



# Full wwPDB X-ray Structure Validation Report ⓘ

Feb 12, 2024 – 12:35 pm GMT

PDB ID : 8CFQ  
Title : Crystal structure of S-adenosyl-L-homocysteine hydrolase from *P. aeruginosa* in complex with F2X-Entry library fragment F11  
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](mailto: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>.

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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

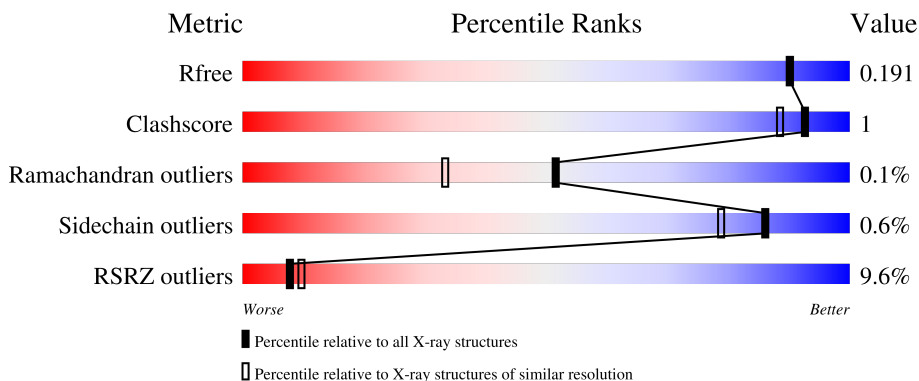
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

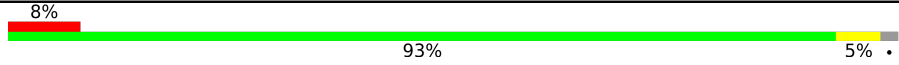
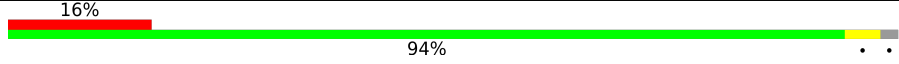
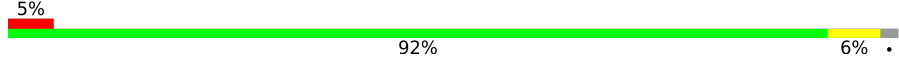
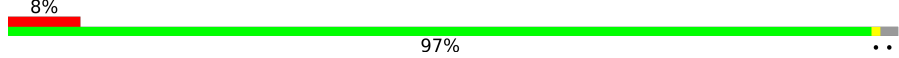
The reported resolution of this entry is 1.73 Å.

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  $\geq 3$ , 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	
1	B	472	
1	C	472	
1	D	472	

## 2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 16352 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	462	3598	2268	623	684	23	0	6	0
1	B	461	3583	2260	620	681	22	0	5	0
1	C	462	3619	2283	626	687	23	0	10	0
1	D	461	3582	2257	619	683	23	0	5	0

There are 12 discrepancies between the modelled and reference sequences:

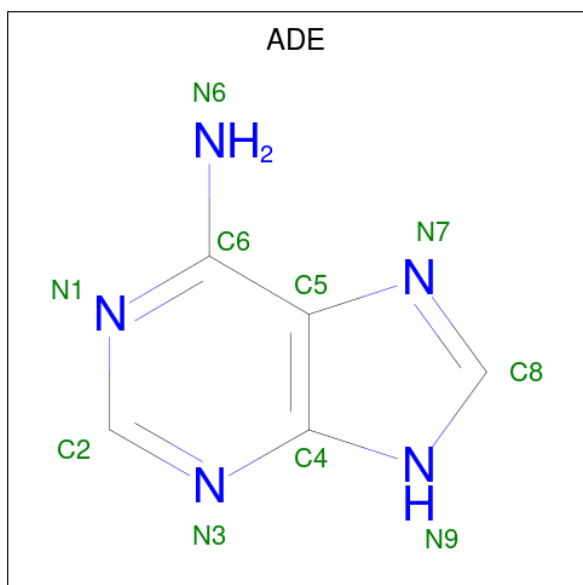
Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q9I685
A	-1	ASN	-	expression tag	UNP Q9I685
A	0	ALA	-	expression tag	UNP Q9I685
B	-2	SER	-	expression tag	UNP Q9I685
B	-1	ASN	-	expression tag	UNP Q9I685
B	0	ALA	-	expression tag	UNP Q9I685
C	-2	SER	-	expression tag	UNP Q9I685
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: C<sub>21</sub>H<sub>27</sub>N<sub>7</sub>O<sub>14</sub>P<sub>2</sub>).



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

- Molecule 3 is ADENINE (three-letter code: ADE) (formula: C<sub>5</sub>H<sub>5</sub>N<sub>5</sub>).

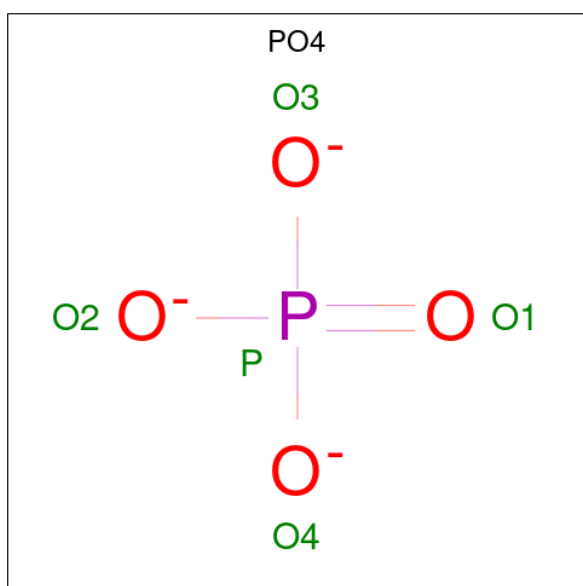


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			10	5	5		
3	B	1	Total	C	N	0	0
			10	5	5		
3	C	1	Total	C	N	0	0
			10	5	5		
3	D	1	Total	C	N	0	0
			10	5	5		

- Molecule 4 is POTASSIUM ION (three-letter code: K) (formula: K).

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

- Molecule 5 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



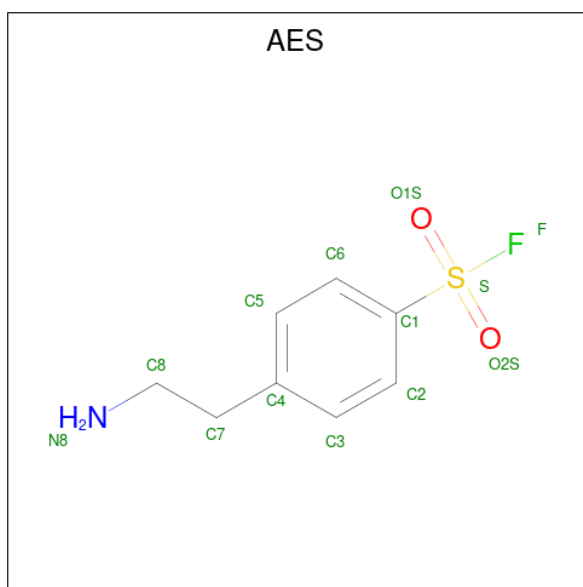
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	A	1	Total	O	P	0	0
			5	4	1		

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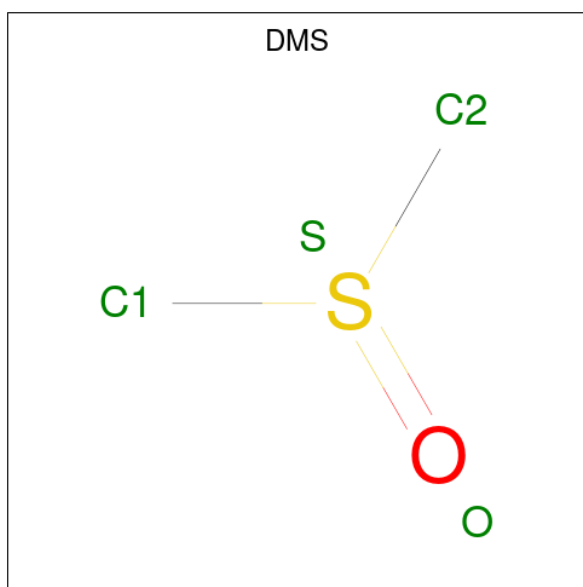
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	B	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total	O	P	0	0
			5	4	1		
5	C	1	Total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

- Molecule 6 is 4-(2-AMINOETHYL)BENZENESULFONYL FLUORIDE (three-letter code: AES) (formula: C<sub>8</sub>H<sub>10</sub>FNO<sub>2</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
6	A	1	Total	C	F	N	O	S	0	0
			13	8	1	1	2	1		
6	A	1	Total	C	F	N	O	S	0	0
			13	8	1	1	2	1		
6	C	1	Total	C	F	N	O	S	0	0
			13	8	1	1	2	1		

- Molecule 7 is DIMETHYL SULFOXIDE (three-letter code: DMS) (formula: C<sub>2</sub>H<sub>6</sub>OS).



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

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

- Molecule 8 is water.

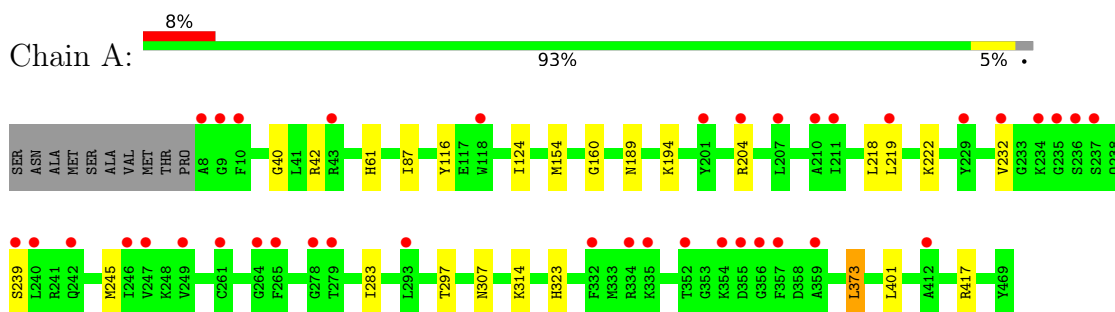
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	426	Total	O	0	20
			447	447		
8	B	327	Total	O	0	15
			342	342		
8	C	378	Total	O	0	17
			395	395		
8	D	418	Total	O	0	20
			439	439		



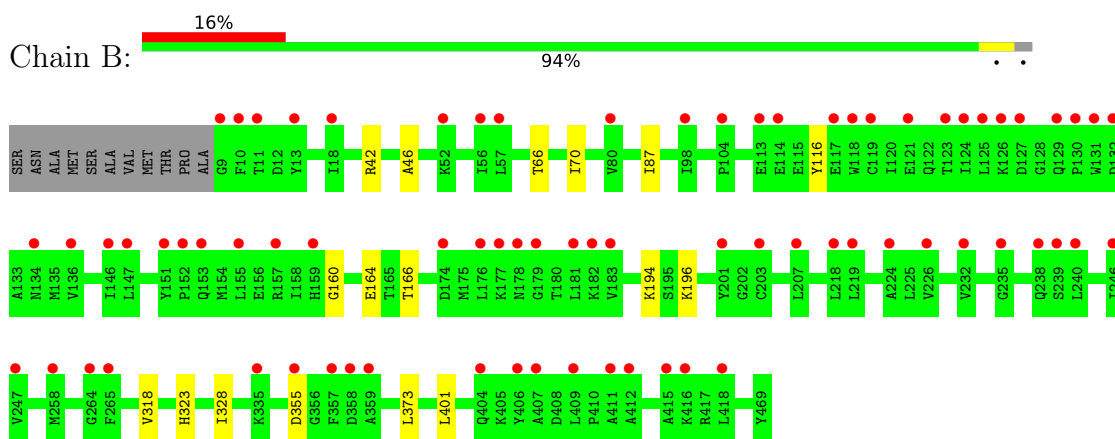
### 3 Residue-property plots [i](#)

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.

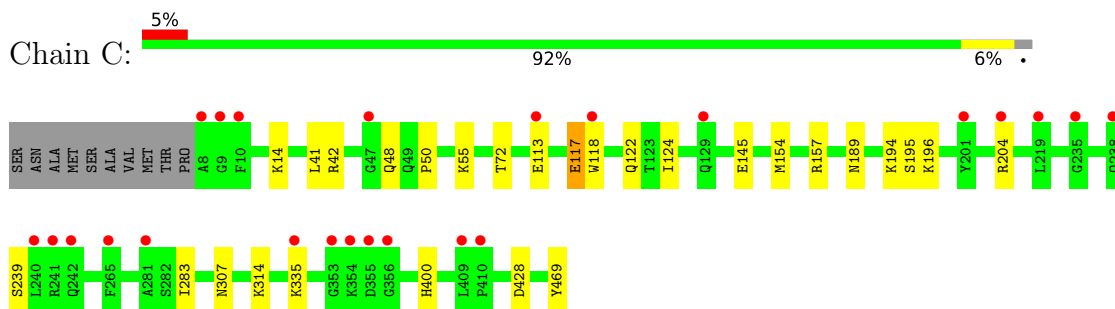
- Molecule 1: Adenosylhomocysteinase



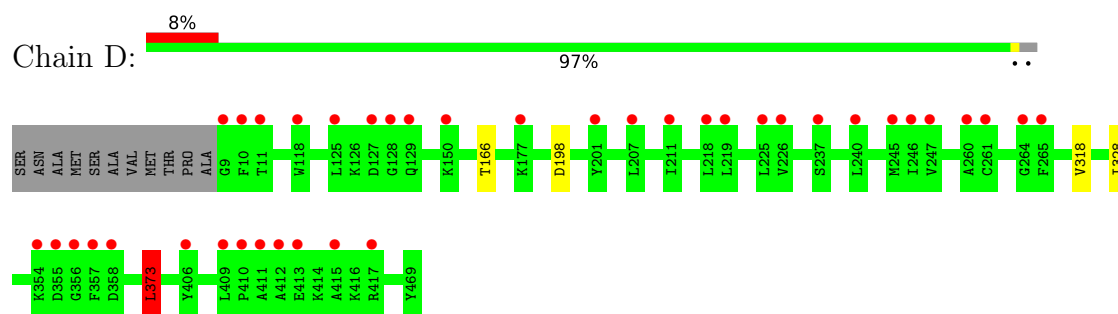
- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	175.90Å 104.01Å 107.52Å 90.00° 100.76° 90.00°	Depositor
Resolution (Å)	41.73 – 1.73 49.35 – 1.73	Depositor EDS
% Data completeness (in resolution range)	99.5 (41.73-1.73) 99.5 (49.35-1.73)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.04 (at 1.73Å)	Xtrriage
Refinement program	PHENIX 1.19.2-4158	Depositor
R, $R_{free}$	0.159 , 0.190 0.160 , 0.191	Depositor DCC
$R_{free}$ test set	2100 reflections (1.06%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	29.0	Xtrriage
Anisotropy	0.177	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 55.6	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.98	EDS
Total number of atoms	16352	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.69% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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, ADE, NAD, DMS, PO4, AES

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	0.52	0/3673	0.66	0/4964
1	B	0.46	0/3658	0.62	0/4944
1	C	0.49	0/3706	0.63	1/5007 (0.0%)
1	D	0.52	0/3651	0.65	2/4935 (0.0%)
All	All	0.50	0/14688	0.64	3/19850 (0.0%)

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	373	LEU	CA-CB-CG	5.62	128.22	115.30
1	D	198	ASP	CB-CG-OD1	5.38	123.14	118.30
1	C	428	ASP	CB-CG-OD1	5.30	123.07	118.30

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	3598	0	3611	14	0
1	B	3583	0	3600	10	0
1	C	3619	0	3645	18	0
1	D	3582	0	3585	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	A	44	0	26	0	0
2	B	44	0	26	1	0
2	C	44	0	26	0	0
2	D	44	0	26	0	0
3	A	10	0	4	0	0
3	B	10	0	4	0	0
3	C	10	0	4	0	0
3	D	10	0	4	0	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
5	A	15	0	0	1	0
5	B	15	0	0	0	0
5	C	30	0	0	1	0
5	D	20	0	0	0	0
6	A	26	0	20	1	0
6	C	13	0	10	1	0
7	C	4	0	6	0	0
7	D	4	0	6	0	0
8	A	447	0	0	0	0
8	B	342	0	0	0	0
8	C	395	0	0	4	0
8	D	439	0	0	0	0
All	All	16352	0	14603	43	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 (43) 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:14:LYS:NZ	8:C:602:HOH:O	2.33	0.62
1:C:189:ASN:HA	1:C:194:LYS:HD2	1.85	0.59
1:D:318:VAL:HG12	1:D:328:ILE:HD13	1.87	0.56
1:B:373:LEU:HD22	2:B:501:NAD:N7N	2.21	0.56
1:C:55:LYS:HE3	8:C:604:HOH:O	2.07	0.55
1:D:373:LEU:HD12	1:D:373:LEU:H	1.72	0.54
1:C:113:GLU:O	1:C:117:GLU:HG2	2.08	0.54
1:C:283:ILE:HG13	1:C:307:ASN:HB3	1.91	0.52
1:C:400:HIS:HE1	8:C:833:HOH:O	1.93	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:204[B]:ARG:HA	1:C:239:SER:HB2	1.93	0.49
1:A:314:LYS:HG3	5:A:504:PO4:O2	2.13	0.48
1:A:40:GLY:HA3	6:A:507:AES:H3	1.96	0.48
1:C:41:LEU:HD21	6:C:511:AES:F	2.04	0.47
1:A:232:VAL:HG12	1:A:297:THR:HB	1.96	0.47
1:A:323:HIS:HA	1:A:373:LEU:HD21	1.97	0.47
1:B:160:GLY:HA3	1:B:401:LEU:HD13	1.95	0.47
1:B:164:GLU:O	1:B:194:LYS:HE3	2.15	0.47
1:B:196[B]:LYS:NZ	1:C:469:TYR:OXT	2.49	0.46
1:C:204[A]:ARG:HA	1:C:239:SER:HB2	1.95	0.46
1:A:283:ILE:HG13	1:A:307:ASN:HB3	1.97	0.46
1:A:160:GLY:HA3	1:A:401:LEU:HD13	1.97	0.46
1:C:118:TRP:O	1:C:122:GLN:HG2	2.16	0.46
1:C:48[B]:GLN:HG2	1:C:50:PRO:HD3	1.99	0.45
1:B:42:ARG:O	1:B:46:ALA:HB2	2.17	0.44
1:A:218:LEU:O	1:A:222:LYS:HD2	2.17	0.44
1:A:204[B]:ARG:HA	1:A:239:SER:HB2	2.01	0.43
1:A:189:ASN:HA	1:A:194:LYS:HD2	2.00	0.43
1:C:124:ILE:HG23	1:C:154:MET:SD	2.59	0.43
1:B:87:ILE:HG22	1:B:116:TYR:HB2	2.00	0.42
1:B:355:ASP:OD1	1:B:355:ASP:N	2.52	0.42
1:C:157:ARG:HG3	8:C:854:HOH:O	2.19	0.42
1:B:323:HIS:HA	1:B:373:LEU:HD21	2.02	0.42
1:A:204[A]:ARG:HA	1:A:239:SER:HB2	2.02	0.42
1:A:219:LEU:O	1:A:245:MET:HG2	2.20	0.42
1:C:117:GLU:HG2	1:C:117:GLU:H	1.62	0.41
1:A:417:ARG:O	1:A:417:ARG:HG3	2.20	0.41
1:B:66:THR:O	1:B:70:ILE:HG13	2.21	0.41
1:C:189:ASN:O	1:C:195:SER:HB3	2.20	0.41
1:A:87:ILE:HG22	1:A:116:TYR:HB2	2.02	0.40
1:A:124:ILE:HG23	1:A:154:MET:SD	2.61	0.40
1:C:42:ARG:HG3	1:C:72:THR:HG23	2.03	0.40
1:C:314:LYS:HG3	5:C:509:PO4:O3	2.21	0.40
1:B:318:VAL:HG12	1:B:328:ILE:HD13	2.03	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	466/472 (99%)	457 (98%)	8 (2%)	1 (0%)	47	29
1	B	464/472 (98%)	453 (98%)	11 (2%)	0	100	100
1	C	470/472 (100%)	459 (98%)	11 (2%)	0	100	100
1	D	464/472 (98%)	455 (98%)	9 (2%)	0	100	100
All	All	1864/1888 (99%)	1824 (98%)	39 (2%)	1 (0%)	51	33

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	61	HIS

### 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	383/385 (100%)	381 (100%)	2 (0%)	88	83
1	B	382/385 (99%)	381 (100%)	1 (0%)	92	89
1	C	387/385 (100%)	382 (99%)	5 (1%)	69	52
1	D	381/385 (99%)	379 (100%)	2 (0%)	88	83
All	All	1533/1540 (100%)	1523 (99%)	10 (1%)	86	75

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

Mol	Chain	Res	Type
1	A	42	ARG
1	A	373	LEU
1	B	166	THR
1	C	117	GLU
1	C	145	GLU
1	C	196[A]	LYS
1	C	196[B]	LYS
1	C	335	LYS
1	D	166	THR
1	D	373	LEU

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 33 ligands modelled in this entry, 4 are monoatomic - leaving 29 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z  > 2$	Counts	RMSZ	$\# Z  > 2$
2	NAD	C	501	-	42,48,48	0.60	0	50,73,73	0.74	1 (2%)



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
6	AES	A	507	-	11,13,13	1.69	3 (27%)	16,18,18	1.95	2 (12%)
5	PO4	B	506	-	4,4,4	0.75	0	6,6,6	1.01	0
7	DMS	D	503	-	3,3,3	0.67	0	3,3,3	1.28	0
5	PO4	C	507	-	4,4,4	1.37	0	6,6,6	0.59	0
5	PO4	A	505	-	4,4,4	0.80	0	6,6,6	0.89	0
5	PO4	C	505	-	4,4,4	0.96	0	6,6,6	1.13	1 (16%)
2	NAD	A	501	-	42,48,48	0.67	0	50,73,73	0.79	1 (2%)
3	ADE	C	502	-	9,11,11	0.82	0	7,15,15	1.16	1 (14%)
5	PO4	D	505	-	4,4,4	1.09	0	6,6,6	0.66	0
5	PO4	B	505	-	4,4,4	1.25	0	6,6,6	0.87	0
5	PO4	B	504	-	4,4,4	0.85	0	6,6,6	0.91	0
3	ADE	D	502	-	9,11,11	0.85	0	7,15,15	1.09	0
5	PO4	D	506	-	4,4,4	0.82	0	6,6,6	0.85	0
6	AES	C	511	-	11,13,13	1.72	4 (36%)	16,18,18	1.61	3 (18%)
7	DMS	C	503	-	3,3,3	0.79	0	3,3,3	0.92	0
2	NAD	B	501	-	42,48,48	0.51	0	50,73,73	0.81	1 (2%)
5	PO4	D	507	-	4,4,4	0.72	0	6,6,6	1.47	1 (16%)
5	PO4	A	506	-	4,4,4	0.62	0	6,6,6	1.53	1 (16%)
5	PO4	D	508	-	4,4,4	0.88	0	6,6,6	0.78	0
5	PO4	A	504	-	4,4,4	1.00	0	6,6,6	0.62	0
6	AES	A	508	-	11,13,13	1.86	4 (36%)	16,18,18	1.44	1 (6%)
2	NAD	D	501	-	42,48,48	0.56	0	50,73,73	0.81	0
5	PO4	C	510	-	4,4,4	0.79	0	6,6,6	0.56	0
3	ADE	A	502	-	9,11,11	1.08	1 (11%)	7,15,15	1.20	1 (14%)
5	PO4	C	509	-	4,4,4	1.06	0	6,6,6	0.45	0
3	ADE	B	502	-	9,11,11	0.96	1 (11%)	7,15,15	1.18	1 (14%)
5	PO4	C	506	-	4,4,4	1.00	0	6,6,6	1.18	2 (33%)
5	PO4	C	508	-	4,4,4	1.07	0	6,6,6	0.70	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	NAD	D	501	-	-	5/26/62/62	0/5/5/5
3	ADE	A	502	-	-	-	0/2/2/2
2	NAD	C	501	-	-	5/26/62/62	0/5/5/5
6	AES	A	507	-	-	4/9/9/9	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	ADE	D	502	-	-	-	0/2/2/2
6	AES	C	511	-	-	2/9/9/9	0/1/1/1
3	ADE	B	502	-	-	-	0/2/2/2
6	AES	A	508	-	-	5/9/9/9	0/1/1/1
2	NAD	A	501	-	-	5/26/62/62	0/5/5/5
3	ADE	C	502	-	-	-	0/2/2/2
2	NAD	B	501	-	-	5/26/62/62	0/5/5/5

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	508	AES	O2S-S	3.26	1.48	1.42
6	C	511	AES	O2S-S	2.91	1.48	1.42
6	A	507	AES	C5-C6	2.75	1.43	1.38
6	A	508	AES	F-S	2.72	1.63	1.53
6	A	508	AES	O1S-S	2.69	1.47	1.42
6	C	511	AES	F-S	2.69	1.63	1.53
6	A	507	AES	O2S-S	2.56	1.47	1.42
3	A	502	ADE	C4-N3	-2.55	1.33	1.37
6	A	507	AES	F-S	2.53	1.63	1.53
3	B	502	ADE	C4-N3	-2.37	1.33	1.37
6	C	511	AES	O1S-S	2.08	1.46	1.42
6	C	511	AES	C5-C6	2.04	1.42	1.38
6	A	508	AES	C5-C6	2.03	1.42	1.38

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	507	AES	O2S-S-O1S	-6.35	99.25	119.07
6	C	511	AES	O2S-S-O1S	-4.65	104.56	119.07
6	A	508	AES	O2S-S-O1S	-4.56	104.85	119.07
6	A	507	AES	F-S-O2S	3.21	113.79	106.49
5	A	506	PO4	O3-P-O1	-2.86	100.43	110.89
6	C	511	AES	F-S-O2S	2.63	112.47	106.49
6	C	511	AES	O2S-S-C1	-2.56	108.13	110.74
3	A	502	ADE	C5-C6-N6	2.48	124.12	120.35
3	B	502	ADE	C5-C6-N6	2.46	124.09	120.35
2	B	501	NAD	C5A-C6A-N6A	2.37	123.96	120.35
5	D	507	PO4	O3-P-O1	-2.22	102.77	110.89
3	C	502	ADE	C5-C6-N6	2.22	123.72	120.35
2	C	501	NAD	C5A-C6A-N6A	2.18	123.66	120.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	C	505	PO4	O4-P-O2	2.13	114.81	107.97
2	A	501	NAD	C5A-C6A-N6A	2.02	123.43	120.35
5	C	506	PO4	O4-P-O3	2.02	114.46	107.97
5	C	506	PO4	O4-P-O2	-2.01	101.51	107.97

There are no chirality outliers.

All (31) torsion outliers are listed below:

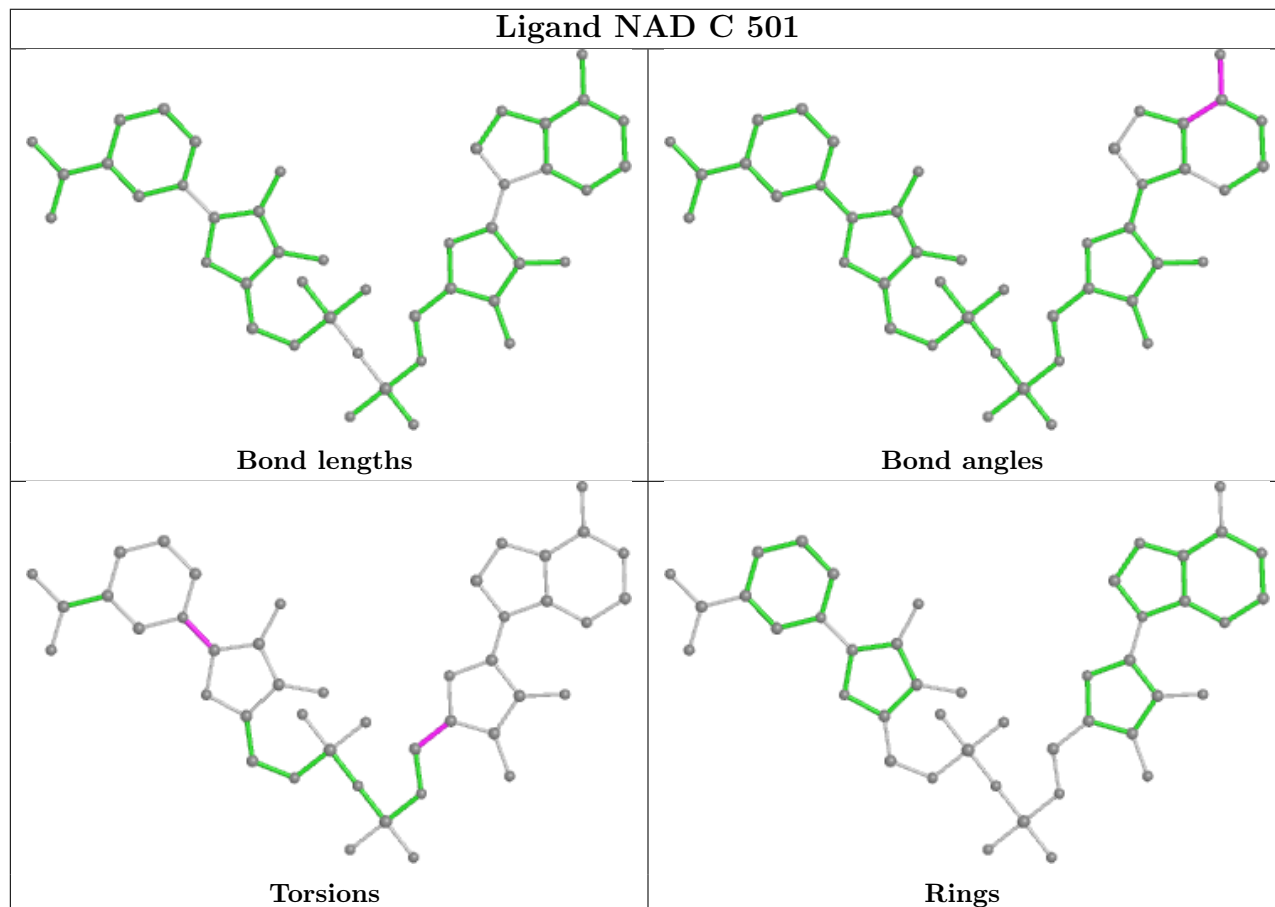
Mol	Chain	Res	Type	Atoms
2	A	501	NAD	O4D-C1D-N1N-C2N
2	A	501	NAD	O4D-C1D-N1N-C6N
2	A	501	NAD	C2D-C1D-N1N-C2N
2	A	501	NAD	C2D-C1D-N1N-C6N
2	B	501	NAD	O4D-C1D-N1N-C2N
2	B	501	NAD	O4D-C1D-N1N-C6N
2	B	501	NAD	C2D-C1D-N1N-C2N
2	B	501	NAD	C2D-C1D-N1N-C6N
2	C	501	NAD	O4D-C1D-N1N-C2N
2	C	501	NAD	O4D-C1D-N1N-C6N
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
6	A	507	AES	C4-C7-C8-N8
6	A	508	AES	C2-C1-S-F
6	A	508	AES	C2-C1-S-O1S
6	A	508	AES	C6-C1-S-F
6	A	508	AES	C6-C1-S-O1S
6	A	508	AES	C4-C7-C8-N8
6	A	507	AES	C2-C1-S-O1S
6	A	507	AES	C6-C1-S-O1S
6	A	507	AES	C6-C1-S-F
6	C	511	AES	C2-C1-S-O1S
6	C	511	AES	C6-C1-S-O1S
2	D	501	NAD	O4B-C4B-C5B-O5B
2	B	501	NAD	O4B-C4B-C5B-O5B
2	C	501	NAD	O4B-C4B-C5B-O5B
2	A	501	NAD	O4B-C4B-C5B-O5B

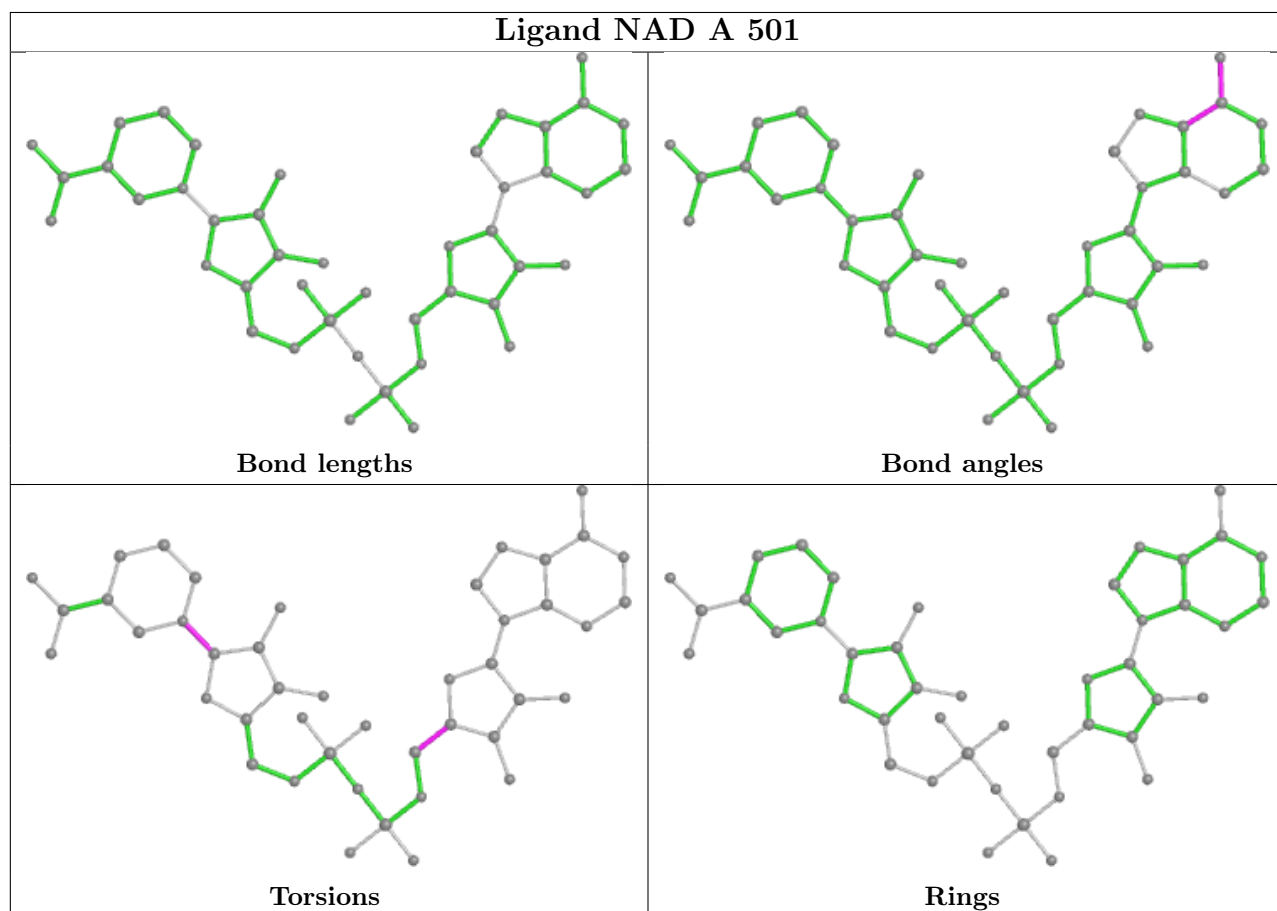
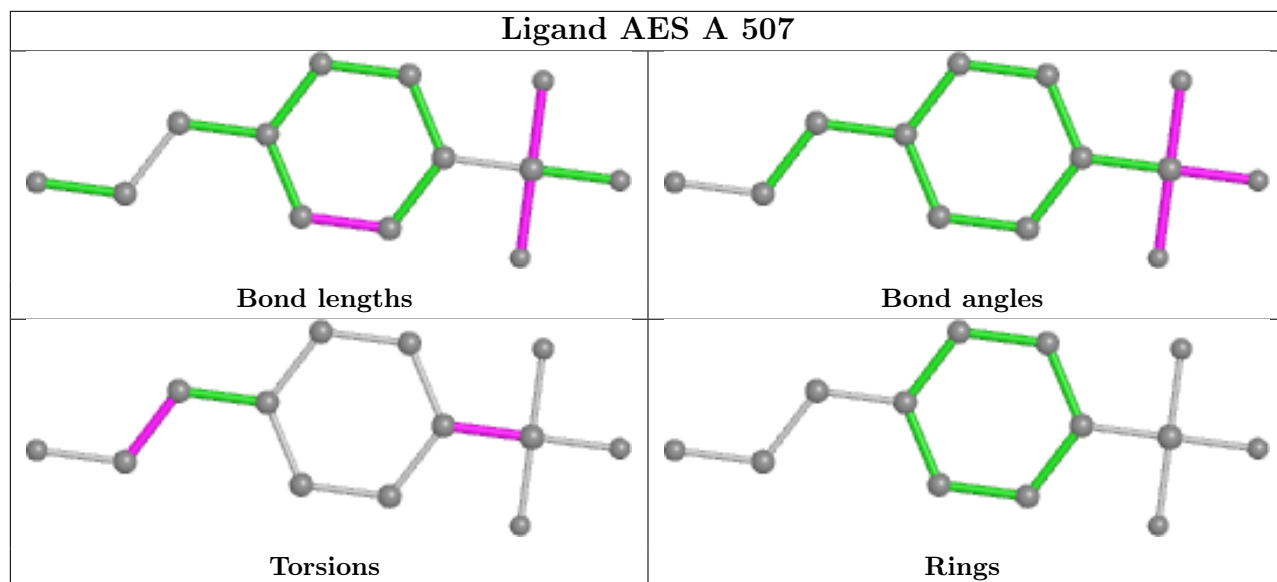
There are no ring outliers.

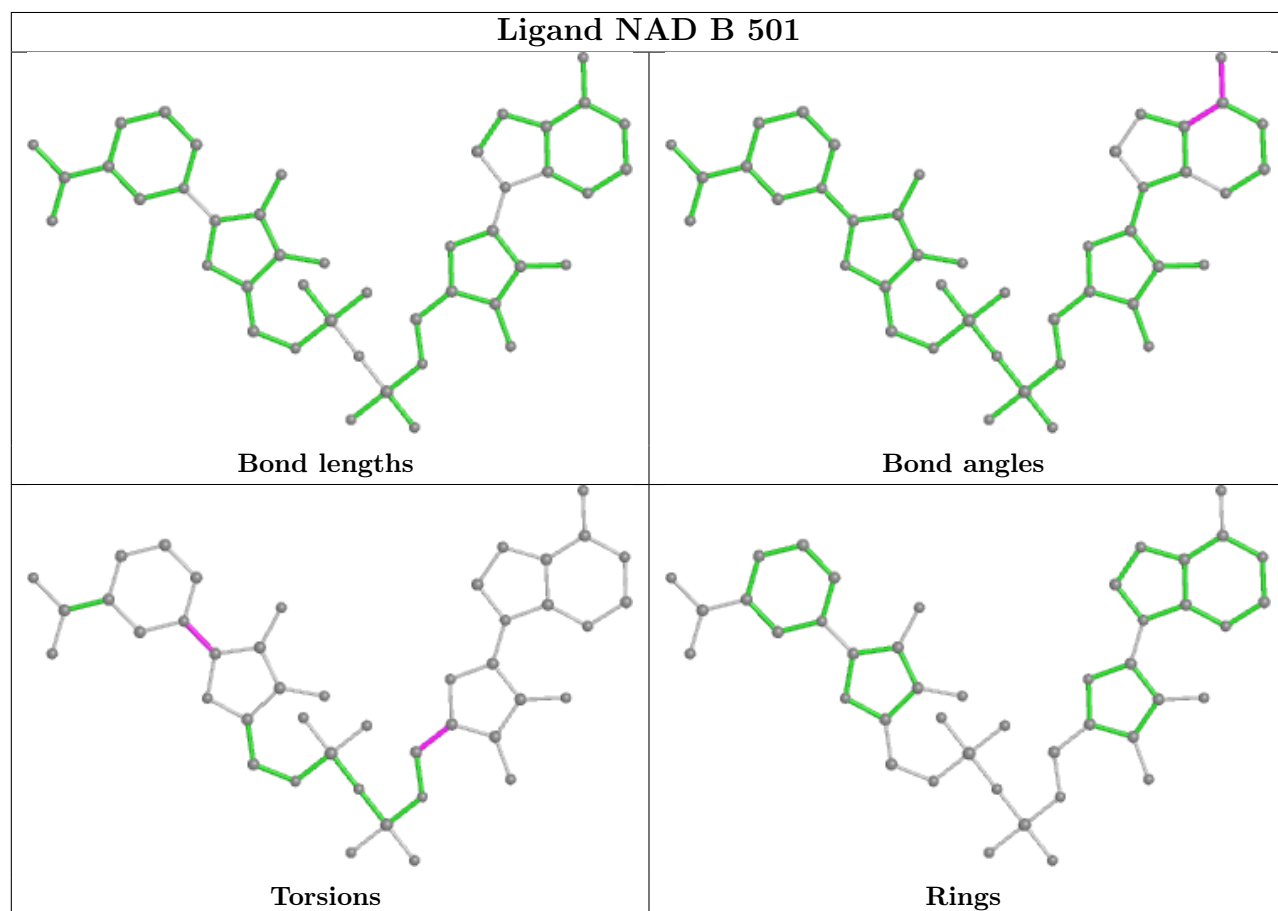
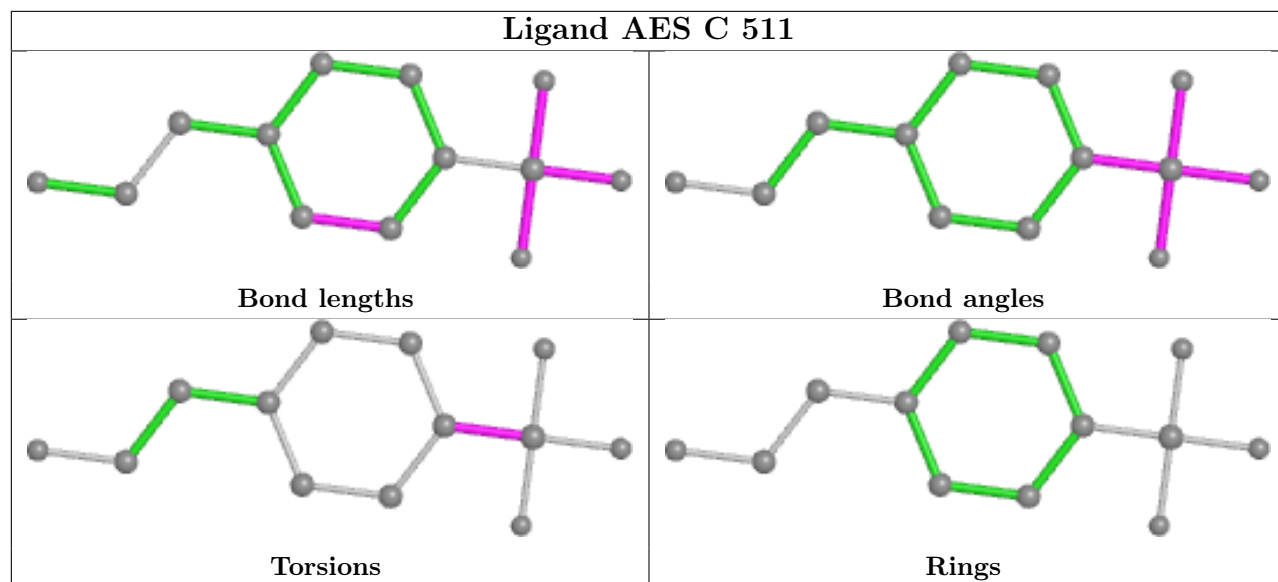
5 monomers are involved in 5 short contacts:

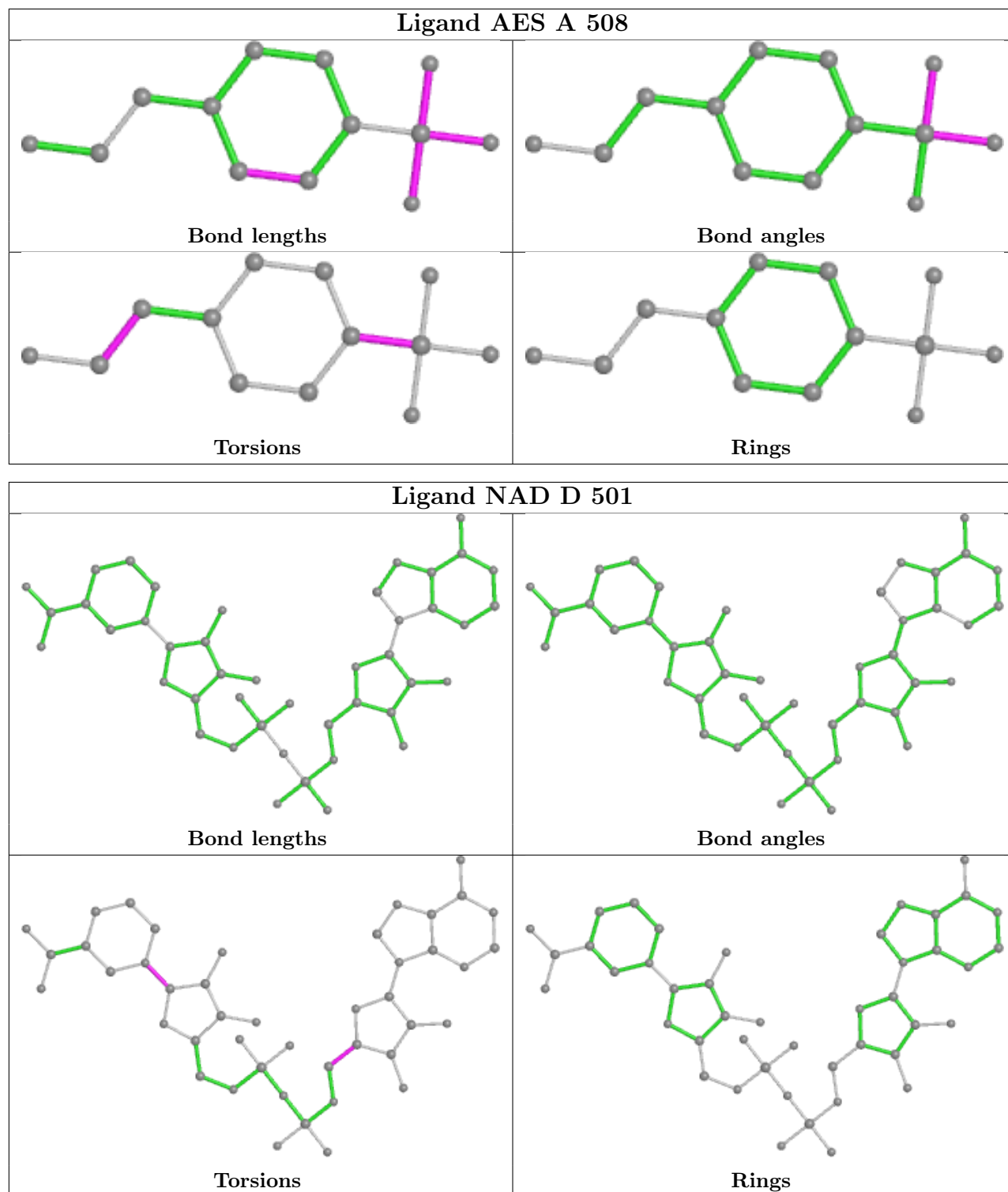
Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	A	507	AES	1	0
6	C	511	AES	1	0
2	B	501	NAD	1	0
5	A	504	PO4	1	0
5	C	509	PO4	1	0

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

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	462/472 (97%)	0.29	39 (8%) <b>11</b> <b>14</b>	20, 28, 47, 84	0
1	B	461/472 (97%)	0.78	75 (16%) <b>1</b> <b>2</b>	21, 38, 72, 94	0
1	C	462/472 (97%)	0.29	24 (5%) <b>27</b> <b>32</b>	22, 33, 53, 85	0
1	D	461/472 (97%)	0.35	39 (8%) <b>10</b> <b>13</b>	20, 30, 53, 70	0
All	All	1846/1888 (97%)	0.43	177 (9%) <b>8</b> <b>10</b>	20, 32, 59, 94	0

All (177) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	10	PHE	6.7
1	B	118	TRP	6.3
1	A	8	ALA	6.0
1	B	124	ILE	5.7
1	A	355	ASP	5.4
1	C	355	ASP	5.3
1	A	9	GLY	5.1
1	B	9	GLY	5.0
1	D	9	GLY	5.0
1	B	130	PRO	4.9
1	B	406	TYR	4.8
1	D	127	ASP	4.6
1	B	181	LEU	4.5
1	B	127	ASP	4.5
1	B	104	PRO	4.4
1	B	121	GLU	4.4
1	B	131	TRP	4.3
1	A	354	LYS	4.0
1	B	13	TYR	4.0
1	B	146	ILE	3.8
1	B	134	ASN	3.8

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>	<b>RSRZ</b>
1	B	176	LEU	3.8
1	B	409	LEU	3.8
1	C	9	GLY	3.7
1	B	129	GLN	3.7
1	D	412	ALA	3.7
1	B	247	VAL	3.7
1	B	114	GLU	3.6
1	B	152	PRO	3.6
1	B	404[A]	GLN	3.6
1	C	10	PHE	3.6
1	D	409	LEU	3.6
1	B	147	LEU	3.5
1	D	128	GLY	3.5
1	C	204[A]	ARG	3.4
1	A	240	LEU	3.4
1	B	219	LEU	3.2
1	B	418	LEU	3.2
1	C	335	LYS	3.2
1	C	118	TRP	3.2
1	B	117	GLU	3.2
1	B	153	GLN	3.2
1	D	356	GLY	3.2
1	B	159	HIS	3.2
1	B	52	LYS	3.2
1	D	219	LEU	3.2
1	B	123	THR	3.2
1	D	411	ALA	3.1
1	A	232	VAL	3.1
1	A	219	LEU	3.1
1	B	125	LEU	3.1
1	B	183	VAL	3.1
1	B	240	LEU	3.1
1	D	10	PHE	3.1
1	B	132	ASP	3.1
1	B	182	LYS	3.0
1	B	412	ALA	3.0
1	D	11	THR	3.0
1	D	129	GLN	3.0
1	D	355	ASP	3.0
1	B	177	LYS	3.0
1	C	129	GLN	3.0
1	B	179	GLY	3.0

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Mol	Chain	Res	Type	RSRZ
1	A	204[A]	ARG	2.9
1	D	265	PHE	2.9
1	D	240	LEU	2.9
1	A	279	THR	2.9
1	B	218	LEU	2.9
1	D	218	LEU	2.9
1	A	265	PHE	2.9
1	C	219	LEU	2.9
1	B	264	GLY	2.9
1	A	352	THR	2.9
1	D	125	LEU	2.8
1	B	201	TYR	2.8
1	A	278	GLY	2.8
1	B	11	THR	2.8
1	B	415	ALA	2.8
1	D	417	ARG	2.8
1	D	354	LYS	2.8
1	B	80	VAL	2.7
1	B	155	LEU	2.7
1	D	357	PHE	2.7
1	C	353	GLY	2.7
1	B	178	ASN	2.7
1	B	56	ILE	2.7
1	C	240	LEU	2.7
1	D	415	ALA	2.6
1	B	126	LYS	2.6
1	A	207	LEU	2.6
1	A	261	CYS	2.6
1	B	416	LYS	2.6
1	D	247	VAL	2.6
1	D	260	ALA	2.6
1	B	151	TYR	2.6
1	D	406	TYR	2.6
1	D	261	CYS	2.6
1	B	207	LEU	2.5
1	C	47	GLY	2.5
1	D	358	ASP	2.5
1	A	10	PHE	2.5
1	D	207	LEU	2.5
1	A	229	TYR	2.5
1	B	355	ASP	2.5
1	D	410	PRO	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	356	GLY	2.5
1	B	238	GLN	2.5
1	A	210	ALA	2.4
1	D	246	ILE	2.4
1	A	357	PHE	2.4
1	B	157	ARG	2.4
1	B	357	PHE	2.4
1	A	118	TRP	2.4
1	D	150	LYS	2.4
1	B	235	GLY	2.4
1	C	238[A]	GLN	2.3
1	C	356	GLY	2.3
1	D	264	GLY	2.3
1	C	410	PRO	2.3
1	B	119	CYS	2.3
1	A	359	ALA	2.3
1	A	242	GLN	2.3
1	A	249	VAL	2.3
1	B	226	VAL	2.3
1	B	246	ILE	2.3
1	D	211	ILE	2.3
1	C	113	GLU	2.3
1	B	265	PHE	2.3
1	C	201	TYR	2.3
1	A	234	LYS	2.3
1	B	407	ALA	2.3
1	D	177	LYS	2.3
1	A	332	PHE	2.3
1	C	265	PHE	2.3
1	A	239	SER	2.2
1	D	118	TRP	2.2
1	A	235	GLY	2.2
1	A	293	LEU	2.2
1	A	211	ILE	2.2
1	A	236	SER	2.2
1	C	235	GLY	2.2
1	B	113	GLU	2.2
1	B	358	ASP	2.2
1	B	239	SER	2.2
1	D	201	TYR	2.2
1	D	237	SER	2.2
1	D	245	MET	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	18	ILE	2.2
1	B	224	ALA	2.2
1	C	241	ARG	2.1
1	C	354	LYS	2.1
1	B	411	ALA	2.1
1	C	8	ALA	2.1
1	C	281	ALA	2.1
1	B	335	LYS	2.1
1	A	43	ARG	2.1
1	A	334	ARG	2.1
1	A	247	VAL	2.1
1	C	242	GLN	2.1
1	B	203	CYS	2.1
1	B	359	ALA	2.1
1	A	412	ALA	2.1
1	B	258[A]	MET	2.1
1	A	246	ILE	2.1
1	D	413	GLU	2.1
1	D	226	VAL	2.1
1	D	225	LEU	2.1
1	A	237	SER	2.1
1	A	201	TYR	2.0
1	B	174	ASP	2.0
1	B	136	VAL	2.0
1	B	232	VAL	2.0
1	C	409	LEU	2.0
1	B	98	ILE	2.0
1	A	264	GLY	2.0
1	A	335	LYS	2.0
1	B	57	LEU	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, 95<sup>th</sup> 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.

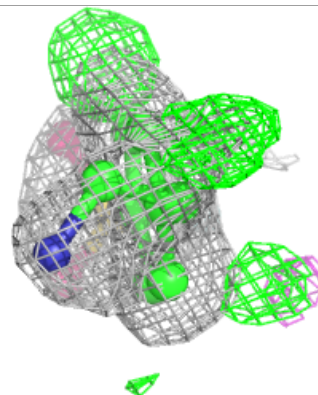
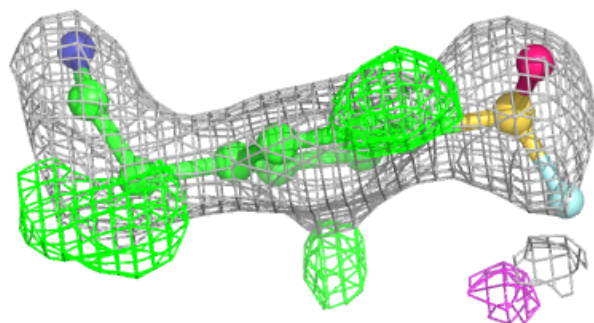
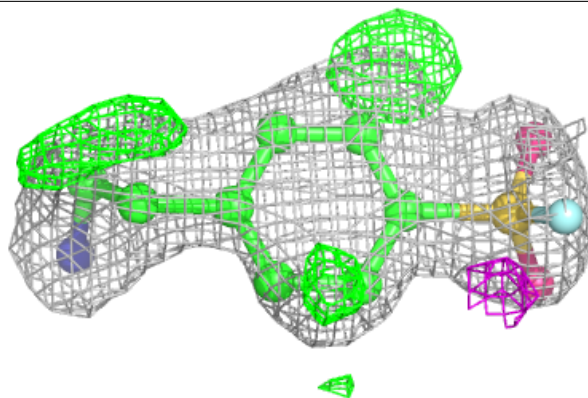
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
7	DMS	D	503	4/4	0.79	0.25	28,31,36,55	4
7	DMS	C	503	4/4	0.81	0.20	40,43,55,73	0
5	PO4	D	508	5/5	0.86	0.23	37,38,42,43	5
6	AES	C	511	13/13	0.87	0.18	39,44,48,52	13
6	AES	A	508	13/13	0.88	0.25	44,50,58,60	13
5	PO4	C	507	5/5	0.89	0.18	35,38,43,44	5
6	AES	A	507	13/13	0.89	0.17	36,39,47,53	13
5	PO4	C	510	5/5	0.90	0.35	68,83,93,95	0
5	PO4	C	509	5/5	0.91	0.16	40,41,44,47	5
5	PO4	B	505	5/5	0.91	0.17	35,36,40,44	5
5	PO4	B	506	5/5	0.92	0.09	35,37,43,48	0
5	PO4	A	504	5/5	0.93	0.13	39,44,48,50	5
5	PO4	D	505	5/5	0.93	0.14	35,36,38,41	5
5	PO4	C	508	5/5	0.94	0.14	43,44,48,51	5
2	NAD	C	501	44/44	0.95	0.08	23,28,31,32	0
3	ADE	B	502	10/10	0.95	0.09	32,35,39,39	0
5	PO4	D	507	5/5	0.95	0.08	24,28,38,39	5
3	ADE	A	502	10/10	0.96	0.09	23,24,25,25	0
2	NAD	B	501	44/44	0.96	0.08	24,28,31,33	0
3	ADE	C	502	10/10	0.96	0.11	26,30,32,32	0
5	PO4	A	506	5/5	0.97	0.08	25,25,36,38	0
3	ADE	D	502	10/10	0.97	0.07	25,25,28,29	0
2	NAD	A	501	44/44	0.97	0.09	20,23,25,26	0
5	PO4	C	506	5/5	0.97	0.08	27,28,37,40	5
2	NAD	D	501	44/44	0.98	0.08	18,23,26,26	0
5	PO4	A	505	5/5	0.98	0.11	34,36,37,38	0
5	PO4	C	505	5/5	0.98	0.11	33,33,36,37	5
4	K	B	503	1/1	0.98	0.13	30,30,30,30	0
5	PO4	D	506	5/5	0.98	0.11	36,37,39,40	0
5	PO4	B	504	5/5	0.98	0.17	47,50,53,56	0
4	K	C	504	1/1	0.99	0.13	27,27,27,27	0
4	K	D	504	1/1	1.00	0.12	25,25,25,25	0
4	K	A	503	1/1	1.00	0.12	25,25,25,25	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.

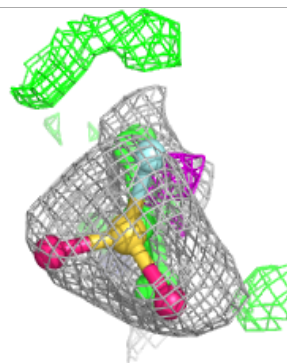
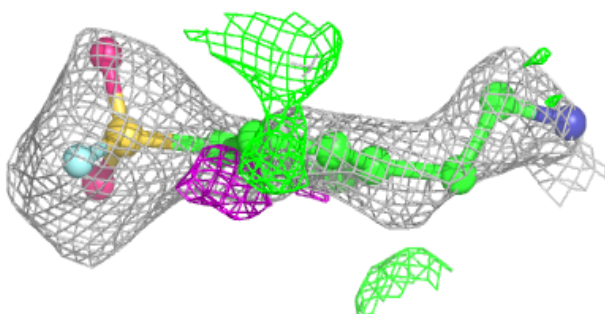
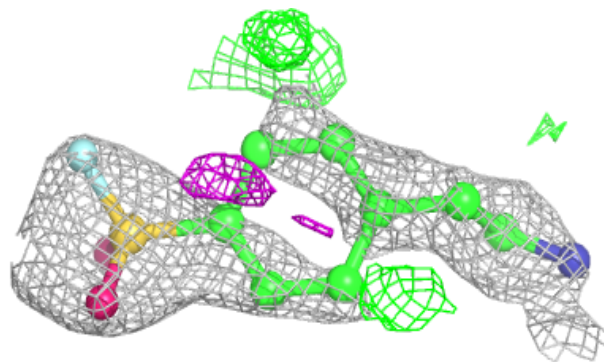
**Electron density around AES C 511:**

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



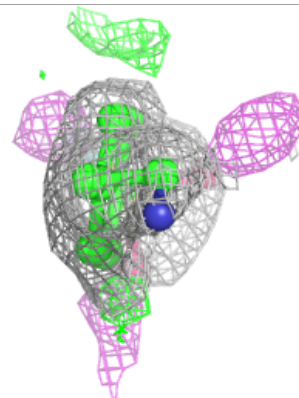
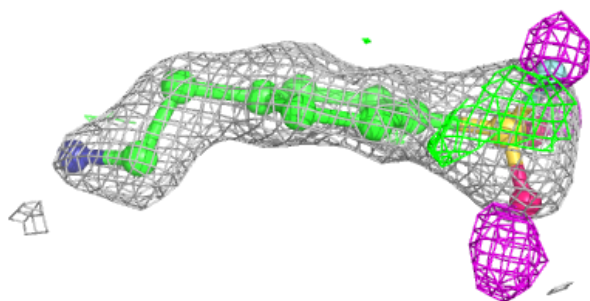
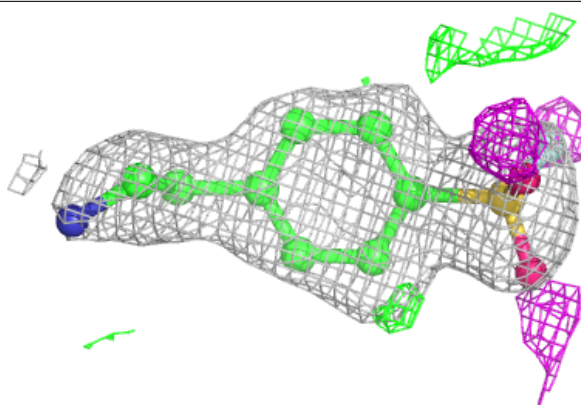
**Electron density around AES A 508:**

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

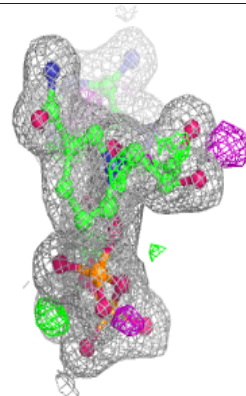
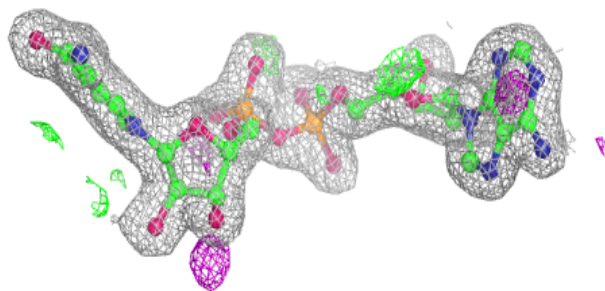
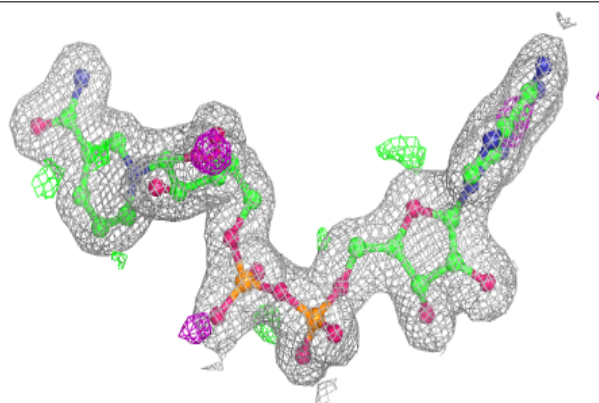


**Electron density around AES A 507:**

$2mF_o-DF_c$  (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:**

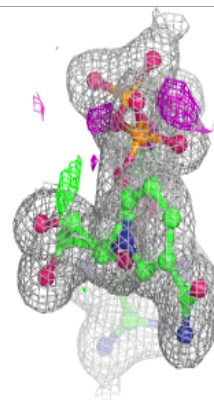
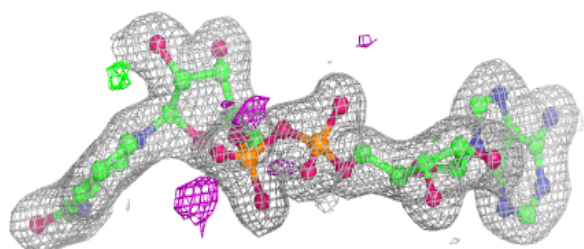
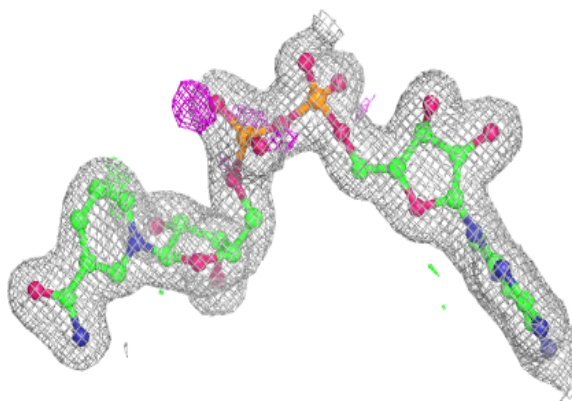
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



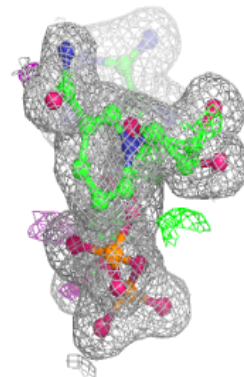
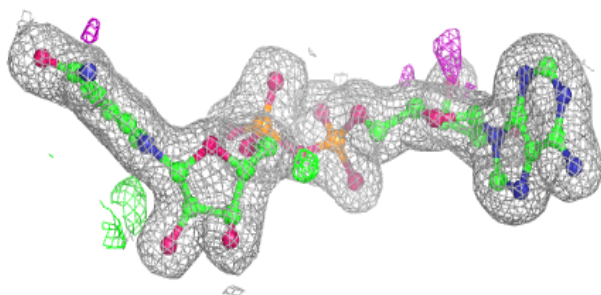
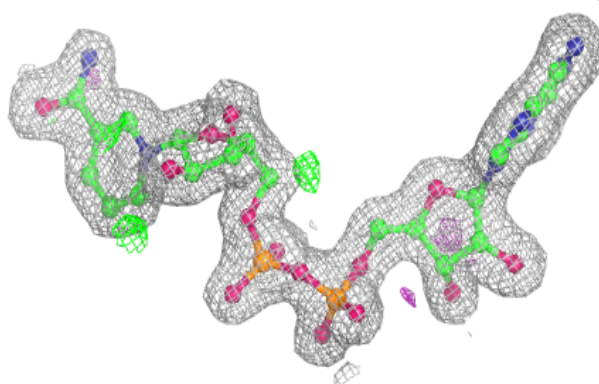


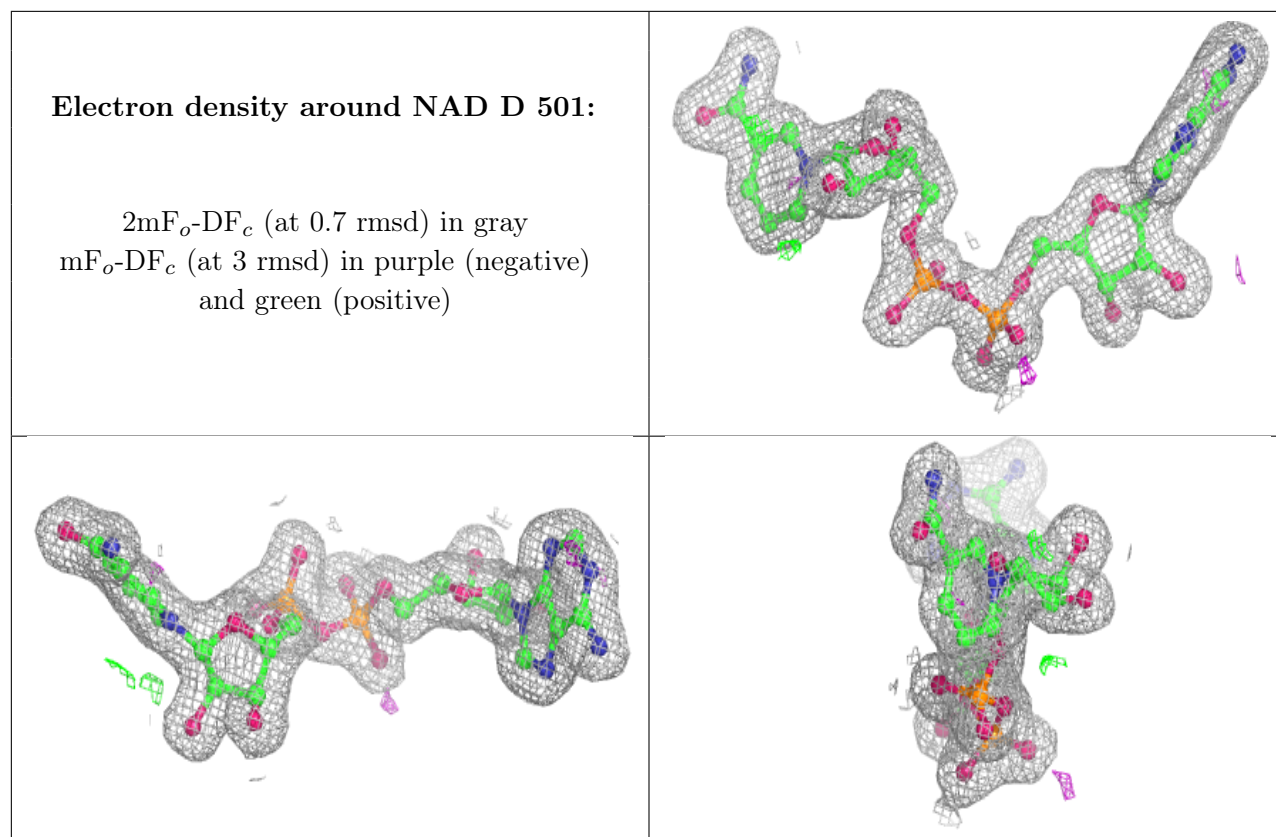
**Electron density around NAD B 501:**

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

**Electron density around NAD 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)





## 6.5 Other polymers [i](#)

There are no such residues in this entry.