



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:44 AM UTC

PDB ID : 1WNB / pdb_00001wnb
Title : Escherichia coli YdcW gene product is a medium-chain aldehyde dehydrogenase (complexed with nadh and betaine aldehyde)
Authors : Gruez, A.; Roig-Zamboni, V.; Tegoni, M.; Cambillau, C.
Deposited on : 2004-07-29
Resolution : 2.20 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

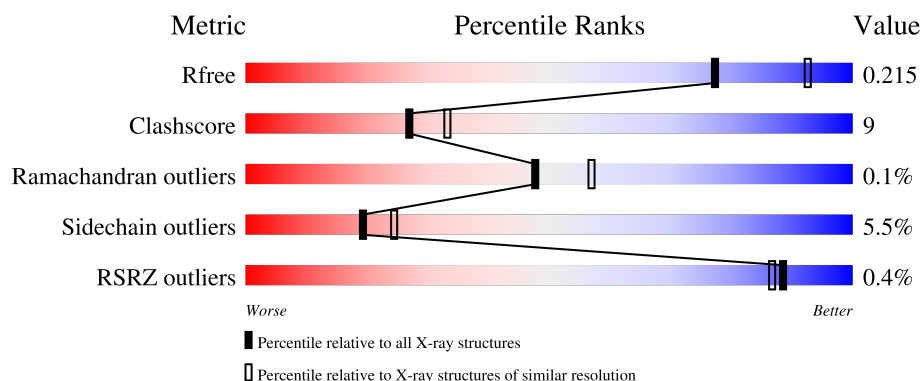
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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	6164 (2.20-2.20)
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)
RSRZ outliers	180081	6166 (2.20-2.20)

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	495	% 75% 19% ..
1	B	495	76% 17% ..
1	C	495	77% 17% ..
1	D	495	75% 19% ..

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	BTL	B	5001	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 15318 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 Putative betaine aldehyde dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	474	Total	C	N	O	S	0	1	0
			3576	2263	616	679	18			
1	B	474	Total	C	N	O	S	9	1	0
			3576	2263	616	679	18			
1	C	474	Total	C	N	O	S	0	1	0
			3576	2263	616	679	18			
1	D	474	Total	C	N	O	S	4	1	0
			3576	2263	616	679	18			

There are 88 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-20	SER	-	expression tag	UNP P77674
A	-19	TYR	-	expression tag	UNP P77674
A	-18	TYR	-	expression tag	UNP P77674
A	-17	HIS	-	expression tag	UNP P77674
A	-16	HIS	-	expression tag	UNP P77674
A	-15	HIS	-	expression tag	UNP P77674
A	-14	HIS	-	expression tag	UNP P77674
A	-13	HIS	-	expression tag	UNP P77674
A	-12	HIS	-	expression tag	UNP P77674
A	-11	LEU	-	expression tag	UNP P77674
A	-10	GLU	-	expression tag	UNP P77674
A	-9	SER	-	expression tag	UNP P77674
A	-8	THR	-	expression tag	UNP P77674
A	-7	SER	-	expression tag	UNP P77674
A	-6	LEU	-	expression tag	UNP P77674
A	-5	TYR	-	expression tag	UNP P77674
A	-4	LYS	-	expression tag	UNP P77674
A	-3	LYS	-	expression tag	UNP P77674
A	-2	ALA	-	expression tag	UNP P77674
A	-1	GLY	-	expression tag	UNP P77674
A	0	LEU	-	expression tag	UNP P77674

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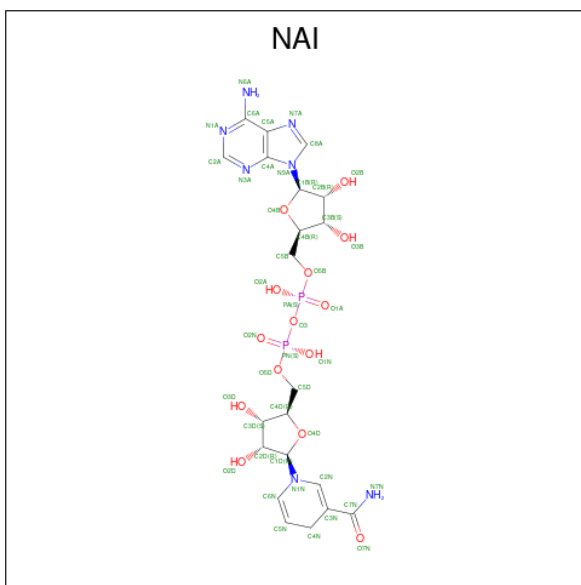
Chain	Residue	Modelled	Actual	Comment	Reference
A	197	VAL	ILE	conflict	UNP P77674
B	-20	SER	-	expression tag	UNP P77674
B	-19	TYR	-	expression tag	UNP P77674
B	-18	TYR	-	expression tag	UNP P77674
B	-17	HIS	-	expression tag	UNP P77674
B	-16	HIS	-	expression tag	UNP P77674
B	-15	HIS	-	expression tag	UNP P77674
B	-14	HIS	-	expression tag	UNP P77674
B	-13	HIS	-	expression tag	UNP P77674
B	-12	HIS	-	expression tag	UNP P77674
B	-11	LEU	-	expression tag	UNP P77674
B	-10	GLU	-	expression tag	UNP P77674
B	-9	SER	-	expression tag	UNP P77674
B	-8	THR	-	expression tag	UNP P77674
B	-7	SER	-	expression tag	UNP P77674
B	-6	LEU	-	expression tag	UNP P77674
B	-5	TYR	-	expression tag	UNP P77674
B	-4	LYS	-	expression tag	UNP P77674
B	-3	LYS	-	expression tag	UNP P77674
B	-2	ALA	-	expression tag	UNP P77674
B	-1	GLY	-	expression tag	UNP P77674
B	0	LEU	-	expression tag	UNP P77674
B	197	VAL	ILE	conflict	UNP P77674
C	-20	SER	-	expression tag	UNP P77674
C	-19	TYR	-	expression tag	UNP P77674
C	-18	TYR	-	expression tag	UNP P77674
C	-17	HIS	-	expression tag	UNP P77674
C	-16	HIS	-	expression tag	UNP P77674
C	-15	HIS	-	expression tag	UNP P77674
C	-14	HIS	-	expression tag	UNP P77674
C	-13	HIS	-	expression tag	UNP P77674
C	-12	HIS	-	expression tag	UNP P77674
C	-11	LEU	-	expression tag	UNP P77674
C	-10	GLU	-	expression tag	UNP P77674
C	-9	SER	-	expression tag	UNP P77674
C	-8	THR	-	expression tag	UNP P77674
C	-7	SER	-	expression tag	UNP P77674
C	-6	LEU	-	expression tag	UNP P77674
C	-5	TYR	-	expression tag	UNP P77674
C	-4	LYS	-	expression tag	UNP P77674
C	-3	LYS	-	expression tag	UNP P77674
C	-2	ALA	-	expression tag	UNP P77674

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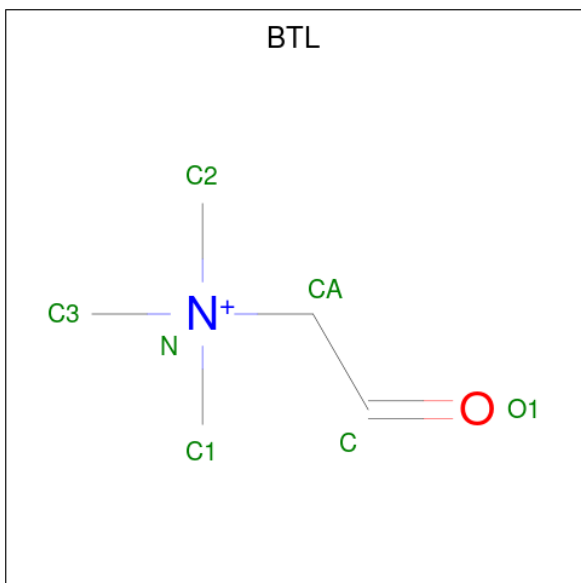
Chain	Residue	Modelled	Actual	Comment	Reference
C	-1	GLY	-	expression tag	UNP P77674
C	0	LEU	-	expression tag	UNP P77674
C	197	VAL	ILE	conflict	UNP P77674
D	-20	SER	-	expression tag	UNP P77674
D	-19	TYR	-	expression tag	UNP P77674
D	-18	TYR	-	expression tag	UNP P77674
D	-17	HIS	-	expression tag	UNP P77674
D	-16	HIS	-	expression tag	UNP P77674
D	-15	HIS	-	expression tag	UNP P77674
D	-14	HIS	-	expression tag	UNP P77674
D	-13	HIS	-	expression tag	UNP P77674
D	-12	HIS	-	expression tag	UNP P77674
D	-11	LEU	-	expression tag	UNP P77674
D	-10	GLU	-	expression tag	UNP P77674
D	-9	SER	-	expression tag	UNP P77674
D	-8	THR	-	expression tag	UNP P77674
D	-7	SER	-	expression tag	UNP P77674
D	-6	LEU	-	expression tag	UNP P77674
D	-5	TYR	-	expression tag	UNP P77674
D	-4	LYS	-	expression tag	UNP P77674
D	-3	LYS	-	expression tag	UNP P77674
D	-2	ALA	-	expression tag	UNP P77674
D	-1	GLY	-	expression tag	UNP P77674
D	0	LEU	-	expression tag	UNP P77674
D	197	VAL	ILE	conflict	UNP P77674

- Molecule 2 is 1,4-DIHYDRONICOTINAMIDE ADENINE DINUCLEOTIDE (CCD ID: NAI) (formula: $C_{21}H_{29}N_7O_{14}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	B	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	C	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	D	1	Total 44	C 21	N 7	O 14	P 2	0	0

- Molecule 3 is BETAINES ALDEHYDE (CCD ID: BTL) (formula: $\text{C}_5\text{H}_{12}\text{NO}$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	B	1	Total	C	N	O	0	0
			7	5	1	1		

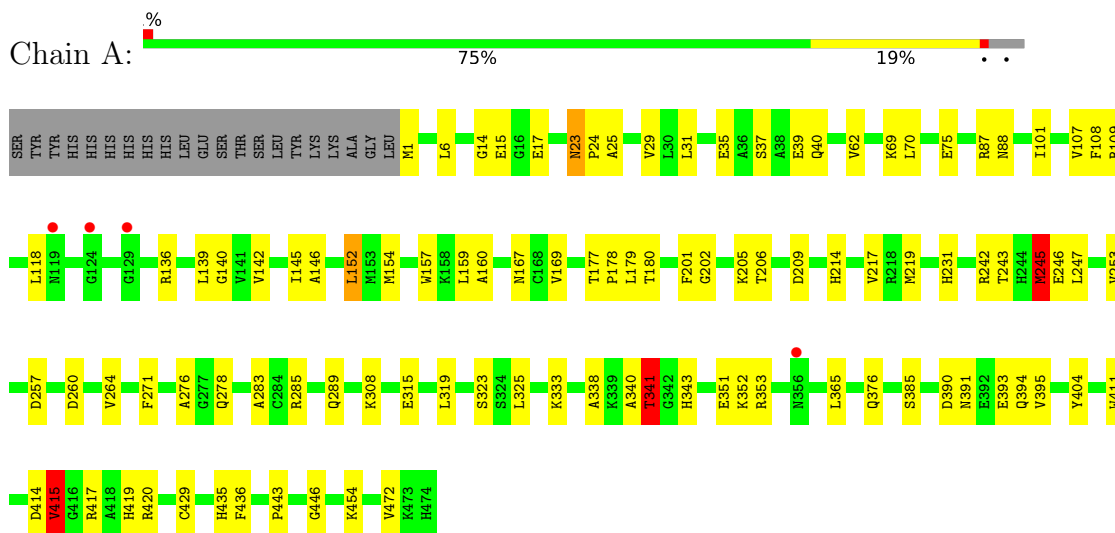
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	199	Total	O	0	0
			199	199		
4	B	216	Total	O	0	0
			216	216		
4	C	240	Total	O	0	0
			240	240		
4	D	176	Total	O	0	0
			176	176		

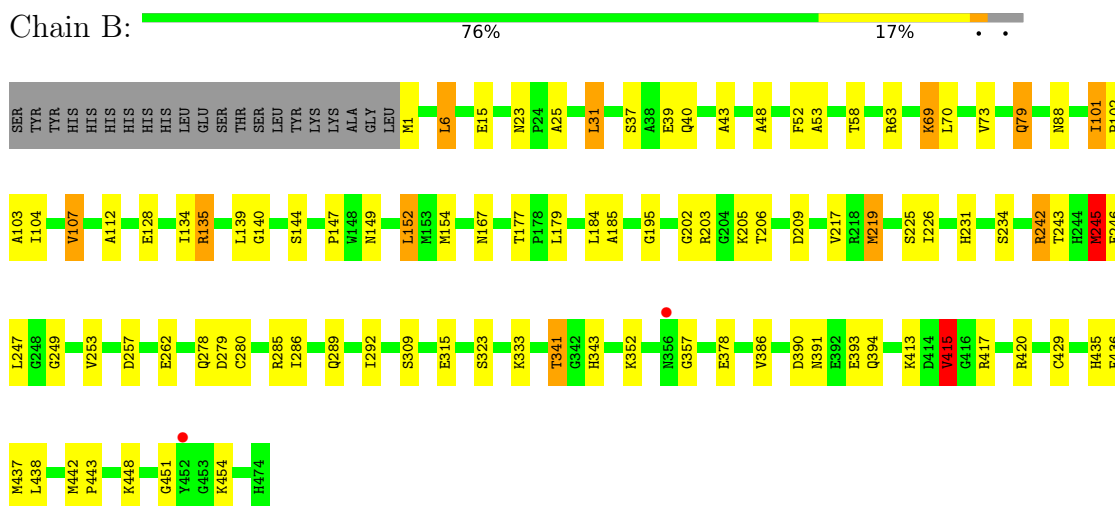
3 Residue-property plots

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.

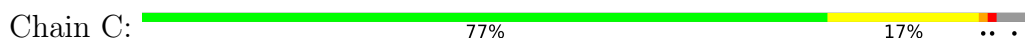
- Molecule 1: Putative betaine aldehyde dehydrogenase



- Molecule 1: Putative betaine aldehyde dehydrogenase

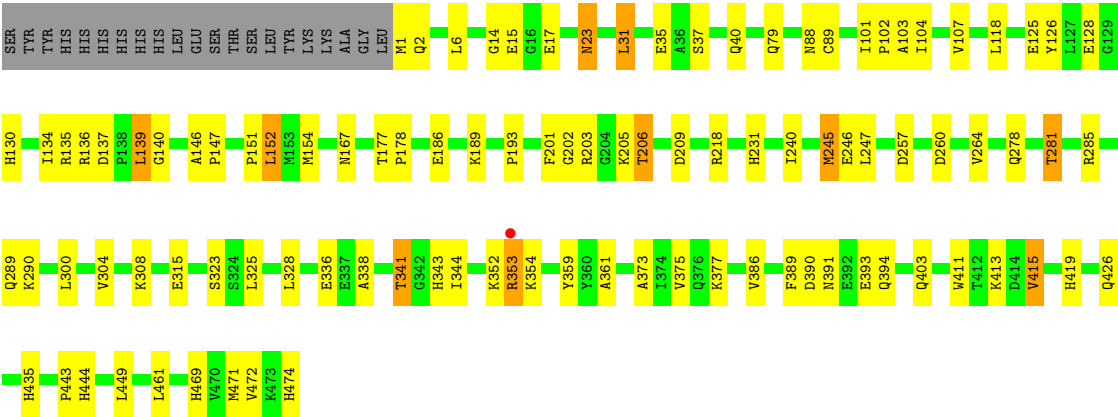


- Molecule 1: Putative betaine aldehyde dehydrogenase





● Molecule 1: Putative betaine aldehyde dehydrogenase



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	80.28Å 168.90Å 85.48Å 90.00° 90.65° 90.00°	Depositor
Resolution (Å)	18.00 – 2.20 18.00 – 2.20	Depositor EDS
% Data completeness (in resolution range)	93.6 (18.00-2.20) 69.8 (18.00-2.20)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.31 (at 2.19Å)	Xtriage
Refinement program	REFMAC 5.1.19	Depositor
R, R_{free}	0.182 , 0.239 (Not available) , 0.215	Depositor DCC
R_{free} test set	6660 reflections (8.29%)	wwPDB-VP
Wilson B-factor (Å ²)	21.2	Xtriage
Anisotropy	0.326	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 34.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	0.065 for h,-k,-l	Xtriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	15318	wwPDB-VP
Average B, all atoms (Å ²)	13.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.66% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: BTL, NAI

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	1.19	8/3655 (0.2%)	1.19	9/4963 (0.2%)
1	B	1.23	6/3655 (0.2%)	1.20	12/4963 (0.2%)
1	C	1.25	9/3655 (0.2%)	1.23	11/4963 (0.2%)
1	D	1.18	4/3655 (0.1%)	1.21	4/4963 (0.1%)
All	All	1.21	27/14620 (0.2%)	1.21	36/19852 (0.2%)

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	1

All (27) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	137	ASP	C-N	9.65	1.45	1.33
1	D	193	PRO	N-CD	-9.34	1.34	1.47
1	A	160	ALA	CA-CB	-8.99	1.42	1.53
1	C	466	VAL	CA-CB	7.54	1.63	1.54
1	B	112	ALA	CA-CB	7.30	1.64	1.53
1	C	2	GLN	C-N	7.05	1.44	1.33
1	A	101	ILE	CA-CB	7.02	1.57	1.54
1	C	383	VAL	CA-CB	6.57	1.63	1.54
1	B	101	ILE	CA-CB	6.53	1.57	1.54
1	C	233	ILE	CA-C	6.23	1.60	1.52
1	C	101	ILE	CA-CB	6.13	1.62	1.54
1	B	43	ALA	CA-CB	5.97	1.62	1.53
1	D	361	ALA	CA-C	5.84	1.59	1.53
1	A	29	VAL	CA-CB	5.84	1.60	1.54

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	142	VAL	CA-C	5.80	1.59	1.52
1	C	292	ILE	CA-CB	5.71	1.62	1.54
1	D	281	THR	CA-CB	5.63	1.62	1.53
1	A	146	ALA	CA-CB	-5.47	1.46	1.53
1	A	62	VAL	CA-CB	5.32	1.61	1.54
1	C	245	MET	C-O	5.28	1.29	1.23
1	A	260	ASP	C-N	-5.27	1.27	1.33
1	C	197	VAL	CA-CB	5.23	1.61	1.54
1	C	410	VAL	CA-CB	5.17	1.62	1.54
1	B	253	VAL	CA-CB	5.14	1.59	1.53
1	A	145	ILE	CA-CB	5.11	1.60	1.54
1	B	219	MET	SD-CE	5.11	1.92	1.79
1	B	217	VAL	CA-CB	5.02	1.59	1.54

All (36) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	245	MET	CG-SD-CE	9.17	121.08	100.90
1	C	136	ARG	NE-CZ-NH1	-7.43	114.07	121.50
1	C	136	ARG	NE-CZ-NH2	7.43	125.88	119.20
1	B	245	MET	N-CA-C	7.22	120.25	108.26
1	C	415	VAL	CB-CA-C	-6.92	102.80	112.14
1	C	453	GLY	N-CA-C	-6.88	105.42	111.95
1	A	415	VAL	CB-CA-C	-6.87	103.17	111.97
1	A	136	ARG	NE-CZ-NH1	-6.53	114.97	121.50
1	B	149	ASN	N-CA-C	6.50	118.16	111.14
1	B	202	GLY	N-CA-C	6.47	119.36	110.56
1	B	415	VAL	N-CA-CB	6.35	117.98	110.55
1	B	415	VAL	CB-CA-C	-6.33	103.86	111.97
1	A	395	VAL	N-CA-C	6.21	116.95	110.62
1	C	139	LEU	N-CA-C	5.73	119.45	112.23
1	A	179	LEU	N-CA-C	5.72	117.19	111.07
1	A	17	GLU	N-CA-C	5.69	118.81	109.76
1	B	417	ARG	NE-CZ-NH2	5.64	124.28	119.20
1	B	357	GLY	N-CA-C	-5.58	105.65	112.68
1	A	341	THR	N-CA-CB	-5.45	102.11	110.12
1	D	202	GLY	N-CA-C	5.42	117.41	110.96
1	D	135	ARG	NE-CZ-NH2	5.42	124.08	119.20
1	B	135	ARG	NE-CZ-NH2	5.39	124.06	119.20
1	A	245	MET	N-CA-C	5.39	118.23	108.69
1	D	353	ARG	NE-CZ-NH2	5.36	124.02	119.20
1	C	263	ALA	N-CA-C	-5.35	105.11	111.69

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	233	ILE	N-CA-C	5.30	115.92	110.36
1	C	242	ARG	NE-CZ-NH2	5.29	123.97	119.20
1	C	265	VAL	N-CA-C	-5.17	105.67	110.53
1	B	285	ARG	NE-CZ-NH1	-5.16	116.34	121.50
1	B	435	HIS	N-CA-C	-5.15	101.09	108.60
1	B	286	ILE	N-CA-C	5.13	115.96	108.58
1	A	446	GLY	N-CA-C	5.08	118.89	112.79
1	D	136	ARG	NE-CZ-NH2	5.05	123.75	119.20
1	A	136	ARG	NE-CZ-NH2	5.04	123.73	119.20
1	B	107	VAL	N-CA-C	-5.03	105.49	110.62
1	C	218	ARG	N-CA-C	-5.01	107.21	113.72

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	417	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	3576	0	3559	63	0
1	B	3576	0	3559	62	0
1	C	3576	0	3559	79	0
1	D	3576	0	3559	68	0
2	A	44	0	27	2	0
2	B	44	0	27	3	0
2	C	44	0	27	6	0
2	D	44	0	27	2	0
3	B	7	0	12	6	0
4	A	199	0	0	10	0
4	B	216	0	0	5	0
4	C	240	0	0	12	0
4	D	176	0	0	6	0
All	All	15318	0	14356	266	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 9.

All (266) 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:222:LEU:HB3	1:C:245:MET:HE2	1.28	1.11
1:B:280[B]:CYS:SG	2:B:2001:NAI:N7N	2.28	1.06
1:C:133:MET:HE3	4:C:3241:HOH:O	1.56	1.04
1:C:222:LEU:HB3	1:C:245:MET:CE	1.91	1.00
1:B:139:LEU:H	1:B:167:ASN:HD21	1.17	0.93
1:C:390:ASP:H	1:C:394:GLN:HE22	0.99	0.92
1:A:139:LEU:H	1:A:167:ASN:HD21	1.10	0.89
1:A:37:SER:H	1:A:40:GLN:HE21	1.18	0.88
1:C:390:ASP:H	1:C:394:GLN:NE2	1.74	0.86
1:B:390:ASP:H	1:B:394:GLN:HE22	1.22	0.85
1:C:222:LEU:CB	1:C:245:MET:HE2	2.05	0.85
1:C:2:GLN:NE2	1:C:186:GLU:CD	2.35	0.84
2:C:3001:NAI:C4D	2:C:3001:NAI:O1N	2.25	0.83
1:D:390:ASP:H	1:D:394:GLN:HE22	1.24	0.83
1:C:133:MET:CE	4:C:3241:HOH:O	2.20	0.82
1:D:257:ASP:H	1:D:289:GLN:HE21	1.32	0.78
1:D:336:GLU:CD	4:D:4122:HOH:O	2.27	0.77
1:B:257:ASP:H	1:B:289:GLN:HE21	1.34	0.76
1:A:118:LEU:HB2	4:A:1139:HOH:O	1.84	0.75
1:D:140:GLY:H	1:D:167:ASN:HD22	1.34	0.75
1:A:390:ASP:H	1:A:394:GLN:HE22	1.33	0.75
1:B:436:PHE:CE1	3:B:5001:BTL:H22	2.22	0.74
1:A:257:ASP:H	1:A:289:GLN:HE21	1.32	0.74
1:B:280[B]:CYS:SG	2:B:2001:NAI:C7N	2.76	0.73
1:B:438:LEU:HD12	3:B:5001:BTL:H33	1.69	0.73
1:C:139:LEU:H	1:C:167:ASN:HD21	1.34	0.72
1:D:444:HIS:HD2	4:D:4032:HOH:O	1.72	0.72
1:A:23:ASN:C	1:A:23:ASN:HD22	1.97	0.72
4:C:3211:HOH:O	1:D:413:LYS:HD2	1.89	0.71
2:D:4001:NAI:N1A	4:D:4005:HOH:O	2.23	0.71
1:B:279:ASP:OD2	3:B:5001:BTL:HA1	1.91	0.71
1:D:444:HIS:CD2	4:D:4032:HOH:O	2.44	0.70
1:B:79:GLN:CB	4:B:5176:HOH:O	2.39	0.70
1:D:139:LEU:H	1:D:167:ASN:HD21	1.39	0.69
1:C:23:ASN:C	1:C:23:ASN:HD22	1.99	0.69
1:D:37:SER:H	1:D:40:GLN:HE21	1.40	0.69
1:D:290:LYS:HG2	1:D:389:PHE:O	1.91	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:390:ASP:H	1:D:394:GLN:NE2	1.90	0.69
1:B:31:LEU:HD11	1:B:179:LEU:HD21	1.75	0.68
1:A:139:LEU:H	1:A:167:ASN:ND2	1.90	0.67
1:B:79:GLN:HB3	4:B:5176:HOH:O	1.92	0.67
1:A:139:LEU:N	1:A:167:ASN:HD21	1.89	0.67
2:C:3001:NAI:O1N	2:C:3001:NAI:C3D	2.43	0.66
2:A:1001:NAI:O1A	2:A:1001:NAI:H52N	1.95	0.66
1:C:37:SER:H	1:C:40:GLN:HE21	1.42	0.66
1:A:390:ASP:H	1:A:394:GLN:NE2	1.94	0.65
1:D:338:ALA:O	1:D:341:THR:HB	1.96	0.65
1:B:443:PRO:HB2	1:B:454:LYS:HD2	1.79	0.64
1:D:2:GLN:HE21	1:D:186:GLU:HB2	1.61	0.64
1:B:37:SER:H	1:B:40:GLN:HE21	1.45	0.64
1:A:23:ASN:ND2	1:A:25:ALA:H	1.94	0.64
1:B:139:LEU:H	1:B:167:ASN:ND2	1.92	0.64
1:C:278:GLN:HE22	1:C:323:SER:H	1.46	0.64
1:C:245:MET:HG3	1:C:247:LEU:HD21	1.79	0.64
4:A:1008:HOH:O	1:C:130:HIS:HE1	1.82	0.63
1:D:140:GLY:H	1:D:167:ASN:ND2	1.97	0.63
1:C:2:GLN:HE21	1:C:186:GLU:CG	2.11	0.63
1:A:23:ASN:HD22	1:A:25:ALA:H	1.48	0.61
1:D:278:GLN:HE22	1:D:323:SER:N	1.98	0.61
1:A:257:ASP:H	1:A:289:GLN:NE2	1.98	0.61
1:C:266:GLU:HG3	4:C:3172:HOH:O	1.99	0.61
2:D:4001:NAI:O1N	2:D:4001:NAI:O1A	2.16	0.61
1:C:245:MET:CG	1:C:247:LEU:HD21	2.30	0.61
1:A:391:ASN:ND2	1:A:394:GLN:H	1.99	0.61
1:C:15:GLU:H	1:C:40:GLN:HE22	1.48	0.61
1:A:15:GLU:H	1:A:40:GLN:HE22	1.48	0.61
1:C:390:ASP:N	1:C:394:GLN:HE22	1.84	0.60
1:B:140:GLY:H	1:B:167:ASN:HD22	1.47	0.60
1:D:23:ASN:HD22	1:D:23:ASN:C	2.10	0.60
1:D:278:GLN:HE22	1:D:323:SER:H	1.48	0.60
1:A:15:GLU:H	1:A:40:GLN:NE2	2.00	0.59
1:C:260:ASP:HB2	1:C:413:LYS:HE2	1.84	0.59
1:B:437:MET:HA	1:B:437:MET:HE2	1.83	0.59
1:B:390:ASP:H	1:B:394:GLN:NE2	1.98	0.59
1:C:257:ASP:H	1:C:289:GLN:HE21	1.50	0.59
1:C:17:GLU:O	1:C:35:GLU:HG3	2.03	0.58
1:C:444:HIS:HD2	4:C:3054:HOH:O	1.84	0.58
2:C:3001:NAI:O1N	2:C:3001:NAI:O4D	2.21	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:88:ASN:HD21	1:A:177:THR:HA	1.67	0.58
1:C:339:LYS:HE2	1:C:346:VAL:HG21	1.85	0.58
1:B:23:ASN:C	1:B:23:ASN:HD22	2.12	0.58
1:B:249:GLY:O	1:B:378:GLU:HG3	2.04	0.58
1:C:222:LEU:CD2	1:C:245:MET:HE2	2.34	0.58
1:C:58:THR:OG1	1:C:63:ARG:HD3	2.03	0.58
1:C:147:PRO:HB2	2:C:3001:NAI:O7N	2.04	0.58
1:D:469:HIS:CE1	1:D:471:MET:HE3	2.40	0.57
1:A:338:ALA:O	1:A:341:THR:HB	2.04	0.57
1:A:415:VAL:HA	1:B:415:VAL:HG13	1.87	0.57
1:B:79:GLN:HB2	4:B:5052:HOH:O	2.05	0.57
1:A:1:MET:N	4:A:1031:HOH:O	2.37	0.56
1:C:203:ARG:HB2	1:C:206:THR:HG22	1.88	0.56
1:C:271:PHE:CD2	1:C:435:HIS:HB3	2.41	0.56
1:B:257:ASP:H	1:B:289:GLN:NE2	2.00	0.56
1:C:73:VAL:HG22	4:C:3077:HOH:O	2.05	0.56
1:B:436:PHE:O	3:B:5001:BTL:H11	2.05	0.56
1:D:245:MET:CG	1:D:247:LEU:HD21	2.36	0.56
1:C:15:GLU:H	1:C:40:GLN:NE2	2.05	0.55
1:D:328:LEU:HD21	1:D:352:LYS:HE3	1.87	0.55
1:B:79:GLN:CG	4:B:5176:HOH:O	2.53	0.55
1:C:35:GLU:OE2	1:C:206:THR:HG21	2.06	0.55
1:A:88:ASN:ND2	1:A:177:THR:HA	2.21	0.55
1:C:2:GLN:HE21	1:C:186:GLU:HG3	1.70	0.55
1:A:39:GLU:HG3	4:A:1108:HOH:O	2.05	0.54
1:D:209:ASP:OD1	1:D:231:HIS:HE1	1.90	0.54
1:C:222:LEU:HB3	1:C:245:MET:HE3	1.86	0.54
1:C:242:ARG:NH1	1:C:465:THR:O	2.32	0.53
1:A:209:ASP:OD1	1:A:231:HIS:HE1	1.91	0.53
1:B:245:MET:HG2	1:B:247:LEU:HD21	1.91	0.53
1:C:140:GLY:H	1:C:167:ASN:HD22	1.54	0.53
1:C:128:GLU:O	1:C:130:HIS:HD2	1.91	0.53
1:D:101:ILE:HB	1:D:102:PRO:HD3	1.91	0.53
1:C:154:MET:HE1	1:C:157:TRP:CZ3	2.44	0.53
1:A:278:GLN:HE22	1:A:323:SER:H	1.57	0.52
2:A:1001:NAI:O1A	2:A:1001:NAI:C5D	2.58	0.52
1:D:103:ALA:O	1:D:107:VAL:HG23	2.08	0.52
1:B:15:GLU:H	1:B:40:GLN:HE22	1.57	0.52
1:D:300:LEU:O	1:D:304:VAL:HG23	2.10	0.52
1:B:103:ALA:O	1:B:107:VAL:HG23	2.09	0.52
1:B:139:LEU:N	1:B:167:ASN:HD21	1.97	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:420:ARG:HD3	4:C:3187:HOH:O	2.09	0.51
1:B:436:PHE:CE1	3:B:5001:BTLL:C2	2.93	0.51
1:B:391:ASN:ND2	1:B:394:GLN:H	2.09	0.51
1:A:75:GLU:CD	1:A:109:ARG:HH12	2.19	0.51
1:A:140:GLY:H	1:A:167:ASN:HD22	1.58	0.51
1:A:152:LEU:HG	1:A:180:THR:HB	1.92	0.51
1:A:419:HIS:CD2	1:D:472:VAL:HG11	2.46	0.51
1:C:120:GLY:HA3	4:C:3229:HOH:O	2.10	0.51
1:C:2:GLN:NE2	1:C:186:GLU:CG	2.71	0.51
1:B:443:PRO:HD2	1:D:134:ILE:HD11	1.91	0.50
1:A:472:VAL:HG11	1:D:419:HIS:CD2	2.47	0.50
4:B:5027:HOH:O	1:D:130:HIS:HE1	1.94	0.50
1:D:17:GLU:O	1:D:35:GLU:HG3	2.10	0.50
1:A:276:ALA:HA	1:A:319:LEU:HD11	1.94	0.50
1:A:23:ASN:C	1:A:23:ASN:ND2	2.69	0.50
1:A:271:PHE:CD2	1:A:435:HIS:HB3	2.47	0.50
1:B:147:PRO:CG	1:B:154:MET:HG3	2.42	0.49
1:C:257:ASP:H	1:C:289:GLN:NE2	2.10	0.49
1:A:243:THR:HB	1:A:245:MET:HE3	1.94	0.49
1:A:278:GLN:HE22	1:A:323:SER:N	2.10	0.49
1:C:139:LEU:N	1:C:167:ASN:HD21	2.08	0.49
1:D:264:VAL:HG22	1:D:411:TRP:CE3	2.48	0.49
1:A:109:ARG:NH2	4:A:1191:HOH:O	2.46	0.49
1:C:278:GLN:HE22	1:C:323:SER:N	2.10	0.49
1:D:341:THR:HG23	1:D:343:HIS:H	1.77	0.49
1:C:23:ASN:C	1:C:23:ASN:ND2	2.70	0.48
1:C:225:SER:HB3	2:C:3001:NAI:O4D	2.12	0.48
1:C:245:MET:HG2	1:C:247:LEU:HD11	1.95	0.48
1:D:139:LEU:N	1:D:167:ASN:HD21	2.06	0.48
1:B:243:THR:HB	1:B:245:MET:HE3	1.96	0.48
1:C:154:MET:HE1	1:C:157:TRP:CE3	2.48	0.48
1:D:245:MET:HG2	1:D:247:LEU:HD21	1.96	0.48
1:C:14:GLY:HA2	1:C:40:GLN:HE22	1.79	0.47
1:D:15:GLU:H	1:D:40:GLN:HE22	1.61	0.47
1:A:472:VAL:HA	1:C:432:VAL:HB	1.95	0.47
1:C:444:HIS:CD2	4:C:3054:HOH:O	2.64	0.47
1:D:403:GLN:O	1:D:449:LEU:HB2	2.14	0.47
1:C:76:GLU:OE1	4:C:3077:HOH:O	2.20	0.47
1:C:152:LEU:HG	1:C:180:THR:HB	1.97	0.47
1:C:23:ASN:ND2	1:C:25:ALA:H	2.12	0.47
1:B:101:ILE:HB	1:B:102:PRO:HD3	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:225:SER:HB3	2:B:2001:NAI:O4D	2.15	0.47
1:C:438:LEU:HB3	1:C:456:MET:HE1	1.96	0.47
1:D:104:ILE:HD13	1:D:152:LEU:HD13	1.97	0.47
1:A:435:HIS:O	1:A:436:PHE:CB	2.62	0.47
1:D:469:HIS:HE1	1:D:471:MET:HE3	1.79	0.47
1:A:159:LEU:HD23	1:A:169:VAL:HG11	1.97	0.47
1:B:292:ILE:C	1:B:292:ILE:HD12	2.40	0.47
1:D:390:ASP:HB3	1:D:394:GLN:NE2	2.29	0.47
1:C:391:ASN:ND2	1:C:394:GLN:H	2.13	0.46
1:D:118:LEU:HD21	1:D:461:LEU:HD23	1.98	0.46
1:B:134:ILE:HD11	1:D:443:PRO:HD2	1.97	0.46
1:D:178:PRO:HG3	1:D:201:PHE:CE2	2.50	0.46
1:B:69:LYS:O	1:B:73:VAL:HG23	2.15	0.46
1:B:226:ILE:HA	1:B:247:LEU:HD13	1.96	0.46
1:D:203:ARG:HB2	1:D:206:THR:HG23	1.97	0.46
1:A:23:ASN:HD22	1:A:24:PRO:N	2.14	0.46
1:A:390:ASP:HB3	1:A:394:GLN:NE2	2.30	0.46
1:C:35:GLU:HA	1:C:201:PHE:HD1	1.81	0.46
1:D:88:ASN:HD21	1:D:177:THR:HA	1.81	0.46
1:A:245:MET:CG	1:A:247:LEU:HD21	2.46	0.45
1:B:6:LEU:HB2	1:B:185:ALA:HB1	1.98	0.45
1:A:214:HIS:HB3	1:A:217:VAL:HG23	1.99	0.45
1:B:219:MET:HG3	1:B:242:ARG:HB3	1.99	0.45
1:A:219:MET:HG3	1:A:242:ARG:HB3	1.98	0.45
1:D:341:THR:HG21	1:D:344:ILE:HG13	1.98	0.45
1:A:420:ARG:HG3	1:D:474:HIS:HB3	1.99	0.45
1:B:48:ALA:HA	1:B:195:GLY:O	2.16	0.45
1:B:278:GLN:HE22	1:B:323:SER:N	2.15	0.45
1:C:278:GLN:NE2	1:C:323:SER:H	2.15	0.45
1:A:376:GLN:O	1:A:404:TYR:HE2	2.00	0.44
1:C:290:LYS:HD2	1:C:390:ASP:OD1	2.16	0.44
1:C:88:ASN:HD21	1:C:178:PRO:HD2	1.83	0.44
1:D:245:MET:HG3	1:D:247:LEU:HD21	1.98	0.44
1:B:104:ILE:HD13	1:B:152:LEU:HD13	1.99	0.44
1:B:139:LEU:CD1	1:B:219:MET:SD	3.05	0.44
1:D:391:ASN:ND2	1:D:394:GLN:H	2.16	0.44
1:A:154:MET:HE1	1:A:157:TRP:CZ3	2.52	0.44
1:A:253:VAL:HG21	1:A:283:ALA:HB1	1.99	0.44
4:A:1008:HOH:O	1:C:130:HIS:CE1	2.64	0.44
1:C:222:LEU:HD23	1:C:245:MET:HE2	1.99	0.44
1:D:2:GLN:NE2	1:D:186:GLU:HB2	2.31	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:443:PRO:HB2	1:A:454:LYS:HD2	2.00	0.44
1:D:125:GLU:HA	1:D:130:HIS:O	2.18	0.44
1:A:340:ALA:HA	4:A:1110:HOH:O	2.17	0.43
1:D:426:GLN:HG2	4:D:4141:HOH:O	2.17	0.43
1:B:203:ARG:NH1	1:B:206:THR:HG21	2.33	0.43
1:C:378:GLU:OE1	4:C:3183:HOH:O	2.21	0.43
1:D:89:CYS:SG	1:D:151:PRO:HG2	2.58	0.43
1:D:154:MET:SD	4:D:4146:HOH:O	2.61	0.43
1:D:353:ARG:HB3	1:D:359:TYR:HB2	1.99	0.43
1:A:70:LEU:HD23	1:A:108:PHE:CE2	2.54	0.43
1:D:14:GLY:HA2	1:D:40:GLN:HE22	1.83	0.43
1:B:341:THR:HG23	1:B:343:HIS:H	1.84	0.43
1:C:415:VAL:HA	1:D:415:VAL:HG13	2.00	0.43
1:A:178:PRO:HG3	1:A:201:PHE:CE2	2.54	0.43
1:A:35:GLU:HG2	1:A:202:GLY:HA2	2.00	0.43
1:D:37:SER:H	1:D:40:GLN:NE2	2.13	0.43
1:B:70:LEU:HD11	1:B:184:LEU:HD11	2.01	0.42
1:B:278:GLN:HE22	1:B:323:SER:H	1.68	0.42
1:C:23:ASN:HD22	1:C:25:ALA:H	1.66	0.42
1:C:31:LEU:HD12	1:C:31:LEU:N	2.34	0.42
1:C:164:ALA:HB3	1:C:461:LEU:HD13	2.01	0.42
1:D:373:ALA:HB1	1:D:377:LYS:HD2	2.01	0.42
1:A:39:GLU:CG	4:A:1108:HOH:O	2.65	0.42
1:B:140:GLY:O	1:B:167:ASN:HB3	2.20	0.42
1:C:239:SER:OG	1:C:241:LYS:HG3	2.19	0.42
1:A:429:CYS:HA	1:C:469:HIS:O	2.19	0.42
1:D:128:GLU:O	1:D:130:HIS:HD2	2.01	0.42
2:C:3001:NAI:C6N	4:C:3183:HOH:O	2.67	0.42
1:C:147:PRO:HG2	1:C:154:MET:HG3	2.02	0.42
1:D:260:ASP:OD1	1:D:260:ASP:C	2.63	0.42
1:A:14:GLY:HA2	1:A:40:GLN:HE22	1.85	0.42
1:C:455:ASP:O	1:C:456:MET:HB2	2.19	0.42
1:A:341:THR:HG23	1:A:343:HIS:CE1	2.55	0.42
1:D:285:ARG:HD3	1:D:375:VAL:O	2.20	0.42
1:B:448:LYS:HG2	1:D:218:ARG:CZ	2.50	0.42
1:D:31:LEU:C	1:D:31:LEU:HD13	2.45	0.42
1:A:87:ARG:NH2	4:A:1175:HOH:O	2.52	0.41
1:D:341:THR:CG2	1:D:343:HIS:H	2.33	0.41
1:B:52:PHE:O	1:B:53:ALA:C	2.59	0.41
1:C:389:PHE:CD1	1:C:395:VAL:HB	2.55	0.41
1:C:390:ASP:N	1:C:394:GLN:NE2	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:451:GLY:HA2	1:D:240:ILE:HG21	2.02	0.41
1:C:179:LEU:HD23	1:C:179:LEU:HA	1.90	0.41
1:A:365:LEU:O	1:A:385:SER:HA	2.21	0.41
1:B:88:ASN:HD21	1:B:177:THR:HA	1.85	0.41
1:A:264:VAL:HG22	1:A:411:TRP:CE3	2.55	0.41
1:B:243:THR:HB	1:B:245:MET:CE	2.50	0.41
1:C:250:LYS:HD3	1:C:378:GLU:HA	2.03	0.41
1:A:257:ASP:N	1:A:289:GLN:HE21	2.09	0.41
1:A:276:ALA:HA	1:A:319:LEU:CD1	2.51	0.41
1:B:58:THR:OG1	1:B:63:ARG:HD3	2.20	0.41
1:C:224:GLY:O	1:C:247:LEU:HA	2.20	0.41
1:D:278:GLN:NE2	1:D:323:SER:H	2.14	0.41
1:A:414:ASP:OD1	4:A:1096:HOH:O	2.22	0.41
1:A:415:VAL:HG23	1:B:413:LYS:O	2.20	0.41
1:B:23:ASN:ND2	1:B:25:ALA:H	2.19	0.41
1:B:442:MET:HE3	1:D:126:TYR:CE1	2.56	0.41
1:B:438:LEU:HD11	3:B:5001:BTL:H	2.03	0.40
1:A:139:LEU:N	1:A:167:ASN:ND2	2.61	0.40
1:B:420:ARG:HG3	1:C:474:HIS:HB3	2.04	0.40
1:B:209:ASP:OD1	1:B:231:HIS:HE1	2.04	0.40
1:C:88:ASN:HD21	1:C:177:THR:HA	1.87	0.40
1:C:425:LEU:HD23	1:C:425:LEU:HA	1.99	0.40
1:D:146:ALA:HA	1:D:147:PRO:HD3	1.96	0.40
1:D:281:THR:O	1:D:435:HIS:NE2	2.48	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	473/495 (96%)	458 (97%)	15 (3%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	473/495 (96%)	459 (97%)	14 (3%)	0	100	100
1	C	473/495 (96%)	462 (98%)	11 (2%)	0	100	100
1	D	473/495 (96%)	457 (97%)	15 (3%)	1 (0%)	43	51
All	All	1892/1980 (96%)	1836 (97%)	55 (3%)	1 (0%)	48	57

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	189	LYS

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	372/390 (95%)	351 (94%)	21 (6%)	19	24
1	B	372/390 (95%)	347 (93%)	25 (7%)	15	17
1	C	372/390 (95%)	356 (96%)	16 (4%)	26	35
1	D	372/390 (95%)	353 (95%)	19 (5%)	21	27
All	All	1488/1560 (95%)	1407 (95%)	81 (5%)	19	25

All (81) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	6	LEU
1	A	23	ASN
1	A	31	LEU
1	A	69	LYS
1	A	107	VAL
1	A	152	LEU
1	A	205	LYS
1	A	206	THR
1	A	245	MET
1	A	246	GLU

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Mol	Chain	Res	Type
1	A	285	ARG
1	A	308	LYS
1	A	315	GLU
1	A	325	LEU
1	A	333	LYS
1	A	341	THR
1	A	351	GLU
1	A	352	LYS
1	A	353	ARG
1	A	393	GLU
1	A	415	VAL
1	B	1	MET
1	B	6	LEU
1	B	31	LEU
1	B	39	GLU
1	B	69	LYS
1	B	79	GLN
1	B	128	GLU
1	B	135	ARG
1	B	144	SER
1	B	152	LEU
1	B	205	LYS
1	B	234	SER
1	B	242	ARG
1	B	245	MET
1	B	246	GLU
1	B	262	GLU
1	B	309	SER
1	B	315	GLU
1	B	333	LYS
1	B	341	THR
1	B	352	LYS
1	B	386	VAL
1	B	393	GLU
1	B	415	VAL
1	B	429	CYS
1	C	6	LEU
1	C	23	ASN
1	C	31	LEU
1	C	152	LEU
1	C	234	SER
1	C	242	ARG

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Mol	Chain	Res	Type
1	C	245	MET
1	C	246	GLU
1	C	262	GLU
1	C	308	LYS
1	C	315	GLU
1	C	352	LYS
1	C	354	LYS
1	C	393	GLU
1	C	415	VAL
1	C	466	VAL
1	D	1	MET
1	D	6	LEU
1	D	23	ASN
1	D	31	LEU
1	D	79	GLN
1	D	139	LEU
1	D	152	LEU
1	D	205	LYS
1	D	206	THR
1	D	245	MET
1	D	246	GLU
1	D	308	LYS
1	D	315	GLU
1	D	325	LEU
1	D	341	THR
1	D	354	LYS
1	D	386	VAL
1	D	393	GLU
1	D	415	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (62) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	2	GLN
1	A	23	ASN
1	A	40	GLN
1	A	77	ASN
1	A	79	GLN
1	A	88	ASN
1	A	119	ASN
1	A	130	HIS
1	A	167	ASN

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Mol	Chain	Res	Type
1	A	231	HIS
1	A	244	HIS
1	A	278	GLN
1	A	289	GLN
1	A	391	ASN
1	A	394	GLN
1	A	403	GLN
1	B	3	HIS
1	B	23	ASN
1	B	40	GLN
1	B	77	ASN
1	B	119	ASN
1	B	167	ASN
1	B	231	HIS
1	B	244	HIS
1	B	278	GLN
1	B	289	GLN
1	B	391	ASN
1	B	394	GLN
1	B	403	GLN
1	B	444	HIS
1	C	2	GLN
1	C	23	ASN
1	C	40	GLN
1	C	77	ASN
1	C	88	ASN
1	C	98	ASN
1	C	119	ASN
1	C	130	HIS
1	C	167	ASN
1	C	231	HIS
1	C	244	HIS
1	C	278	GLN
1	C	289	GLN
1	C	391	ASN
1	C	394	GLN
1	C	403	GLN
1	C	444	HIS
1	D	2	GLN
1	D	23	ASN
1	D	40	GLN
1	D	77	ASN

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Mol	Chain	Res	Type
1	D	88	ASN
1	D	119	ASN
1	D	130	HIS
1	D	167	ASN
1	D	231	HIS
1	D	278	GLN
1	D	289	GLN
1	D	391	ASN
1	D	394	GLN
1	D	403	GLN
1	D	444	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](#)

5 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAI	D	4001	-	47,48,48	2.15	10 (21%)	64,73,73	1.91	16 (25%)
3	BTL	B	5001	-	6,6,6	1.07	0	8,8,8	1.98	2 (25%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAI	B	2001	-	47,48,48	2.02	10 (21%)	64,73,73	2.03	15 (23%)
2	NAI	A	1001	-	47,48,48	2.04	8 (17%)	64,73,73	2.38	27 (42%)
2	NAI	C	3001	-	47,48,48	2.26	10 (21%)	64,73,73	2.08	22 (34%)

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	NAI	D	4001	-	-	11/29/72/72	0/5/5/5
3	BTL	B	5001	-	-	1/3/4/4	-
2	NAI	B	2001	-	-	10/29/72/72	0/5/5/5
2	NAI	A	1001	-	-	10/29/72/72	0/5/5/5
2	NAI	C	3001	-	-	10/29/72/72	0/5/5/5

All (38) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	4001	NAI	O7N-C7N	8.30	1.43	1.24
2	C	3001	NAI	PN-O3	8.30	1.68	1.59
2	C	3001	NAI	O7N-C7N	7.60	1.42	1.24
2	B	2001	NAI	O7N-C7N	6.65	1.40	1.24
2	A	1001	NAI	O7N-C7N	6.55	1.39	1.24
2	B	2001	NAI	PN-O3	6.54	1.66	1.59
2	D	4001	NAI	PN-O3	6.46	1.66	1.59
2	A	1001	NAI	C4N-C3N	-6.13	1.38	1.50
2	A	1001	NAI	C4N-C5N	-5.36	1.35	1.49
2	C	3001	NAI	C4N-C3N	-5.32	1.39	1.50
2	B	2001	NAI	C4N-C3N	-4.92	1.40	1.50
2	A	1001	NAI	PN-O3	4.71	1.64	1.59
2	D	4001	NAI	C4N-C3N	-4.55	1.41	1.50
2	D	4001	NAI	C2A-N1A	3.99	1.41	1.33
2	B	2001	NAI	C2A-N3A	3.94	1.40	1.33
2	C	3001	NAI	C4N-C5N	-3.88	1.38	1.49
2	D	4001	NAI	C4N-C5N	-3.53	1.39	1.49
2	B	2001	NAI	C4N-C5N	-3.51	1.39	1.49
2	C	3001	NAI	C8A-N7A	3.40	1.38	1.31
2	A	1001	NAI	C2A-N1A	2.91	1.39	1.33
2	C	3001	NAI	PA-O3	2.91	1.62	1.59
2	D	4001	NAI	C2A-N3A	2.90	1.39	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	2001	NAI	C2A-N1A	2.87	1.39	1.33
2	A	1001	NAI	C2A-N3A	2.75	1.38	1.33
2	D	4001	NAI	C8A-N7A	2.73	1.36	1.31
2	A	1001	NAI	C8A-N7A	2.71	1.36	1.31
2	A	1001	NAI	C2N-C3N	2.67	1.42	1.35
2	C	3001	NAI	C2A-N3A	2.65	1.38	1.33
2	D	4001	NAI	C6N-C5N	2.56	1.40	1.33
2	B	2001	NAI	C8A-N7A	2.48	1.36	1.31
2	D	4001	NAI	PA-O3	-2.43	1.56	1.59
2	C	3001	NAI	C2A-N1A	2.36	1.38	1.33
2	C	3001	NAI	C5D-C4D	2.32	1.58	1.51
2	B	2001	NAI	C6N-C5N	2.16	1.39	1.33
2	C	3001	NAI	C6N-C5N	2.13	1.39	1.33
2	B	2001	NAI	C6A-N1A	2.07	1.41	1.35
2	B	2001	NAI	PN-O5D	2.05	1.67	1.59
2	D	4001	NAI	O4D-C4D	-2.05	1.40	1.45

All (82) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2001	NAI	N3A-C2A-N1A	-7.15	117.77	128.58
2	C	3001	NAI	O4D-C1D-N1N	6.54	120.56	108.08
2	D	4001	NAI	O2A-PA-O3	6.51	124.86	107.27
2	A	1001	NAI	C1D-N1N-C2N	5.81	130.72	121.14
2	A	1001	NAI	C3N-C2N-N1N	-5.52	115.09	123.20
2	A	1001	NAI	O5D-C5D-C4D	5.22	126.75	108.99
2	A	1001	NAI	C1D-N1N-C6N	-4.90	110.42	120.77
2	B	2001	NAI	O4B-C1B-N9A	4.83	117.36	108.09
2	D	4001	NAI	C5A-C4A-N3A	-4.79	120.12	126.72
2	C	3001	NAI	N9A-C8A-N7A	-4.76	107.18	113.94
3	B	5001	BTL	C2-N-C3	-4.53	97.07	108.98
2	B	2001	NAI	C5A-C4A-N3A	-4.47	120.56	126.72
2	A	1001	NAI	N3A-C2A-N1A	-4.46	121.83	128.58
2	C	3001	NAI	C5A-C4A-N3A	-4.37	120.69	126.72
2	D	4001	NAI	N3A-C2A-N1A	-4.31	122.06	128.58
2	B	2001	NAI	C2A-N3A-C4A	4.23	122.17	111.83
2	C	3001	NAI	N3A-C2A-N1A	-4.23	122.18	128.58
2	A	1001	NAI	O3-PA-O1A	-4.20	98.07	110.70
2	B	2001	NAI	N9A-C8A-N7A	-4.10	108.12	113.94
2	B	2001	NAI	O7N-C7N-C3N	-4.10	113.18	120.90
2	A	1001	NAI	N9A-C8A-N7A	-3.96	108.32	113.94
2	C	3001	NAI	C3N-C2N-N1N	-3.93	117.44	123.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3001	NAI	C5A-N7A-C8A	3.93	109.62	103.45
2	B	2001	NAI	C3N-C2N-N1N	-3.81	117.61	123.20
2	A	1001	NAI	O3-PN-O2N	-3.81	99.25	110.70
2	D	4001	NAI	N3A-C4A-N9A	3.63	133.34	127.17
2	C	3001	NAI	C4D-O4D-C1D	-3.52	101.69	109.47
2	C	3001	NAI	O5D-C5D-C4D	3.47	120.81	108.99
2	A	1001	NAI	O3D-C3D-C2D	-3.46	100.71	111.82
2	C	3001	NAI	O4B-C1B-N9A	3.45	114.72	108.09
2	B	2001	NAI	N3A-C4A-N9A	3.44	133.01	127.17
2	A	1001	NAI	C5A-N7A-C8A	3.38	108.76	103.45
2	A	1001	NAI	C5A-C4A-N3A	-3.36	122.09	126.72
2	D	4001	NAI	C1D-N1N-C2N	-3.31	115.69	121.14
2	A	1001	NAI	C2D-C3D-C4D	3.27	108.93	102.61
2	D	4001	NAI	O1N-PN-O2N	3.14	127.05	112.44
2	D	4001	NAI	N9A-C8A-N7A	-3.13	109.49	113.94
2	B	2001	NAI	C3N-C7N-N7N	3.11	123.18	117.67
2	A	1001	NAI	O4B-C1B-N9A	3.10	114.04	108.09
2	B	2001	NAI	C5A-N7A-C8A	3.08	108.29	103.45
2	A	1001	NAI	C4D-O4D-C1D	3.07	116.25	109.47
2	A	1001	NAI	C2D-C1D-N1N	-2.95	106.06	113.31
2	D	4001	NAI	C6A-C5A-C4A	2.92	121.17	117.18
3	B	5001	BTL	C1-N-C2	2.81	116.35	108.98
2	D	4001	NAI	C2A-N3A-C4A	2.79	118.64	111.83
2	D	4001	NAI	C5A-N7A-C8A	2.79	107.83	103.45
2	A	1001	NAI	C4A-C5A-N7A	-2.75	107.44	110.58
2	C	3001	NAI	C2A-N3A-C4A	2.74	118.53	111.83
2	A	1001	NAI	O7N-C7N-C3N	2.70	125.98	120.90
2	C	3001	NAI	C4A-C5A-N7A	-2.68	107.52	110.58
2	C	3001	NAI	O3-PN-O2N	2.65	118.67	110.70
2	A	1001	NAI	C2A-N3A-C4A	2.64	118.29	111.83
2	C	3001	NAI	O1N-PN-O5D	-2.64	95.60	107.57
2	B	2001	NAI	C6N-N1N-C2N	2.57	122.06	119.32
2	A	1001	NAI	C4A-N9A-C8A	2.56	108.43	105.74
2	D	4001	NAI	C2D-C1D-N1N	2.55	119.59	113.31
2	C	3001	NAI	O1N-PN-O3	-2.54	100.41	107.27
2	A	1001	NAI	O4D-C1D-N1N	2.53	112.92	108.08
2	C	3001	NAI	O4D-C1D-C2D	-2.49	101.29	106.62
2	A	1001	NAI	C3D-C2D-C1D	2.49	106.17	101.46
2	B	2001	NAI	C2D-C1D-N1N	-2.48	107.20	113.31
2	A	1001	NAI	C3N-C7N-N7N	-2.48	113.26	117.67
2	B	2001	NAI	C5A-C6A-N6A	-2.39	117.38	123.29
2	C	3001	NAI	O3D-C3D-C2D	-2.36	104.25	111.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	3001	NAI	N3A-C4A-N9A	2.36	131.18	127.17
2	B	2001	NAI	C4A-N9A-C8A	2.32	108.18	105.74
2	A	1001	NAI	O2A-PA-O3	2.32	113.55	107.27
2	A	1001	NAI	O4D-C4D-C3D	-2.32	100.56	105.15
2	C	3001	NAI	O3B-C3B-C4B	-2.31	104.45	111.08
2	D	4001	NAI	O4B-C1B-N9A	2.31	112.52	108.09
2	D	4001	NAI	C4A-N9A-C8A	2.28	108.13	105.74
2	D	4001	NAI	C4A-C5A-N7A	-2.26	108.00	110.58
2	C	3001	NAI	O4D-C4D-C5D	2.22	116.46	109.33
2	A	1001	NAI	N3A-C4A-N9A	2.17	130.85	127.17
2	D	4001	NAI	C1D-N1N-C6N	2.15	125.32	120.77
2	A	1001	NAI	O4D-C1D-C2D	-2.15	102.02	106.62
2	D	4001	NAI	O3-PA-O1A	-2.14	104.27	110.70
2	C	3001	NAI	C6A-C5A-C4A	2.11	120.06	117.18
2	C	3001	NAI	C5A-C4A-N9A	2.11	108.11	105.81
2	A	1001	NAI	PN-O5D-C5D	2.09	133.33	121.35
2	C	3001	NAI	O7N-C7N-C3N	-2.08	116.99	120.90
2	B	2001	NAI	O2B-C2B-C3B	2.07	118.46	111.82

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	NAI	C5B-O5B-PA-O3
2	A	1001	NAI	PA-O3-PN-O5D
2	B	2001	NAI	C5D-O5D-PN-O3
2	B	2001	NAI	C5D-O5D-PN-O2N
2	B	2001	NAI	O4D-C1D-N1N-C2N
2	C	3001	NAI	C5D-O5D-PN-O3
2	C	3001	NAI	C5D-O5D-PN-O1N
2	C	3001	NAI	C5D-O5D-PN-O2N
2	C	3001	NAI	C4D-C5D-O5D-PN
2	C	3001	NAI	O4D-C4D-C5D-O5D
2	D	4001	NAI	C5B-O5B-PA-O3
2	D	4001	NAI	C5D-O5D-PN-O2N
2	D	4001	NAI	C2D-C1D-N1N-C6N
2	D	4001	NAI	C2D-C1D-N1N-C2N
2	A	1001	NAI	C3D-C4D-C5D-O5D
2	C	3001	NAI	C3D-C4D-C5D-O5D
2	A	1001	NAI	O4D-C4D-C5D-O5D
2	D	4001	NAI	O4D-C4D-C5D-O5D
2	D	4001	NAI	C3D-C4D-C5D-O5D

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Mol	Chain	Res	Type	Atoms
2	C	3001	NAI	PA-O3-PN-O5D
2	A	1001	NAI	O4D-C1D-N1N-C2N
3	B	5001	BTL	C-CA-N-C1
2	C	3001	NAI	PN-O3-PA-O2A
2	A	1001	NAI	C5B-O5B-PA-O1A
2	A	1001	NAI	C5D-O5D-PN-O3
2	A	1001	NAI	C5D-O5D-PN-O1N
2	A	1001	NAI	C5D-O5D-PN-O2N
2	B	2001	NAI	C5B-O5B-PA-O1A
2	B	2001	NAI	C5B-O5B-PA-O2A
2	B	2001	NAI	C5B-O5B-PA-O3
2	B	2001	NAI	C5D-O5D-PN-O1N
2	D	4001	NAI	C5B-O5B-PA-O1A
2	D	4001	NAI	C5D-O5D-PN-O3
2	D	4001	NAI	C5D-O5D-PN-O1N
2	B	2001	NAI	PN-O3-PA-O2A
2	C	3001	NAI	O4D-C1D-N1N-C6N
2	D	4001	NAI	O4D-C1D-N1N-C6N
2	A	1001	NAI	C4D-C5D-O5D-PN
2	B	2001	NAI	C2N-C3N-C7N-N7N
2	D	4001	NAI	O4D-C1D-N1N-C2N
2	C	3001	NAI	PN-O3-PA-O1A
2	B	2001	NAI	PN-O3-PA-O1A

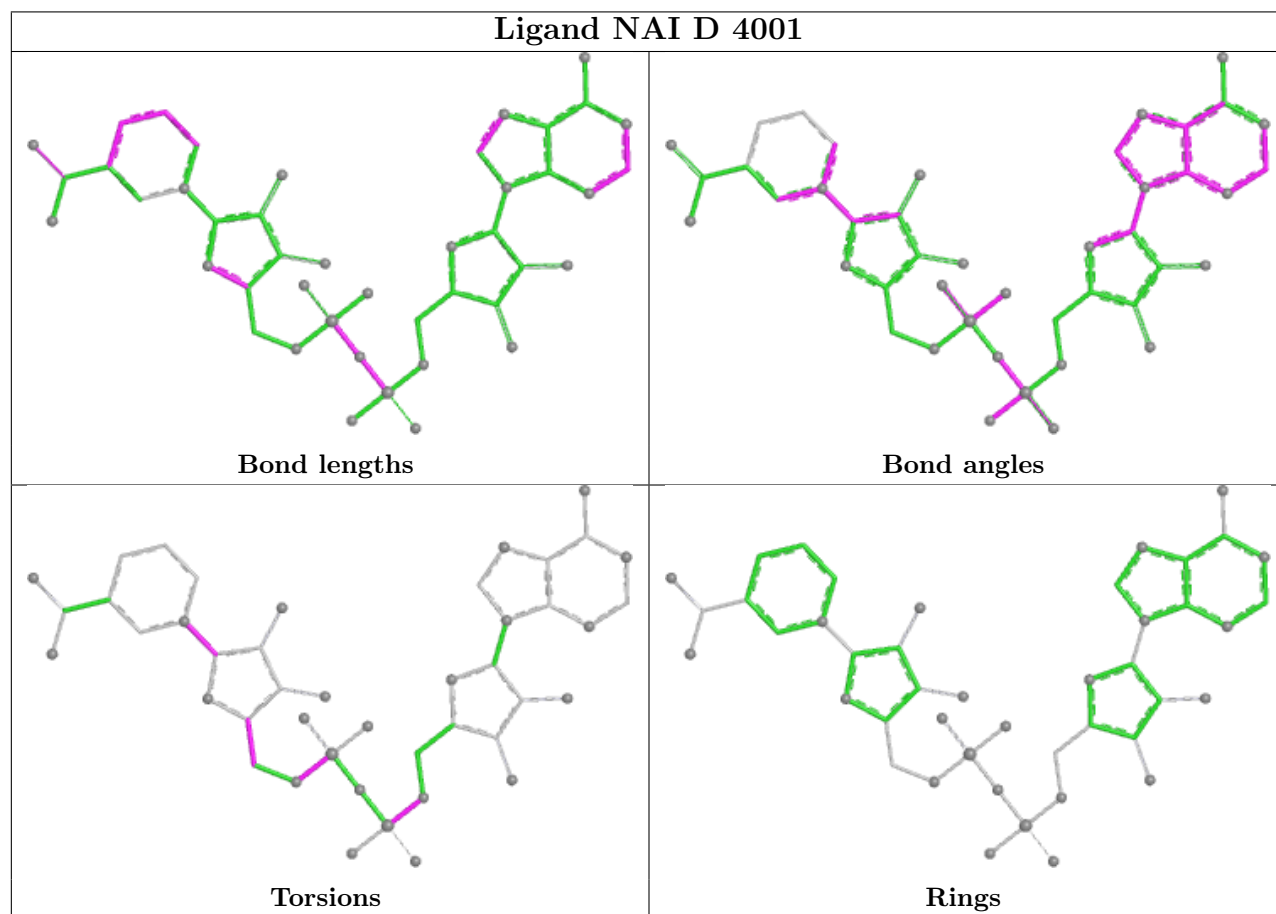
There are no ring outliers.

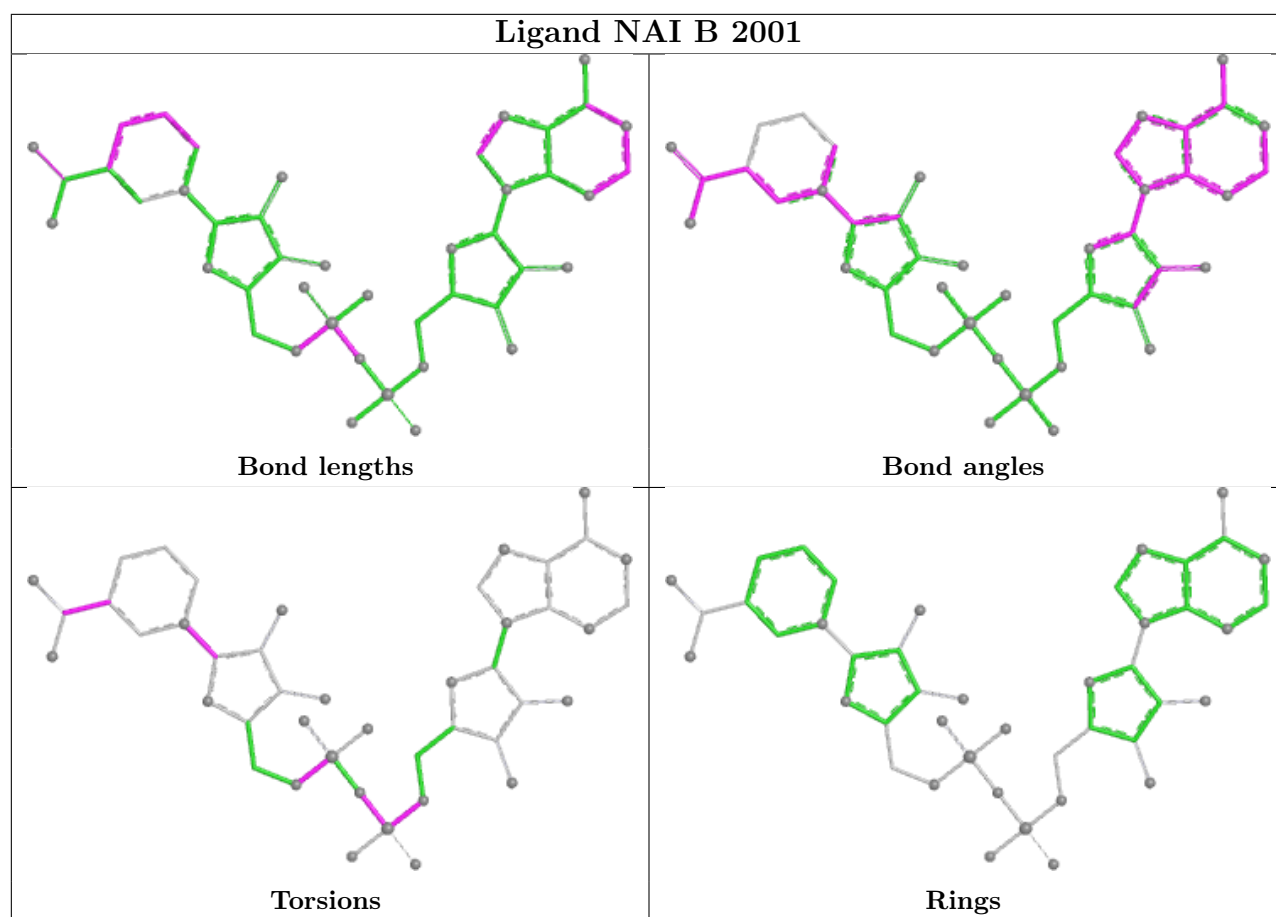
5 monomers are involved in 19 short contacts:

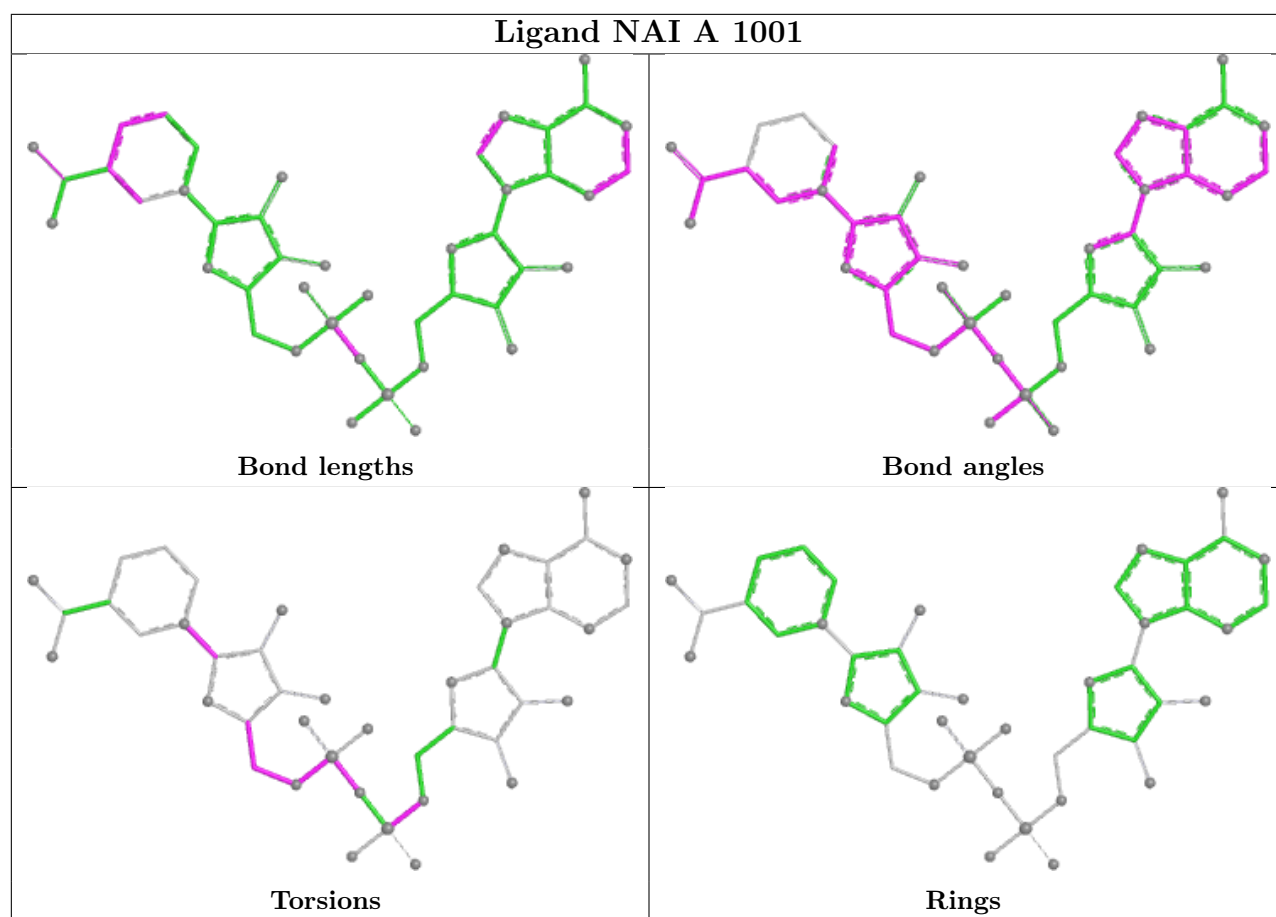
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	4001	NAI	2	0
3	B	5001	BTL	6	0
2	B	2001	NAI	3	0
2	A	1001	NAI	2	0
2	C	3001	NAI	6	0

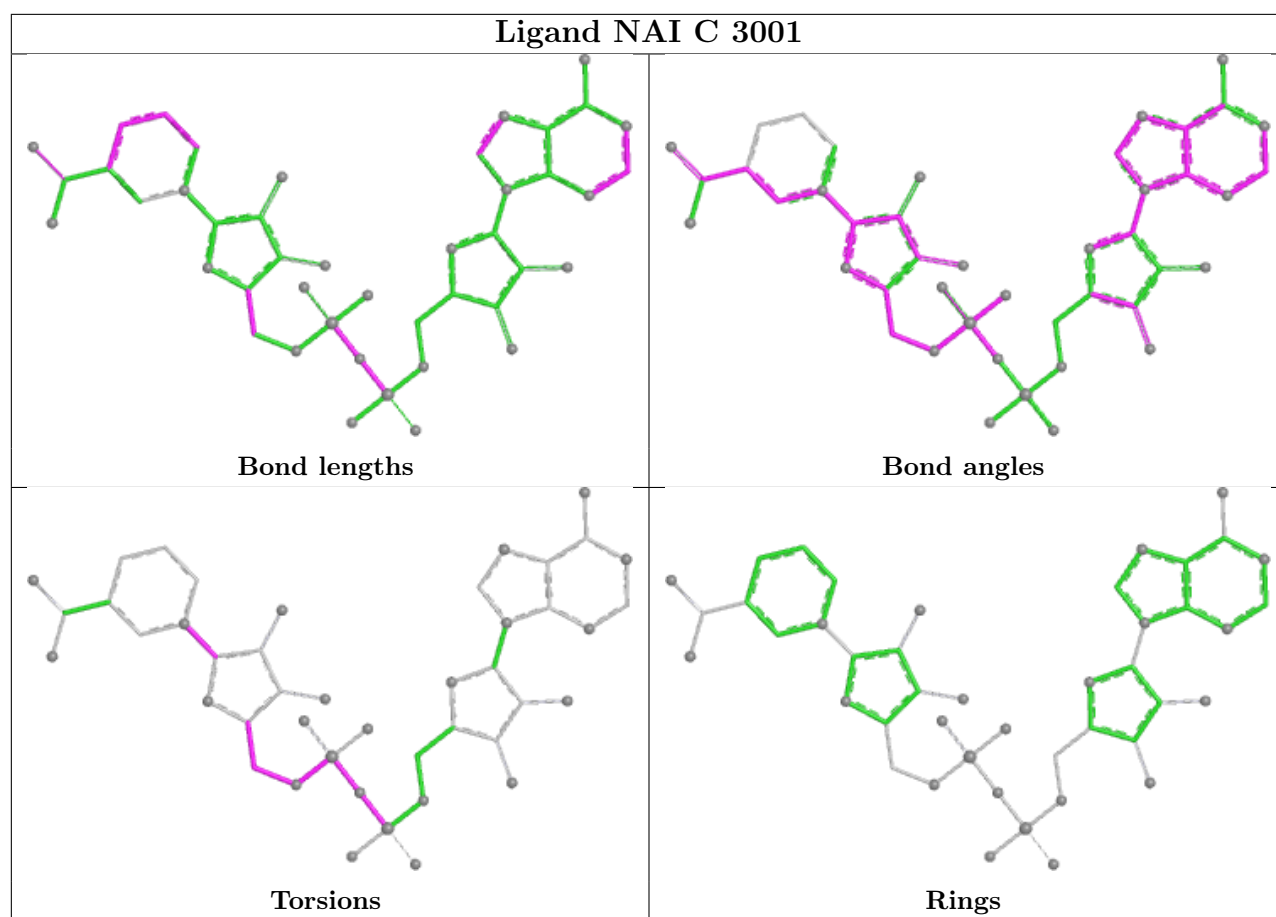
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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	474/495 (95%)	0.03	4 (0%) 82 80	7, 12, 18, 24	13 (2%)
1	B	474/495 (95%)	-0.24	2 (0%) 88 87	7, 12, 18, 23	12 (2%)
1	C	474/495 (95%)	-0.32	1 (0%) 91 90	7, 12, 18, 25	9 (1%)
1	D	474/495 (95%)	-0.20	1 (0%) 91 90	6, 12, 18, 26	11 (2%)
All	All	1896/1980 (95%)	-0.18	8 (0%) 88 87	6, 12, 18, 26	45 (2%)

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	356	ASN	2.6
1	D	353	ARG	2.4
1	B	452	TYR	2.2
1	A	119	ASN	2.2
1	A	129	GLY	2.1
1	B	356	ASN	2.0
1	A	124	GLY	2.0
1	C	1	MET	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](#)

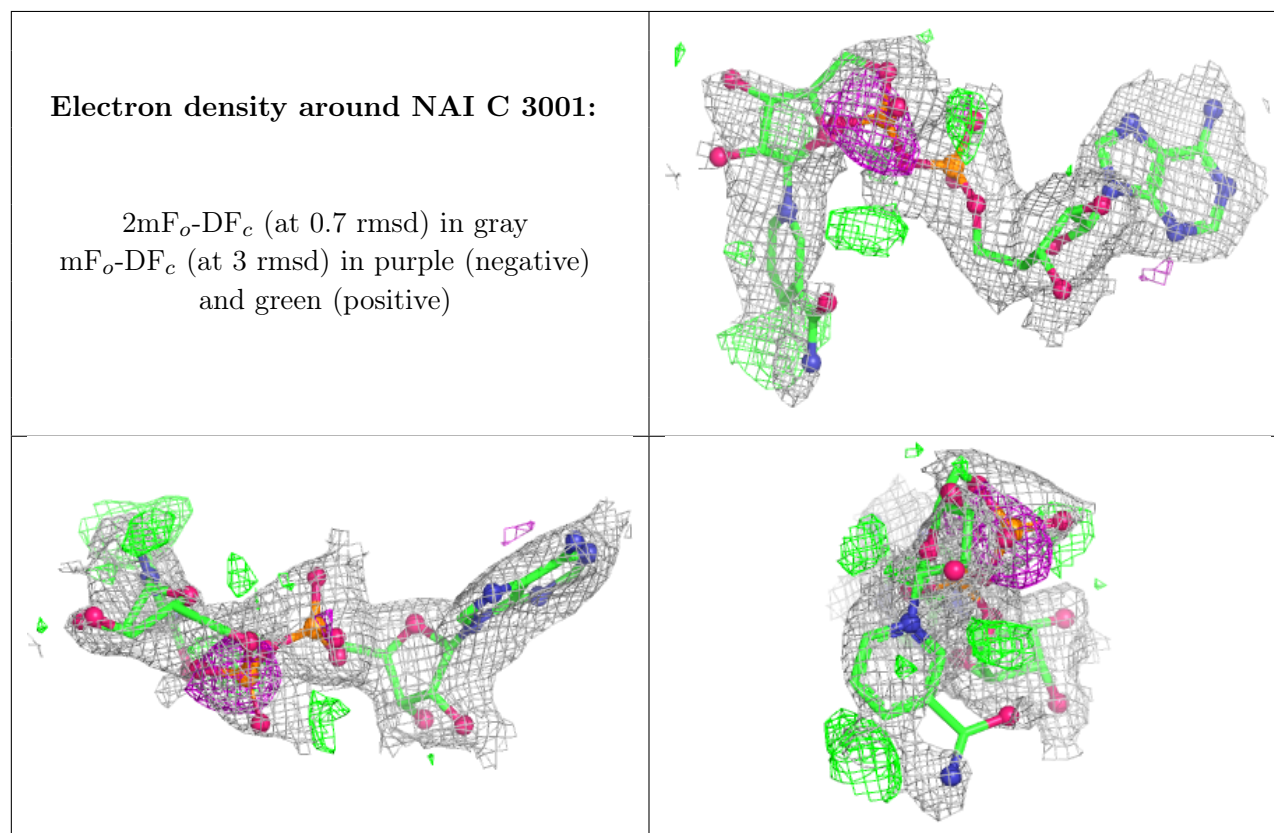
There are no oligosaccharides in this entry.

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.

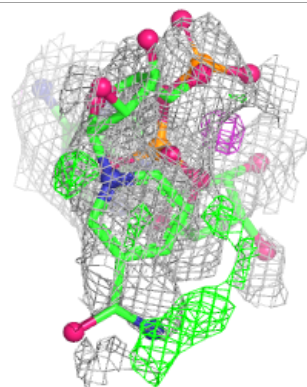
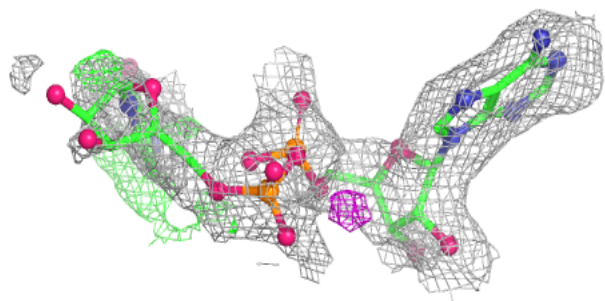
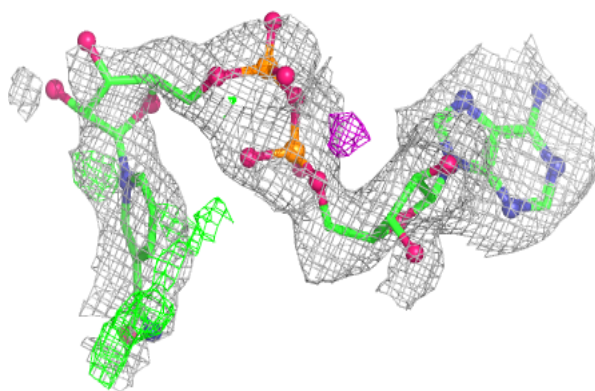
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	BTL	B	5001	7/7	0.85	0.15	31,32,34,34	0
2	NAI	C	3001	44/44	0.90	0.12	18,22,31,39	17
2	NAI	A	1001	44/44	0.91	0.13	21,24,29,32	21
2	NAI	D	4001	44/44	0.91	0.11	19,25,32,39	18
2	NAI	B	2001	44/44	0.91	0.12	18,24,29,36	17

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.



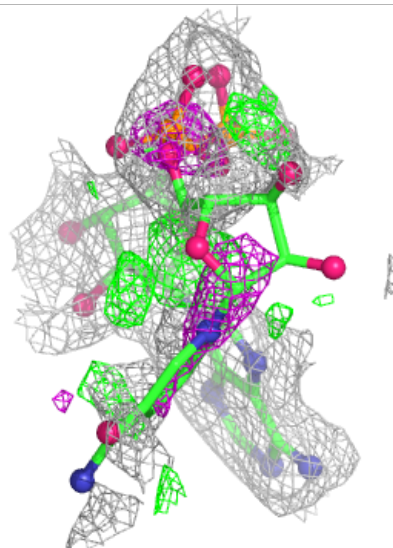
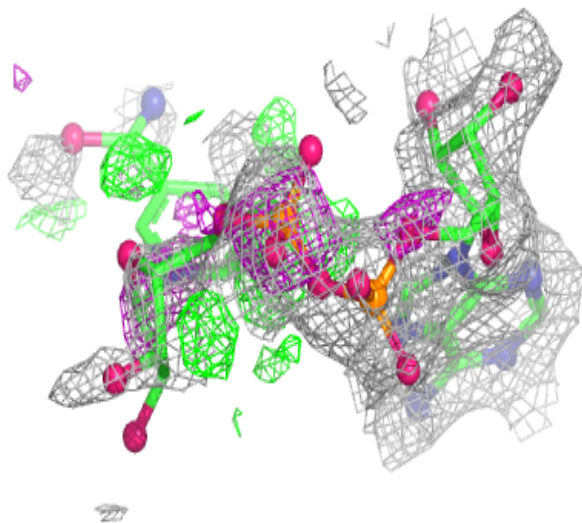
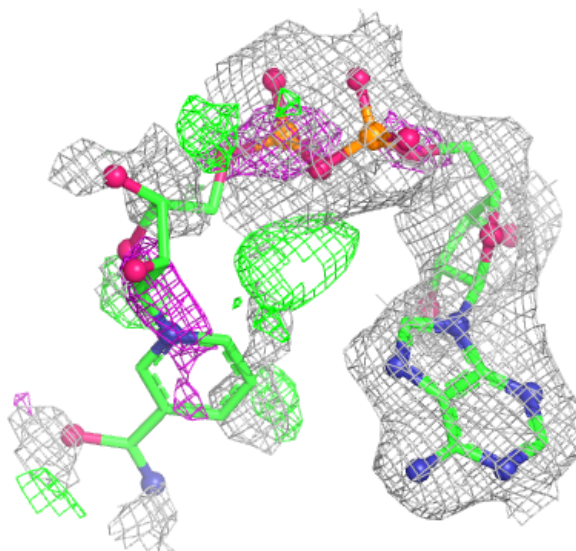
Electron density around NAI A 1001:

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



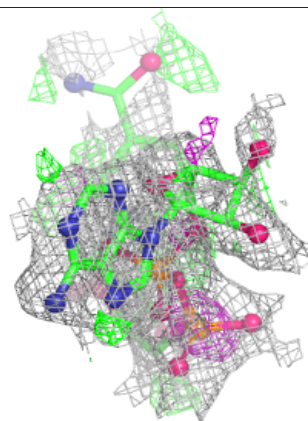
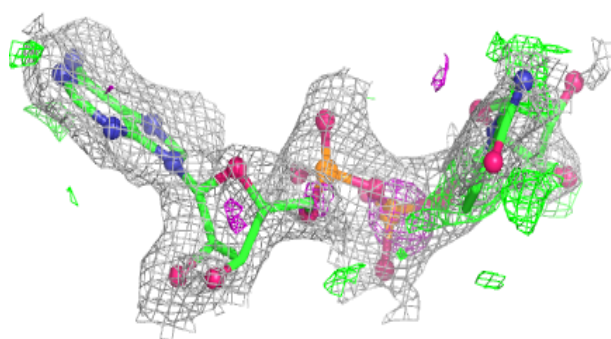
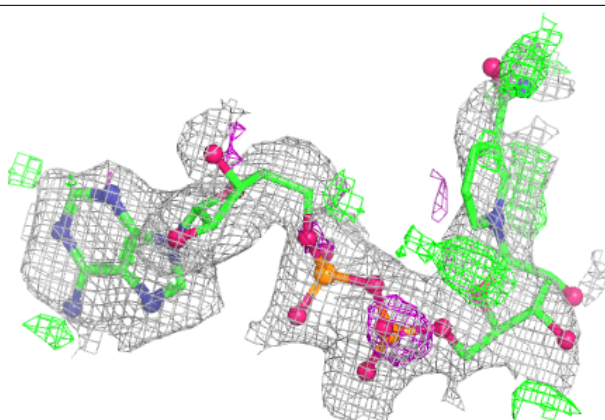
Electron density around NAI D 4001:

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



Electron density around NAI B 2001:

$2mF_o-DF_c$ (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.