H11	1.85	0.57
1:C:271:LEU:O	1:C:272:GLU:HG2	2.03	0.57
1:D:48:LYS:HA	1:D:51:ILE:HD12	1.88	0.54
1:D:29:ARG:HG2	1:D:29:ARG:HH11	1.73	0.54
1:B:25:ARG:HH21	4:B:302:GOL:C1	2.20	0.54
1:C:182:ALA:HA	1:D:198:TRP:CD1	2.44	0.52
1:A:225:PHE:CE2	1:A:232:LEU:HD22	2.45	0.51
1:C:184:GLU:O	1:C:188:SER:HB3	2.11	0.51
1:A:65:HIS:CD2	1:A:121:ILE:HG13	2.45	0.50
1:D:77:LEU:HB3	1:D:78:PRO:HD2	1.93	0.50
2:B:301:A1JNH:C8	2:B:301:A1JNH:N1	2.75	0.49
1:C:65:HIS:CD2	1:C:121:ILE:HG13	2.47	0.49
1:D:177:SER:CB	1:D:179:MET:HE2	2.42	0.49
1:D:119[B]:MET:SD	1:D:200[B]:ILE:HG13	2.53	0.49
1:C:191:TYR:HB3	3:D:302:EDO:H12	1.95	0.48
1:B:14:LEU:HD23	1:B:14:LEU:C	2.39	0.48
1:B:19:ALA:H	3:B:307:EDO:HO1	1.58	0.48
1:D:220:GLN:NE2	6:D:405:HOH:O	2.47	0.48
1:A:17[A]:HIS:CE1	1:A:18:GLY:O	2.67	0.48
1:D:59:ILE:HD13	1:D:162:ALA:HB3	1.95	0.48
1:B:65:HIS:CD2	1:B:121:ILE:HG13	2.50	0.47
1:A:69[B]:VAL:HG11	3:A:307:EDO:C1	2.44	0.47
1:C:69:VAL:HG21	3:C:305:EDO:C1	2.45	0.47
1:C:191:TYR:CE2	1:D:189:GLN:HG3	2.50	0.47
1:A:186:ILE:HG22	1:A:187:MET:CE	2.41	0.47
1:D:196:ASP:O	1:D:200[B]:ILE:HG12	2.14	0.47
1:D:41:ILE:HG22	1:D:53:LEU:HD12	1.96	0.47
1:D:46:LEU:C	1:D:46:LEU:HD12	2.40	0.47
1:D:6:ASP:C	1:D:29:ARG:HD3	2.40	0.46
1:A:220:GLN:CD	1:A:220:GLN:N	2.74	0.46
1:B:132:LEU:HD13	1:B:200[B]:ILE:CD1	2.43	0.46
1:B:77:LEU:HB3	1:B:78:PRO:HD2	1.99	0.45
1:B:115:ILE:HG21	1:B:200[B]:ILE:HD12	1.98	0.45
1:B:196:ASP:O	1:B:200[B]:ILE:HG12	2.17	0.45
1:A:218:SER:HB2	1:A:220:GLN:OE1	2.15	0.45
1:D:77:LEU:HB3	1:D:78:PRO:CD	2.47	0.45
1:C:14:LEU:C	1:C:14:LEU:HD23	2.42	0.44
1:C:187:MET:HE1	1:D:254:ARG:NH1	2.32	0.44
2:A:301:A1JNH:C8	2:A:301:A1JNH:N1	2.80	0.44
1:D:7:PHE:N	1:D:29:ARG:HD3	2.33	0.44
1:B:214:PHE:HA	1:B:217:ASN:OD1	2.17	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:41:ILE:HD13	1:D:50:GLN:HE21	1.82	0.44
1:C:165:LEU:HD22	1:C:190:HIS:ND1	2.33	0.44
1:C:183:PRO:HD3	1:D:198:TRP:CE2	2.53	0.44
1:C:271:LEU:O	1:C:272:GLU:CG	2.66	0.43
1:D:14:LEU:C	1:D:14:LEU:HD23	2.44	0.43
1:D:191:TYR:CE2	3:D:302:EDO:H21	2.54	0.43
1:C:69:VAL:HG21	3:C:305:EDO:H12	2.02	0.42
1:A:239:GLU:H	1:A:239:GLU:CD	2.28	0.41
1:B:19:ALA:N	3:B:307:EDO:O1	2.35	0.41
1:D:210:GLY:HA2	6:D:430:HOH:O	2.19	0.41
1:B:77:LEU:HB3	1:B:78:PRO:CD	2.50	0.41
1:C:198:TRP:CD1	1:D:182:ALA:HA	2.55	0.41
1:D:55:LYS:HE3	1:D:59:ILE:HD11	2.02	0.41
1:A:225:PHE:CZ	1:A:232:LEU:HD22	2.56	0.41
1:A:17[A]:HIS:CG	1:A:21:ALA:O	2.74	0.41
1:C:141:TYR:CE1	1:C:152:ILE:HG12	2.56	0.41
1:D:271:LEU:HD23	1:D:271:LEU:HA	1.79	0.41
1:A:77:LEU:HG	1:A:82:PHE:CE1	2.51	0.40
1:B:128[B]:ILE:HD11	1:B:192:ASP:OD2	2.21	0.40
1:D:45:ASN:O	1:D:49:SER:HB3	2.21	0.40
1:A:77:LEU:HB3	1:A:78:PRO:HD2	2.02	0.40
2:C:301:A1JNH:N1	2:C:301:A1JNH:C8	2.83	0.40

All (1) 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:C:106:ASP:OD2	1:D:243:TYR:OH[1_545]	2.07	0.13

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	266/280 (95%)	260 (98%)	6 (2%)	0	100	100
1	B	267/280 (95%)	259 (97%)	8 (3%)	0	100	100
1	C	253/280 (90%)	246 (97%)	7 (3%)	0	100	100
1	D	264/280 (94%)	255 (97%)	9 (3%)	0	100	100
All	All	1050/1120 (94%)	1020 (97%)	30 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	232/241 (96%)	232 (100%)	0	100	100
1	B	221/241 (92%)	221 (100%)	0	100	100
1	C	217/241 (90%)	217 (100%)	0	100	100
1	D	223/241 (92%)	223 (100%)	0	100	100
All	All	893/964 (93%)	893 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (13) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	113	HIS
1	A	123	HIS
1	A	229	ASN
1	B	50	GLN
1	B	123	HIS
1	C	79	ASN
1	C	123	HIS
1	C	229	ASN
1	D	50	GLN
1	D	113	HIS

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Mol	Chain	Res	Type
1	D	123	HIS
1	D	229	ASN
1	D	255	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 29 ligands modelled in this entry, 1 is monoatomic - leaving 28 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	A1JNH	C	301	-	28,28,28	0.36	0	35,41,41	0.44	0
3	EDO	B	309	-	3,3,3	0.63	0	2,2,2	0.16	0
3	EDO	A	307	-	3,3,3	0.28	0	2,2,2	0.87	0
3	EDO	A	305	-	3,3,3	0.50	0	2,2,2	0.25	0
2	A1JNH	B	301	-	28,28,28	0.72	0	35,41,41	0.51	0
3	EDO	B	311	-	3,3,3	0.40	0	2,2,2	0.35	0
3	EDO	A	302	-	3,3,3	0.53	0	2,2,2	0.04	0
3	EDO	C	305	-	3,3,3	0.20	0	2,2,2	0.32	0
4	GOL	B	304[B]	-	5,5,5	0.38	0	5,5,5	0.18	0
3	EDO	B	307	-	3,3,3	0.34	0	2,2,2	0.45	0
2	A1JNH	A	301	-	28,28,28	0.78	0	35,41,41	0.55	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	EDO	D	303	-	3,3,3	0.62	0	2,2,2	0.41	0
3	EDO	D	304	-	3,3,3	0.47	0	2,2,2	0.34	0
3	EDO	B	310	-	3,3,3	0.36	0	2,2,2	0.58	0
3	EDO	A	303	-	3,3,3	0.42	0	2,2,2	0.69	0
4	GOL	B	302	-	5,5,5	0.47	0	5,5,5	0.72	0
3	EDO	B	312	-	3,3,3	0.54	0	2,2,2	0.33	0
3	EDO	A	304	-	3,3,3	0.64	0	2,2,2	0.06	0
3	EDO	B	306	-	3,3,3	0.34	0	2,2,2	0.45	0
3	EDO	C	304	-	3,3,3	0.38	0	2,2,2	0.59	0
4	GOL	B	304[A]	-	5,5,5	0.55	0	5,5,5	0.53	0
3	EDO	B	305	-	3,3,3	0.27	0	2,2,2	0.66	0
2	A1JNH	D	301	-	28,28,28	0.26	0	35,41,41	0.45	0
3	EDO	A	306	-	3,3,3	0.55	0	2,2,2	0.23	0
4	GOL	C	303	-	5,5,5	0.42	0	5,5,5	0.56	0
4	GOL	B	303	-	5,5,5	0.59	0	5,5,5	0.56	0
3	EDO	D	302	-	3,3,3	0.28	0	2,2,2	0.61	0
3	EDO	B	308	-	3,3,3	0.42	0	2,2,2	0.44	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	A1JNH	C	301	-	-	0/14/23/23	0/4/4/4
3	EDO	B	309	-	-	1/1/1/1	-
3	EDO	A	307	-	-	1/1/1/1	-
3	EDO	A	305	-	-	1/1/1/1	-
2	A1JNH	B	301	-	-	0/14/23/23	0/4/4/4
3	EDO	B	311	-	-	0/1/1/1	-
3	EDO	A	302	-	-	1/1/1/1	-
3	EDO	C	305	-	-	0/1/1/1	-
4	GOL	B	304[B]	-	-	0/4/4/4	-
3	EDO	B	307	-	-	0/1/1/1	-
2	A1JNH	A	301	-	-	0/14/23/23	0/4/4/4
3	EDO	D	303	-	-	1/1/1/1	-
3	EDO	D	304	-	-	1/1/1/1	-
3	EDO	B	310	-	-	1/1/1/1	-
3	EDO	A	303	-	-	1/1/1/1	-
4	GOL	B	302	-	-	0/4/4/4	-
3	EDO	B	312	-	-	0/1/1/1	-
3	EDO	A	304	-	-	1/1/1/1	-
3	EDO	B	306	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	EDO	C	304	-	-	0/1/1/1	-
4	GOL	B	304[A]	-	-	2/4/4/4	-
3	EDO	B	305	-	-	0/1/1/1	-
2	A1JNH	D	301	-	-	0/14/23/23	0/4/4/4
3	EDO	A	306	-	-	1/1/1/1	-
4	GOL	C	303	-	-	0/4/4/4	-
4	GOL	B	303	-	-	0/4/4/4	-
3	EDO	D	302	-	-	0/1/1/1	-
3	EDO	B	308	-	-	1/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (13) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	B	304[A]	GOL	C1-C2-C3-O3
4	B	304[A]	GOL	O2-C2-C3-O3
3	B	310	EDO	O1-C1-C2-O2
3	D	304	EDO	O1-C1-C2-O2
3	A	303	EDO	O1-C1-C2-O2
3	A	302	EDO	O1-C1-C2-O2
3	A	306	EDO	O1-C1-C2-O2
3	D	303	EDO	O1-C1-C2-O2
3	B	309	EDO	O1-C1-C2-O2
3	A	304	EDO	O1-C1-C2-O2
3	A	305	EDO	O1-C1-C2-O2
3	A	307	EDO	O1-C1-C2-O2
3	B	308	EDO	O1-C1-C2-O2

There are no ring outliers.

9 monomers are involved in 16 short contacts:

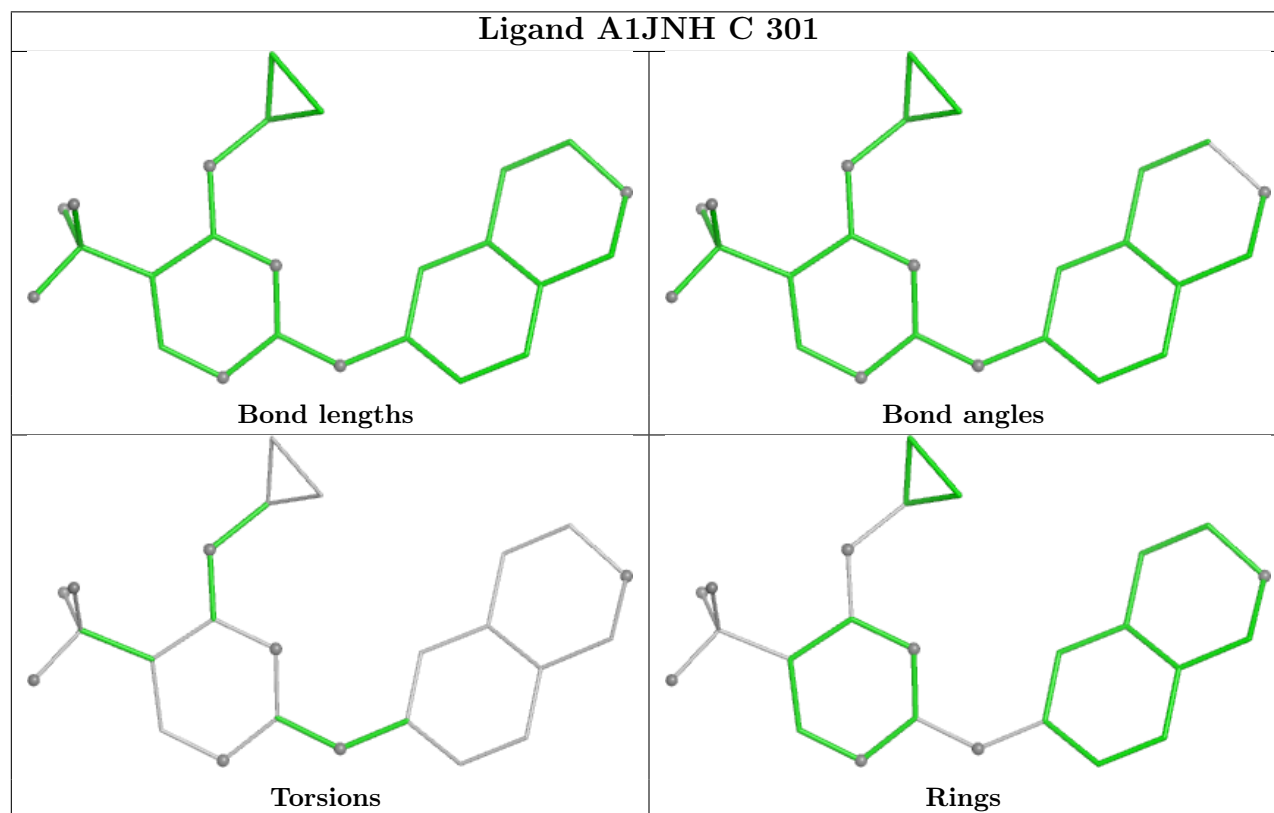
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	301	A1JNH	1	0
3	A	307	EDO	3	0
2	B	301	A1JNH	1	0
3	C	305	EDO	4	0
3	B	307	EDO	2	0
2	A	301	A1JNH	1	0

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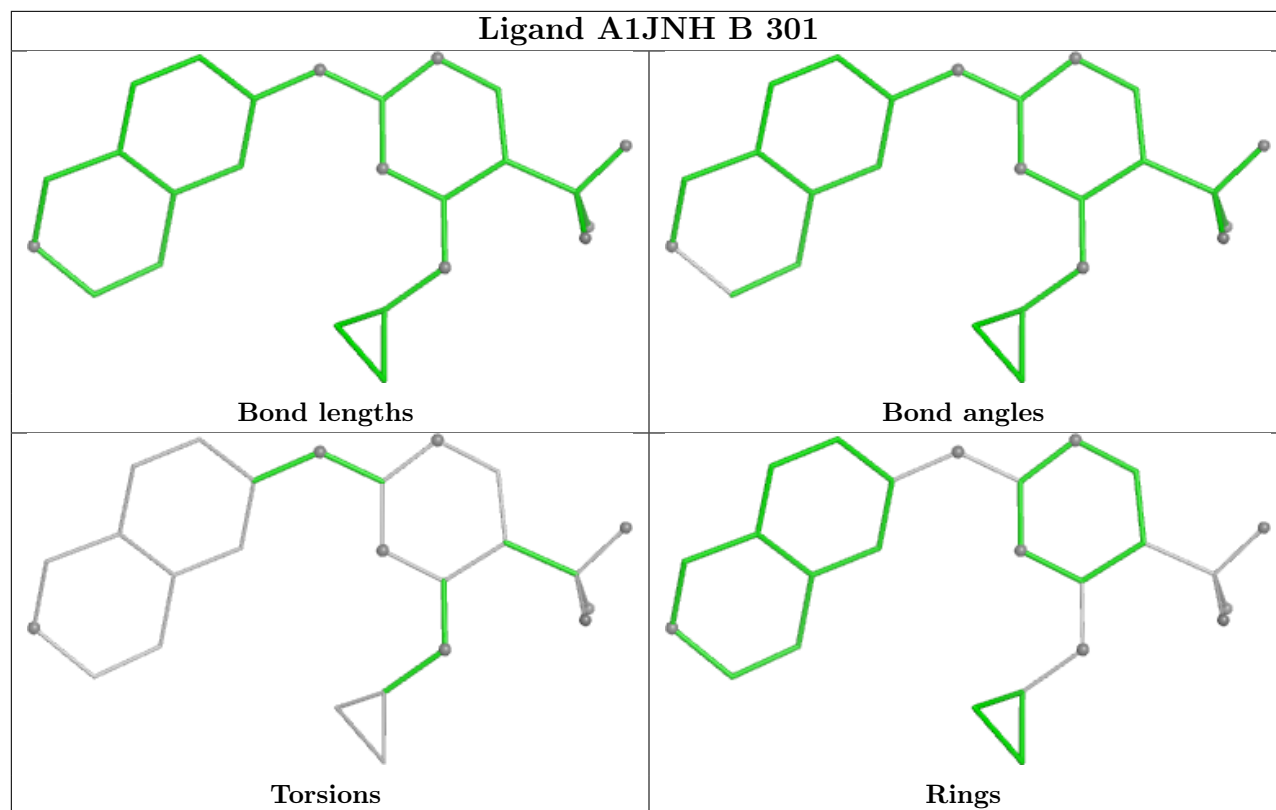
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	B	302	GOL	1	0
4	B	303	GOL	1	0
3	D	302	EDO	2	0

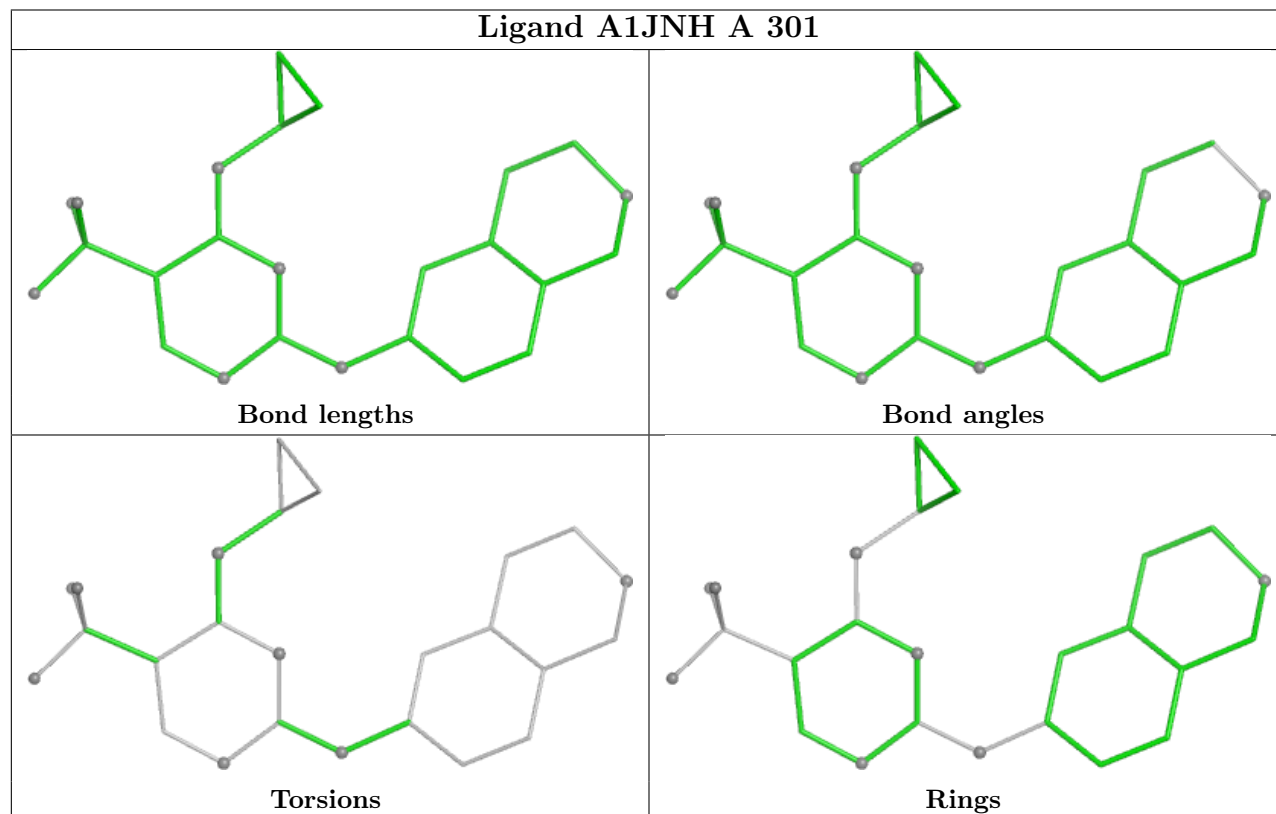
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

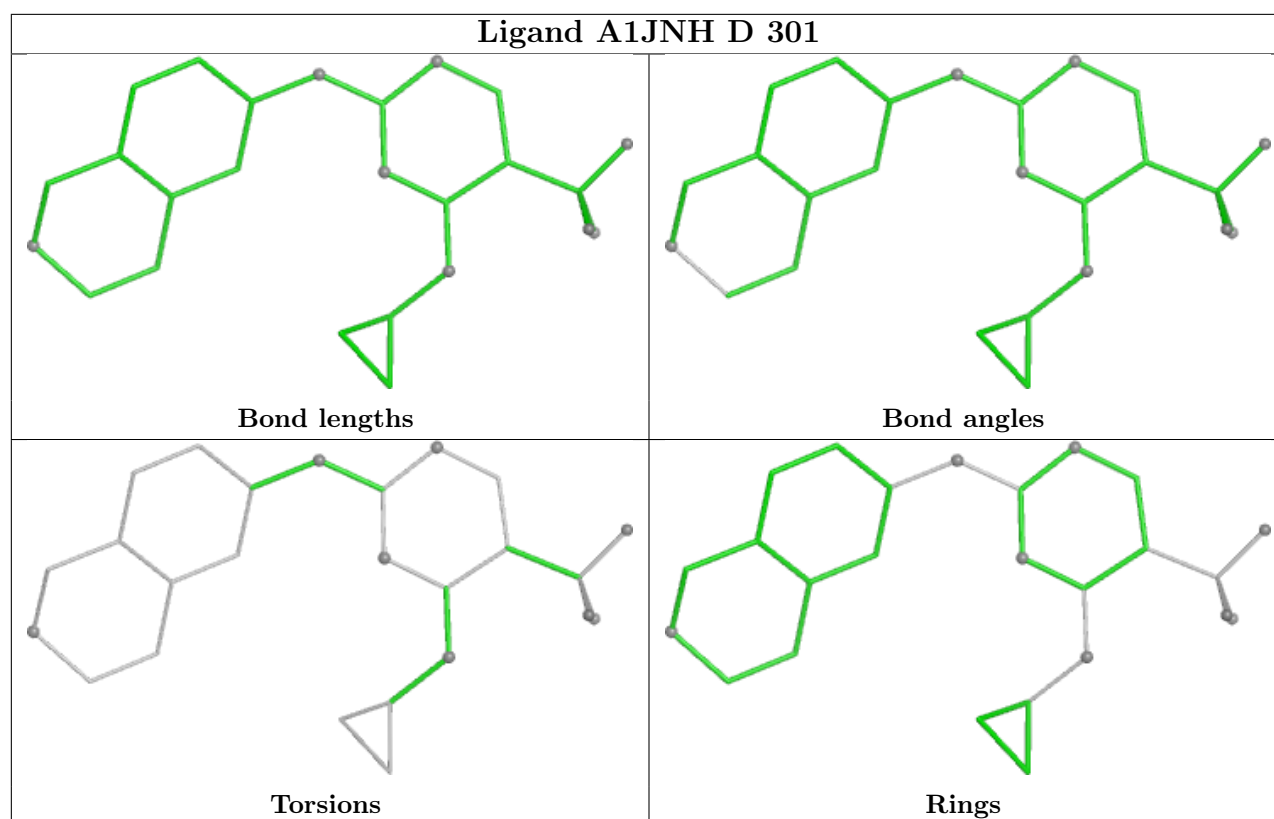


Ligand A1JNH B 301



Ligand A1JNH A 301





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	264/280 (94%)	0.27	15 (5%)	29 38	14, 36, 80, 109	6 (2%)
1	B	268/280 (95%)	0.36	27 (10%)	12 17	20, 39, 88, 132	3 (1%)
1	C	257/280 (91%)	0.67	20 (7%)	19 25	20, 49, 92, 127	2 (0%)
1	D	265/280 (94%)	0.79	37 (13%)	6 9	22, 52, 91, 131	3 (1%)
All	All	1054/1120 (94%)	0.52	99 (9%)	14 19	14, 45, 91, 132	14 (1%)

All (99) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	178	PRO	5.4
1	C	142	ALA	4.6
1	A	233	MET	4.5
1	C	143	ASN	4.3
1	D	51	ILE	3.9
1	D	46	LEU	3.7
1	D	216	ALA	3.7
1	D	77	LEU	3.6
1	D	81	VAL	3.6
1	D	20	PHE	3.5
1	A	17[A]	HIS	3.4
1	A	231	SER	3.4
1	C	52	LEU	3.4
1	D	45	ASN	3.3
1	C	0	SER	3.2
1	D	266	PHE	3.2
1	A	179	MET	3.2
1	D	165	LEU	3.1
1	D	143	ASN	3.0
1	D	262	PHE	2.9
1	D	52	LEU	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	20	PHE	2.9
1	C	49	SER	2.9
1	B	229	ASN	2.8
1	D	17	HIS	2.8
1	D	233	MET	2.8
1	D	21	ALA	2.8
1	C	53	LEU	2.8
1	C	145	ARG	2.7
1	D	53	LEU	2.7
1	B	143	ASN	2.7
1	B	77	LEU	2.7
1	D	219	PRO	2.7
1	C	51	ILE	2.7
1	B	274	GLY	2.7
1	D	142	ALA	2.6
1	B	147	SER	2.6
1	D	41	ILE	2.6
1	B	218	SER	2.6
1	B	257	LYS	2.6
1	D	167	SER	2.6
1	B	233	MET	2.6
1	B	146	LYS	2.6
1	D	149	VAL	2.6
1	D	0	SER	2.5
1	D	177	SER	2.5
1	B	144	ARG	2.5
1	B	20	PHE	2.5
1	A	232	LEU	2.5
1	B	145	ARG	2.5
1	B	216	ALA	2.5
1	D	146	LYS	2.5
1	A	274	GLY	2.4
1	C	224	MET	2.4
1	C	166	HIS	2.4
1	B	232	LEU	2.4
1	C	144	ARG	2.4
1	D	49	SER	2.4
1	A	257	LYS	2.4
1	C	50	GLN	2.3
1	C	232	LEU	2.3
1	D	78	PRO	2.3
1	B	177	SER	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	215	GLN	2.3
1	C	141	TYR	2.3
1	C	225	PHE	2.3
1	B	231	SER	2.3
1	B	220	GLN	2.3
1	D	215	GLN	2.3
1	A	230	ARG	2.2
1	D	235	SER	2.2
1	C	101	GLY	2.2
1	D	48	LYS	2.2
1	C	14	LEU	2.2
1	A	225	PHE	2.2
1	B	17	HIS	2.2
1	B	223	ARG	2.2
1	C	177	SER	2.1
1	C	165	LEU	2.1
1	A	189	GLN	2.1
1	A	0	SER	2.1
1	D	80	SER	2.1
1	D	144	ARG	2.1
1	A	234	PRO	2.1
1	B	219	PRO	2.1
1	C	190	HIS	2.1
1	D	64	GLN	2.1
1	D	43	LYS	2.1
1	D	3	VAL	2.1
1	B	189	GLN	2.1
1	B	142	ALA	2.1
1	B	225	PHE	2.0
1	D	231	SER	2.0
1	B	166	HIS	2.0
1	B	272	GLU	2.0
1	A	146	LYS	2.0
1	D	124	SER	2.0
1	D	234	PRO	2.0
1	B	149	VAL	2.0

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

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

6.3 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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.

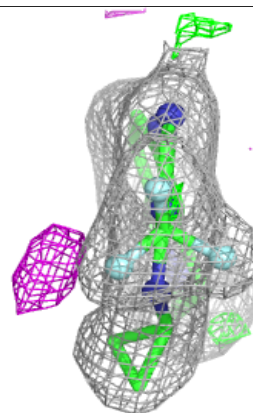
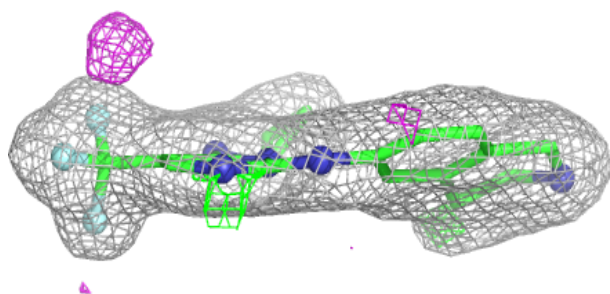
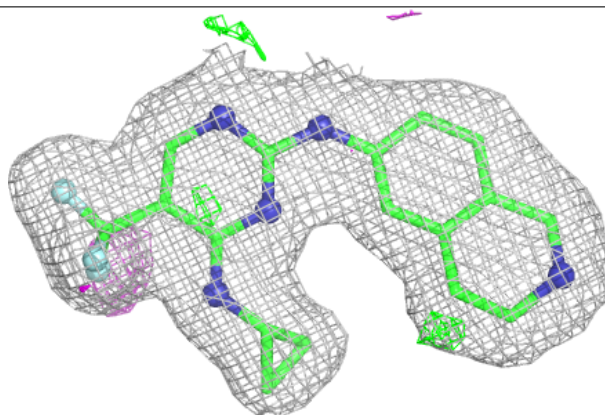
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	EDO	A	305	4/4	0.74	0.15	68,72,76,76	0
3	EDO	C	304	4/4	0.74	0.16	54,59,64,74	0
4	GOL	B	304[A]	6/6	0.74	0.21	47,52,54,54	6
4	GOL	B	304[B]	6/6	0.74	0.21	46,53,55,56	6
3	EDO	A	306	4/4	0.75	0.17	55,55,58,65	0
3	EDO	D	303	4/4	0.76	0.18	59,61,63,65	0
3	EDO	D	304	4/4	0.77	0.17	62,63,68,69	0
3	EDO	B	307	4/4	0.79	0.14	59,60,62,63	0
4	GOL	B	303	6/6	0.80	0.14	53,58,62,64	0
3	EDO	D	302	4/4	0.81	0.15	58,61,69,73	0
4	GOL	C	303	6/6	0.81	0.11	50,54,57,62	0
3	EDO	A	303	4/4	0.83	0.16	44,49,54,56	0
4	GOL	B	302	6/6	0.83	0.11	44,48,51,55	0
3	EDO	B	310	4/4	0.84	0.14	49,53,54,58	0
3	EDO	B	308	4/4	0.84	0.14	61,63,64,65	0
3	EDO	B	309	4/4	0.86	0.13	59,61,63,67	0
3	EDO	B	306	4/4	0.87	0.13	40,40,45,47	0
3	EDO	A	307	4/4	0.87	0.19	35,38,46,56	0
3	EDO	B	305	4/4	0.90	0.19	58,63,64,64	0
3	EDO	A	302	4/4	0.90	0.14	41,41,43,44	0
3	EDO	B	312	4/4	0.90	0.14	60,61,61,68	0
3	EDO	A	304	4/4	0.91	0.12	42,48,50,57	0
3	EDO	C	305	4/4	0.92	0.14	48,53,54,54	0
2	A1JNH	B	301	25/25	0.94	0.08	23,30,36,41	0
3	EDO	B	311	4/4	0.95	0.13	38,42,46,48	0
2	A1JNH	A	301	25/25	0.95	0.07	20,28,33,36	0
2	A1JNH	C	301	25/25	0.95	0.08	33,39,46,49	0
2	A1JNH	D	301	25/25	0.96	0.06	33,38,42,44	0
5	MG	C	302	1/1	0.97	0.04	32,32,32,32	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.

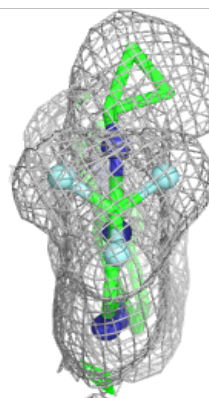
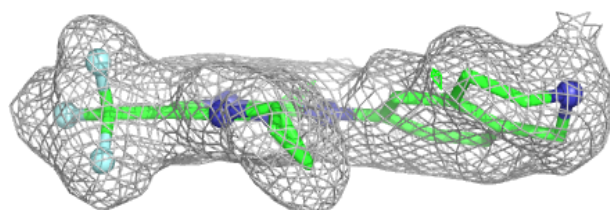
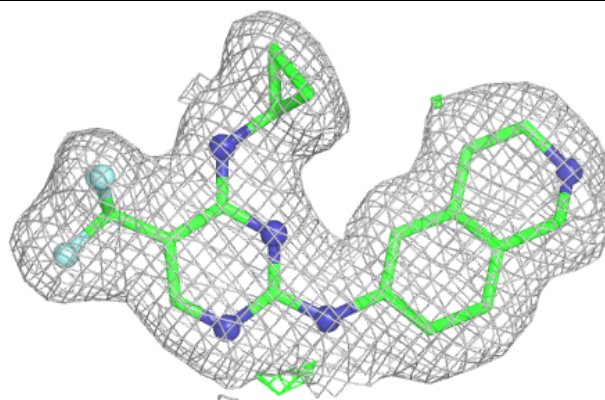
Electron density around A1JNH B 301:

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



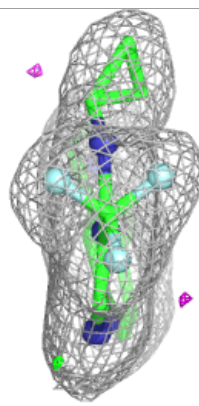
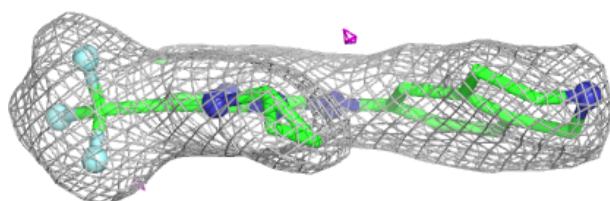
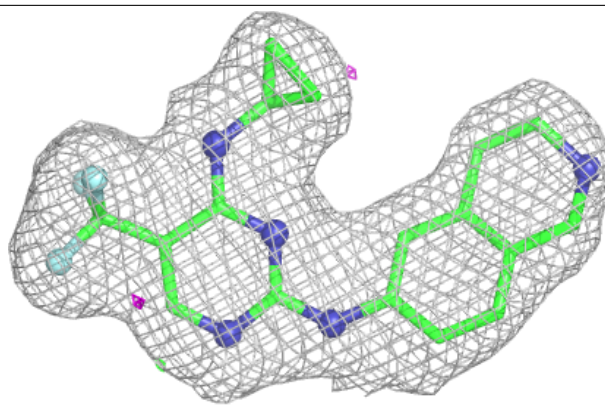
Electron density around A1JNH A 301:

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

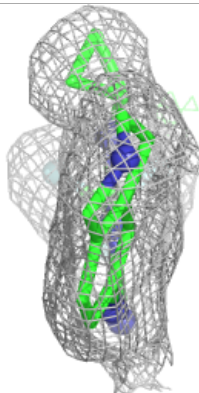
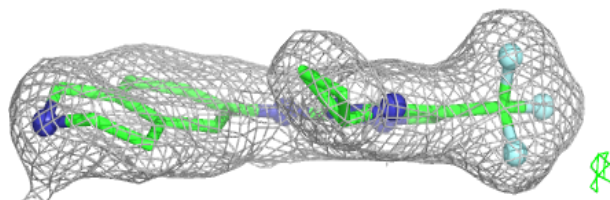
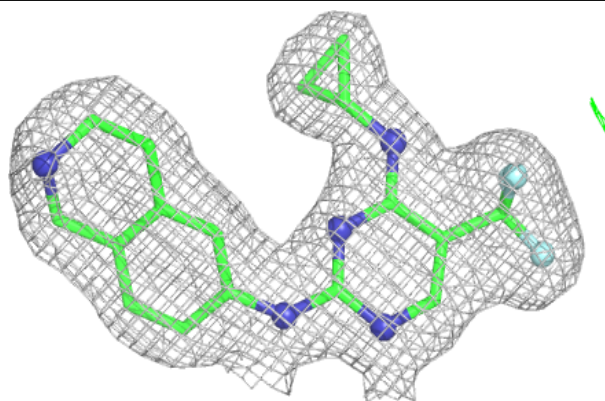


Electron density around A1JNH C 301:

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

**Electron density around A1JNH D 301:**

$2mF_o-DF_c$ (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.