



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2024 – 03:28 pm GMT

PDB ID : 8CFK
Title : Crystal structure of S-adenosyl-L-homocysteine hydrolase from *P. aeruginosa* in complex with F2X-Entry library fragment E06
Authors : Malecki, P.H.; Gawel, M.; Stepniewska, M.; Brzezinski, K.
Deposited on : 2023-02-03
Resolution : 1.73 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 : 4.02b-467
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
buster-report : 1.1.7 (2018)
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.36

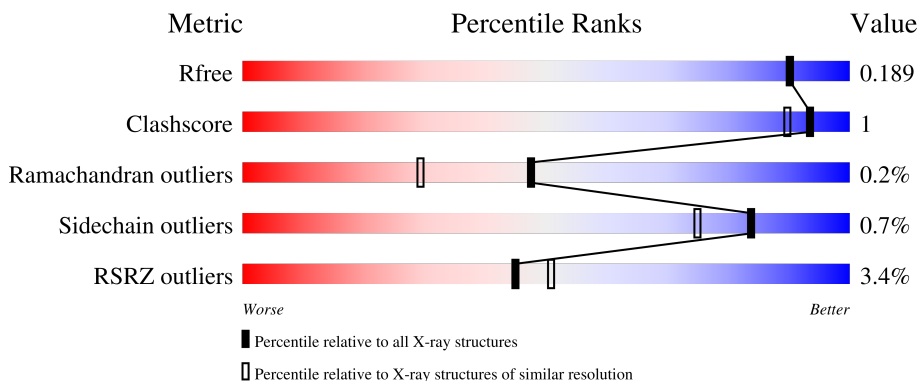
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.73 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}	130704	3764 (1.76-1.72)
Clashscore	141614	3923 (1.76-1.72)
Ramachandran outliers	138981	3878 (1.76-1.72)
Sidechain outliers	138945	3878 (1.76-1.72)
RSRZ outliers	127900	3705 (1.76-1.72)

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	472	 3% 94%
1	B	472	 2% 94%
1	C	472	 5% 94%
1	D	472	 3% 93% 5%

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

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
8	PO4	A	509	-	-	X	-
8	PO4	C	508	-	-	X	-

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 16459 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.

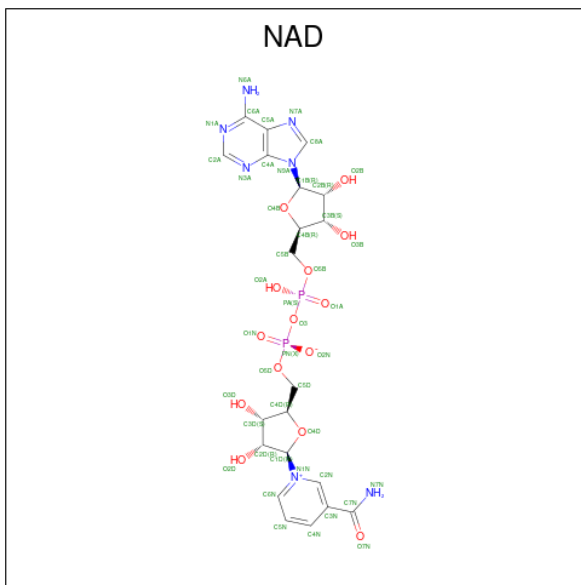
- Molecule 1 is a protein called Adenosylhomocysteinase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	464	Total 3614	C 2278	N 626	O 687	S 23	0	6	0
1	B	461	Total 3591	C 2265	N 623	O 681	S 22	0	6	0
1	C	460	Total 3588	C 2262	N 620	O 683	S 23	0	6	0
1	D	462	Total 3596	C 2266	N 623	O 684	S 23	0	6	0

There are 12 discrepancies between the modelled and reference sequences:

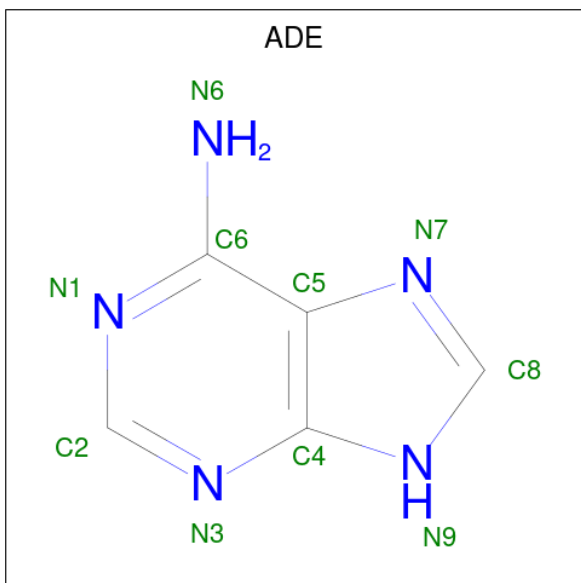
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q9I685
A	-1	ASN	-	expression tag	UNP Q9I685
A	0	ALA	-	expression tag	UNP Q9I685
B	-2	SER	-	expression tag	UNP Q9I685
B	-1	ASN	-	expression tag	UNP Q9I685
B	0	ALA	-	expression tag	UNP Q9I685
C	-2	SER	-	expression tag	UNP Q9I685
C	-1	ASN	-	expression tag	UNP Q9I685
C	0	ALA	-	expression tag	UNP Q9I685
D	-2	SER	-	expression tag	UNP Q9I685
D	-1	ASN	-	expression tag	UNP Q9I685
D	0	ALA	-	expression tag	UNP Q9I685

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂).



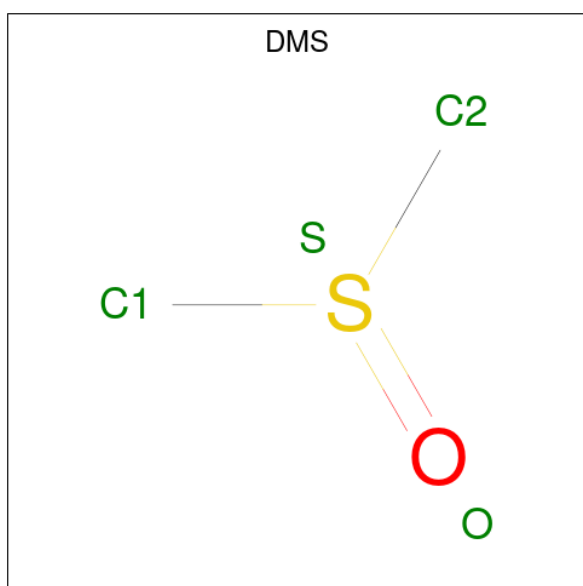
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	A	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	B	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	C	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	D	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is ADENINE (three-letter code: ADE) (formula: $C_5H_5N_5$).



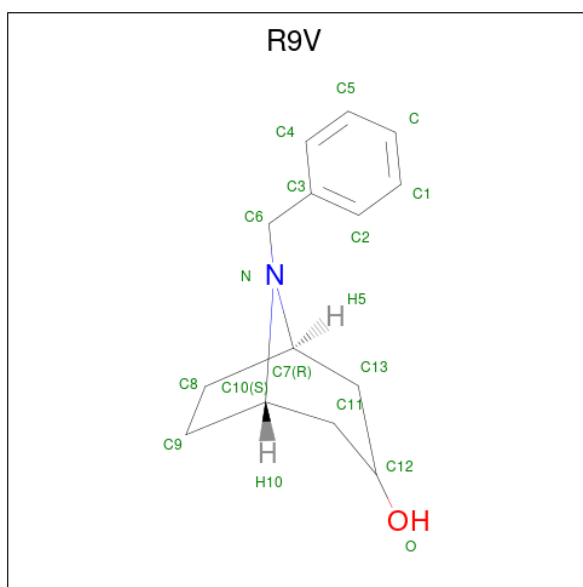
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			10	5	5		
3	B	1	Total	C	N	0	0
			10	5	5		
3	C	1	Total	C	N	0	0
			10	5	5		
3	D	1	Total	C	N	0	0
			10	5	5		

- Molecule 4 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C₂H₆OS).



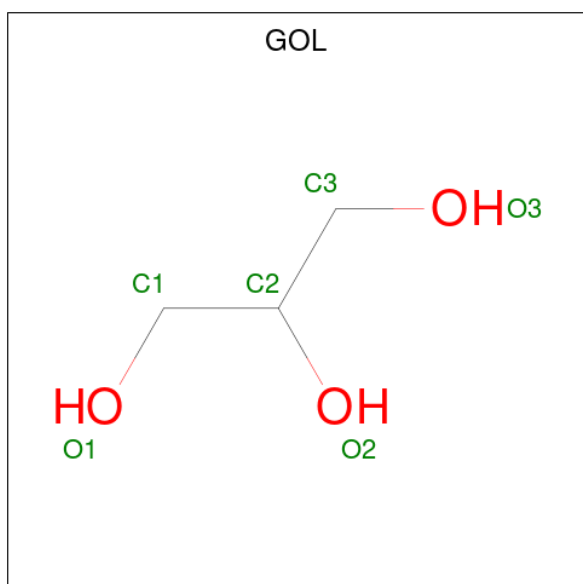
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	S	0	0
			4	2	1	1		

- Molecule 5 is (3-endo)-8-benzyl-8-azabicyclo[3.2.1]octan-3-ol (three-letter code: R9V) (formula: C₁₄H₁₉NO) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
5	A	1	Total	C	N	O	0	0
			16	14	1	1		
5	A	1	Total	C	N	O	0	0
			16	14	1	1		
5	B	1	Total	C	N	O	0	0
			16	14	1	1		
5	C	1	Total	C	N	O	0	0
			16	14	1	1		
5	D	1	Total	C	N	O	0	0
			16	14	1	1		

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: C₃H₈O₃).

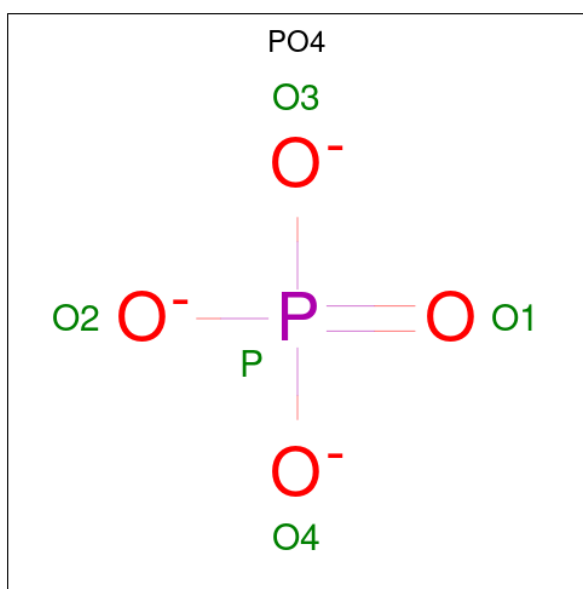


Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	B	1	Total C O 6 3 3	0	0
6	D	1	Total C O 6 3 3	0	0

- Molecule 7 is POTASSIUM ION (three-letter code: K) (formula: K).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	1	Total K 1 1	0	0
7	B	1	Total K 1 1	0	0
7	C	1	Total K 1 1	0	0
7	D	1	Total K 1 1	0	0

- Molecule 8 is PHOSPHATE ION (three-letter code: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total O P 5 4 1	0	0

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

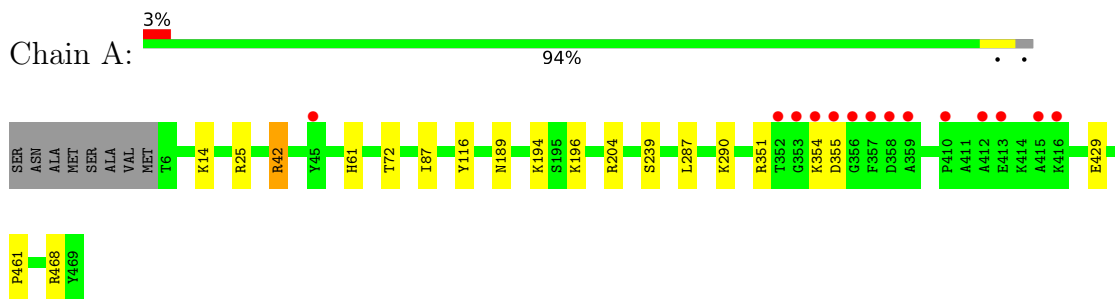
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	403	Total	O	0	21
			421	421		
9	B	430	Total	O	0	20
			449	449		
9	C	356	Total	O	0	8
			364	364		
9	D	411	Total	O	0	15
			422	422		

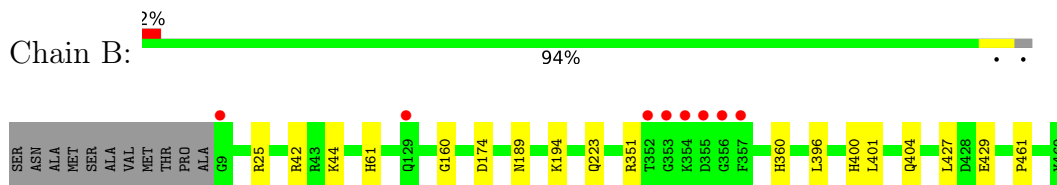
3 Residue-property plots [i](#)

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.

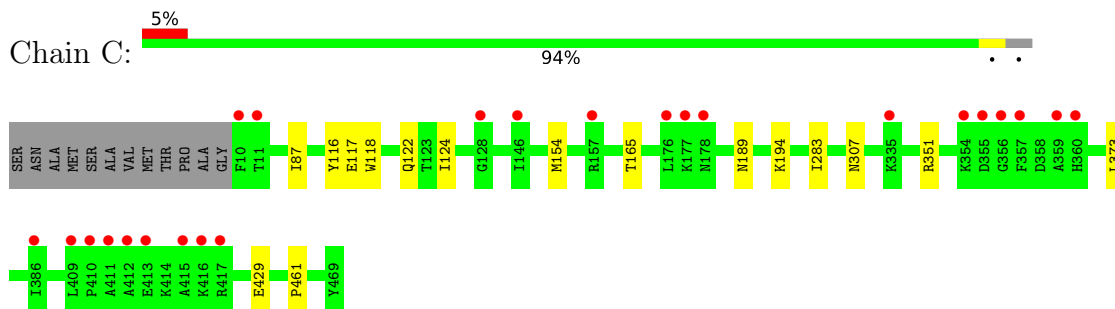
- Molecule 1: Adenosylhomocysteinase



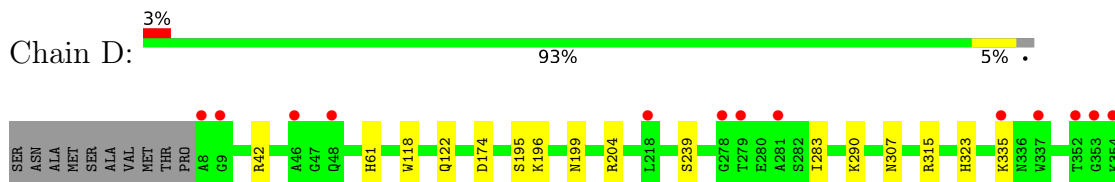
- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	75.57Å 132.39Å 98.85Å 90.00° 101.93° 90.00°	Depositor
Resolution (Å)	37.19 – 1.73 41.67 – 1.73	Depositor EDS
% Data completeness (in resolution range)	97.7 (37.19-1.73) 97.7 (41.67-1.73)	Depositor EDS
R_{merge}	0.12	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 1.73Å)	Xtrriage
Refinement program	PHENIX 1.19.2-4158	Depositor
R, R_{free}	0.155 , 0.190 0.155 , 0.189	Depositor DCC
R_{free} test set	2101 reflections (1.09%)	wwPDB-VP
Wilson B-factor (Å ²)	22.6	Xtrriage
Anisotropy	0.220	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 52.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.98	EDS
Total number of atoms	16459	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.78% 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: K, R9V, GOL, DMS, ADE, NAD, PO4

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	0.38	0/3687	0.59	0/4984
1	B	0.38	0/3669	0.59	0/4958
1	C	0.35	0/3663	0.56	0/4951
1	D	0.37	0/3668	0.57	0/4957
All	All	0.37	0/14687	0.58	0/19850

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [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	3614	0	3627	13	0
1	B	3591	0	3613	9	0
1	C	3588	0	3599	8	0
1	D	3596	0	3605	13	0
2	A	44	0	26	0	0
2	B	44	0	26	0	0
2	C	44	0	26	1	0
2	D	44	0	26	0	0
3	A	10	0	4	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	10	0	4	0	0
3	C	10	0	4	0	0
3	D	10	0	4	0	0
4	A	4	0	6	0	0
5	A	32	0	0	0	0
5	B	16	0	0	0	0
5	C	16	0	0	0	0
5	D	16	0	0	0	0
6	A	6	0	8	0	0
6	B	18	0	24	1	0
6	D	6	0	8	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	20	0	0	3	0
8	B	20	0	0	1	0
8	C	20	0	0	3	0
8	D	20	0	0	0	0
9	A	421	0	0	2	0
9	B	449	0	0	0	0
9	C	364	0	0	0	0
9	D	422	0	0	0	0
All	All	16459	0	14610	41	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 1.

All (41) 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:189:ASN:HA	1:C:194:LYS:HD2	1.85	0.57
1:A:351:ARG:NH2	8:A:508:PO4:O4	2.38	0.56
1:B:396:LEU:HD13	1:B:427:LEU:HD22	1.91	0.53
8:A:509:PO4:P	1:B:360:HIS:HE2	2.31	0.53
1:B:400:HIS:O	1:B:404[B]:GLN:HG2	2.09	0.52
8:C:508:PO4:O1	1:D:360:HIS:NE2	2.32	0.51
1:C:373:LEU:HD23	2:C:501:NAD:N7N	2.27	0.48
1:C:351:ARG:NH2	8:C:505:PO4:O1	2.46	0.48
1:A:287:LEU:O	1:A:290[B]:LYS:HG2	2.14	0.47
1:B:189:ASN:HA	1:B:194:LYS:HD2	1.97	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:323:HIS:HA	1:D:373:LEU:HD21	1.98	0.45
1:D:204[B]:ARG:HA	1:D:239:SER:HB2	1.99	0.45
1:B:25:ARG:HB2	6:B:505:GOL:H12	2.00	0.44
1:B:429:GLU:OE1	1:B:461:PRO:HA	2.18	0.44
1:D:283:ILE:HG13	1:D:307:ASN:HB3	2.00	0.44
1:B:351:ARG:NH2	8:B:508:PO4:O4	2.51	0.44
1:D:204[A]:ARG:HA	1:D:239:SER:HB2	2.00	0.44
1:D:290:LYS:HB2	1:D:290:LYS:HE3	1.70	0.44
1:C:283:ILE:HG13	1:C:307:ASN:HB3	2.00	0.44
1:A:204[B]:ARG:HA	1:A:239:SER:HB2	2.00	0.43
1:A:42:ARG:HG3	1:A:72:THR:HG23	2.00	0.43
1:A:196:LYS:HE3	1:D:468:ARG:HB2	2.00	0.43
1:A:14:LYS:NZ	9:A:934[B]:HOH:O	2.51	0.43
1:A:429:GLU:OE1	1:A:461:PRO:HA	2.19	0.43
1:D:429:GLU:OE1	1:D:461:PRO:HA	2.19	0.42
1:A:354:LYS:HE3	9:A:639:HOH:O	2.19	0.42
1:B:223[B]:GLN:HE21	1:B:223[B]:GLN:HB3	1.68	0.42
1:D:118:TRP:O	1:D:122:GLN:HG2	2.19	0.42
1:D:315:ARG:NH1	1:D:362:ASP:HB2	2.35	0.42
1:D:195:SER:O	1:D:199:ASN:HB2	2.20	0.42
1:A:87:ILE:HG22	1:A:116:TYR:HB2	2.01	0.42
1:A:468:ARG:HB2	1:D:196:LYS:HE3	2.02	0.42
1:A:204[A]:ARG:HA	1:A:239:SER:HB2	2.02	0.41
1:B:160:GLY:HA3	1:B:401:LEU:HD13	2.03	0.41
1:C:429:GLU:OE1	1:C:461:PRO:HA	2.21	0.41
1:C:87:ILE:HG22	1:C:116:TYR:HB2	2.01	0.41
1:C:118:TRP:O	1:C:122:GLN:HG2	2.21	0.41
1:C:124:ILE:HG23	1:C:154:MET:SD	2.61	0.41
1:A:189:ASN:HA	1:A:194:LYS:HD2	2.02	0.41
1:A:25:ARG:NH1	8:A:509:PO4:O3	2.48	0.40
8:C:508:PO4:P	1:D:360:HIS:HE2	2.41	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	468/472 (99%)	458 (98%)	8 (2%)	2 (0%)	34	17
1	B	465/472 (98%)	455 (98%)	9 (2%)	1 (0%)	47	29
1	C	464/472 (98%)	455 (98%)	9 (2%)	0	100	100
1	D	466/472 (99%)	455 (98%)	10 (2%)	1 (0%)	47	29
All	All	1863/1888 (99%)	1823 (98%)	36 (2%)	4 (0%)	47	29

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	61	HIS
1	B	61	HIS
1	D	61	HIS
1	A	355	ASP

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	385/385 (100%)	384 (100%)	1 (0%)	92	89
1	B	383/385 (100%)	380 (99%)	3 (1%)	81	72
1	C	383/385 (100%)	381 (100%)	2 (0%)	88	83
1	D	382/385 (99%)	378 (99%)	4 (1%)	76	63
All	All	1533/1540 (100%)	1523 (99%)	10 (1%)	84	75

All (10) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	ARG
1	B	42	ARG
1	B	44	LYS
1	B	174	ASP

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Mol	Chain	Res	Type
1	C	117	GLU
1	C	165	THR
1	D	42	ARG
1	D	174	ASP
1	D	335	LYS
1	D	355	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 39 ligands modelled in this entry, 4 are monoatomic - leaving 35 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	$\# Z > 2$
5	R9V	D	504	-	18,18,18	6.24	11 (61%)	24,25,25	2.29	4 (16%)
6	GOL	B	504	-	5,5,5	1.23	1 (20%)	5,5,5	0.97	0
8	PO4	D	506	-	4,4,4	1.07	0	6,6,6	0.43	0
8	PO4	B	510	-	4,4,4	0.90	0	6,6,6	0.42	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	PO4	C	508	-	4,4,4	0.99	0	6,6,6	0.51	0
5	R9V	A	504	-	18,18,18	6.28	12 (66%)	24,25,25	2.27	5 (20%)
3	ADE	B	503	-	9,11,11	0.85	0	7,15,15	1.10	0
3	ADE	A	502	-	9,11,11	0.97	0	7,15,15	1.08	0
4	DMS	A	503	-	3,3,3	0.68	0	3,3,3	0.56	0
5	R9V	C	503	-	18,18,18	6.31	12 (66%)	24,25,25	2.39	6 (25%)
8	PO4	B	508	-	4,4,4	1.04	0	6,6,6	0.45	0
8	PO4	B	509	-	4,4,4	0.64	0	6,6,6	1.28	0
5	R9V	B	506	-	18,18,18	6.34	12 (66%)	24,25,25	2.34	5 (20%)
3	ADE	C	502	-	9,11,11	1.18	2 (22%)	7,15,15	1.16	1 (14%)
6	GOL	A	505	-	5,5,5	1.18	1 (20%)	5,5,5	1.04	0
2	NAD	A	501	-	42,48,48	0.58	0	50,73,73	0.80	2 (4%)
8	PO4	D	509	-	4,4,4	0.97	0	6,6,6	0.41	0
8	PO4	D	508	-	4,4,4	0.98	0	6,6,6	0.47	0
8	PO4	C	506	-	4,4,4	0.89	0	6,6,6	0.72	0
8	PO4	A	511	-	4,4,4	0.99	0	6,6,6	0.45	0
8	PO4	D	507	-	4,4,4	1.00	0	6,6,6	0.70	0
3	ADE	D	502	-	9,11,11	1.19	2 (22%)	7,15,15	1.19	1 (14%)
8	PO4	A	508	-	4,4,4	1.04	0	6,6,6	0.79	0
2	NAD	B	502	-	42,48,48	0.56	0	50,73,73	0.72	1 (2%)
8	PO4	C	505	-	4,4,4	0.99	0	6,6,6	0.69	0
8	PO4	C	507	-	4,4,4	0.94	0	6,6,6	0.59	0
6	GOL	B	505	-	5,5,5	0.98	0	5,5,5	0.93	0
8	PO4	B	511	-	4,4,4	1.03	0	6,6,6	0.38	0
6	GOL	B	501	-	5,5,5	1.20	0	5,5,5	0.72	0
2	NAD	D	501	-	42,48,48	0.52	0	50,73,73	0.76	1 (2%)
8	PO4	A	510	-	4,4,4	0.89	0	6,6,6	0.43	0
5	R9V	A	506	-	18,18,18	6.44	12 (66%)	24,25,25	2.57	6 (25%)
8	PO4	A	509	-	4,4,4	0.95	0	6,6,6	0.52	0
6	GOL	D	503	-	5,5,5	1.19	0	5,5,5	0.77	0
2	NAD	C	501	-	42,48,48	0.53	0	50,73,73	0.77	2 (4%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	R9V	C	503	-	-	1/4/25/25	0/4/3/3
5	R9V	D	504	-	-	0/4/25/25	0/4/3/3

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	GOL	B	505	-	-	1/4/4/4	-
6	GOL	B	504	-	-	3/4/4/4	-
3	ADE	B	503	-	-	-	0/2/2/2
6	GOL	B	501	-	-	0/4/4/4	-
2	NAD	D	501	-	-	5/26/62/62	0/5/5/5
5	R9V	A	506	-	-	2/4/25/25	0/4/3/3
5	R9V	B	506	-	-	0/4/25/25	0/4/3/3
6	GOL	A	505	-	-	0/4/4/4	-
3	ADE	A	502	-	-	-	0/2/2/2
2	NAD	A	501	-	-	5/26/62/62	0/5/5/5
3	ADE	C	502	-	-	-	0/2/2/2
6	GOL	D	503	-	-	0/4/4/4	-
5	R9V	A	504	-	-	0/4/25/25	0/4/3/3
3	ADE	D	502	-	-	-	0/2/2/2
2	NAD	C	501	-	-	5/26/62/62	0/5/5/5
2	NAD	B	502	-	-	5/26/62/62	0/5/5/5

All (65) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	503	R9V	C9-C8	-13.11	1.18	1.54
5	B	506	R9V	C9-C8	-13.06	1.18	1.54
5	A	504	R9V	C9-C8	-13.06	1.18	1.54
5	A	506	R9V	C9-C8	-13.01	1.18	1.54
5	D	504	R9V	C9-C8	-12.89	1.18	1.54
5	A	506	R9V	C10-N	-11.88	1.32	1.48
5	A	506	R9V	C11-C12	11.87	1.73	1.51
5	C	503	R9V	C11-C12	11.58	1.73	1.51
5	A	504	R9V	C10-N	-11.53	1.33	1.48
5	B	506	R9V	C10-N	-11.49	1.33	1.48
5	C	503	R9V	C10-N	-11.46	1.33	1.48
5	D	504	R9V	C11-C12	11.42	1.72	1.51
5	B	506	R9V	C11-C12	11.36	1.72	1.51
5	D	504	R9V	C10-N	-11.31	1.33	1.48
5	A	504	R9V	C11-C12	11.30	1.72	1.51
5	A	506	R9V	C7-N	-10.17	1.35	1.48
5	B	506	R9V	C7-N	-9.83	1.35	1.48
5	C	503	R9V	C7-N	-9.64	1.35	1.48
5	A	504	R9V	C7-N	-9.45	1.36	1.48
5	D	504	R9V	C7-N	-9.45	1.36	1.48
5	A	506	R9V	C13-C12	8.47	1.67	1.51

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	504	R9V	C13-C12	8.21	1.66	1.51
5	B	506	R9V	C13-C12	8.18	1.66	1.51
5	C	503	R9V	C13-C12	8.14	1.66	1.51
5	D	504	R9V	C13-C12	8.12	1.66	1.51
5	B	506	R9V	C6-N	-7.81	1.35	1.47
5	D	504	R9V	C6-N	-7.49	1.36	1.47
5	A	504	R9V	C6-N	-7.29	1.36	1.47
5	C	503	R9V	C6-N	-7.27	1.36	1.47
5	A	506	R9V	C6-N	-7.17	1.36	1.47
5	B	506	R9V	C8-C7	-4.46	1.42	1.53
5	C	503	R9V	C8-C7	-4.45	1.42	1.53
5	A	504	R9V	C8-C7	-4.41	1.42	1.53
5	A	506	R9V	C8-C7	-4.40	1.42	1.53
5	D	504	R9V	C8-C7	-4.26	1.42	1.53
5	C	503	R9V	C9-C10	-4.22	1.42	1.53
5	A	506	R9V	C9-C10	-4.20	1.42	1.53
5	B	506	R9V	C9-C10	-4.10	1.42	1.53
5	A	504	R9V	C9-C10	-4.08	1.43	1.53
5	D	504	R9V	C9-C10	-3.96	1.43	1.53
5	A	506	R9V	C6-C3	2.91	1.56	1.51
5	B	506	R9V	C11-C10	-2.62	1.48	1.53
5	A	504	R9V	C4-C3	2.60	1.44	1.38
5	A	504	R9V	C11-C10	-2.57	1.48	1.53
5	D	504	R9V	C11-C10	-2.55	1.48	1.53
3	D	502	ADE	C4-N3	-2.55	1.33	1.37
5	A	504	R9V	C6-C3	2.50	1.55	1.51
5	D	504	R9V	C6-C3	2.49	1.55	1.51
5	C	503	R9V	C11-C10	-2.49	1.48	1.53
5	B	506	R9V	C4-C3	2.48	1.44	1.38
5	C	503	R9V	C6-C3	2.48	1.55	1.51
5	D	504	R9V	C4-C3	2.47	1.44	1.38
5	A	506	R9V	C11-C10	-2.46	1.48	1.53
5	A	506	R9V	C4-C3	2.44	1.44	1.38
3	C	502	ADE	C4-N3	-2.43	1.33	1.37
5	C	503	R9V	C4-C3	2.33	1.43	1.38
6	A	505	GOL	C3-C2	2.31	1.61	1.51
5	A	504	R9V	C5-C4	-2.26	1.34	1.38
5	B	506	R9V	C5-C4	-2.26	1.34	1.38
3	C	502	ADE	C4-N9	2.13	1.38	1.34
5	C	503	R9V	C5-C4	-2.13	1.34	1.38
3	D	502	ADE	C4-N9	2.10	1.38	1.34
5	A	506	R9V	C5-C4	-2.10	1.34	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	B	504	GOL	O2-C2	-2.08	1.37	1.43
5	B	506	R9V	C6-C3	2.03	1.55	1.51

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	506	R9V	C8-C7-N	-6.21	92.47	104.02
5	B	506	R9V	C8-C7-N	-5.93	92.98	104.02
5	A	506	R9V	C9-C10-N	-5.80	93.23	104.02
5	D	504	R9V	C8-C7-N	-5.73	93.36	104.02
5	C	503	R9V	C9-C10-N	-5.69	93.43	104.02
5	C	503	R9V	C8-C7-N	-5.64	93.52	104.02
5	A	506	R9V	C9-C8-C7	5.60	112.40	104.05
5	D	504	R9V	C9-C10-N	-5.45	93.87	104.02
5	B	506	R9V	C9-C10-N	-5.44	93.90	104.02
5	A	504	R9V	C8-C7-N	-5.36	94.04	104.02
5	A	504	R9V	C9-C10-N	-5.34	94.08	104.02
5	B	506	R9V	C8-C9-C10	4.96	111.45	104.05
5	A	504	R9V	C8-C9-C10	4.95	111.43	104.05
5	A	506	R9V	C8-C9-C10	4.94	111.42	104.05
5	D	504	R9V	C8-C9-C10	4.93	111.41	104.05
5	C	503	R9V	C9-C8-C7	4.93	111.40	104.05
5	C	503	R9V	C8-C9-C10	4.83	111.26	104.05
5	B	506	R9V	C9-C8-C7	4.78	111.18	104.05
5	D	504	R9V	C9-C8-C7	4.77	111.17	104.05
5	A	504	R9V	C9-C8-C7	4.64	110.97	104.05
5	A	506	R9V	C3-C6-N	3.46	118.57	112.59
5	A	506	R9V	C6-N-C10	2.59	121.09	114.16
5	C	503	R9V	C13-C7-N	2.45	112.53	108.45
2	C	501	NAD	C5A-C6A-N6A	2.38	123.96	120.35
3	D	502	ADE	C5-C6-N6	2.38	123.96	120.35
5	C	503	R9V	C11-C10-N	2.37	112.38	108.45
5	A	504	R9V	C13-C7-N	2.33	112.33	108.45
2	D	501	NAD	C5A-C6A-N6A	2.33	123.89	120.35
2	B	502	NAD	C5A-C6A-N6A	2.31	123.86	120.35
2	A	501	NAD	C5A-C6A-N6A	2.28	123.82	120.35
3	C	502	ADE	C5-C6-N6	2.27	123.80	120.35
2	A	501	NAD	PN-O3-PA	-2.25	125.10	132.83
2	C	501	NAD	PN-O3-PA	-2.06	125.76	132.83
5	B	506	R9V	C13-C7-N	2.04	111.84	108.45

There are no chirality outliers.

All (27) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	501	NAD	O4D-C1D-N1N-C2N
2	A	501	NAD	O4D-C1D-N1N-C6N
2	A	501	NAD	C2D-C1D-N1N-C2N
2	A	501	NAD	C2D-C1D-N1N-C6N
2	B	502	NAD	O4D-C1D-N1N-C2N
2	B	502	NAD	O4D-C1D-N1N-C6N
2	B	502	NAD	C2D-C1D-N1N-C2N
2	B	502	NAD	C2D-C1D-N1N-C6N
2	C	501	NAD	O4D-C1D-N1N-C2N
2	C	501	NAD	O4D-C1D-N1N-C6N
2	C	501	NAD	C2D-C1D-N1N-C2N
2	C	501	NAD	C2D-C1D-N1N-C6N
2	D	501	NAD	O4D-C1D-N1N-C2N
2	D	501	NAD	O4D-C1D-N1N-C6N
2	D	501	NAD	C2D-C1D-N1N-C2N
2	D	501	NAD	C2D-C1D-N1N-C6N
5	A	506	R9V	C3-C6-N-C10
6	B	504	GOL	O1-C1-C2-C3
5	A	506	R9V	C3-C6-N-C7
6	B	504	GOL	O1-C1-C2-O2
6	B	505	GOL	O1-C1-C2-C3
6	B	504	GOL	O2-C2-C3-O3
2	B	502	NAD	O4B-C4B-C5B-O5B
2	C	501	NAD	O4B-C4B-C5B-O5B
2	D	501	NAD	O4B-C4B-C5B-O5B
5	C	503	R9V	C3-C6-N-C10
2	A	501	NAD	O4B-C4B-C5B-O5B

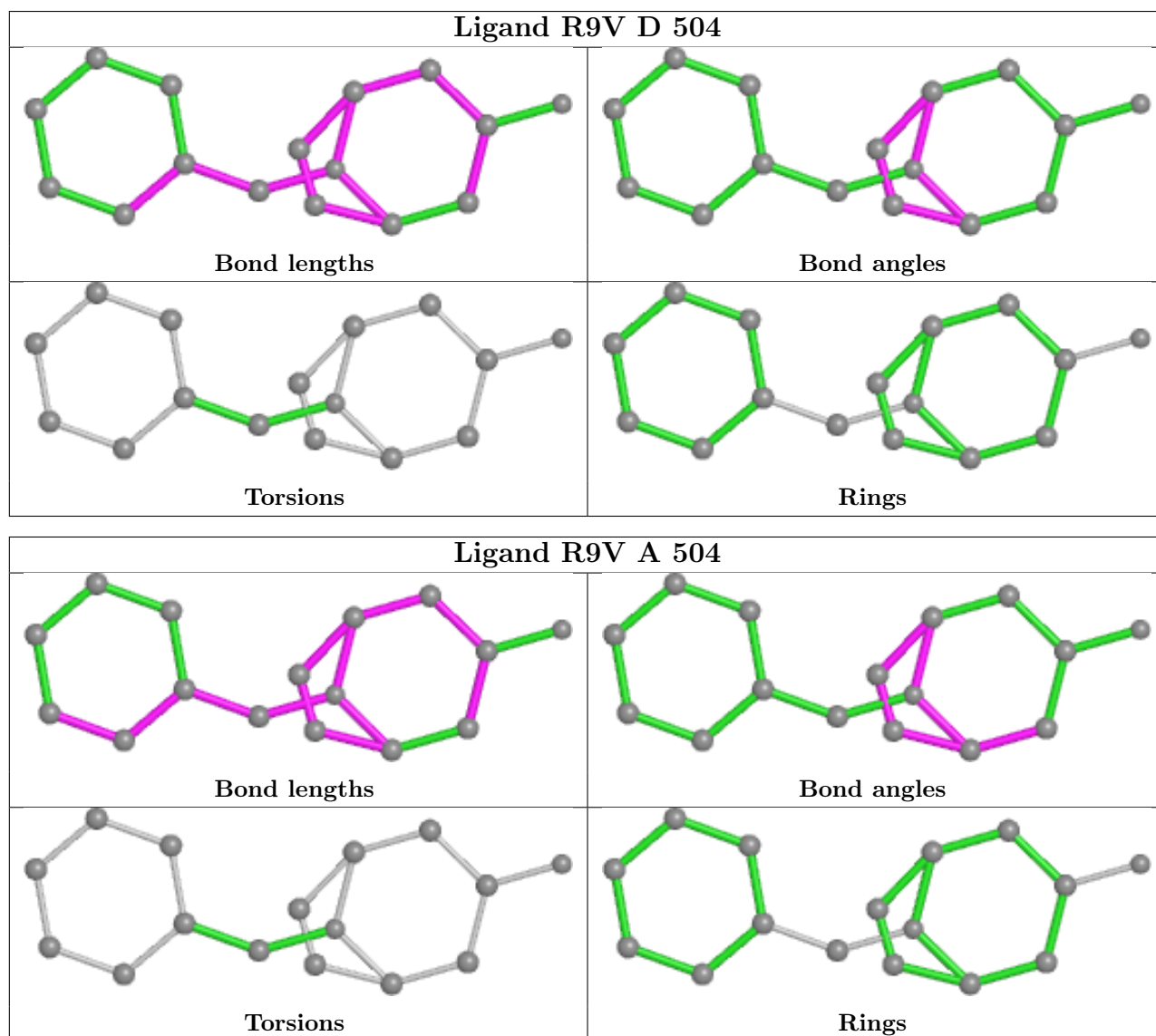
There are no ring outliers.

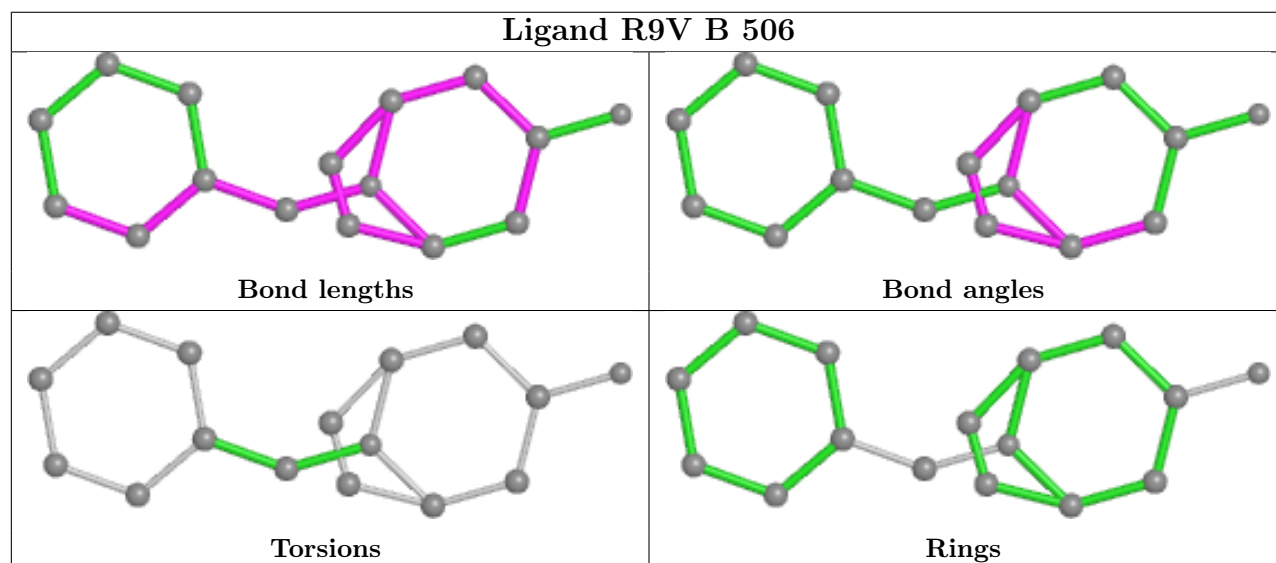
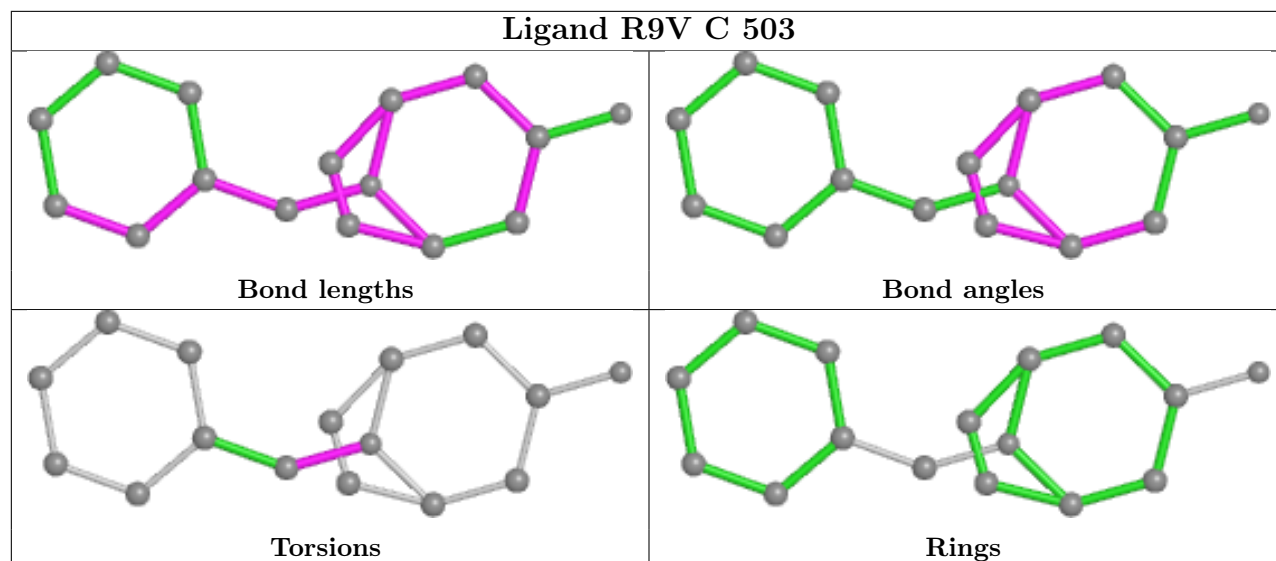
7 monomers are involved in 9 short contacts:

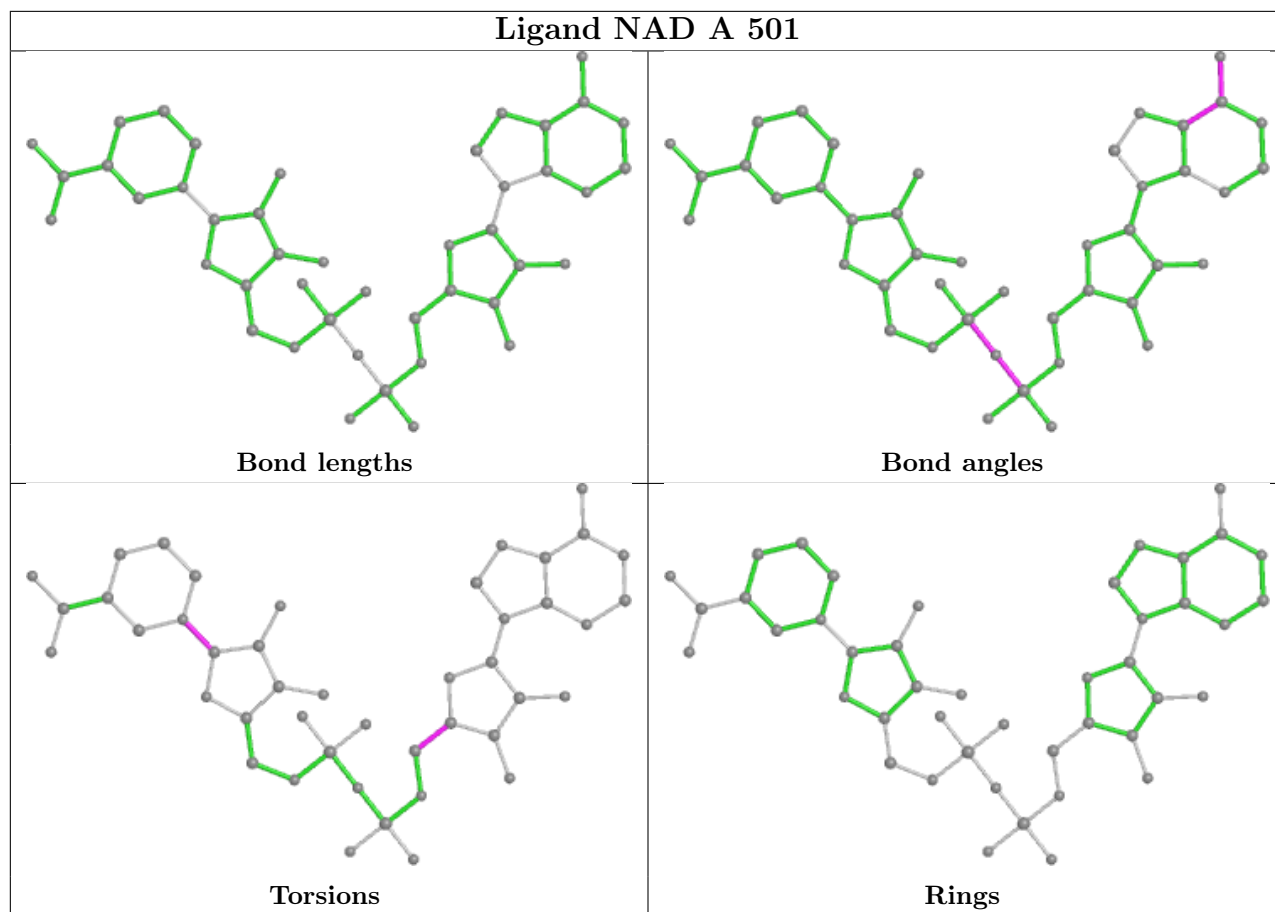
Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	C	508	PO4	2	0
8	B	508	PO4	1	0
8	A	508	PO4	1	0
8	C	505	PO4	1	0
6	B	505	GOL	1	0
8	A	509	PO4	2	0
2	C	501	NAD	1	0

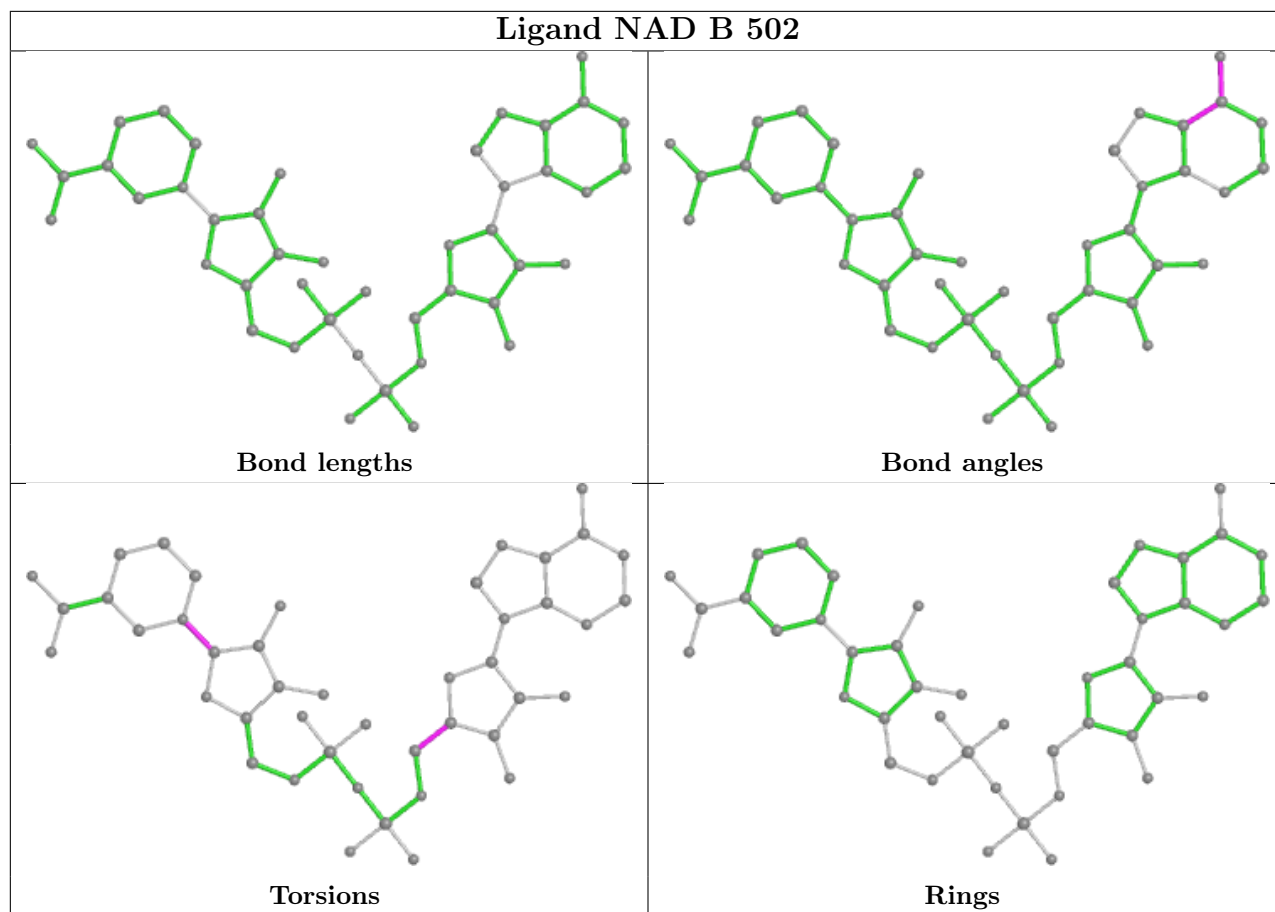
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

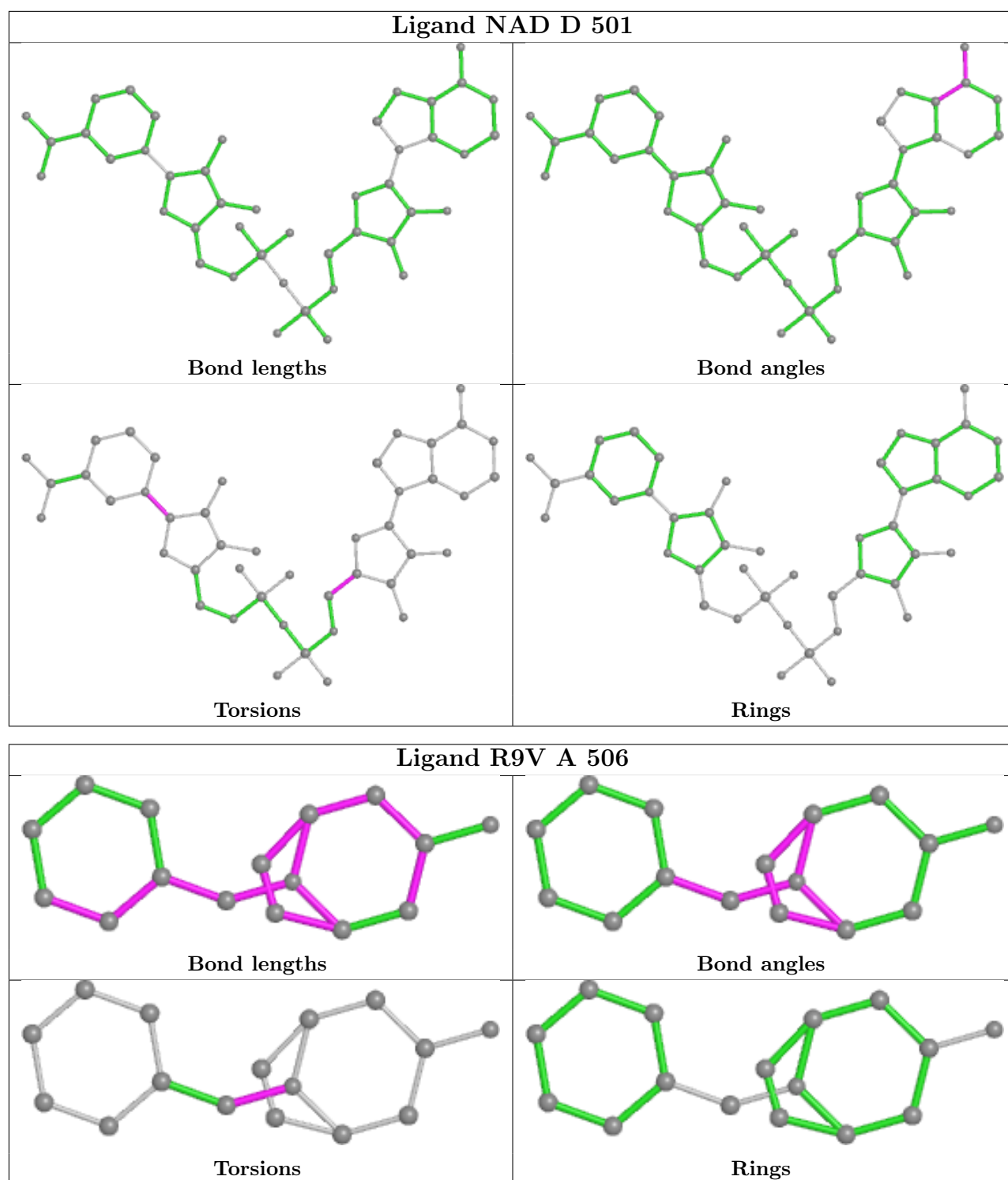
bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 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.

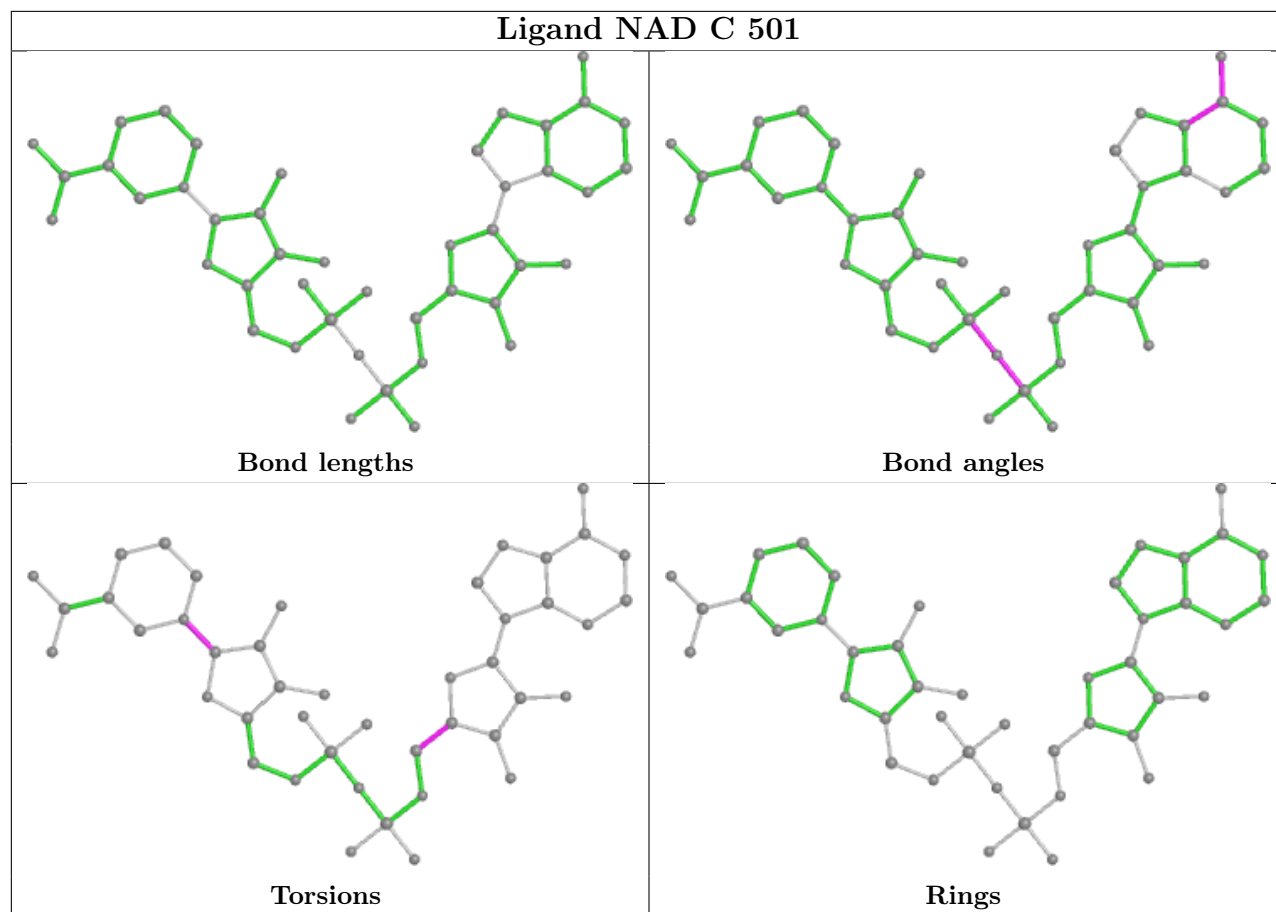












5.7 Other polymers [i](#)

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	464/472 (98%)	-0.27	14 (3%) 50 56	15, 22, 41, 72	0
1	B	461/472 (97%)	-0.27	8 (1%) 70 76	15, 22, 38, 66	0
1	C	460/472 (97%)	-0.07	24 (5%) 27 32	16, 26, 48, 83	0
1	D	462/472 (97%)	-0.19	16 (3%) 44 49	16, 24, 42, 73	0
All	All	1847/1888 (97%)	-0.20	62 (3%) 45 51	15, 23, 42, 83	0

All (62) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	412	ALA	7.1
1	D	8	ALA	6.5
1	C	415	ALA	5.7
1	A	355	ASP	5.7
1	D	355	ASP	5.2
1	D	9	GLY	5.0
1	B	355	ASP	4.8
1	C	411	ALA	4.5
1	C	355	ASP	4.4
1	A	356	GLY	3.8
1	D	357	PHE	3.7
1	D	335	LYS	3.7
1	D	356	GLY	3.7
1	C	416	LYS	3.6
1	C	354	LYS	3.5
1	C	356	GLY	3.3
1	C	410	PRO	3.3
1	B	356	GLY	3.2
1	A	412	ALA	3.1
1	C	11	THR	3.1
1	C	177	LYS	3.1

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Mol	Chain	Res	Type	RSRZ
1	C	413	GLU	3.1
1	D	354	LYS	3.1
1	A	353	GLY	2.9
1	D	46	ALA	2.9
1	A	352	THR	2.9
1	C	357	PHE	2.9
1	A	357	PHE	2.8
1	C	157	ARG	2.8
1	D	279	THR	2.8
1	A	416	LYS	2.8
1	D	281	ALA	2.8
1	D	353	GLY	2.7
1	C	417	ARG	2.6
1	C	409	LEU	2.5
1	D	278	GLY	2.5
1	B	357	PHE	2.5
1	C	10	PHE	2.5
1	D	337	TRP	2.5
1	A	354	LYS	2.5
1	B	9	GLY	2.5
1	B	352	THR	2.3
1	D	352	THR	2.3
1	C	178	ASN	2.3
1	C	335	LYS	2.3
1	B	353	GLY	2.3
1	A	415	ALA	2.3
1	D	48	GLN	2.2
1	C	359	ALA	2.2
1	B	354	LYS	2.2
1	A	45	TYR	2.2
1	C	146	ILE	2.2
1	A	358	ASP	2.2
1	C	176	LEU	2.2
1	C	386	ILE	2.2
1	A	413	GLU	2.1
1	C	128	GLY	2.1
1	D	218	LEU	2.1
1	A	410	PRO	2.1
1	B	129	GLN	2.1
1	A	359	ALA	2.0
1	C	360	HIS	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 monosaccharides 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.

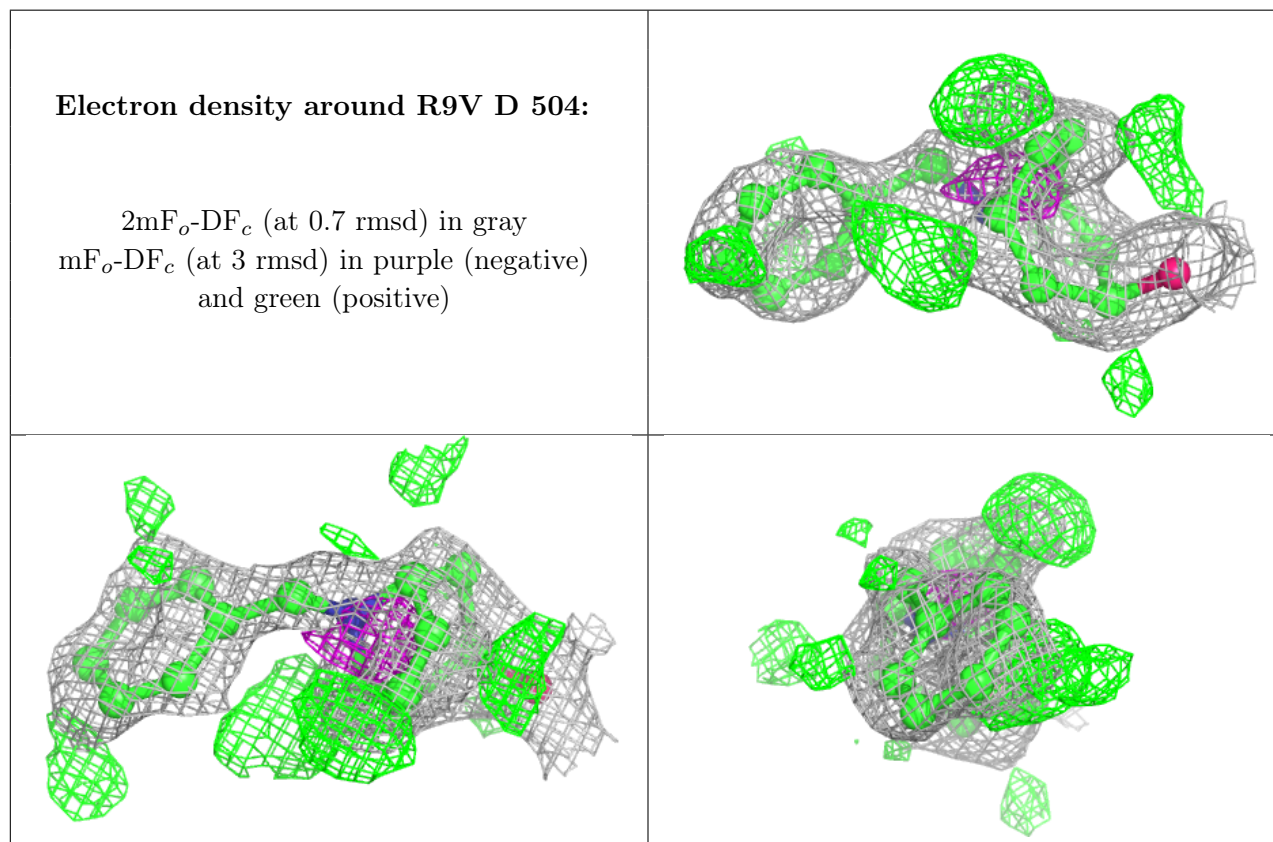
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	R9V	D	504	16/16	0.72	0.23	27,31,36,38	16
5	R9V	C	503	16/16	0.86	0.19	36,42,49,50	16
5	R9V	A	506	16/16	0.86	0.26	43,51,65,68	0
6	GOL	B	504	6/6	0.86	0.15	31,35,40,49	0
6	GOL	A	505	6/6	0.87	0.16	27,32,41,44	0
5	R9V	B	506	16/16	0.87	0.23	30,39,46,48	16
5	R9V	A	504	16/16	0.88	0.15	31,37,42,44	16
6	GOL	B	501	6/6	0.90	0.12	27,33,35,39	0
6	GOL	B	505	6/6	0.90	0.22	32,38,41,43	0
6	GOL	D	503	6/6	0.91	0.16	27,37,44,45	0
4	DMS	A	503	4/4	0.92	0.13	27,31,46,53	0
8	PO4	B	510	5/5	0.92	0.13	37,39,43,46	5
8	PO4	C	507	5/5	0.92	0.16	32,37,38,39	5
8	PO4	D	507	5/5	0.92	0.11	25,27,33,41	0
8	PO4	D	508	5/5	0.92	0.11	32,34,40,49	5
8	PO4	D	506	5/5	0.93	0.22	31,31,36,39	5
8	PO4	A	511	5/5	0.94	0.11	33,35,41,45	5
8	PO4	A	510	5/5	0.94	0.10	22,29,31,36	0
8	PO4	B	509	5/5	0.95	0.09	20,20,29,31	5
8	PO4	C	506	5/5	0.95	0.08	27,28,39,44	0
8	PO4	D	509	5/5	0.95	0.21	35,49,52,58	0
8	PO4	A	508	5/5	0.96	0.14	31,32,33,41	5
8	PO4	B	508	5/5	0.96	0.16	25,27,33,37	5
8	PO4	C	505	5/5	0.96	0.12	32,34,37,41	5
3	ADE	C	502	10/10	0.97	0.10	20,22,23,23	0
8	PO4	C	508	5/5	0.97	0.24	32,48,49,50	0
8	PO4	B	511	5/5	0.98	0.10	21,29,32,34	5

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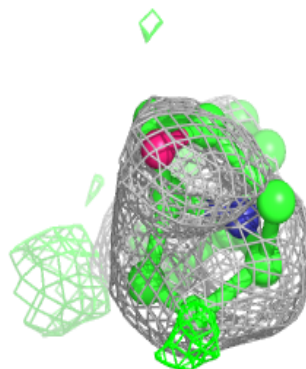
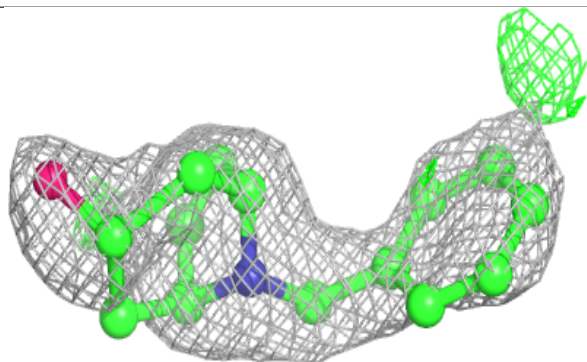
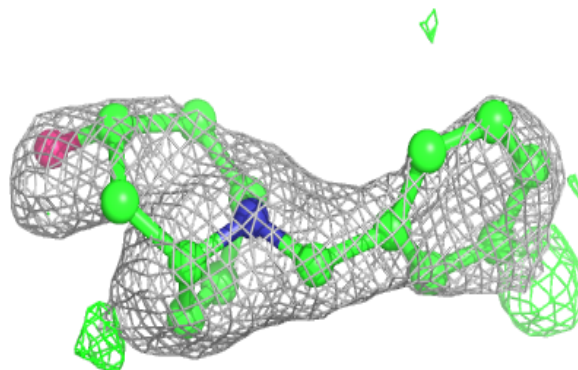
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	ADE	A	502	10/10	0.98	0.07	14,16,18,18	0
3	ADE	B	503	10/10	0.98	0.08	16,17,18,18	0
8	PO4	A	509	5/5	0.98	0.11	25,29,31,32	5
2	NAD	A	501	44/44	0.98	0.06	13,18,20,21	0
3	ADE	D	502	10/10	0.98	0.10	17,20,21,22	0
2	NAD	B	502	44/44	0.98	0.06	15,18,21,24	0
2	NAD	C	501	44/44	0.98	0.06	15,20,23,26	0
2	NAD	D	501	44/44	0.98	0.06	16,20,21,24	0
7	K	A	507	1/1	1.00	0.09	17,17,17,17	0
7	K	B	507	1/1	1.00	0.07	19,19,19,19	0
7	K	C	504	1/1	1.00	0.10	21,21,21,21	0
7	K	D	505	1/1	1.00	0.07	19,19,19,19	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.

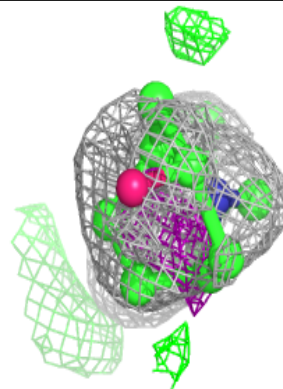
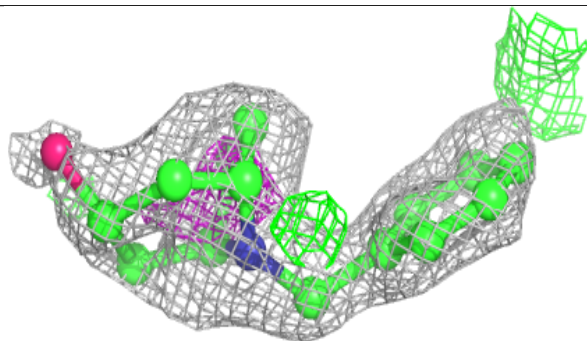
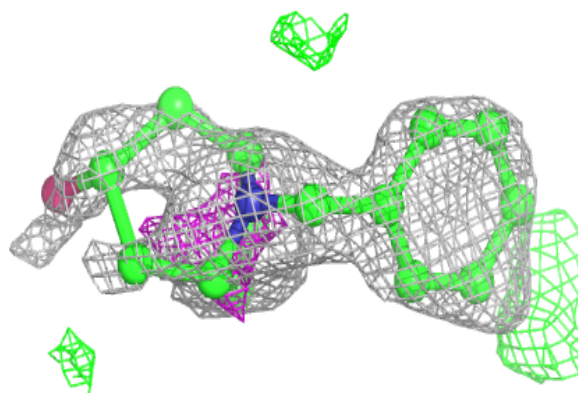


Electron density around R9V C 503:

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

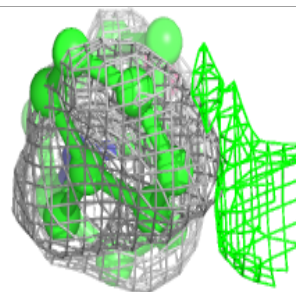
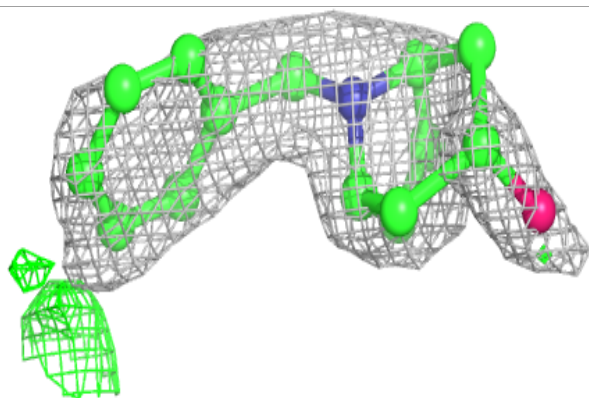
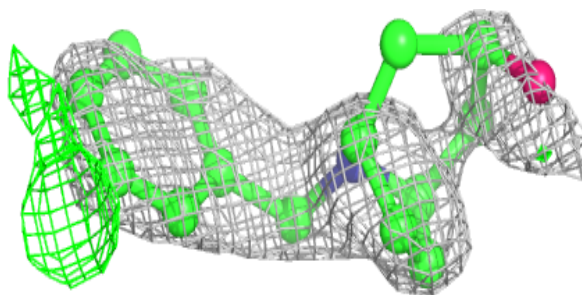
**Electron density around R9V A 506:**

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

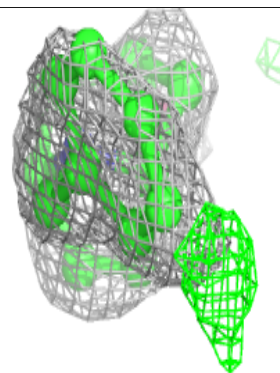
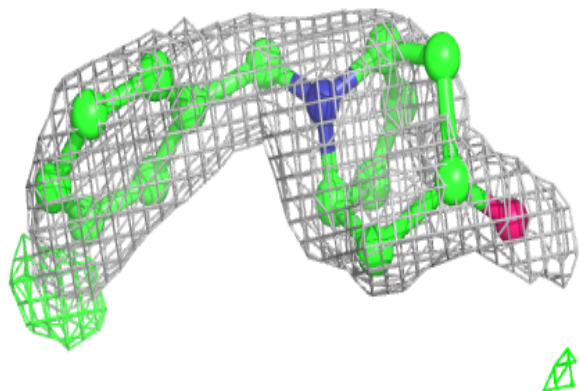
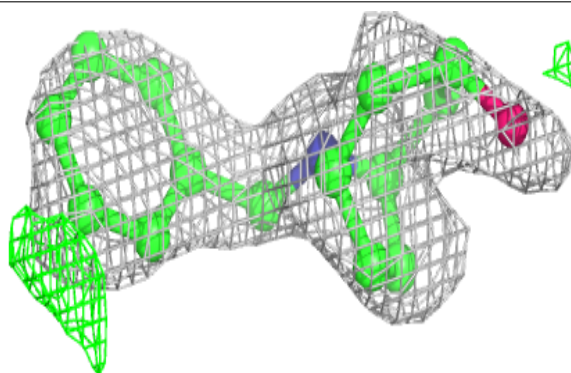


Electron density around R9V B 506:

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

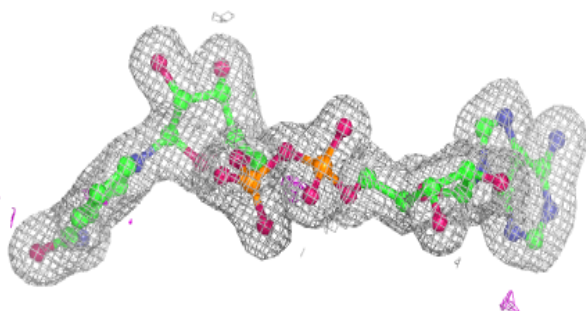
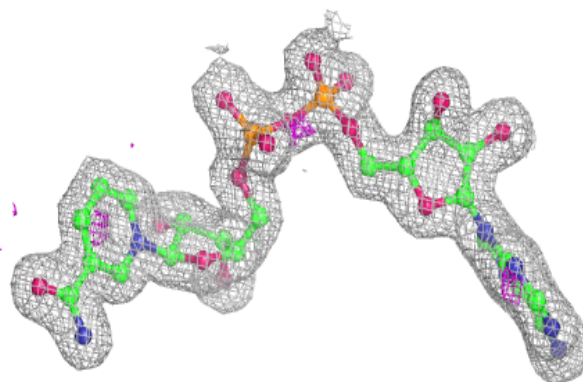
**Electron density around R9V A 504:**

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

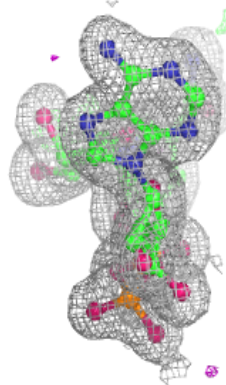
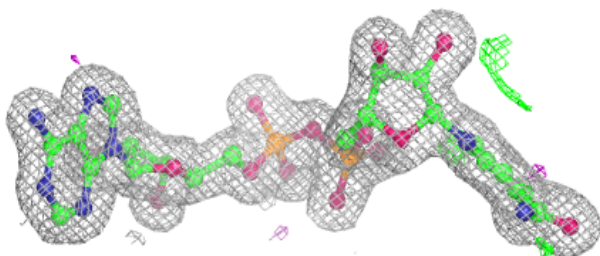
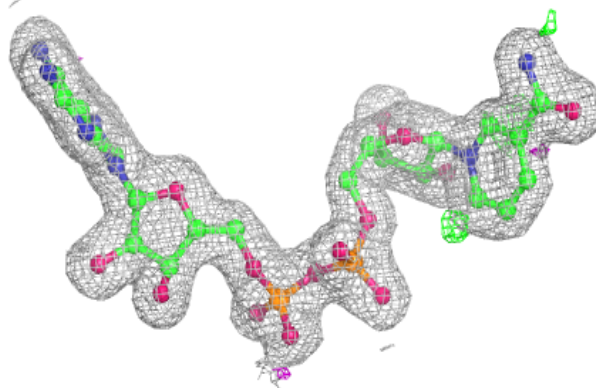


Electron density around NAD A 501:

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

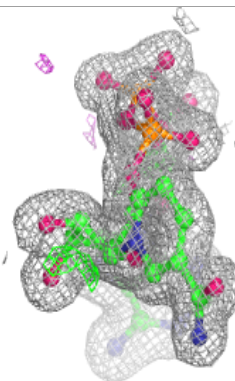
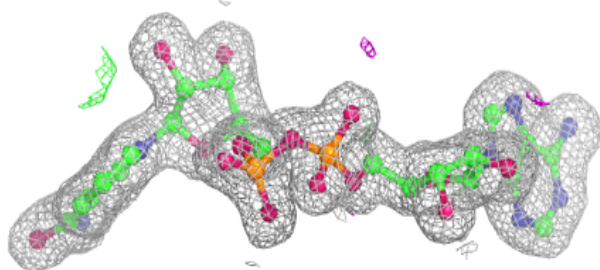
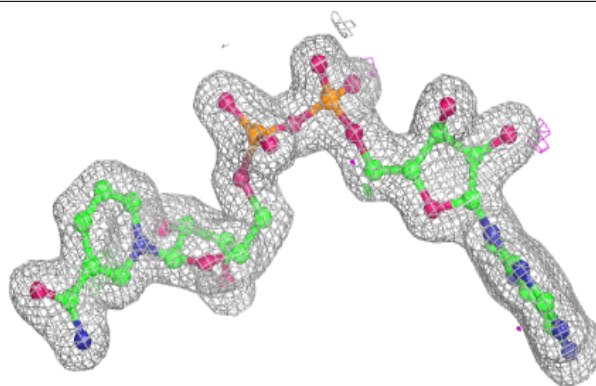
**Electron density around NAD B 502:**

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

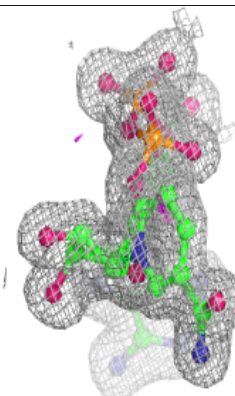
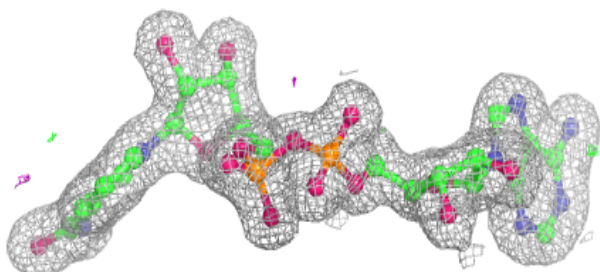
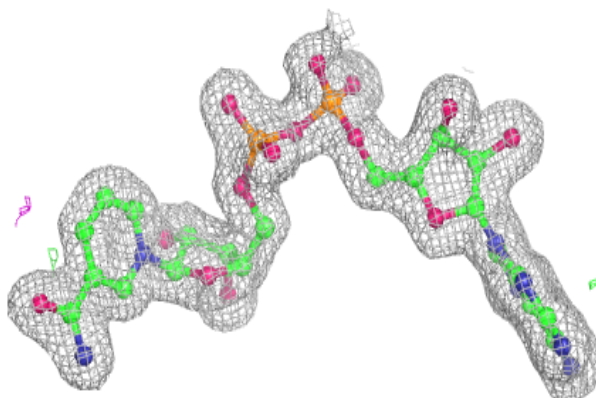


Electron density around NAD C 501:

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

**Electron density around NAD D 501:**

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



6.5 Other polymers [i](#)

There are no such residues in this entry.