



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 30, 2023 – 11:07 AM EDT

PDB ID : 3N58  
Title : Crystal structure of S-ADENOSYL-L-HOMOCYSTEINE hydrolase from brucella melitensis in ternary complex with NAD and adenosine, orthorhombic form  
Authors : Seattle Structural Genomics Center for Infectious Disease (SSGCID)  
Deposited on : 2010-05-24  
Resolution : 2.39 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>.

---

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.35  
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) : 2.35

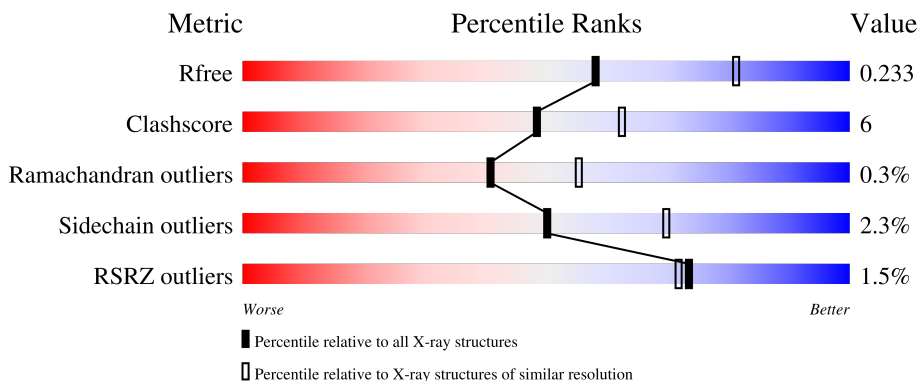
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*


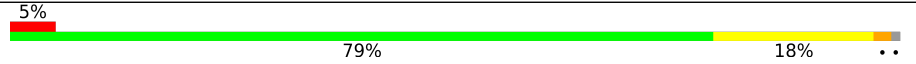
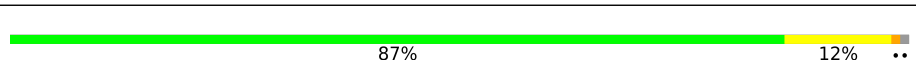

The reported resolution of this entry is 2.39 Å.

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	3907 (2.40-2.40)
Clashscore	141614	4398 (2.40-2.40)
Ramachandran outliers	138981	4318 (2.40-2.40)
Sidechain outliers	138945	4319 (2.40-2.40)
RSRZ outliers	127900	3811 (2.40-2.40)

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	464	 89% 9% ..
1	B	464	 5% 79% 18% ..
1	C	464	 87% 12% ..
1	D	464	 % 86% 12% ..

## 2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 14819 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	460	Total 3506	C 2211	N 596	O 681	S 18	0	2	0
1	B	461	Total 3413	C 2153	N 592	O 650	S 18	0	1	0
1	C	461	Total 3493	C 2205	N 593	O 676	S 19	0	1	0
1	D	461	Total 3459	C 2185	N 590	O 665	S 19	0	0	0

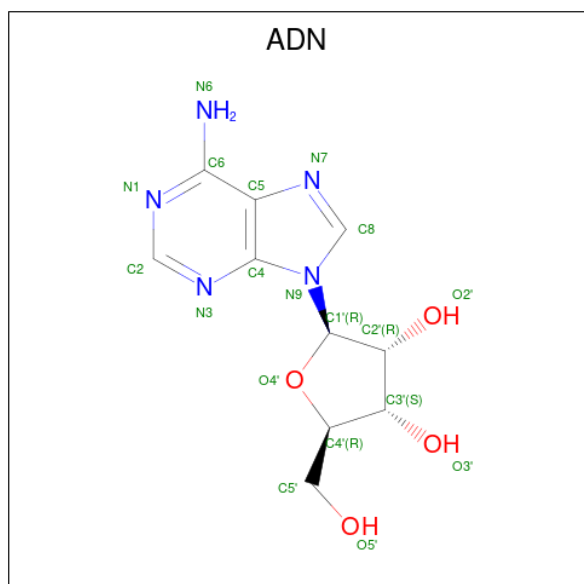
There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	3	GLY	-	expression tag	UNP Q2YQX8
A	4	PRO	-	expression tag	UNP Q2YQX8
A	5	GLY	-	expression tag	UNP Q2YQX8
A	6	SER	-	expression tag	UNP Q2YQX8
A	7	MET	-	expression tag	UNP Q2YQX8
B	3	GLY	-	expression tag	UNP Q2YQX8
B	4	PRO	-	expression tag	UNP Q2YQX8
B	5	GLY	-	expression tag	UNP Q2YQX8
B	6	SER	-	expression tag	UNP Q2YQX8
B	7	MET	-	expression tag	UNP Q2YQX8
C	3	GLY	-	expression tag	UNP Q2YQX8
C	4	PRO	-	expression tag	UNP Q2YQX8
C	5	GLY	-	expression tag	UNP Q2YQX8
C	6	SER	-	expression tag	UNP Q2YQX8
C	7	MET	-	expression tag	UNP Q2YQX8
D	3	GLY	-	expression tag	UNP Q2YQX8
D	4	PRO	-	expression tag	UNP Q2YQX8
D	5	GLY	-	expression tag	UNP Q2YQX8
D	6	SER	-	expression tag	UNP Q2YQX8
D	7	MET	-	expression tag	UNP Q2YQX8

- Molecule 2 is POTASSIUM ION (three-letter code: K) (formula: K).

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

- Molecule 3 is ADENOSINE (three-letter code: ADN) (formula: C<sub>10</sub>H<sub>13</sub>N<sub>5</sub>O<sub>4</sub>).



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

- Molecule 4 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	
4	A	1	Total	44	21	7	14	2	0	0
4	B	1	Total	44	21	7	14	2	0	0
4	C	1	Total	44	21	7	14	2	0	0
4	D	1	Total	44	21	7	14	2	0	0

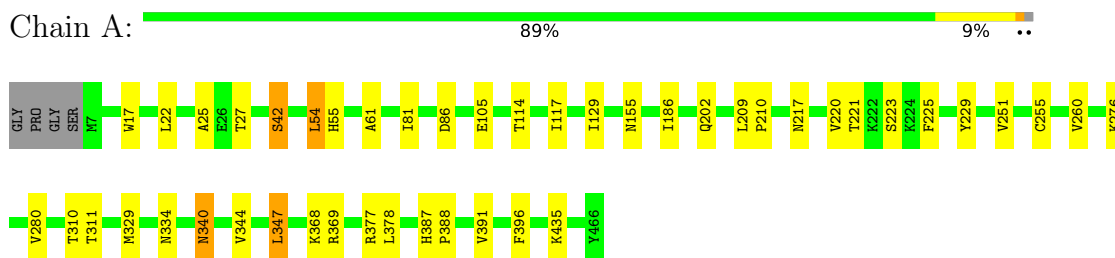
- Molecule 5 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
5	A	269	Total	269	0	0
5	B	127	Total	127	0	0
5	C	189	Total	189	0	0
5	D	127	Total	127	0	0

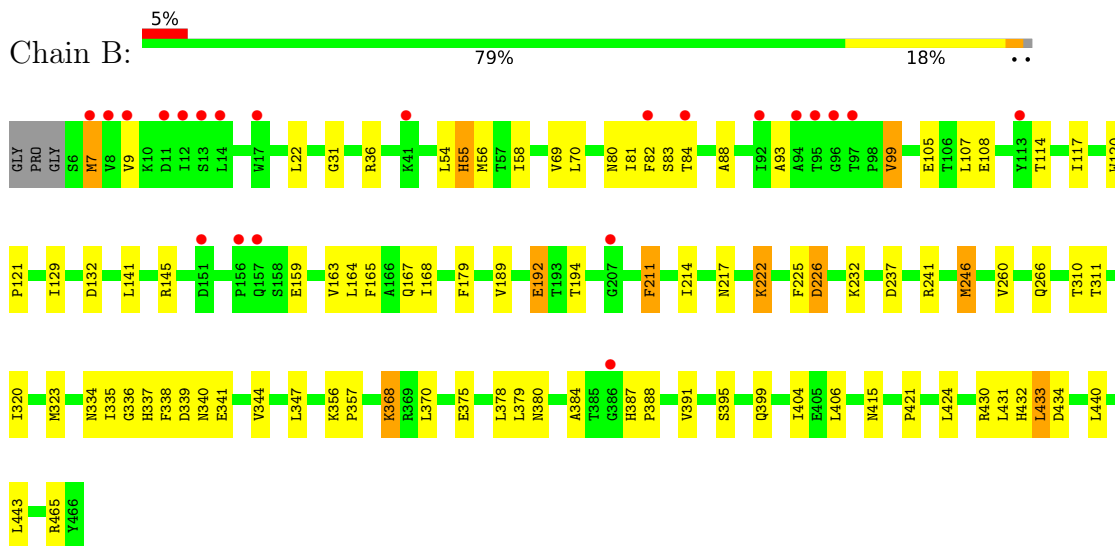
### 3 Residue-property plots [i](#)

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.

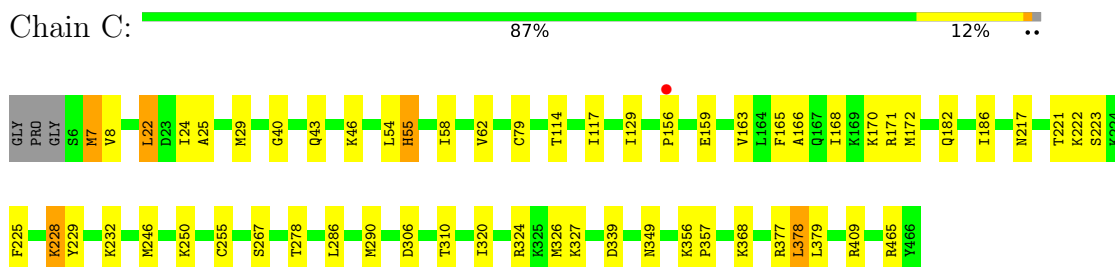
- Molecule 1: Adenosylhomocysteinase



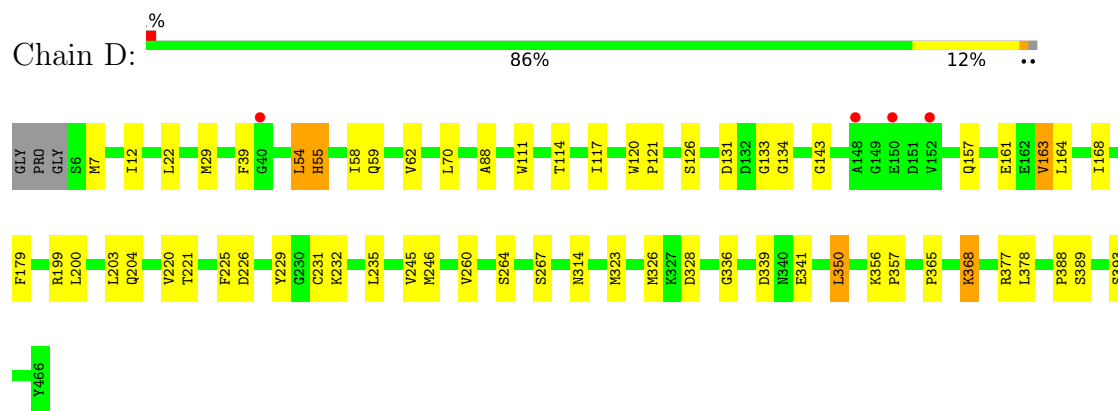
- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



- Molecule 1: Adenosylhomocysteinase



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	68.45Å 165.23Å 184.14Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	49.27 – 2.39 49.27 – 2.39	Depositor EDS
% Data completeness (in resolution range)	(Not available) (49.27-2.39) 99.7 (49.27-2.39)	Depositor EDS
$R_{merge}$	0.11	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	3.51 (at 2.39Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE: 1.6.1_357)	Depositor
R, $R_{free}$	0.172 , 0.235 0.173 , 0.233	Depositor DCC
$R_{free}$ test set	4170 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	26.9	Xtriage
Anisotropy	0.848	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.30 , 44.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	14819	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	32.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.52% 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: ADN, K, NAD

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	0.44	0/3572	0.59	0/4840
1	B	0.41	0/3474	0.57	0/4719
1	C	0.42	0/3556	0.58	0/4819
1	D	0.43	0/3519	0.58	0/4775
All	All	0.42	0/14121	0.58	0/19153

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	3506	0	3486	31	0
1	B	3413	0	3325	60	0
1	C	3493	0	3467	39	0
1	D	3459	0	3411	41	0
2	A	1	0	0	0	0
2	C	1	0	0	0	0
2	D	1	0	0	0	0
3	A	19	0	13	1	0
3	C	19	0	13	1	0

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	19	0	13	2	0
4	A	44	0	26	1	0
4	B	44	0	26	1	0
4	C	44	0	26	1	0
4	D	44	0	26	2	0
5	A	269	0	0	4	0
5	B	127	0	0	1	0
5	C	189	0	0	1	0
5	D	127	0	0	0	0
All	All	14819	0	13832	168	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 6.

All (168) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:194:THR:HG22	1:B:217:ASN:ND2	2.00	0.77
1:D:58:ILE:HD13	1:D:88:ALA:HB2	1.67	0.76
1:B:58:ILE:HD12	1:B:88:ALA:HB2	1.66	0.76
1:B:217:ASN:HA	1:B:222:LYS:HE2	1.75	0.69
1:D:157:GLN:N	1:D:161:GLU:OE1	2.22	0.69
1:B:141:LEU:O	1:B:145:ARG:HG3	1.94	0.68
1:B:114:THR:O	1:B:117:ILE:HG12	1.93	0.67
1:D:339:ASP:HB3	1:D:377:ARG:HG2	1.76	0.67
1:B:336:GLY:O	1:B:378:LEU:HD11	1.95	0.66
1:A:377:ARG:NH1	5:A:504:HOH:O	2.31	0.63
1:A:114:THR:O	1:A:117:ILE:HG12	1.98	0.63
1:D:114:THR:O	1:D:117:ILE:HG12	1.99	0.62
1:B:339:ASP:O	1:B:340:ASN:CG	2.37	0.62
1:C:114:THR:O	1:C:117:ILE:HG12	1.98	0.62
1:C:326:MET:O	1:C:368:LYS:HD3	2.00	0.62
1:C:320:ILE:O	1:C:324:ARG:HG3	1.99	0.61
3:A:500:ADN:H3'	4:A:550:NAD:C4N	2.31	0.60
1:B:310:THR:HG22	1:B:334:ASN:HA	1.83	0.60
1:B:129:ILE:HB	1:B:189:VAL:HG12	1.84	0.60
1:A:340:ASN:H	1:A:340:ASN:HD22	1.51	0.59
1:C:250:LYS:HD3	1:C:306:ASP:HB3	1.85	0.59
1:C:379:LEU:C	1:C:379:LEU:HD12	2.23	0.58
1:B:211:PHE:HA	1:B:415:ASN:OD1	2.04	0.58
1:B:194:THR:HG22	1:B:217:ASN:HD21	1.66	0.57

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:29:MET:HB3	1:D:393:SER:HB2	1.86	0.56
1:A:280:VAL:HG11	1:B:443:LEU:HD23	1.87	0.56
1:A:129:ILE:HG13	1:A:186:ILE:HD12	1.87	0.56
1:A:220:VAL:HG22	1:B:465:ARG:CZ	2.36	0.55
1:C:326:MET:O	1:C:368:LYS:CD	2.54	0.55
1:D:39:PHE:HB2	1:D:70:LEU:CD2	2.37	0.54
1:B:7:MET:HE1	1:B:9:VAL:HG22	1.89	0.54
1:D:326:MET:O	1:D:368:LYS:HD3	2.08	0.54
1:A:329:MET:HE1	1:C:24:ILE:HG12	1.89	0.54
1:B:391:VAL:HG23	1:D:246:MET:SD	2.48	0.54
1:B:81:ILE:HG22	1:B:105:GLU:HG3	1.89	0.54
1:C:25:ALA:O	1:C:29:MET:HG3	2.08	0.53
1:C:339:ASP:HB3	1:C:377:ARG:HG3	1.90	0.53
1:D:336:GLY:HA3	1:D:341:GLU:OE2	2.09	0.53
1:A:225:PHE:HA	1:A:229:TYR:HD2	1.74	0.53
1:B:232:LYS:HD2	1:B:266:GLN:HB3	1.90	0.53
1:B:36:ARG:HD3	1:B:69:VAL:HG21	1.92	0.52
3:C:500:ADN:H3'	4:C:550:NAD:C4N	2.40	0.52
1:B:192:GLU:O	1:B:192:GLU:HG3	2.09	0.52
1:D:314:ASN:O	1:D:341:GLU:HG2	2.10	0.51
1:B:430:ARG:HA	1:B:433:LEU:HD22	1.93	0.51
3:D:500:ADN:H3'	4:D:550:NAD:C4N	2.40	0.51
1:D:200:LEU:HA	1:D:203:LEU:HD12	1.93	0.51
1:A:25:ALA:HA	5:A:594:HOH:O	2.11	0.50
1:B:168:ILE:HG23	1:B:179:PHE:CZ	2.46	0.50
1:C:232:LYS:HA	1:C:267:SER:HB2	1.93	0.50
1:D:111:TRP:CD1	1:D:163:VAL:HG22	2.47	0.50
1:B:260:VAL:HG12	1:B:311:THR:HB	1.94	0.49
1:C:159:GLU:O	1:C:163:VAL:HG23	2.12	0.49
1:C:356:LYS:HB2	1:C:357:PRO:HD2	1.95	0.49
1:C:255:CYS:HB2	1:C:310:THR:HA	1.93	0.49
1:D:58:ILE:HD13	1:D:88:ALA:CB	2.41	0.49
1:C:166:ALA:O	1:C:170:LYS:HG3	2.12	0.49
1:B:380:ASN:O	1:B:384:ALA:HB3	2.12	0.48
1:B:56:MET:HB3	1:B:84:THR:HG23	1.96	0.48
1:D:111:TRP:HD1	1:D:163:VAL:HG22	1.78	0.48
1:B:54:LEU:O	1:B:55:HIS:C	2.52	0.48
1:B:168:ILE:HG23	1:B:179:PHE:CE2	2.48	0.48
1:C:182:GLN:O	1:C:186:ILE:HG12	2.14	0.48
1:B:80:ASN:HB3	1:B:83:SER:OG	2.13	0.48
1:D:232:LYS:HA	1:D:267:SER:HB2	1.96	0.48

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:81:ILE:HG13	1:B:82:PHE:CD2	2.49	0.47
1:B:246:MET:HB2	1:D:388:PRO:HB2	1.95	0.47
1:B:311:THR:HG22	1:B:335:ILE:HG22	1.96	0.47
1:A:42:SER:HB3	5:A:665:HOH:O	2.14	0.47
1:C:217:ASN:O	1:C:223:SER:HB3	2.14	0.47
1:D:231:CYS:SG	1:D:260:VAL:HG13	2.54	0.47
1:B:320:ILE:CD1	1:B:347:LEU:HD23	2.43	0.47
1:C:22:LEU:HD23	1:C:62:VAL:HG22	1.96	0.47
1:A:280:VAL:HG11	1:B:443:LEU:CD2	2.44	0.47
1:B:70:LEU:HD23	1:B:404:ILE:HD11	1.95	0.47
1:B:368:LYS:HE3	1:B:370:LEU:HD21	1.96	0.47
1:D:133:GLY:O	1:D:199:ARG:NH1	2.39	0.47
1:D:29:MET:CB	1:D:393:SER:HB2	2.45	0.47
1:D:226:ASP:OD2	3:D:500:ADN:O2'	2.30	0.47
1:B:93:ALA:HB2	1:B:99:VAL:CG1	2.45	0.47
1:A:209:LEU:HA	1:A:210:PRO:HD3	1.73	0.46
1:D:39:PHE:HB2	1:D:70:LEU:HD22	1.98	0.46
1:D:221:THR:HA	1:D:225:PHE:CD2	2.51	0.46
1:D:39:PHE:CB	1:D:70:LEU:HD22	2.45	0.46
1:A:81:ILE:HG22	1:A:105:GLU:HG3	1.97	0.46
1:C:465:ARG:CZ	1:D:220:VAL:HG22	2.46	0.46
1:C:168:ILE:O	1:C:172:MET:HG3	2.16	0.45
1:C:286:LEU:O	1:C:290:MET:HG2	2.16	0.45
1:D:12:ILE:O	1:D:12:ILE:HG13	2.16	0.45
1:C:368:LYS:HB3	1:C:368:LYS:HE2	1.57	0.45
1:D:120:TRP:NE1	1:D:126:SER:OG	2.35	0.45
1:B:54:LEU:HG	1:B:132:ASP:HB2	1.97	0.45
1:A:255:CYS:HB2	1:A:310:THR:HA	1.98	0.45
1:D:164:LEU:O	1:D:168:ILE:HG13	2.17	0.45
1:D:39:PHE:HB2	1:D:70:LEU:HD21	1.98	0.45
1:B:31:GLY:HA3	1:B:432:HIS:CE1	2.52	0.45
1:A:340:ASN:HD22	1:A:340:ASN:N	2.11	0.45
1:B:192:GLU:HB2	1:B:399:GLN:HE21	1.82	0.45
1:A:391:VAL:HB	1:C:246:MET:CE	2.47	0.44
1:D:225:PHE:HA	1:D:229:TYR:HD2	1.81	0.44
1:B:337:HIS:HA	1:B:338:PHE:HA	1.58	0.44
1:C:54:LEU:O	1:C:55:HIS:C	2.55	0.44
1:D:368:LYS:HB3	1:D:368:LYS:HE2	1.40	0.44
1:B:344:VAL:HG21	1:B:375:GLU:O	2.18	0.44
1:B:440:LEU:HD12	1:B:440:LEU:HA	1.81	0.44
1:D:323:MET:O	1:D:368:LYS:NZ	2.43	0.44

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:228:LYS:HG3	1:C:229:TYR:N	2.31	0.44
1:C:327:LYS:HG2	5:C:637:HOH:O	2.17	0.44
1:B:108:GLU:HA	1:B:163:VAL:CG1	2.48	0.44
1:C:409:ARG:HE	1:C:409:ARG:HB3	1.33	0.44
1:B:387:HIS:HA	1:B:388:PRO:HD3	1.84	0.44
1:D:235:LEU:HD22	1:D:264:SER:HB3	2.00	0.44
1:A:310:THR:HG23	1:A:334:ASN:OD1	2.17	0.43
1:A:260:VAL:HG12	1:A:311:THR:HB	2.00	0.43
1:C:378:LEU:HD12	1:C:378:LEU:H	1.83	0.43
1:C:129:ILE:HG13	1:C:186:ILE:HD12	2.00	0.43
1:D:356:LYS:HB2	1:D:357:PRO:CD	2.49	0.43
1:A:221:THR:HA	1:A:225:PHE:CD2	2.54	0.43
1:C:7:MET:HG2	1:C:8:VAL:N	2.33	0.43
1:C:222:LYS:HD3	1:C:222:LYS:C	2.38	0.43
1:D:22:LEU:HD12	1:D:62:VAL:HG22	2.00	0.43
1:B:164:LEU:HD23	1:B:165:PHE:CE1	2.54	0.43
1:B:167:GLN:HB2	5:B:609:HOH:O	2.18	0.43
1:A:22:LEU:HD21	1:A:61:ALA:HB3	2.00	0.42
1:D:54:LEU:O	1:D:55:HIS:C	2.57	0.42
1:D:131:ASP:OD2	1:D:134:GLY:HA2	2.19	0.42
1:A:54:LEU:HD11	1:A:396:PHE:CZ	2.54	0.42
1:B:237:ASP:O	1:B:241:ARG:HG3	2.20	0.42
1:D:350:LEU:HD22	1:D:365:PRO:HD3	2.00	0.42
1:C:156:PRO:HG3	1:C:165:PHE:CD2	2.54	0.42
1:A:251:VAL:HG11	1:A:276:LYS:HE3	2.01	0.42
1:A:27:THR:O	1:A:435:LYS:HE2	2.19	0.42
1:A:340:ASN:H	1:A:340:ASN:ND2	2.15	0.42
1:B:22:LEU:HD23	1:B:58:ILE:HG23	2.01	0.42
1:B:159:GLU:O	1:B:163:VAL:HG23	2.19	0.42
1:A:368:LYS:HG2	1:A:369:ARG:N	2.35	0.42
1:B:379:LEU:HD12	1:B:379:LEU:C	2.40	0.42
1:B:120:TRP:HA	1:B:121:PRO:HD3	1.78	0.42
1:C:55:HIS:CE1	1:C:79:CYS:SG	3.13	0.42
1:C:221:THR:HA	1:C:225:PHE:CD2	2.55	0.42
1:B:421:PRO:HD2	1:B:424:LEU:HD12	2.02	0.41
1:B:433:LEU:HD12	1:B:433:LEU:HA	1.84	0.41
1:A:217:ASN:O	1:A:223:SER:HB3	2.20	0.41
1:B:310:THR:HG21	1:B:341:GLU:HB2	2.02	0.41
1:D:59:GLN:HG3	1:D:389:SER:HA	2.01	0.41
1:D:143:GLY:HA3	1:D:179:PHE:CD1	2.56	0.41
1:A:17:TRP:CD1	1:A:17:TRP:C	2.92	0.41

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:86:ASP:HB3	5:A:548:HOH:O	2.19	0.41
1:C:40:GLY:O	1:C:43:GLN:HG2	2.20	0.41
1:C:255:CYS:HA	1:C:278:THR:OG1	2.21	0.41
1:B:406:LEU:HD23	1:B:406:LEU:HA	1.92	0.41
1:D:120:TRP:HA	1:D:121:PRO:HD3	1.80	0.41
1:A:344:VAL:O	1:A:347:LEU:HB2	2.21	0.41
1:C:54:LEU:HD12	1:C:55:HIS:N	2.36	0.41
1:B:310:THR:HG21	1:B:341:GLU:CB	2.51	0.41
1:B:323:MET:HB3	1:B:370:LEU:HD11	2.02	0.41
4:D:550:NAD:H6N	4:D:550:NAD:H2D	1.85	0.41
1:B:214:ILE:HG12	1:B:406:LEU:HD11	2.03	0.41
1:B:356:LYS:HB2	1:B:357:PRO:CD	2.51	0.41
1:C:58:ILE:O	1:C:62:VAL:HG23	2.20	0.41
1:A:387:HIS:HA	1:A:388:PRO:HD3	1.93	0.40
1:D:328:ASP:HA	1:D:368:LYS:HG2	2.03	0.40
1:B:107:LEU:HD12	1:B:107:LEU:HA	1.94	0.40
1:B:336:GLY:HA3	1:B:341:GLU:OE2	2.20	0.40
1:C:171:ARG:O	1:C:171:ARG:HD3	2.22	0.40
4:B:550:NAD:H2D	4:B:550:NAD:H6N	1.78	0.40
1:C:356:LYS:HB2	1:C:357:PRO:CD	2.51	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	460/464 (99%)	443 (96%)	16 (4%)	1 (0%)	47 62
1	B	460/464 (99%)	440 (96%)	18 (4%)	2 (0%)	34 48
1	C	460/464 (99%)	444 (96%)	15 (3%)	1 (0%)	47 62
1	D	459/464 (99%)	443 (96%)	15 (3%)	1 (0%)	47 62
All	All	1839/1856 (99%)	1770 (96%)	64 (4%)	5 (0%)	41 55

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	226	ASP
1	C	55	HIS
1	A	55	HIS
1	B	55	HIS
1	D	55	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	371/377 (98%)	365 (98%)	6 (2%)	62 79
1	B	342/377 (91%)	329 (96%)	13 (4%)	33 51
1	C	367/377 (97%)	361 (98%)	6 (2%)	62 79
1	D	358/377 (95%)	350 (98%)	8 (2%)	52 71
All	All	1438/1508 (95%)	1405 (98%)	33 (2%)	50 70

All (33) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	42	SER
1	A	54	LEU
1	A	202	GLN
1	A	340	ASN
1	A	347	LEU
1	A	378	LEU
1	B	7	MET
1	B	99	VAL
1	B	192	GLU
1	B	211	PHE
1	B	222	LYS
1	B	225	PHE
1	B	226	ASP
1	B	246	MET
1	B	368	LYS

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
1	B	395	SER
1	B	431	LEU
1	B	433	LEU
1	B	434	ASP
1	C	7	MET
1	C	22	LEU
1	C	46	LYS
1	C	228	LYS
1	C	349	ASN
1	C	378	LEU
1	D	7	MET
1	D	54	LEU
1	D	163	VAL
1	D	204	GLN
1	D	245	VAL
1	D	350	LEU
1	D	368	LYS
1	D	378	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	340	ASN
1	B	43	GLN
1	C	354	ASN
1	D	423	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 monosaccharides in this entry.



## 5.6 Ligand geometry

Of 10 ligands modelled in this entry, 3 are monoatomic - leaving 7 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
4	NAD	C	550	-	42,48,48	1.09	2 (4%)	50,73,73	1.52	9 (18%)
3	ADN	A	500	-	18,21,21	0.95	1 (5%)	18,31,31	1.59	5 (27%)
3	ADN	C	500	-	18,21,21	1.04	2 (11%)	18,31,31	1.43	3 (16%)
4	NAD	D	550	-	42,48,48	1.11	2 (4%)	50,73,73	1.34	5 (10%)
3	ADN	D	500	-	18,21,21	0.95	1 (5%)	18,31,31	1.35	4 (22%)
4	NAD	A	550	-	42,48,48	1.14	3 (7%)	50,73,73	1.55	10 (20%)
4	NAD	B	550	-	42,48,48	1.06	2 (4%)	50,73,73	1.38	5 (10%)

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
4	NAD	C	550	-	-	5/26/62/62	0/5/5/5
3	ADN	A	500	-	-	2/2/22/22	0/3/3/3
3	ADN	C	500	-	-	2/2/22/22	0/3/3/3
4	NAD	D	550	-	-	9/26/62/62	0/5/5/5
3	ADN	D	500	-	-	2/2/22/22	0/3/3/3
4	NAD	A	550	-	-	6/26/62/62	0/5/5/5
4	NAD	B	550	-	-	10/26/62/62	0/5/5/5

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	550	NAD	O7N-C7N	4.51	1.32	1.24
4	D	550	NAD	O7N-C7N	4.45	1.32	1.24
4	C	550	NAD	O7N-C7N	4.39	1.32	1.24

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	550	NAD	O7N-C7N	4.30	1.32	1.24
4	B	550	NAD	C7N-N7N	-3.02	1.27	1.33
4	D	550	NAD	C7N-N7N	-2.87	1.27	1.33
4	A	550	NAD	C7N-N7N	-2.79	1.27	1.33
3	D	500	ADN	C5-C4	2.74	1.48	1.40
4	C	550	NAD	C7N-N7N	-2.68	1.27	1.33
3	C	500	ADN	C5-C4	2.61	1.47	1.40
4	A	550	NAD	O4D-C1D	2.51	1.44	1.41
3	A	500	ADN	C5-C4	2.39	1.47	1.40
3	C	500	ADN	C2-N3	2.25	1.35	1.32

All (41) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	C	550	NAD	N3A-C2A-N1A	-4.90	121.01	128.68
4	D	550	NAD	N3A-C2A-N1A	-4.85	121.10	128.68
4	A	550	NAD	N3A-C2A-N1A	-4.35	121.88	128.68
4	B	550	NAD	N3A-C2A-N1A	-4.32	121.92	128.68
4	B	550	NAD	PN-O3-PA	-3.79	119.83	132.83
4	C	550	NAD	O4B-C1B-C2B	-3.63	101.62	106.93
3	C	500	ADN	N3-C2-N1	-3.53	123.16	128.68
3	A	500	ADN	N3-C2-N1	-3.53	123.17	128.68
4	A	550	NAD	O4D-C1D-C2D	-3.33	102.06	106.93
4	B	550	NAD	C5N-C4N-C3N	-3.21	116.55	120.34
4	A	550	NAD	C6N-N1N-C2N	-2.99	119.25	121.97
4	A	550	NAD	O7N-C7N-N7N	-2.99	118.33	122.58
4	A	550	NAD	PN-O3-PA	-2.97	122.65	132.83
4	C	550	NAD	PN-O3-PA	-2.96	122.66	132.83
4	A	550	NAD	C3N-C2N-N1N	2.92	123.28	120.43
4	D	550	NAD	O4D-C1D-C2D	-2.92	102.66	106.93
3	D	500	ADN	N3-C2-N1	-2.88	124.18	128.68
4	C	550	NAD	C3N-C7N-N7N	2.81	121.12	117.75
4	A	550	NAD	O4B-C1B-C2B	-2.75	102.91	106.93
3	A	500	ADN	C4-C5-N7	-2.74	106.54	109.40
4	D	550	NAD	O7N-C7N-N7N	-2.68	118.78	122.58
4	A	550	NAD	C5N-C4N-C3N	-2.64	117.22	120.34
4	A	550	NAD	O3D-C3D-C4D	-2.54	103.69	111.05
4	C	550	NAD	O7N-C7N-N7N	-2.52	119.00	122.58
4	A	550	NAD	C4A-C5A-N7A	-2.52	106.78	109.40
4	C	550	NAD	O3D-C3D-C4D	-2.49	103.85	111.05
3	A	500	ADN	C1'-N9-C4	-2.48	122.28	126.64
4	D	550	NAD	PN-O3-PA	-2.43	124.50	132.83

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	A	500	ADN	C5-C6-N6	2.37	123.95	120.35
3	C	500	ADN	C3'-C2'-C1'	2.36	104.53	100.98
3	C	500	ADN	C1'-N9-C4	-2.35	122.51	126.64
4	B	550	NAD	C6N-N1N-C2N	-2.34	119.84	121.97
3	A	500	ADN	C3'-C2'-C1'	2.29	104.43	100.98
4	C	550	NAD	O4D-C1D-C2D	-2.28	103.59	106.93
4	B	550	NAD	C4A-C5A-N7A	-2.25	107.05	109.40
4	D	550	NAD	C5N-C4N-C3N	-2.24	117.69	120.34
3	D	500	ADN	C3'-C2'-C1'	2.23	104.34	100.98
3	D	500	ADN	C4-C5-N7	-2.12	107.19	109.40
3	D	500	ADN	C2-N1-C6	2.08	122.31	118.75
4	C	550	NAD	C4A-C5A-N7A	-2.07	107.24	109.40
4	C	550	NAD	O3B-C3B-C4B	-2.01	105.23	111.05

There are no chirality outliers.

All (36) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	550	NAD	O4D-C1D-N1N-C2N
4	A	550	NAD	O4D-C1D-N1N-C6N
4	A	550	NAD	C2D-C1D-N1N-C2N
4	A	550	NAD	C2D-C1D-N1N-C6N
4	B	550	NAD	C5B-O5B-PA-O1A
4	B	550	NAD	O4D-C1D-N1N-C2N
4	B	550	NAD	O4D-C1D-N1N-C6N
4	B	550	NAD	C2D-C1D-N1N-C2N
4	B	550	NAD	C2D-C1D-N1N-C6N
4	C	550	NAD	O4D-C1D-N1N-C2N
4	C	550	NAD	O4D-C1D-N1N-C6N
4	C	550	NAD	C2D-C1D-N1N-C2N
4	C	550	NAD	C2D-C1D-N1N-C6N
4	D	550	NAD	C5B-O5B-PA-O1A
4	D	550	NAD	O4B-C4B-C5B-O5B
4	D	550	NAD	O4D-C1D-N1N-C2N
4	D	550	NAD	O4D-C1D-N1N-C6N
4	D	550	NAD	C2D-C1D-N1N-C2N
4	D	550	NAD	C2D-C1D-N1N-C6N
3	D	500	ADN	O4'-C4'-C5'-O5'
3	D	500	ADN	C3'-C4'-C5'-O5'
3	C	500	ADN	C3'-C4'-C5'-O5'
4	B	550	NAD	O4B-C4B-C5B-O5B
4	B	550	NAD	C3B-C4B-C5B-O5B

*Continued on next page...*

*Continued from previous page...*

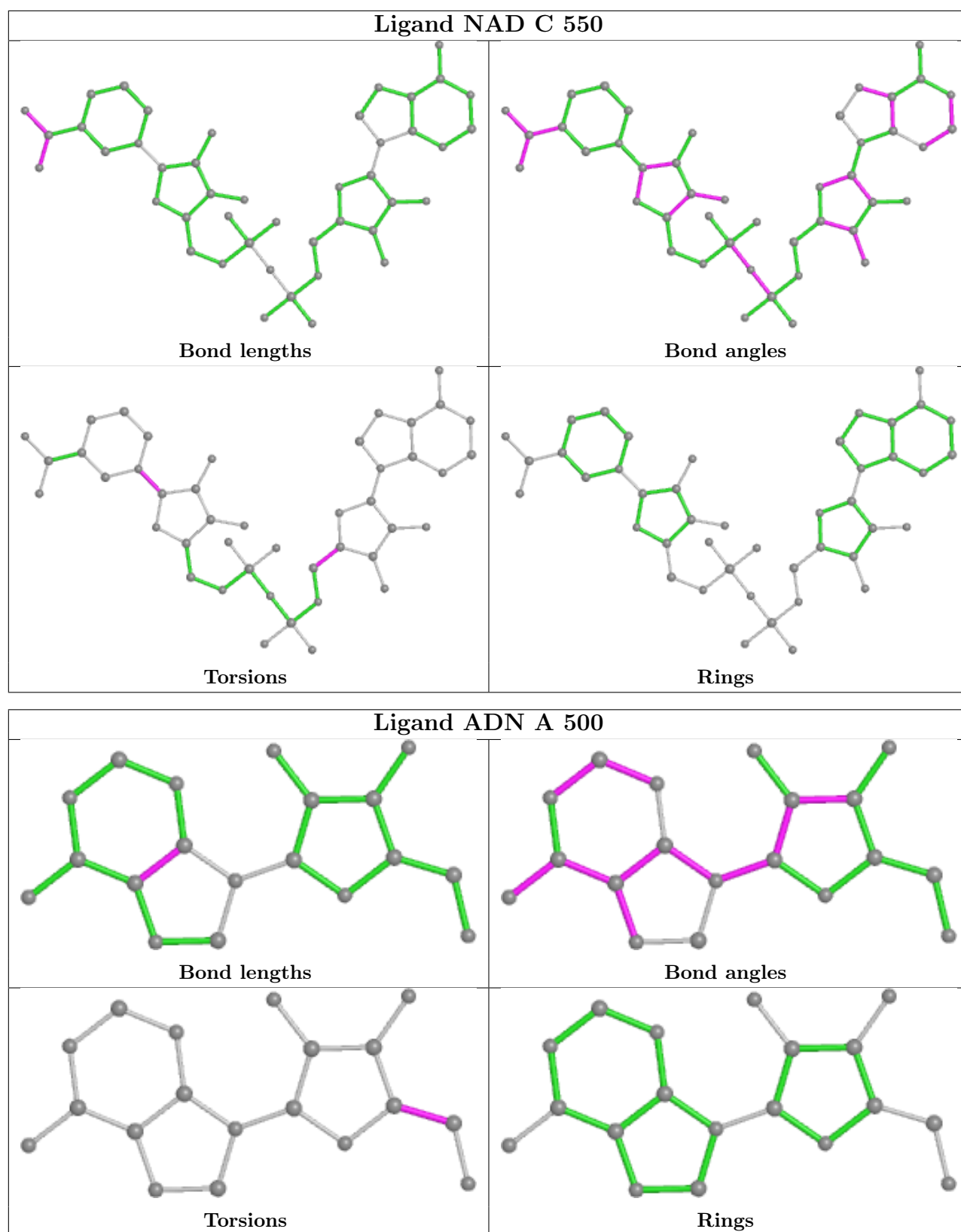
Mol	Chain	Res	Type	Atoms
4	D	550	NAD	C3B-C4B-C5B-O5B
3	A	500	ADN	C3'-C4'-C5'-O5'
3	A	500	ADN	O4'-C4'-C5'-O5'
3	C	500	ADN	O4'-C4'-C5'-O5'
4	A	550	NAD	O4B-C4B-C5B-O5B
4	B	550	NAD	PN-O3-PA-O5B
4	D	550	NAD	PN-O3-PA-O5B
4	A	550	NAD	C3B-C4B-C5B-O5B
4	B	550	NAD	C5B-O5B-PA-O3
4	B	550	NAD	C5B-O5B-PA-O2A
4	D	550	NAD	C5B-O5B-PA-O3
4	C	550	NAD	O4B-C4B-C5B-O5B

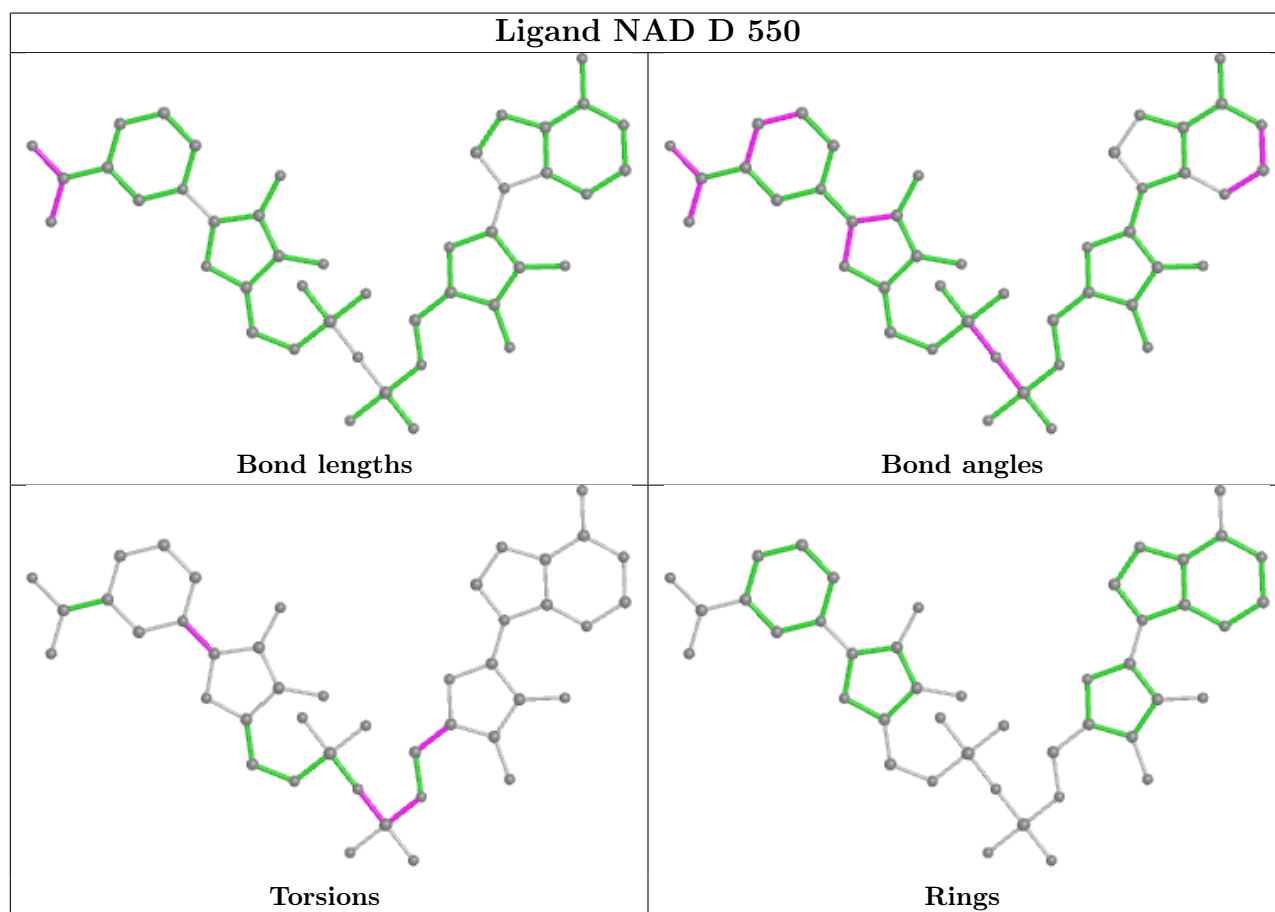
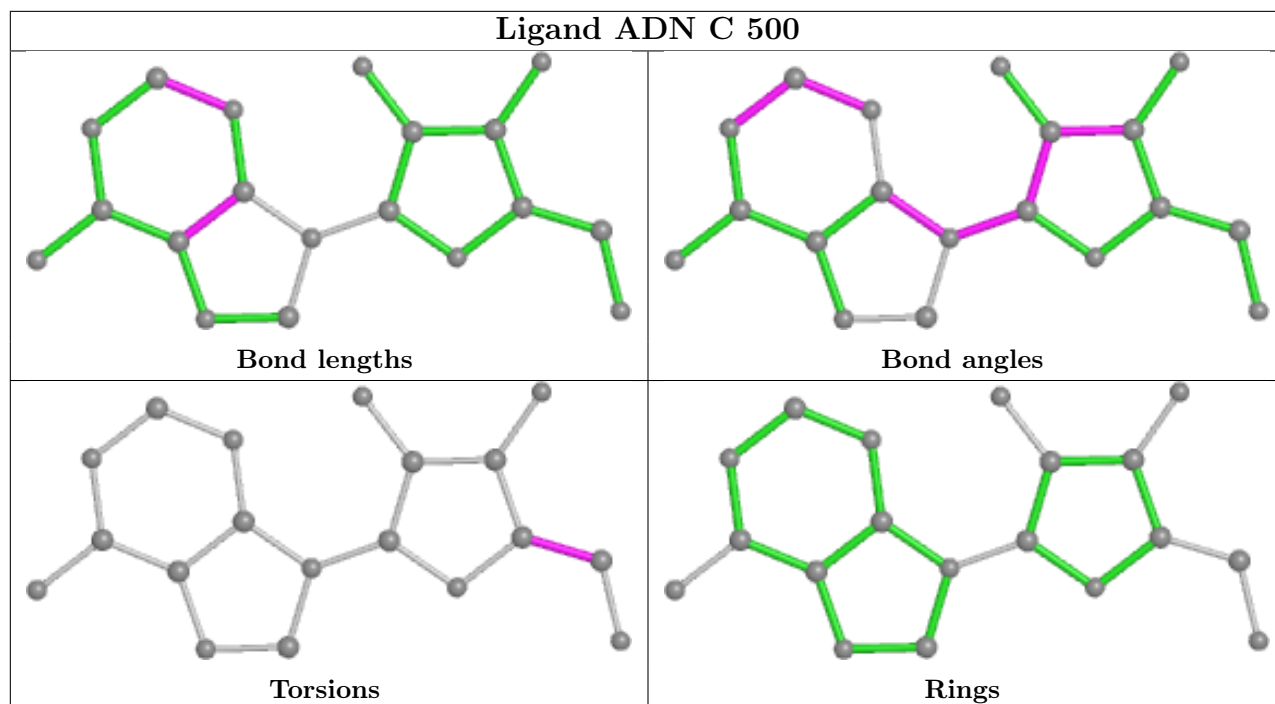
There are no ring outliers.

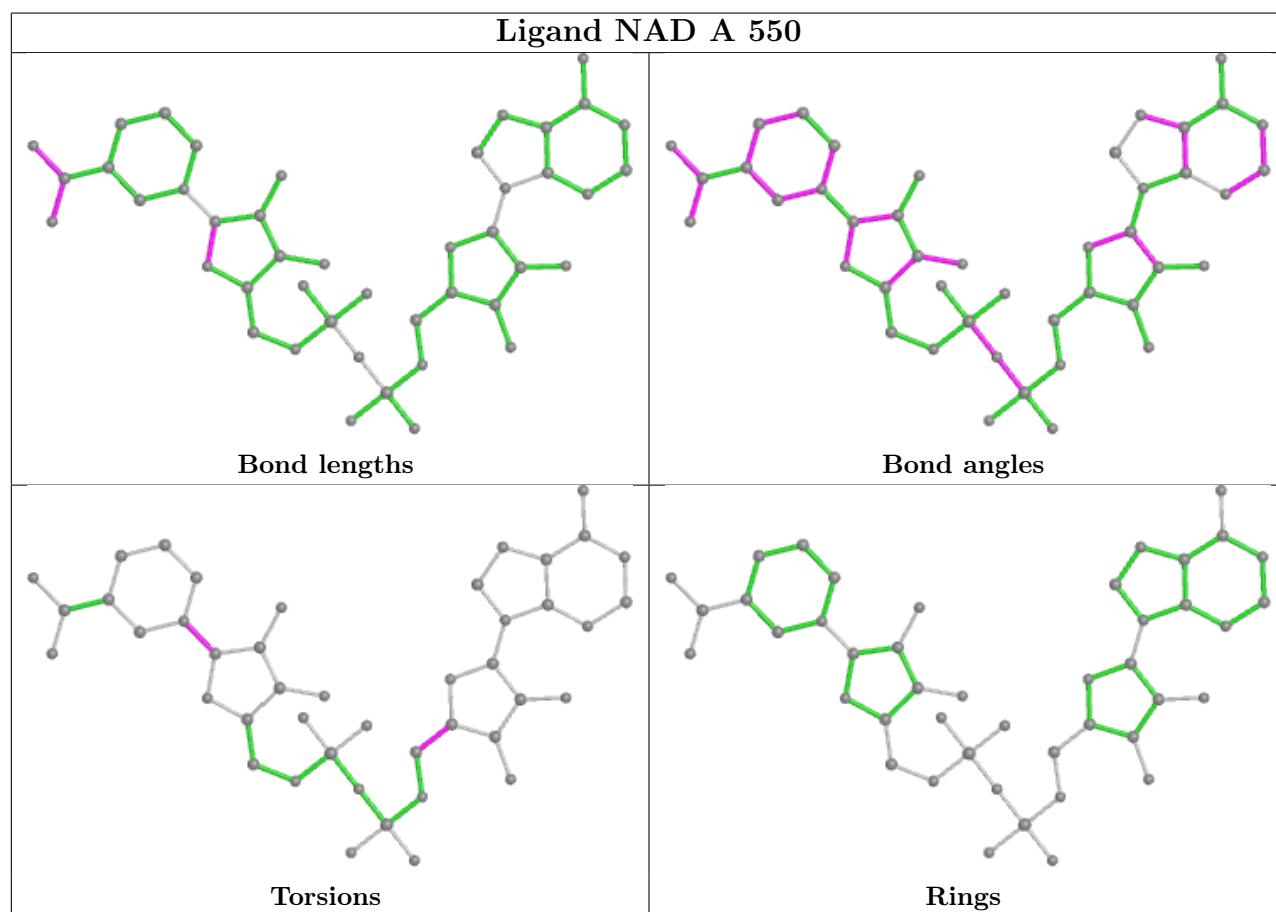
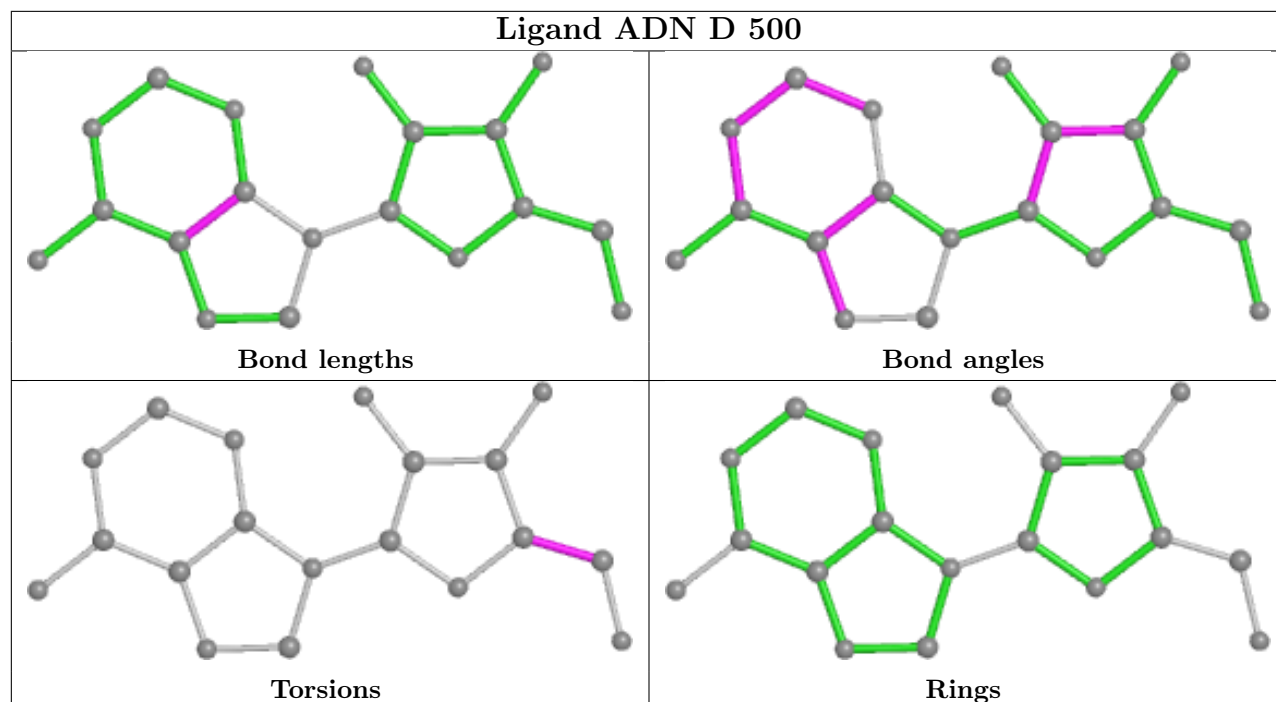
7 monomers are involved in 6 short contacts:

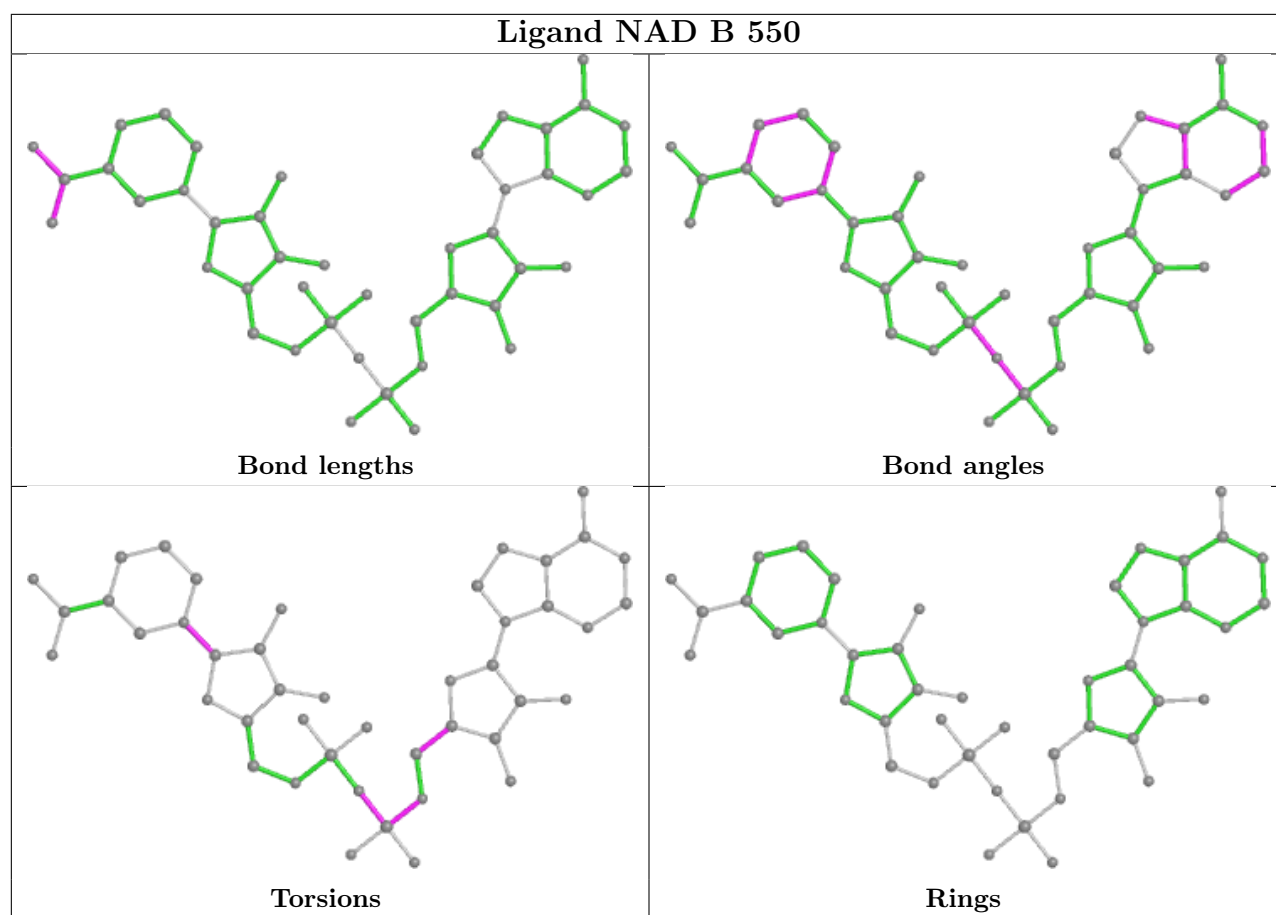
Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	550	NAD	1	0
3	A	500	ADN	1	0
3	C	500	ADN	1	0
4	D	550	NAD	2	0
3	D	500	ADN	2	0
4	A	550	NAD	1	0
4	B	550	NAD	1	0

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, 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	460/464 (99%)	-0.39	0 <span style="border: 1px solid blue; padding: 2px;">100</span> <span style="border: 1px solid blue; padding: 2px;">100</span>	10, 26, 44, 74	0
1	B	461/464 (99%)	0.04	22 (4%) <span style="border: 1px solid red; padding: 2px;">30</span> <span style="border: 1px solid red; padding: 2px;">29</span>	17, 36, 64, 101	0
1	C	461/464 (99%)	-0.34	1 (0%) <span style="border: 1px solid blue; padding: 2px;">95</span> <span style="border: 1px solid blue; padding: 2px;">94</span>	15, 29, 49, 81	0
1	D	461/464 (99%)	-0.28	4 (0%) <span style="border: 1px solid blue; padding: 2px;">84</span> <span style="border: 1px solid blue; padding: 2px;">82</span>	17, 33, 56, 94	0
All	All	1843/1856 (99%)	-0.24	27 (1%) <span style="border: 1px solid blue; padding: 2px;">73</span> <span style="border: 1px solid blue; padding: 2px;">72</span>	10, 31, 56, 101	0

All (27) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	8	VAL	3.7
1	B	13	SER	3.7
1	B	12	ILE	3.6
1	B	157	GLN	3.5
1	B	92	ILE	3.4
1	D	40	GLY	3.4
1	B	9	VAL	3.3
1	B	96	GLY	3.2
1	B	7	MET	2.9
1	B	82	PHE	2.8
1	B	11	ASP	2.8
1	B	113	TYR	2.8
1	B	41	LYS	2.8
1	D	152	VAL	2.7
1	B	14	LEU	2.6
1	B	386	GLY	2.6
1	D	148	ALA	2.3
1	B	17	TRP	2.2
1	B	95	THR	2.1
1	B	156	PRO	2.1
1	C	156	PRO	2.1

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
1	B	97	THR	2.1
1	B	207	GLY	2.1
1	B	94	ALA	2.1
1	B	151	ASP	2.1
1	D	150	GLU	2.0
1	B	84	THR	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](#)

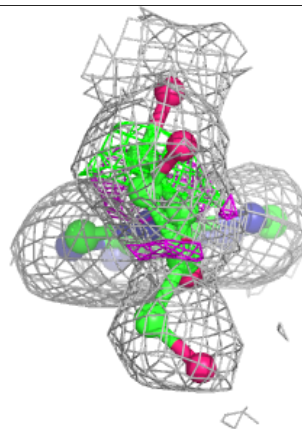
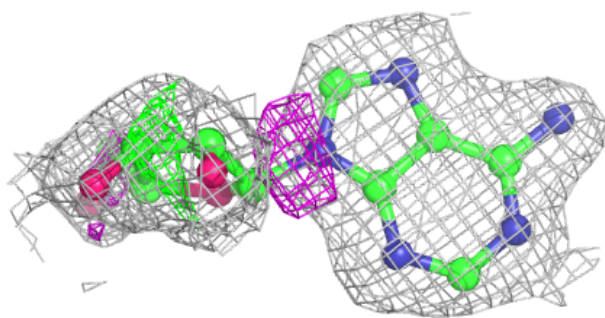
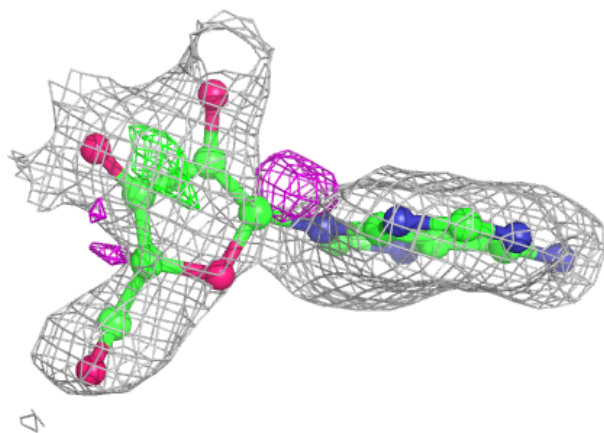
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
2	K	D	467	1/1	0.89	0.12	43,43,43,43	0
3	ADN	C	500	19/19	0.92	0.20	16,31,65,70	0
3	ADN	D	500	19/19	0.93	0.16	21,37,57,62	0
3	ADN	A	500	19/19	0.95	0.16	7,17,49,60	0
2	K	A	2	1/1	0.96	0.18	33,33,33,33	0
4	NAD	B	550	44/44	0.97	0.10	17,29,48,58	0
4	NAD	D	550	44/44	0.97	0.11	8,27,36,41	0
4	NAD	C	550	44/44	0.98	0.12	7,20,32,36	0
4	NAD	A	550	44/44	0.98	0.11	4,17,26,32	0
2	K	C	1	1/1	0.99	0.16	33,33,33,33	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

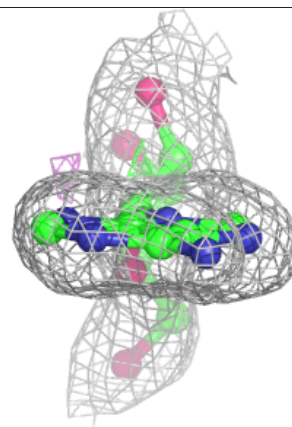
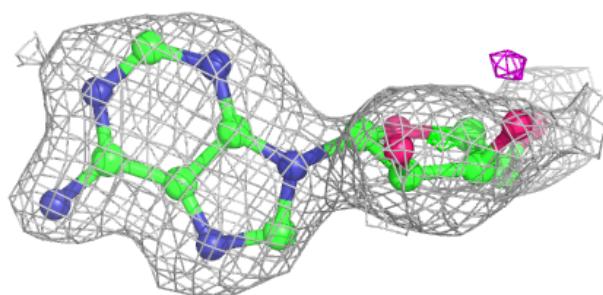
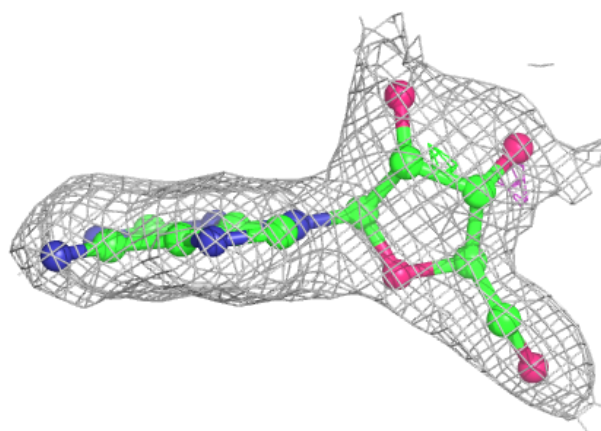
**Electron density around ADN C 500:**

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

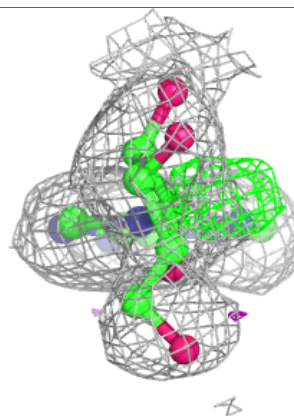
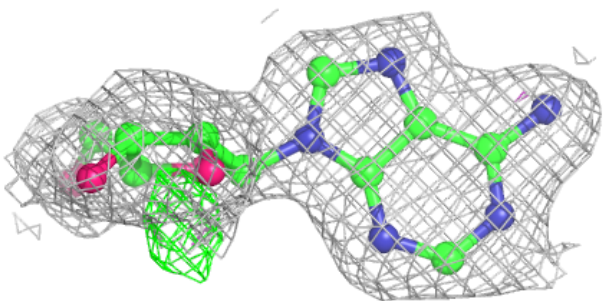
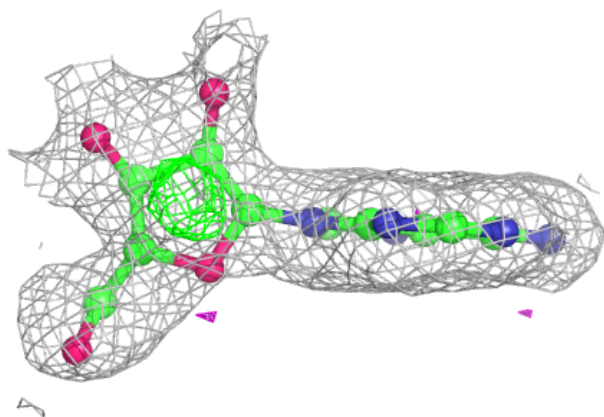


**Electron density around ADN D 500:**

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

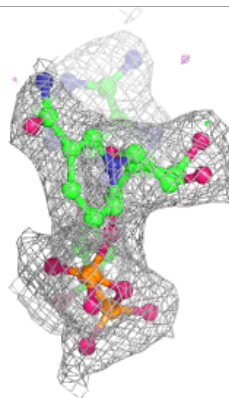
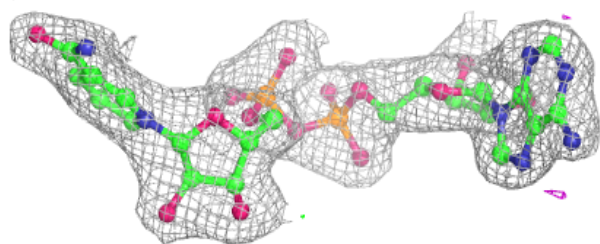
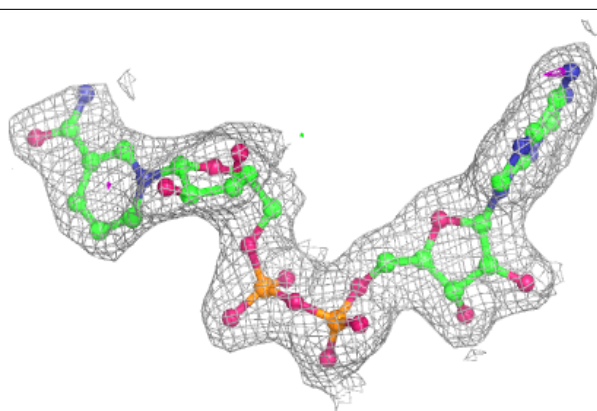
**Electron density around ADN A 500:**

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

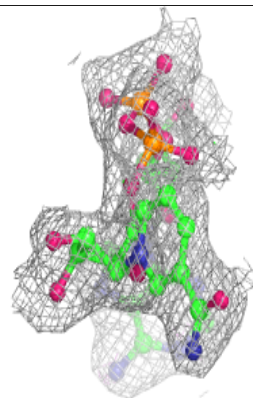
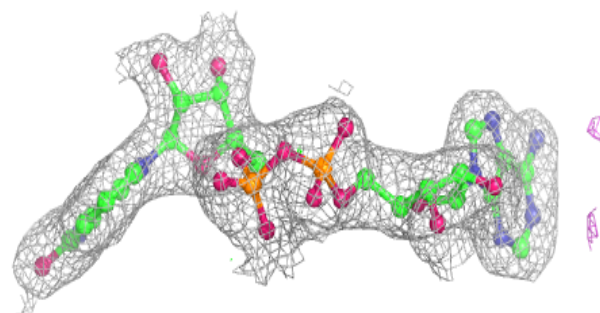
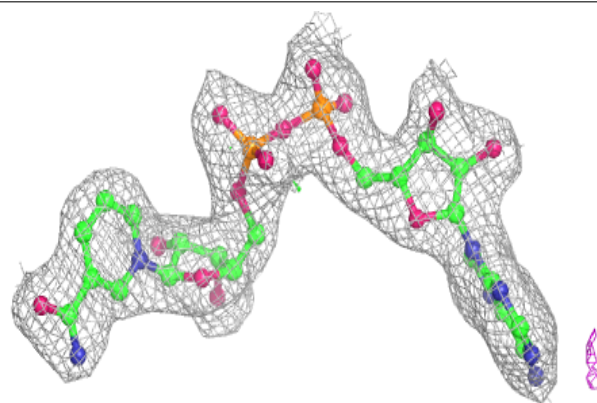


**Electron density around NAD B 550:**

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

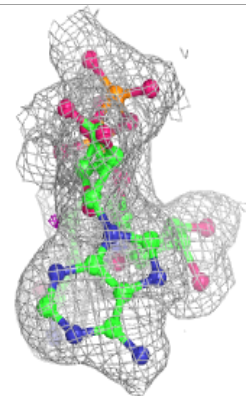
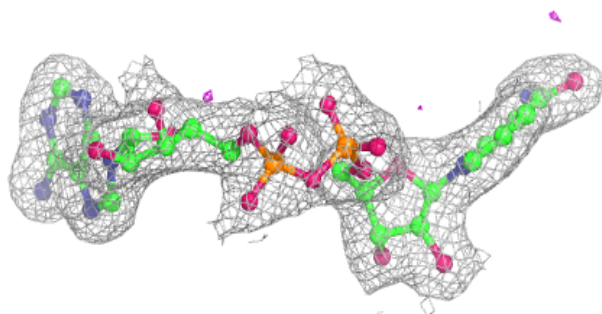
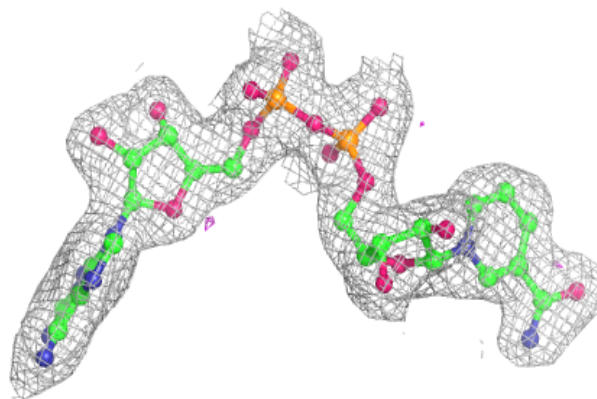
**Electron density around NAD D 550:**

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

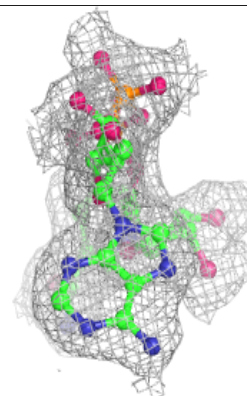
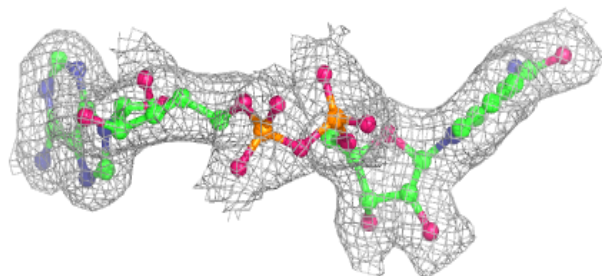
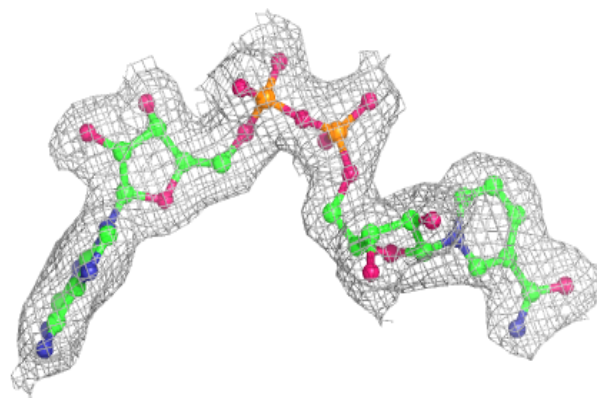


**Electron density around NAD C 550:**

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

**Electron density around NAD A 550:**

$2mF_o-DF_c$  (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.