



Full wwPDB X-ray Structure Validation Report ⓘ

Jun 6, 2020 – 05:25 am BST

PDB ID : 6O4E
Title : Structure of ALDH7A1 mutant N167S complexed with NAD
Authors : Tanner, J.J.; Korasick, D.A.; Laciak, A.R.
Deposited on : 2019-02-28
Resolution : 1.75 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 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

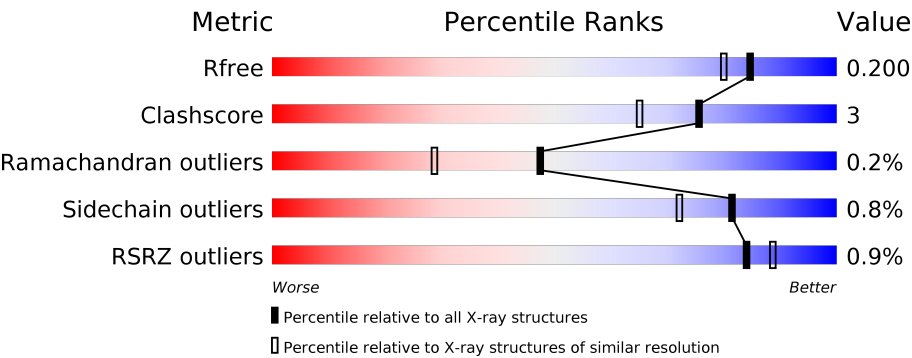
1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.75 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	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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 ≥ 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	513	<div><div>%</div><div>91%8%</div></div>
1	B	513	<div><div>2%</div><div>90%8%</div></div>
1	C	513	<div><div>%</div><div>91%8%</div></div>
1	D	513	<div><div>%</div><div>90%9%</div></div>
1	E	513	<div><div>%</div><div>93%6%</div></div>
1	F	513	<div><div>%</div><div>90%9%</div></div>

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Mol	Chain	Length	Quality of chain
1	G	513	<div><div></div><div>92%</div><div>7% •</div></div>
1	H	513	<div>%<div><div></div><div>93%</div><div>6% •</div></div></div>

2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 33404 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 Alpha-aminoadipic semialdehyde dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	508	Total	C	N	O	S	0	3	0
			3858	2456	665	719	18			
1	B	508	Total	C	N	O	S	0	3	0
			3867	2460	671	719	17			
1	C	508	Total	C	N	O	S	0	3	0
			3857	2455	666	718	18			
1	D	509	Total	C	N	O	S	0	3	0
			3868	2459	673	718	18			
1	E	508	Total	C	N	O	S	0	3	0
			3850	2451	663	718	18			
1	F	509	Total	C	N	O	S	0	0	0
			3853	2449	666	721	17			
1	G	508	Total	C	N	O	S	0	0	0
			3849	2445	668	719	17			
1	H	509	Total	C	N	O	S	0	4	0
			3875	2469	668	720	18			

There are 24 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	GLY	-	expression tag	UNP P49419
A	0	HIS	-	expression tag	UNP P49419
A	167	SER	ASN	engineered mutation	UNP P49419
B	-1	GLY	-	expression tag	UNP P49419
B	0	HIS	-	expression tag	UNP P49419
B	167	SER	ASN	engineered mutation	UNP P49419
C	-1	GLY	-	expression tag	UNP P49419
C	0	HIS	-	expression tag	UNP P49419
C	167	SER	ASN	engineered mutation	UNP P49419
D	-1	GLY	-	expression tag	UNP P49419
D	0	HIS	-	expression tag	UNP P49419
D	167	SER	ASN	engineered mutation	UNP P49419
E	-1	GLY	-	expression tag	UNP P49419

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Chain	Residue	Modelled	Actual	Comment	Reference
E	0	HIS	-	expression tag	UNP P49419
E	167	SER	ASN	engineered mutation	UNP P49419
F	-1	GLY	-	expression tag	UNP P49419
F	0	HIS	-	expression tag	UNP P49419
F	167	SER	ASN	engineered mutation	UNP P49419
G	-1	GLY	-	expression tag	UNP P49419
G	0	HIS	-	expression tag	UNP P49419
G	167	SER	ASN	engineered mutation	UNP P49419
H	-1	GLY	-	expression tag	UNP P49419
H	0	HIS	-	expression tag	UNP P49419
H	167	SER	ASN	engineered mutation	UNP P49419

- # NAD
-
- The image displays the chemical structure of Nicotinamide Adenine Dinucleotide (NAD), a crucial coenzyme. It is composed of two nucleotides linked by a pyrophosphate bridge. The first nucleotide consists of a nicotinamide ring (colored blue) and a ribose sugar (colored green). The second nucleotide consists of an adenine ring (colored blue) and a ribose sugar (colored green). The pyrophosphate bridge (colored pink) connects the 3' carbon of the first ribose to the 5' carbon of the second ribose. The structure is labeled with various atoms and groups, including NH₂, NH, OH, and O⁻.

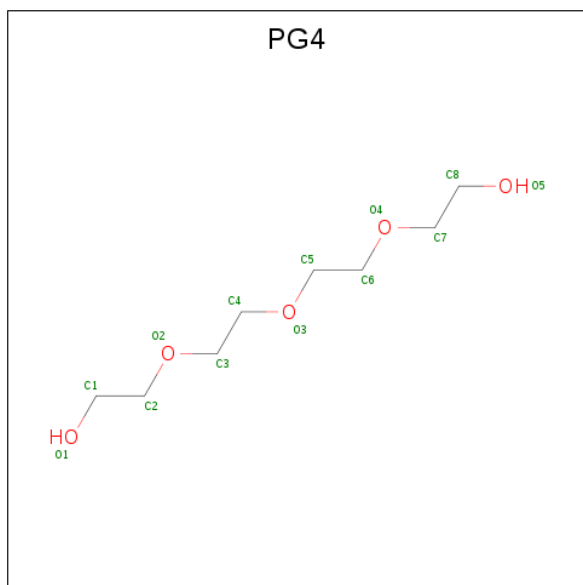
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	B	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	C	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	D	1	Total 44	C 21	N 7	O 14	P 2	0	0
2	E	1	Total 44	C 21	N 7	O 14	P 2	0	0



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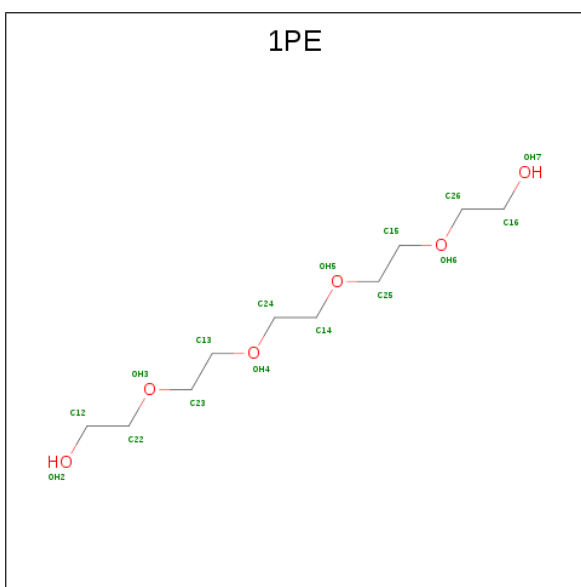
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	F	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	G	1	Total	C	N	O	P	0	0
			44	21	7	14	2		
2	H	1	Total	C	N	O	P	0	0
			44	21	7	14	2		

- Molecule 3 is TETRAETHYLENE GLYCOL (three-letter code: PG4) (formula: $C_8H_{18}O_5$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			13	8	5		
3	D	1	Total	C	O	0	0
			13	8	5		
3	E	1	Total	C	O	0	0
			13	8	5		

- Molecule 4 is PENTAETHYLENE GLYCOL (three-letter code: 1PE) (formula: $C_{10}H_{22}O_6$).

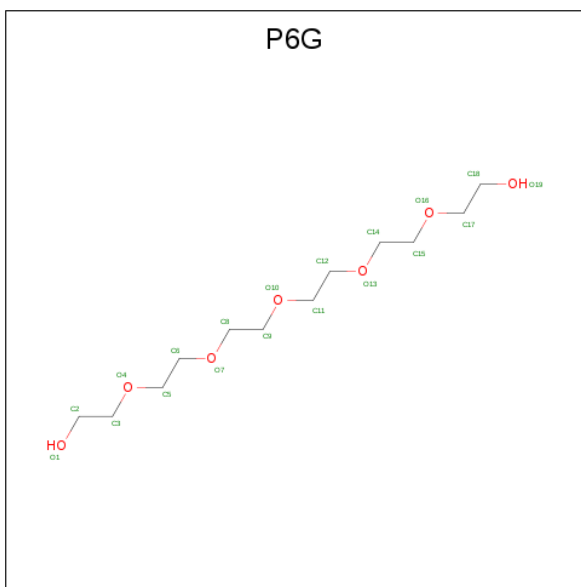


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	B	1	Total	C	O	0	0
			16	10	6		
4	C	1	Total	C	O	0	0
			16	10	6		
4	G	1	Total	C	O	0	0
			13	8	5		
4	H	1	Total	C	O	0	0
			16	10	6		

- Molecule 5 is MAGNESIUM ION (three-letter code: MG) (formula: Mg).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	G	1	Total	Mg	0	0
			1	1		
5	D	1	Total	Mg	0	0
			1	1		
5	H	1	Total	Mg	0	0
			1	1		
5	B	1	Total	Mg	0	0
			1	1		
5	C	1	Total	Mg	0	0
			1	1		
5	F	1	Total	Mg	0	0
			1	1		

- Molecule 6 is HEXAETHYLENE GLYCOL (three-letter code: P6G) (formula: C₁₂H₂₆O₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	F	1	Total	C	O	0	0
			19	12	7		

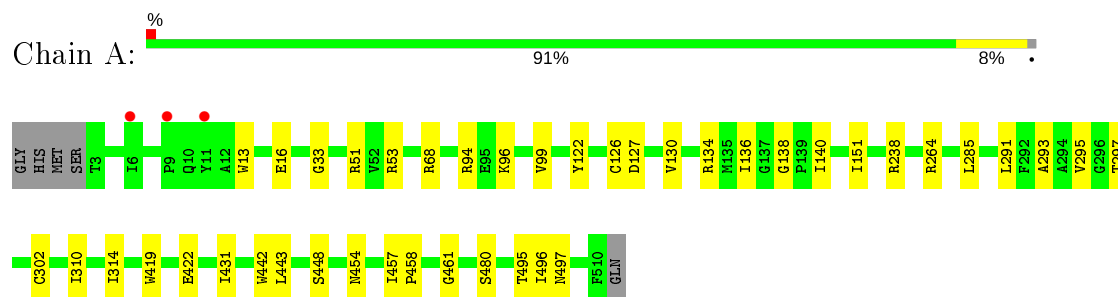
- Molecule 7 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
7	A	255	Total O 255 255	0	0
7	B	252	Total O 253 253	0	1
7	C	257	Total O 257 257	0	0
7	D	228	Total O 230 230	0	2
7	E	248	Total O 248 248	0	0
7	F	247	Total O 247 247	0	0
7	G	275	Total O 275 275	0	0
7	H	284	Total O 285 285	0	1

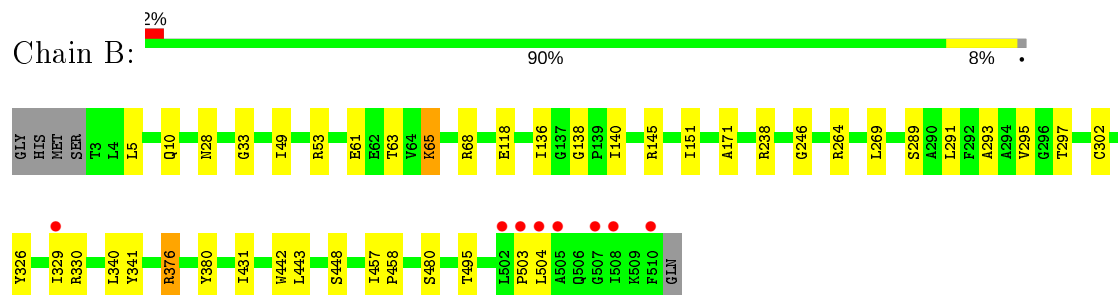
3 Residue-property plots [i](#)

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.

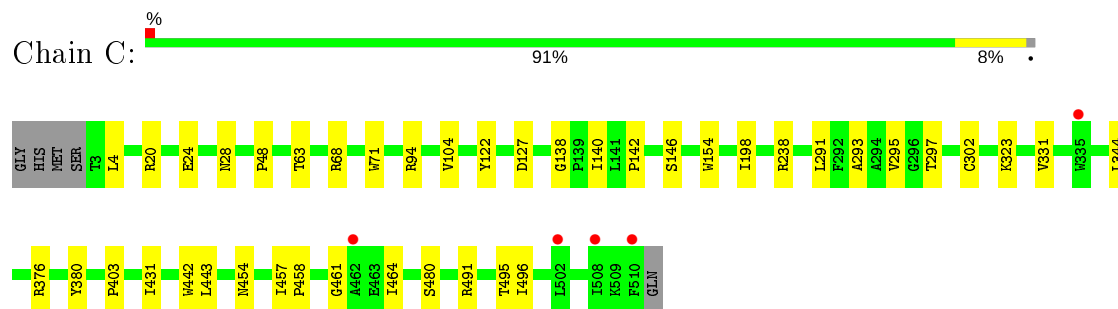
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase



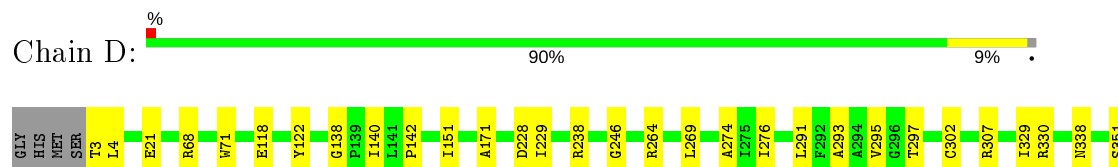
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

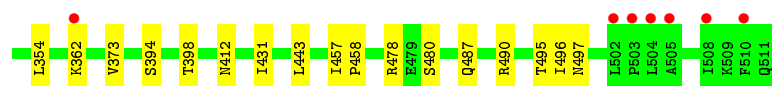


- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

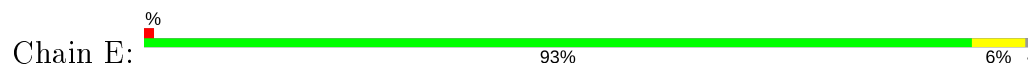


- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase

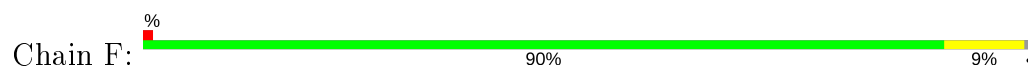




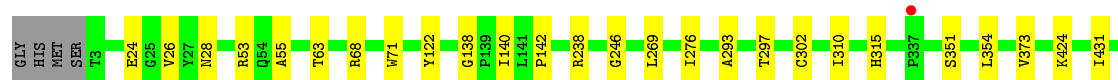
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase



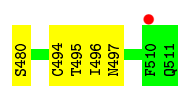
- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase



- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase



- Molecule 1: Alpha-aminoadipic semialdehyde dehydrogenase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	154.92Å 161.73Å 158.41Å 90.00° 94.65° 90.00°	Depositor
Resolution (Å)	53.09 – 1.75 56.49 – 1.75	Depositor EDS
% Data completeness (in resolution range)	90.0 (53.09-1.75) 94.1 (56.49-1.75)	Depositor EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.32 (at 1.75Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.168 , 0.202 0.166 , 0.200	Depositor DCC
R_{free} test set	18372 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	24.4	Xtriage
Anisotropy	0.424	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 40.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	33404	wwPDB-VP
Average B, all atoms (Å ²)	30.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 15.39% 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: MG, P6G, PG4, NAD, 1PE

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	0/3946	0.52	0/5355
1	B	0.34	0/3955	0.54	0/5366
1	C	0.34	0/3945	0.53	0/5355
1	D	0.34	0/3956	0.52	0/5367
1	E	0.35	0/3938	0.53	0/5345
1	F	0.35	0/3932	0.52	0/5336
1	G	0.35	0/3928	0.52	0/5331
1	H	0.35	0/3966	0.54	0/5381
All	All	0.35	0/31566	0.53	0/42836

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	3858	0	3846	31	0
1	B	3867	0	3871	32	0
1	C	3857	0	3846	30	0
1	D	3868	0	3864	31	0
1	E	3850	0	3839	24	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	F	3853	0	3835	32	0
1	G	3849	0	3833	27	0
1	H	3875	0	3882	24	0
2	A	44	0	24	1	0
2	B	44	0	24	2	0
2	C	44	0	25	1	0
2	D	44	0	24	1	0
2	E	44	0	24	1	0
2	F	44	0	24	1	0
2	G	44	0	24	1	0
2	H	44	0	25	2	0
3	A	13	0	18	1	0
3	D	13	0	18	2	0
3	E	13	0	18	2	0
4	B	16	0	22	0	0
4	C	16	0	22	1	0
4	G	13	0	17	3	0
4	H	16	0	22	4	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	F	1	0	0	0	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
6	F	19	0	26	1	0
7	A	255	0	0	2	0
7	B	253	0	0	3	0
7	C	257	0	0	0	0
7	D	230	0	0	2	0
7	E	248	0	0	2	0
7	F	247	0	0	1	0
7	G	275	0	0	0	0
7	H	285	0	0	0	0
All	All	33404	0	31173	195	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 (195) 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:F:291:LEU:HD11	1:F:329:ILE:HD11	1.66	0.78
1:A:461:GLY:O	1:B:145:ARG:NH1	2.24	0.70
1:D:291:LEU:HD11	1:D:329:ILE:HD11	1.72	0.69
1:D:4:LEU:HD12	1:D:21:GLU:HG2	1.78	0.66
1:A:140[A]:ILE:HG22	1:A:151:ILE:HG12	1.76	0.65
1:A:140[A]:ILE:HG13	1:D:138:GLY:O	1.95	0.64
1:H:293:ALA:HB2	1:H:458:PRO:HB3	1.78	0.64
1:C:94:ARG:NH2	1:C:127:ASP:OD2	2.31	0.63
1:F:151:ILE:HB	1:G:140:ILE:HD11	1.81	0.62
1:H:68:ARG:HH22	4:H:602:1PE:C23	2.15	0.60
1:G:354:LEU:HD21	1:G:373:VAL:HG23	1.84	0.60
1:C:293:ALA:HB2	1:C:458:PRO:HB2	1.83	0.58
1:A:94:ARG:NH2	1:A:127:ASP:OD2	2.36	0.58
1:H:68:ARG:HH22	4:H:602:1PE:H232	1.69	0.58
1:A:293:ALA:HB2	1:A:458:PRO:HB2	1.86	0.57
1:A:33:GLY:O	1:A:53:ARG:NH1	2.38	0.57
1:A:68:ARG:HB3	3:A:602:PG4:H22	1.87	0.57
1:B:291:LEU:O	1:B:295:VAL:HG22	2.06	0.56
1:C:443:LEU:HD11	1:D:496:ILE:HD11	1.86	0.56
1:B:293:ALA:HB2	1:B:458:PRO:CB	2.35	0.56
1:C:20:ARG:NH2	1:C:24:GLU:OE1	2.32	0.55
1:C:457[A]:ILE:HD12	1:C:461:GLY:HA3	1.89	0.55
1:B:138:GLY:O	1:C:140:ILE:HG22	2.07	0.54
1:A:457:ILE:HD11	1:B:495:THR:HB	1.90	0.54
1:G:293:ALA:HB2	1:G:458:PRO:HB3	1.91	0.54
1:A:16:GLU:O	1:A:96:LYS:HE3	2.08	0.53
1:G:478:ARG:O	1:G:487:GLN:NE2	2.38	0.53
1:F:151:ILE:HG12	1:F:494:CYS:HB2	1.91	0.53
1:C:443:LEU:HD13	1:D:151:ILE:HD11	1.92	0.52
1:D:293:ALA:HB2	1:D:458:PRO:HB2	1.91	0.52
1:B:118:GLU:HG3	1:B:171:ALA:HB2	1.91	0.52
1:A:138:GLY:O	1:D:140:ILE:HG22	2.10	0.52
1:B:140:ILE:HG22	1:C:138:GLY:O	2.09	0.52
1:B:33:GLY:O	1:B:53:ARG:NH2	2.43	0.52
1:G:68:ARG:NH2	4:G:602:1PE:H132	2.26	0.51
1:D:412:ASN:ND2	7:D:702:HOH:O	2.44	0.51
1:D:3:THR:N	7:D:703:HOH:O	2.44	0.51
1:H:276:ILE:HB	1:H:431:ILE:HG22	1.92	0.51
1:D:68:ARG:HB3	3:D:602:PG4:H21	1.91	0.51
2:B:601:NAD:H8A	7:B:830:HOH:O	2.11	0.51
1:F:118:GLU:HG3	1:F:171:ALA:HB2	1.92	0.51
1:A:495:THR:HB	1:B:457:ILE:HD11	1.92	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:496:ILE:HD11	1:B:443:LEU:HD11	1.92	0.51
1:G:28:ASN:HB3	1:G:63:THR:HG23	1.93	0.51
1:E:138:GLY:O	1:H:140[B]:ILE:HG22	2.11	0.51
1:E:140:ILE:HG22	1:H:138:GLY:O	2.10	0.51
1:B:293:ALA:HB2	1:B:458:PRO:HB3	1.92	0.51
1:B:68:ARG:HD2	1:B:238:ARG:HB3	1.93	0.51
1:C:457[B]:ILE:HG13	1:C:458:PRO:HD2	1.93	0.50
1:F:478:ARG:O	1:F:487:GLN:NE2	2.36	0.50
1:E:118:GLU:HG3	1:E:171:ALA:HB2	1.94	0.50
1:H:291:LEU:O	1:H:295:VAL:HG22	2.12	0.50
1:C:68:ARG:HD2	1:C:238:ARG:HB3	1.94	0.50
1:B:330:ARG:NH2	7:B:703:HOH:O	2.46	0.49
1:A:291:LEU:O	1:A:295:VAL:HG22	2.13	0.49
1:D:264:ARG:HH22	1:D:490:ARG:HA	1.77	0.49
1:G:68:ARG:HD2	1:G:238:ARG:HB3	1.94	0.49
1:B:293:ALA:HB2	1:B:458:PRO:HB2	1.95	0.49
1:E:302:CYS:HB3	2:E:601:NAD:C2N	2.43	0.49
1:E:457:ILE:HD11	1:F:495:THR:HB	1.95	0.48
1:C:457[A]:ILE:HG23	1:D:497:ASN:HB2	1.94	0.48
1:E:151[A]:ILE:HD11	1:F:443:LEU:HD13	1.94	0.48
1:F:439:ILE:HG23	1:F:455:VAL:HG21	1.96	0.48
1:H:291:LEU:HD11	1:H:329:ILE:HD11	1.94	0.48
1:A:51:ARG:HD3	7:A:875:HOH:O	2.13	0.48
1:F:7:ASN:ND2	1:F:21:GLU:OE2	2.46	0.48
1:H:151[A]:ILE:HG13	1:H:494:CYS:HB2	1.95	0.48
1:F:151:ILE:HB	1:G:140:ILE:CD1	2.44	0.48
1:A:13:TRP:HE3	1:A:99:VAL:HG23	1.79	0.48
1:A:264:ARG:NH2	7:A:702:HOH:O	2.40	0.48
1:D:354:LEU:HD21	1:D:373:VAL:HG23	1.96	0.48
1:E:293:ALA:HB2	1:E:458:PRO:HB3	1.95	0.48
1:C:431:ILE:HG23	1:C:442:TRP:CE2	2.49	0.47
1:D:68:ARG:HD2	1:D:238:ARG:HB3	1.95	0.47
1:C:457[A]:ILE:HD11	1:D:495:THR:HB	1.96	0.47
1:G:443:LEU:HD13	1:H:151[A]:ILE:HD11	1.96	0.47
1:E:68:ARG:HD2	1:E:238:ARG:HB3	1.97	0.47
1:F:145:ARG:NH1	7:F:703:HOH:O	2.40	0.47
1:A:431:ILE:HG23	1:A:442:TRP:CE2	2.50	0.47
1:C:154:TRP:CH2	1:C:491:ARG:HB2	2.49	0.47
1:D:118:GLU:HG3	1:D:171:ALA:HB2	1.96	0.47
1:D:276:ILE:HB	1:D:431:ILE:HG22	1.97	0.47
1:F:291:LEU:O	1:F:295:VAL:HG22	2.15	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:68:ARG:HH12	4:H:602:1PE:H231	1.79	0.47
1:E:497:ASN:HB2	1:F:457:ILE:HG23	1.97	0.47
1:E:293:ALA:HB2	1:E:458:PRO:CB	2.44	0.46
1:C:376:ARG:HH11	1:C:376:ARG:HG3	1.79	0.46
1:H:104:VAL:HA	1:H:198:ILE:HD11	1.98	0.46
1:B:302:CYS:HB3	2:B:601:NAD:C2N	2.45	0.46
1:H:302:CYS:HB3	2:H:601:NAD:C2N	2.45	0.46
1:E:457:ILE:HG23	1:F:497:ASN:HB2	1.98	0.46
1:F:293:ALA:HB2	1:F:458:PRO:HB3	1.98	0.46
1:B:289:SER:HB3	1:B:458:PRO:HD3	1.97	0.46
1:B:376[A]:ARG:HH11	1:B:376[A]:ARG:HG3	1.81	0.46
1:H:293:ALA:HB2	1:H:458:PRO:CB	2.46	0.46
1:C:291:LEU:O	1:C:295:VAL:HG22	2.16	0.45
1:E:28:ASN:HB3	1:E:63:THR:HG23	1.97	0.45
1:D:291:LEU:O	1:D:295:VAL:HG22	2.17	0.45
1:D:302:CYS:HB3	2:D:601:NAD:C2N	2.47	0.45
1:F:140:ILE:HG22	1:G:138:GLY:O	2.16	0.45
1:B:329:ILE:HD12	1:B:341:TYR:HB2	1.97	0.45
1:B:326:TYR:O	1:B:329:ILE:HG12	2.17	0.45
1:C:28:ASN:HB3	1:C:63:THR:HG23	1.99	0.45
1:F:5:LEU:HD12	1:F:49:ILE:HG12	1.98	0.45
1:E:323:LYS:NZ	7:E:708:HOH:O	2.49	0.45
1:E:68:ARG:HH21	3:E:602:PG4:H22	1.81	0.45
1:G:495:THR:HB	1:H:457:ILE:HD11	1.98	0.45
1:G:457:ILE:HG23	1:H:497:ASN:HB2	1.98	0.45
1:A:68:ARG:HD2	1:A:238:ARG:HB3	1.98	0.44
1:E:126:CYS:O	1:E:130:VAL:HG23	2.17	0.44
1:F:425:GLN:O	1:F:472:LYS:HE3	2.18	0.44
1:B:431:ILE:HG23	1:B:442:TRP:CE2	2.53	0.44
1:C:496:ILE:HD11	1:D:443:LEU:HD11	2.00	0.44
1:A:454:ASN:HB3	1:A:457:ILE:HG13	1.99	0.44
1:B:5:LEU:HB2	1:B:49:ILE:HA	2.00	0.44
1:E:431:ILE:HG23	1:E:442:TRP:CE2	2.52	0.44
1:H:126:CYS:O	1:H:130:VAL:HG23	2.17	0.44
1:G:424:LYS:HD3	1:G:473:HIS:CE1	2.51	0.44
1:A:285:LEU:HD12	1:B:503:PRO:HD3	2.00	0.44
1:C:4:LEU:HD23	1:C:48:PRO:HB2	1.98	0.44
1:E:99:VAL:HG22	7:E:881:HOH:O	2.17	0.44
1:F:276:ILE:HB	1:F:431:ILE:HG22	2.00	0.43
1:C:293:ALA:HB2	1:C:458:PRO:CB	2.48	0.43
1:D:293:ALA:HB2	1:D:458:PRO:CB	2.47	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:443:LEU:HD11	1:H:496:ILE:HD11	1.99	0.43
1:C:344:LEU:HD21	1:C:403:PRO:HD3	2.01	0.43
1:C:454:ASN:HB3	1:C:457[A]:ILE:HG13	1.99	0.43
1:A:140[B]:ILE:HD11	1:D:151:ILE:HB	2.00	0.43
1:D:478:ARG:O	1:D:487:GLN:NE2	2.43	0.43
1:F:20:ARG:NH2	1:F:24:GLU:OE2	2.36	0.43
1:B:136:ILE:O	1:C:142:PRO:HD3	2.19	0.43
1:F:208:LYS:HE2	1:F:212:ASP:OD2	2.18	0.43
1:F:302:CYS:HB3	2:F:601:NAD:C2N	2.49	0.43
1:A:302:CYS:HB3	2:A:601:NAD:C2N	2.47	0.43
1:B:376[A]:ARG:HD3	1:B:380:TYR:CG	2.53	0.43
1:E:104:VAL:HA	1:E:198:ILE:HD11	2.01	0.43
1:D:274:ALA:HA	1:D:307:ARG:O	2.19	0.43
1:F:104:VAL:HA	1:F:198:ILE:HD11	2.01	0.43
1:G:26:VAL:HG22	1:G:55:ALA:HB2	2.01	0.43
1:F:287:VAL:HB	1:F:288:PRO:HD3	2.01	0.43
1:C:495:THR:HB	1:D:457:ILE:HD11	2.00	0.43
1:F:293:ALA:HB2	1:F:458:PRO:CB	2.49	0.43
1:B:264:ARG:NH2	7:B:707:HOH:O	2.51	0.43
1:C:376:ARG:HD3	1:C:380:TYR:CG	2.54	0.42
1:D:394:SER:O	1:D:398:THR:HG23	2.18	0.42
1:A:293:ALA:HB2	1:A:458:PRO:CB	2.48	0.42
1:C:71:TRP:CE3	4:C:602:1PE:H251	2.54	0.42
1:A:126:CYS:O	1:A:130:VAL:HG23	2.20	0.42
1:C:302:CYS:HB3	2:C:601:NAD:C2N	2.50	0.42
1:G:310:ILE:HG21	1:G:315:HIS:HA	2.02	0.42
1:A:134:ARG:HD2	1:C:464:ILE:HD11	2.01	0.42
1:G:24:GLU:OE2	1:G:53:ARG:NH1	2.53	0.42
1:G:302:CYS:HB3	2:G:601:NAD:C2N	2.49	0.42
1:G:439:ILE:HG23	1:G:455:VAL:HG21	2.01	0.42
1:A:442:TRP:CH2	1:A:448:SER:HB2	2.55	0.42
1:B:28:ASN:HB3	1:B:63:THR:HG23	2.01	0.42
1:A:136:ILE:O	1:D:142:PRO:HD3	2.20	0.42
1:G:442:TRP:CH2	1:G:448:SER:HB2	2.55	0.42
1:G:71:TRP:CE3	4:G:602:1PE:H242	2.54	0.42
1:A:497:ASN:HB2	1:B:457:ILE:HG23	2.01	0.42
1:H:4:LEU:CD1	1:H:21:GLU:HG3	2.50	0.42
1:B:329:ILE:HG22	1:B:340:LEU:HD23	2.02	0.42
1:D:228:ASP:OD1	1:D:229:ILE:N	2.52	0.42
1:F:419:TRP:O	1:F:422:GLU:HG2	2.20	0.42
1:G:457:ILE:HD11	1:H:495:THR:HB	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:276:ILE:HB	1:E:431:ILE:HG22	2.02	0.41
1:D:330:ARG:NE	1:D:338:ASN:O	2.53	0.41
1:E:154:TRP:CH2	1:E:491:ARG:HB2	2.55	0.41
1:B:246:GLY:O	1:B:269:LEU:HA	2.20	0.41
1:D:71:TRP:CZ3	3:D:602:PG4:H41	2.56	0.41
1:E:291:LEU:HD12	1:E:326:TYR:CD1	2.55	0.41
1:C:104:VAL:HA	1:C:198:ILE:HD11	2.01	0.41
1:G:246:GLY:O	1:G:269:LEU:HA	2.20	0.41
1:G:293:ALA:HB2	1:G:458:PRO:CB	2.50	0.41
1:H:439:ILE:HG23	1:H:455:VAL:HG21	2.03	0.41
1:C:454:ASN:HB3	1:C:457[B]:ILE:HG23	2.03	0.41
1:E:495:THR:HB	1:F:457:ILE:HD11	2.02	0.41
1:A:310:ILE:HG22	1:A:314:ILE:HG13	2.01	0.41
1:A:419:TRP:O	1:A:422:GLU:HG2	2.20	0.41
3:E:602:PG4:H42	3:E:602:PG4:H62	1.83	0.41
1:G:276:ILE:HB	1:G:431:ILE:HG22	2.02	0.41
1:F:71:TRP:CE3	6:F:602:P6G:H111	2.55	0.41
1:H:167:SER:OG	2:H:601:NAD:H5N	2.21	0.41
1:G:68:ARG:HH21	4:G:602:1PE:H132	1.86	0.41
1:F:188:LEU:HD11	1:F:223:THR:HG23	2.03	0.41
1:B:442:TRP:CH2	1:B:448:SER:HB2	2.56	0.40
1:A:443:LEU:HD13	1:B:151[B]:ILE:HD11	2.04	0.40
1:E:442:TRP:CH2	1:E:448:SER:HB2	2.57	0.40
1:B:61:GLU:O	1:B:65:LYS:HD3	2.21	0.40
1:D:246:GLY:O	1:D:269:LEU:HA	2.22	0.40
1:F:136:ILE:O	1:G:142:PRO:HD3	2.20	0.40
1:H:246:GLY:O	1:H:269:LEU:HA	2.21	0.40
1:F:344:LEU:HD21	1:F:403:PRO:HD3	2.03	0.40
1:H:68:ARG:HH22	4:H:602:1PE:H231	1.86	0.40
1:E:496:ILE:HD11	1:F:443:LEU:HD11	2.04	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	509/513 (99%)	495 (97%)	13 (3%)	1 (0%)	47	29
1	B	509/513 (99%)	494 (97%)	14 (3%)	1 (0%)	47	29
1	C	509/513 (99%)	493 (97%)	15 (3%)	1 (0%)	47	29
1	D	510/513 (99%)	495 (97%)	14 (3%)	1 (0%)	47	29
1	E	509/513 (99%)	493 (97%)	15 (3%)	1 (0%)	47	29
1	F	507/513 (99%)	491 (97%)	15 (3%)	1 (0%)	47	29
1	G	506/513 (99%)	493 (97%)	12 (2%)	1 (0%)	47	29
1	H	511/513 (100%)	494 (97%)	16 (3%)	1 (0%)	47	29
All	All	4070/4104 (99%)	3948 (97%)	114 (3%)	8 (0%)	47	29

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	480	SER
1	B	480	SER
1	C	480	SER
1	D	480	SER
1	E	480	SER
1	F	480	SER
1	G	480	SER
1	H	480	SER

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	400/410 (98%)	398 (100%)	2 (0%)	88	83
1	B	403/410 (98%)	397 (98%)	6 (2%)	65	49
1	C	400/410 (98%)	395 (99%)	5 (1%)	69	54
1	D	402/410 (98%)	398 (99%)	4 (1%)	76	63

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	400/410 (98%)	397 (99%)	3 (1%)	81	72
1	F	400/410 (98%)	398 (100%)	2 (0%)	88	83
1	G	400/410 (98%)	397 (99%)	3 (1%)	81	72
1	H	404/410 (98%)	401 (99%)	3 (1%)	84	75
All	All	3209/3280 (98%)	3181 (99%)	28 (1%)	81	67

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	122	TYR
1	A	297	THR
1	B	10	GLN
1	B	65	LYS
1	B	297	THR
1	B	376[A]	ARG
1	B	376[B]	ARG
1	B	504	LEU
1	C	122	TYR
1	C	146	SER
1	C	297	THR
1	C	323	LYS
1	C	331	VAL
1	D	122	TYR
1	D	297	THR
1	D	351	SER
1	D	362	LYS
1	E	214	LYS
1	E	291	LEU
1	E	297	THR
1	F	24	GLU
1	F	297	THR
1	G	122	TYR
1	G	297	THR
1	G	351	SER
1	H	122	TYR
1	H	297	THR
1	H	375	ASP

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

Mol	Chain	Res	Type
1	B	10	GLN
1	D	259	GLN
1	G	473	HIS

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 ⓘ

Of 22 ligands modelled in this entry, 6 are monoatomic - leaving 16 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
3	PG4	D	602	-	12,12,12	0.64	0	11,11,11	0.30	0
2	NAD	F	601	5	42,48,48	5.11	16 (38%)	50,73,73	1.43	4 (8%)
2	NAD	D	601	5	42,48,48	5.15	16 (38%)	50,73,73	1.41	6 (12%)
4	1PE	B	602	-	15,15,15	0.54	0	14,14,14	0.41	0
4	1PE	C	602	-	15,15,15	0.50	0	14,14,14	0.25	0
2	NAD	H	601	5	42,48,48	5.15	15 (35%)	50,73,73	1.49	5 (10%)
4	1PE	G	602	-	12,12,15	0.53	0	11,11,14	0.33	0
2	NAD	A	601	-	42,48,48	5.14	15 (35%)	50,73,73	1.41	5 (10%)
2	NAD	G	601	5	42,48,48	5.17	16 (38%)	50,73,73	1.35	4 (8%)
2	NAD	E	601	-	42,48,48	5.12	16 (38%)	50,73,73	1.51	8 (16%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	PG4	E	602	-	12,12,12	0.67	0	11,11,11	0.35	0
6	P6G	F	602	-	18,18,18	0.54	0	17,17,17	0.41	0
3	PG4	A	602	-	12,12,12	0.64	0	11,11,11	0.45	0
2	NAD	C	601	5	42,48,48	5.17	16 (38%)	50,73,73	1.49	7 (14%)
4	1PE	H	602	-	15,15,15	0.53	0	14,14,14	0.44	0
2	NAD	B	601	5	42,48,48	5.20	15 (35%)	50,73,73	1.56	8 (16%)

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
3	PG4	D	602	-	-	6/10/10/10	-
2	NAD	F	601	5	-	3/26/62/62	0/5/5/5
2	NAD	D	601	5	-	3/26/62/62	0/5/5/5
4	1PE	B	602	-	-	4/13/13/13	-
4	1PE	C	602	-	-	2/13/13/13	-
2	NAD	H	601	5	-	3/26/62/62	0/5/5/5
4	1PE	G	602	-	-	5/10/10/13	-
2	NAD	A	601	-	-	3/26/62/62	0/5/5/5
2	NAD	G	601	5	-	3/26/62/62	0/5/5/5
2	NAD	E	601	-	-	3/26/62/62	0/5/5/5
3	PG4	E	602	-	-	5/10/10/10	-
6	P6G	F	602	-	-	4/16/16/16	-
3	PG4	A	602	-	-	6/10/10/10	-
2	NAD	C	601	5	-	3/26/62/62	0/5/5/5
4	1PE	H	602	-	-	6/13/13/13	-
2	NAD	B	601	5	-	3/26/62/62	0/5/5/5

All (125) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	601	NAD	C2D-C1D	-16.57	1.28	1.53
2	G	601	NAD	C2D-C1D	-16.26	1.29	1.53
2	C	601	NAD	C2D-C1D	-16.20	1.29	1.53
2	B	601	NAD	C2D-C1D	-16.11	1.29	1.53
2	H	601	NAD	C2B-C1B	-16.04	1.29	1.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	F	601	NAD	C2D-C1D	-15.90	1.29	1.53
2	H	601	NAD	C2D-C1D	-15.88	1.29	1.53
2	E	601	NAD	C2D-C1D	-15.77	1.29	1.53
2	D	601	NAD	C2D-C1D	-15.64	1.30	1.53
2	F	601	NAD	C2B-C1B	-15.62	1.30	1.53
2	A	601	NAD	C2B-C1B	-15.57	1.30	1.53
2	G	601	NAD	C2B-C1B	-15.52	1.30	1.53
2	B	601	NAD	C2B-C1B	-15.50	1.30	1.53
2	C	601	NAD	C2B-C1B	-15.48	1.30	1.53
2	E	601	NAD	C2B-C1B	-15.45	1.30	1.53
2	D	601	NAD	C2B-C1B	-15.40	1.30	1.53
2	C	601	NAD	O4D-C1D	14.84	1.61	1.41
2	D	601	NAD	O4D-C1D	14.76	1.61	1.41
2	B	601	NAD	O4D-C1D	14.72	1.61	1.41
2	B	601	NAD	O4B-C1B	14.64	1.61	1.41
2	A	601	NAD	O4D-C1D	14.55	1.61	1.41
2	E	601	NAD	O4D-C1D	14.52	1.61	1.41
2	G	601	NAD	O4B-C1B	14.49	1.61	1.41
2	H	601	NAD	O4D-C1D	14.46	1.61	1.41
2	G	601	NAD	O4D-C1D	14.39	1.61	1.41
2	D	601	NAD	O4B-C1B	14.38	1.61	1.41
2	F	601	NAD	O4D-C1D	14.14	1.60	1.41
2	C	601	NAD	O4B-C1B	14.00	1.60	1.41
2	H	601	NAD	O4B-C1B	13.95	1.60	1.41
2	E	601	NAD	O4B-C1B	13.83	1.60	1.41
2	F	601	NAD	O4B-C1B	13.80	1.60	1.41
2	A	601	NAD	O4B-C1B	13.29	1.59	1.41
2	B	601	NAD	C7N-N7N	6.63	1.45	1.33
2	D	601	NAD	C7N-N7N	6.62	1.45	1.33
2	A	601	NAD	C7N-N7N	6.59	1.45	1.33
2	E	601	NAD	C7N-N7N	6.59	1.45	1.33
2	F	601	NAD	C7N-N7N	6.46	1.45	1.33
2	H	601	NAD	C7N-N7N	6.34	1.45	1.33
2	C	601	NAD	C7N-N7N	6.33	1.45	1.33
2	F	601	NAD	O4D-C4D	-6.16	1.31	1.45
2	D	601	NAD	O4B-C4B	-6.16	1.31	1.45
2	G	601	NAD	C7N-N7N	6.13	1.44	1.33
2	C	601	NAD	O4B-C4B	-6.10	1.31	1.45
2	E	601	NAD	O4B-C4B	-6.03	1.31	1.45
2	A	601	NAD	O4D-C4D	-6.02	1.31	1.45
2	E	601	NAD	O4D-C4D	-6.00	1.31	1.45
2	G	601	NAD	O4D-C4D	-5.98	1.31	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	601	NAD	O4B-C4B	-5.92	1.31	1.45
2	C	601	NAD	O4D-C4D	-5.92	1.31	1.45
2	A	601	NAD	O4B-C4B	-5.92	1.31	1.45
2	H	601	NAD	O4D-C4D	-5.91	1.31	1.45
2	B	601	NAD	O4B-C4B	-5.89	1.31	1.45
2	G	601	NAD	O4B-C4B	-5.88	1.31	1.45
2	D	601	NAD	O4D-C4D	-5.86	1.31	1.45
2	F	601	NAD	O4B-C4B	-5.85	1.31	1.45
2	B	601	NAD	O4D-C4D	-5.71	1.32	1.45
2	E	601	NAD	C3N-C7N	3.99	1.56	1.50
2	A	601	NAD	C3N-C7N	3.90	1.56	1.50
2	C	601	NAD	C3N-C7N	3.87	1.56	1.50
2	B	601	NAD	C3N-C7N	3.85	1.56	1.50
2	F	601	NAD	C3N-C7N	3.81	1.56	1.50
2	D	601	NAD	C3N-C7N	3.78	1.56	1.50
2	E	601	NAD	C2N-N1N	3.74	1.39	1.35
2	A	601	NAD	C2N-N1N	3.63	1.39	1.35
2	C	601	NAD	C2N-N1N	3.59	1.39	1.35
2	H	601	NAD	C2N-N1N	3.47	1.39	1.35
2	F	601	NAD	C2N-N1N	3.45	1.39	1.35
2	H	601	NAD	C3N-C7N	3.45	1.55	1.50
2	D	601	NAD	C2N-N1N	3.44	1.39	1.35
2	B	601	NAD	C2N-N1N	3.43	1.39	1.35
2	G	601	NAD	C3N-C7N	3.42	1.55	1.50
2	G	601	NAD	C2N-N1N	3.37	1.39	1.35
2	B	601	NAD	O3D-C3D	-3.33	1.35	1.43
2	D	601	NAD	O3D-C3D	-3.21	1.35	1.43
2	E	601	NAD	C2A-N3A	3.18	1.37	1.32
2	C	601	NAD	O3D-C3D	-3.16	1.35	1.43
2	H	601	NAD	O3D-C3D	-3.16	1.35	1.43
2	G	601	NAD	O3D-C3D	-3.11	1.35	1.43
2	F	601	NAD	O3D-C3D	-3.10	1.35	1.43
2	A	601	NAD	O3D-C3D	-3.05	1.35	1.43
2	H	601	NAD	C2A-N3A	3.01	1.36	1.32
2	E	601	NAD	O3D-C3D	-2.99	1.35	1.43
2	E	601	NAD	O3B-C3B	-2.97	1.36	1.43
2	B	601	NAD	O3B-C3B	-2.96	1.36	1.43
2	F	601	NAD	O3B-C3B	-2.94	1.36	1.43
2	A	601	NAD	O3B-C3B	-2.91	1.36	1.43
2	C	601	NAD	O2B-C2B	2.88	1.49	1.43
2	G	601	NAD	O3B-C3B	-2.88	1.36	1.43
2	F	601	NAD	C2A-N3A	2.88	1.36	1.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	601	NAD	O2B-C2B	2.87	1.49	1.43
2	A	601	NAD	C2A-N3A	2.80	1.36	1.32
2	B	601	NAD	O2B-C2B	2.80	1.49	1.43
2	G	601	NAD	C2A-N3A	2.77	1.36	1.32
2	D	601	NAD	O3B-C3B	-2.74	1.36	1.43
2	A	601	NAD	C6A-N6A	2.72	1.43	1.34
2	B	601	NAD	C6A-N6A	2.66	1.43	1.34
2	B	601	NAD	C2A-N3A	2.62	1.36	1.32
2	D	601	NAD	C6A-N6A	2.62	1.43	1.34
2	F	601	NAD	C6A-N6A	2.60	1.43	1.34
2	F	601	NAD	O2B-C2B	2.59	1.49	1.43
2	G	601	NAD	O2B-C2B	2.56	1.49	1.43
2	H	601	NAD	O2B-C2B	2.54	1.49	1.43
2	C	601	NAD	C6A-N6A	2.52	1.43	1.34
2	G	601	NAD	C6A-N6A	2.52	1.43	1.34
2	H	601	NAD	C6A-N6A	2.51	1.43	1.34
2	E	601	NAD	C6A-N6A	2.48	1.43	1.34
2	E	601	NAD	O2D-C2D	2.43	1.48	1.43
2	F	601	NAD	C5A-C4A	-2.38	1.34	1.40
2	C	601	NAD	C2A-N3A	2.35	1.35	1.32
2	C	601	NAD	O2D-C2D	2.35	1.48	1.43
2	B	601	NAD	O2D-C2D	2.34	1.48	1.43
2	G	601	NAD	O2D-C2D	2.33	1.48	1.43
2	F	601	NAD	O2D-C2D	2.33	1.48	1.43
2	E	601	NAD	O2B-C2B	2.32	1.48	1.43
2	D	601	NAD	O2D-C2D	2.32	1.48	1.43
2	A	601	NAD	O2B-C2B	2.31	1.48	1.43
2	H	601	NAD	O2D-C2D	2.30	1.48	1.43
2	A	601	NAD	O2D-C2D	2.28	1.48	1.43
2	G	601	NAD	C5A-C4A	-2.24	1.35	1.40
2	D	601	NAD	C5A-C4A	-2.19	1.35	1.40
2	C	601	NAD	O3B-C3B	-2.16	1.37	1.43
2	E	601	NAD	C5A-C4A	-2.15	1.35	1.40
2	D	601	NAD	C2A-N3A	2.14	1.35	1.32
2	H	601	NAD	C5A-C4A	-2.11	1.35	1.40
2	C	601	NAD	C5A-C4A	-2.10	1.35	1.40

All (47) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	601	NAD	N3A-C2A-N1A	-5.90	119.46	128.68
2	C	601	NAD	N3A-C2A-N1A	-5.84	119.55	128.68

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	601	NAD	N3A-C2A-N1A	-5.73	119.72	128.68
2	F	601	NAD	N3A-C2A-N1A	-5.46	120.14	128.68
2	H	601	NAD	N3A-C2A-N1A	-5.43	120.19	128.68
2	B	601	NAD	N3A-C2A-N1A	-5.29	120.42	128.68
2	E	601	NAD	N3A-C2A-N1A	-5.13	120.66	128.68
2	A	601	NAD	N3A-C2A-N1A	-4.97	120.91	128.68
2	F	601	NAD	C3N-C7N-N7N	4.34	122.96	117.75
2	C	601	NAD	C5A-C6A-N6A	4.29	126.87	120.35
2	B	601	NAD	C5A-C6A-N6A	4.16	126.68	120.35
2	E	601	NAD	C5A-C6A-N6A	4.07	126.54	120.35
2	B	601	NAD	C3N-C7N-N7N	3.78	122.28	117.75
2	H	601	NAD	C3N-C7N-N7N	3.77	122.28	117.75
2	A	601	NAD	C3N-C7N-N7N	3.66	122.14	117.75
2	H	601	NAD	C5A-C6A-N6A	3.58	125.79	120.35
2	E	601	NAD	O4D-C1D-C2D	-3.49	101.82	106.93
2	A	601	NAD	O4D-C1D-C2D	-3.46	101.87	106.93
2	B	601	NAD	O4D-C1D-C2D	-3.38	101.99	106.93
2	D	601	NAD	C5A-C6A-N6A	3.38	125.48	120.35
2	F	601	NAD	O4D-C1D-C2D	-3.32	102.08	106.93
2	E	601	NAD	C3N-C7N-N7N	3.20	121.59	117.75
2	A	601	NAD	C5A-C6A-N6A	3.13	125.11	120.35
2	C	601	NAD	O4D-C1D-C2D	-3.00	102.54	106.93
2	C	601	NAD	N6A-C6A-N1A	-2.99	112.36	118.57
2	G	601	NAD	O4D-C1D-C2D	-2.96	102.60	106.93
2	H	601	NAD	O4D-C1D-C2D	-2.92	102.65	106.93
2	D	601	NAD	C3N-C7N-N7N	2.76	121.06	117.75
2	C	601	NAD	C3N-C7N-N7N	2.70	120.99	117.75
2	B	601	NAD	N6A-C6A-N1A	-2.61	113.16	118.57
2	E	601	NAD	N6A-C6A-N1A	-2.53	113.33	118.57
2	F	601	NAD	O7N-C7N-N7N	-2.39	119.17	122.58
2	D	601	NAD	O4D-C1D-C2D	-2.39	103.43	106.93
2	E	601	NAD	O7N-C7N-N7N	-2.36	119.22	122.58
2	G	601	NAD	C3N-C7N-N7N	2.34	120.56	117.75
2	H	601	NAD	N6A-C6A-N1A	-2.31	113.78	118.57
2	B	601	NAD	O4B-C1B-C2B	-2.25	103.64	106.93
2	E	601	NAD	O4B-C1B-C2B	-2.16	103.77	106.93
2	D	601	NAD	N6A-C6A-N1A	-2.14	114.14	118.57
2	C	601	NAD	O7N-C7N-N7N	-2.12	119.56	122.58
2	G	601	NAD	C5A-C6A-N6A	2.09	123.53	120.35
2	D	601	NAD	O7N-C7N-N7N	-2.09	119.61	122.58
2	A	601	NAD	O7N-C7N-N7N	-2.09	119.61	122.58
2	B	601	NAD	O7N-C7N-N7N	-2.07	119.64	122.58

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	601	NAD	C4A-C5A-N7A	-2.03	107.29	109.40
2	E	601	NAD	C4A-C5A-N7A	-2.01	107.30	109.40
2	C	601	NAD	C4A-C5A-N7A	-2.00	107.31	109.40

There are no chirality outliers.

All (62) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	G	601	NAD	C3D-C4D-C5D-O5D
2	B	601	NAD	C3D-C4D-C5D-O5D
3	A	602	PG4	O2-C3-C4-O3
2	E	601	NAD	O4D-C4D-C5D-O5D
2	E	601	NAD	C3D-C4D-C5D-O5D
2	G	601	NAD	O4D-C4D-C5D-O5D
2	H	601	NAD	C3D-C4D-C5D-O5D
2	B	601	NAD	O4D-C4D-C5D-O5D
2	C	601	NAD	C3D-C4D-C5D-O5D
3	D	602	PG4	O1-C1-C2-O2
3	D	602	PG4	O2-C3-C4-O3
4	G	602	1PE	OH7-C16-C26-OH6
3	E	602	PG4	O1-C1-C2-O2
2	F	601	NAD	C3D-C4D-C5D-O5D
2	A	601	NAD	C3D-C4D-C5D-O5D
3	E	602	PG4	O3-C5-C6-O4
3	E	602	PG4	C4-C3-O2-C2
4	H	602	1PE	OH4-C13-C23-OH3
2	F	601	NAD	O4D-C4D-C5D-O5D
2	H	601	NAD	O4D-C4D-C5D-O5D
2	C	601	NAD	O4D-C4D-C5D-O5D
2	D	601	NAD	C3D-C4D-C5D-O5D
2	A	601	NAD	O4D-C4D-C5D-O5D
4	G	602	1PE	C14-C24-OH4-C13
3	E	602	PG4	C6-C5-O3-C4
2	E	601	NAD	C4D-C5D-O5D-PN
6	F	602	P6G	O1-C2-C3-O4
3	D	602	PG4	O3-C5-C6-O4
4	H	602	1PE	OH2-C12-C22-OH3
4	B	602	1PE	C14-C24-OH4-C13
4	C	602	1PE	C12-C22-OH3-C23
2	F	601	NAD	C4D-C5D-O5D-PN
2	G	601	NAD	C4D-C5D-O5D-PN
2	A	601	NAD	C4D-C5D-O5D-PN

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Mol	Chain	Res	Type	Atoms
2	C	601	NAD	C4D-C5D-O5D-PN
4	B	602	1PE	C24-C14-OH5-C25
4	H	602	1PE	C12-C22-OH3-C23
3	A	602	PG4	C1-C2-O2-C3
6	F	602	P6G	O7-C8-C9-O10
2	H	601	NAD	C4D-C5D-O5D-PN
2	B	601	NAD	C4D-C5D-O5D-PN
3	D	602	PG4	C1-C2-O2-C3
6	F	602	P6G	C2-C3-O4-C5
3	E	602	PG4	C1-C2-O2-C3
4	G	602	1PE	OH4-C13-C23-OH3
2	D	601	NAD	C4D-C5D-O5D-PN
3	A	602	PG4	O3-C5-C6-O4
3	A	602	PG4	C8-C7-O4-C6
2	D	601	NAD	O4D-C4D-C5D-O5D
4	B	602	1PE	OH6-C15-C25-OH5
4	C	602	1PE	OH2-C12-C22-OH3
4	H	602	1PE	C13-C23-OH3-C22
4	G	602	1PE	OH5-C14-C24-OH4
4	G	602	1PE	C15-C25-OH5-C14
4	H	602	1PE	C14-C24-OH4-C13
3	D	602	PG4	C8-C7-O4-C6
3	A	602	PG4	C6-C5-O3-C4
4	H	602	1PE	C23-C13-OH4-C24
4	B	602	1PE	C15-C25-OH5-C14
3	A	602	PG4	O4-C7-C8-O5
6	F	602	P6G	C11-C12-O13-C14
3	D	602	PG4	C6-C5-O3-C4

There are no ring outliers.

15 monomers are involved in 24 short contacts:

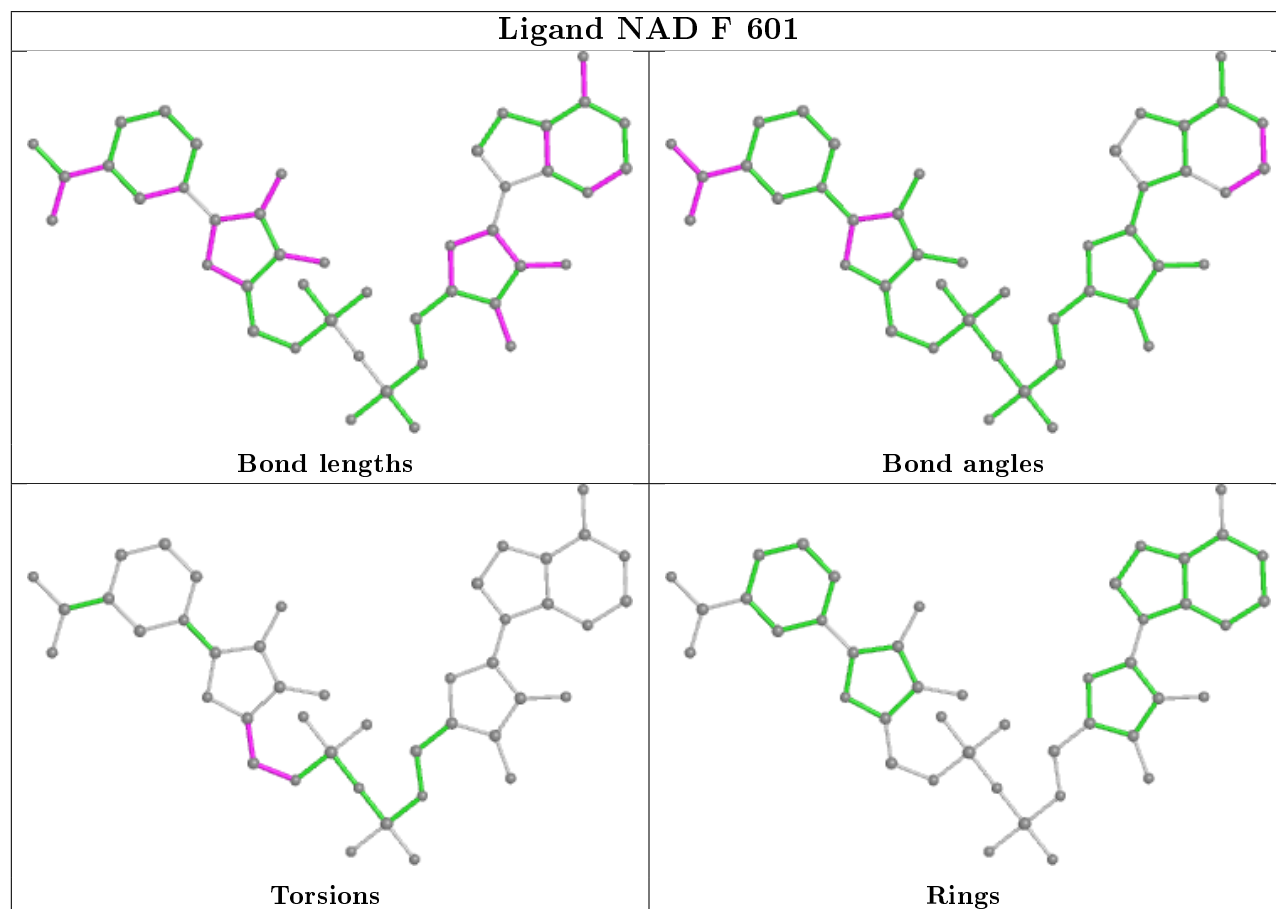
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	602	PG4	2	0
2	F	601	NAD	1	0
2	D	601	NAD	1	0
4	C	602	1PE	1	0
2	H	601	NAD	2	0
4	G	602	1PE	3	0
2	A	601	NAD	1	0
2	G	601	NAD	1	0
2	E	601	NAD	1	0

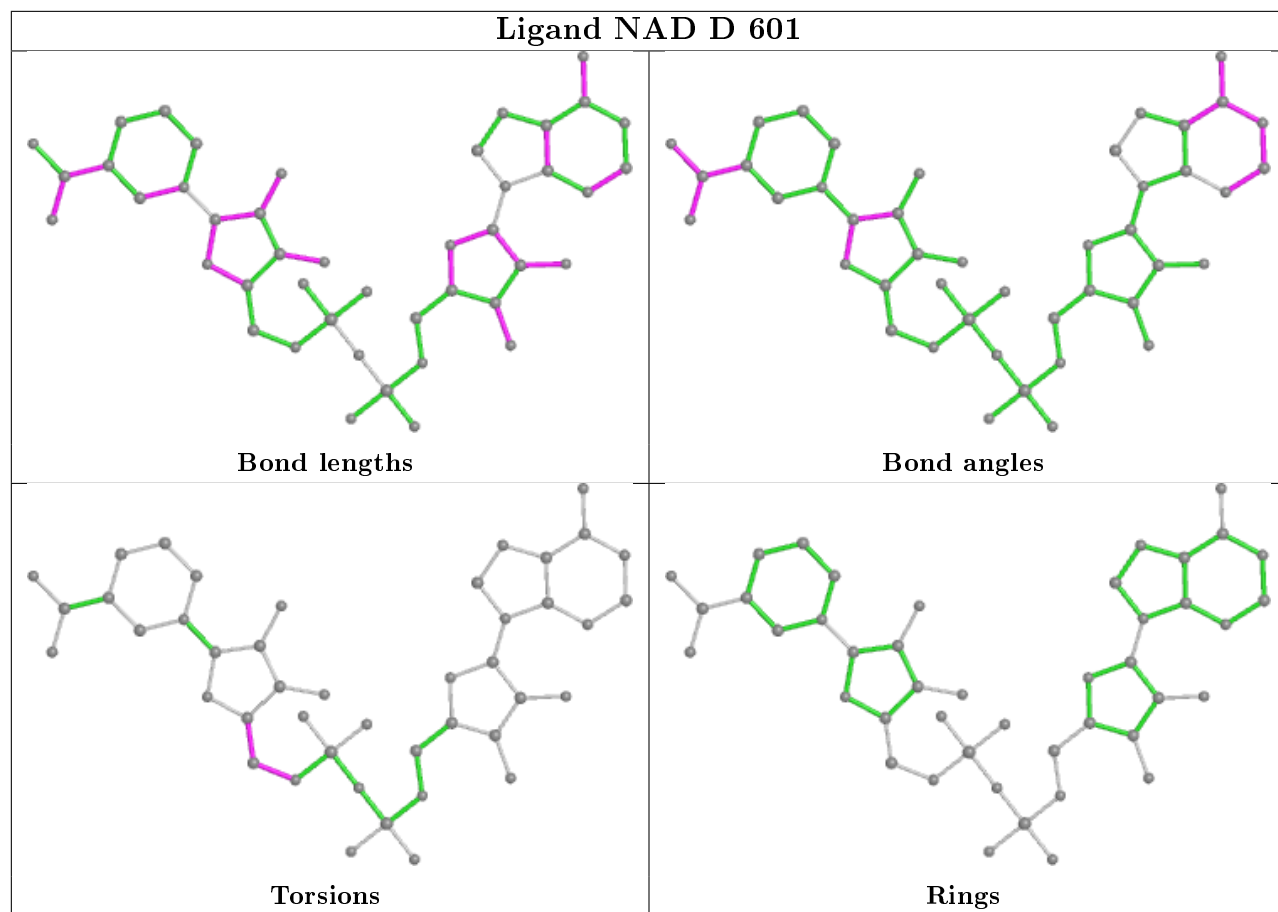
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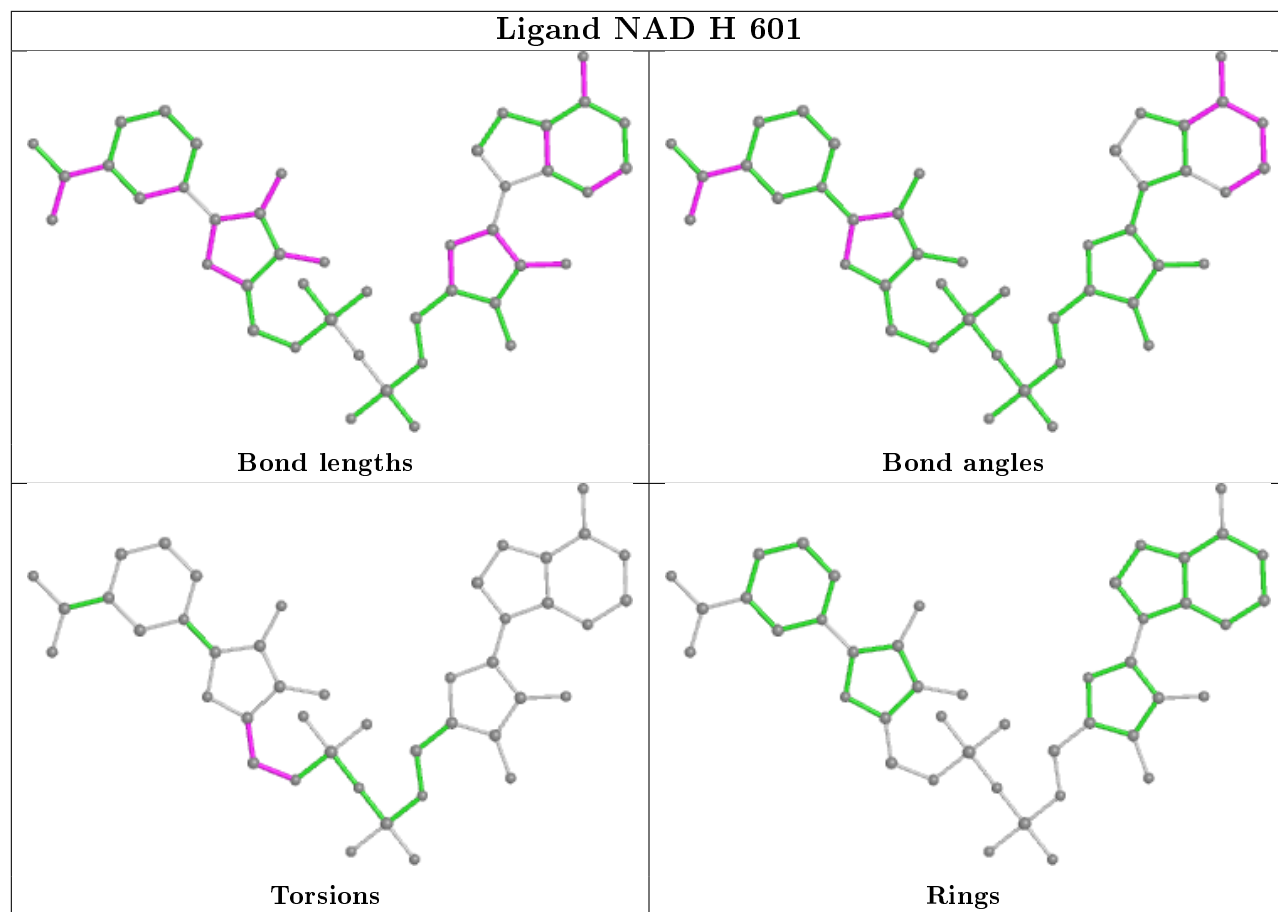
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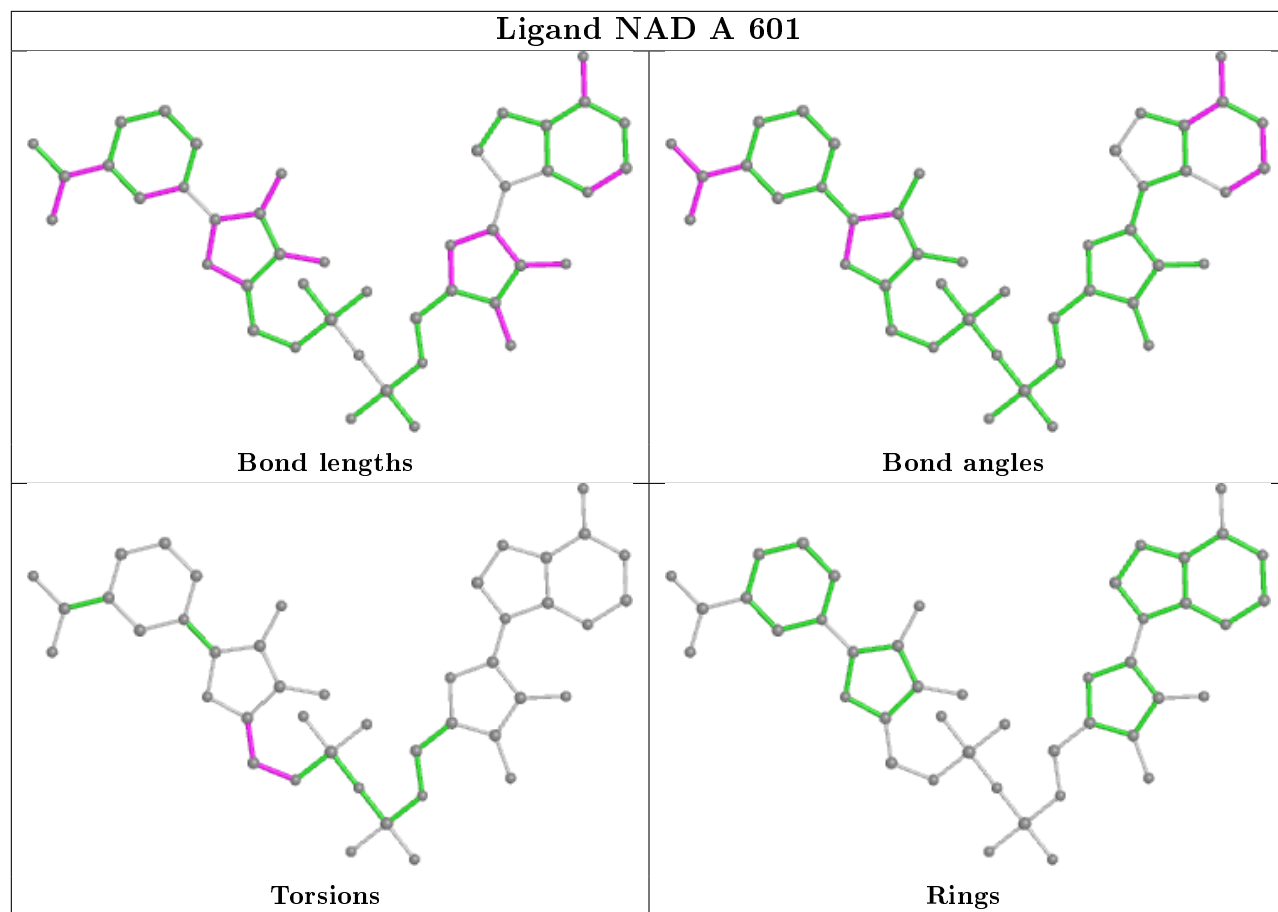
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	E	602	PG4	2	0
6	F	602	P6G	1	0
3	A	602	PG4	1	0
2	C	601	NAD	1	0
4	H	602	1PE	4	0
2	B	601	NAD	2	0

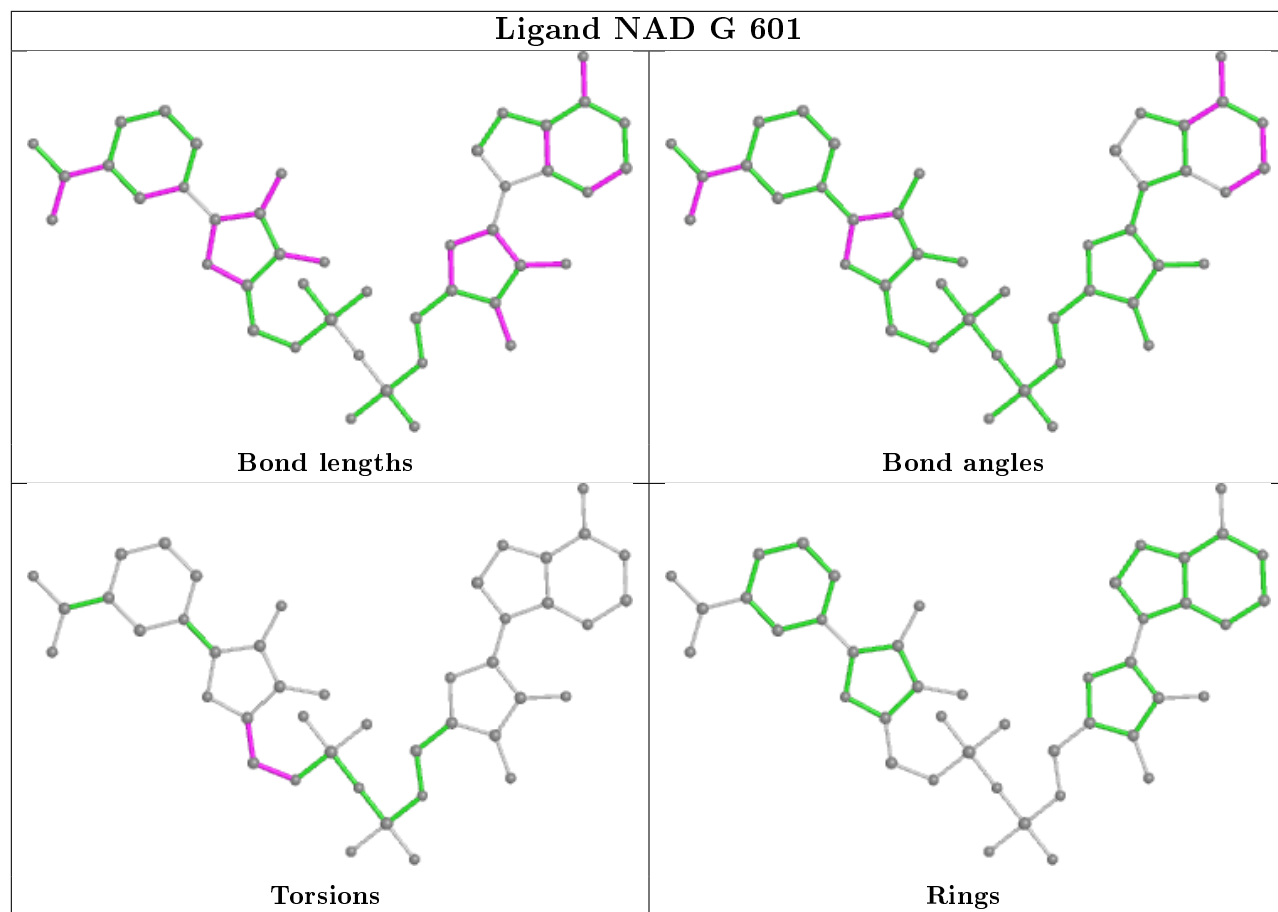
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

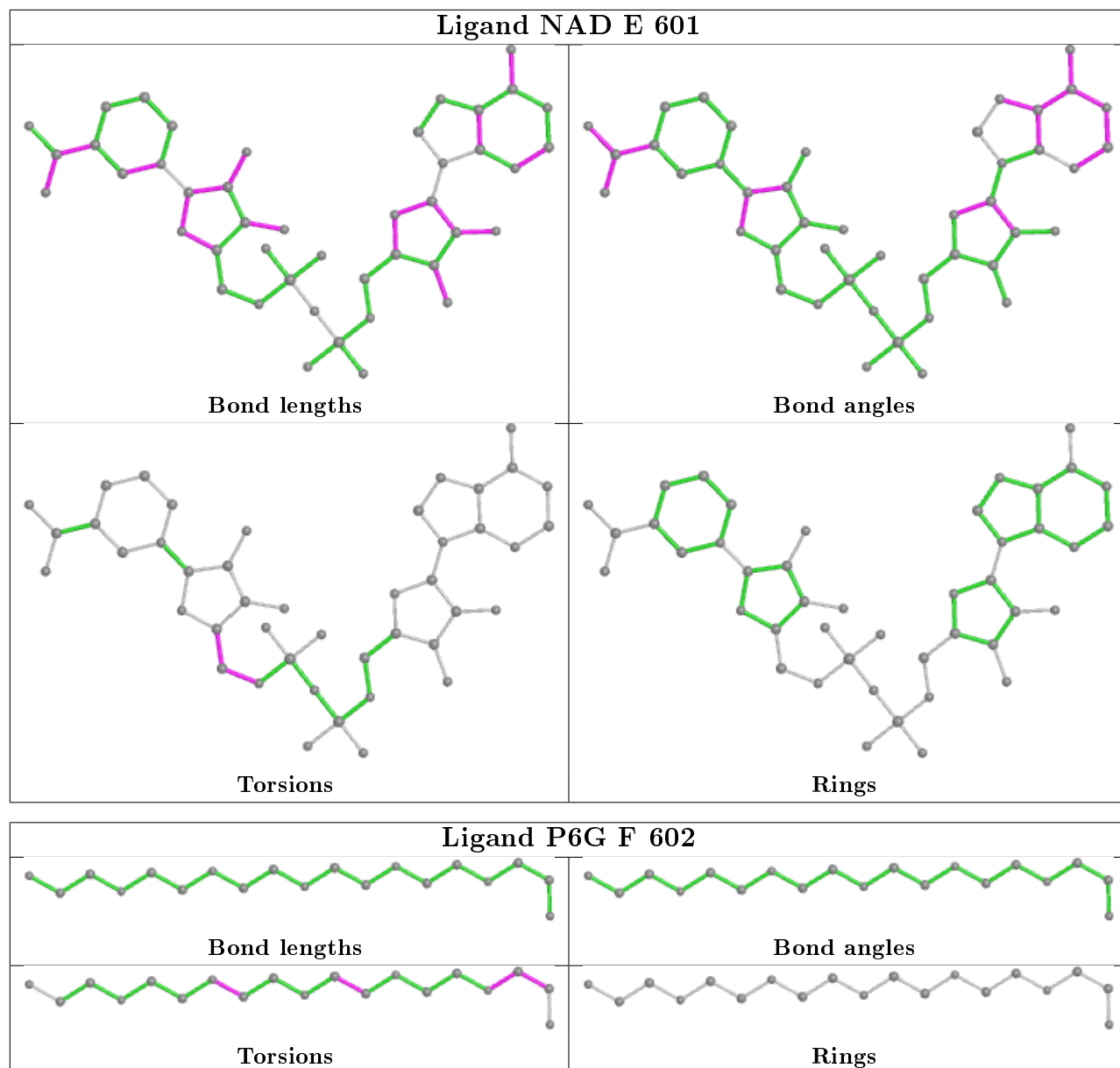


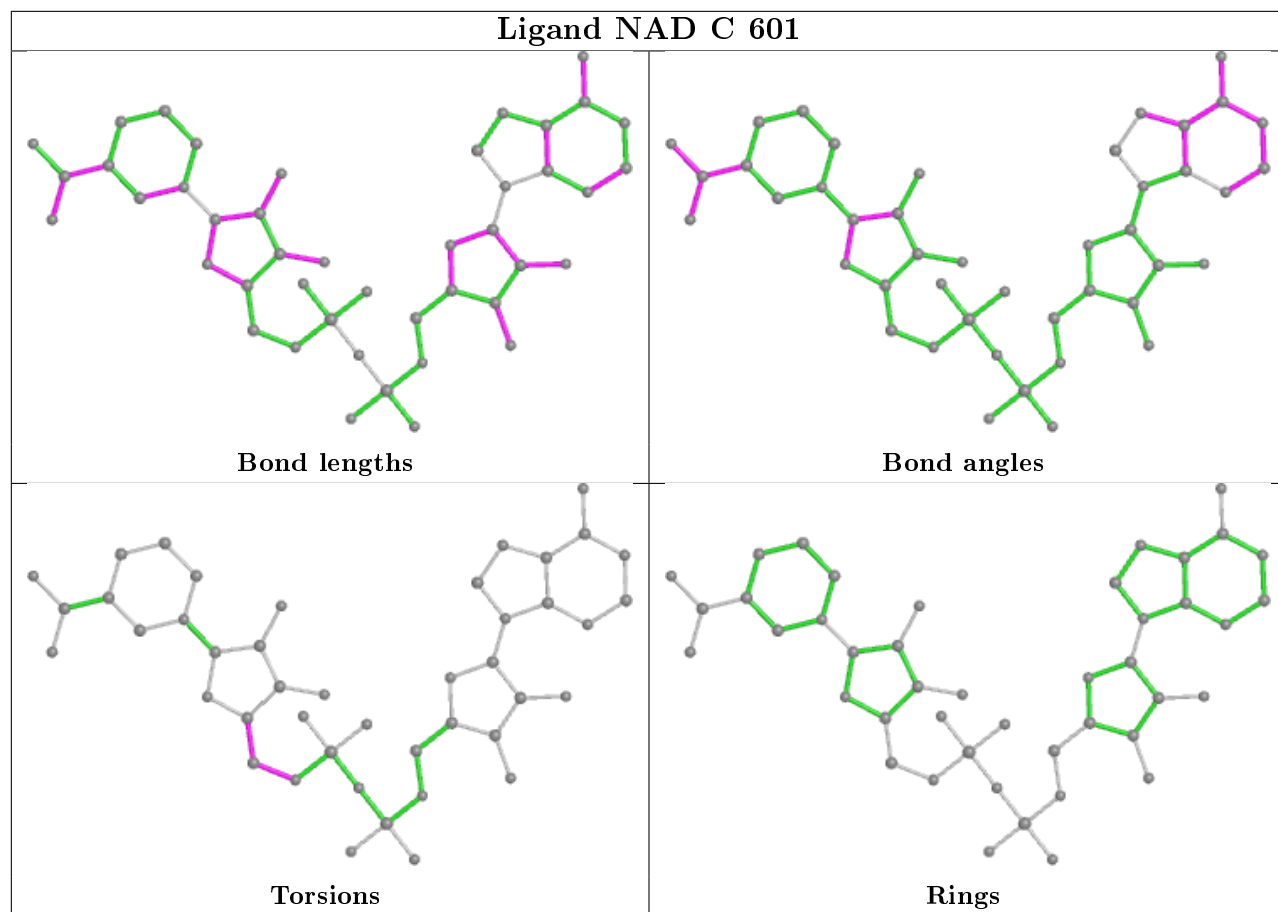


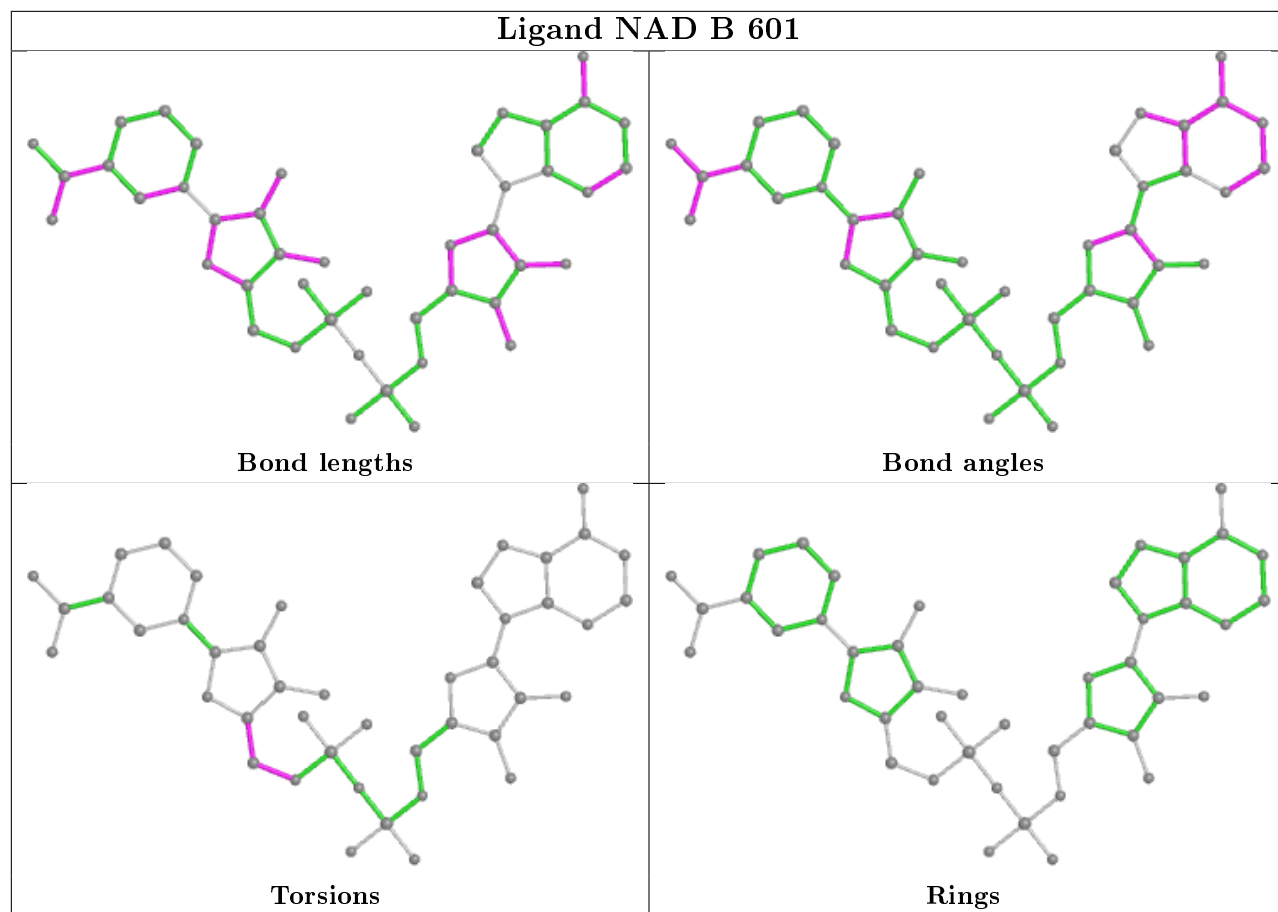












5.7 Other polymers [i](#)

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	508/513 (99%)	-0.28	3 (0%) 89 92	19, 27, 43, 58	0
1	B	508/513 (99%)	-0.32	8 (1%) 72 79	19, 27, 44, 70	0
1	C	508/513 (99%)	-0.30	5 (0%) 82 87	19, 27, 49, 69	0
1	D	509/513 (99%)	-0.25	7 (1%) 75 82	20, 29, 50, 71	0
1	E	508/513 (99%)	-0.36	3 (0%) 89 92	19, 27, 41, 54	0
1	F	509/513 (99%)	-0.30	5 (0%) 82 87	20, 27, 43, 56	0
1	G	508/513 (99%)	-0.39	1 (0%) 95 96	19, 27, 41, 64	0
1	H	509/513 (99%)	-0.34	4 (0%) 86 90	18, 27, 43, 64	0
All	All	4067/4104 (99%)	-0.32	36 (0%) 84 89	18, 27, 45, 71	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	505	ALA	3.6
1	D	502	LEU	3.5
1	D	505	ALA	3.4
1	D	510	PHE	3.3
1	D	503	PRO	3.3
1	D	504	LEU	3.2
1	B	508	ILE	3.1
1	E	510	PHE	3.1
1	B	329	ILE	3.0
1	B	510	PHE	2.9
1	B	504	LEU	2.9
1	F	3	THR	2.7
1	G	337	PRO	2.7
1	F	338	ASN	2.6
1	B	502	LEU	2.6
1	D	508	ILE	2.6

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Mol	Chain	Res	Type	RSRZ
1	F	502	LEU	2.6
1	B	507	GLY	2.5
1	H	510	PHE	2.5
1	C	502	LEU	2.4
1	C	335	TRP	2.4
1	C	510	PHE	2.4
1	E	502	LEU	2.4
1	F	510	PHE	2.4
1	H	9	PRO	2.4
1	F	508	ILE	2.4
1	A	6	ILE	2.3
1	A	11	TYR	2.3
1	B	503	PRO	2.3
1	D	362	LYS	2.3
1	H	4	LEU	2.2
1	C	508	ILE	2.2
1	A	9	PRO	2.2
1	C	462	ALA	2.2
1	E	9	PRO	2.1
1	H	329	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	MG	C	603	1/1	0.87	0.10	48,48,48,48	0
3	PG4	E	602	13/13	0.88	0.12	35,42,49,50	0
4	1PE	H	602	16/16	0.89	0.12	38,46,53,54	0

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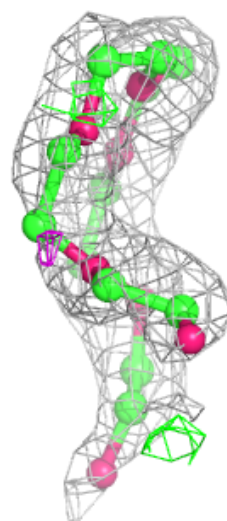
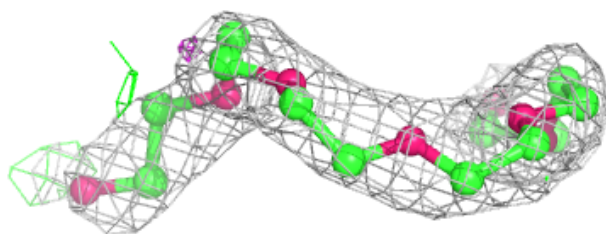
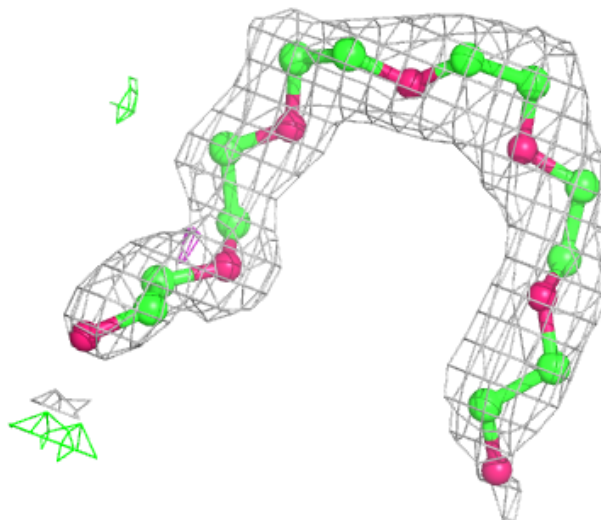
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	PG4	A	602	13/13	0.90	0.14	31,42,55,56	0
6	P6G	F	602	19/19	0.90	0.14	37,46,61,67	0
4	1PE	B	602	16/16	0.90	0.11	41,45,51,56	0
3	PG4	D	602	13/13	0.91	0.12	36,41,54,55	0
4	1PE	G	602	13/16	0.92	0.11	29,44,55,61	0
5	MG	D	603	1/1	0.93	0.08	48,48,48,48	0
5	MG	F	603	1/1	0.94	0.08	39,39,39,39	0
5	MG	H	603	1/1	0.94	0.08	47,47,47,47	0
2	NAD	E	601	44/44	0.95	0.11	18,30,49,56	0
4	1PE	C	602	16/16	0.95	0.12	32,39,53,59	0
2	NAD	H	601	44/44	0.96	0.09	16,29,48,60	0
2	NAD	B	601	44/44	0.96	0.10	20,29,55,62	0
2	NAD	A	601	44/44	0.96	0.12	18,28,51,56	44
2	NAD	D	601	44/44	0.96	0.09	22,31,57,62	0
2	NAD	G	601	44/44	0.96	0.10	19,30,55,66	0
2	NAD	C	601	44/44	0.96	0.10	20,30,57,64	0
5	MG	B	603	1/1	0.97	0.07	43,43,43,43	0
2	NAD	F	601	44/44	0.97	0.10	20,29,53,61	0
5	MG	G	603	1/1	0.97	0.08	44,44,44,44	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.

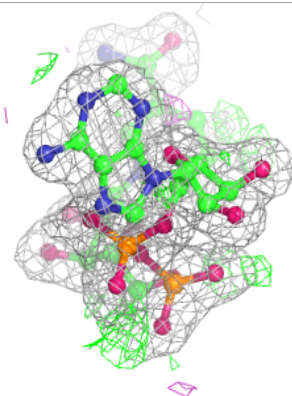
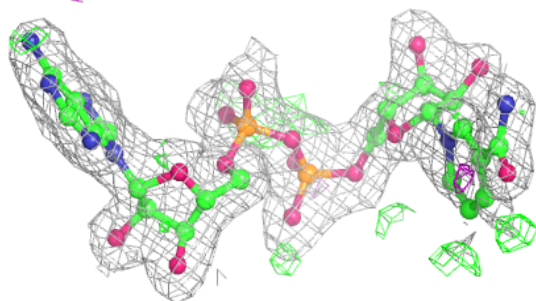
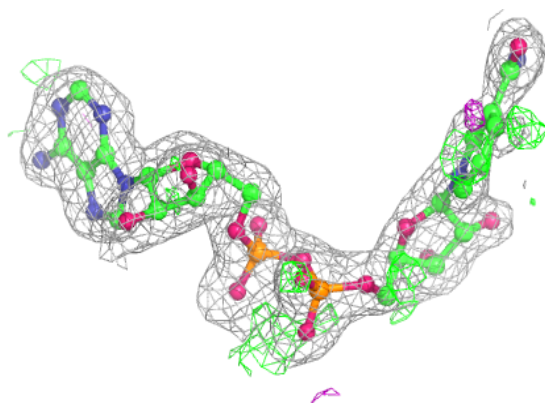
Electron density around P6G F 602:

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

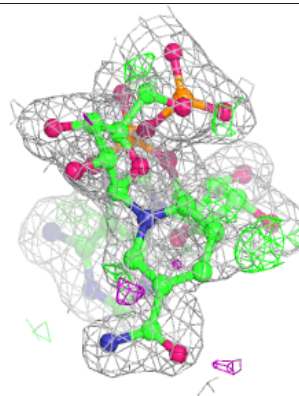
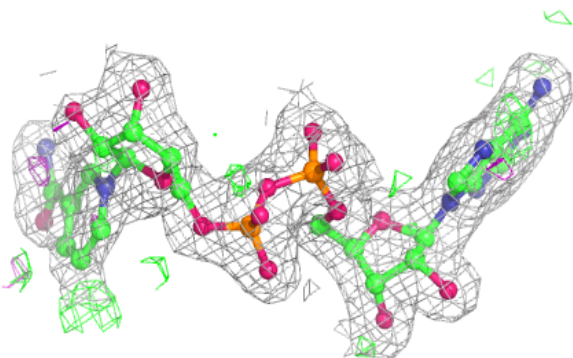
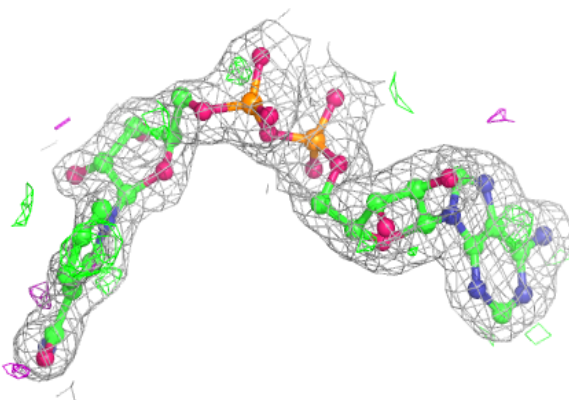


Electron density around NAD E 601:

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

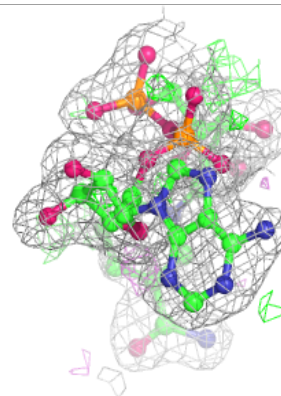
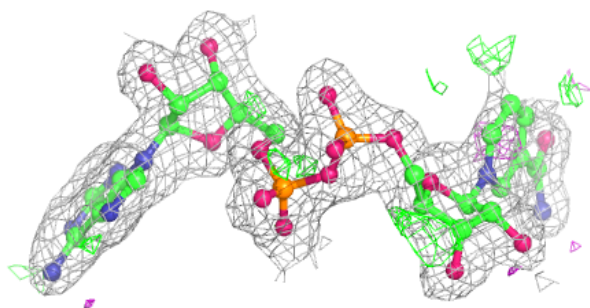
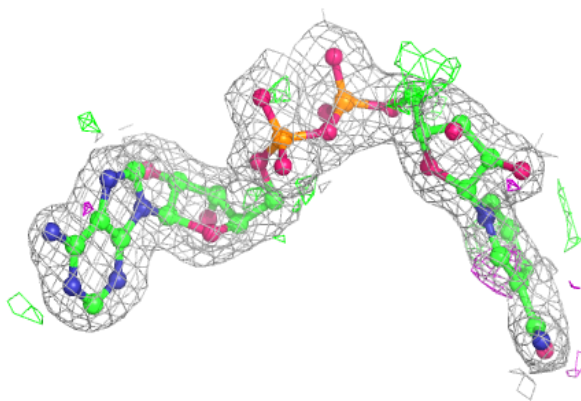
**Electron density around NAD H 601:**

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

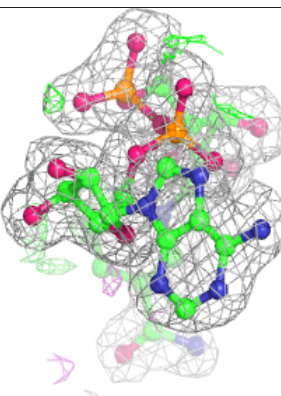
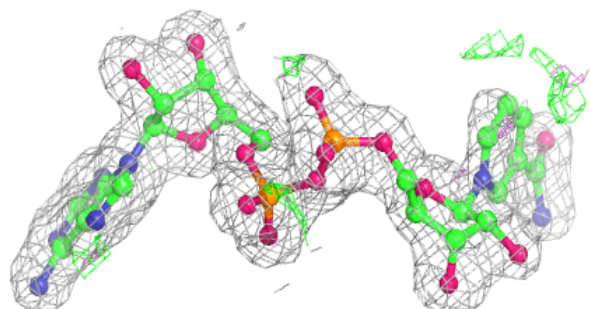
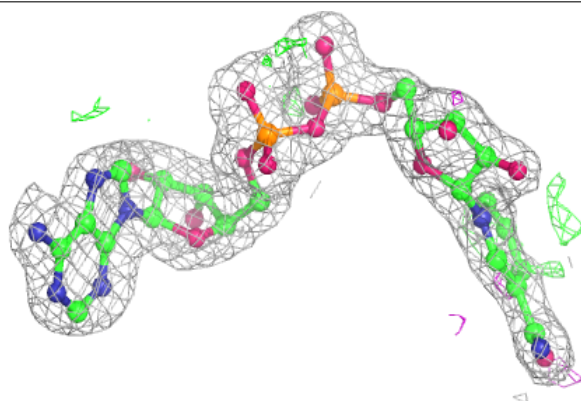


Electron density around NAD B 601:

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

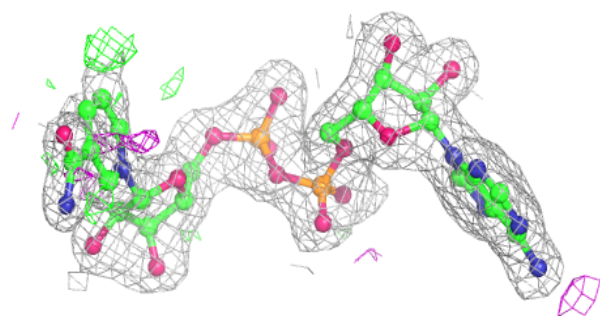
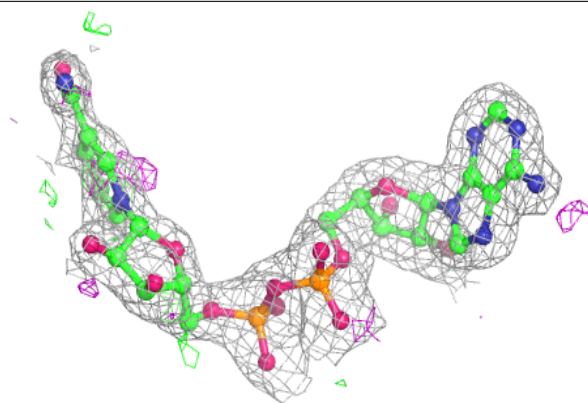
**Electron density around NAD A 601:**

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

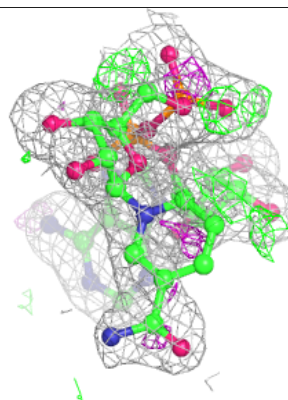
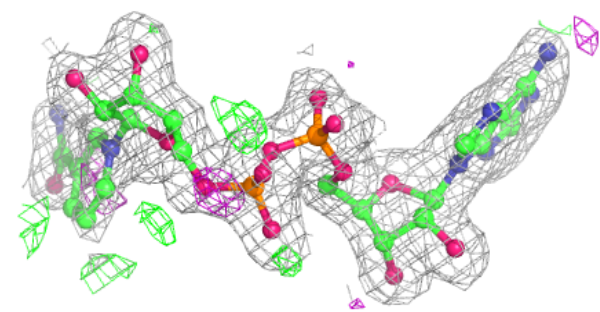
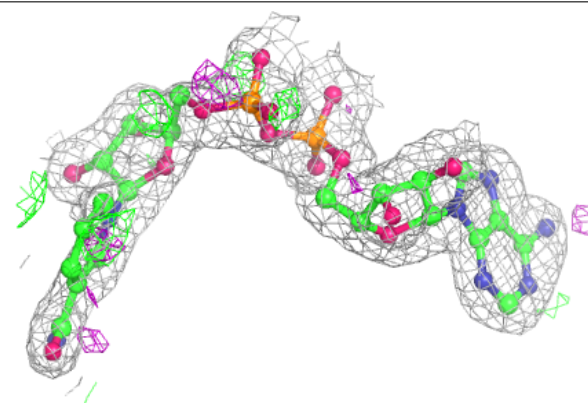


Electron density around NAD D 601:

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

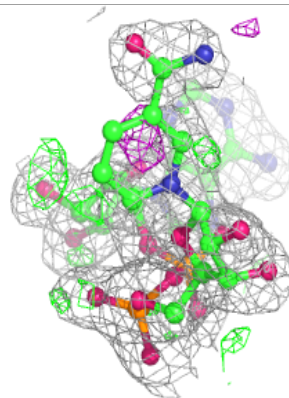
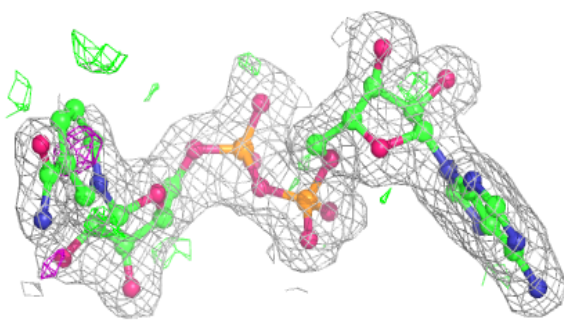
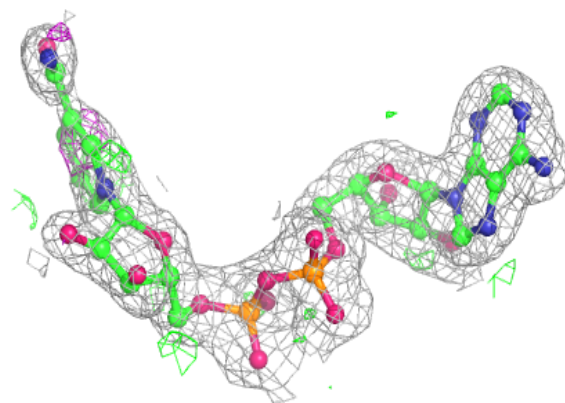
**Electron density around NAD G 601:**

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

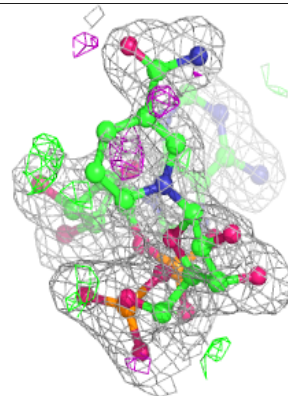
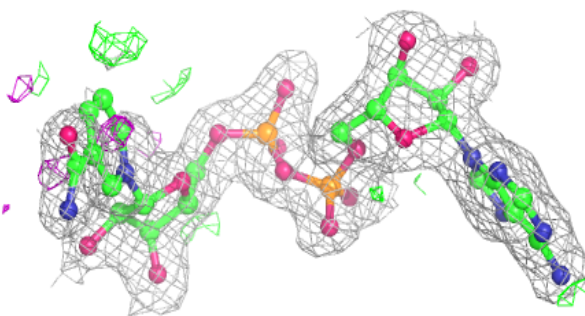
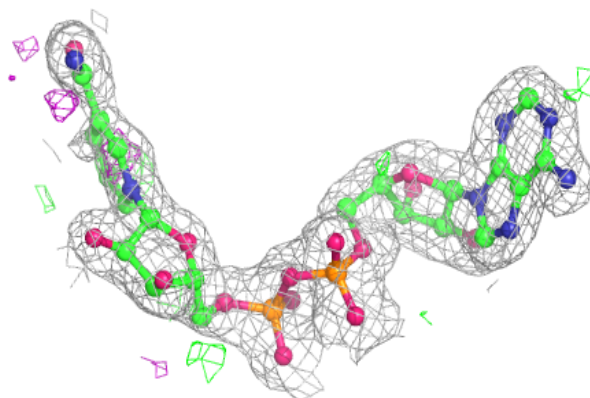


Electron density around NAD C 601:

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

**Electron density around NAD F 601:**

$2mF_o-DF_c$ (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.