



# Full wwPDB X-ray Structure Validation Report ⓘ

May 15, 2020 – 11:26 pm BST

PDB ID : 5CPB  
Title : The effect of isoleucine to alanine mutation on InhA enzyme crystallization pattern and inhibition by ligand PT70 (TCU)  
Authors : Li, H.-J.; Lai, C.-T.; Liu, N.; Yu, W.; Shah, S.; Bommineni, G.R.; Perrone, V.; Garcia-Diaz, M.; Tonge, P.J.; Simmerling, C.  
Deposited on : 2015-07-21  
Resolution : 2.00 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
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) : 2.11

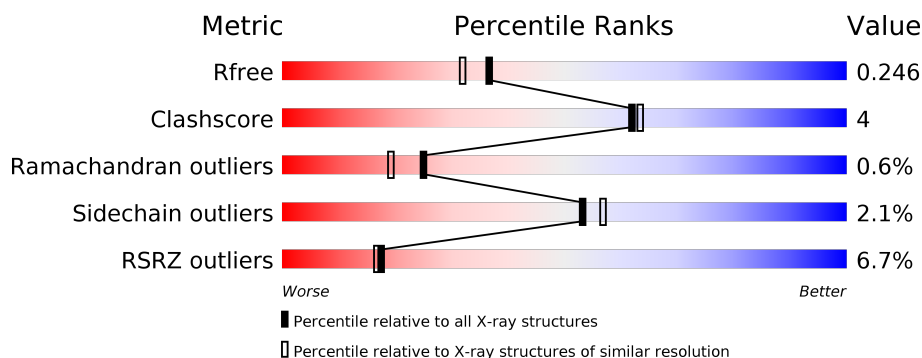
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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 on 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	289	<div> <div>11%</div> <div> <div></div> <div>82%</div> <div>11%</div> <div>7%</div> </div> </div>
1	B	289	<div> <div>6%</div> <div> <div></div> <div>80%</div> <div>6%</div> <div>15%</div> </div> </div>
1	C	289	<div> <div>2%</div> <div> <div></div> <div>82%</div> <div>9%</div> <div>7%</div> </div> </div>
1	D	289	<div> <div>7%</div> <div> <div></div> <div>85%</div> <div>7%</div> <div>7%</div> </div> </div>
1	E	289	<div> <div>4%</div> <div> <div></div> <div>74%</div> <div>15%</div> <div>10%</div> </div> </div>
1	F	289	<div> <div>6%</div> <div> <div></div> <div>85%</div> <div>6%</div> <div>8%</div> </div> </div>

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 12443 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	268	Total	C	N	O	S	0	0	0
			1992	1261	348	373	10			
1	B	246	Total	C	N	O	S	0	0	0
			1823	1159	315	340	9			
1	C	268	Total	C	N	O	S	0	0	0
			1973	1251	348	364	10			
1	D	268	Total	C	N	O	S	0	0	0
			1992	1261	348	373	10			
1	E	260	Total	C	N	O	S	0	0	0
			1926	1220	335	362	9			
1	F	266	Total	C	N	O	S	0	0	1
			1938	1226	345	357	10			

There are 126 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP M9TGV3
A	-18	GLY	-	expression tag	UNP M9TGV3
A	-17	SER	-	expression tag	UNP M9TGV3
A	-16	SER	-	expression tag	UNP M9TGV3
A	-15	HIS	-	expression tag	UNP M9TGV3
A	-14	HIS	-	expression tag	UNP M9TGV3
A	-13	HIS	-	expression tag	UNP M9TGV3
A	-12	HIS	-	expression tag	UNP M9TGV3
A	-11	HIS	-	expression tag	UNP M9TGV3
A	-10	HIS	-	expression tag	UNP M9TGV3
A	-9	SER	-	expression tag	UNP M9TGV3
A	-8	SER	-	expression tag	UNP M9TGV3
A	-7	GLY	-	expression tag	UNP M9TGV3
A	-6	LEU	-	expression tag	UNP M9TGV3
A	-5	VAL	-	expression tag	UNP M9TGV3
A	-4	PRO	-	expression tag	UNP M9TGV3
A	-3	ARG	-	expression tag	UNP M9TGV3

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP M9TGV3
A	-1	SER	-	expression tag	UNP M9TGV3
A	0	HIS	-	expression tag	UNP M9TGV3
A	215	ALA	ILE	engineered mutation	UNP M9TGV3
B	-19	MET	-	initiating methionine	UNP M9TGV3
B	-18	GLY	-	expression tag	UNP M9TGV3
B	-17	SER	-	expression tag	UNP M9TGV3
B	-16	SER	-	expression tag	UNP M9TGV3
B	-15	HIS	-	expression tag	UNP M9TGV3
B	-14	HIS	-	expression tag	UNP M9TGV3
B	-13	HIS	-	expression tag	UNP M9TGV3
B	-12	HIS	-	expression tag	UNP M9TGV3
B	-11	HIS	-	expression tag	UNP M9TGV3
B	-10	HIS	-	expression tag	UNP M9TGV3
B	-9	SER	-	expression tag	UNP M9TGV3
B	-8	SER	-	expression tag	UNP M9TGV3
B	-7	GLY	-	expression tag	UNP M9TGV3
B	-6	LEU	-	expression tag	UNP M9TGV3
B	-5	VAL	-	expression tag	UNP M9TGV3
B	-4	PRO	-	expression tag	UNP M9TGV3
B	-3	ARG	-	expression tag	UNP M9TGV3
B	-2	GLY	-	expression tag	UNP M9TGV3
B	-1	SER	-	expression tag	UNP M9TGV3
B	0	HIS	-	expression tag	UNP M9TGV3
B	215	ALA	ILE	engineered mutation	UNP M9TGV3
C	-19	MET	-	initiating methionine	UNP M9TGV3
C	-18	GLY	-	expression tag	UNP M9TGV3
C	-17	SER	-	expression tag	UNP M9TGV3
C	-16	SER	-	expression tag	UNP M9TGV3
C	-15	HIS	-	expression tag	UNP M9TGV3
C	-14	HIS	-	expression tag	UNP M9TGV3
C	-13	HIS	-	expression tag	UNP M9TGV3
C	-12	HIS	-	expression tag	UNP M9TGV3
C	-11	HIS	-	expression tag	UNP M9TGV3
C	-10	HIS	-	expression tag	UNP M9TGV3
C	-9	SER	-	expression tag	UNP M9TGV3
C	-8	SER	-	expression tag	UNP M9TGV3
C	-7	GLY	-	expression tag	UNP M9TGV3
C	-6	LEU	-	expression tag	UNP M9TGV3
C	-5	VAL	-	expression tag	UNP M9TGV3
C	-4	PRO	-	expression tag	UNP M9TGV3
C	-3	ARG	-	expression tag	UNP M9TGV3

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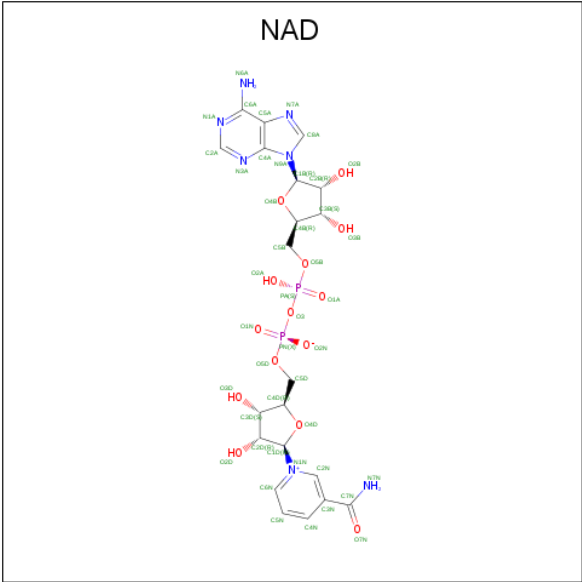
Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	GLY	-	expression tag	UNP M9TGV3
C	-1	SER	-	expression tag	UNP M9TGV3
C	0	HIS	-	expression tag	UNP M9TGV3
C	215	ALA	ILE	engineered mutation	UNP M9TGV3
D	-19	MET	-	initiating methionine	UNP M9TGV3
D	-18	GLY	-	expression tag	UNP M9TGV3
D	-17	SER	-	expression tag	UNP M9TGV3
D	-16	SER	-	expression tag	UNP M9TGV3
D	-15	HIS	-	expression tag	UNP M9TGV3
D	-14	HIS	-	expression tag	UNP M9TGV3
D	-13	HIS	-	expression tag	UNP M9TGV3
D	-12	HIS	-	expression tag	UNP M9TGV3
D	-11	HIS	-	expression tag	UNP M9TGV3
D	-10	HIS	-	expression tag	UNP M9TGV3
D	-9	SER	-	expression tag	UNP M9TGV3
D	-8	SER	-	expression tag	UNP M9TGV3
D	-7	GLY	-	expression tag	UNP M9TGV3
D	-6	LEU	-	expression tag	UNP M9TGV3
D	-5	VAL	-	expression tag	UNP M9TGV3
D	-4	PRO	-	expression tag	UNP M9TGV3
D	-3	ARG	-	expression tag	UNP M9TGV3
D	-2	GLY	-	expression tag	UNP M9TGV3
D	-1	SER	-	expression tag	UNP M9TGV3
D	0	HIS	-	expression tag	UNP M9TGV3
D	215	ALA	ILE	engineered mutation	UNP M9TGV3
E	-19	MET	-	initiating methionine	UNP M9TGV3
E	-18	GLY	-	expression tag	UNP M9TGV3
E	-17	SER	-	expression tag	UNP M9TGV3
E	-16	SER	-	expression tag	UNP M9TGV3
E	-15	HIS	-	expression tag	UNP M9TGV3
E	-14	HIS	-	expression tag	UNP M9TGV3
E	-13	HIS	-	expression tag	UNP M9TGV3
E	-12	HIS	-	expression tag	UNP M9TGV3
E	-11	HIS	-	expression tag	UNP M9TGV3
E	-10	HIS	-	expression tag	UNP M9TGV3
E	-9	SER	-	expression tag	UNP M9TGV3
E	-8	SER	-	expression tag	UNP M9TGV3
E	-7	GLY	-	expression tag	UNP M9TGV3
E	-6	LEU	-	expression tag	UNP M9TGV3
E	-5	VAL	-	expression tag	UNP M9TGV3
E	-4	PRO	-	expression tag	UNP M9TGV3
E	-3	ARG	-	expression tag	UNP M9TGV3

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-2	GLY	-	expression tag	UNP M9TGV3
E	-1	SER	-	expression tag	UNP M9TGV3
E	0	HIS	-	expression tag	UNP M9TGV3
E	215	ALA	ILE	engineered mutation	UNP M9TGV3
F	-19	MET	-	initiating methionine	UNP M9TGV3
F	-18	GLY	-	expression tag	UNP M9TGV3
F	-17	SER	-	expression tag	UNP M9TGV3
F	-16	SER	-	expression tag	UNP M9TGV3
F	-15	HIS	-	expression tag	UNP M9TGV3
F	-14	HIS	-	expression tag	UNP M9TGV3
F	-13	HIS	-	expression tag	UNP M9TGV3
F	-12	HIS	-	expression tag	UNP M9TGV3
F	-11	HIS	-	expression tag	UNP M9TGV3
F	-10	HIS	-	expression tag	UNP M9TGV3
F	-9	SER	-	expression tag	UNP M9TGV3
F	-8	SER	-	expression tag	UNP M9TGV3
F	-7	GLY	-	expression tag	UNP M9TGV3
F	-6	LEU	-	expression tag	UNP M9TGV3
F	-5	VAL	-	expression tag	UNP M9TGV3
F	-4	PRO	-	expression tag	UNP M9TGV3
F	-3	ARG	-	expression tag	UNP M9TGV3
F	-2	GLY	-	expression tag	UNP M9TGV3
F	-1	SER	-	expression tag	UNP M9TGV3
F	0	HIS	-	expression tag	UNP M9TGV3
F	215	ALA	ILE	engineered mutation	UNP M9TGV3

- Molecule 2 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (three-letter code: NAD) (formula:  $C_{21}H_{27}N_7O_{14}P_2$ ).



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

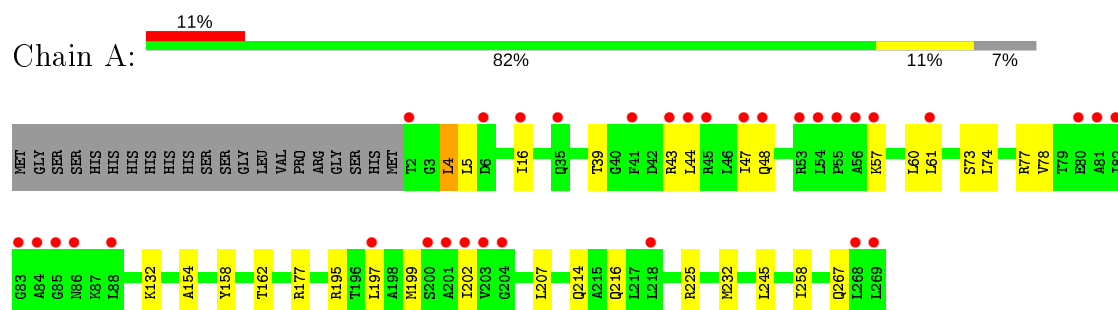
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	61	Total	O	0	0
			61	61		
3	B	64	Total	O	0	0
			64	64		
3	C	122	Total	O	0	0
			122	122		
3	D	125	Total	O	0	0
			125	125		
3	E	82	Total	O	0	0
			82	82		
3	F	81	Total	O	0	0
			81	81		

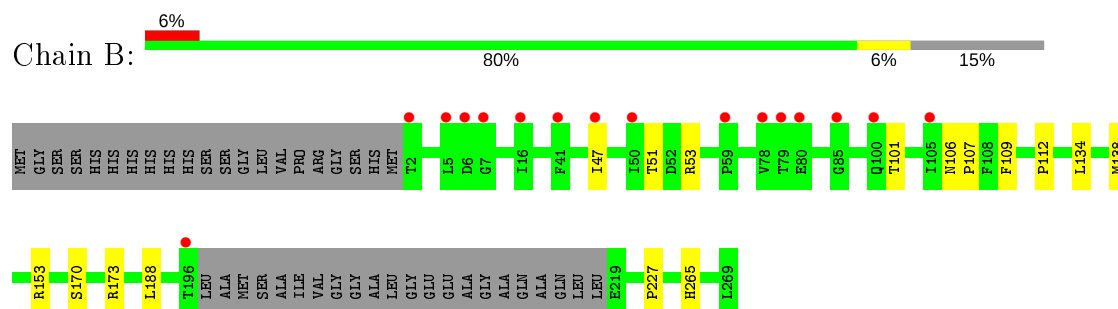
### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

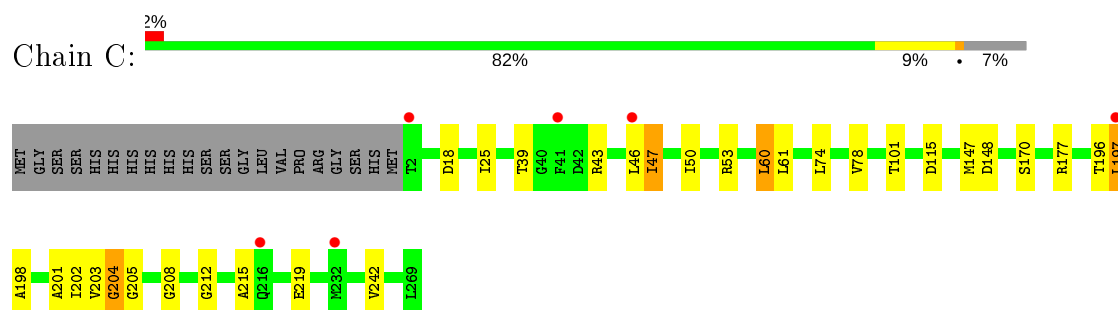
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



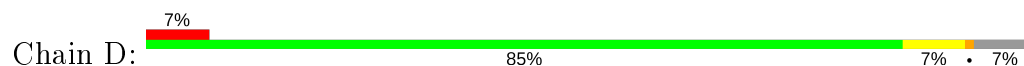
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



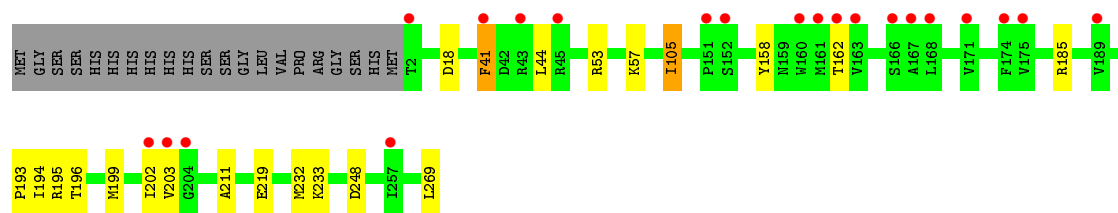
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



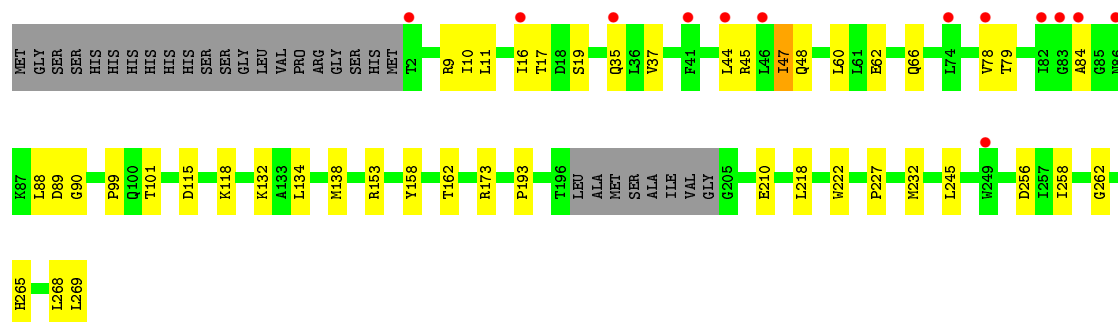
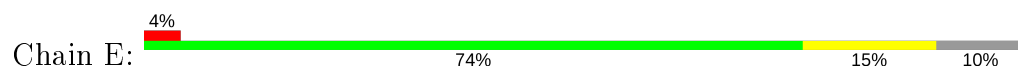
- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



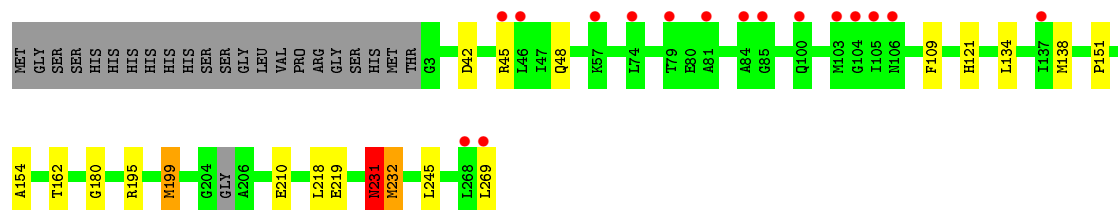
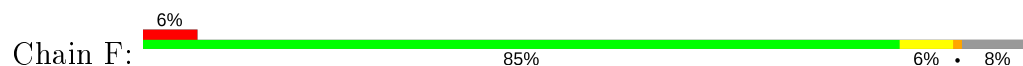




- Molecule 1: Enoyl-[acyl-carrier-protein] reductase [NADH]



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



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 2 2 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	82.32Å 100.23Å 379.10Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.73 – 2.00 48.73 – 2.00	Depositor EDS
% Data completeness (in resolution range)	99.3 (48.73-2.00) 99.3 (48.73-2.00)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.72 (at 2.00Å)	Xtriage
Refinement program	PHENIX 1.7.2 _869	Depositor
R, $R_{free}$	0.200 , 0.248 0.197 , 0.246	Depositor DCC
$R_{free}$ test set	5283 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	30.8	Xtriage
Anisotropy	0.351	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 50.8	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.42$ , $\langle L^2 \rangle = 0.25$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	12443	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 24.22 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 3.9989e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 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	0.35	0/2030	0.52	0/2757
1	B	0.34	0/1860	0.52	0/2530
1	C	0.46	0/2011	0.60	0/2727
1	D	0.45	0/2030	0.59	0/2757
1	E	0.36	0/1963	0.52	0/2667
1	F	0.35	0/1974	0.56	1/2672 (0.0%)
All	All	0.39	0/11868	0.55	1/16110 (0.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	F	0	1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed( $^{\circ}$ )	Ideal( $^{\circ}$ )
1	F	231	ASN	C-N-CA	5.11	134.49	121.70

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	F	231	ASN	Peptide

## 5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1992	0	2007	23	0
1	B	1823	0	1817	14	0
1	C	1973	0	1981	21	0
1	D	1992	0	2007	15	0
1	E	1926	0	1917	32	0
1	F	1938	0	1920	12	0
2	A	44	0	26	0	0
2	B	44	0	26	1	0
2	C	44	0	26	2	0
2	D	44	0	26	0	0
2	E	44	0	26	0	0
2	F	44	0	26	0	0
3	A	61	0	0	5	0
3	B	64	0	0	0	0
3	C	122	0	0	3	0
3	D	125	0	0	4	0
3	E	82	0	0	3	0
3	F	81	0	0	2	0
All	All	12443	0	11805	104	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 4.

All (104) 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:147:MET:SD	3:C:511:HOH:O	2.22	0.98
1:E:245:LEU:HD21	1:E:258:ILE:HD12	1.62	0.79
1:C:47:ILE:HD11	1:C:60:LEU:HD21	1.66	0.78
1:C:177:ARG:NH2	1:D:269:LEU:O	2.17	0.78
1:B:153:ARG:NH1	1:E:265:HIS:O	2.20	0.73
1:C:203:VAL:HA	1:C:212:GLY:HA2	1.70	0.72
1:E:173:ARG:NH2	3:E:402:HOH:O	2.23	0.70
1:E:44:LEU:HD12	1:E:47:ILE:HD11	1.75	0.69
1:D:248:ASP:OD1	3:D:401:HOH:O	2.10	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:265:HIS:O	1:E:153:ARG:NH1	2.26	0.68
1:E:47:ILE:HG13	1:E:60:LEU:HD21	1.76	0.68
1:C:205:GLY:H	1:C:208:GLY:H	1.40	0.68
1:B:153:ARG:HH21	1:E:153:ARG:CZ	2.06	0.68
1:D:185:ARG:NH1	3:D:403:HOH:O	2.25	0.67
1:C:196:THR:O	1:C:198:ALA:N	2.29	0.66
1:B:153:ARG:HE	1:E:153:ARG:HH21	1.44	0.64
1:E:99:PRO:HB2	1:E:101:THR:HG22	1.81	0.63
1:E:48:GLN:HG2	1:E:60:LEU:HD23	1.81	0.62
1:D:41:PHE:O	3:D:402:HOH:O	2.16	0.62
1:D:18:ASP:OD2	1:D:53:ARG:NH2	2.33	0.60
1:A:202:ILE:HG22	1:A:207:LEU:HD13	1.83	0.60
1:E:101:THR:HG21	1:E:115:ASP:OD2	2.00	0.60
1:D:193:PRO:O	1:D:232:MET:HG2	2.03	0.59
1:E:9:ARG:NH1	1:E:35:GLN:OE1	2.36	0.59
1:A:132:LYS:HD2	1:B:109:PHE:HB3	1.85	0.58
1:C:196:THR:O	3:C:401:HOH:O	2.17	0.58
1:D:158:TYR:HD2	1:D:162:THR:HG1	1.51	0.58
1:B:153:ARG:HH21	1:E:153:ARG:NE	2.03	0.57
1:A:44:LEU:HD13	1:A:47:ILE:HD11	1.86	0.57
1:E:89:ASP:OD1	3:E:401:HOH:O	2.18	0.57
1:A:202:ILE:O	3:A:401:HOH:O	2.18	0.56
1:C:101:THR:HG21	1:C:115:ASP:OD2	2.05	0.56
1:C:201:ALA:C	1:C:203:VAL:H	2.10	0.55
1:C:201:ALA:O	1:C:203:VAL:N	2.40	0.54
1:F:195:ARG:HA	1:F:199:MET:HB3	1.90	0.54
1:A:48:GLN:HG2	1:A:60:LEU:HD13	1.88	0.54
1:A:4:LEU:HB3	1:A:5:LEU:HD13	1.91	0.53
1:E:132:LYS:HD2	1:F:109:PHE:HB3	1.89	0.53
1:C:25:ILE:HD13	1:C:242:VAL:HG11	1.90	0.53
1:A:225:ARG:HD2	1:A:267:GLN:O	2.08	0.53
1:B:153:ARG:NE	1:E:153:ARG:HH21	2.06	0.52
1:B:101:THR:HG21	1:B:112:PRO:HD2	1.91	0.52
1:A:214:GLN:NE2	3:A:406:HOH:O	2.38	0.52
1:C:43:ARG:O	1:C:47:ILE:HG23	2.11	0.51
1:C:205:GLY:N	1:C:208:GLY:H	2.07	0.51
1:D:196:THR:HG22	1:D:199:MET:HG3	1.95	0.49
2:C:300:NAD:H2N	2:C:300:NAD:O1N	2.11	0.49
1:D:219:GLU:HB2	1:D:232:MET:SD	2.52	0.49
1:A:47:ILE:HG13	1:A:60:LEU:HD11	1.94	0.49
1:A:16:ILE:HD11	1:A:43:ARG:HH21	1.78	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:18:ASP:OD2	1:C:53:ARG:NH1	2.45	0.48
1:D:202:ILE:O	1:D:203:VAL:HB	2.13	0.48
1:E:134:LEU:O	1:E:138:MET:HG3	2.14	0.47
1:A:73:SER:OG	1:A:77:ARG:NE	2.35	0.46
1:A:44:LEU:HA	1:A:47:ILE:HD11	1.97	0.46
1:D:105:ILE:HD12	1:D:105:ILE:HA	1.69	0.46
1:A:177:ARG:NH1	3:A:402:HOH:O	2.24	0.46
1:A:245:LEU:HD11	1:A:258:ILE:HD13	1.98	0.46
1:A:74:LEU:O	1:A:78:VAL:HG23	2.16	0.46
1:A:16:ILE:HD11	1:A:43:ARG:HE	1.80	0.45
1:D:105:ILE:HD13	1:D:211:ALA:HB2	1.98	0.45
1:E:173:ARG:NH1	1:F:151:PRO:O	2.50	0.45
1:F:121:HIS:ND1	3:F:403:HOH:O	2.36	0.45
1:F:218:LEU:HD12	3:F:434:HOH:O	2.16	0.45
1:D:57:LYS:NZ	3:D:404:HOH:O	2.38	0.45
1:F:195:ARG:NH1	1:F:219:GLU:OE1	2.50	0.45
1:F:134:LEU:O	1:F:138:MET:HG3	2.17	0.44
1:E:193:PRO:HD3	1:E:222:TRP:CE2	2.53	0.44
1:C:74:LEU:O	1:C:78:VAL:HG23	2.18	0.44
1:E:44:LEU:HD22	1:E:62:GLU:HB2	1.98	0.44
1:E:173:ARG:HB3	1:F:154:ALA:HB2	1.98	0.44
1:E:158:TYR:HD2	1:E:162:THR:HG1	1.63	0.43
1:A:214:GLN:HG3	3:A:460:HOH:O	2.17	0.43
1:C:148:ASP:O	2:C:300:NAD:H6N	2.19	0.43
1:B:47:ILE:O	1:B:51:THR:HG23	2.18	0.43
1:E:66:GLN:OE1	1:E:118:LYS:NZ	2.52	0.43
1:E:173:ARG:NH1	3:E:409:HOH:O	2.45	0.43
1:A:39:THR:HA	1:A:61:LEU:O	2.19	0.42
1:E:11:LEU:HA	1:E:37:VAL:O	2.19	0.42
1:F:231:ASN:HA	1:F:232:MET:HB3	2.02	0.42
1:B:227:PRO:O	1:F:180:GLY:HA3	2.19	0.42
1:F:45:ARG:HG2	1:F:45:ARG:H	1.66	0.42
1:A:158:TYR:HD2	1:A:162:THR:HG1	1.62	0.42
1:A:199:MET:SD	3:A:461:HOH:O	2.62	0.42
1:E:227:PRO:HD2	1:E:262:GLY:O	2.18	0.42
1:E:268:LEU:O	1:E:269:LEU:HD23	2.20	0.42
1:B:106:ASN:HA	1:B:107:PRO:HD3	1.89	0.42
1:C:215:ALA:O	1:C:219:GLU:HG3	2.20	0.42
1:E:10:ILE:HG12	1:E:90:GLY:HA3	2.01	0.41
1:A:154:ALA:HB2	1:B:173:ARG:HB3	2.02	0.41
1:D:194:ILE:O	1:D:196:THR:N	2.54	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:57:LYS:HE3	1:A:57:LYS:HB2	1.83	0.41
1:E:79:THR:HG22	1:E:84:ALA:HA	2.03	0.41
1:E:16:ILE:HG23	1:E:17:THR:HG23	2.02	0.41
1:A:267:GLN:OE1	1:F:154:ALA:HB3	2.20	0.41
1:B:134:LEU:O	1:B:138:MET:HG3	2.21	0.41
1:C:198:ALA:O	3:C:402:HOH:O	2.21	0.41
1:E:78:VAL:HG11	1:E:88:LEU:HD11	2.01	0.41
1:C:46:LEU:O	1:C:50:ILE:HG12	2.21	0.41
1:B:153:ARG:HH21	1:E:153:ARG:NH2	2.19	0.40
1:D:233:LYS:HE3	1:D:233:LYS:HB2	1.84	0.40
2:B:300:NAD:N7N	2:B:300:NAD:O1N	2.39	0.40
1:C:204:GLY:HA3	1:C:205:GLY:HA3	1.75	0.40
1:C:39:THR:HA	1:C:61:LEU:O	2.22	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	266/289 (92%)	253 (95%)	12 (4%)	1 (0%)	34	30
1	B	242/289 (84%)	231 (96%)	11 (4%)	0	100	100
1	C	266/289 (92%)	251 (94%)	12 (4%)	3 (1%)	14	8
1	D	266/289 (92%)	252 (95%)	12 (4%)	2 (1%)	19	13
1	E	256/289 (89%)	241 (94%)	15 (6%)	0	100	100
1	F	260/289 (90%)	241 (93%)	16 (6%)	3 (1%)	13	7
All	All	1556/1734 (90%)	1469 (94%)	78 (5%)	9 (1%)	25	19

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	202	ILE
1	D	195	ARG
1	F	210	GLU
1	A	195	ARG
1	C	204	GLY
1	F	232	MET
1	C	197	LEU
1	F	42	ASP
1	D	41	PHE

### 5.3.2 Protein sidechains ⓘ

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	203/221 (92%)	199 (98%)	4 (2%)	55	58
1	B	186/221 (84%)	183 (98%)	3 (2%)	62	67
1	C	200/221 (90%)	196 (98%)	4 (2%)	55	58
1	D	203/221 (92%)	201 (99%)	2 (1%)	76	81
1	E	194/221 (88%)	187 (96%)	7 (4%)	35	34
1	F	193/221 (87%)	188 (97%)	5 (3%)	46	48
All	All	1179/1326 (89%)	1154 (98%)	25 (2%)	53	57

All (25) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	4	LEU
1	A	197	LEU
1	A	216	GLN
1	A	232	MET
1	B	53	ARG
1	B	170	SER
1	B	188	LEU
1	C	47	ILE
1	C	60	LEU
1	C	170	SER

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Mol	Chain	Res	Type
1	C	197	LEU
1	D	44	LEU
1	D	105	ILE
1	E	19	SER
1	E	45	ARG
1	E	47	ILE
1	E	210	GLU
1	E	218	LEU
1	E	232	MET
1	E	256	ASP
1	F	48	GLN
1	F	162	THR
1	F	199	MET
1	F	245	LEU
1	F	269	LEU

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

### 5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

## 5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

## 5.5 Carbohydrates ⓘ

There are no carbohydrates in this entry.

## 5.6 Ligand geometry ⓘ

6 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	A	300	-	42,48,48	3.38	20 (47%)	50,73,73	1.68	10 (20%)
2	NAD	F	300	-	42,48,48	3.26	20 (47%)	50,73,73	1.63	11 (22%)
2	NAD	C	300	-	42,48,48	3.28	19 (45%)	50,73,73	1.55	7 (14%)
2	NAD	B	300	-	42,48,48	3.34	20 (47%)	50,73,73	1.67	9 (18%)
2	NAD	E	300	-	42,48,48	3.37	21 (50%)	50,73,73	1.73	13 (26%)
2	NAD	D	300	-	42,48,48	3.29	20 (47%)	50,73,73	1.77	11 (22%)

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	A	300	-	-	11/26/62/62	0/5/5/5
2	NAD	F	300	-	-	8/26/62/62	0/5/5/5
2	NAD	C	300	-	-	9/26/62/62	0/5/5/5
2	NAD	B	300	-	-	7/26/62/62	0/5/5/5
2	NAD	E	300	-	-	8/26/62/62	0/5/5/5
2	NAD	D	300	-	-	10/26/62/62	0/5/5/5

All (120) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	300	NAD	C2N-N1N	9.85	1.47	1.35
2	C	300	NAD	C2N-N1N	9.78	1.46	1.35
2	E	300	NAD	C2N-N1N	9.45	1.46	1.35
2	B	300	NAD	C2N-N1N	9.28	1.46	1.35
2	D	300	NAD	C2N-N1N	9.08	1.46	1.35
2	F	300	NAD	C2N-N1N	8.97	1.45	1.35
2	B	300	NAD	C7N-N7N	7.41	1.47	1.33
2	E	300	NAD	C7N-N7N	7.34	1.47	1.33
2	D	300	NAD	C7N-N7N	7.14	1.46	1.33
2	A	300	NAD	C7N-N7N	7.10	1.46	1.33
2	F	300	NAD	C7N-N7N	7.09	1.46	1.33
2	C	300	NAD	C7N-N7N	6.98	1.46	1.33
2	B	300	NAD	C4N-C3N	6.43	1.50	1.39
2	A	300	NAD	C2A-N3A	6.36	1.42	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	300	NAD	C4N-C3N	6.32	1.50	1.39
2	A	300	NAD	C4N-C3N	6.26	1.50	1.39
2	D	300	NAD	C2A-N3A	6.21	1.42	1.32
2	F	300	NAD	C4N-C3N	6.18	1.49	1.39
2	B	300	NAD	C2A-N3A	6.18	1.42	1.32
2	E	300	NAD	C2A-N3A	6.17	1.42	1.32
2	D	300	NAD	C4N-C3N	6.15	1.49	1.39
2	F	300	NAD	C2A-N3A	6.10	1.41	1.32
2	C	300	NAD	C4N-C3N	5.94	1.49	1.39
2	F	300	NAD	C8A-N7A	5.86	1.45	1.34
2	C	300	NAD	C2A-N3A	5.80	1.41	1.32
2	D	300	NAD	C8A-N7A	5.75	1.44	1.34
2	E	300	NAD	C6N-N1N	5.72	1.49	1.35
2	B	300	NAD	C6N-N1N	5.65	1.49	1.35
2	E	300	NAD	C8A-N7A	5.65	1.44	1.34
2	A	300	NAD	C8A-N7A	5.65	1.44	1.34
2	A	300	NAD	C6N-N1N	5.62	1.49	1.35
2	D	300	NAD	C6N-N1N	5.56	1.49	1.35
2	C	300	NAD	C6N-N1N	5.51	1.48	1.35
2	B	300	NAD	C8A-N7A	5.44	1.44	1.34
2	F	300	NAD	C6N-N1N	5.44	1.48	1.35
2	C	300	NAD	C8A-N7A	5.43	1.44	1.34
2	A	300	NAD	C2N-C3N	5.10	1.46	1.39
2	E	300	NAD	C2N-C3N	4.96	1.46	1.39
2	C	300	NAD	C2N-C3N	4.87	1.46	1.39
2	F	300	NAD	C2N-C3N	4.74	1.46	1.39
2	B	300	NAD	C2N-C3N	4.72	1.46	1.39
2	A	300	NAD	C2A-N1A	4.70	1.42	1.33
2	D	300	NAD	C2A-N1A	4.66	1.42	1.33
2	B	300	NAD	C2A-N1A	4.59	1.42	1.33
2	E	300	NAD	C2A-N1A	4.59	1.42	1.33
2	D	300	NAD	C2N-C3N	4.53	1.46	1.39
2	D	300	NAD	PA-O1A	4.43	1.66	1.50
2	E	300	NAD	PA-O1A	4.43	1.66	1.50
2	B	300	NAD	PA-O1A	4.32	1.66	1.50
2	A	300	NAD	PA-O1A	4.32	1.66	1.50
2	C	300	NAD	C2A-N1A	4.32	1.41	1.33
2	C	300	NAD	PA-O1A	4.30	1.66	1.50
2	F	300	NAD	PA-O1A	4.22	1.65	1.50
2	B	300	NAD	PN-O1N	4.20	1.65	1.50
2	D	300	NAD	PN-O1N	4.19	1.65	1.50
2	F	300	NAD	C2A-N1A	4.14	1.41	1.33

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	300	NAD	PN-O1N	4.10	1.65	1.50
2	F	300	NAD	PN-O1N	4.05	1.65	1.50
2	A	300	NAD	PN-O1N	4.03	1.65	1.50
2	C	300	NAD	PN-O1N	3.99	1.65	1.50
2	B	300	NAD	C6N-C5N	3.78	1.47	1.38
2	A	300	NAD	C6A-N6A	3.70	1.47	1.34
2	E	300	NAD	C6N-C5N	3.65	1.46	1.38
2	E	300	NAD	C6A-N6A	3.62	1.47	1.34
2	D	300	NAD	C6N-C5N	3.59	1.46	1.38
2	B	300	NAD	C6A-N6A	3.55	1.47	1.34
2	B	300	NAD	C3B-C4B	3.53	1.62	1.53
2	F	300	NAD	C6N-C5N	3.51	1.46	1.38
2	F	300	NAD	C3B-C4B	3.50	1.61	1.53
2	C	300	NAD	C3B-C4B	3.45	1.61	1.53
2	F	300	NAD	C6A-N6A	3.43	1.46	1.34
2	A	300	NAD	C6N-C5N	3.43	1.46	1.38
2	C	300	NAD	C6N-C5N	3.34	1.46	1.38
2	E	300	NAD	C3B-C4B	3.32	1.61	1.53
2	C	300	NAD	C6A-N6A	3.32	1.46	1.34
2	D	300	NAD	C3B-C4B	3.31	1.61	1.53
2	D	300	NAD	C6A-N6A	3.30	1.46	1.34
2	A	300	NAD	C3B-C4B	3.27	1.61	1.53
2	F	300	NAD	O7N-C7N	-3.07	1.18	1.24
2	A	300	NAD	C3N-C7N	3.07	1.55	1.50
2	E	300	NAD	C2B-C1B	-3.00	1.49	1.53
2	F	300	NAD	C2B-C1B	-2.96	1.49	1.53
2	E	300	NAD	C5N-C4N	2.92	1.45	1.38
2	B	300	NAD	C5N-C4N	2.92	1.45	1.38
2	A	300	NAD	O7N-C7N	-2.88	1.18	1.24
2	C	300	NAD	C3N-C7N	2.85	1.54	1.50
2	E	300	NAD	C3N-C7N	2.85	1.54	1.50
2	B	300	NAD	C3N-C7N	2.84	1.54	1.50
2	A	300	NAD	C2B-C1B	-2.82	1.49	1.53
2	D	300	NAD	C5N-C4N	2.76	1.44	1.38
2	D	300	NAD	O7N-C7N	-2.76	1.18	1.24
2	C	300	NAD	C5N-C4N	2.74	1.44	1.38
2	A	300	NAD	C5N-C4N	2.72	1.44	1.38
2	B	300	NAD	O7N-C7N	-2.69	1.19	1.24
2	F	300	NAD	C5N-C4N	2.68	1.44	1.38
2	C	300	NAD	C2B-C1B	-2.68	1.49	1.53
2	E	300	NAD	O7N-C7N	-2.62	1.19	1.24
2	D	300	NAD	C2B-C1B	-2.58	1.49	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	300	NAD	C2B-C1B	-2.55	1.49	1.53
2	C	300	NAD	O7N-C7N	-2.51	1.19	1.24
2	D	300	NAD	PA-O5B	2.51	1.69	1.59
2	C	300	NAD	C3D-C4D	2.46	1.59	1.53
2	D	300	NAD	C3D-C4D	2.44	1.59	1.53
2	A	300	NAD	PA-O5B	2.42	1.69	1.59
2	E	300	NAD	PA-O5B	2.40	1.69	1.59
2	D	300	NAD	C3N-C7N	2.31	1.54	1.50
2	A	300	NAD	C3D-C4D	2.30	1.58	1.53
2	F	300	NAD	C2D-C1D	-2.27	1.50	1.53
2	B	300	NAD	PA-O5B	2.24	1.68	1.59
2	A	300	NAD	O4B-C4B	2.23	1.50	1.45
2	E	300	NAD	C3D-C4D	2.22	1.58	1.53
2	D	300	NAD	O4B-C4B	2.21	1.49	1.45
2	E	300	NAD	PN-O5D	2.14	1.68	1.59
2	F	300	NAD	C3D-C4D	2.14	1.58	1.53
2	B	300	NAD	C2D-C1D	-2.11	1.50	1.53
2	E	300	NAD	O4B-C4B	2.11	1.49	1.45
2	C	300	NAD	PN-O5D	2.05	1.67	1.59
2	F	300	NAD	PA-O5B	2.03	1.67	1.59
2	F	300	NAD	C3N-C7N	2.03	1.53	1.50
2	B	300	NAD	C3D-C4D	2.02	1.58	1.53

All (61) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	300	NAD	N3A-C2A-N1A	-6.15	119.06	128.68
2	F	300	NAD	N3A-C2A-N1A	-6.13	119.10	128.68
2	D	300	NAD	N3A-C2A-N1A	-5.91	119.45	128.68
2	C	300	NAD	N3A-C2A-N1A	-5.85	119.53	128.68
2	E	300	NAD	N3A-C2A-N1A	-5.70	119.77	128.68
2	A	300	NAD	N3A-C2A-N1A	-5.64	119.86	128.68
2	A	300	NAD	PN-O3-PA	-4.35	117.89	132.83
2	D	300	NAD	PN-O3-PA	-4.28	118.13	132.83
2	B	300	NAD	PN-O3-PA	-3.97	119.20	132.83
2	C	300	NAD	PN-O3-PA	-3.89	119.47	132.83
2	E	300	NAD	PN-O3-PA	-3.57	120.58	132.83
2	D	300	NAD	C3D-C2D-C1D	-3.35	95.93	100.98
2	D	300	NAD	O2D-C2D-C1D	3.30	123.05	110.85
2	D	300	NAD	O4B-C1B-C2B	-3.23	102.20	106.93
2	F	300	NAD	PN-O3-PA	-3.23	121.73	132.83
2	D	300	NAD	C2N-C3N-C4N	3.19	121.87	118.26

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	300	NAD	O2D-C2D-C1D	3.13	122.40	110.85
2	E	300	NAD	O2D-C2D-C3D	2.96	121.39	111.82
2	B	300	NAD	O2D-C2D-C3D	2.88	121.15	111.82
2	A	300	NAD	O2D-C2D-C1D	2.73	120.94	110.85
2	C	300	NAD	O2D-C2D-C3D	2.73	120.64	111.82
2	F	300	NAD	O2D-C2D-C1D	2.71	120.85	110.85
2	F	300	NAD	C2N-C3N-C4N	2.69	121.31	118.26
2	B	300	NAD	O4B-C1B-C2B	-2.68	103.01	106.93
2	E	300	NAD	O4D-C4D-C5D	2.66	118.11	109.37
2	D	300	NAD	O3B-C3B-C4B	2.54	118.40	111.05
2	E	300	NAD	O3D-C3D-C2D	2.54	120.05	111.82
2	D	300	NAD	C6N-N1N-C2N	-2.53	119.66	121.97
2	B	300	NAD	O2D-C2D-C1D	2.51	120.12	110.85
2	C	300	NAD	O3B-C3B-C4B	2.39	117.95	111.05
2	B	300	NAD	O3B-C3B-C4B	2.38	117.92	111.05
2	B	300	NAD	C3N-C7N-N7N	2.38	120.60	117.75
2	A	300	NAD	C6N-N1N-C2N	-2.35	119.83	121.97
2	E	300	NAD	O4B-C1B-C2B	-2.34	103.51	106.93
2	D	300	NAD	O5B-C5B-C4B	2.34	117.03	108.99
2	B	300	NAD	C2N-C3N-C4N	2.33	120.89	118.26
2	F	300	NAD	C1B-N9A-C4A	-2.31	122.59	126.64
2	E	300	NAD	C3N-C7N-N7N	2.29	120.50	117.75
2	E	300	NAD	O5D-C5D-C4D	2.28	116.83	108.99
2	E	300	NAD	C2N-C3N-C4N	2.27	120.83	118.26
2	F	300	NAD	O2D-C2D-C3D	2.26	119.14	111.82
2	C	300	NAD	O2D-C2D-C1D	2.26	119.19	110.85
2	A	300	NAD	C3N-C7N-N7N	2.25	120.46	117.75
2	A	300	NAD	O3B-C3B-C4B	2.24	117.54	111.05
2	E	300	NAD	C6N-N1N-C2N	-2.22	119.95	121.97
2	F	300	NAD	C3N-C2N-N1N	-2.19	118.28	120.43
2	A	300	NAD	O4B-C4B-C5B	2.17	116.52	109.37
2	C	300	NAD	O2B-C2B-C1B	2.16	118.84	110.85
2	F	300	NAD	O4B-C1B-C2B	-2.15	103.78	106.93
2	E	300	NAD	C3D-C2D-C1D	-2.15	97.74	100.98
2	F	300	NAD	O3D-C3D-C4D	2.14	117.23	111.05
2	D	300	NAD	O3D-C3D-C4D	2.14	117.23	111.05
2	A	300	NAD	O4B-C1B-C2B	-2.13	103.81	106.93
2	A	300	NAD	C3D-C2D-C1D	-2.10	97.82	100.98
2	D	300	NAD	O2B-C2B-C1B	2.08	118.54	110.85
2	A	300	NAD	C2N-C3N-C4N	2.08	120.62	118.26
2	F	300	NAD	O4D-C4D-C5D	2.05	116.12	109.37
2	C	300	NAD	O4B-C1B-C2B	-2.03	103.95	106.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	300	NAD	O3B-C3B-C4B	2.03	116.92	111.05
2	E	300	NAD	C4A-C5A-N7A	-2.03	107.29	109.40
2	B	300	NAD	C6N-N1N-C2N	-2.03	120.13	121.97

There are no chirality outliers.

All (53) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	300	NAD	C5B-O5B-PA-O2A
2	A	300	NAD	C5D-O5D-PN-O3
2	A	300	NAD	C5D-O5D-PN-O2N
2	A	300	NAD	O4D-C1D-N1N-C2N
2	A	300	NAD	O4D-C1D-N1N-C6N
2	F	300	NAD	C5D-O5D-PN-O3
2	F	300	NAD	C5D-O5D-PN-O2N
2	F	300	NAD	O4D-C1D-N1N-C2N
2	F	300	NAD	O4D-C1D-N1N-C6N
2	C	300	NAD	C5B-O5B-PA-O2A
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	B	300	NAD	O4D-C1D-N1N-C2N
2	E	300	NAD	C5D-O5D-PN-O3
2	E	300	NAD	C5D-O5D-PN-O2N
2	E	300	NAD	O4D-C1D-N1N-C2N
2	D	300	NAD	C5B-O5B-PA-O1A
2	D	300	NAD	C5B-O5B-PA-O2A
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	D	300	NAD	O4D-C1D-N1N-C6N
2	A	300	NAD	PN-O3-PA-O5B
2	C	300	NAD	PN-O3-PA-O5B
2	E	300	NAD	PN-O3-PA-O5B
2	D	300	NAD	PN-O3-PA-O5B
2	A	300	NAD	C5B-O5B-PA-O3
2	C	300	NAD	C5B-O5B-PA-O3
2	C	300	NAD	C5D-O5D-PN-O3
2	B	300	NAD	C5D-O5D-PN-O3
2	D	300	NAD	C5B-O5B-PA-O3
2	A	300	NAD	C5B-O5B-PA-O1A
2	A	300	NAD	C5D-O5D-PN-O1N

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Mol	Chain	Res	Type	Atoms
2	F	300	NAD	C5D-O5D-PN-O1N
2	C	300	NAD	C5B-O5B-PA-O1A
2	B	300	NAD	C5D-O5D-PN-O1N
2	E	300	NAD	C5D-O5D-PN-O1N
2	B	300	NAD	PA-O3-PN-O2N
2	C	300	NAD	O4B-C4B-C5B-O5B
2	F	300	NAD	PN-O3-PA-O5B
2	A	300	NAD	C2D-C1D-N1N-C6N
2	F	300	NAD	C2D-C1D-N1N-C6N
2	E	300	NAD	C5B-O5B-PA-O3
2	D	300	NAD	C5D-O5D-PN-O3
2	B	300	NAD	O4B-C4B-C5B-O5B
2	E	300	NAD	O4B-C4B-C5B-O5B
2	B	300	NAD	PA-O3-PN-O1N
2	B	300	NAD	C5D-O5D-PN-O2N
2	E	300	NAD	C5B-O5B-PA-O1A
2	A	300	NAD	O4B-C4B-C5B-O5B
2	F	300	NAD	O4B-C4B-C5B-O5B
2	D	300	NAD	O4B-C4B-C5B-O5B

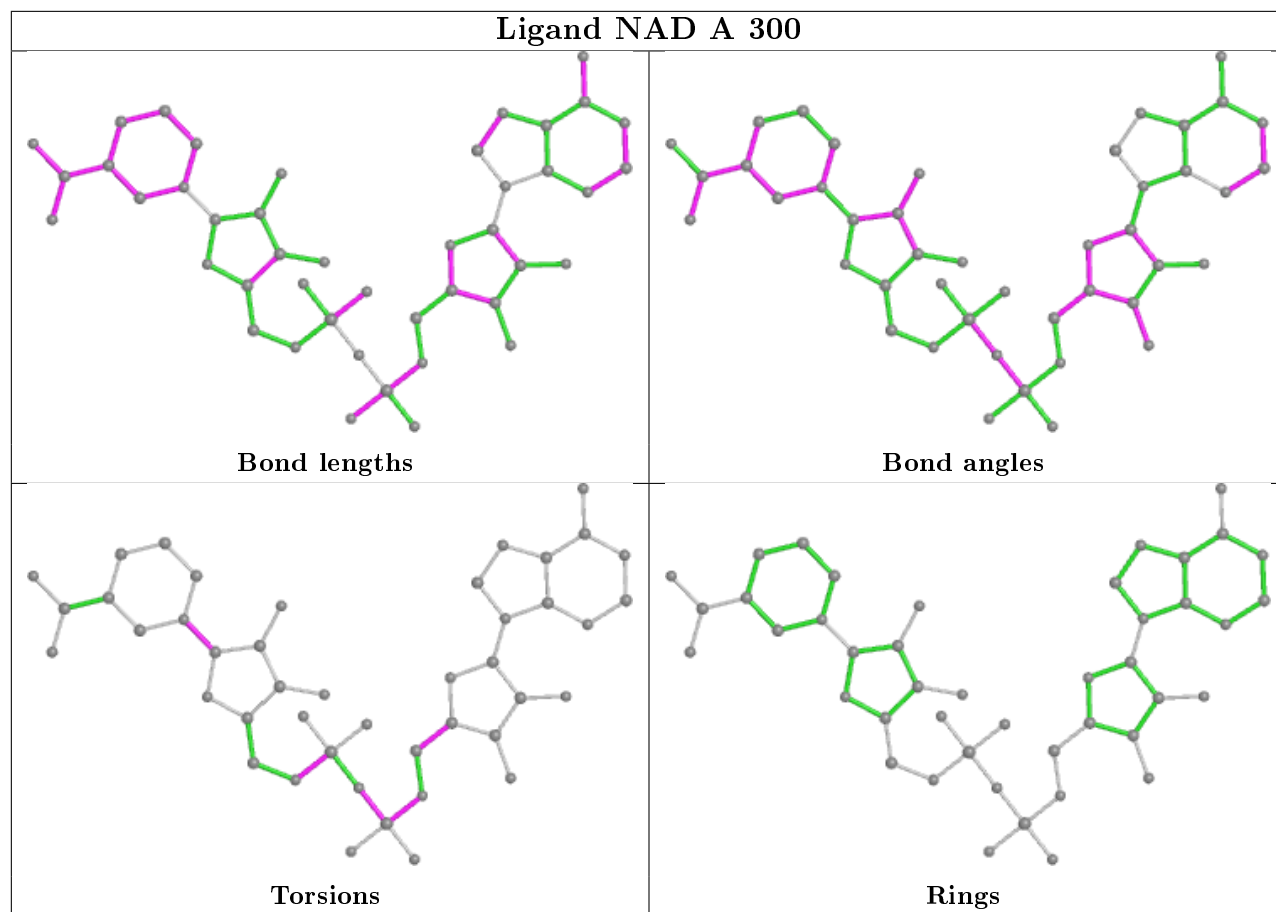
There are no ring outliers.

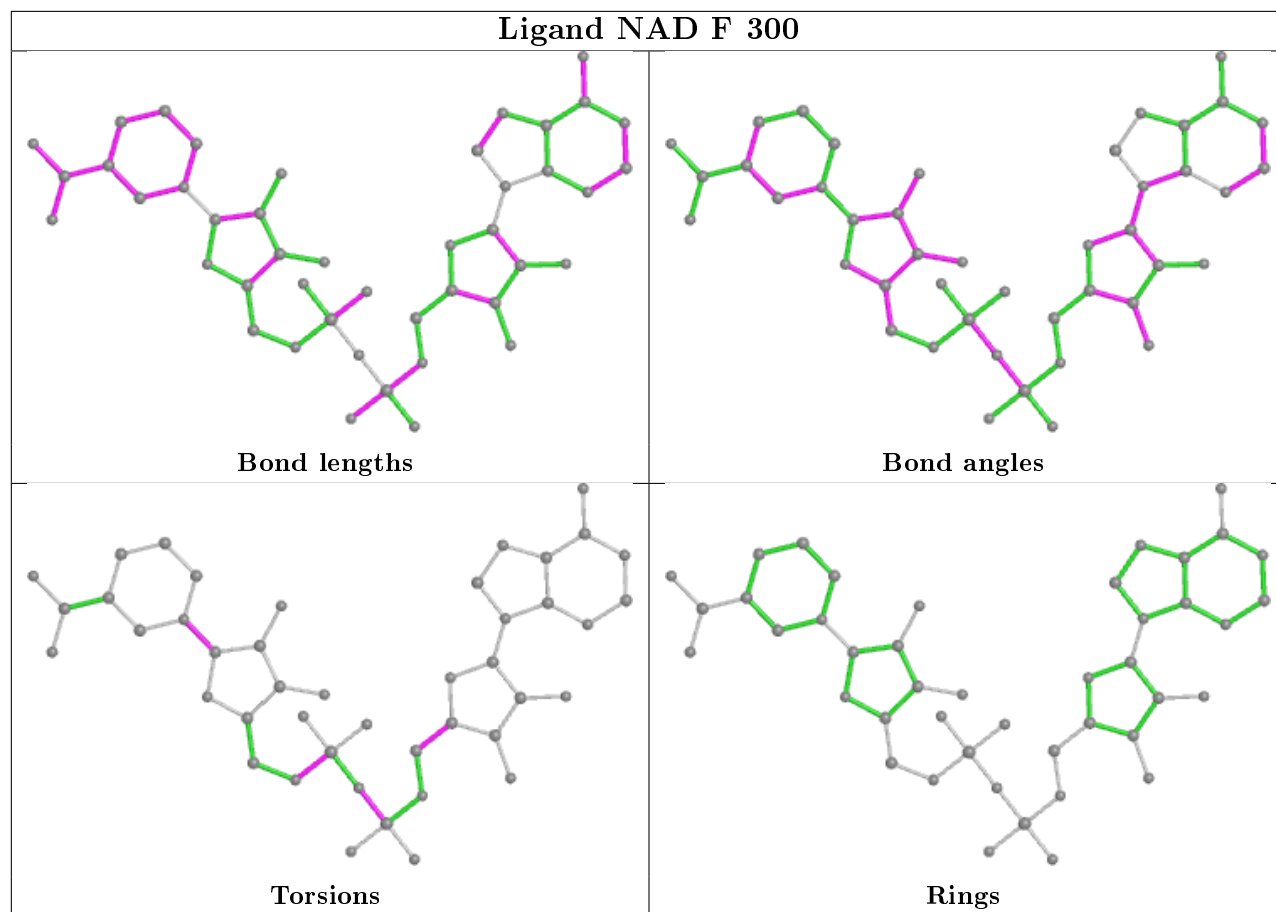
2 monomers are involved in 3 short contacts:

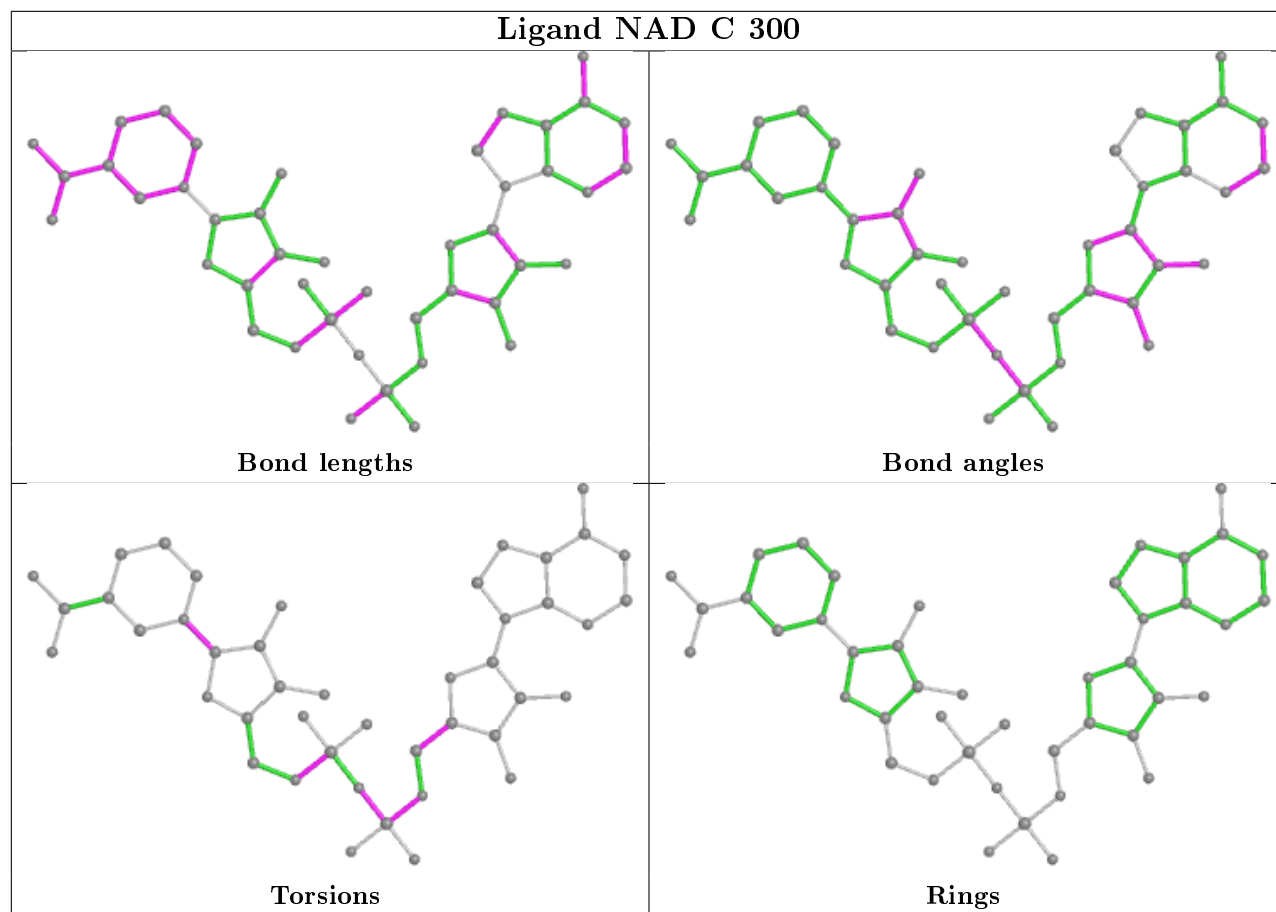
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	300	NAD	2	0
2	B	300	NAD	1	0

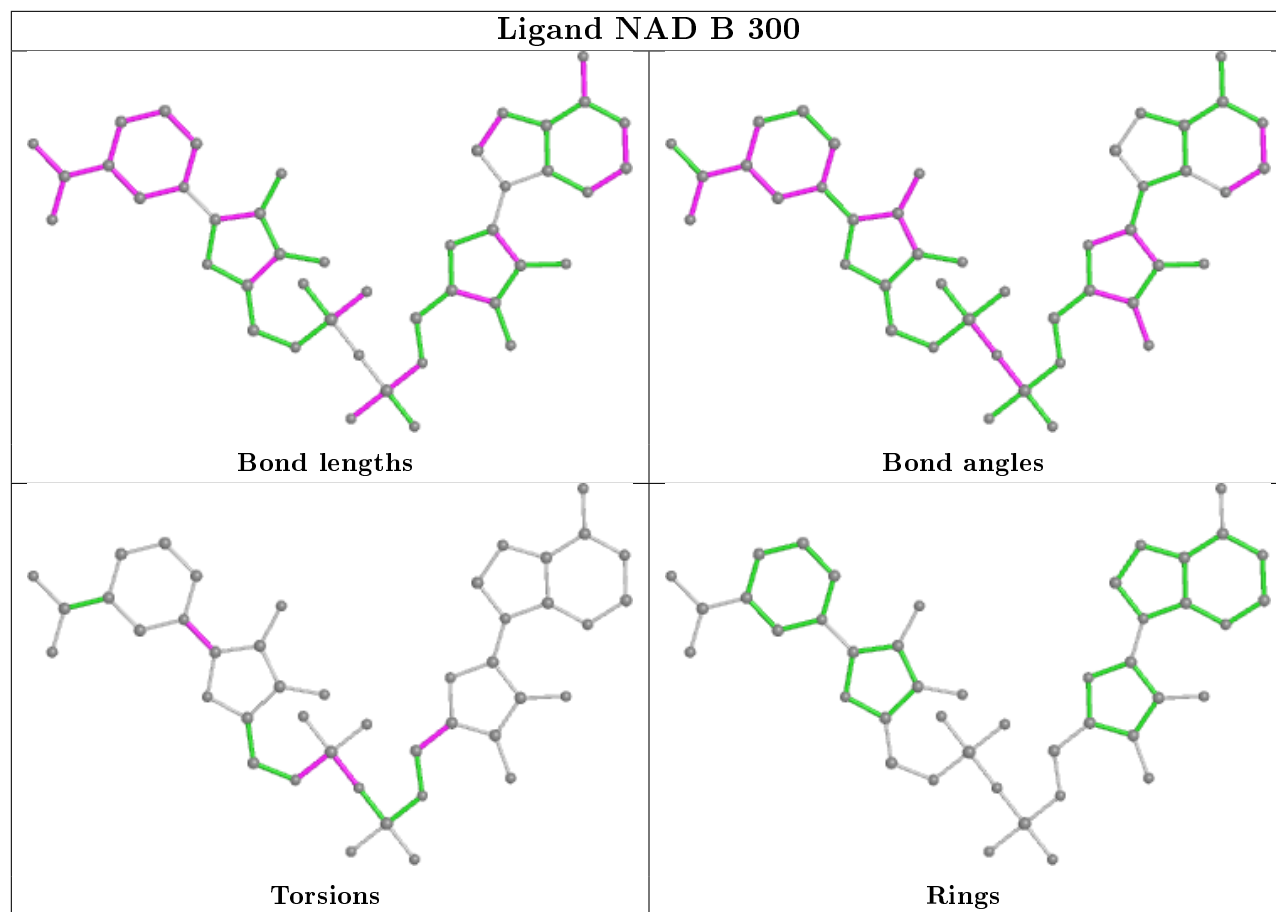
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

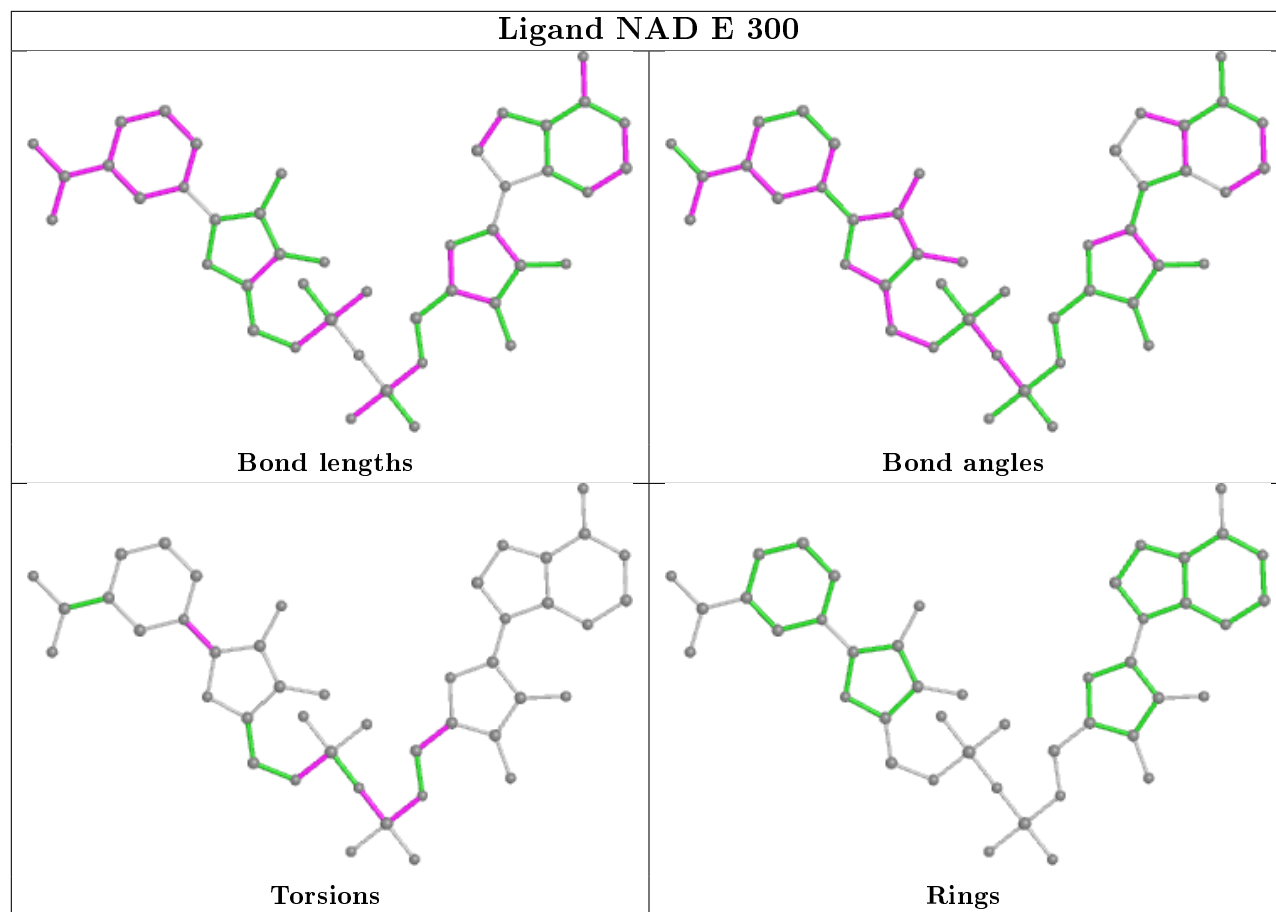


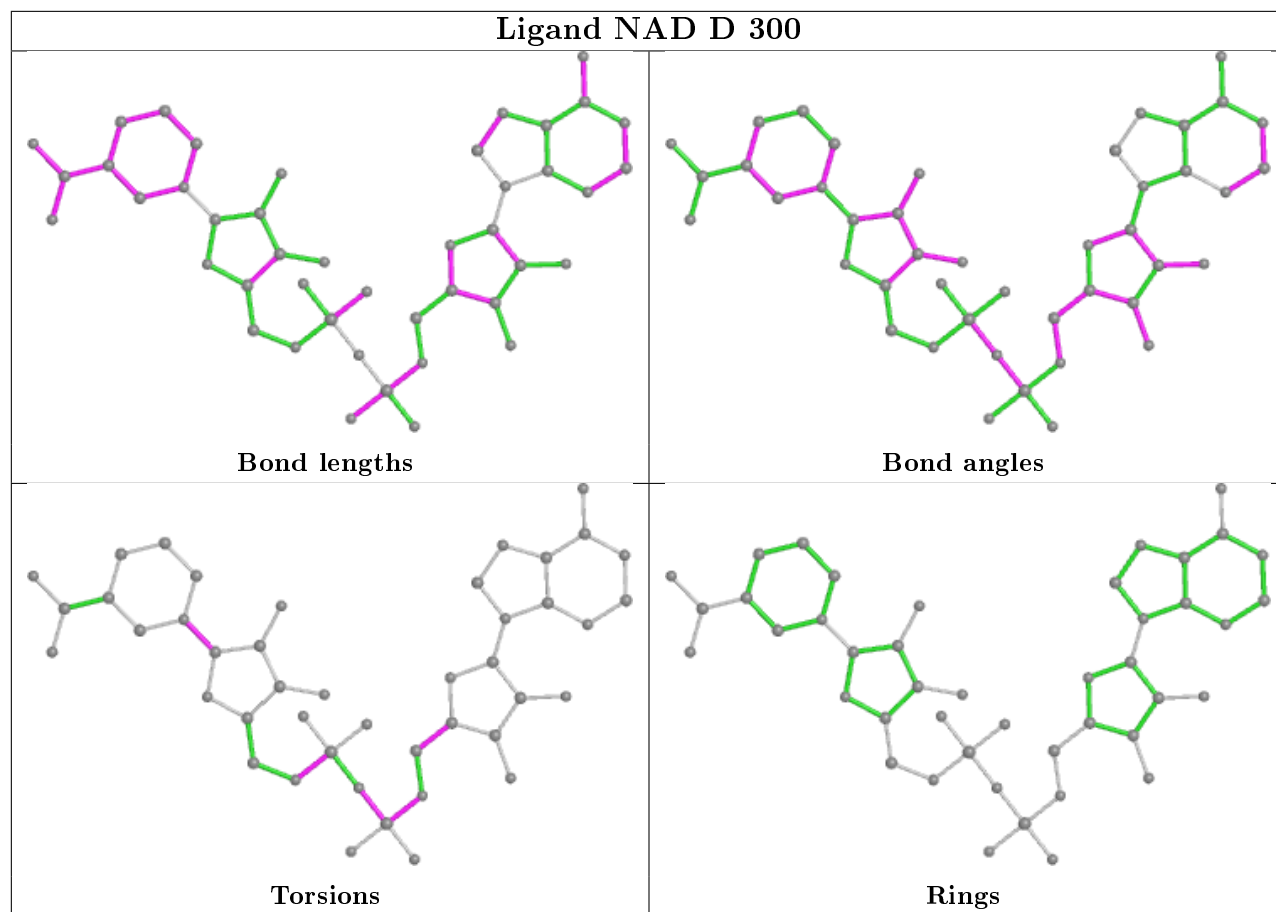












## 5.7 Other polymers [i](#)

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	268/289 (92%)	0.81	33 (12%) 4 3	25, 40, 63, 79	0
1	B	246/289 (85%)	0.56	16 (6%) 18 18	27, 40, 61, 68	0
1	C	268/289 (92%)	0.25	6 (2%) 62 60	16, 26, 47, 61	0
1	D	268/289 (92%)	0.60	21 (7%) 13 12	16, 27, 49, 66	0
1	E	260/289 (89%)	0.54	13 (5%) 28 28	24, 37, 56, 71	0
1	F	266/289 (92%)	0.49	16 (6%) 21 20	25, 37, 57, 67	0
All	All	1576/1734 (90%)	0.54	105 (6%) 17 17	16, 34, 57, 79	0

All (105) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	105	ILE	6.3
1	E	2	THR	6.2
1	A	2	THR	4.9
1	A	83	GLY	4.5
1	A	85	GLY	4.4
1	A	82	ILE	4.4
1	D	2	THR	4.1
1	E	74	LEU	4.1
1	A	197	LEU	3.9
1	D	203	VAL	3.9
1	B	105	ILE	3.8
1	B	2	THR	3.8
1	C	2	THR	3.7
1	E	84	ALA	3.7
1	F	81	ALA	3.7
1	A	55	PRO	3.7
1	B	41	PHE	3.6
1	A	47	ILE	3.6
1	A	200	SER	3.6

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Mol	Chain	Res	Type	RSRZ
1	E	78	VAL	3.6
1	A	218	LEU	3.6
1	A	203	VAL	3.6
1	A	35	GLN	3.5
1	D	168	LEU	3.5
1	F	85	GLY	3.4
1	E	41	PHE	3.4
1	D	41	PHE	3.4
1	B	80	GLU	3.3
1	F	84	ALA	3.2
1	F	57	LYS	3.2
1	F	268	LEU	3.1
1	E	44	LEU	3.1
1	A	43	ARG	3.1
1	B	6	ASP	3.0
1	C	41	PHE	2.9
1	C	197	LEU	2.9
1	A	202	ILE	2.9
1	A	57	LYS	2.8
1	B	85	GLY	2.8
1	C	216	GLN	2.8
1	E	249	TRP	2.8
1	A	84	ALA	2.8
1	B	78	VAL	2.8
1	D	171	VAL	2.8
1	B	5	LEU	2.8
1	D	163	VAL	2.7
1	D	45	ARG	2.7
1	A	54	LEU	2.7
1	A	269	LEU	2.7
1	A	45	ARG	2.7
1	D	43	ARG	2.7
1	A	41	PHE	2.6
1	A	16	ILE	2.6
1	F	104	GLY	2.6
1	E	86	ASN	2.6
1	D	204	GLY	2.6
1	A	88	LEU	2.6
1	E	46	LEU	2.6
1	A	201	ALA	2.6
1	B	47	ILE	2.6
1	E	82	ILE	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	81	ALA	2.5
1	F	269	LEU	2.5
1	A	44	LEU	2.5
1	E	83	GLY	2.4
1	D	202	ILE	2.4
1	D	189	VAL	2.4
1	D	152	SER	2.4
1	C	232	MET	2.4
1	D	257	ILE	2.4
1	F	46	LEU	2.4
1	D	167	ALA	2.4
1	A	6	ASP	2.4
1	A	80	GLU	2.4
1	E	16	ILE	2.4
1	A	61	LEU	2.3
1	D	174	PHE	2.3
1	F	79	THR	2.3
1	A	86	ASN	2.3
1	A	204	GLY	2.3
1	F	45	ARG	2.3
1	A	268	LEU	2.3
1	A	48	GLN	2.2
1	B	7	GLY	2.2
1	B	196	THR	2.2
1	D	166	SER	2.2
1	B	100	GLN	2.2
1	D	162	THR	2.2
1	F	106	ASN	2.2
1	D	151	PRO	2.2
1	F	74	LEU	2.2
1	A	56	ALA	2.2
1	B	79	THR	2.1
1	F	137	ILE	2.1
1	D	160	TRP	2.1
1	D	175	VAL	2.1
1	F	100	GLN	2.1
1	B	50	ILE	2.1
1	C	46	LEU	2.1
1	B	59	PRO	2.1
1	E	35	GLN	2.1
1	F	103	MET	2.1
1	D	161	MET	2.0

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Mol	Chain	Res	Type	RSRZ
1	A	53	ARG	2.0
1	B	16	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 carbohydrates in this entry.

## 6.4 Ligands [i](#)

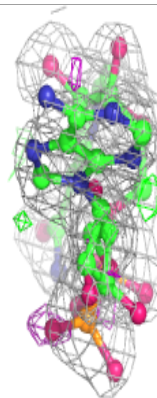
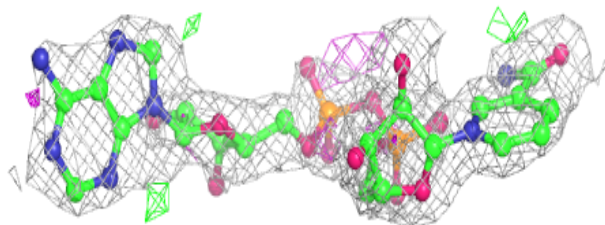
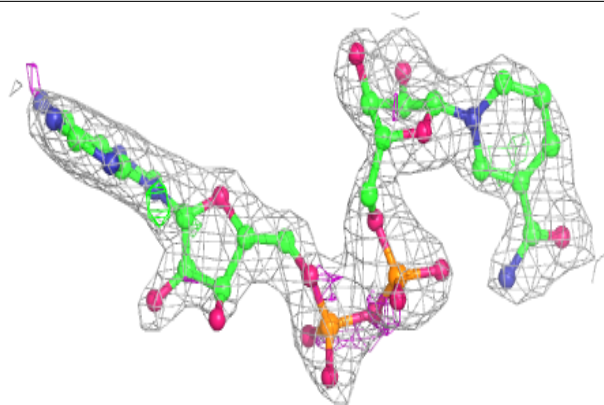
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	NAD	A	300	44/44	0.89	0.20	36,47,56,60	0
2	NAD	E	300	44/44	0.90	0.18	34,46,51,59	0
2	NAD	D	300	44/44	0.90	0.18	28,37,47,51	0
2	NAD	B	300	44/44	0.91	0.18	36,44,50,56	0
2	NAD	C	300	44/44	0.94	0.13	24,33,40,45	0
2	NAD	F	300	44/44	0.95	0.13	32,35,40,42	0

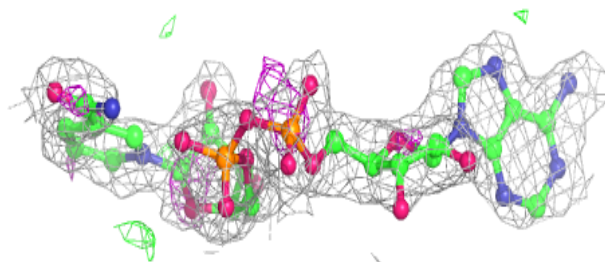
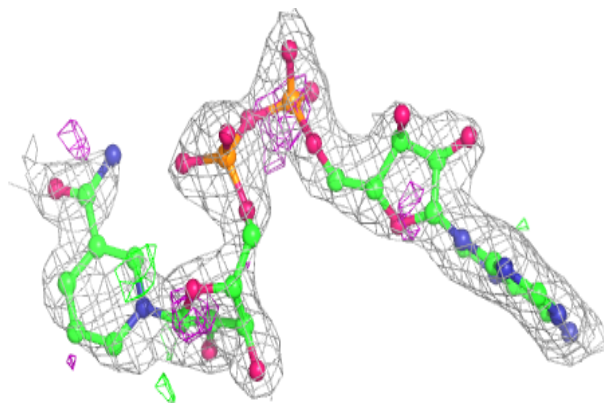
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around NAD 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)

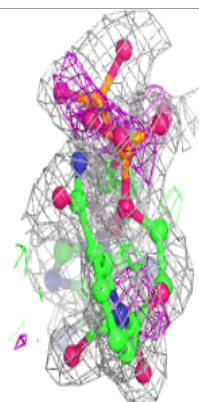
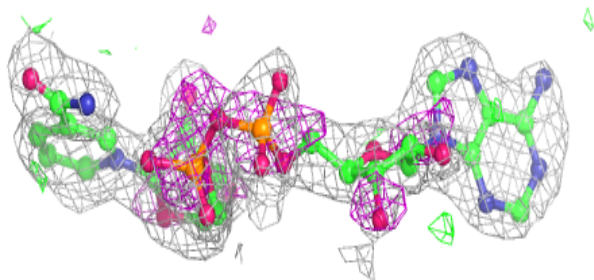
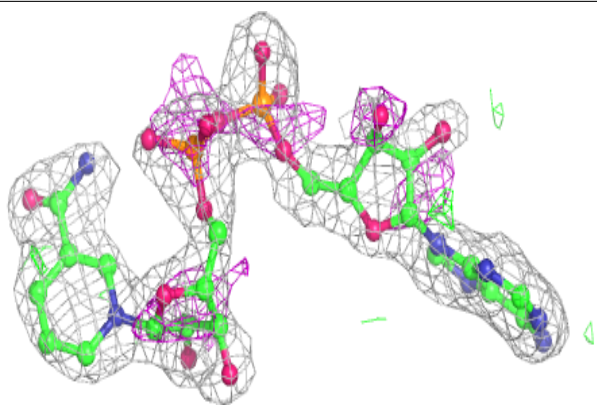
**Electron density around NAD E 300:**

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

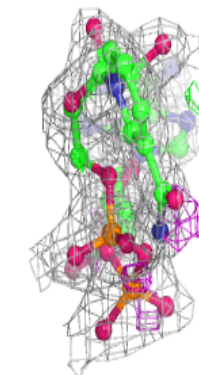
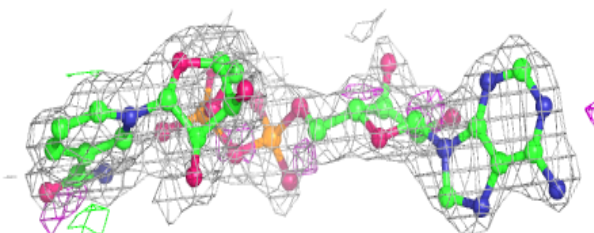
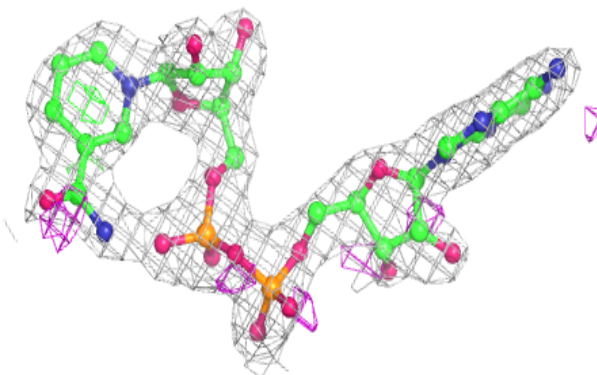


**Electron density around NAD D 300:**

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

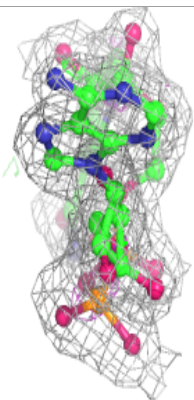
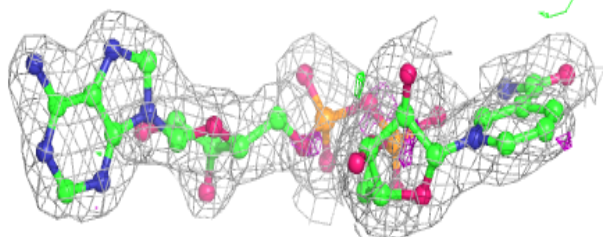
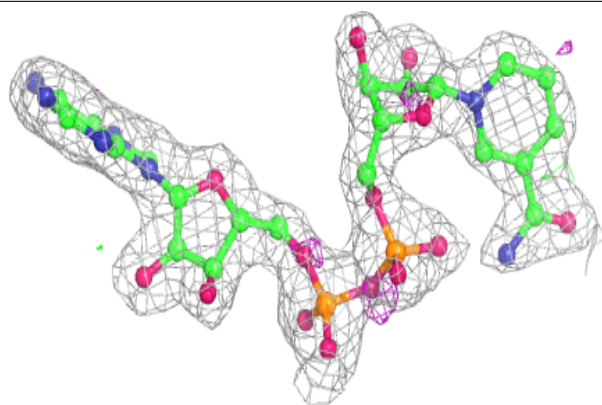
**Electron density around NAD B 300:**

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

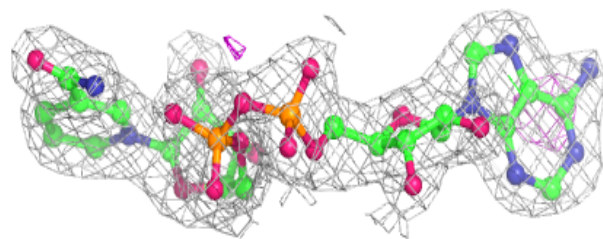
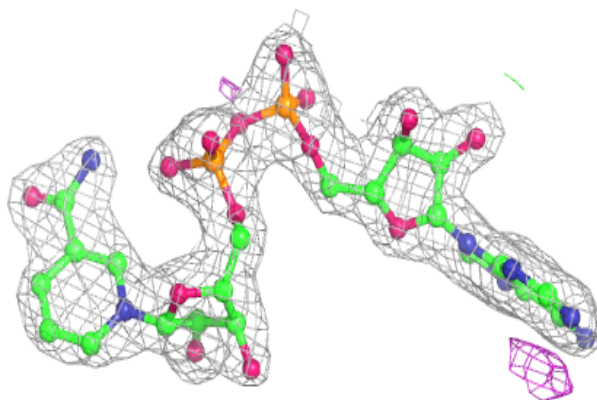


**Electron density around NAD C 300:**

$2mF_o-DF_c$  (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)



## 6.5 Other polymers [i](#)

There are no such residues in this entry.