



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:55 PM UTC

PDB ID : 4HYP / pdb_00004hyp
Title : Pyrrolopyrimidine inhibitors of dna gyrase b and topoisomerase iv, part i: structure guided discovery and optimization of dual targeting agents with potent, broad-spectrum enzymatic activity.
Authors : Bensen, D.C.; Creighton, C.J.; Tari, L.W.
Deposited on : 2012-11-13
Resolution : 2.60 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)
Xtrriage (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

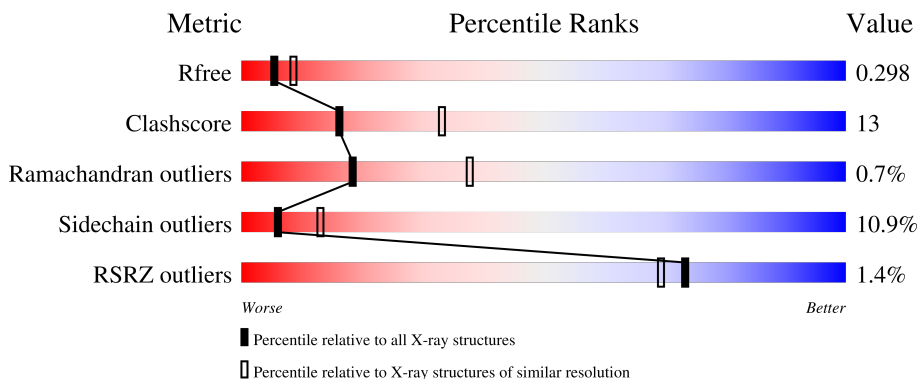
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4008 (2.60-2.60)
Clashscore	190562	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)
RSRZ outliers	180081	4008 (2.60-2.60)

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	215	 2% 57% 31% • 10%
1	B	215	 64% 23% • 10%
1	C	215	 61% 26% •• 10%
1	D	215	 62% 23% 5% • 10%

2 Entry composition i

There are 4 unique types of molecules in this entry. The entry contains 6475 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 DNA gyrase subunit B.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	194	1498	941	268	284	5	0	0	0
1	B	194	1498	941	268	284	5	0	0	0
1	C	194	1498	941	268	284	5	0	0	0
1	D	194	1498	941	268	284	5	0	0	0

There are 36 discrepancies between the modelled and reference sequences:

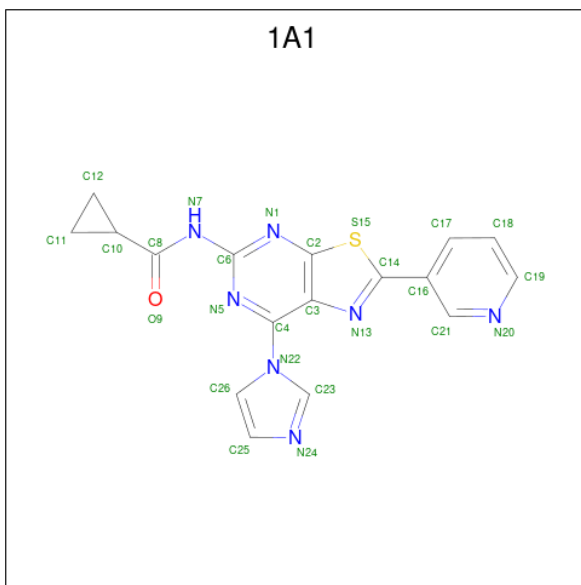
Chain	Residue	Modelled	Actual	Comment	Reference
A	14	MET	-	expression tag	UNP P0AES6
A	225	LEU	-	expression tag	UNP P0AES6
A	226	GLU	-	expression tag	UNP P0AES6
A	227	HIS	-	expression tag	UNP P0AES6
A	228	HIS	-	expression tag	UNP P0AES6
A	229	HIS	-	expression tag	UNP P0AES6
A	230	HIS	-	expression tag	UNP P0AES6
A	231	HIS	-	expression tag	UNP P0AES6
A	232	HIS	-	expression tag	UNP P0AES6
B	14	MET	-	expression tag	UNP P0AES6
B	225	LEU	-	expression tag	UNP P0AES6
B	226	GLU	-	expression tag	UNP P0AES6
B	227	HIS	-	expression tag	UNP P0AES6
B	228	HIS	-	expression tag	UNP P0AES6
B	229	HIS	-	expression tag	UNP P0AES6
B	230	HIS	-	expression tag	UNP P0AES6
B	231	HIS	-	expression tag	UNP P0AES6
B	232	HIS	-	expression tag	UNP P0AES6
C	14	MET	-	expression tag	UNP P0AES6
C	225	LEU	-	expression tag	UNP P0AES6
C	226	GLU	-	expression tag	UNP P0AES6

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Chain	Residue	Modelled	Actual	Comment	Reference
C	227	HIS	-	expression tag	UNP P0AES6
C	228	HIS	-	expression tag	UNP P0AES6
C	229	HIS	-	expression tag	UNP P0AES6
C	230	HIS	-	expression tag	UNP P0AES6
C	231	HIS	-	expression tag	UNP P0AES6
C	232	HIS	-	expression tag	UNP P0AES6
D	14	MET	-	expression tag	UNP P0AES6
D	225	LEU	-	expression tag	UNP P0AES6
D	226	GLU	-	expression tag	UNP P0AES6
D	227	HIS	-	expression tag	UNP P0AES6
D	228	HIS	-	expression tag	UNP P0AES6
D	229	HIS	-	expression tag	UNP P0AES6
D	230	HIS	-	expression tag	UNP P0AES6
D	231	HIS	-	expression tag	UNP P0AES6
D	232	HIS	-	expression tag	UNP P0AES6

- Molecule 2 is N-[7-(1H-imidazol-1-yl)-2-(pyridin-3-yl)[1,3]thiazolo[5,4-d]pyrimidin-5-yl]cyclopropanecarboxamide (CCD ID: 1A1) (formula: C₁₇H₁₃N₇OS).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
2	A	1	Total	C	N	O	S	0	0
			26	17	7	1	1		
2	B	1	Total	C	N	O	S	0	0
			26	17	7	1	1		
2	C	1	Total	C	N	O	S	0	0
			26	17	7	1	1		

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Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	D	1	Total	C	N	O	S	0	0
			26	17	7	1	1		

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		
3	C	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		

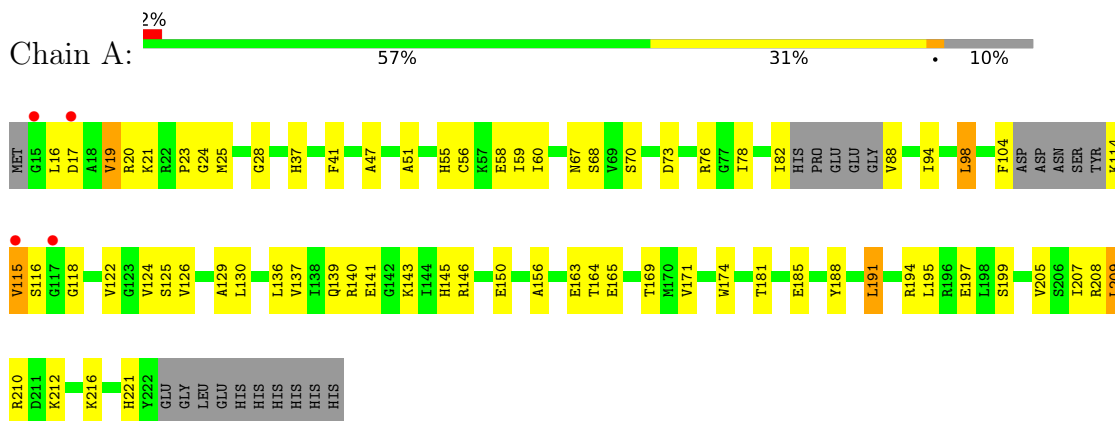
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	90	Total	O	0	0
			90	90		
4	B	96	Total	O	0	0
			96	96		
4	C	101	Total	O	0	0
			101	101		
4	D	88	Total	O	0	0
			88	88		

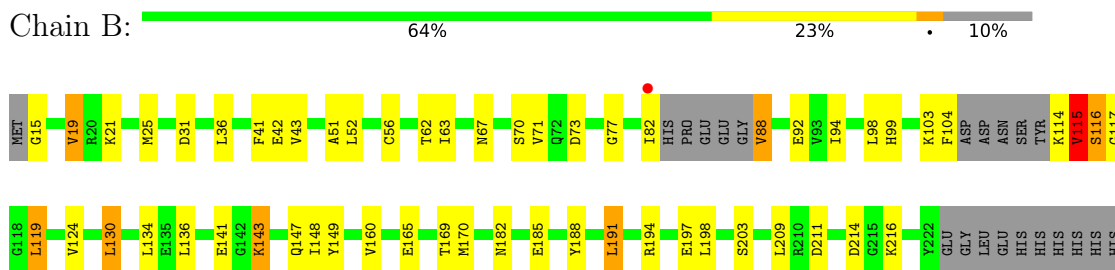
3 Residue-property plots [i](#)

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.

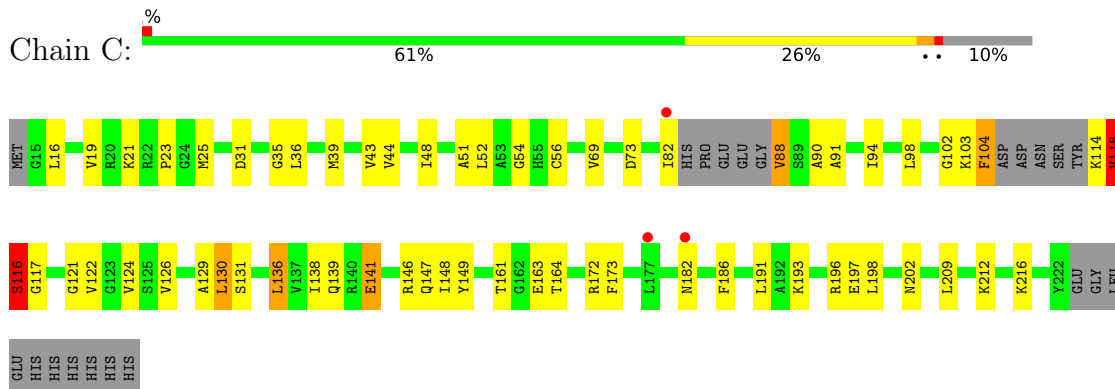
- Molecule 1: DNA gyrase subunit B



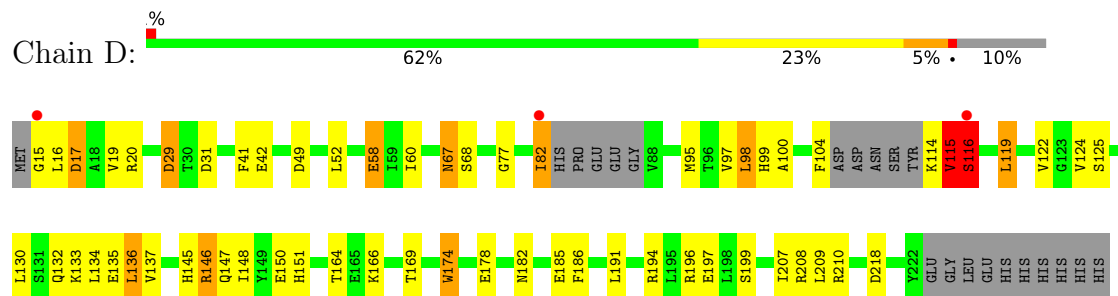
- Molecule 1: DNA gyrase subunit B



- Molecule 1: DNA gyrase subunit B



- Molecule 1: DNA gyrase subunit B



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	48.41Å 101.31Å 82.28Å 90.00° 101.60° 90.00°	Depositor
Resolution (Å)	42.89 – 2.60 42.89 – 2.60	Depositor EDS
% Data completeness (in resolution range)	96.3 (42.89-2.60) 96.3 (42.89-2.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.87 (at 2.61Å)	Xtrriage
Refinement program	REFMAC 5.6.0117	Depositor
R, R_{free}	0.195 , 0.294 0.200 , 0.298	Depositor DCC
R_{free} test set	1230 reflections (5.12%)	wwPDB-VP
Wilson B-factor (Å ²)	15.1	Xtrriage
Anisotropy	0.115	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 43.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	6475	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 71.34 % 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 2.6731e-06. 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: 1A1, MG

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	0.93	2/1523 (0.1%)	1.09	4/2054 (0.2%)
1	B	0.98	4/1523 (0.3%)	1.08	3/2054 (0.1%)
1	C	0.97	2/1523 (0.1%)	1.07	2/2054 (0.1%)
1	D	0.96	1/1523 (0.1%)	1.08	2/2054 (0.1%)
All	All	0.96	9/6092 (0.1%)	1.08	11/8216 (0.1%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	D	0	1

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	116	SER	CA-C	5.88	1.60	1.52
1	C	115	VAL	CA-C	5.57	1.59	1.52
1	B	116	SER	N-CA	5.55	1.53	1.46
1	A	116	SER	N-CA	5.47	1.52	1.46
1	D	116	SER	N-CA	5.38	1.53	1.46
1	B	115	VAL	CA-C	5.35	1.59	1.52
1	A	221	HIS	CG-CD2	5.31	1.41	1.35
1	B	99	HIS	CG-CD2	5.15	1.41	1.35
1	C	116	SER	N-CA	5.11	1.52	1.46

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	116	SER	N-CA-C	12.49	125.49	107.88
1	B	43	VAL	N-CA-C	-10.02	103.70	111.62
1	C	43	VAL	N-CA-C	-7.40	105.78	111.62
1	D	67	ASN	N-CA-C	7.18	121.38	111.90
1	C	115	VAL	N-CA-C	6.85	123.59	109.34
1	B	115	VAL	N-CA-C	6.37	122.59	109.34
1	A	115	VAL	N-CA-C	5.84	121.49	109.34
1	B	67	ASN	N-CA-C	5.82	119.59	111.74
1	A	181	THR	N-CA-C	5.50	119.38	111.02
1	A	156	ALA	N-CA-C	-5.42	103.24	108.07
1	D	115	VAL	N-CA-C	5.34	120.45	109.34

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	D	116	SER	Peptide

5.2 Too-close contacts [i](#)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1498	0	1487	40	0
1	B	1498	0	1487	36	0
1	C	1498	0	1487	45	0
1	D	1498	0	1487	46	0
2	A	26	0	13	2	0
2	B	26	0	13	2	0
2	C	26	0	13	2	0
2	D	26	0	13	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
4	A	90	0	0	4	0
4	B	96	0	0	1	0
4	C	101	0	0	9	0
4	D	88	0	0	9	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	6475	0	6000	158	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 13.

All (158) 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:C:52:LEU:HD13	1:C:115:VAL:HG21	1.46	0.98
1:D:31:ASP:HB2	4:D:450:HOH:O	1.67	0.93
1:C:115:VAL:O	1:C:116:SER:HB3	1.68	0.91
1:D:99:HIS:HD2	4:D:480:HOH:O	1.55	0.87
1:A:137:VAL:HG22	1:A:146:ARG:HG3	1.54	0.87
1:D:52:LEU:HD13	1:D:115:VAL:HG21	1.55	0.86
1:D:137:VAL:HG22	1:D:146:ARG:HG2	1.56	0.85
1:A:115:VAL:HG13	4:A:488:HOH:O	1.79	0.82
1:B:52:LEU:HD13	1:B:115:VAL:HG21	1.62	0.80
1:C:196:ARG:HD2	4:C:435:HOH:O	1.82	0.80
1:D:199:SER:HB3	1:D:207:ILE:HD12	1.67	0.76
1:A:24:GLY:HA2	1:A:28:GLY:O	1.85	0.75
1:A:94:ILE:HD11	1:A:104:PHE:CE1	2.28	0.69
1:A:78:ILE:HD12	1:A:169:THR:HG21	1.75	0.69
1:D:99:HIS:CD2	4:D:480:HOH:O	2.36	0.68
1:B:114:LYS:O	1:B:114:LYS:HG3	1.93	0.68
1:C:94:ILE:HD11	1:C:104:PHE:CE1	2.29	0.68
1:A:122:VAL:HG13	1:A:126:VAL:HG21	1.76	0.67
1:C:31:ASP:O	1:C:182:ASN:HB2	1.95	0.66
1:D:60:ILE:HG21	1:D:210:ARG:NH2	2.11	0.66
1:B:143:LYS:HB3	1:B:160:VAL:HG13	1.78	0.65
1:C:52:LEU:HD13	1:C:115:VAL:CG2	2.26	0.64
1:A:67:ASN:OD1	1:A:185:GLU:HG2	1.97	0.64
1:C:102:GLY:N	1:D:114:LYS:HD3	2.13	0.64
1:D:122:VAL:HA	4:D:485:HOH:O	1.98	0.63
1:C:25:MET:HE2	1:D:197:GLU:HG2	1.82	0.62
1:C:116:SER:HB3	4:C:465:HOH:O	2.00	0.61
1:D:95:MET:HE3	1:D:136:LEU:HG	1.81	0.61
1:B:36:LEU:O	1:B:36:LEU:HG	2.01	0.61
1:C:115:VAL:O	1:C:116:SER:CB	2.48	0.60
1:A:58:GLU:OE2	1:A:208:ARG:NE	2.26	0.60
1:C:114:LYS:O	1:C:114:LYS:HG3	2.02	0.58
1:A:146:ARG:CD	4:A:401:HOH:O	2.53	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:15:GLY:N	4:B:443:HOH:O	2.38	0.56
1:B:51:ALA:HA	1:B:56:CYS:HB3	1.87	0.56
1:C:193:LYS:O	1:C:197:GLU:HG3	2.05	0.56
1:D:67:ASN:ND2	1:D:185:GLU:HA	2.21	0.56
1:B:52:LEU:CD1	1:B:115:VAL:HG21	2.33	0.55
1:A:73:ASP:OD1	2:A:301:1A1:H1	2.06	0.54
1:B:63:ILE:HD11	1:B:191:LEU:HD22	1.89	0.54
1:D:210:ARG:NH1	4:D:419:HOH:O	2.22	0.54
1:C:117:GLY:N	4:C:492:HOH:O	1.93	0.54
1:D:31:ASP:O	1:D:182:ASN:HB3	2.08	0.54
1:A:195:LEU:HD22	1:A:207:ILE:HG21	1.90	0.54
1:C:54:GLY:HA2	4:C:495:HOH:O	2.07	0.54
1:D:77:GLY:HA2	1:D:169:THR:OG1	2.08	0.53
1:B:147:GLN:NE2	1:B:149:TYR:OH	2.41	0.53
1:A:25:MET:HG3	1:B:197:GLU:HB3	1.89	0.53
1:B:82:ILE:HG23	1:B:88:VAL:O	2.08	0.53
1:C:104:PHE:N	1:C:104:PHE:CD1	2.76	0.53
1:A:16:LEU:HD13	1:A:129:ALA:HB2	1.89	0.53
1:C:23:PRO:HB3	1:C:130:LEU:HD11	1.91	0.53
1:A:188:TYR:CE2	1:A:209:LEU:HD13	2.44	0.52
1:D:41:PHE:CZ	1:D:194:ARG:HB3	2.45	0.52
1:B:19:VAL:HG22	1:B:130:LEU:HD13	1.91	0.52
1:C:16:LEU:HB3	1:C:129:ALA:HB2	1.92	0.51
1:C:51:ALA:HA	1:C:56:CYS:HB3	1.91	0.51
2:C:301:1A1:H7	2:C:301:1A1:N13	2.26	0.51
1:B:77:GLY:HA2	1:B:169:THR:OG1	2.10	0.51
1:C:146:ARG:HD3	4:C:446:HOH:O	2.11	0.51
1:C:147:GLN:NE2	1:C:149:TYR:OH	2.44	0.51
1:A:47:ALA:HB1	1:A:59:ILE:HG12	1.93	0.51
1:D:60:ILE:HG21	1:D:210:ARG:HH21	1.76	0.50
1:B:117:GLY:HA3	1:B:198:LEU:HD21	1.92	0.50
1:C:52:LEU:HD21	1:C:202:ASN:HB3	1.94	0.50
1:C:82:ILE:HG23	1:C:88:VAL:O	2.11	0.50
1:A:19:VAL:HG21	1:A:126:VAL:HG13	1.94	0.50
1:A:197:GLU:HG2	1:B:25:MET:HE2	1.93	0.50
1:A:188:TYR:CZ	1:A:216:LYS:HG2	2.47	0.49
1:A:114:LYS:N	4:A:467:HOH:O	2.46	0.49
1:B:185:GLU:HG3	1:C:141:GLU:HG3	1.94	0.49
1:C:136:LEU:HD22	1:C:138:ILE:HG13	1.94	0.49
1:C:16:LEU:HB3	1:C:129:ALA:CB	2.43	0.49
1:C:114:LYS:C	1:C:115:VAL:HG13	2.37	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:97:VAL:HB	1:D:100:ALA:HB2	1.95	0.49
1:D:137:VAL:HA	1:D:145:HIS:O	2.12	0.49
1:C:131:SER:OG	1:C:173:PHE:HB2	2.13	0.48
1:A:55:HIS:CD2	1:A:76:ARG:NE	2.81	0.48
1:D:115:VAL:O	1:D:116:SER:OG	2.32	0.47
1:D:166:LYS:NZ	4:D:457:HOH:O	2.47	0.47
1:D:67:ASN:HD21	1:D:185:GLU:HA	1.79	0.47
1:B:73:ASP:OD2	1:B:73:ASP:C	2.58	0.47
1:A:188:TYR:CZ	1:A:209:LEU:HD13	2.49	0.47
1:A:104:PHE:HD2	2:A:301:1A1:H13	1.79	0.47
1:D:16:LEU:HD21	1:D:125:SER:HB2	1.96	0.47
1:D:49:ASP:HA	1:D:52:LEU:HD12	1.97	0.47
1:C:69:VAL:O	1:C:172:ARG:HA	2.16	0.46
1:B:42:GLU:OE2	1:B:119:LEU:HB2	2.14	0.46
1:B:19:VAL:HG22	1:B:130:LEU:CD1	2.47	0.45
1:B:88:VAL:HG13	1:B:92:GLU:HB3	1.98	0.45
1:D:67:ASN:HD21	1:D:186:PHE:H	1.64	0.45
1:A:137:VAL:HA	1:A:145:HIS:O	2.16	0.45
1:A:146:ARG:HD3	4:A:401:HOH:O	2.17	0.45
1:D:29:ASP:OD1	1:D:31:ASP:OD2	2.35	0.45
1:A:60:ILE:HG21	1:A:210:ARG:NH2	2.32	0.45
1:D:52:LEU:HD13	1:D:115:VAL:CG2	2.38	0.44
1:C:25:MET:HG3	1:D:197:GLU:HB3	2.00	0.44
1:C:35:GLY:O	1:C:39:MET:HG2	2.17	0.44
1:C:122:VAL:HG13	1:C:126:VAL:HG21	1.97	0.44
1:A:197:GLU:HG2	1:B:25:MET:CE	2.47	0.44
1:C:121:GLY:HA2	1:D:114:LYS:HE2	2.00	0.44
1:D:196:ARG:HD2	4:D:464:HOH:O	2.17	0.44
1:B:41:PHE:CZ	1:B:194:ARG:HB3	2.53	0.44
1:B:94:ILE:HD11	1:B:104:PHE:CE1	2.53	0.44
1:A:51:ALA:N	1:A:56:CYS:HB3	2.33	0.43
1:B:134:LEU:HB3	1:B:149:TYR:HB2	2.00	0.43
1:D:98:LEU:HA	1:D:98:LEU:HD12	1.69	0.43
1:B:63:ILE:HD11	1:B:191:LEU:CD2	2.49	0.43
1:A:37:HIS:HD2	1:A:191:LEU:HD13	1.84	0.43
1:A:197:GLU:HB3	1:B:25:MET:HG3	2.01	0.43
1:C:36:LEU:O	1:C:186:PHE:HE1	2.02	0.43
1:D:134:LEU:HD23	1:D:135:GLU:N	2.34	0.43
1:A:25:MET:HE3	1:A:25:MET:HB2	1.86	0.43
1:B:31:ASP:O	1:B:182:ASN:HB2	2.19	0.42
1:C:51:ALA:CA	1:C:56:CYS:HB3	2.49	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:51:ALA:HB1	1:A:205:VAL:HG22	2.01	0.42
1:C:146:ARG:HD2	1:C:161:THR:HG21	2.01	0.42
1:D:132:GLN:NE2	4:D:487:HOH:O	2.42	0.42
1:A:41:PHE:CZ	1:A:194:ARG:HB3	2.55	0.42
1:A:68:SER:HB3	1:A:174:TRP:CD1	2.53	0.42
1:C:90:ALA:O	1:C:91:ALA:C	2.61	0.42
1:D:68:SER:HB3	1:D:174:TRP:CD1	2.54	0.42
1:B:71:VAL:O	1:B:170:MET:HA	2.19	0.42
1:C:103:LYS:HG3	4:C:485:HOH:O	2.19	0.42
1:C:216:LYS:HE3	4:C:442:HOH:O	2.18	0.42
1:A:118:GLY:O	1:B:119:LEU:HD12	2.20	0.42
1:B:104:PHE:CD1	1:B:104:PHE:N	2.88	0.42
1:C:117:GLY:HA3	1:C:198:LEU:HD21	2.02	0.42
1:C:73:ASP:OD2	1:C:73:ASP:C	2.63	0.42
1:D:82:ILE:HD13	1:D:82:ILE:N	2.35	0.42
1:A:98:LEU:HD12	1:A:98:LEU:HA	1.94	0.42
1:D:58:GLU:OE2	1:D:208:ARG:NE	2.34	0.41
1:A:70:SER:HA	1:A:171:VAL:O	2.20	0.41
2:C:301:1A1:N13	2:C:301:1A1:C26	2.82	0.41
2:B:301:1A1:H7	2:B:301:1A1:N13	2.35	0.41
1:A:197:GLU:HA	1:B:25:MET:HE2	2.02	0.41
1:A:73:ASP:OD2	1:A:73:ASP:C	2.63	0.41
1:C:139:GLN:HB3	1:C:164:THR:HG21	2.03	0.41
1:D:137:VAL:HG22	1:D:146:ARG:CG	2.41	0.41
1:B:119:LEU:HD13	1:B:119:LEU:HA	1.93	0.41
1:B:188:TYR:CD2	1:B:211:ASP:HB2	2.55	0.41
1:D:42:GLU:OE2	1:D:119:LEU:HB2	2.20	0.41
1:A:139:GLN:HG2	1:A:164:THR:HG21	2.03	0.41
1:C:88:VAL:N	4:C:402:HOH:O	2.54	0.41
1:C:102:GLY:CA	1:D:114:LYS:HD3	2.51	0.41
1:A:20:ARG:O	1:A:23:PRO:HD3	2.22	0.40
1:D:133:LYS:HE2	1:D:174:TRP:CH2	2.57	0.40
1:B:62:THR:HB	1:B:70:SER:OG	2.21	0.40
1:B:104:PHE:HD2	2:B:301:1A1:H13	1.85	0.40
1:B:214:ASP:OD2	1:B:216:LYS:HE3	2.21	0.40
1:D:17:ASP:CG	1:D:20:ARG:HH12	2.29	0.40
1:C:114:LYS:O	1:C:115:VAL:HG13	2.21	0.40
1:C:212:LYS:HD3	4:C:500:HOH:O	2.21	0.40
1:D:104:PHE:HB3	2:D:301:1A1:H13	2.03	0.40
1:D:132:GLN:HA	1:D:151:HIS:CE1	2.57	0.40
1:D:147:GLN:C	1:D:148:ILE:HD12	2.46	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:169:THR:HG22	2:D:301:1A1:H2	2.03	0.40
1:D:15:GLY:HA2	4:D:426:HOH:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	188/215 (87%)	175 (93%)	13 (7%)	0	100	100
1	B	188/215 (87%)	181 (96%)	5 (3%)	2 (1%)	11	25
1	C	188/215 (87%)	180 (96%)	6 (3%)	2 (1%)	11	25
1	D	188/215 (87%)	178 (95%)	9 (5%)	1 (0%)	24	46
All	All	752/860 (87%)	714 (95%)	33 (4%)	5 (1%)	18	38

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	116	SER
1	B	115	VAL
1	C	115	VAL
1	D	115	VAL
1	B	116	SER

5.3.2 Protein sidechains [i](#)

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	161/180 (89%)	141 (88%)	20 (12%)	4	9
1	B	161/180 (89%)	145 (90%)	16 (10%)	7	16
1	C	161/180 (89%)	146 (91%)	15 (9%)	8	18
1	D	161/180 (89%)	142 (88%)	19 (12%)	5	10
All	All	644/720 (89%)	574 (89%)	70 (11%)	6	13

All (70) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	17	ASP
1	A	19	VAL
1	A	21	LYS
1	A	82	ILE
1	A	88	VAL
1	A	98	LEU
1	A	124	VAL
1	A	125	SER
1	A	130	LEU
1	A	136	LEU
1	A	140	ARG
1	A	141	GLU
1	A	143	LYS
1	A	150	GLU
1	A	163	GLU
1	A	165	GLU
1	A	191	LEU
1	A	199	SER
1	A	209	LEU
1	A	212	LYS
1	B	19	VAL
1	B	21	LYS
1	B	88	VAL
1	B	98	LEU
1	B	103	LYS
1	B	119	LEU
1	B	124	VAL
1	B	130	LEU
1	B	136	LEU
1	B	141	GLU
1	B	143	LYS

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Mol	Chain	Res	Type
1	B	148	ILE
1	B	165	GLU
1	B	191	LEU
1	B	203	SER
1	B	209	LEU
1	C	19	VAL
1	C	21	LYS
1	C	44	VAL
1	C	48	ILE
1	C	88	VAL
1	C	98	LEU
1	C	104	PHE
1	C	124	VAL
1	C	130	LEU
1	C	136	LEU
1	C	141	GLU
1	C	148	ILE
1	C	163	GLU
1	C	191	LEU
1	C	209	LEU
1	D	17	ASP
1	D	19	VAL
1	D	29	ASP
1	D	58	GLU
1	D	82	ILE
1	D	98	LEU
1	D	115	VAL
1	D	119	LEU
1	D	124	VAL
1	D	130	LEU
1	D	136	LEU
1	D	146	ARG
1	D	150	GLU
1	D	164	THR
1	D	174	TRP
1	D	178	GLU
1	D	191	LEU
1	D	209	LEU
1	D	218	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (15) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	132	GLN
1	A	147	GLN
1	A	221	HIS
1	B	55	HIS
1	B	147	GLN
1	B	155	GLN
1	B	182	ASN
1	C	145	HIS
1	C	147	GLN
1	D	55	HIS
1	D	67	ASN
1	D	72	GLN
1	D	99	HIS
1	D	147	GLN
1	D	202	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 8 ligands modelled in this entry, 4 are monoatomic - leaving 4 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	1A1	C	301	-	30,30,30	2.05	5 (16%)	39,43,43	3.09	22 (56%)
2	1A1	D	301	-	30,30,30	2.04	7 (23%)	39,43,43	3.43	18 (46%)
2	1A1	B	301	-	30,30,30	2.17	8 (26%)	39,43,43	3.09	18 (46%)
2	1A1	A	301	-	30,30,30	1.92	6 (20%)	39,43,43	3.49	18 (46%)

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	1A1	C	301	-	-	1/16/18/18	0/5/5/5
2	1A1	D	301	-	-	4/16/18/18	0/5/5/5
2	1A1	B	301	-	-	2/16/18/18	0/5/5/5
2	1A1	A	301	-	-	0/16/18/18	0/5/5/5

All (26) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	1A1	C3-C2	7.04	1.48	1.41
2	D	301	1A1	C3-C2	6.85	1.48	1.41
2	C	301	1A1	C3-C2	6.11	1.47	1.41
2	A	301	1A1	C3-C2	5.95	1.47	1.41
2	C	301	1A1	C4-N22	-5.92	1.33	1.42
2	B	301	1A1	C4-N22	-5.25	1.34	1.42
2	D	301	1A1	C4-N22	-5.14	1.34	1.42
2	A	301	1A1	C4-N22	-4.89	1.34	1.42
2	B	301	1A1	C2-S15	-4.08	1.67	1.74
2	D	301	1A1	C2-S15	-3.64	1.68	1.74
2	A	301	1A1	C2-S15	-3.60	1.68	1.74
2	C	301	1A1	C2-S15	-3.40	1.68	1.74
2	C	301	1A1	C26-N22	-3.25	1.31	1.38
2	B	301	1A1	C2-N1	3.06	1.37	1.33
2	A	301	1A1	C3-C4	2.82	1.48	1.41
2	B	301	1A1	C26-N22	-2.68	1.33	1.38
2	D	301	1A1	C3-C4	2.68	1.48	1.41
2	A	301	1A1	C26-N22	-2.49	1.33	1.38
2	C	301	1A1	C2-N1	2.46	1.36	1.33
2	B	301	1A1	C3-N13	-2.40	1.35	1.39
2	D	301	1A1	C6-N7	-2.34	1.35	1.38
2	D	301	1A1	C26-N22	-2.12	1.34	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	1A1	C3-C4	2.11	1.46	1.41
2	D	301	1A1	C26-C25	2.09	1.40	1.35
2	B	301	1A1	C4-N5	2.07	1.36	1.34
2	A	301	1A1	C6-N7	-2.03	1.36	1.38

All (76) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	1A1	C3-C2-S15	13.67	114.39	109.80
2	D	301	1A1	C3-C2-S15	12.69	114.06	109.80
2	B	301	1A1	C11-C10-C8	-9.00	108.44	117.24
2	D	301	1A1	C3-C2-N1	-8.80	119.76	126.17
2	A	301	1A1	C3-C2-N1	-8.44	120.02	126.17
2	C	301	1A1	C3-C2-N1	-7.80	120.49	126.17
2	C	301	1A1	C11-C10-C8	-7.61	109.80	117.24
2	D	301	1A1	C12-C10-C8	-7.04	110.36	117.24
2	B	301	1A1	C3-C2-N1	-6.75	121.25	126.17
2	A	301	1A1	C2-C3-N13	-6.57	108.14	114.88
2	C	301	1A1	N5-C4-N22	6.08	123.30	115.29
2	B	301	1A1	N5-C4-N22	5.74	122.86	115.29
2	D	301	1A1	C2-C3-N13	-5.50	109.24	114.88
2	C	301	1A1	C26-N22-C23	5.45	114.48	106.40
2	B	301	1A1	C26-N22-C23	5.26	114.19	106.40
2	D	301	1A1	C26-N22-C23	5.23	114.16	106.40
2	A	301	1A1	C26-N22-C23	5.19	114.10	106.40
2	C	301	1A1	S15-C2-N1	4.69	128.75	121.69
2	B	301	1A1	S15-C2-N1	4.68	128.74	121.69
2	B	301	1A1	C12-C10-C8	-4.65	112.69	117.24
2	C	301	1A1	N5-C6-N1	-4.46	118.95	126.26
2	A	301	1A1	C11-C10-C8	-4.34	113.00	117.24
2	A	301	1A1	C4-N22-C23	-4.22	121.31	127.38
2	D	301	1A1	C4-N22-C23	-3.94	121.70	127.38
2	C	301	1A1	C12-C10-C8	-3.91	113.41	117.24
2	A	301	1A1	C3-N13-C14	3.82	115.13	110.69
2	B	301	1A1	N5-C6-N1	-3.67	120.24	126.26
2	B	301	1A1	C19-N20-C21	3.66	123.26	116.85
2	B	301	1A1	C2-S15-C14	3.59	91.79	88.86
2	D	301	1A1	C11-C10-C8	-3.47	113.84	117.24
2	C	301	1A1	C2-S15-C14	3.47	91.69	88.86
2	C	301	1A1	C2-C3-N13	-3.47	111.32	114.88
2	C	301	1A1	C6-N5-C4	3.47	125.11	113.99
2	B	301	1A1	C3-N13-C14	3.42	114.67	110.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	301	1A1	C6-N5-C4	3.35	124.72	113.99
2	B	301	1A1	C16-C21-N20	-3.23	118.69	123.50
2	B	301	1A1	C4-N22-C23	-3.23	122.72	127.38
2	B	301	1A1	C2-C3-N13	-3.22	111.57	114.88
2	C	301	1A1	C4-N22-C23	-3.16	122.83	127.38
2	C	301	1A1	O9-C8-C10	-3.13	117.35	122.19
2	A	301	1A1	C16-C14-N13	3.13	130.48	123.82
2	C	301	1A1	C3-N13-C14	3.12	114.32	110.69
2	D	301	1A1	N5-C4-N22	3.11	119.38	115.29
2	D	301	1A1	C3-N13-C14	3.07	114.27	110.69
2	D	301	1A1	S15-C2-N1	2.97	126.16	121.69
2	D	301	1A1	C6-N5-C4	2.91	123.33	113.99
2	A	301	1A1	N5-C6-N1	-2.91	121.49	126.26
2	D	301	1A1	C16-C21-N20	-2.88	119.22	123.50
2	A	301	1A1	C6-N5-C4	2.84	123.09	113.99
2	C	301	1A1	C3-C2-S15	2.84	110.75	109.80
2	B	301	1A1	O9-C8-C10	-2.67	118.06	122.19
2	C	301	1A1	C17-C16-C21	2.65	120.56	117.61
2	A	301	1A1	C19-N20-C21	2.62	121.43	116.85
2	A	301	1A1	S15-C2-N1	2.57	125.56	121.69
2	D	301	1A1	N5-C6-N1	-2.54	122.10	126.26
2	A	301	1A1	C16-C21-N20	-2.51	119.77	123.50
2	A	301	1A1	N22-C23-N24	-2.47	104.78	111.13
2	C	301	1A1	C16-C21-N20	-2.44	119.87	123.50
2	B	301	1A1	N22-C23-N24	-2.39	105.01	111.13
2	C	301	1A1	S15-C14-N13	-2.37	111.90	115.54
2	B	301	1A1	S15-C14-N13	-2.33	111.96	115.54
2	D	301	1A1	C17-C16-C21	2.31	120.19	117.61
2	C	301	1A1	C25-C26-N22	-2.26	102.62	106.70
2	D	301	1A1	C19-N20-C21	2.23	120.75	116.85
2	C	301	1A1	C10-C8-N7	2.22	119.45	115.16
2	A	301	1A1	C12-C10-C8	-2.21	115.07	117.24
2	D	301	1A1	C25-C26-N22	-2.19	102.75	106.70
2	D	301	1A1	N22-C23-N24	-2.14	105.65	111.13
2	A	301	1A1	C17-C16-C21	2.13	119.98	117.61
2	A	301	1A1	C16-C14-S15	-2.13	116.65	120.32
2	C	301	1A1	N22-C23-N24	-2.11	105.71	111.13
2	A	301	1A1	C18-C17-C16	-2.09	118.31	120.36
2	C	301	1A1	C17-C16-C14	-2.08	117.58	120.75
2	B	301	1A1	C17-C16-C14	-2.03	117.66	120.75
2	C	301	1A1	C16-C14-N13	2.03	128.14	123.82
2	D	301	1A1	C17-C16-C14	-2.02	117.67	120.75

There are no chirality outliers.

All (7) torsion outliers are listed below:

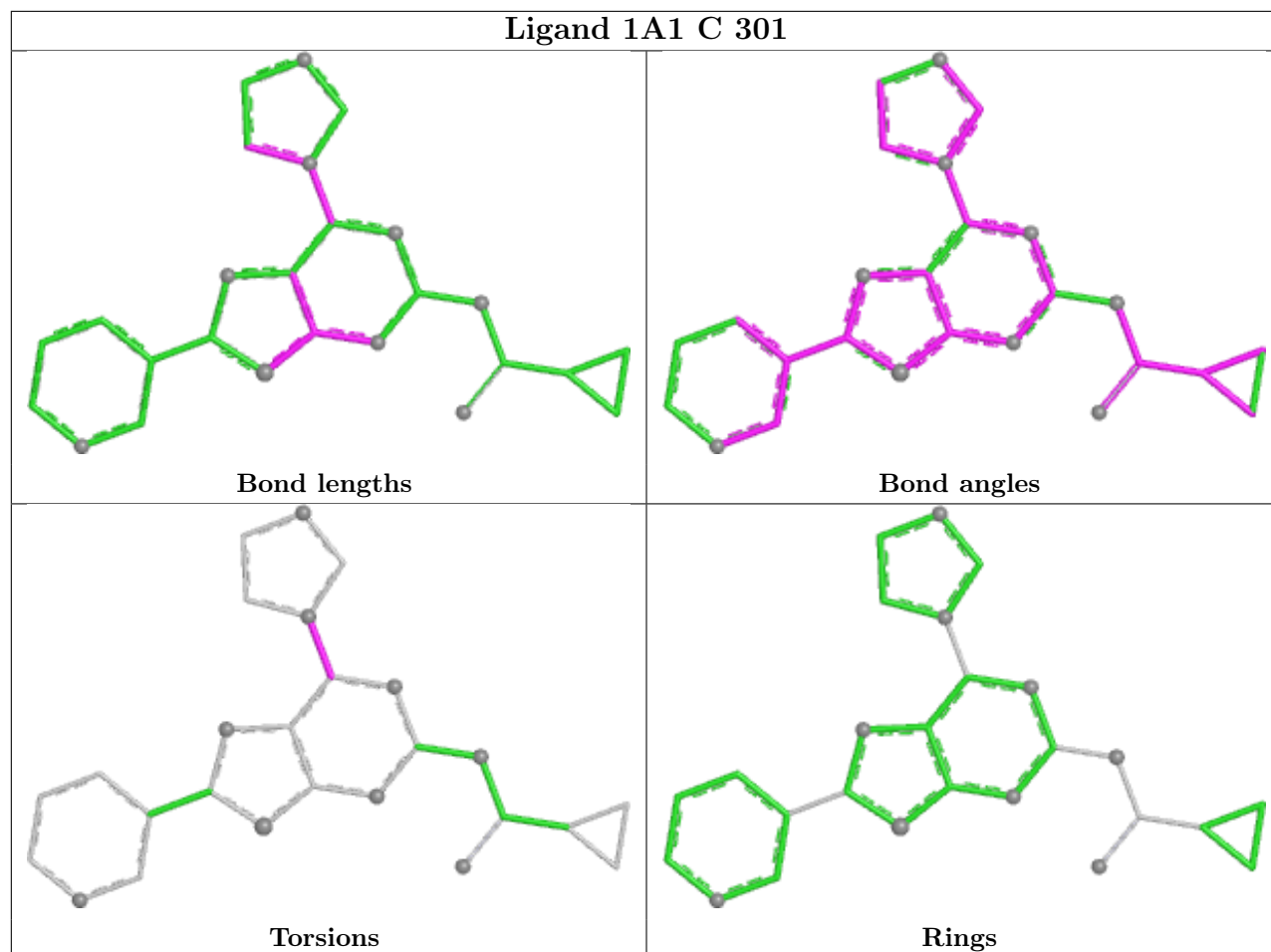
Mol	Chain	Res	Type	Atoms
2	B	301	1A1	N1-C6-N7-C8
2	B	301	1A1	N5-C6-N7-C8
2	D	301	1A1	C12-C10-C8-O9
2	D	301	1A1	C11-C10-C8-O9
2	D	301	1A1	C12-C10-C8-N7
2	D	301	1A1	C11-C10-C8-N7
2	C	301	1A1	C3-C4-N22-C26

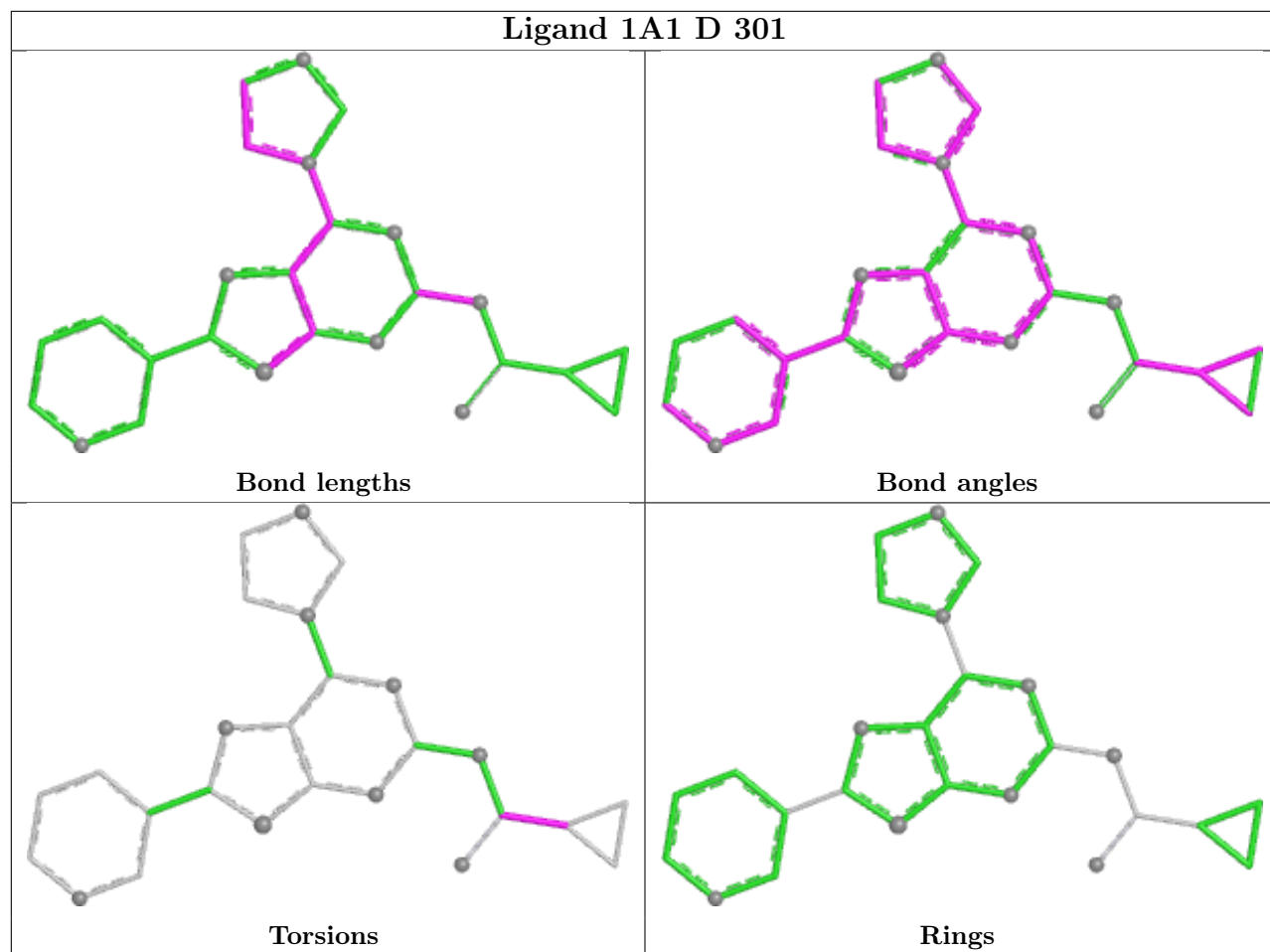
There are no ring outliers.

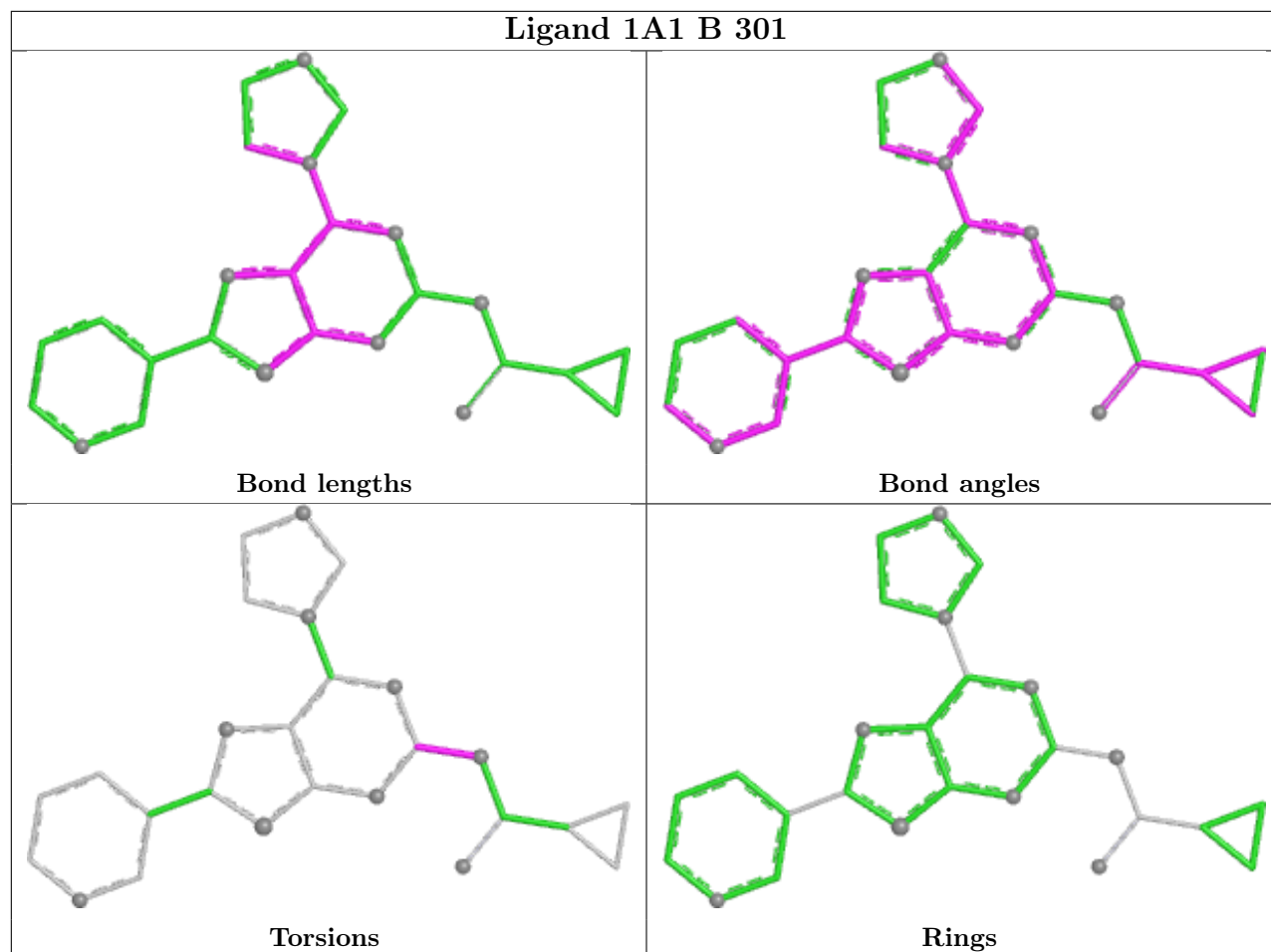
4 monomers are involved in 8 short contacts:

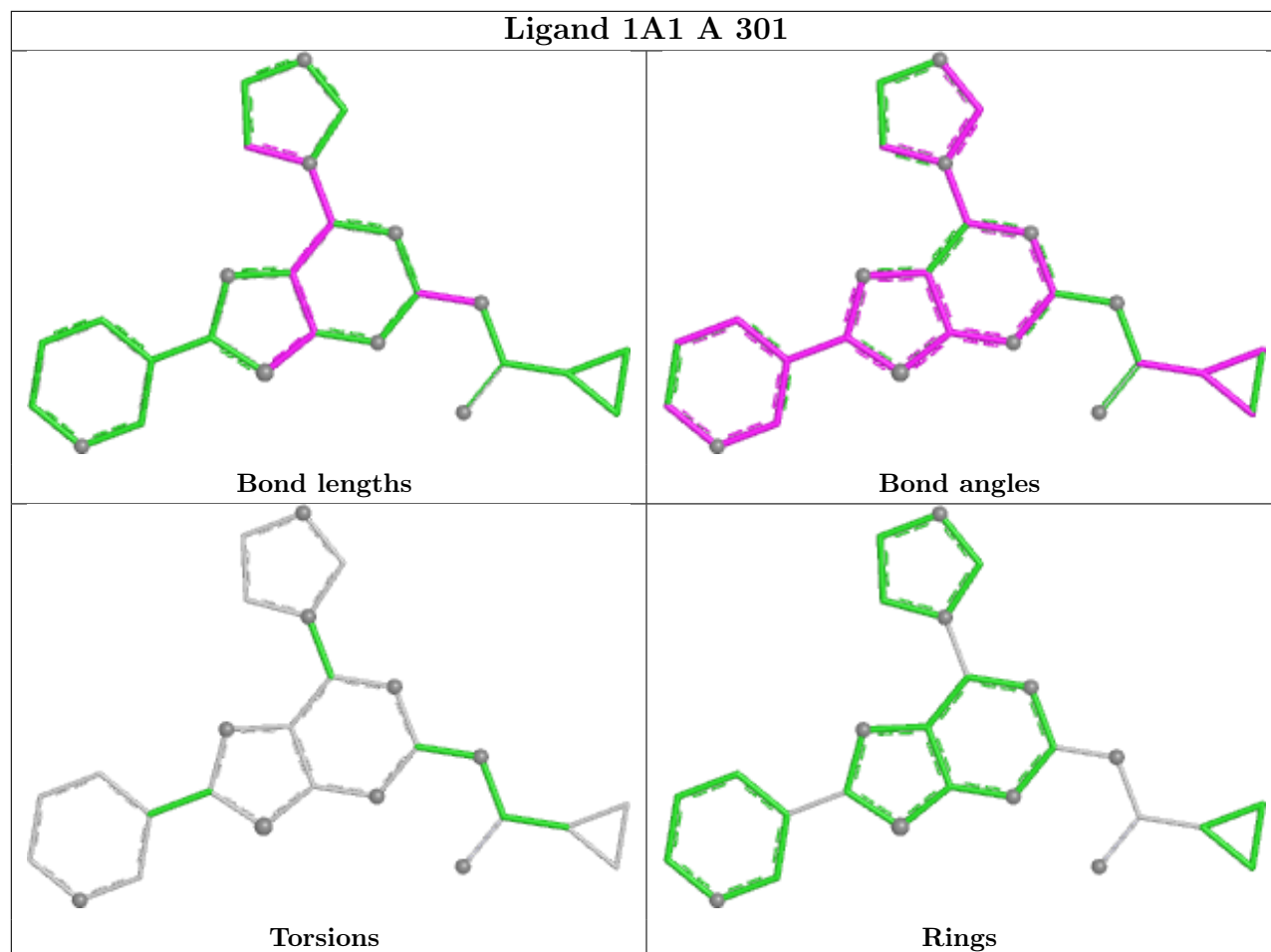
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	301	1A1	2	0
2	D	301	1A1	2	0
2	B	301	1A1	2	0
2	A	301	1A1	2	0

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









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	194/215 (90%)	0.02	4 (2%) 63 58	21, 30, 43, 57	0
1	B	194/215 (90%)	0.05	1 (0%) 87 85	21, 29, 43, 54	0
1	C	194/215 (90%)	0.02	3 (1%) 72 68	20, 29, 44, 52	0
1	D	194/215 (90%)	0.06	3 (1%) 72 68	18, 30, 45, 56	0
All	All	776/860 (90%)	0.04	11 (1%) 73 69	18, 29, 44, 57	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	82	ILE	4.7
1	D	15	GLY	3.2
1	B	82	ILE	3.2
1	A	15	GLY	2.9
1	A	115	VAL	2.4
1	C	182	ASN	2.3
1	C	82	ILE	2.2
1	A	17	ASP	2.2
1	D	116	SER	2.0
1	C	177	LEU	2.0
1	A	117	GLY	2.0

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

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

6.3 Carbohydrates [i](#)

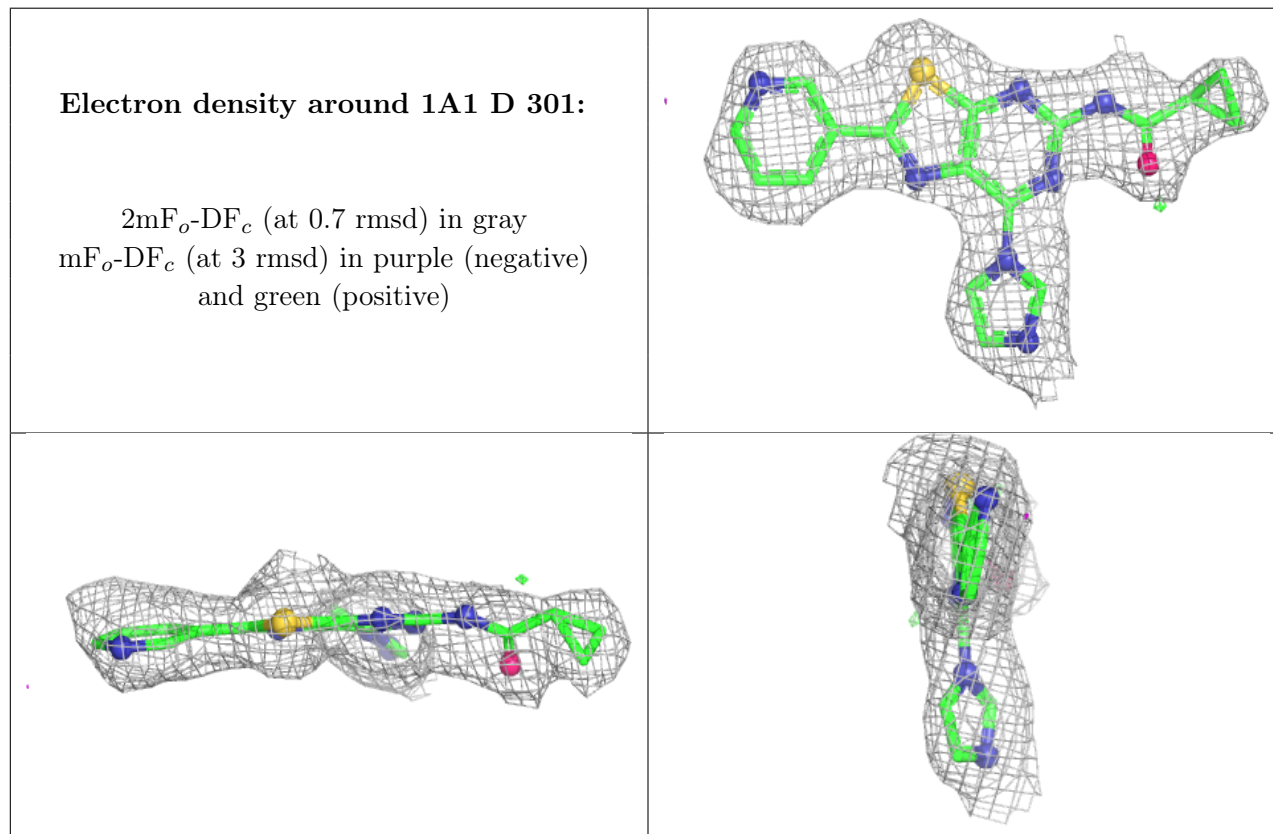
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

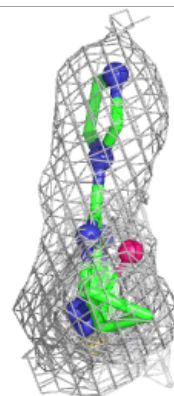
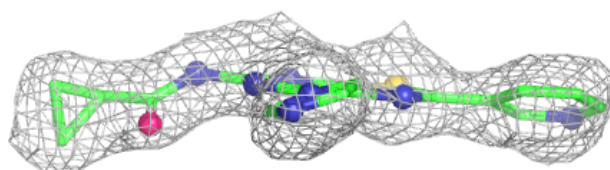
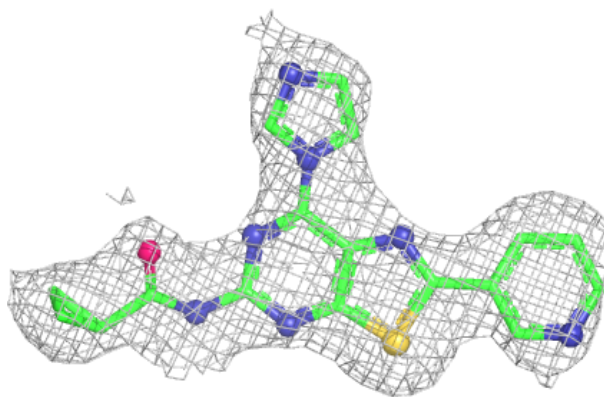
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	MG	C	302	1/1	0.87	0.16	39,39,39,39	0
3	MG	A	302	1/1	0.88	0.10	25,25,25,25	0
2	1A1	D	301	26/26	0.93	0.10	26,29,31,33	0
2	1A1	C	301	26/26	0.95	0.09	21,27,29,32	0
2	1A1	A	301	26/26	0.95	0.09	23,25,28,29	0
3	MG	D	302	1/1	0.95	0.08	27,27,27,27	0
2	1A1	B	301	26/26	0.96	0.08	24,28,30,32	0
3	MG	B	302	1/1	0.97	0.04	26,26,26,26	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.

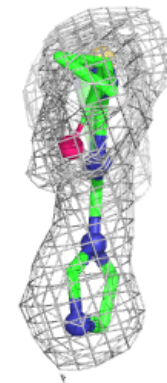
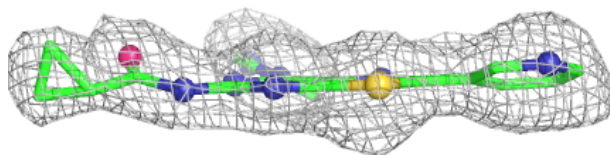
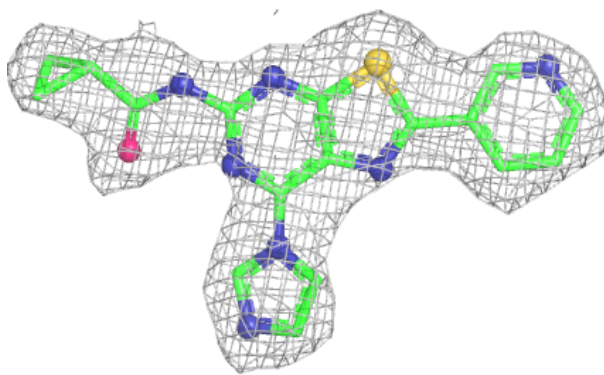


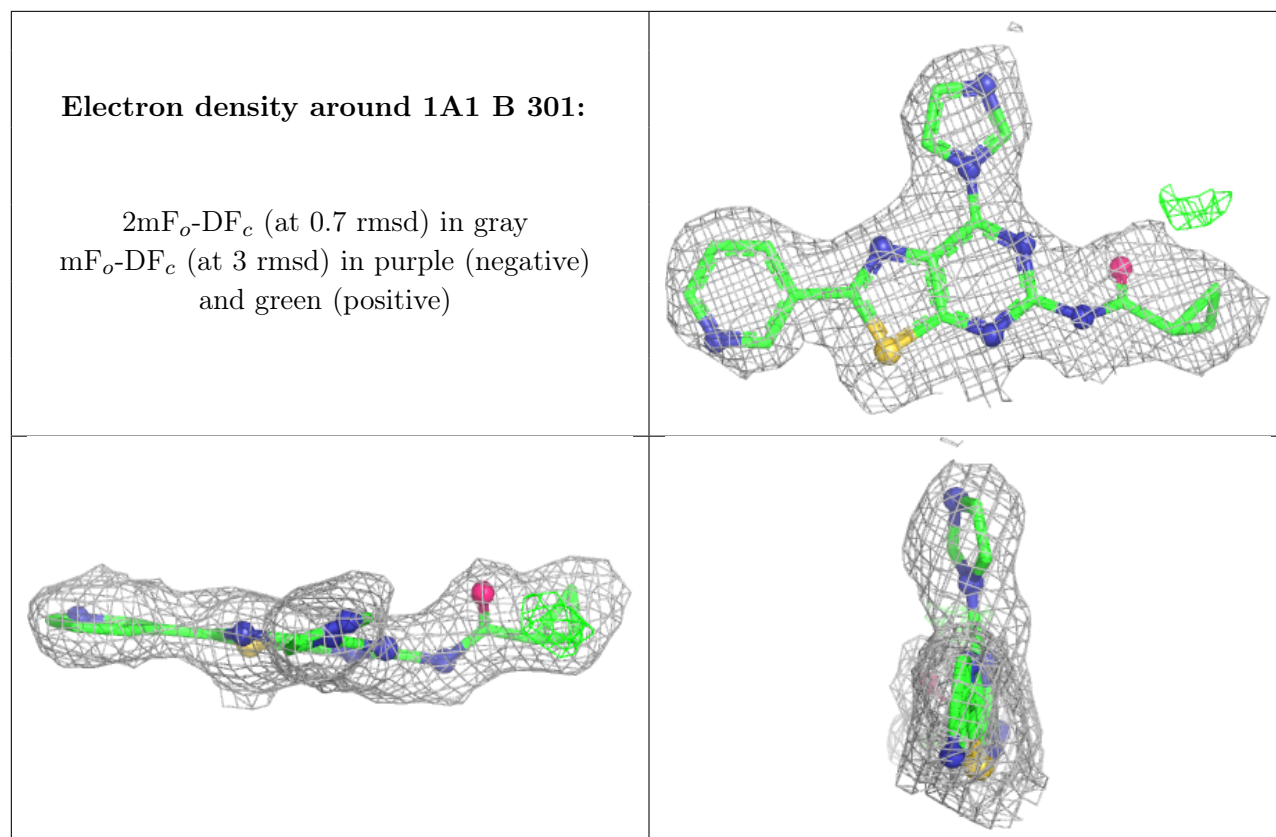
Electron density around 1A1 C 301:

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

**Electron density around 1A1 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)





6.5 Other polymers [i](#)

There are no such residues in this entry.