



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 01:05 AM UTC

PDB ID : 5TF4 / pdb_00005tf4
Title : Crystal structure of enoyl-(acyl carrier protein) reductase from *Bartonella henselae* in complex with NAD
Authors : Seattle Structural Genomics Center for Infectious Disease (SSGCID)
Deposited on : 2016-09-24
Resolution : 1.95 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

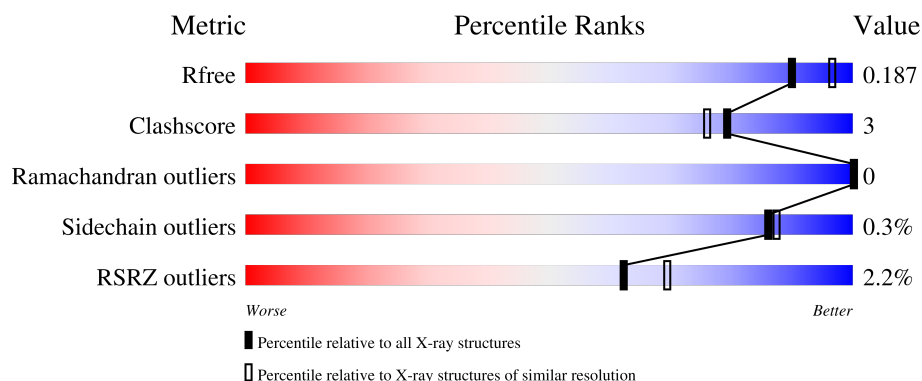
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.95 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



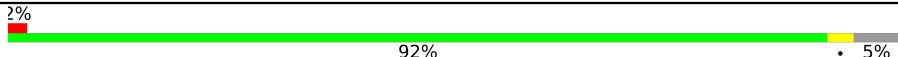
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3494 (1.96-1.96)
Clashscore	190562	3612 (1.96-1.96)
Ramachandran outliers	187476	3587 (1.96-1.96)
Sidechain outliers	187428	3587 (1.96-1.96)
RSRZ outliers	180081	3495 (1.96-1.96)

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	274	3% 91% 6% .
1	B	274	90% 5% .
1	C	274	4% 88% 7% 5%
1	D	274	% 93% 5% .
1	E	274	3% 93% .

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Mol	Chain	Length	Quality of chain
1	F	274	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	GOL	A	301	-	-	X	-
3	GOL	B	301	-	-	X	-
3	GOL	D	301	-	-	X	-
3	GOL	F	301	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 12944 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.

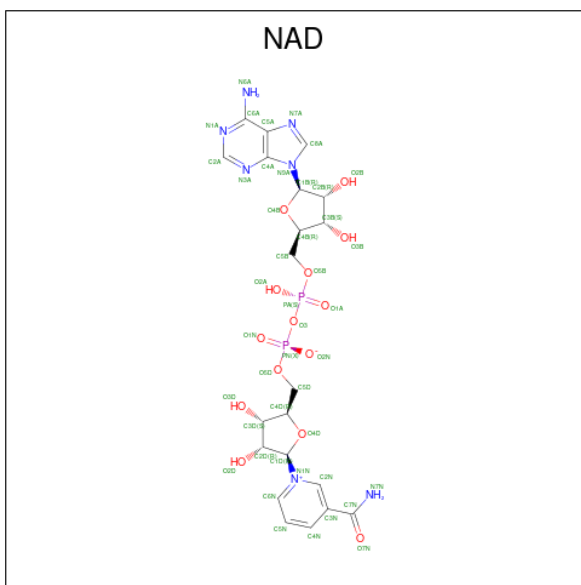
- Molecule 1 is a protein called Enoyl-[acyl-carrier-protein] reductase [NADH].

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	264	Total	C	N	O	S	0	7	0
			1982	1264	329	378	11			
1	B	259	Total	C	N	O	S	0	5	0
			1975	1257	330	378	10			
1	C	260	Total	C	N	O	S	0	7	0
			1959	1251	325	372	11			
1	D	268	Total	C	N	O	S	0	4	0
			2003	1277	330	387	9			
1	E	262	Total	C	N	O	S	0	5	0
			1974	1262	324	379	9			
1	F	260	Total	C	N	O	S	0	3	0
			1936	1231	322	373	10			

There are 12 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
A	0	SER	-	expression tag	UNP A0A0H3M2Q2
B	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
B	0	SER	-	expression tag	UNP A0A0H3M2Q2
C	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
C	0	SER	-	expression tag	UNP A0A0H3M2Q2
D	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
D	0	SER	-	expression tag	UNP A0A0H3M2Q2
E	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
E	0	SER	-	expression tag	UNP A0A0H3M2Q2
F	-1	GLY	-	expression tag	UNP A0A0H3M2Q2
F	0	SER	-	expression tag	UNP A0A0H3M2Q2

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: C₂₁H₂₇N₇O₁₄P₂).



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

- Molecule 3 is GLYCEROL (CCD ID: GOL) (formula: $\text{C}_3\text{H}_8\text{O}_3$).



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

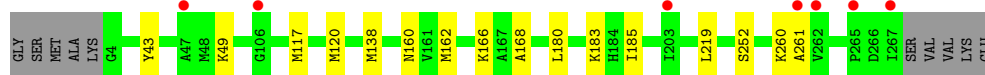
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	139	Total	O	0	1
			140	140		
4	B	179	Total	O	0	0
			179	179		
4	C	152	Total	O	0	1
			153	153		
4	D	126	Total	O	0	0
			126	126		
4	E	121	Total	O	0	1
			122	122		
4	F	100	Total	O	0	1
			101	101		

3 Residue-property plots

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

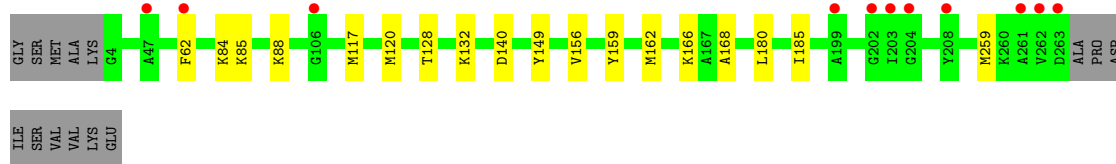
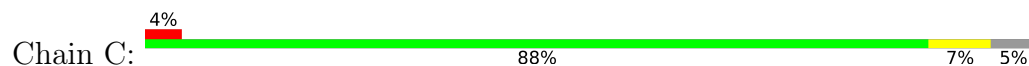
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



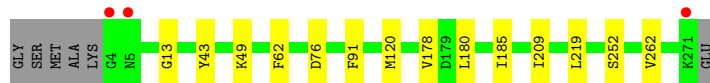
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



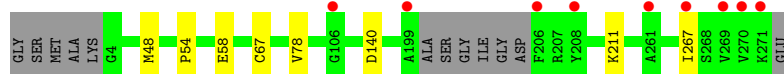
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



● Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	122.44Å 76.86Å 171.60Å 90.00° 107.73° 90.00°	Depositor
Resolution (Å)	40.86 – 1.95 40.86 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.7 (40.86-1.95) 99.7 (40.86-1.95)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.88 (at 1.95Å)	Xtriage
Refinement program	PHENIX 1.11rc1_2513	Depositor
R, R_{free}	0.151 , 0.187 0.152 , 0.187	Depositor DCC
R_{free} test set	2007 reflections (1.81%)	wwPDB-VP
Wilson B-factor (Å ²)	25.5	Xtriage
Anisotropy	0.580	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 56.9	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	12944	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.96% 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: NAD, GOL

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.30	0/2038	0.49	0/2765
1	B	0.34	0/2024	0.51	0/2738
1	C	0.30	0/2014	0.47	0/2729
1	D	0.30	0/2051	0.47	0/2786
1	E	0.30	0/2025	0.48	0/2748
1	F	0.28	0/1980	0.48	0/2689
All	All	0.30	0/12132	0.48	0/16455

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	1982	0	1959	11	0
1	B	1975	0	1982	8	0
1	C	1959	0	1958	12	0
1	D	2003	0	1965	7	0
1	E	1974	0	1938	6	0
1	F	1936	0	1893	8	0
2	A	44	0	26	4	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	B	44	0	26	5	0
2	C	44	0	26	3	0
2	D	44	0	26	4	0
2	E	44	0	26	0	0
2	F	44	0	26	3	0
3	A	6	0	8	4	0
3	B	6	0	8	7	0
3	C	6	0	8	3	0
3	D	6	0	8	4	0
3	F	6	0	8	4	0
4	A	140	0	0	4	0
4	B	179	0	0	0	0
4	C	153	0	0	1	0
4	D	126	0	0	0	0
4	E	122	0	0	0	0
4	F	101	0	0	0	0
All	All	12944	0	11891	64	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 3.

All (64) 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:A:162:MET:HE3	1:A:166:LYS:HE2	1.68	0.75
1:A:117:MET:HE3	1:C:117:MET:HE3	1.72	0.70
1:A:183:LYS:NZ	4:A:401:HOH:O	2.25	0.68
1:B:134:ALA:HB1	1:B:138:MET:HE3	1.77	0.66
1:C:162[B]:MET:HE3	1:C:166:LYS:HE2	1.78	0.64
2:B:300:NAD:C5N	3:B:301:GOL:H11	2.27	0.64
2:B:300:NAD:C4N	3:B:301:GOL:H31	2.29	0.63
1:B:162[B]:MET:HE3	1:B:166:LYS:HE2	1.82	0.62
1:A:120:MET:HE2	1:C:120:MET:HE2	1.83	0.60
1:B:203:ILE:HD11	3:B:301:GOL:H2	1.84	0.59
1:B:120:MET:HE2	1:D:120:MET:HE2	1.84	0.59
1:F:203:ILE:HD11	3:F:301:GOL:H2	1.85	0.58
4:A:404:HOH:O	1:E:140:ASP:HB3	2.03	0.57
2:D:300:NAD:C4N	3:D:301:GOL:H31	2.36	0.56
1:B:159:TYR:OH	3:B:301:GOL:H12	2.06	0.55
2:F:300:NAD:C7N	3:F:301:GOL:H32	2.37	0.55
1:F:134:ALA:HB1	1:F:138:MET:HE3	1.89	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:C:300:NAD:C5N	3:C:301:GOL:H11	2.36	0.54
1:C:149:TYR:HE2	1:C:156[A]:VAL:HG21	1.73	0.54
2:A:300:NAD:C4N	3:A:301:GOL:H31	2.38	0.53
1:C:62:PHE:CZ	1:C:85:LYS:HD3	2.45	0.52
2:B:300:NAD:C4N	3:B:301:GOL:H11	2.41	0.51
1:D:219:LEU:HB2	1:D:252:SER:HB3	1.93	0.51
1:A:49:LYS:NZ	4:A:406:HOH:O	2.44	0.50
1:A:219:LEU:HB2	1:A:252:SER:HB3	1.93	0.50
1:D:180:LEU:HB3	1:D:185:ILE:HB	1.93	0.50
1:F:138:MET:C	1:F:140:ASP:H	2.21	0.48
1:A:43:TYR:CZ	1:A:49:LYS:HD2	2.48	0.48
1:D:13:GLY:HA3	1:D:91:PHE:CE1	2.50	0.47
1:C:259[A]:MET:HE1	1:D:209:ILE:HG23	1.96	0.46
2:C:300:NAD:C4N	3:C:301:GOL:H11	2.46	0.45
1:F:138:MET:O	1:F:140:ASP:N	2.40	0.45
1:E:54:PRO:O	1:E:58[B]:GLU:HG3	2.16	0.45
1:B:155:VAL:HG11	1:D:178:VAL:HG21	1.98	0.45
1:C:88:LYS:NZ	1:C:140:ASP:OD2	2.40	0.44
2:D:300:NAD:C6N	3:D:301:GOL:H11	2.48	0.44
1:C:84:LYS:NZ	4:C:404:HOH:O	2.47	0.44
2:F:300:NAD:C4N	3:F:301:GOL:H11	2.48	0.44
2:A:300:NAD:C5N	3:A:301:GOL:H11	2.47	0.44
1:C:128:THR:O	1:C:132:LYS:HG3	2.18	0.43
1:E:48:MET:HE3	1:E:48:MET:HB2	1.78	0.43
1:A:260:LYS:HG2	1:A:261:ALA:O	2.19	0.43
2:D:300:NAD:C2N	3:D:301:GOL:H11	2.48	0.43
1:E:267:ILE:O	1:F:260:LYS:HG2	2.17	0.43
1:C:180:LEU:HB3	1:C:185:ILE:HB	2.01	0.43
1:A:168:ALA:HB2	1:C:168:ALA:HB2	2.00	0.43
2:B:300:NAD:H4N	3:B:301:GOL:H31	1.99	0.43
2:B:300:NAD:C6N	3:B:301:GOL:H11	2.48	0.43
1:C:156[A]:VAL:HG23	1:C:159:TYR:HB2	2.00	0.42
1:A:160:ASN:HB2	4:A:497:HOH:O	2.19	0.42
1:E:211:LYS:HD3	1:E:211:LYS:HA	1.84	0.42
1:F:259:MET:HE2	1:F:259:MET:HB2	1.93	0.42
2:F:300:NAD:C3N	3:F:301:GOL:H11	2.49	0.42
2:C:300:NAD:C4N	3:C:301:GOL:H31	2.50	0.42
1:F:13:GLY:HA3	1:F:91:PHE:CZ	2.54	0.42
1:E:67:CYS:HB2	1:E:78:VAL:HG11	2.01	0.41
2:A:300:NAD:C6N	3:A:301:GOL:H11	2.50	0.41
2:D:300:NAD:N1N	3:D:301:GOL:H11	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:LEU:HB3	1:A:185:ILE:HB	2.03	0.41
1:B:108:TYR:O	1:B:111:ILE:HG12	2.20	0.41
1:D:43:TYR:CD1	1:D:49:LYS:HB2	2.56	0.41
1:B:180:LEU:HB3	1:B:185:ILE:HB	2.03	0.41
2:A:300:NAD:C4N	3:A:301:GOL:H11	2.51	0.40
1:F:140:ASP:N	1:F:140:ASP:OD1	2.54	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	269/274 (98%)	260 (97%)	9 (3%)	0	100	100
1	B	262/274 (96%)	255 (97%)	7 (3%)	0	100	100
1	C	265/274 (97%)	257 (97%)	8 (3%)	0	100	100
1	D	270/274 (98%)	264 (98%)	6 (2%)	0	100	100
1	E	262/274 (96%)	255 (97%)	7 (3%)	0	100	100
1	F	261/274 (95%)	252 (97%)	9 (3%)	0	100	100
All	All	1589/1644 (97%)	1543 (97%)	46 (3%)	0	100	100

There are no Ramachandran outliers to report.

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	204/219 (93%)	203 (100%)	1 (0%)	81	82
1	B	208/219 (95%)	208 (100%)	0	100	100
1	C	204/219 (93%)	204 (100%)	0	100	100
1	D	206/219 (94%)	203 (98%)	3 (2%)	57	54
1	E	205/219 (94%)	205 (100%)	0	100	100
1	F	198/219 (90%)	198 (100%)	0	100	100
All	All	1225/1314 (93%)	1221 (100%)	4 (0%)	86	87

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	138	MET
1	D	62	PHE
1	D	76	ASP
1	D	262	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	255	ASN
1	B	213	ASN
1	F	121	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry

11 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAD	B	300	-	46,48,48	0.39	0	64,73,73	0.74	1 (1%)
2	NAD	F	300	-	46,48,48	0.40	0	64,73,73	0.59	0
3	GOL	D	301	-	5,5,5	0.42	0	5,5,5	0.80	0
2	NAD	A	300	-	46,48,48	0.41	0	64,73,73	0.60	1 (1%)
2	NAD	D	300	-	46,48,48	0.39	0	64,73,73	0.64	1 (1%)
3	GOL	C	301	-	5,5,5	0.36	0	5,5,5	0.39	0
3	GOL	F	301	-	5,5,5	0.37	0	5,5,5	0.49	0
2	NAD	C	300	-	46,48,48	0.46	0	64,73,73	0.59	0
2	NAD	E	300	-	46,48,48	0.40	0	64,73,73	0.56	0
3	GOL	A	301	-	5,5,5	0.42	0	5,5,5	0.44	0
3	GOL	B	301	-	5,5,5	0.50	0	5,5,5	1.16	1 (20%)

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	B	300	-	-	6/30/62/62	0/5/5/5
2	NAD	F	300	-	-	5/30/62/62	0/5/5/5
3	GOL	D	301	-	-	1/4/4/4	-
2	NAD	A	300	-	-	6/30/62/62	0/5/5/5
2	NAD	D	300	-	-	5/30/62/62	0/5/5/5
3	GOL	C	301	-	-	0/4/4/4	-
3	GOL	F	301	-	-	2/4/4/4	-
2	NAD	C	300	-	-	6/30/62/62	0/5/5/5
2	NAD	E	300	-	-	7/30/62/62	0/5/5/5
3	GOL	A	301	-	-	0/4/4/4	-
3	GOL	B	301	-	-	0/4/4/4	-

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	300	NAD	C4D-O4D-C1D	-2.51	107.63	109.92
2	D	300	NAD	O5B-PA-O1A	2.27	117.93	108.94
2	A	300	NAD	C4D-O4D-C1D	-2.15	107.96	109.92
3	B	301	GOL	O2-C2-C3	2.04	117.63	109.18

There are no chirality outliers.

All (38) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	300	NAD	PN-O3-PA-O5B
2	A	300	NAD	C5D-O5D-PN-O3
2	A	300	NAD	C5D-O5D-PN-O1N
2	A	300	NAD	C5D-O5D-PN-O2N
2	A	300	NAD	O4D-C1D-N1N-C2N
2	B	300	NAD	C5D-O5D-PN-O3
2	B	300	NAD	C5D-O5D-PN-O1N
2	B	300	NAD	C5D-O5D-PN-O2N
2	B	300	NAD	O4D-C1D-N1N-C2N
2	C	300	NAD	C5D-O5D-PN-O3
2	C	300	NAD	C5D-O5D-PN-O1N
2	C	300	NAD	C5D-O5D-PN-O2N
2	C	300	NAD	O4D-C1D-N1N-C2N
2	D	300	NAD	C5D-O5D-PN-O3
2	D	300	NAD	C5D-O5D-PN-O1N
2	D	300	NAD	C5D-O5D-PN-O2N
2	D	300	NAD	O4D-C1D-N1N-C2N
2	E	300	NAD	C5D-O5D-PN-O3
2	E	300	NAD	C5D-O5D-PN-O1N
2	E	300	NAD	O4D-C1D-N1N-C2N
2	F	300	NAD	C5D-O5D-PN-O3
2	F	300	NAD	C5D-O5D-PN-O1N
2	F	300	NAD	C5D-O5D-PN-O2N
2	F	300	NAD	O4D-C1D-N1N-C2N
3	F	301	GOL	C1-C2-C3-O3
3	D	301	GOL	O2-C2-C3-O3
2	B	300	NAD	PN-O3-PA-O5B
2	E	300	NAD	C5D-O5D-PN-O2N
2	A	300	NAD	O4D-C1D-N1N-C6N
2	B	300	NAD	O4D-C1D-N1N-C6N
2	C	300	NAD	O4D-C1D-N1N-C6N

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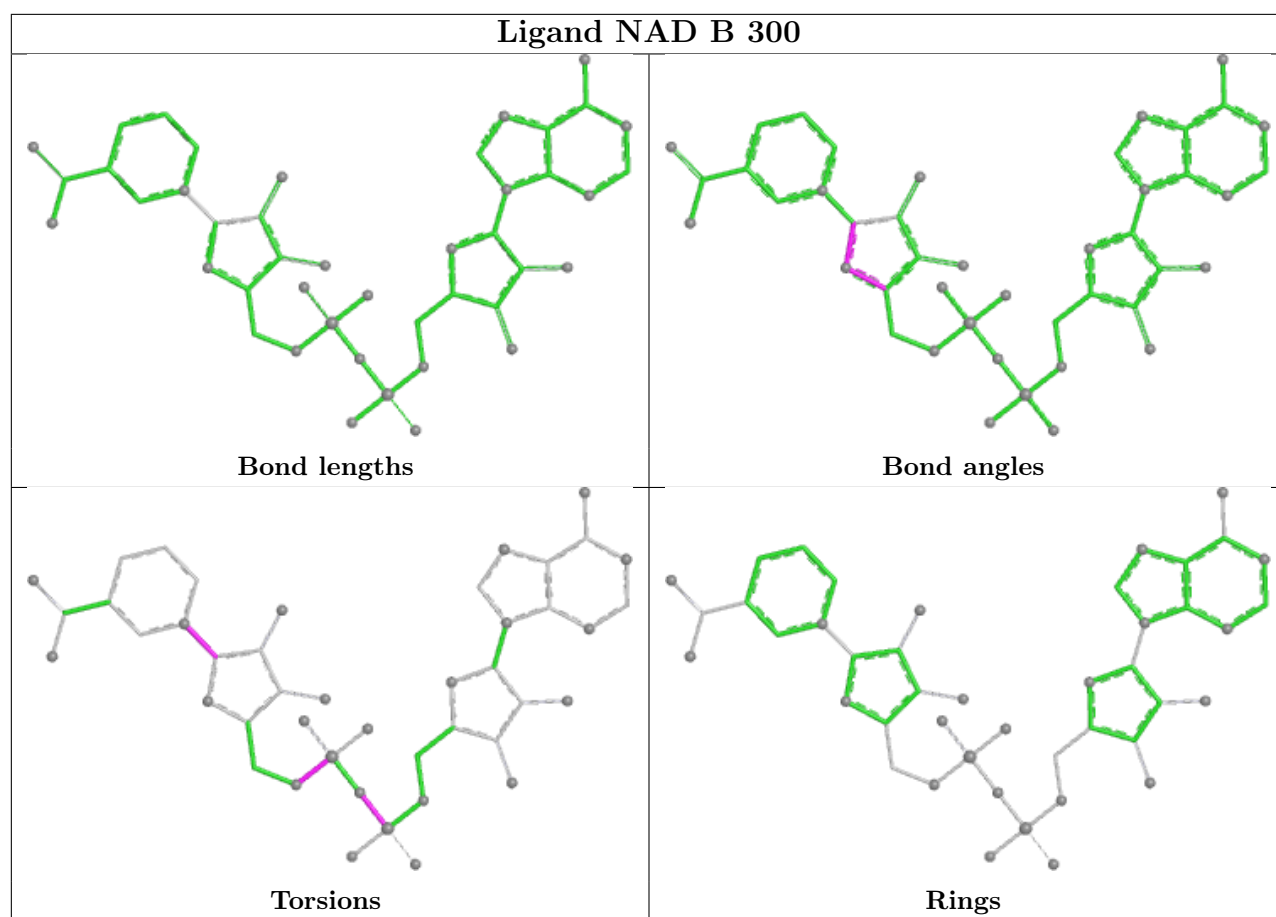
Mol	Chain	Res	Type	Atoms
2	D	300	NAD	O4D-C1D-N1N-C6N
2	E	300	NAD	O4D-C1D-N1N-C6N
2	F	300	NAD	O4D-C1D-N1N-C6N
3	F	301	GOL	O2-C2-C3-O3
2	E	300	NAD	PA-O3-PN-O1N
2	E	300	NAD	PA-O3-PN-O2N
2	C	300	NAD	O4B-C4B-C5B-O5B

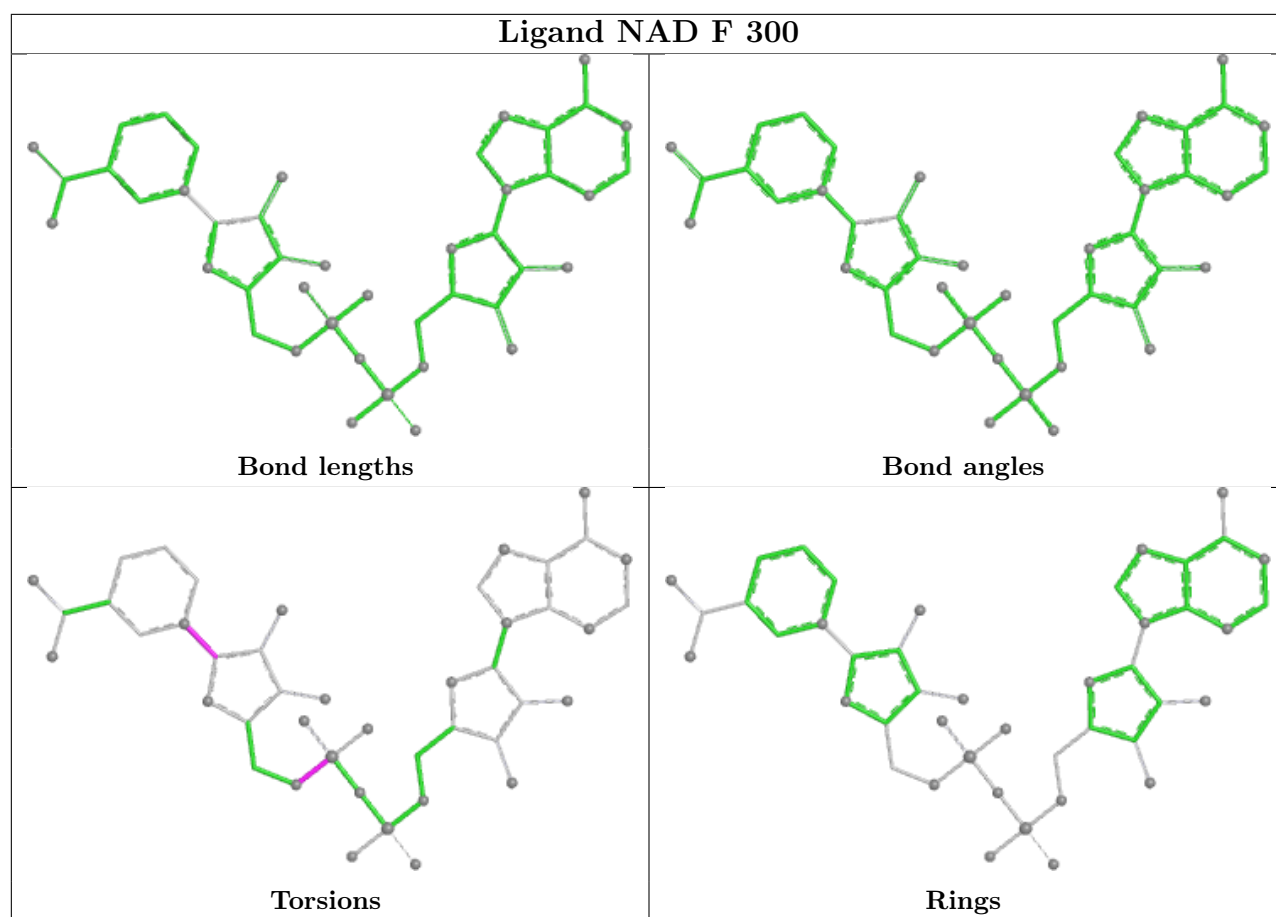
There are no ring outliers.

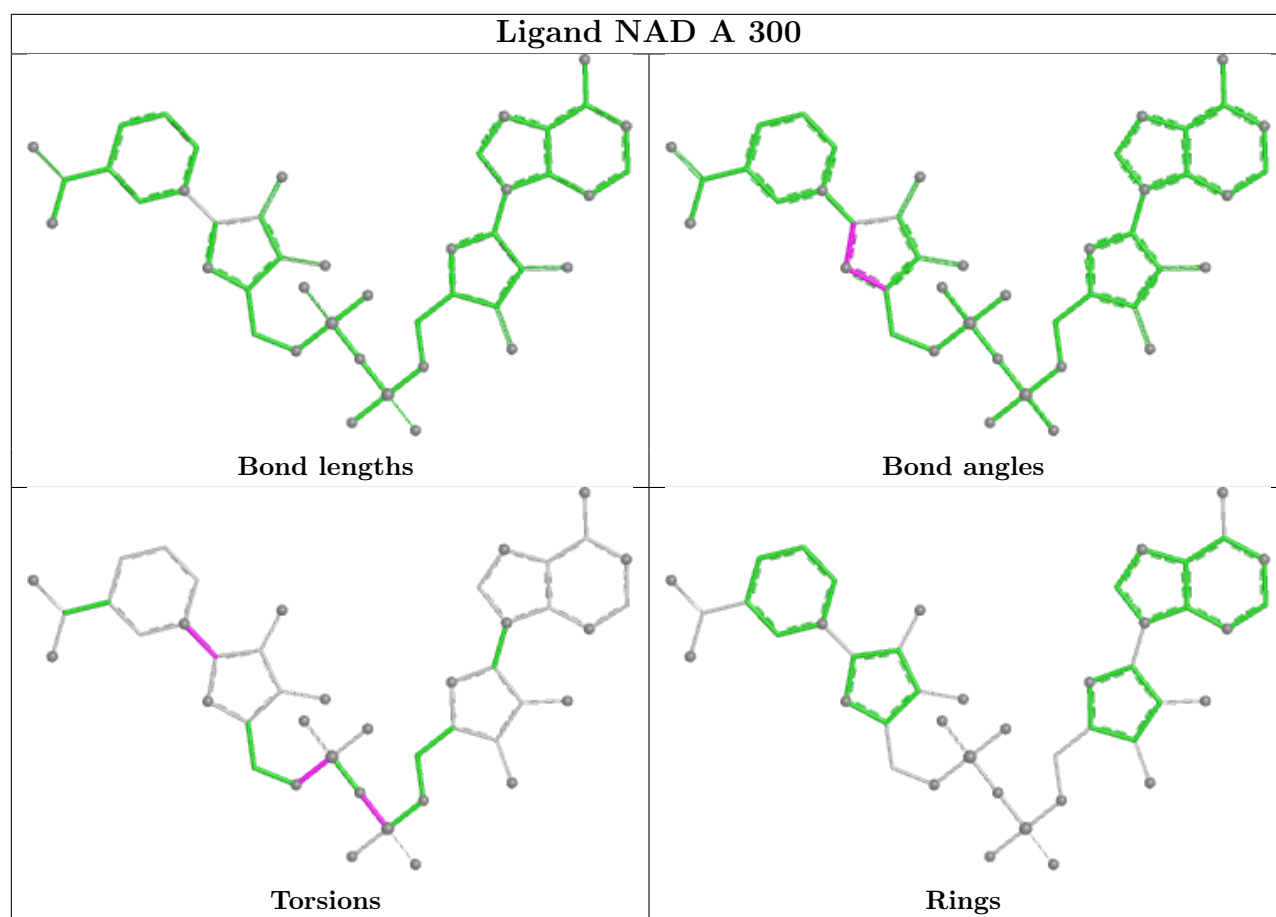
10 monomers are involved in 22 short contacts:

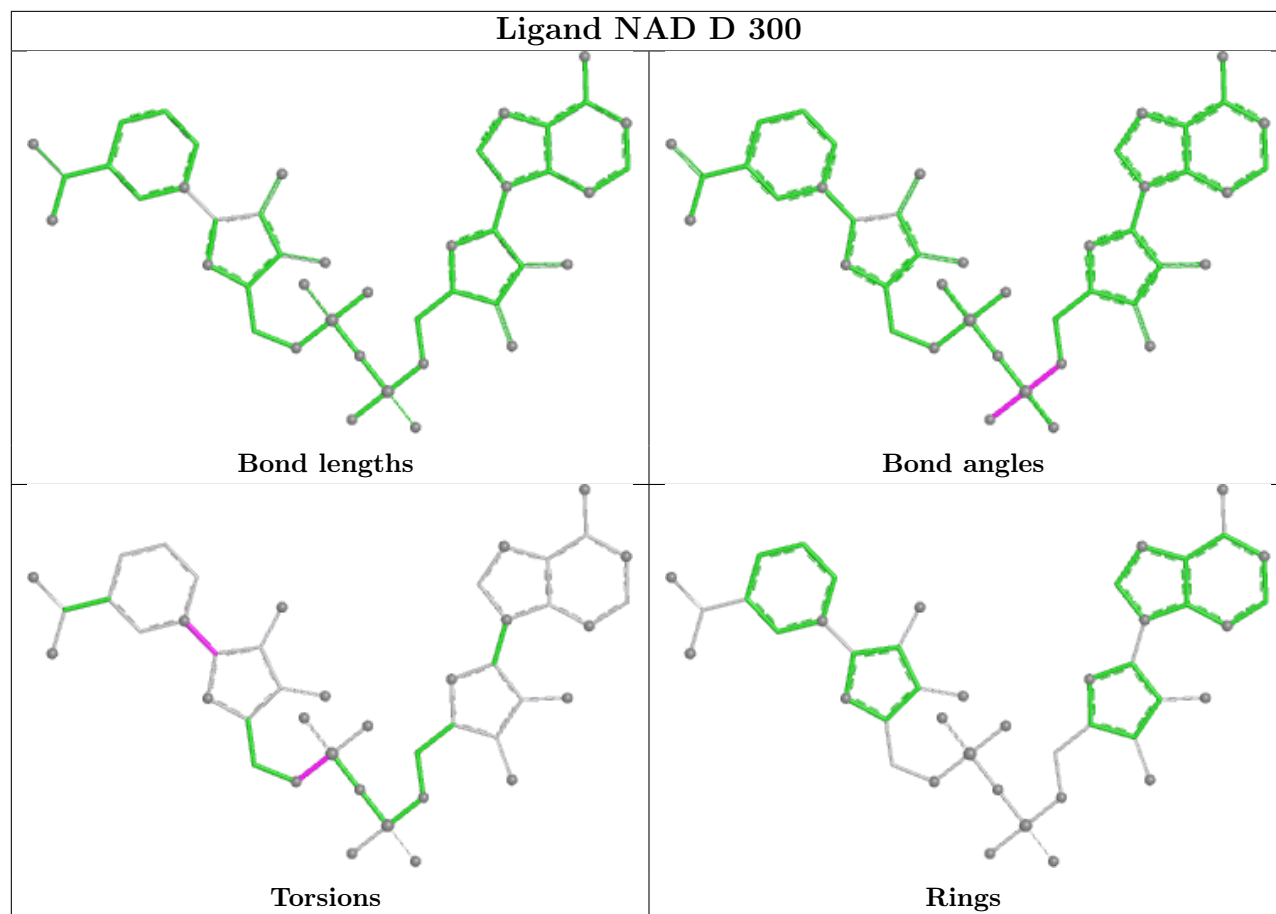
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	300	NAD	5	0
2	F	300	NAD	3	0
3	D	301	GOL	4	0
2	A	300	NAD	4	0
2	D	300	NAD	4	0
3	C	301	GOL	3	0
3	F	301	GOL	4	0
2	C	300	NAD	3	0
3	A	301	GOL	4	0
3	B	301	GOL	7	0

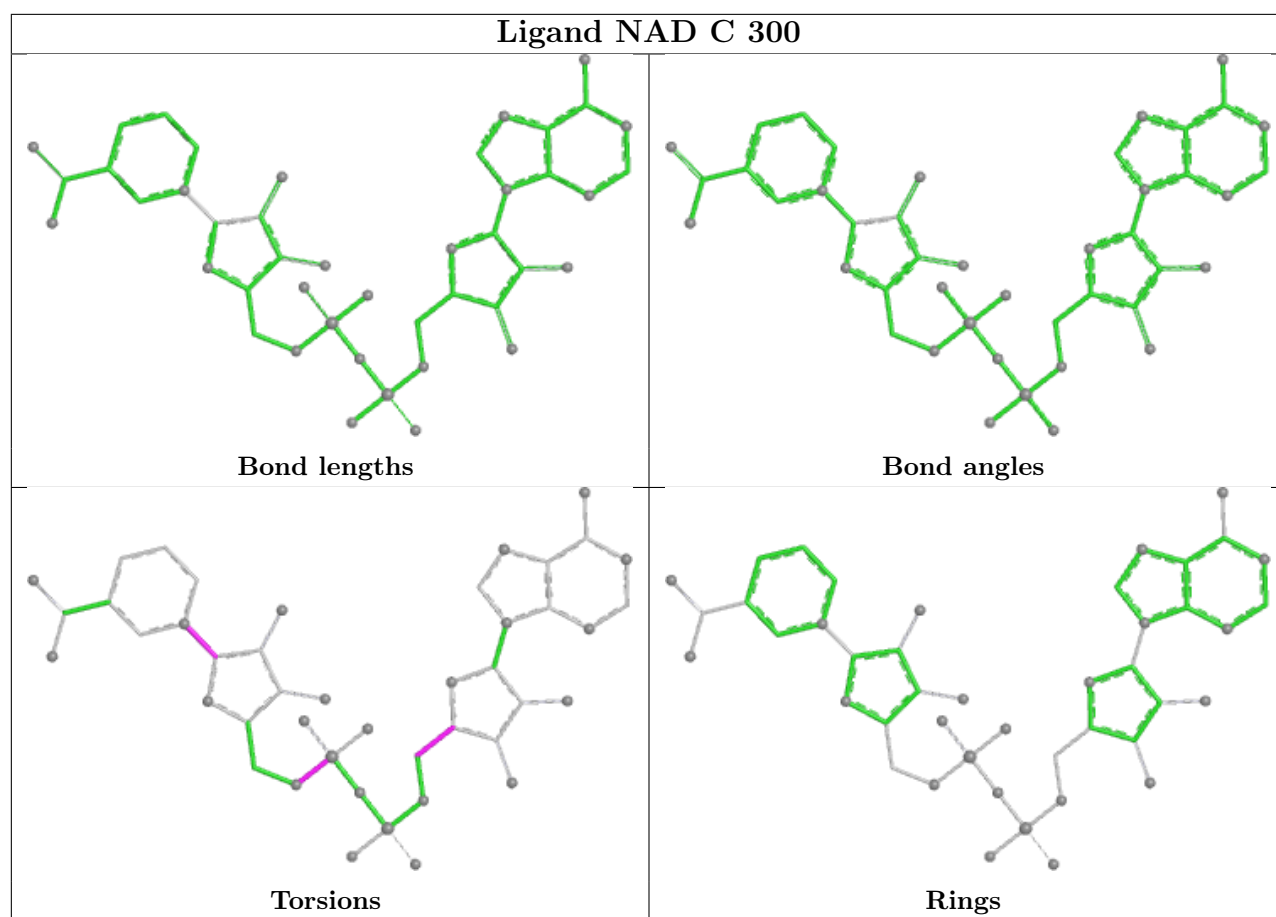
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

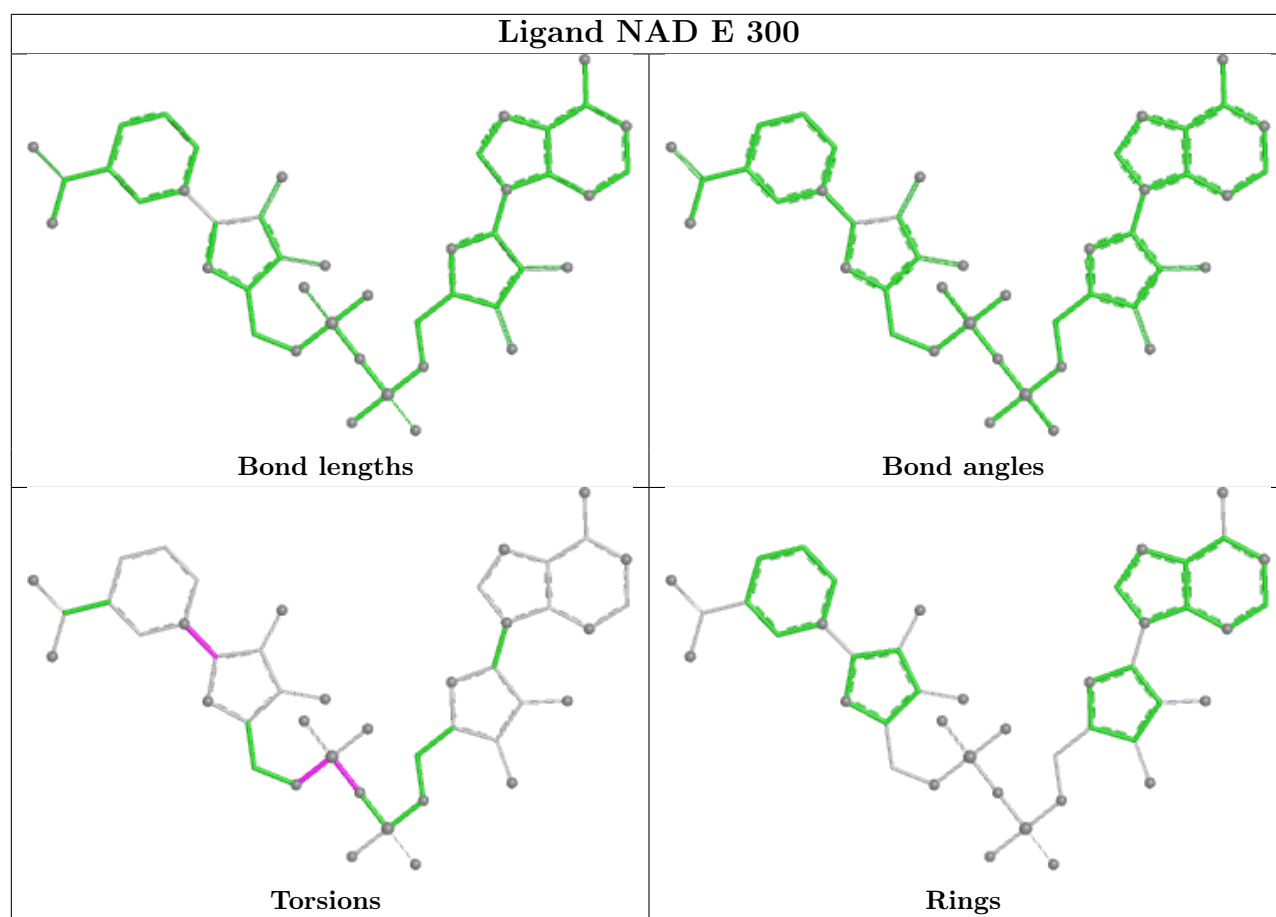












5.7 Other polymers [i](#)

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	264/274 (96%)	-0.28	7 (2%) 56 62	13, 29, 55, 78	7 (2%)
1	B	259/274 (94%)	-0.52	0 100 100	13, 25, 46, 66	5 (1%)
1	C	260/274 (94%)	-0.23	11 (4%) 40 47	13, 31, 63, 98	7 (2%)
1	D	268/274 (97%)	-0.13	3 (1%) 78 83	12, 36, 63, 88	4 (1%)
1	E	262/274 (95%)	-0.20	9 (3%) 48 54	18, 31, 56, 80	5 (1%)
1	F	260/274 (94%)	-0.16	5 (1%) 66 74	19, 35, 60, 80	3 (1%)
All	All	1573/1644 (95%)	-0.25	35 (2%) 62 69	12, 31, 58, 98	31 (1%)

All (35) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	204	GLY	4.1
1	E	106	GLY	3.6
1	C	263	ASP	3.4
1	C	62	PHE	3.4
1	C	203	ILE	3.3
1	F	139	SER	3.1
1	A	267	ILE	3.1
1	F	265	PRO	3.0
1	C	199	ALA	2.9
1	C	261	ALA	2.8
1	E	206[A]	PHE	2.8
1	A	106	GLY	2.8
1	D	4	GLY	2.8
1	A	262	VAL	2.7
1	E	208	TYR	2.7
1	C	202	GLY	2.6
1	C	47	ALA	2.6
1	C	208	TYR	2.4
1	D	271	LYS	2.4

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Mol	Chain	Res	Type	RSRZ
1	A	261	ALA	2.4
1	E	199	ALA	2.4
1	A	47	ALA	2.4
1	E	271	LYS	2.3
1	E	261	ALA	2.3
1	F	264	ALA	2.3
1	D	5	ASN	2.3
1	F	140	ASP	2.3
1	E	270	VAL	2.2
1	C	106	GLY	2.1
1	E	267	ILE	2.1
1	F	9	TYR	2.1
1	C	262	VAL	2.1
1	E	269	VAL	2.1
1	A	265	PRO	2.1
1	A	203	ILE	2.0

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

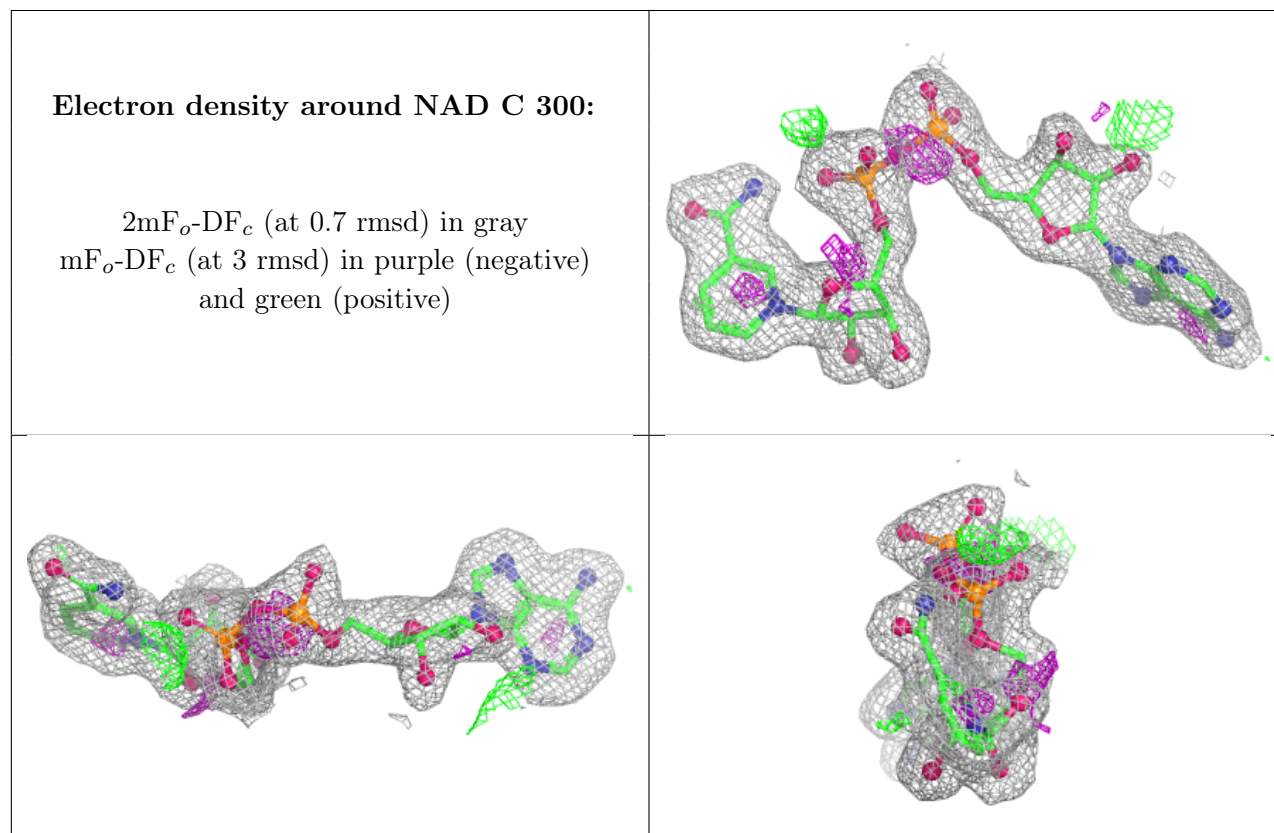
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	GOL	F	301	6/6	0.67	0.23	40,60,66,69	0
3	GOL	B	301	6/6	0.75	0.22	32,42,49,54	6
3	GOL	D	301	6/6	0.79	0.20	49,63,67,71	0
3	GOL	C	301	6/6	0.84	0.15	53,65,69,70	0
3	GOL	A	301	6/6	0.88	0.14	35,57,61,62	0
2	NAD	C	300	44/44	0.94	0.07	29,39,44,52	0
2	NAD	E	300	44/44	0.95	0.07	28,34,54,63	0

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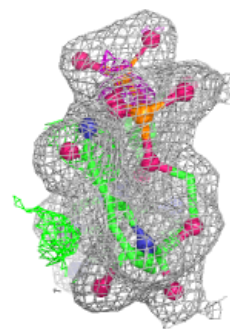
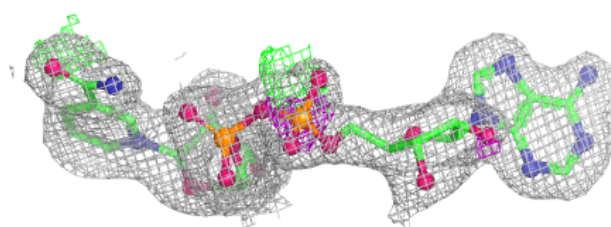
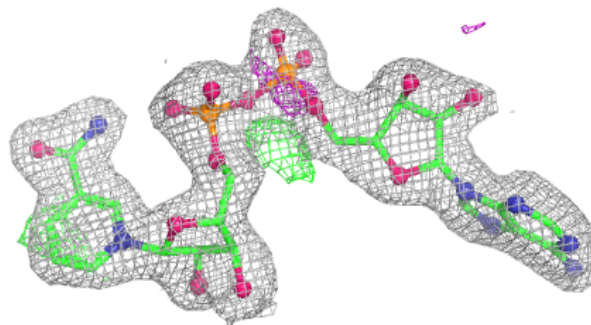
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	NAD	D	300	44/44	0.95	0.07	26,33,37,40	0
2	NAD	A	300	44/44	0.96	0.06	23,31,36,39	0
2	NAD	F	300	44/44	0.97	0.06	24,30,38,40	0
2	NAD	B	300	44/44	0.98	0.04	19,24,27,29	0

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.

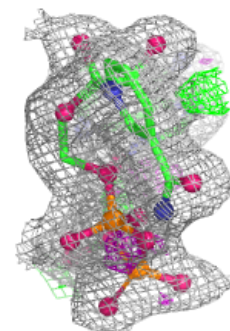
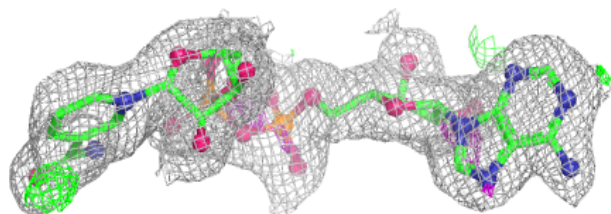
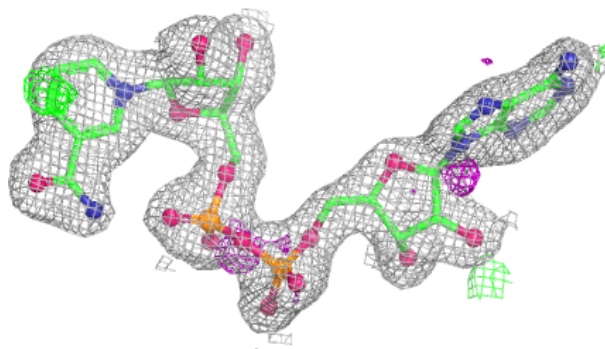


Electron density around NAD E 300:

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

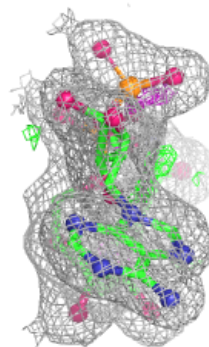
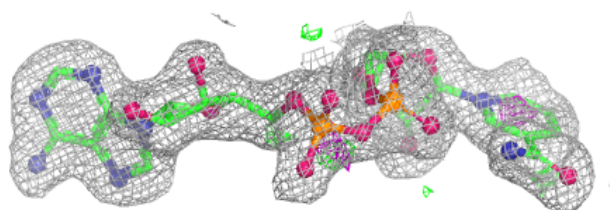
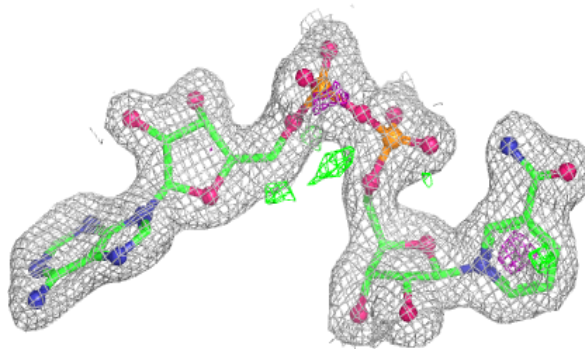
**Electron density around NAD D 300:**

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

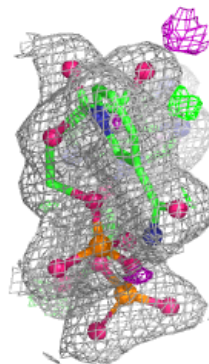
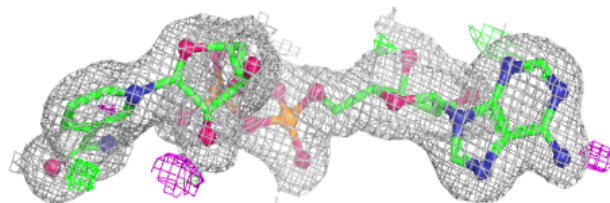
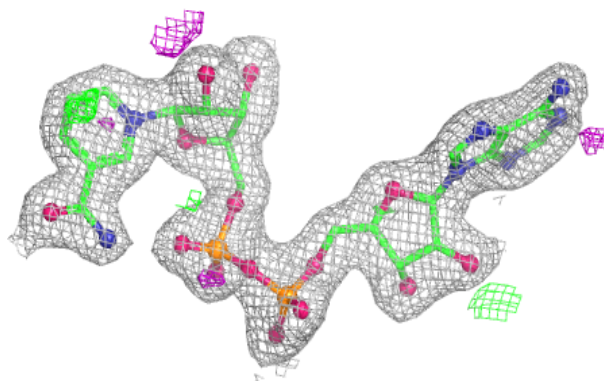


Electron density around NAD A 300:

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

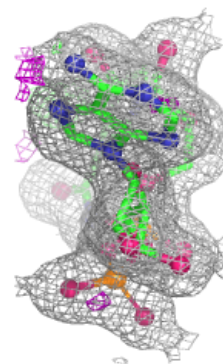
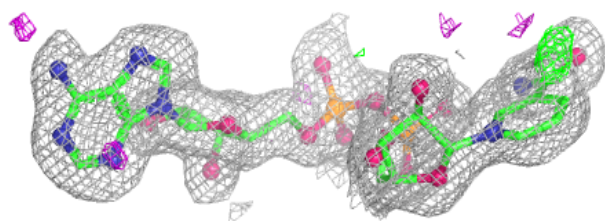
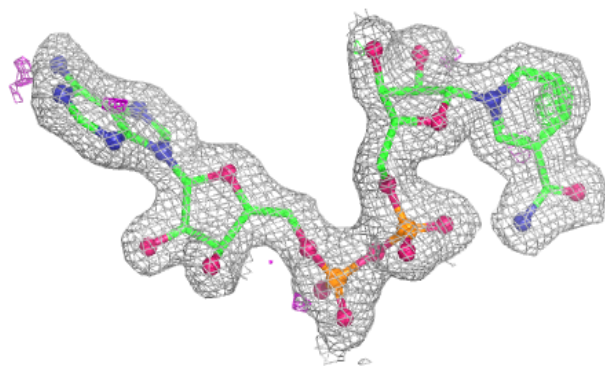
**Electron density around NAD F 300:**

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



Electron density around NAD B 300:

$2mF_o-DF_c$ (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.