



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 1, 2026 – 09:51 PM UTC

PDB ID : 6HXS / pdb_00006hxs
Title : Human PARP16 (ARTD15) IN COMPLEX WITH CARBA-NAD
Authors : Karlberg, T.; Pinto, A.F.; Thorsell, A.G.; Schuler, H.
Deposited on : 2018-10-18
Resolution : 2.05 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

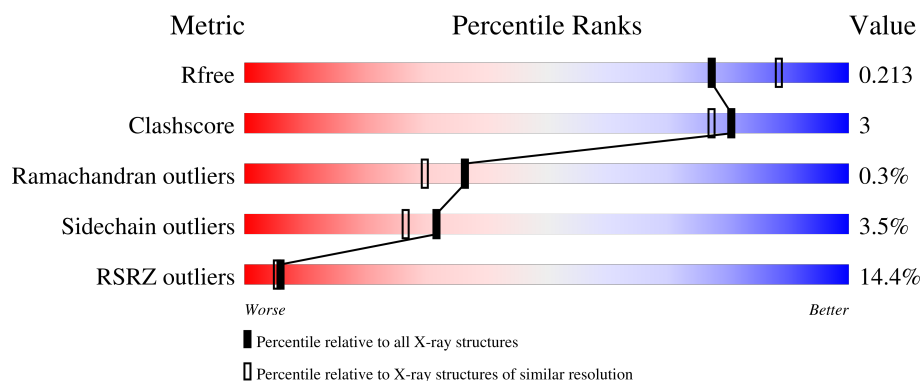
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.05 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	2260 (2.04-2.04)
Clashscore	190562	2333 (2.04-2.04)
Ramachandran outliers	187476	2318 (2.04-2.04)
Sidechain outliers	187428	2318 (2.04-2.04)
RSRZ outliers	180081	2260 (2.04-2.04)

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	298	10% 75% 7% 17%
1	B	298	15% 71% 7% 21%
1	C	298	9% 70% 8% 22%

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 5959 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 Mono [ADP-ribose] polymerase PARP16.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	248	Total	C	N	O	S	0	0	0
			1948	1250	336	354	8			
1	B	234	Total	C	N	O	S	0	0	0
			1837	1180	317	333	7			
1	C	233	Total	C	N	O	S	0	0	0
			1836	1179	316	334	7			

There are 69 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	MET	-	initiating methionine	UNP Q8N5Y8
A	-17	HIS	-	expression tag	UNP Q8N5Y8
A	-16	HIS	-	expression tag	UNP Q8N5Y8
A	-15	HIS	-	expression tag	UNP Q8N5Y8
A	-14	HIS	-	expression tag	UNP Q8N5Y8
A	-13	HIS	-	expression tag	UNP Q8N5Y8
A	-12	HIS	-	expression tag	UNP Q8N5Y8
A	-11	SER	-	expression tag	UNP Q8N5Y8
A	-10	SER	-	expression tag	UNP Q8N5Y8
A	-9	GLY	-	expression tag	UNP Q8N5Y8
A	-8	VAL	-	expression tag	UNP Q8N5Y8
A	-7	ASP	-	expression tag	UNP Q8N5Y8
A	-6	LEU	-	expression tag	UNP Q8N5Y8
A	-5	GLY	-	expression tag	UNP Q8N5Y8
A	-4	THR	-	expression tag	UNP Q8N5Y8
A	-3	GLU	-	expression tag	UNP Q8N5Y8
A	-2	ASN	-	expression tag	UNP Q8N5Y8
A	-1	LEU	-	expression tag	UNP Q8N5Y8
A	0	TYR	-	expression tag	UNP Q8N5Y8
A	1	PHE	-	expression tag	UNP Q8N5Y8
A	2	GLN	-	expression tag	UNP Q8N5Y8
A	3	SER	-	expression tag	UNP Q8N5Y8
A	4	MET	-	expression tag	UNP Q8N5Y8

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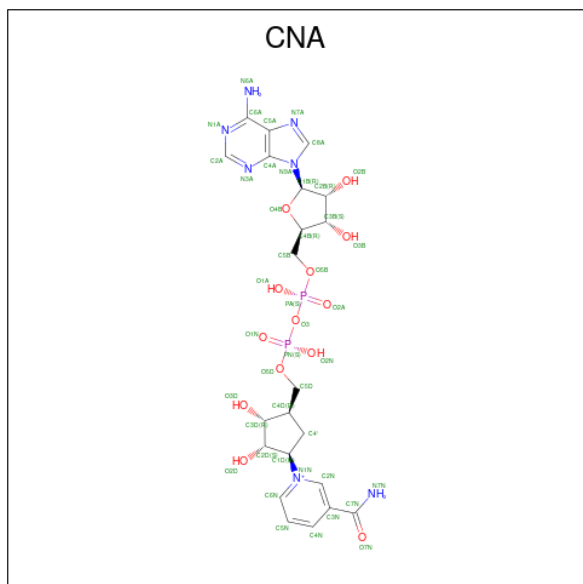
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	MET	-	initiating methionine	UNP Q8N5Y8
B	-17	HIS	-	expression tag	UNP Q8N5Y8
B	-16	HIS	-	expression tag	UNP Q8N5Y8
B	-15	HIS	-	expression tag	UNP Q8N5Y8
B	-14	HIS	-	expression tag	UNP Q8N5Y8
B	-13	HIS	-	expression tag	UNP Q8N5Y8
B	-12	HIS	-	expression tag	UNP Q8N5Y8
B	-11	SER	-	expression tag	UNP Q8N5Y8
B	-10	SER	-	expression tag	UNP Q8N5Y8
B	-9	GLY	-	expression tag	UNP Q8N5Y8
B	-8	VAL	-	expression tag	UNP Q8N5Y8
B	-7	ASP	-	expression tag	UNP Q8N5Y8
B	-6	LEU	-	expression tag	UNP Q8N5Y8
B	-5	GLY	-	expression tag	UNP Q8N5Y8
B	-4	THR	-	expression tag	UNP Q8N5Y8
B	-3	GLU	-	expression tag	UNP Q8N5Y8
B	-2	ASN	-	expression tag	UNP Q8N5Y8
B	-1	LEU	-	expression tag	UNP Q8N5Y8
B	0	TYR	-	expression tag	UNP Q8N5Y8
B	1	PHE	-	expression tag	UNP Q8N5Y8
B	2	GLN	-	expression tag	UNP Q8N5Y8
B	3	SER	-	expression tag	UNP Q8N5Y8
B	4	MET	-	expression tag	UNP Q8N5Y8
C	-18	MET	-	initiating methionine	UNP Q8N5Y8
C	-17	HIS	-	expression tag	UNP Q8N5Y8
C	-16	HIS	-	expression tag	UNP Q8N5Y8
C	-15	HIS	-	expression tag	UNP Q8N5Y8
C	-14	HIS	-	expression tag	UNP Q8N5Y8
C	-13	HIS	-	expression tag	UNP Q8N5Y8
C	-12	HIS	-	expression tag	UNP Q8N5Y8
C	-11	SER	-	expression tag	UNP Q8N5Y8
C	-10	SER	-	expression tag	UNP Q8N5Y8
C	-9	GLY	-	expression tag	UNP Q8N5Y8
C	-8	VAL	-	expression tag	UNP Q8N5Y8
C	-7	ASP	-	expression tag	UNP Q8N5Y8
C	-6	LEU	-	expression tag	UNP Q8N5Y8
C	-5	GLY	-	expression tag	UNP Q8N5Y8
C	-4	THR	-	expression tag	UNP Q8N5Y8
C	-3	GLU	-	expression tag	UNP Q8N5Y8
C	-2	ASN	-	expression tag	UNP Q8N5Y8
C	-1	LEU	-	expression tag	UNP Q8N5Y8
C	0	TYR	-	expression tag	UNP Q8N5Y8

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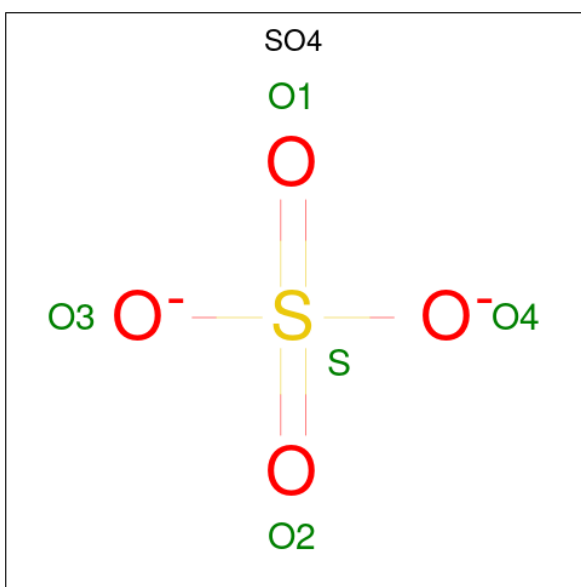
Chain	Residue	Modelled	Actual	Comment	Reference
C	1	PHE	-	expression tag	UNP Q8N5Y8
C	2	GLN	-	expression tag	UNP Q8N5Y8
C	3	SER	-	expression tag	UNP Q8N5Y8
C	4	MET	-	expression tag	UNP Q8N5Y8

- Molecule 2 is CARBA-NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: CNA) (formula: $C_{22}H_{30}N_7O_{13}P_2$).



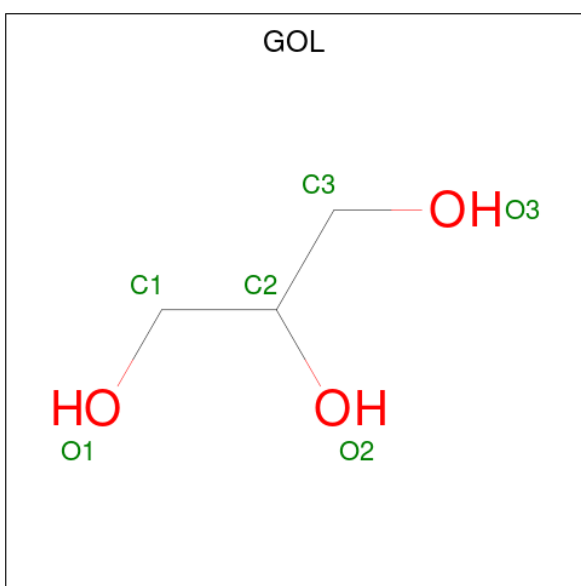
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 44	C 22	N 7	O 13	P 2	0	0
2	B	1	Total 44	C 22	N 7	O 13	P 2	0	0

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



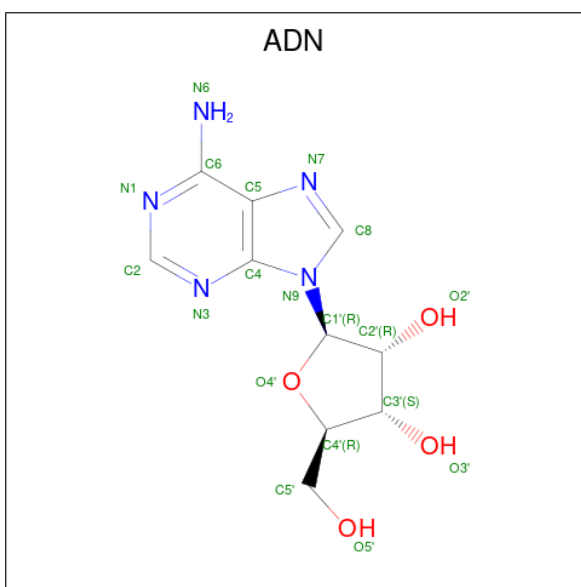
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 5 is ADENOSINE (CCD ID: ADN) (formula: C₁₀H₁₃N₅O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	C	1	Total	C	N	O	0	0
			19	10	5	4		

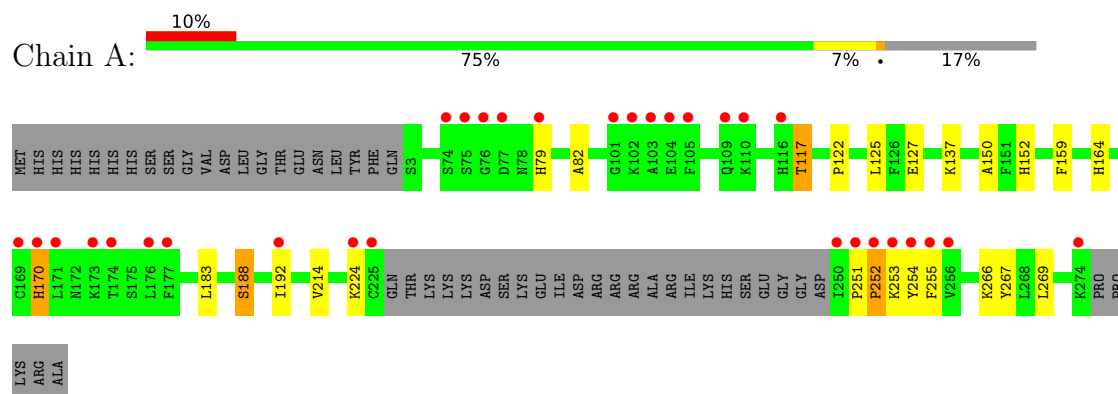
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	94	Total	O	0	0
			94	94		
6	B	62	Total	O	0	0
			62	62		
6	C	59	Total	O	0	0
			59	59		

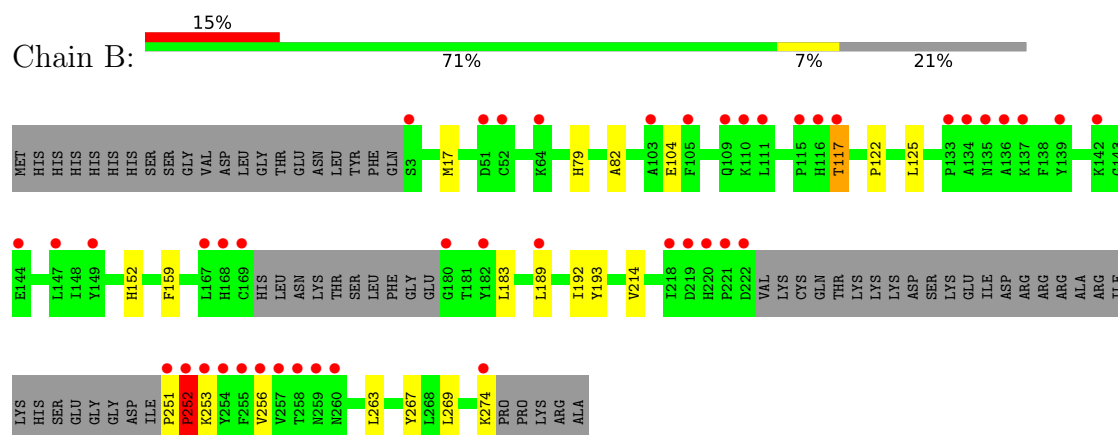
3 Residue-property plots

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.

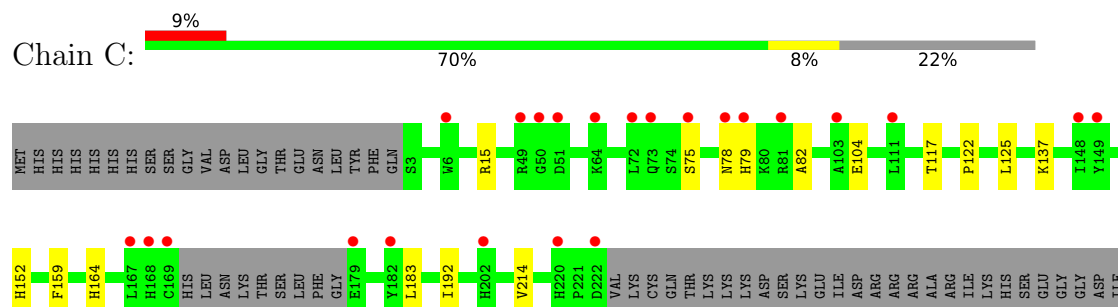
- Molecule 1: Mono [ADP-ribose] polymerase PARP16

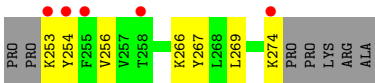


- Molecule 1: Mono [ADP-ribose] polymerase PARP16



- Molecule 1: Mono [ADP-ribose] polymerase PARP16





4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	147.89Å 147.89Å 100.21Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	29.82 – 2.05 29.82 – 2.05	Depositor EDS
% Data completeness (in resolution range)	100.0 (29.82-2.05) 99.9 (29.82-2.05)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.59 (at 2.05Å)	Xtriage
Refinement program	BUSTER 2.10.3	Depositor
R, R_{free}	0.197 , 0.209 0.201 , 0.213	Depositor DCC
R_{free} test set	3517 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	37.4	Xtriage
Anisotropy	0.080	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 42.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	5959	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.57% 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: ADN, CNA, SO4, GOL

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	0.84	0/1999	1.14	5/2709 (0.2%)
1	B	0.86	1/1885 (0.1%)	1.11	4/2555 (0.2%)
1	C	0.81	0/1884	1.10	1/2553 (0.0%)
All	All	0.84	1/5768 (0.0%)	1.12	10/7817 (0.1%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	17	MET	SD-CE	-5.01	1.67	1.79

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	251	PRO	CA-C-N	7.39	129.08	119.84
1	A	251	PRO	C-N-CA	7.39	129.08	119.84
1	A	252	PRO	N-CA-CB	7.12	110.72	103.25
1	A	251	PRO	N-CA-CB	6.81	109.69	103.08
1	B	252	PRO	N-CA-CB	6.56	110.13	103.25
1	B	251	PRO	N-CA-CB	6.53	110.18	103.00
1	A	159	PHE	CA-CB-CG	-6.18	107.62	113.80
1	C	159	PHE	CA-CB-CG	-5.94	107.86	113.80
1	B	159	PHE	CA-CB-CG	-5.55	108.25	113.80
1	B	117	THR	CB-CA-C	5.13	116.59	108.84

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	1948	0	1909	13	0
1	B	1837	0	1798	8	0
1	C	1836	0	1801	9	0
2	A	44	0	28	0	0
2	B	44	0	28	1	0
3	A	5	0	0	0	0
3	B	5	0	0	0	0
4	A	6	0	8	0	0
5	C	19	0	13	0	0
6	A	94	0	0	1	1
6	B	62	0	0	1	0
6	C	59	0	0	1	0
All	All	5959	0	5585	29	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 3.

All (29) 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:B:189:LEU:HD11	1:B:252:PRO:CB	2.34	0.58
1:C:79:HIS:HB3	1:C:82:ALA:HB3	1.86	0.56
1:A:150:ALA:HB2	1:A:255:PHE:HZ	1.71	0.56
1:B:125:LEU:HD13	1:B:269:LEU:HD23	1.87	0.55
1:B:214:VAL:HB	1:B:267:TYR:HB2	1.92	0.51
1:B:79:HIS:HD2	6:B:419:HOH:O	1.95	0.50
1:B:152:HIS:HB2	1:B:183:LEU:HD23	1.95	0.48
1:A:79:HIS:HB3	1:A:82:ALA:HB3	1.95	0.48
1:A:150:ALA:HB2	1:A:255:PHE:CZ	2.49	0.48
1:A:170:HIS:H	1:A:170:HIS:CD2	2.32	0.48
1:C:152:HIS:HB2	1:C:183:LEU:HD23	1.96	0.48
1:C:122:PRO:HG3	1:C:269:LEU:HD22	1.97	0.47
1:A:122:PRO:HG3	1:A:269:LEU:HD22	1.98	0.46
1:A:152:HIS:HB2	1:A:183:LEU:HD23	1.97	0.46
1:B:193:TYR:CE1	2:B:301:CNA:H19	2.51	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:214:VAL:HB	1:A:267:TYR:HB2	1.98	0.46
1:C:125:LEU:HD13	1:C:269:LEU:HD23	1.99	0.45
1:C:214:VAL:HB	1:C:267:TYR:HB2	1.97	0.45
1:B:122:PRO:HG3	1:B:269:LEU:HD22	1.99	0.45
1:A:164:HIS:HD2	6:A:428:HOH:O	2.01	0.44
1:A:117:THR:HG22	1:A:188:SER:OG	2.19	0.43
1:A:125:LEU:HD13	1:A:269:LEU:HD23	1.99	0.43
1:B:79:HIS:HB3	1:B:82:ALA:HB3	2.00	0.43
1:A:127:GLU:OE2	1:C:15:ARG:HD3	2.18	0.43
1:C:164:HIS:HE1	6:C:621:HOH:O	2.01	0.43
1:C:75:SER:HB2	1:C:78:ASN:HD22	1.84	0.42
1:A:266:LYS:HD2	1:A:266:LYS:HA	1.82	0.42
1:C:266:LYS:HD2	1:C:266:LYS:HA	1.81	0.41
1:A:253:LYS:HB3	1:A:254:TYR:H	1.74	0.41

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)
6:A:408:HOH:O	6:A:408:HOH:O[8_555]	0.53	1.67

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	244/298 (82%)	234 (96%)	9 (4%)	1 (0%)	30	22
1	B	228/298 (76%)	224 (98%)	3 (1%)	1 (0%)	30	22
1	C	227/298 (76%)	223 (98%)	4 (2%)	0	100	100
All	All	699/894 (78%)	681 (97%)	16 (2%)	2 (0%)	36	30

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	252	PRO
1	B	252	PRO

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	207/254 (82%)	201 (97%)	6 (3%)	37	33
1	B	194/254 (76%)	187 (96%)	7 (4%)	31	26
1	C	195/254 (77%)	187 (96%)	8 (4%)	27	21
All	All	596/762 (78%)	575 (96%)	21 (4%)	32	27

All (21) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	117	THR
1	A	137	LYS
1	A	170	HIS
1	A	188	SER
1	A	192	ILE
1	A	224	LYS
1	B	104	GLU
1	B	117	THR
1	B	192	ILE
1	B	253	LYS
1	B	256	VAL
1	B	263	LEU
1	B	274	LYS
1	C	104	GLU
1	C	117	THR
1	C	137	LYS
1	C	192	ILE
1	C	253	LYS
1	C	254	TYR
1	C	256	VAL
1	C	274	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (17) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	32	GLN
1	A	78	ASN
1	A	79	HIS
1	A	109	GLN
1	A	116	HIS
1	A	158	ASN
1	A	164	HIS
1	A	170	HIS
1	A	172	ASN
1	A	201	GLN
1	B	79	HIS
1	B	109	GLN
1	C	32	GLN
1	C	78	ASN
1	C	109	GLN
1	C	158	ASN
1	C	164	HIS

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](#)

6 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	$\# Z > 2$
3	SO4	B	302	-	4,4,4	0.41	0	6,6,6	0.40	0
5	ADN	C	501	-	21,21,21	0.15	0	31,31,31	0.27	0
2	CNA	A	301	-	47,48,48	2.48	14 (29%)	65,73,73	2.51	16 (24%)
3	SO4	A	302	-	4,4,4	0.25	0	6,6,6	0.23	0
2	CNA	B	301	-	47,48,48	2.57	15 (31%)	65,73,73	2.71	21 (32%)
4	GOL	A	303	-	5,5,5	0.17	0	5,5,5	0.38	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
4	GOL	A	303	-	-	0/4/4/4	-
5	ADN	C	501	-	-	1/6/22/22	0/3/3/3
2	CNA	A	301	-	-	6/28/62/62	0/5/5/5
2	CNA	B	301	-	-	8/28/62/62	0/5/5/5

All (29) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	CNA	C2A-N3A	8.20	1.48	1.33
2	A	301	CNA	C2A-N1A	7.01	1.46	1.33
2	A	301	CNA	C2N-N1N	6.69	1.42	1.35
2	B	301	CNA	C2A-N1A	6.40	1.45	1.33
2	B	301	CNA	C2N-N1N	6.37	1.42	1.35
2	A	301	CNA	C2A-N3A	5.82	1.44	1.33
2	B	301	CNA	C3N-C7N	-5.32	1.42	1.50
2	B	301	CNA	C2D-C1D	-5.11	1.46	1.53
2	A	301	CNA	C4N-C3N	4.68	1.46	1.39
2	A	301	CNA	C2D-C1D	-4.36	1.47	1.53
2	A	301	CNA	C3N-C7N	-4.08	1.44	1.50
2	A	301	CNA	C6N-N1N	4.01	1.44	1.35
2	B	301	CNA	O2B-C2B	-3.64	1.33	1.43
2	A	301	CNA	PN-O3	-3.58	1.55	1.59
2	B	301	CNA	C5A-N7A	-3.27	1.33	1.39
2	B	301	CNA	C6N-N1N	3.18	1.42	1.35
2	B	301	CNA	PN-O3	-3.16	1.56	1.59
2	A	301	CNA	O2B-C2B	-3.13	1.35	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	CNA	C5A-N7A	-3.12	1.33	1.39
2	A	301	CNA	C2N-C3N	3.12	1.43	1.39
2	B	301	CNA	C2N-C3N	2.76	1.43	1.39
2	B	301	CNA	C8A-N9A	-2.75	1.32	1.37
2	B	301	CNA	C4N-C3N	2.43	1.43	1.39
2	B	301	CNA	PA-O3	-2.15	1.57	1.59
2	B	301	CNA	O3B-C3B	-2.14	1.37	1.43
2	A	301	CNA	C5D-C4D	2.11	1.55	1.51
2	A	301	CNA	C3B-C4B	2.05	1.58	1.53
2	B	301	CNA	C4A-N9A	-2.05	1.33	1.37
2	A	301	CNA	C8A-N9A	-2.02	1.34	1.37

All (37) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	CNA	N3A-C2A-N1A	-13.65	107.92	128.58
2	B	301	CNA	N3A-C2A-N1A	-13.05	108.82	128.58
2	B	301	CNA	C2A-N3A-C4A	5.43	125.08	111.83
2	A	301	CNA	C2A-N1A-C6A	5.41	127.62	118.73
2	B	301	CNA	C4A-C5A-N7A	-5.36	104.45	110.58
2	A	301	CNA	C2A-N3A-C4A	5.27	124.71	111.83
2	B	301	CNA	C4'-C1D-N1N	5.13	119.93	113.50
2	B	301	CNA	C5A-N7A-C8A	5.02	111.34	103.45
2	B	301	CNA	N9A-C8A-N7A	-4.61	107.39	113.94
2	B	301	CNA	C4'-C1D-C2D	-4.25	97.02	104.22
2	A	301	CNA	C4A-C5A-N7A	-4.20	105.78	110.58
2	A	301	CNA	C4D-C3D-C2D	-4.16	98.97	103.87
2	B	301	CNA	C5A-C4A-N3A	-4.12	121.05	126.72
2	B	301	CNA	C2A-N1A-C6A	3.96	125.24	118.73
2	A	301	CNA	C5A-C4A-N9A	3.70	109.84	105.81
2	B	301	CNA	O4B-C1B-N9A	3.69	115.17	108.09
2	B	301	CNA	C6N-N1N-C2N	-3.51	118.89	121.88
2	A	301	CNA	C5A-N7A-C8A	3.32	108.67	103.45
2	B	301	CNA	C5A-C4A-N9A	3.10	109.19	105.81
2	A	301	CNA	O2N-PN-O3	3.07	115.57	107.27
2	A	301	CNA	C4'-C1D-N1N	2.98	117.23	113.50
2	A	301	CNA	C5A-C4A-N3A	-2.92	122.70	126.72
2	A	301	CNA	N9A-C8A-N7A	-2.83	109.92	113.94
2	A	301	CNA	O1A-PA-O3	-2.74	99.87	107.27
2	B	301	CNA	O2N-PN-O3	2.70	114.57	107.27
2	A	301	CNA	O4B-C1B-C2B	-2.67	100.91	106.62
2	A	301	CNA	C6N-N1N-C2N	-2.66	119.62	121.88

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	301	CNA	O3B-C3B-C4B	-2.52	103.84	111.08
2	B	301	CNA	O4B-C4B-C5B	2.45	117.19	109.33
2	B	301	CNA	O4B-C1B-C2B	-2.33	101.62	106.62
2	B	301	CNA	C6A-C5A-N7A	2.21	136.36	132.09
2	B	301	CNA	O3B-C3B-C4B	-2.18	104.82	111.08
2	B	301	CNA	C4D-C3D-C2D	-2.13	101.35	103.87
2	B	301	CNA	C5N-C4N-C3N	2.12	122.45	120.36
2	B	301	CNA	C4B-O4B-C1B	-2.12	104.78	109.47
2	A	301	CNA	C6A-C5A-N7A	2.12	136.17	132.09
2	B	301	CNA	O7N-C7N-C3N	2.05	122.11	119.60

There are no chirality outliers.

All (15) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	CNA	C5D-O5D-PN-O3
2	A	301	CNA	C5D-O5D-PN-O1N
2	A	301	CNA	C4'-C4D-C5D-O5D
2	B	301	CNA	C5D-O5D-PN-O3
2	B	301	CNA	C5D-O5D-PN-O1N
2	B	301	CNA	C4D-C5D-O5D-PN
2	A	301	CNA	C2B-C1B-N9A-C8A
2	A	301	CNA	C5D-O5D-PN-O2N
2	B	301	CNA	C5B-O5B-PA-O1A
2	B	301	CNA	C5B-O5B-PA-O2A
2	B	301	CNA	C5B-O5B-PA-O3
2	B	301	CNA	C4'-C4D-C5D-O5D
2	A	301	CNA	C3D-C4D-C5D-O5D
5	C	501	ADN	C2'-C1'-N9-C8
2	B	301	CNA	PN-O3-PA-O1A

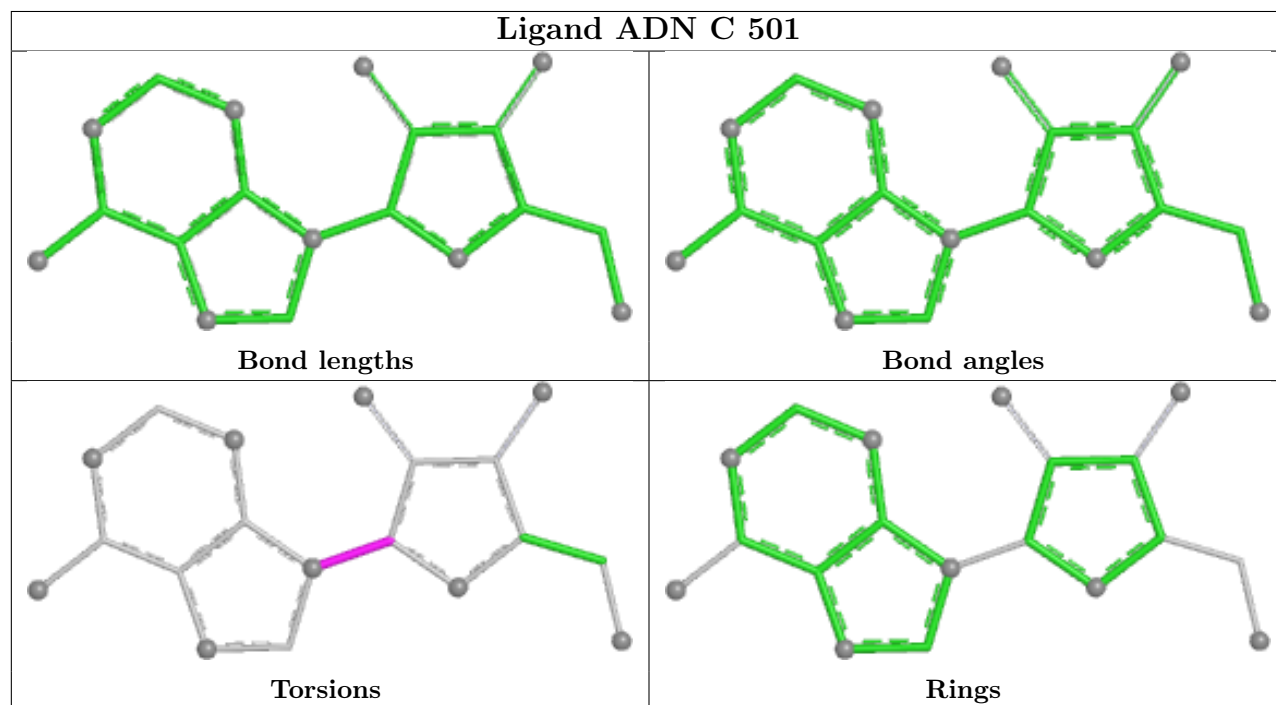
There are no ring outliers.

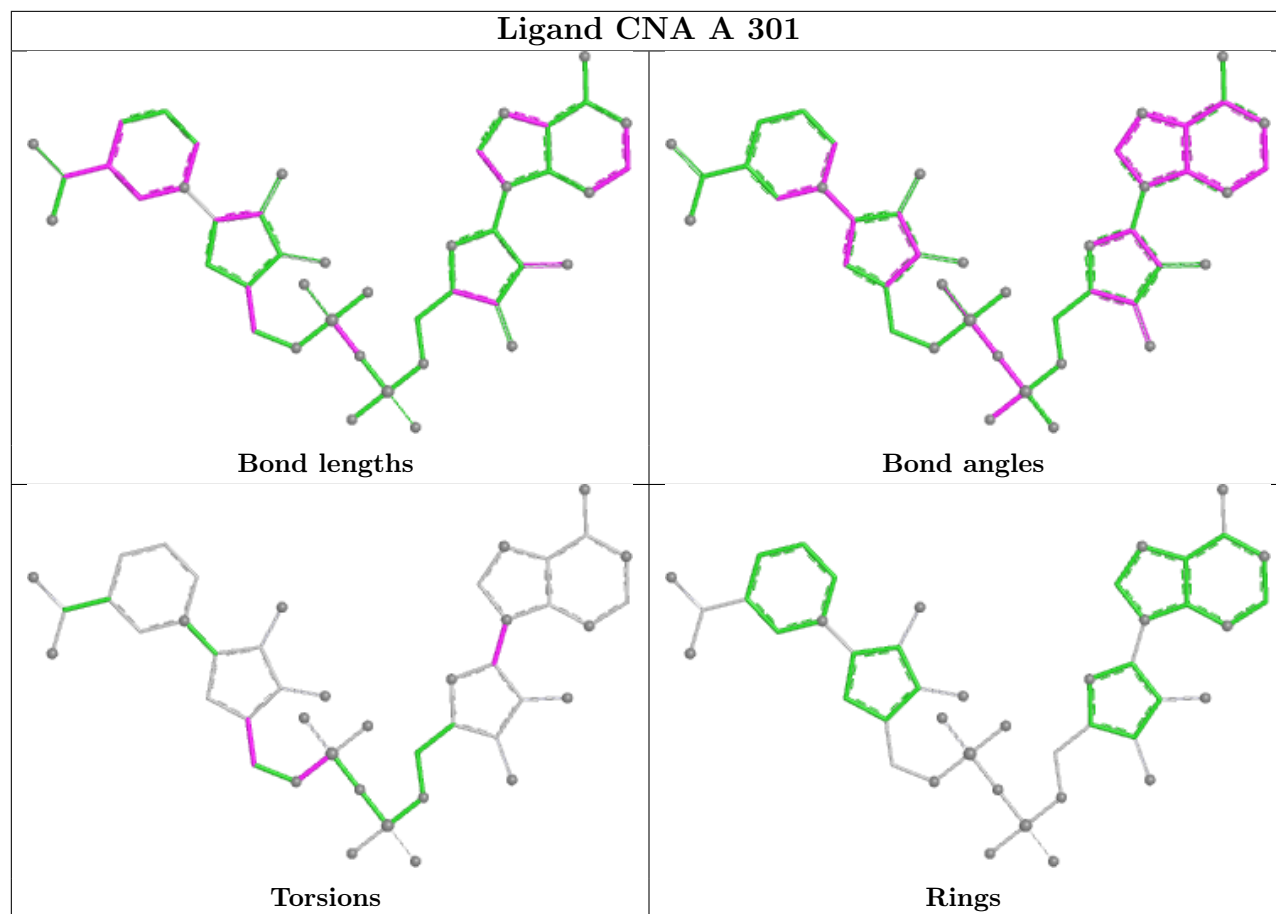
1 monomer is involved in 1 short contact:

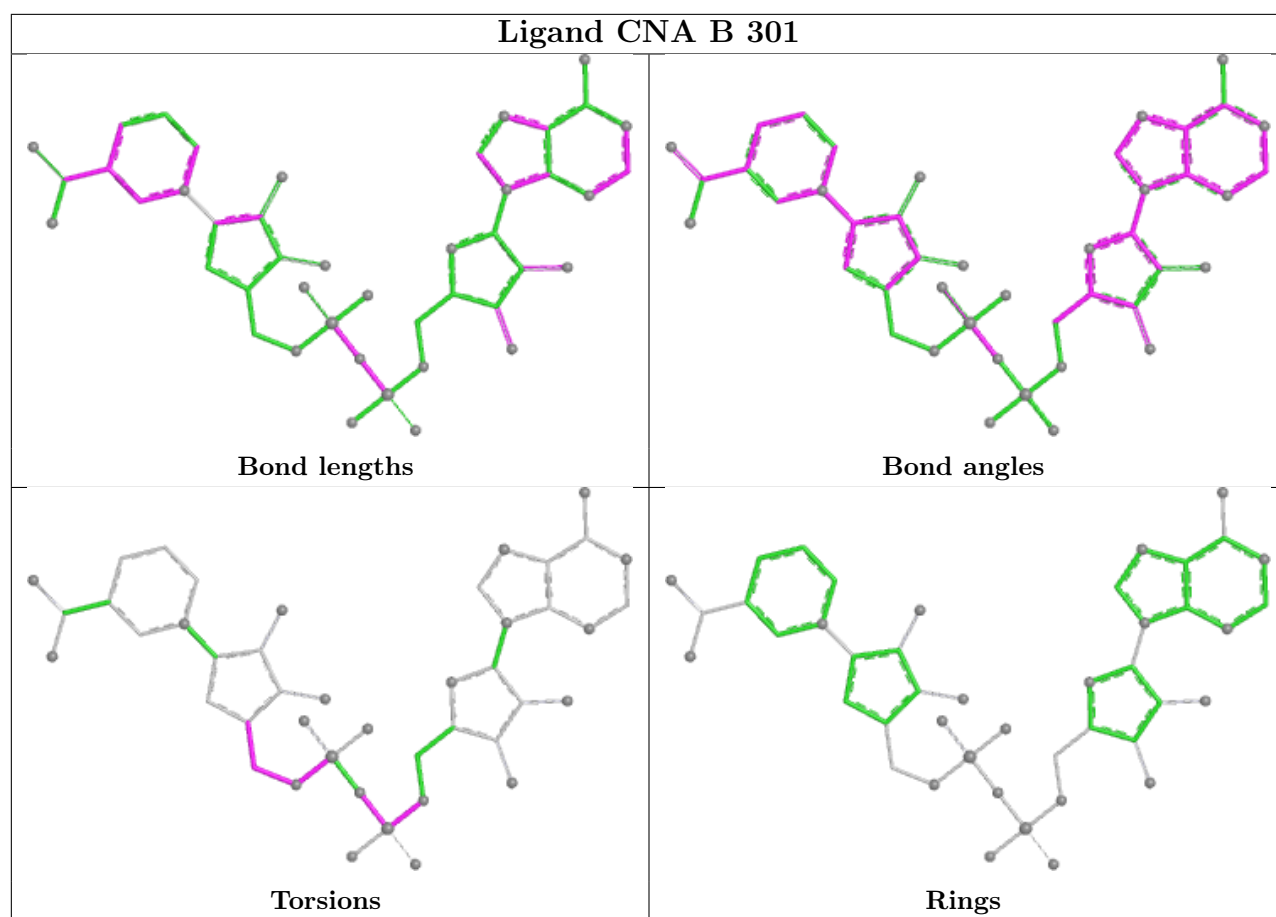
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	CNA	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier.

Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	248/298 (83%)	0.40	31 (12%) 8 7	23, 39, 87, 109	0
1	B	234/298 (78%)	0.70	44 (18%) 3 2	26, 44, 110, 156	0
1	C	233/298 (78%)	0.62	28 (12%) 9 8	33, 49, 96, 124	0
All	All	715/894 (79%)	0.57	103 (14%) 6 5	23, 44, 98, 156	0

All (103) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	251	PRO	9.6
1	A	251	PRO	8.9
1	B	252	PRO	7.5
1	B	169	CYS	5.8
1	A	252	PRO	5.8
1	C	169	CYS	5.6
1	A	250	ILE	5.4
1	B	253	LYS	5.2
1	B	168	HIS	5.0
1	A	254	TYR	5.0
1	B	255	PHE	4.8
1	C	111	LEU	4.6
1	A	253	LYS	4.6
1	B	222	ASP	4.5
1	B	182	TYR	4.1
1	C	255	PHE	4.1
1	A	170	HIS	4.1
1	B	133	PRO	4.0
1	A	225	CYS	4.0
1	C	254	TYR	4.0
1	C	274	LYS	4.0
1	C	253	LYS	3.9
1	A	174	THR	3.9

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Mol	Chain	Res	Type	RSRZ
1	C	79	HIS	3.9
1	B	52	CYS	3.8
1	A	274	LYS	3.8
1	A	171	LEU	3.7
1	A	102	LYS	3.7
1	C	222	ASP	3.6
1	B	258	THR	3.6
1	A	116	HIS	3.5
1	A	76	GLY	3.5
1	C	179	GLU	3.4
1	B	254	TYR	3.4
1	B	180	GLY	3.4
1	B	139	TYR	3.4
1	C	149	TYR	3.4
1	B	115	PRO	3.4
1	B	136	ALA	3.4
1	B	116	HIS	3.3
1	A	255	PHE	3.3
1	C	168	HIS	3.3
1	C	258	THR	3.2
1	A	104	GLU	3.2
1	B	111	LEU	3.2
1	A	105	PHE	3.2
1	B	221	PRO	3.2
1	B	149	TYR	3.1
1	C	72	LEU	3.1
1	C	64	LYS	3.1
1	A	224	LYS	3.1
1	B	134	ALA	3.0
1	C	75	SER	3.0
1	B	274	LYS	2.9
1	B	144	GLU	2.9
1	A	109	GLN	2.8
1	B	220	HIS	2.8
1	B	117	THR	2.8
1	C	182	TYR	2.7
1	B	142	LYS	2.7
1	A	177	PHE	2.7
1	B	259	ASN	2.7
1	B	218	ILE	2.7
1	A	74	SER	2.7
1	B	189	LEU	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	50	GLY	2.7
1	A	101	GLY	2.6
1	A	75	SER	2.6
1	A	79	HIS	2.6
1	A	103	ALA	2.6
1	A	192	ILE	2.5
1	A	169	CYS	2.5
1	C	51	ASP	2.5
1	C	220	HIS	2.5
1	B	103	ALA	2.5
1	B	110	LYS	2.5
1	B	51	ASP	2.4
1	B	147	LEU	2.4
1	C	6	TRP	2.4
1	B	64	LYS	2.4
1	A	256	VAL	2.3
1	B	109	GLN	2.3
1	A	176	LEU	2.3
1	B	105	PHE	2.3
1	A	173	LYS	2.2
1	C	49	ARG	2.2
1	C	78	ASN	2.2
1	B	257	VAL	2.2
1	C	103	ALA	2.2
1	B	3	SER	2.2
1	C	81	ARG	2.2
1	B	256	VAL	2.1
1	C	167	LEU	2.1
1	A	110	LYS	2.1
1	B	135	ASN	2.1
1	B	167	LEU	2.1
1	A	77	ASP	2.1
1	B	219	ASP	2.1
1	C	73	GLN	2.1
1	C	202	HIS	2.1
1	C	148	ILE	2.1
1	B	260	ASN	2.0
1	B	137	LYS	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 [i](#)

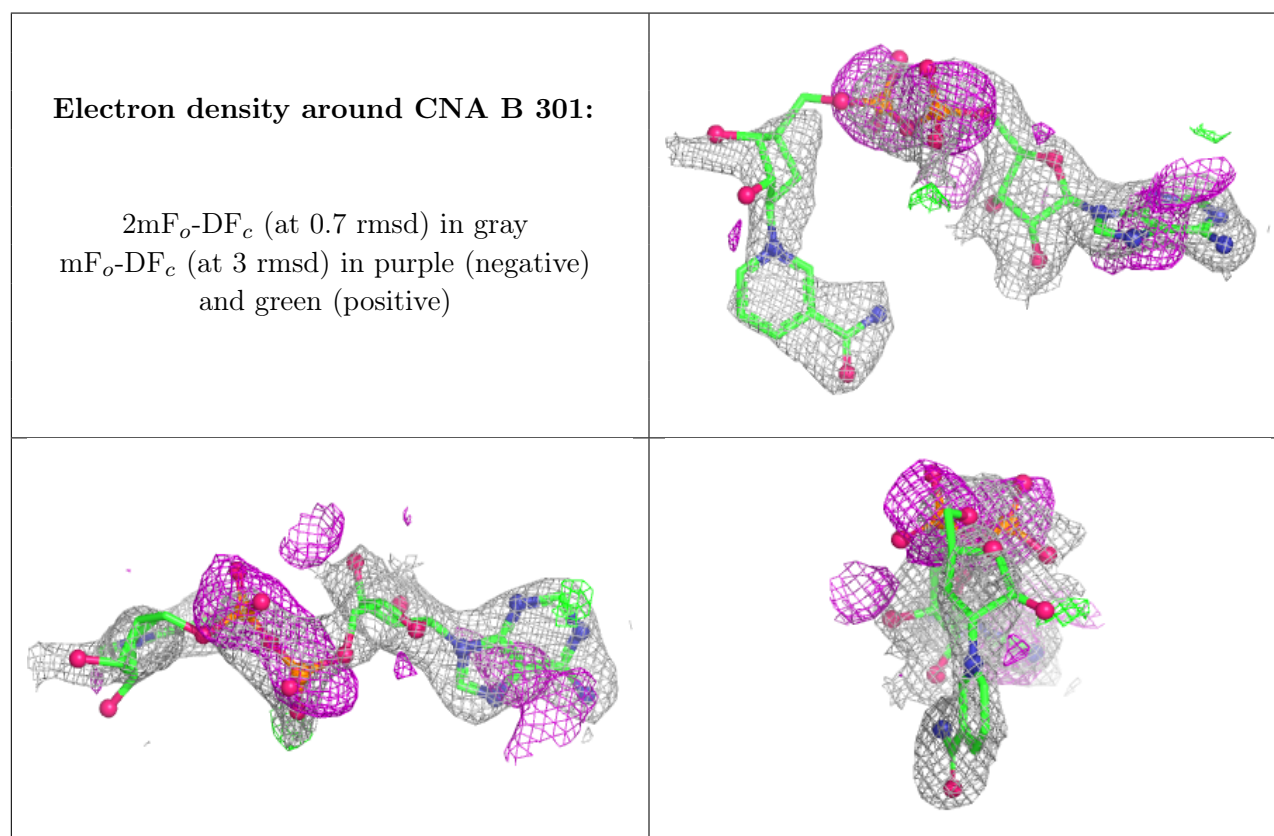
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

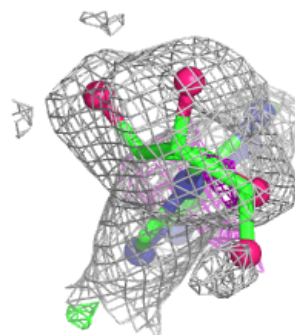
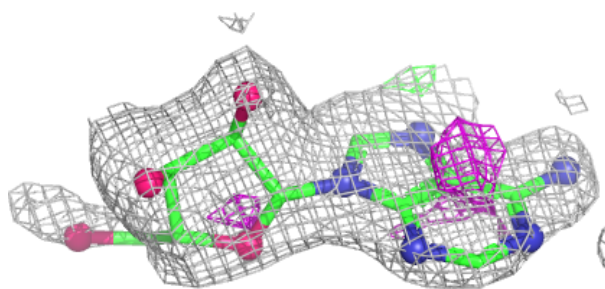
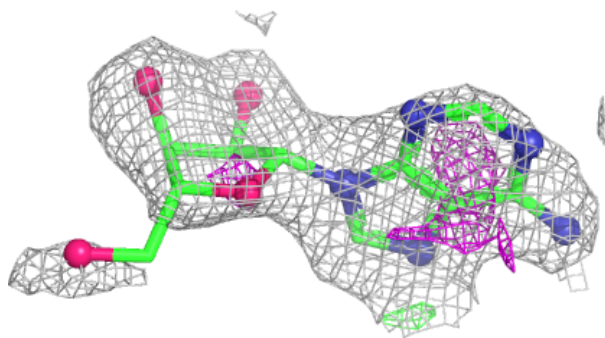
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	CNA	B	301	44/44	0.71	0.16	58,86,110,112	0
5	ADN	C	501	19/19	0.74	0.16	67,74,82,83	0
3	SO4	A	302	5/5	0.84	0.12	85,86,87,89	0
4	GOL	A	303	6/6	0.89	0.14	48,54,55,57	0
3	SO4	B	302	5/5	0.89	0.10	59,59,65,65	0
2	CNA	A	301	44/44	0.95	0.08	31,48,59,62	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.

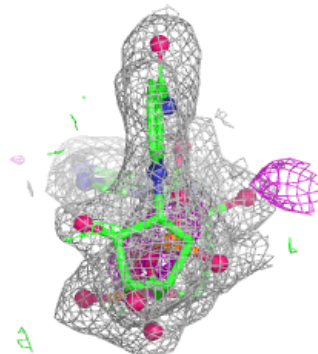
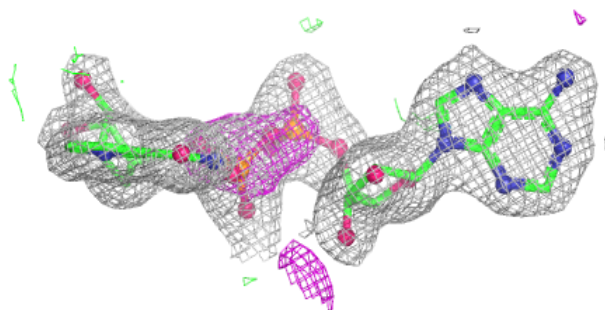
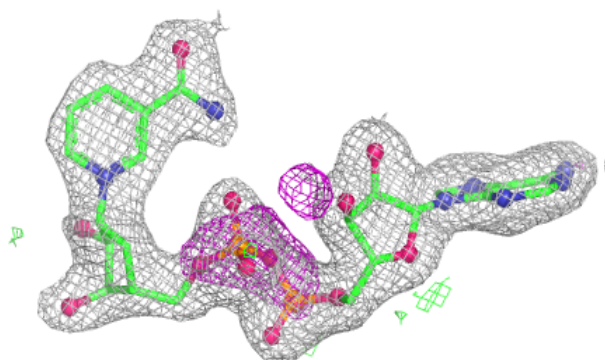


Electron density around ADN C 501:

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

**Electron density around CNA 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 ⓘ

There are no such residues in this entry.