



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 06:32 PM UTC

PDB ID : 9E0C / pdb_00009e0c
Title : Structure of proline utilization A complexed with 1-benzofuran-5-ylmethanol
Authors : Tanner, J.J.; Meeks, K.R.
Deposited on : 2024-10-17
Resolution : 1.32 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

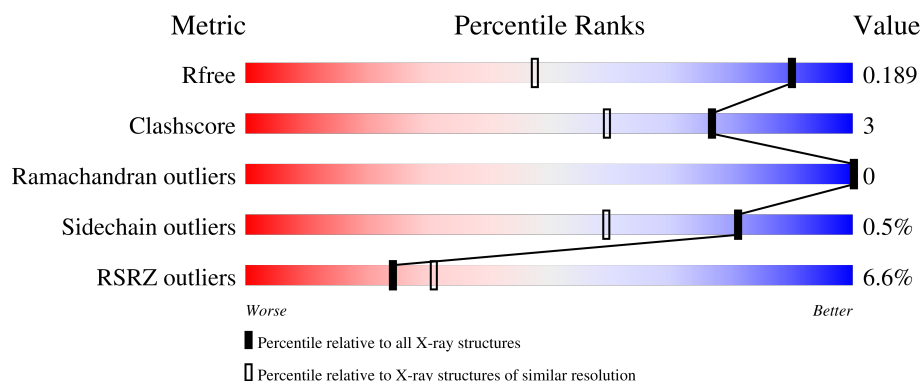
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.32 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	2531 (1.34-1.30)
Clashscore	190562	2585 (1.34-1.30)
Ramachandran outliers	187476	2528 (1.34-1.30)
Sidechain outliers	187428	2528 (1.34-1.30)
RSRZ outliers	180081	2528 (1.34-1.30)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1235	<div> <div>5%</div> <div> <div></div> <div>92%</div> <div>7%</div> </div> </div>
1	B	1235	<div> <div>8%</div> <div> <div></div> <div>91%</div> <div>7%</div> </div> </div>

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	FMT	B	1309	-	-	X	-

2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 21105 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.

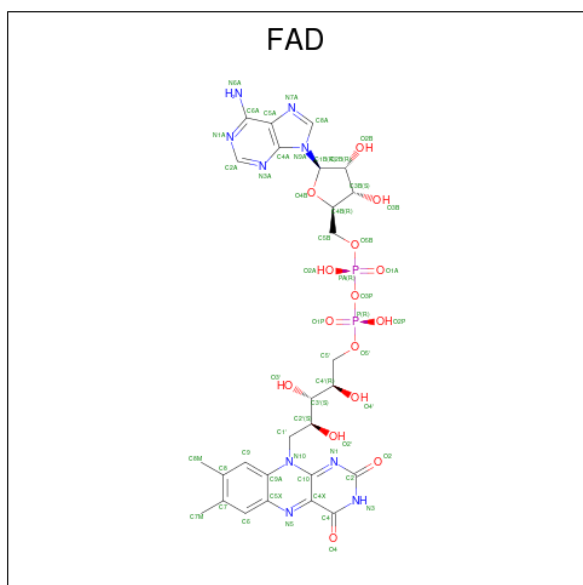
- Molecule 1 is a protein called Bifunctional protein PutA.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	1216	Total	C	N	O	S	0	25	0
			9065	5729	1608	1692	36			
1	B	1210	Total	C	N	O	S	0	27	0
			9031	5700	1621	1676	34			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-1	SER	-	expression tag	UNP F7X6I3
A	0	MET	-	expression tag	UNP F7X6I3
B	-1	SER	-	expression tag	UNP F7X6I3
B	0	MET	-	expression tag	UNP F7X6I3

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	
			106	54	18	30	4	
2	B	1	Total	C	N	O	P	
			106	54	18	30	4	

- Molecule 3 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



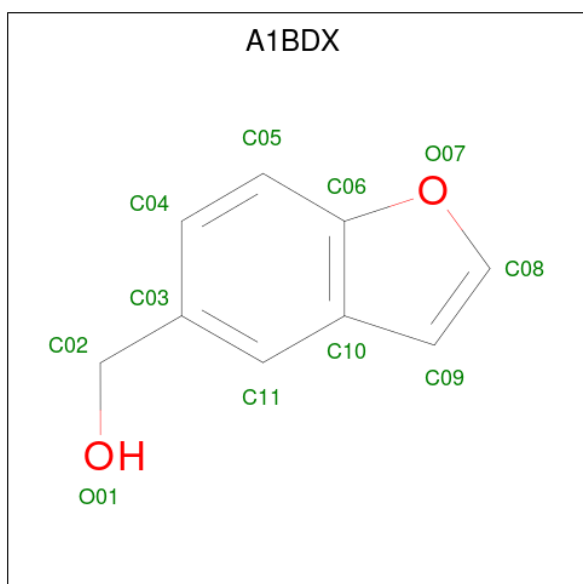
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O		
			7	4	3	0	0
3	A	1	Total	C	O		
			7	4	3	0	0
3	B	1	Total	C	O		
			7	4	3	0	0
3	B	1	Total	C	O		
			7	4	3	0	0
3	B	1	Total	C	O		
			7	4	3	0	0

- Molecule 4 is FORMIC ACID (CCD ID: FMT) (formula: CH_2O_2).



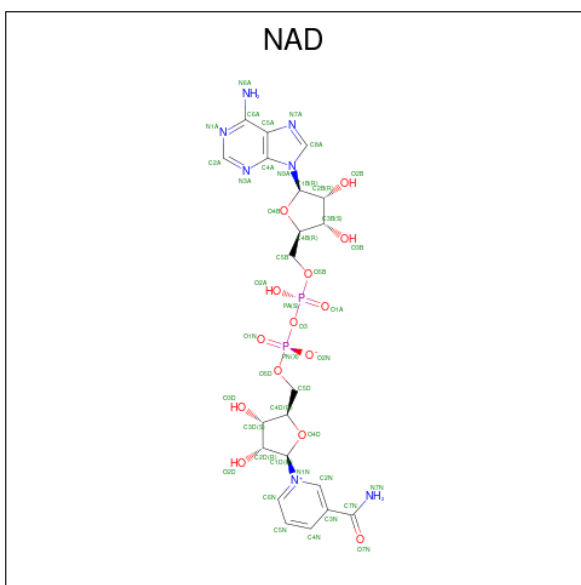
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		
4	B	1	Total	C	O	0	0
			3	1	2		

- Molecule 5 is (1-benzofuran-5-yl)methanol (CCD ID: A1BDX) (formula: $C_9H_8O_2$) (labeled as "Ligand of Interest" by depositor).



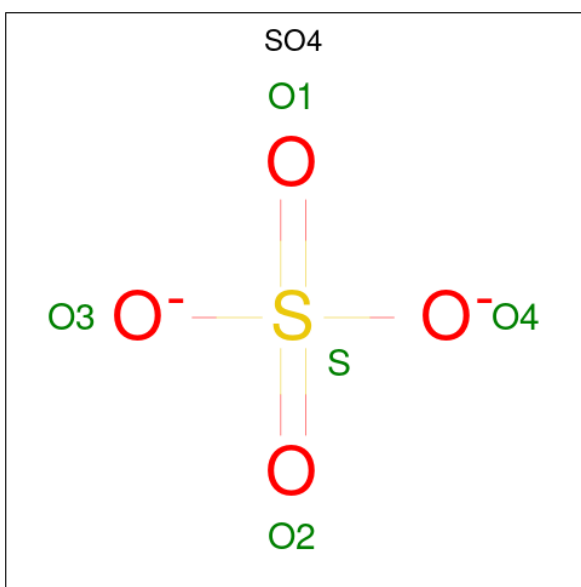
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total 11	C 9	O 2	0	0
5	B	1	Total 11	C 9	O 2	0	0

- Molecule 6 is NICOTINAMIDE-ADENINE-DINUCLEOTIDE (CCD ID: NAD) (formula: $\text{C}_{21}\text{H}_{27}\text{N}_7\text{O}_{14}\text{P}_2$) (labeled as "Ligand of Interest" by depositor).



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

- Molecule 7 is SULFATE ION (CCD ID: SO4) (formula: O_4S).

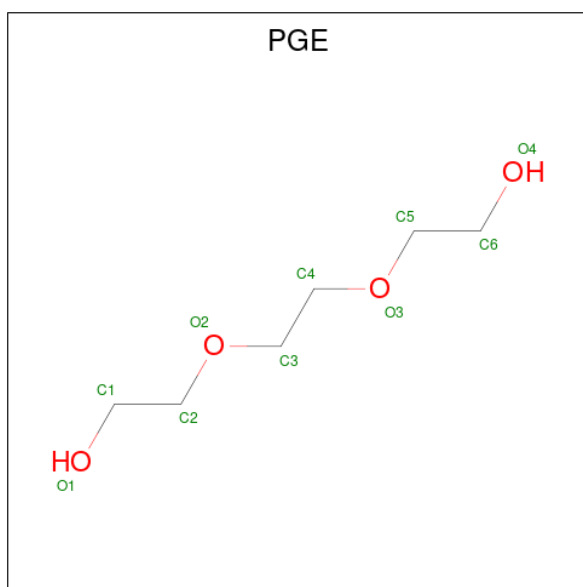


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	A	1	Total	O	S	0	0
			5	4	1		
7	B	1	Total	O	S	0	0
			5	4	1		
7	B	1	Total	O	S	0	0
			5	4	1		

- Molecule 8 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

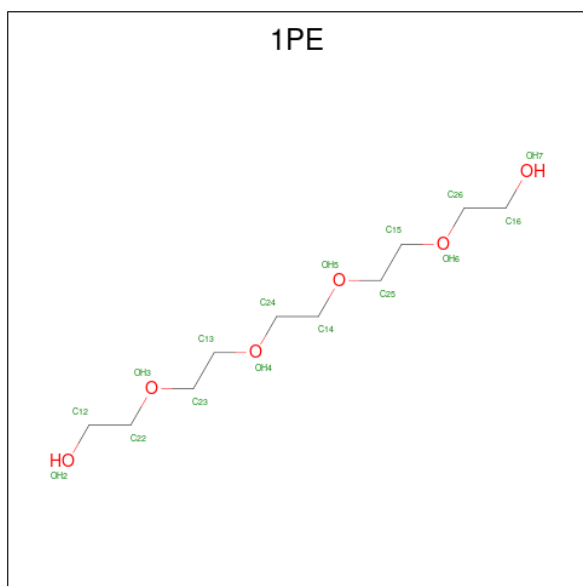
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Mg	0	0
			1	1		
8	B	1	Total	Mg	0	0
			1	1		

- Molecule 9 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: C₆H₁₄O₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	B	1	Total	C	O	0	0
			10	6	4		

- Molecule 10 is PENTAETHYLENE GLYCOL (CCD ID: 1PE) (formula: $C_{10}H_{22}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	B	1	Total	C	O	0	0
			16	10	6		

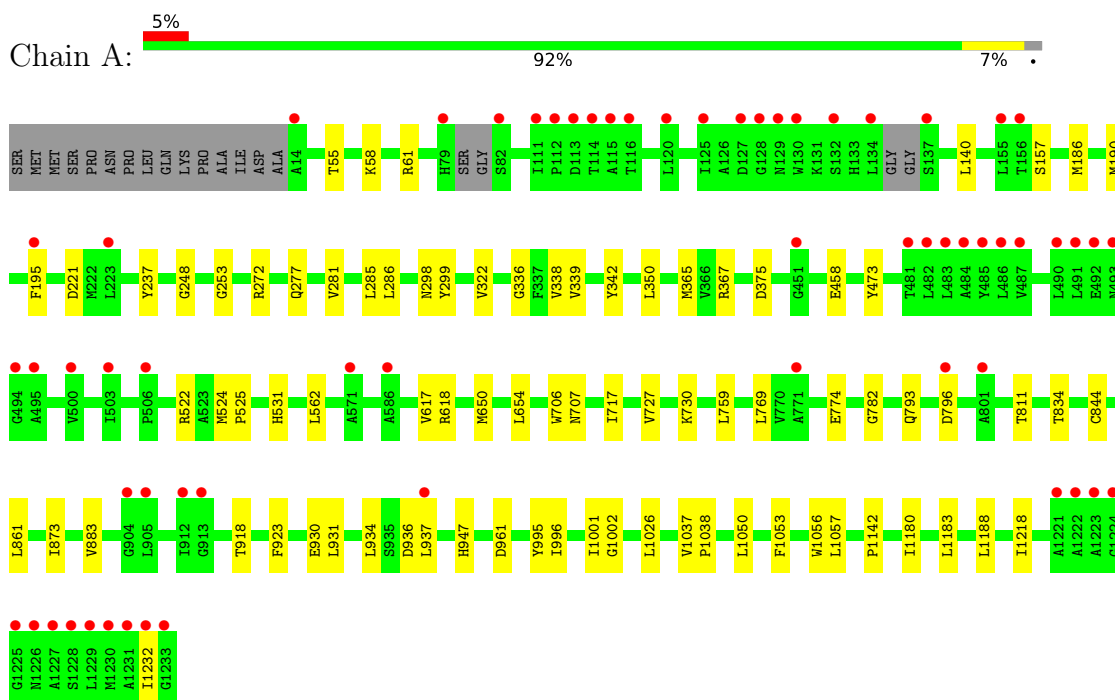
- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	1295	Total 1295	O 1295	0	0
11	B	1282	Total 1282	O 1282	0	4

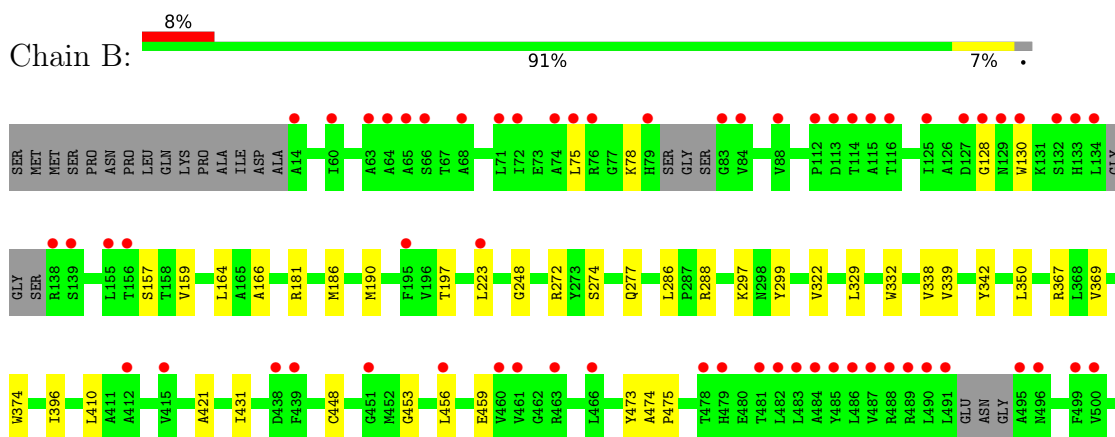
3 Residue-property plots [i](#)

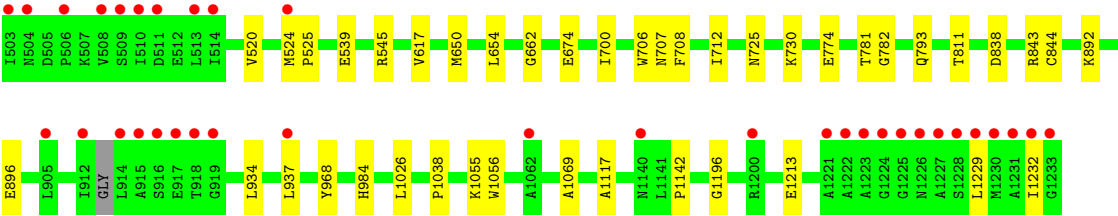
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density.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

• Molecule 1: Bifunctional protein PutA



• Molecule 1: Bifunctional protein PutA





4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	100.37Å 101.64Å 125.92Å 90.00° 106.42° 90.00°	Depositor
Resolution (Å)	48.14 – 1.32 48.14 – 1.32	Depositor EDS
% Data completeness (in resolution range)	93.1 (48.14-1.32) 93.9 (48.14-1.32)	Depositor EDS
R_{merge}	0.06	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.23 (at 1.32Å)	Xtriage
Refinement program	PHENIX 1.21rc1_5156	Depositor
R, R_{free}	0.172 , 0.190 0.171 , 0.189	Depositor DCC
R_{free} test set	26921 reflections (4.75%)	wwPDB-VP
Wilson B-factor (Å ²)	17.3	Xtriage
Anisotropy	0.269	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 37.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	21105	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.71% 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: PEG, NAD, MG, FAD, A1BDX, SO4, 1PE, PGE, FMT

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	0.26	0/9285	0.45	0/12646
1	B	0.29	0/9276	0.48	0/12624
All	All	0.27	0/18561	0.47	0/25270

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	9065	0	9105	49	0
1	B	9031	0	9050	56	0
2	A	106	0	62	3	0
2	B	106	0	62	3	0
3	A	14	0	20	0	0
3	B	21	0	30	3	0
4	A	3	0	1	0	0
4	B	9	0	3	4	0
5	A	11	0	0	0	0
5	B	11	0	0	0	0
6	A	44	0	26	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	44	0	26	2	0
7	A	25	0	0	1	0
7	B	10	0	0	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
9	B	10	0	14	0	0
10	B	16	0	22	0	0
11	A	1295	0	0	9	1
11	B	1282	0	0	9	1
All	All	21105	0	18421	107	1

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:844:CYS:SG	6:B:1311:NAD:C4N	2.72	0.77
1:A:281:VAL:HG13	1:A:285[B]:LEU:HD23	1.71	0.72
1:B:674:GLU:OE1	11:B:1401:HOH:O	2.07	0.72
1:B:793:GLN:OE1	11:B:1402:HOH:O	2.08	0.72
1:B:339[A]:VAL:HG21	1:B:350:LEU:HD21	1.75	0.69
1:A:339[A]:VAL:HG21	1:A:350:LEU:HD21	1.78	0.64
1:A:796:ASP:OD1	11:A:1401:HOH:O	2.15	0.63
1:A:844:CYS:SG	6:A:1305:NAD:C4N	2.85	0.63
1:A:996[B]:ILE:HD12	1:A:1218:ILE:HG12	1.81	0.63
1:A:286:LEU:HD21	1:A:322:VAL:HG11	1.79	0.63
1:B:1213:GLU:HG3	4:B:1309:FMT:H	1.81	0.62
1:B:838:ASP:OD1	1:B:843[A]:ARG:NH2	2.34	0.61
1:A:873:ILE:HG13	1:A:883:VAL:HB	1.83	0.60
1:A:1183:LEU:O	11:A:1402:HOH:O	2.17	0.59
1:B:650:MET:O	1:B:654:LEU:HG	2.02	0.58
1:B:539:GLU:OE1	11:B:1403:HOH:O	2.16	0.58
1:A:524[A]:MET:HE3	1:A:525:PRO:HD2	1.85	0.58
1:B:286:LEU:HD21	1:B:322:VAL:HG11	1.86	0.58
1:B:297:LYS:HD2	1:B:329:LEU:HA	1.85	0.57
1:B:838:ASP:HB3	1:B:843[A]:ARG:HH12	1.69	0.57
1:B:1213:GLU:CG	4:B:1309:FMT:H	2.36	0.56
1:B:197[B]:THR:HG21	1:B:474:ALA:HB1	1.88	0.55
1:B:1213:GLU:H	4:B:1309:FMT:H	1.70	0.55
1:A:793:GLN:OE1	11:A:1403:HOH:O	2.17	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:844:CYS:SG	6:B:1311:NAD:C3N	2.96	0.53
1:B:524[A]:MET:HE3	1:B:525:PRO:HD2	1.90	0.53
1:B:1213:GLU:H	4:B:1309:FMT:C	2.21	0.53
1:B:1056:TRP:CD1	1:B:1142:PRO:HD3	2.43	0.53
1:A:458:GLU:OE1	11:A:1404:HOH:O	2.19	0.52
1:A:961:ASP:OD2	1:B:1055:LYS:NZ	2.40	0.52
1:B:782:GLY:O	1:B:811:THR:HA	2.10	0.52
1:A:995:TYR:OH	1:A:1002[A]:GLY:O	2.22	0.51
1:A:298:ASN:ND2	11:A:1411:HOH:O	2.29	0.51
1:A:1026:LEU:HD23	1:A:1038:PRO:HG2	1.92	0.50
1:A:473:TYR:HB2	2:A:1301[A]:FAD:HM71	1.94	0.50
1:B:968[B]:TYR:OH	11:B:1404:HOH:O	2.18	0.49
1:A:562:LEU:HD11	1:A:654:LEU:HD12	1.95	0.49
1:B:937:LEU:HD12	11:B:2256:HOH:O	2.12	0.49
1:B:78:LYS:NZ	1:B:459:GLU:OE2	2.36	0.48
1:A:706:TRP:CE3	1:A:707:ASN:HA	2.49	0.48
1:A:759[A]:LEU:HD13	1:A:769:LEU:HD21	1.95	0.48
1:A:157:SER:OG	7:A:1310:SO4:O4	2.30	0.48
1:A:375[B]:ASP:OD1	11:A:1405:HOH:O	2.20	0.47
1:B:274[B]:SER:OG	11:B:1405:HOH:O	2.20	0.47
1:A:844:CYS:SG	6:A:1305:NAD:C3N	3.03	0.47
1:B:662:GLY:HA2	11:B:1462:HOH:O	2.14	0.47
1:B:706:TRP:CE3	1:B:707:ASN:HA	2.50	0.47
1:B:1196:GLY:HA3	3:B:1306:PEG:H22	1.96	0.46
1:A:248:GLY:HA3	1:A:299:TYR:CG	2.50	0.46
1:B:708:PHE:CD1	3:B:1308:PEG:H31	2.51	0.46
1:A:272:ARG:HB3	1:A:277:GLN:HG3	1.97	0.46
1:B:1026:LEU:HD23	1:B:1038:PRO:HG2	1.98	0.45
1:B:1229:LEU:HD23	1:B:1232:ILE:HD12	1.98	0.45
1:B:892[A]:LYS:NZ	1:B:896:GLU:OE2	2.42	0.45
1:B:396:ILE:HD11	1:B:520:VAL:HB	1.98	0.45
1:A:717:ILE:HG12	1:A:727:VAL:HG11	1.99	0.45
1:B:374:TRP:HZ3	1:B:1229:LEU:HB3	1.80	0.45
2:B:1301[A]:FAD:H9	2:B:1301[A]:FAD:H1'1	1.75	0.45
1:B:186:MET:O	1:B:190:MET:HG3	2.17	0.45
1:A:782:GLY:O	1:A:811:THR:HA	2.17	0.45
1:B:712:ILE:HD13	1:B:781:THR:HG21	1.99	0.44
1:B:473:TYR:HB2	2:B:1301[B]:FAD:HM71	1.98	0.44
1:B:448:CYS:HB2	1:B:453:GLY:HA3	1.99	0.44
1:B:892[B]:LYS:NZ	11:B:1427:HOH:O	2.44	0.44
1:A:861[B]:LEU:HD21	1:A:930:GLU:CD	2.43	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:197[B]:THR:HG22	1:B:475:PRO:O	2.17	0.44
1:A:618:ARG:NH2	11:A:1424:HOH:O	2.39	0.43
1:A:1056:TRP:CD1	1:A:1142:PRO:HD3	2.53	0.43
1:B:984:HIS:C	1:B:984:HIS:CD2	2.96	0.43
1:B:159:VAL:HG13	1:B:164:LEU:HD12	1.99	0.43
1:A:1037:VAL:HG11	1:B:166:ALA:HB1	2.01	0.43
1:B:248:GLY:HA3	1:B:299:TYR:CG	2.54	0.43
1:A:1050:LEU:C	1:A:1050:LEU:HD13	2.43	0.42
1:B:272:ARG:HB3	1:B:277:GLN:HG3	2.01	0.42
1:A:1053:PHE:CE2	1:A:1057:LEU:HD11	2.55	0.42
1:B:545:ARG:HA	3:B:1307:PEG:H22	2.01	0.42
1:A:834:THR:HG22	1:A:1001[B]:ILE:HD11	2.01	0.42
2:A:1301[A]:FAD:H8A	11:A:1786:HOH:O	2.19	0.42
1:B:369:VAL:HG12	1:B:421:ALA:HB3	2.00	0.42
1:A:221:ASP:HB2	1:A:473:TYR:CZ	2.54	0.42
1:A:650:MET:O	1:A:654:LEU:HG	2.20	0.42
1:A:531:HIS:CE1	1:A:1232:ILE:HG23	2.54	0.42
1:B:617:VAL:HG12	1:B:774:GLU:HB2	2.02	0.42
1:B:1069:ALA:HA	1:B:1117:ALA:HB1	2.01	0.42
1:B:288[B]:ARG:HD3	11:B:1499:HOH:O	2.20	0.41
1:A:1180:ILE:HG23	1:A:1188:LEU:HD12	2.02	0.41
1:B:128:GLY:O	1:B:130:TRP:N	2.49	0.41
1:B:410:LEU:HD11	1:B:431:ILE:HG23	2.02	0.41
1:B:297:LYS:HG3	1:B:332:TRP:HB2	2.02	0.41
1:A:617:VAL:HG12	1:A:774:GLU:HB2	2.02	0.41
1:A:186:MET:HE2	1:A:186:MET:HB2	1.90	0.41
1:B:338:VAL:HG22	1:B:367:ARG:HB3	2.03	0.41
2:B:1301[B]:FAD:HM73	2:B:1301[B]:FAD:HM81	1.88	0.41
1:A:253:GLY:HA2	11:A:2363:HOH:O	2.20	0.41
1:A:918:THR:HB	1:A:923:PHE:CD1	2.56	0.41
2:A:1301[B]:FAD:H4'	2:A:1301[B]:FAD:H1'1	1.82	0.41
1:A:931:LEU:HD13	1:A:936:ASP:HB2	2.01	0.41
1:A:937:LEU:HD21	1:A:947:HIS:CD2	2.56	0.41
1:B:75:LEU:HD11	1:B:456:LEU:HD13	2.03	0.41
1:B:223:LEU:HD21	1:B:475:PRO:HB3	2.03	0.41
1:A:58:LYS:HD3	1:A:61:ARG:NH2	2.36	0.40
1:A:55:THR:OG1	1:A:522:ARG:NH2	2.43	0.40
1:A:237:TYR:CD1	1:A:237:TYR:C	2.99	0.40
1:A:338:VAL:HG22	1:A:367:ARG:HB3	2.04	0.40
1:A:190:MET:HE2	1:A:195:PHE:CZ	2.56	0.40
1:A:336:GLY:HA2	1:A:365:MET:O	2.22	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:700[B]:ILE:HG12	1:B:725:ASN:HB3	2.03	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
11:A:1407:HOH:O	11:B:2315:HOH:O[2_556]	2.18	0.02

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	1235/1235 (100%)	1217 (98%)	18 (2%)	0	100	100
1	B	1229/1235 (100%)	1207 (98%)	22 (2%)	0	100	100
All	All	2464/2470 (100%)	2424 (98%)	40 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	909/951 (96%)	905 (100%)	4 (0%)	84	64
1	B	900/951 (95%)	893 (99%)	7 (1%)	73	45

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	1809/1902 (95%)	1798 (99%)	11 (1%)	81	54

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	140	LEU
1	A	342	TYR
1	A	730	LYS
1	A	934	LEU
1	B	157[A]	SER
1	B	157[B]	SER
1	B	181[A]	ARG
1	B	181[B]	ARG
1	B	342	TYR
1	B	730	LYS
1	B	934	LEU

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

Mol	Chain	Res	Type
1	A	667	ASN
1	A	1040	GLN
1	A	1140	ASN
1	B	793	GLN

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 oligosaccharides in this entry.

5.6 Ligand geometry

Of 28 ligands modelled in this entry, 2 are monoatomic - leaving 26 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	FAD	B	1301[B]	-	58,58,58	2.40	16 (27%)	85,89,89	1.66	19 (22%)
4	FMT	B	1309	-	2,2,2	0.63	0	1,1,1	0.54	0
2	FAD	A	1301[A]	-	58,58,58	2.20	13 (22%)	85,89,89	1.69	16 (18%)
5	A1BDX	B	1310	-	12,12,12	2.41	7 (58%)	16,16,16	2.54	5 (31%)
2	FAD	B	1301[A]	-	58,58,58	2.15	14 (24%)	85,89,89	1.57	18 (21%)
9	PGE	B	1302	-	9,9,9	0.33	0	8,8,8	0.50	0
4	FMT	B	1305	-	2,2,2	0.62	0	1,1,1	0.23	0
4	FMT	A	1303	-	2,2,2	0.49	0	1,1,1	0.29	0
7	SO4	A	1310	-	4,4,4	0.67	0	6,6,6	0.07	0
7	SO4	B	1313	-	4,4,4	0.66	0	6,6,6	0.11	0
6	NAD	B	1311	8	46,48,48	2.06	6 (13%)	64,73,73	1.85	10 (15%)
7	SO4	A	1309	-	4,4,4	0.69	0	6,6,6	0.15	0
6	NAD	A	1305	8	46,48,48	2.13	9 (19%)	64,73,73	1.69	10 (15%)
7	SO4	B	1312	-	4,4,4	0.57	0	6,6,6	0.20	0
3	PEG	A	1312	-	6,6,6	0.27	0	5,5,5	0.18	0
3	PEG	B	1307	-	6,6,6	0.25	0	5,5,5	0.26	0
10	1PE	B	1304	-	15,15,15	0.27	0	14,14,14	0.37	0
7	SO4	A	1308	-	4,4,4	0.67	0	6,6,6	0.14	0
3	PEG	B	1306	-	6,6,6	0.26	0	5,5,5	0.20	0
5	A1BDX	A	1304	-	12,12,12	2.53	7 (58%)	16,16,16	2.46	5 (31%)
7	SO4	A	1306	-	4,4,4	0.58	0	6,6,6	0.30	0
7	SO4	A	1307	-	4,4,4	0.61	0	6,6,6	0.16	0
3	PEG	B	1308	-	6,6,6	0.25	0	5,5,5	0.26	0
3	PEG	A	1302	-	6,6,6	0.26	0	5,5,5	0.20	0
2	FAD	A	1301[B]	-	58,58,58	2.24	14 (24%)	85,89,89	1.78	21 (24%)
4	FMT	B	1303	-	2,2,2	0.80	0	1,1,1	0.32	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns.

'-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	FAD	B	1301[B]	-	-	9/34/50/50	0/6/6/6
6	NAD	A	1305	8	-	3/30/62/62	0/5/5/5
3	PEG	A	1312	-	-	1/4/4/4	-
3	PEG	B	1307	-	-	2/4/4/4	-
2	FAD	A	1301[A]	-	-	11/34/50/50	0/6/6/6
6	NAD	B	1311	8	-	4/30/62/62	0/5/5/5
10	1PE	B	1304	-	-	3/13/13/13	-
3	PEG	B	1306	-	-	1/4/4/4	-
5	A1BDX	B	1310	-	-	0/2/2/2	0/2/2/2
2	FAD	B	1301[A]	-	-	2/34/50/50	0/6/6/6
5	A1BDX	A	1304	-	-	0/2/2/2	0/2/2/2
3	PEG	B	1308	-	-	4/4/4/4	-
3	PEG	A	1302	-	-	0/4/4/4	-
2	FAD	A	1301[B]	-	-	2/34/50/50	0/6/6/6
9	PGE	B	1302	-	-	0/7/7/7	-

All (86) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1301[B]	FAD	PA-O3P	-10.67	1.48	1.59
2	B	1301[A]	FAD	PA-O3P	-9.72	1.49	1.59
2	A	1301[B]	FAD	PA-O3P	-9.33	1.49	1.59
2	A	1301[A]	FAD	PA-O3P	-9.08	1.49	1.59
6	B	1311	NAD	PA-O3	-7.66	1.51	1.59
6	A	1305	NAD	PA-O3	-7.36	1.51	1.59
2	B	1301[B]	FAD	O4-C4	7.11	1.37	1.23
2	A	1301[B]	FAD	O4-C4	6.92	1.36	1.23
2	A	1301[A]	FAD	O4-C4	6.48	1.35	1.23
6	A	1305	NAD	C2N-N1N	6.36	1.42	1.35
2	B	1301[A]	FAD	O4-C4	6.27	1.35	1.23
6	B	1311	NAD	C2N-N1N	6.09	1.41	1.35
2	B	1301[B]	FAD	O2-C2	5.68	1.35	1.24
6	A	1305	NAD	C7N-N7N	5.09	1.42	1.33
2	A	1301[B]	FAD	O2-C2	4.90	1.34	1.24
2	A	1301[A]	FAD	O2-C2	4.73	1.33	1.24
6	B	1311	NAD	C7N-N7N	4.60	1.41	1.33
5	A	1304	A1BDX	O07-C08	-4.59	1.31	1.38
2	B	1301[A]	FAD	O2-C2	4.56	1.33	1.24
2	A	1301[B]	FAD	C4X-N5	4.20	1.39	1.30
2	B	1301[B]	FAD	C4X-N5	4.12	1.39	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1301[A]	FAD	C6A-N6A	4.06	1.44	1.34
2	B	1301[B]	FAD	C6A-N6A	4.05	1.44	1.34
5	B	1310	A1BDX	O07-C08	-4.03	1.32	1.38
2	A	1301[B]	FAD	C6A-N6A	4.03	1.44	1.34
6	B	1311	NAD	C6A-N6A	4.01	1.44	1.34
2	A	1301[A]	FAD	P-O3P	3.97	1.63	1.59
2	B	1301[A]	FAD	C6A-N6A	3.93	1.44	1.34
2	B	1301[A]	FAD	C4X-N5	3.84	1.39	1.30
2	A	1301[A]	FAD	C4X-N5	3.84	1.39	1.30
5	A	1304	A1BDX	C11-C10	3.71	1.47	1.40
6	A	1305	NAD	C6A-N6A	3.70	1.43	1.34
5	B	1310	A1BDX	C11-C10	3.55	1.46	1.40
5	B	1310	A1BDX	C05-C06	3.22	1.46	1.39
5	A	1304	A1BDX	C05-C06	3.19	1.46	1.39
2	B	1301[B]	FAD	C2-N1	3.15	1.43	1.36
2	A	1301[B]	FAD	PA-O5B	-3.15	1.47	1.59
5	A	1304	A1BDX	C11-C03	3.09	1.44	1.39
2	A	1301[B]	FAD	P-O3P	2.98	1.62	1.59
5	B	1310	A1BDX	C11-C03	2.92	1.44	1.39
2	A	1301[A]	FAD	O2'-C2'	-2.88	1.37	1.43
2	A	1301[A]	FAD	C2-N1	2.79	1.43	1.36
5	B	1310	A1BDX	C05-C04	2.75	1.43	1.38
2	B	1301[B]	FAD	O2'-C2'	-2.73	1.37	1.43
2	B	1301[B]	FAD	PA-O5B	-2.72	1.48	1.59
5	A	1304	A1BDX	C05-C04	2.69	1.43	1.38
2	A	1301[B]	FAD	C2-N1	2.68	1.42	1.36
2	A	1301[B]	FAD	O4'-C4'	-2.66	1.37	1.43
2	B	1301[A]	FAD	O4'-C4'	-2.60	1.37	1.43
5	A	1304	A1BDX	C09-C08	2.59	1.38	1.33
6	A	1305	NAD	C6N-N1N	2.55	1.41	1.35
6	A	1305	NAD	PA-O5B	-2.55	1.49	1.59
2	A	1301[A]	FAD	O4'-C4'	-2.54	1.38	1.43
2	A	1301[B]	FAD	O2'-C2'	-2.53	1.38	1.43
2	B	1301[A]	FAD	P-O3P	2.50	1.62	1.59
2	B	1301[B]	FAD	C10-N1	2.49	1.38	1.33
2	B	1301[B]	FAD	P-O3P	2.48	1.62	1.59
2	A	1301[A]	FAD	PA-O5B	-2.47	1.49	1.59
2	B	1301[B]	FAD	O4'-C4'	-2.46	1.38	1.43
2	B	1301[A]	FAD	O2'-C2'	-2.46	1.38	1.43
5	B	1310	A1BDX	O07-C06	-2.45	1.34	1.37
5	B	1310	A1BDX	C09-C08	2.42	1.37	1.33
2	A	1301[B]	FAD	O4B-C4B	-2.36	1.39	1.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1301[B]	FAD	O2B-C2B	-2.34	1.37	1.43
2	A	1301[B]	FAD	C10-N1	2.31	1.37	1.33
2	B	1301[B]	FAD	O4B-C4B	-2.29	1.39	1.45
2	A	1301[A]	FAD	C10-N1	2.24	1.37	1.33
2	B	1301[B]	FAD	PA-O2A	-2.24	1.45	1.55
6	A	1305	NAD	C2D-C3D	-2.23	1.47	1.53
5	A	1304	A1BDX	O07-C06	-2.22	1.34	1.37
2	B	1301[A]	FAD	O4B-C4B	-2.20	1.40	1.45
2	B	1301[A]	FAD	C2-N1	2.20	1.41	1.36
6	A	1305	NAD	C2B-C3B	-2.18	1.47	1.53
2	B	1301[A]	FAD	PA-O5B	-2.16	1.50	1.59
2	A	1301[A]	FAD	PA-O2A	-2.16	1.45	1.55
2	A	1301[B]	FAD	PA-O2A	-2.14	1.45	1.55
6	A	1305	NAD	O3D-C3D	-2.14	1.37	1.43
6	B	1311	NAD	C6N-N1N	2.14	1.40	1.35
2	B	1301[A]	FAD	PA-O2A	-2.11	1.45	1.55
6	B	1311	NAD	PA-O5B	-2.10	1.51	1.59
2	A	1301[A]	FAD	O4B-C4B	-2.10	1.40	1.45
2	A	1301[B]	FAD	O3'-C3'	-2.06	1.37	1.43
2	B	1301[B]	FAD	P-O1P	2.06	1.57	1.50
2	B	1301[A]	FAD	O2B-C2B	-2.04	1.37	1.43
2	B	1301[A]	FAD	P-O1P	2.04	1.57	1.50
2	B	1301[B]	FAD	O3'-C3'	-2.01	1.38	1.43

All (104) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	1310	A1BDX	O07-C08-C09	-6.47	107.17	112.49
5	A	1304	A1BDX	O07-C08-C09	-6.13	107.45	112.49
6	B	1311	NAD	N3A-C2A-N1A	-6.07	119.39	128.58
6	A	1305	NAD	N3A-C2A-N1A	-5.96	119.55	128.58
2	A	1301[B]	FAD	N3A-C2A-N1A	-5.89	119.67	128.58
5	A	1304	A1BDX	C06-O07-C08	5.70	110.92	105.19
2	A	1301[A]	FAD	N3A-C2A-N1A	-5.66	120.01	128.58
5	B	1310	A1BDX	C06-O07-C08	5.57	110.79	105.19
2	B	1301[B]	FAD	N3A-C2A-N1A	-5.56	120.16	128.58
2	B	1301[A]	FAD	N3A-C2A-N1A	-5.48	120.28	128.58
6	B	1311	NAD	C5A-C4A-N3A	-5.17	119.60	126.72
2	A	1301[A]	FAD	C5A-C4A-N3A	-5.15	119.63	126.72
6	B	1311	NAD	C5A-N7A-C8A	4.68	110.81	103.45
2	A	1301[B]	FAD	C5A-C4A-N3A	-4.57	120.43	126.72
2	B	1301[B]	FAD	C5A-C4A-N3A	-4.51	120.51	126.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	B	1311	NAD	N9A-C8A-N7A	-4.25	107.91	113.94
6	B	1311	NAD	C2A-N3A-C4A	3.99	121.58	111.83
2	A	1301[A]	FAD	N3A-C4A-N9A	3.98	133.93	127.17
2	A	1301[A]	FAD	C5A-N7A-C8A	3.96	109.68	103.45
6	B	1311	NAD	C4A-C5A-N7A	-3.95	106.06	110.58
6	A	1305	NAD	C4D-O4D-C1D	-3.95	106.31	109.92
2	A	1301[B]	FAD	C4-C4X-N5	3.92	123.63	118.21
2	A	1301[B]	FAD	C5A-N7A-C8A	3.87	109.53	103.45
6	A	1305	NAD	C5A-C4A-N3A	-3.85	121.42	126.72
2	B	1301[B]	FAD	N3A-C4A-N9A	3.83	133.69	127.17
6	A	1305	NAD	C5A-N7A-C8A	3.77	109.38	103.45
6	B	1311	NAD	N3A-C4A-N9A	3.76	133.56	127.17
2	A	1301[A]	FAD	C2A-N3A-C4A	3.68	120.82	111.83
2	B	1301[B]	FAD	C5A-N7A-C8A	3.58	109.07	103.45
2	A	1301[B]	FAD	C2A-N3A-C4A	3.57	120.54	111.83
2	A	1301[B]	FAD	N3A-C4A-N9A	3.55	133.21	127.17
2	A	1301[B]	FAD	N9A-C8A-N7A	-3.47	109.02	113.94
2	B	1301[A]	FAD	C5A-C4A-N3A	-3.41	122.02	126.72
2	A	1301[B]	FAD	O2A-PA-O3P	-3.39	98.12	107.27
6	A	1305	NAD	N3A-C4A-N9A	3.37	132.90	127.17
2	B	1301[B]	FAD	C2A-N3A-C4A	3.36	120.03	111.83
6	A	1305	NAD	N9A-C8A-N7A	-3.26	109.30	113.94
2	A	1301[A]	FAD	O2P-P-O3P	-3.24	98.50	107.27
2	A	1301[A]	FAD	C4-C4X-N5	3.24	122.69	118.21
2	B	1301[B]	FAD	C4-C4X-N5	3.24	122.68	118.21
2	A	1301[A]	FAD	N9A-C8A-N7A	-3.20	109.39	113.94
2	A	1301[A]	FAD	O2A-PA-O3P	-3.20	98.63	107.27
2	B	1301[A]	FAD	C5A-N7A-C8A	3.19	108.46	103.45
2	B	1301[B]	FAD	O2P-P-O3P	-3.16	98.73	107.27
6	A	1305	NAD	C2A-N3A-C4A	3.13	119.47	111.83
2	A	1301[A]	FAD	C4A-C5A-N7A	-3.11	107.03	110.58
2	B	1301[A]	FAD	O2-C2-N1	-3.02	116.78	121.80
2	B	1301[A]	FAD	N3A-C4A-N9A	2.96	132.20	127.17
2	A	1301[B]	FAD	C4A-C5A-N7A	-2.95	107.21	110.58
2	A	1301[B]	FAD	O2P-P-O3P	-2.94	99.32	107.27
2	A	1301[B]	FAD	C4X-C4-N3	2.89	120.62	113.25
2	B	1301[B]	FAD	N9A-C8A-N7A	-2.84	109.91	113.94
2	B	1301[A]	FAD	C2A-N3A-C4A	2.84	118.76	111.83
2	A	1301[B]	FAD	O5'-P-O1P	2.83	120.13	108.94
2	B	1301[A]	FAD	C4-C4X-N5	2.74	121.99	118.21
2	A	1301[B]	FAD	O3P-P-O1P	2.74	118.94	110.70
2	A	1301[A]	FAD	C4X-C4-N3	2.74	120.22	113.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	1304	A1BDX	O07-C06-C05	2.73	130.53	125.99
2	B	1301[A]	FAD	C5X-C9A-N10	2.71	120.42	117.97
6	A	1305	NAD	C4A-C5A-N7A	-2.71	107.48	110.58
2	A	1301[A]	FAD	C4-N3-C2	-2.70	120.85	125.64
2	B	1301[B]	FAD	O2A-PA-O3P	-2.69	99.99	107.27
2	B	1301[A]	FAD	N9A-C8A-N7A	-2.69	110.12	113.94
2	B	1301[B]	FAD	C4A-C5A-N7A	-2.67	107.53	110.58
6	B	1311	NAD	C3N-C7N-N7N	2.63	120.98	117.74
2	A	1301[B]	FAD	C5X-C9A-N10	2.62	120.34	117.97
2	B	1301[A]	FAD	C4-N3-C2	-2.61	121.00	125.64
2	B	1301[A]	FAD	C9-C9A-N10	-2.61	118.35	121.85
2	B	1301[A]	FAD	C4X-C10-N10	2.61	120.21	116.48
2	A	1301[B]	FAD	C9-C9A-N10	-2.58	118.38	121.85
5	B	1310	A1BDX	O07-C06-C05	2.57	130.26	125.99
5	B	1310	A1BDX	C10-C11-C03	-2.56	119.24	122.22
6	B	1311	NAD	C6A-C5A-N7A	2.52	136.95	132.09
2	B	1301[B]	FAD	C4-N3-C2	-2.52	121.16	125.64
6	B	1311	NAD	C4A-N9A-C8A	2.51	108.37	105.74
2	B	1301[A]	FAD	C4A-C5A-N7A	-2.49	107.73	110.58
5	B	1310	A1BDX	C05-C06-C10	-2.49	120.08	123.81
2	B	1301[A]	FAD	C2A-N1A-C6A	2.48	122.81	118.73
2	A	1301[B]	FAD	O4-C4-C4X	-2.48	119.98	126.53
2	B	1301[B]	FAD	C4X-C4-N3	2.47	119.54	113.25
2	A	1301[A]	FAD	O3P-P-O1P	2.45	118.06	110.70
2	B	1301[A]	FAD	C2'-C1'-N10	2.43	121.68	110.20
5	A	1304	A1BDX	C05-C06-C10	-2.43	120.17	123.81
6	A	1305	NAD	C2A-N1A-C6A	2.40	122.67	118.73
2	A	1301[B]	FAD	C4-N3-C2	-2.39	121.41	125.64
2	B	1301[B]	FAD	C10-C4X-N5	-2.34	120.03	124.81
2	B	1301[B]	FAD	O3P-P-O1P	2.31	117.67	110.70
6	A	1305	NAD	C4A-N9A-C8A	2.30	108.16	105.74
2	B	1301[A]	FAD	C4X-C4-N3	2.26	119.02	113.25
2	B	1301[A]	FAD	O4-C4-C4X	-2.21	120.69	126.53
2	A	1301[B]	FAD	O3P-PA-O1A	2.20	117.32	110.70
5	A	1304	A1BDX	C10-C11-C03	-2.19	119.67	122.22
2	B	1301[B]	FAD	C5X-C9A-N10	2.19	119.95	117.97
2	B	1301[B]	FAD	C9-C9A-N10	-2.18	118.93	121.85
2	A	1301[A]	FAD	C5X-C9A-N10	2.11	119.87	117.97
2	B	1301[B]	FAD	C4X-C10-N10	2.11	119.50	116.48
2	B	1301[B]	FAD	O4-C4-C4X	-2.08	121.05	126.53
2	A	1301[A]	FAD	O4-C4-C4X	-2.07	121.06	126.53
2	B	1301[A]	FAD	C4A-N9A-C8A	2.06	107.90	105.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1301[B]	FAD	O2P-P-O5'	-2.05	98.30	107.57
2	A	1301[B]	FAD	C4A-N9A-C8A	2.04	107.88	105.74
2	A	1301[B]	FAD	C10-C4X-N5	-2.01	120.69	124.81
2	B	1301[B]	FAD	C2A-N1A-C6A	2.01	122.04	118.73
2	A	1301[A]	FAD	C10-C4X-N5	-2.01	120.70	124.81

There are no chirality outliers.

All (42) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1301[A]	FAD	C5B-O5B-PA-O1A
2	A	1301[A]	FAD	C5B-O5B-PA-O2A
2	A	1301[A]	FAD	C5B-O5B-PA-O3P
2	A	1301[A]	FAD	P-O3P-PA-O5B
2	A	1301[B]	FAD	N10-C1'-C2'-O2'
2	A	1301[B]	FAD	N10-C1'-C2'-C3'
2	B	1301[A]	FAD	N10-C1'-C2'-O2'
2	B	1301[A]	FAD	N10-C1'-C2'-C3'
2	B	1301[B]	FAD	C5B-O5B-PA-O3P
2	A	1301[A]	FAD	C3B-C4B-C5B-O5B
2	B	1301[B]	FAD	C3B-C4B-C5B-O5B
3	A	1312	PEG	O2-C3-C4-O4
2	A	1301[A]	FAD	C2'-C3'-C4'-O4'
2	B	1301[B]	FAD	C2'-C3'-C4'-O4'
2	A	1301[A]	FAD	C2'-C3'-C4'-C5'
2	B	1301[B]	FAD	O3'-C3'-C4'-O4'
2	A	1301[A]	FAD	O4B-C4B-C5B-O5B
2	A	1301[A]	FAD	O3'-C3'-C4'-C5'
10	B	1304	1PE	OH5-C14-C24-OH4
3	B	1306	PEG	O1-C1-C2-O2
2	A	1301[A]	FAD	O3'-C3'-C4'-O4'
2	B	1301[B]	FAD	O4B-C4B-C5B-O5B
2	B	1301[B]	FAD	P-O3P-PA-O5B
6	A	1305	NAD	C2B-C1B-N9A-C8A
3	B	1307	PEG	C4-C3-O2-C2
3	B	1308	PEG	O2-C3-C4-O4
10	B	1304	1PE	OH7-C16-C26-OH6
10	B	1304	1PE	C16-C26-OH6-C15
6	B	1311	NAD	C2B-C1B-N9A-C8A
6	A	1305	NAD	C4D-C5D-O5D-PN
6	B	1311	NAD	C4D-C5D-O5D-PN
3	B	1307	PEG	C1-C2-O2-C3

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Mol	Chain	Res	Type	Atoms
2	B	1301[B]	FAD	O3'-C3'-C4'-C5'
2	B	1301[B]	FAD	C2'-C3'-C4'-C5'
3	B	1308	PEG	C1-C2-O2-C3
2	B	1301[B]	FAD	C4'-C5'-O5'-P
6	A	1305	NAD	O4B-C1B-N9A-C8A
6	B	1311	NAD	O4B-C1B-N9A-C8A
6	B	1311	NAD	C2B-C1B-N9A-C4A
2	A	1301[A]	FAD	C4'-C5'-O5'-P
3	B	1308	PEG	C4-C3-O2-C2
3	B	1308	PEG	O1-C1-C2-O2

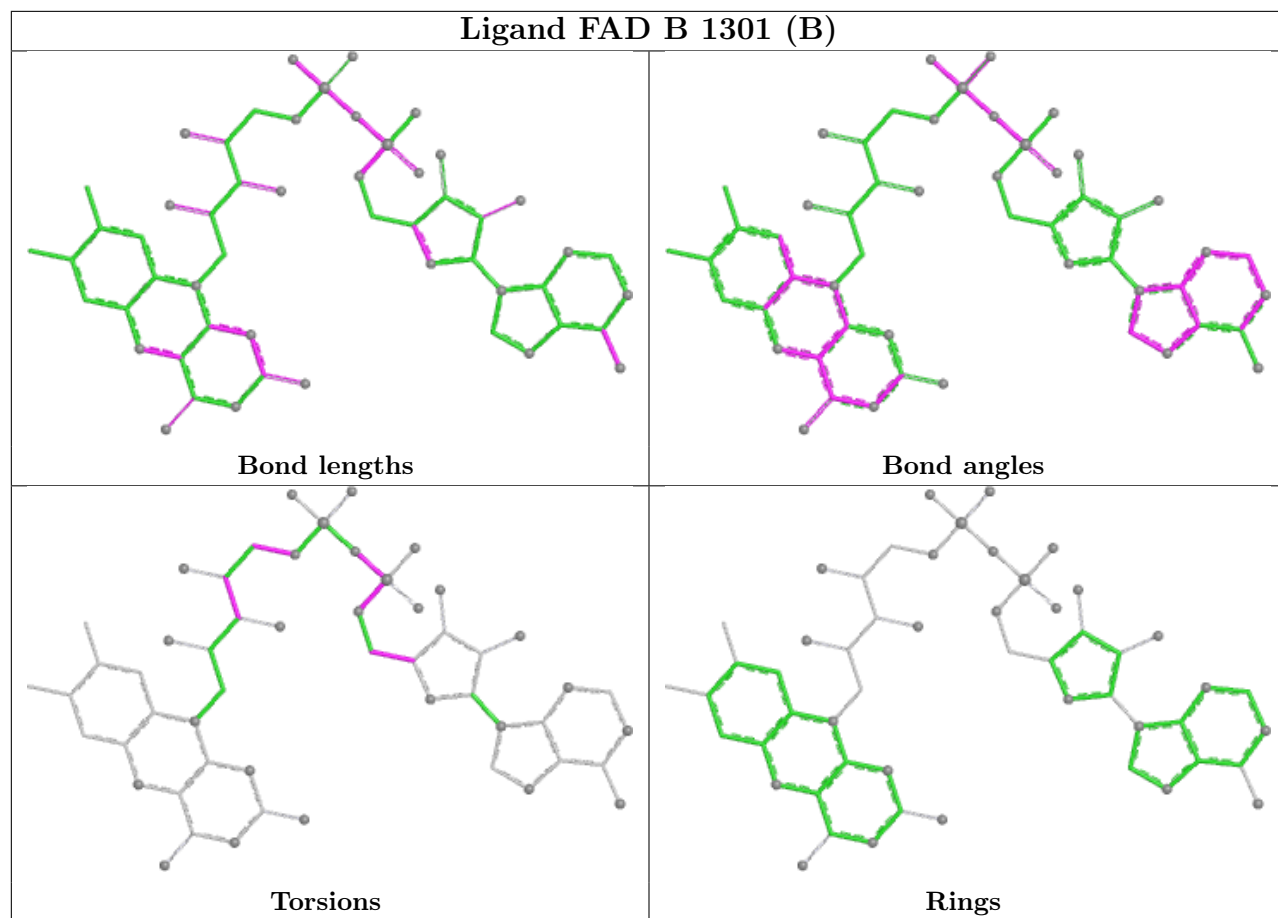
There are no ring outliers.

11 monomers are involved in 18 short contacts:

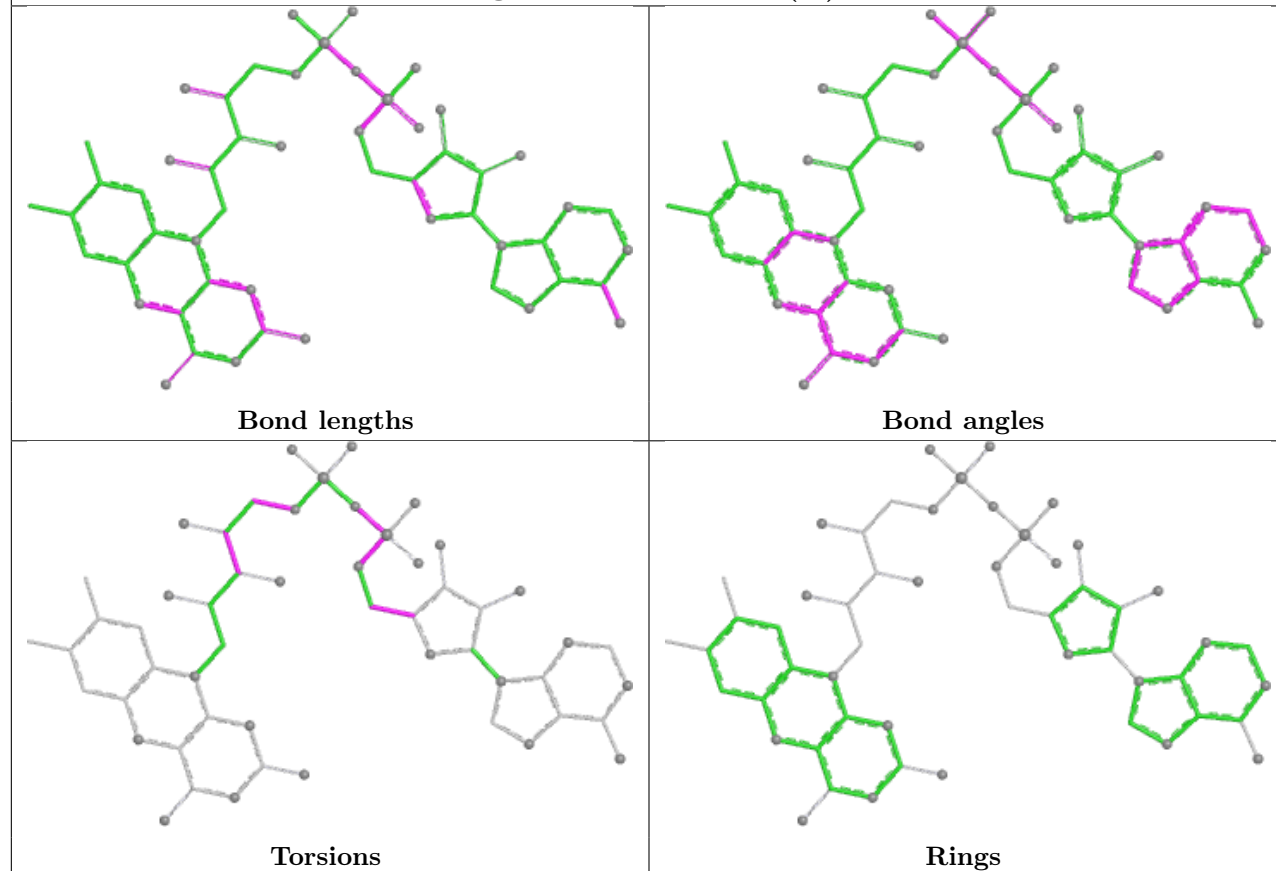
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	1301[B]	FAD	2	0
4	B	1309	FMT	4	0
2	A	1301[A]	FAD	2	0
2	B	1301[A]	FAD	1	0
7	A	1310	SO4	1	0
6	B	1311	NAD	2	0
6	A	1305	NAD	2	0
3	B	1307	PEG	1	0
3	B	1306	PEG	1	0
3	B	1308	PEG	1	0
2	A	1301[B]	FAD	1	0

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.

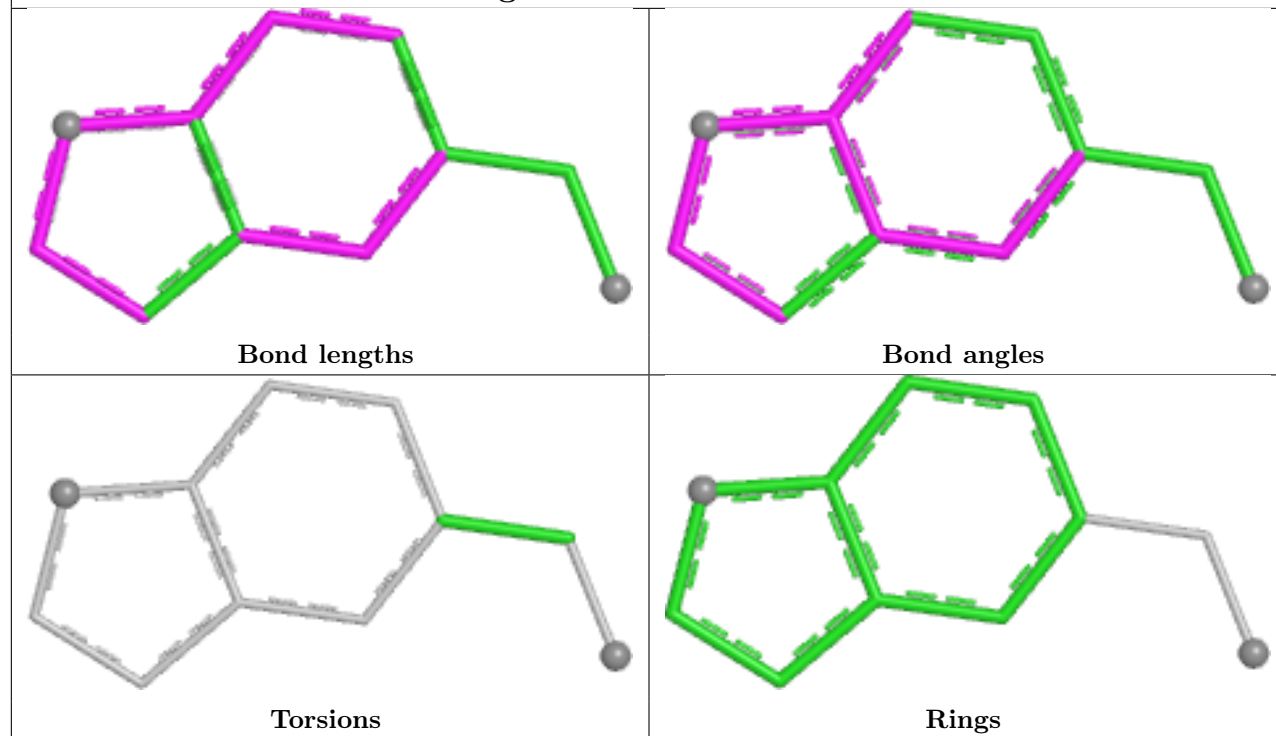
Ligand FAD B 1301 (B)

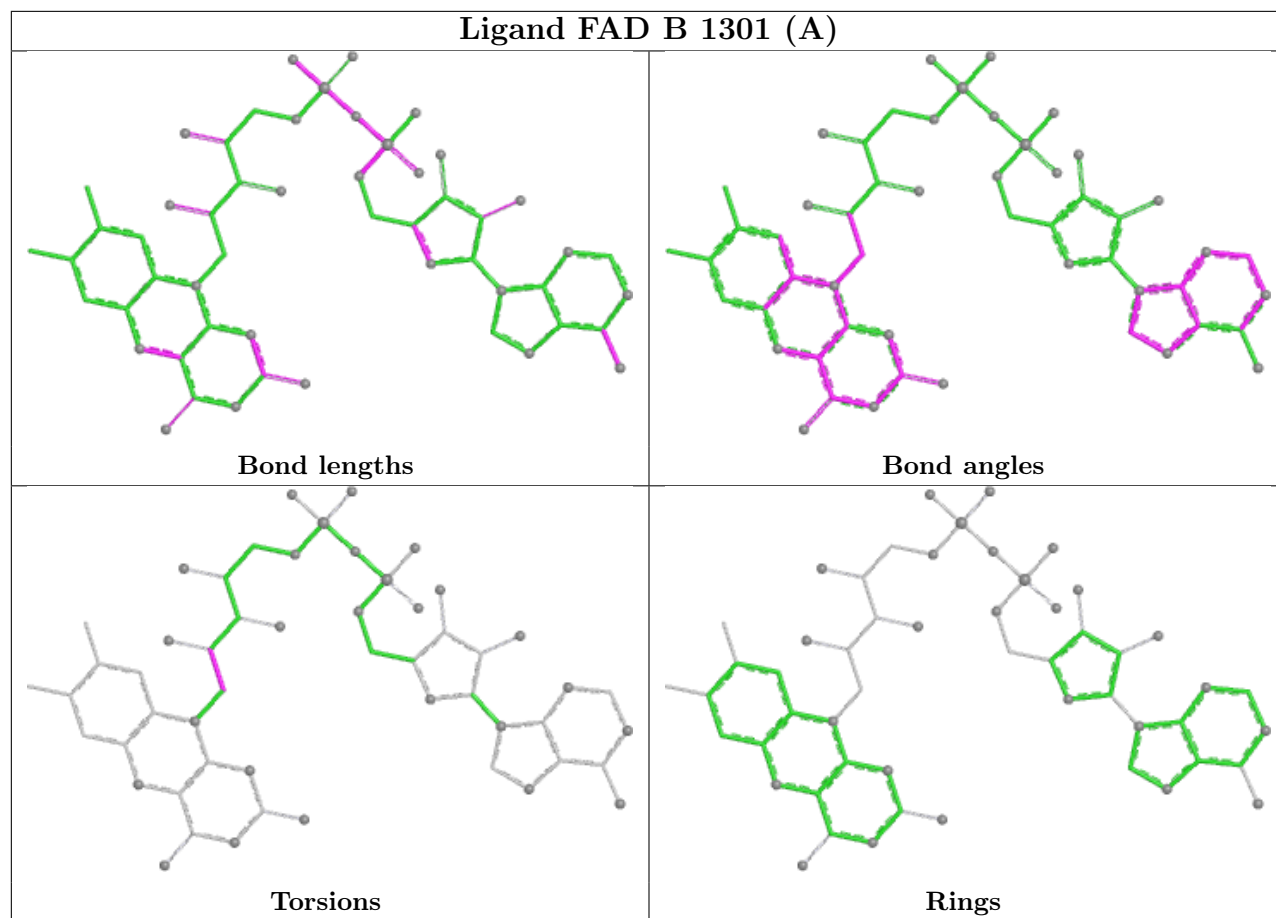


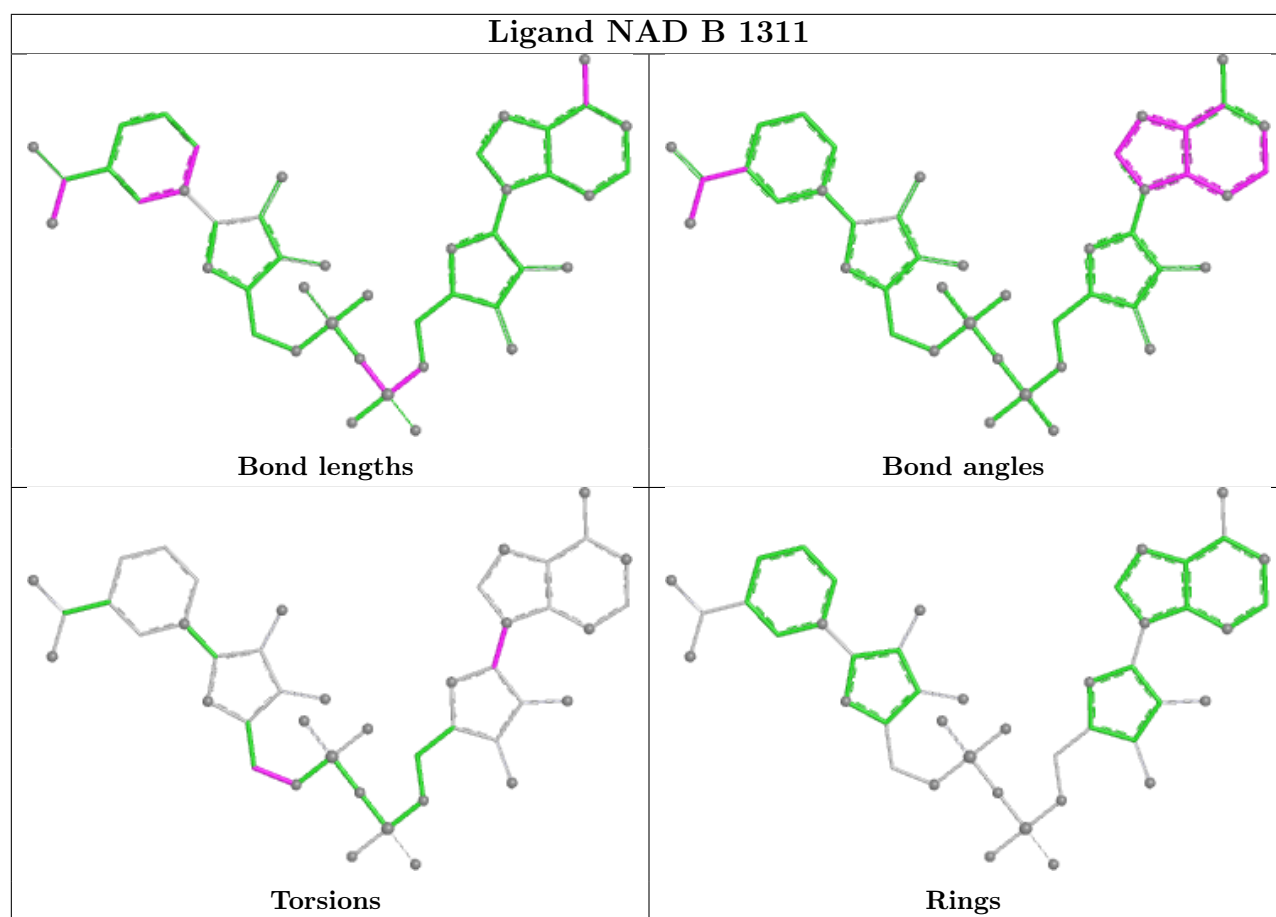
Ligand FAD A 1301 (A)



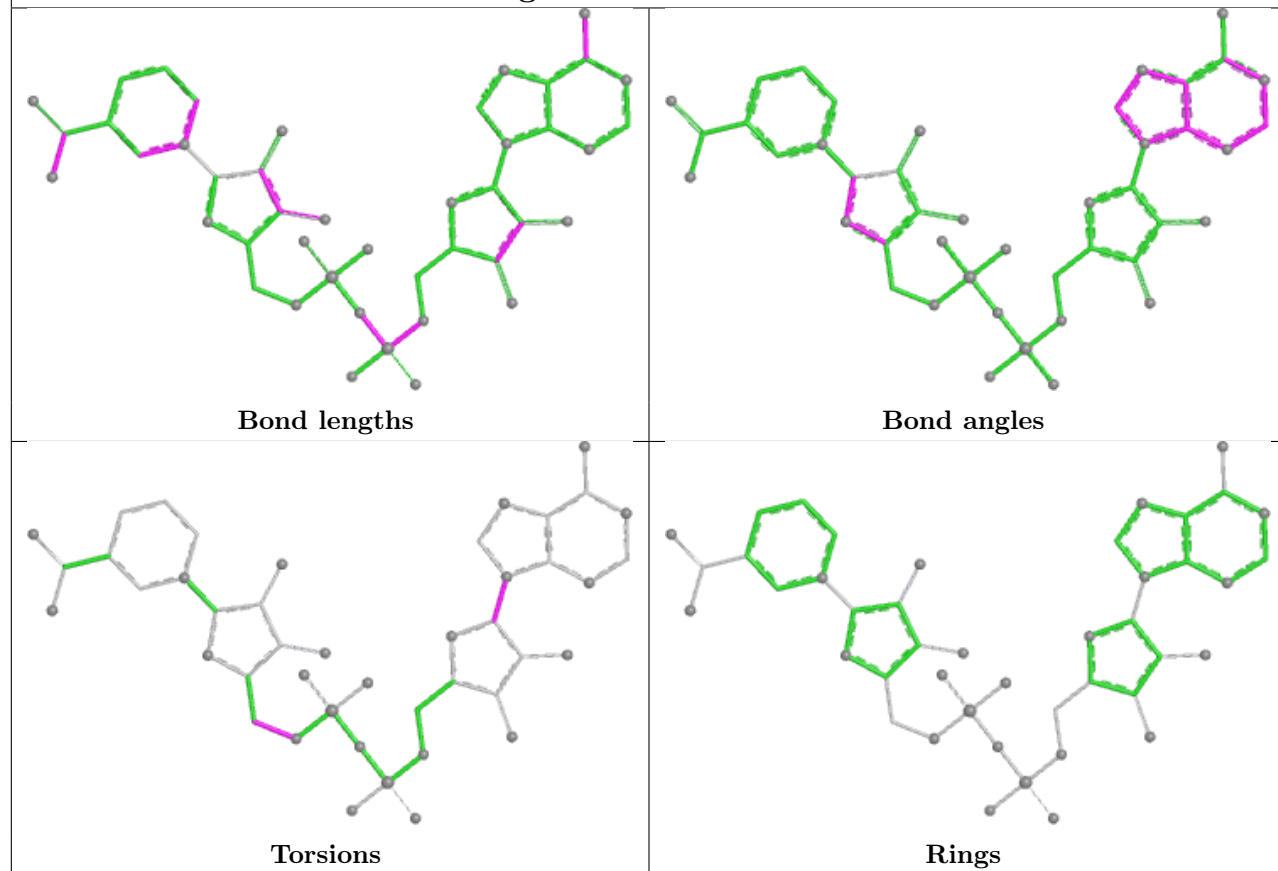
Ligand A1BDX B 1310



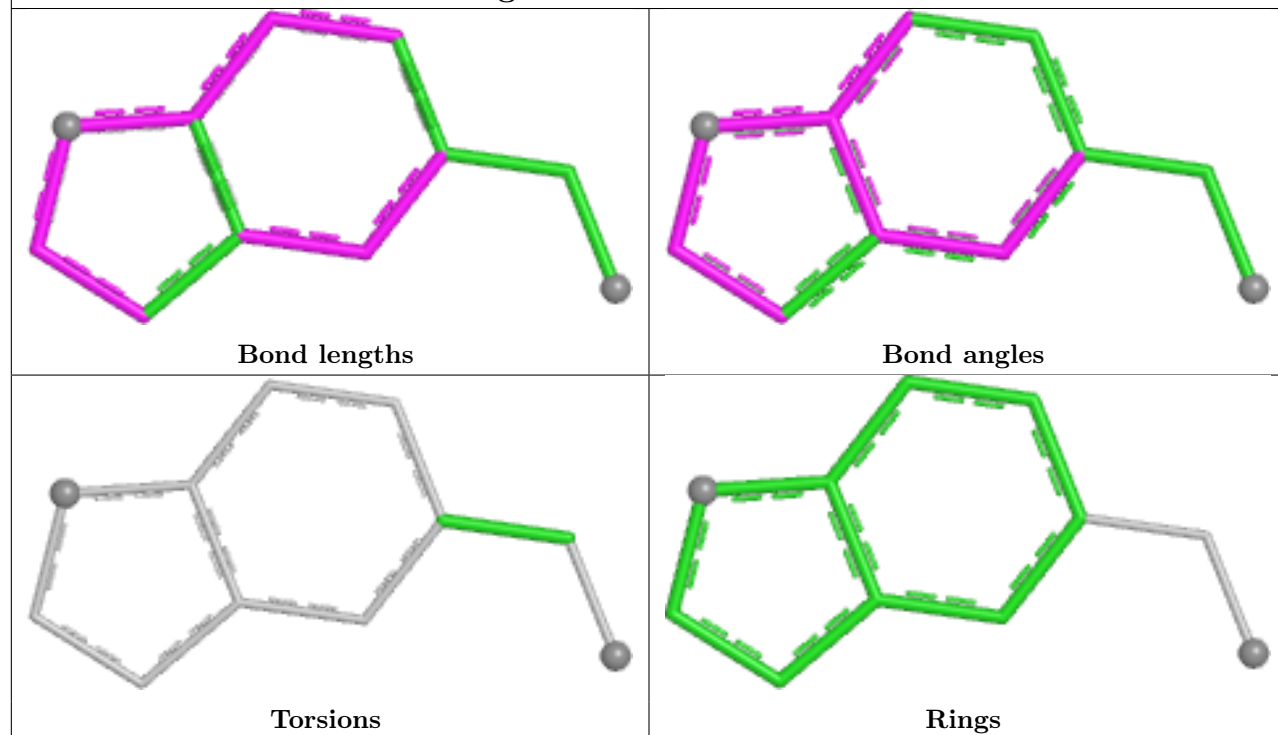


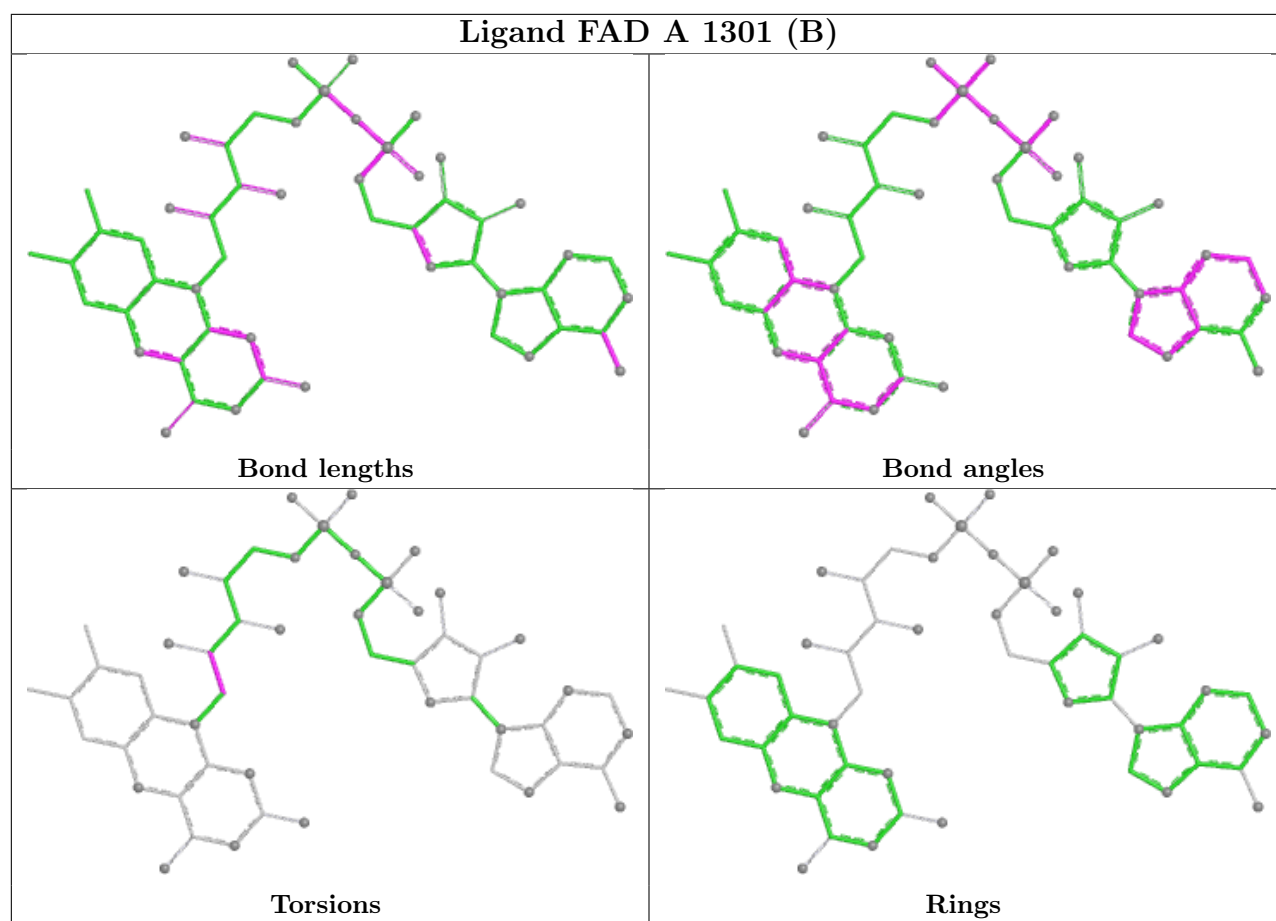


Ligand NAD A 1305



Ligand A1BDX A 1304





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	1216/1235 (98%)	0.41	62 (5%)	33	42	9, 22, 38, 61	25 (2%)
1	B	1210/1235 (97%)	0.43	97 (8%)	18	23	8, 20, 40, 64	27 (2%)
All	All	2426/2470 (98%)	0.42	159 (6%)	24	31	8, 21, 39, 64	52 (2%)

All (159) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	491	LEU	8.4
1	B	1231	ALA	6.9
1	B	490	LEU	6.8
1	B	487	VAL	6.2
1	A	493	ASN	6.0
1	B	1222	ALA	5.9
1	B	1223	ALA	5.9
1	B	1229	LEU	5.8
1	B	1232	ILE	5.7
1	B	510	ILE	5.6
1	B	508	VAL	5.6
1	B	918	THR	5.5
1	B	1227	ALA	5.4
1	B	1230	MET	5.4
1	B	486	LEU	5.4
1	A	494	GLY	5.3
1	B	914	LEU	5.2
1	A	1227	ALA	5.2
1	B	484	ALA	5.0
1	B	500	VAL	4.9
1	B	485	TYR	4.9
1	A	134	LEU	4.8
1	B	481	THR	4.7
1	B	915	ALA	4.5

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Mol	Chain	Res	Type	RSRZ
1	B	1225	GLY	4.5
1	A	1222	ALA	4.5
1	A	1223	ALA	4.4
1	A	82	SER	4.4
1	B	79	HIS	4.3
1	A	490	LEU	4.2
1	A	1225	GLY	4.2
1	A	1232	ILE	4.2
1	B	134	LEU	4.2
1	B	479	HIS	4.1
1	A	1230	MET	4.1
1	A	1228	SER	4.1
1	B	1228	SER	4.1
1	B	478	THR	4.0
1	B	482	LEU	3.9
1	B	503	ILE	3.9
1	B	495	ALA	3.8
1	A	491	LEU	3.7
1	A	500	VAL	3.7
1	B	84	VAL	3.7
1	A	495	ALA	3.7
1	B	14	ALA	3.6
1	B	66	SER	3.6
1	A	129	ASN	3.6
1	A	484	ALA	3.5
1	A	137	SER	3.5
1	A	1231	ALA	3.5
1	B	488	ARG	3.5
1	B	439	PHE	3.5
1	B	60	ILE	3.5
1	B	129	ASN	3.4
1	A	128	GLY	3.4
1	B	1233	GLY	3.4
1	A	1229	LEU	3.3
1	B	223	LEU	3.3
1	B	128	GLY	3.3
1	B	156	THR	3.3
1	B	75	LEU	3.3
1	B	506	PRO	3.3
1	A	116	THR	3.2
1	A	130	TRP	3.2
1	B	483	LEU	3.2

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Mol	Chain	Res	Type	RSRZ
1	A	79	HIS	3.2
1	B	133	HIS	3.2
1	A	912	ILE	3.2
1	B	1226	ASN	3.2
1	A	156	THR	3.1
1	B	127	ASP	3.1
1	A	111	ILE	3.1
1	A	14	ALA	3.1
1	A	485	TYR	3.1
1	A	492	GLU	3.1
1	A	132	SER	3.1
1	B	1224	GLY	3.1
1	B	916	SER	3.0
1	A	115	ALA	2.9
1	B	456	LEU	2.9
1	A	1226	ASN	2.9
1	B	1221	ALA	2.9
1	B	132	SER	2.9
1	B	138	ARG	2.8
1	A	481	THR	2.8
1	A	1224	GLY	2.8
1	B	74	ALA	2.8
1	B	912	ILE	2.8
1	B	155	LEU	2.7
1	A	125	ILE	2.7
1	B	68	ALA	2.7
1	B	115	ALA	2.7
1	A	487	VAL	2.7
1	A	586	ALA	2.7
1	A	114	THR	2.7
1	A	506	PRO	2.7
1	B	917	GLU	2.7
1	A	905	LEU	2.7
1	A	503	ILE	2.6
1	B	415	VAL	2.6
1	A	223	LEU	2.6
1	B	116	THR	2.6
1	B	83	GLY	2.6
1	B	72	ILE	2.6
1	A	120	LEU	2.5
1	A	801	ALA	2.5
1	B	905	LEU	2.5

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Mol	Chain	Res	Type	RSRZ
1	A	451	GLY	2.4
1	B	489	ARG	2.4
1	A	937	LEU	2.4
1	A	1233	GLY	2.4
1	B	451	GLY	2.4
1	B	125	ILE	2.4
1	A	127	ASP	2.4
1	A	482	LEU	2.4
1	B	130	TRP	2.4
1	B	496	ASN	2.4
1	A	571	ALA	2.4
1	B	63	ALA	2.4
1	B	463	ARG	2.3
1	A	112	PRO	2.3
1	A	1221	ALA	2.3
1	A	195	PHE	2.3
1	B	499	PHE	2.3
1	B	514	ILE	2.3
1	A	155	LEU	2.3
1	B	71	LEU	2.3
1	B	460	VAL	2.3
1	B	64	ALA	2.3
1	B	509	SER	2.3
1	B	195	PHE	2.3
1	A	483	LEU	2.3
1	B	937	LEU	2.3
1	A	904	GLY	2.3
1	B	524[A]	MET	2.2
1	B	438	ASP	2.2
1	A	796	ASP	2.2
1	A	913	GLY	2.2
1	B	513	LEU	2.1
1	B	1200	ARG	2.1
1	B	139	SER	2.1
1	B	76	ARG	2.1
1	B	412	ALA	2.1
1	B	919	GLY	2.1
1	B	466	LEU	2.1
1	A	113	ASP	2.1
1	A	771	ALA	2.1
1	B	112	PRO	2.1
1	B	88	VAL	2.1

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Mol	Chain	Res	Type	RSRZ
1	B	461	VAL	2.1
1	B	504	ASN	2.0
1	B	114	THR	2.0
1	B	511	ASP	2.0
1	A	486	LEU	2.0
1	B	65	ALA	2.0
1	B	1062	ALA	2.0
1	B	1140	ASN	2.0
1	B	113	ASP	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

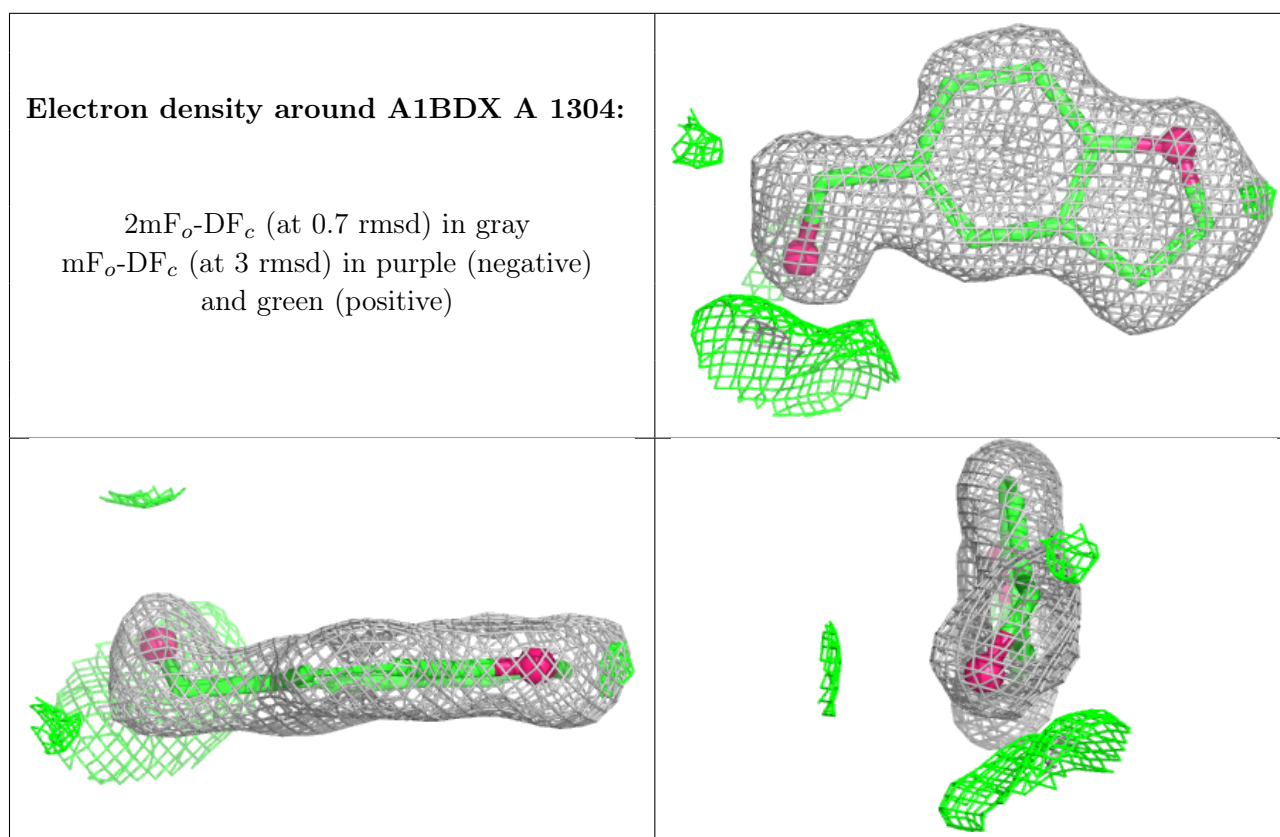
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	PEG	A	1302	7/7	0.80	0.14	26,30,37,43	0
7	SO4	A	1310	5/5	0.80	0.14	35,37,41,41	5
3	PEG	B	1308	7/7	0.81	0.15	26,32,40,41	0
3	PEG	B	1306	7/7	0.83	0.14	30,37,45,47	0
3	PEG	A	1312	7/7	0.85	0.13	31,36,43,47	0
7	SO4	A	1308	5/5	0.86	0.15	26,26,31,39	5
5	A1BDX	A	1304	11/11	0.89	0.12	16,19,21,26	11
3	PEG	B	1307	7/7	0.89	0.10	32,35,42,44	0
4	FMT	B	1305	3/3	0.89	0.10	32,32,36,40	0
4	FMT	B	1309	3/3	0.90	0.11	14,14,18,18	3
10	1PE	B	1304	16/16	0.90	0.11	26,34,37,39	0
4	FMT	A	1303	3/3	0.91	0.09	25,25,30,31	0
7	SO4	A	1309	5/5	0.91	0.11	33,33,39,46	5
9	PGE	B	1302	10/10	0.92	0.09	29,35,40,40	0

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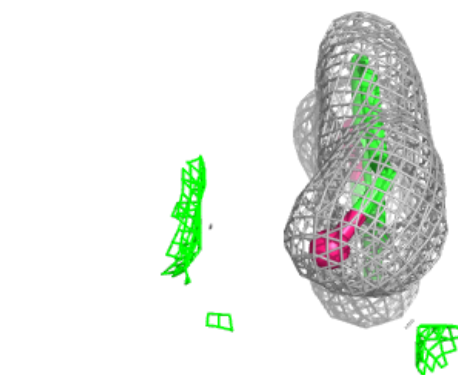
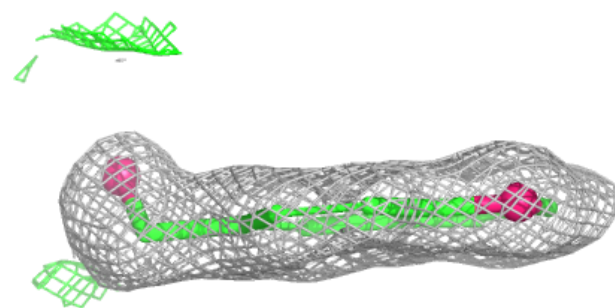
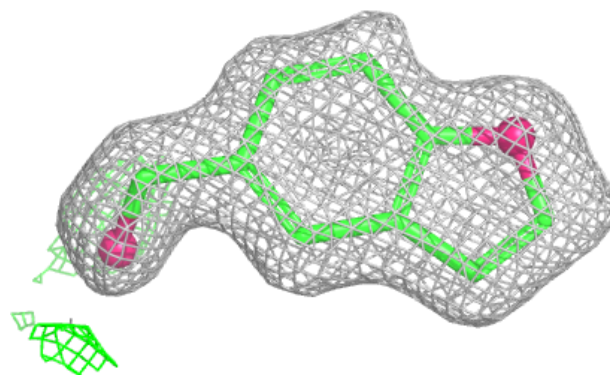
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
7	SO4	B	1313	5/5	0.93	0.08	42,42,44,46	5
5	A1BDX	B	1310	11/11	0.93	0.10	17,18,23,31	11
4	FMT	B	1303	3/3	0.93	0.11	13,13,30,35	0
6	NAD	A	1305	44/44	0.95	0.09	16,21,24,31	0
7	SO4	A	1307	5/5	0.95	0.09	23,28,36,36	5
2	FAD	B	1301[B]	53/53	0.95	0.07	14,18,22,24	53
2	FAD	B	1301[A]	53/53	0.95	0.07	14,18,22,25	53
8	MG	B	1314	1/1	0.96	0.04	18,18,18,18	1
2	FAD	A	1301[B]	53/53	0.96	0.07	12,17,20,24	53
2	FAD	A	1301[A]	53/53	0.96	0.07	13,18,19,21	53
6	NAD	B	1311	44/44	0.97	0.06	13,15,17,28	0
7	SO4	B	1312	5/5	0.98	0.06	15,16,19,20	0
7	SO4	A	1306	5/5	0.98	0.05	17,18,22,23	0
8	MG	A	1311	1/1	0.98	0.05	21,21,21,21	1

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.

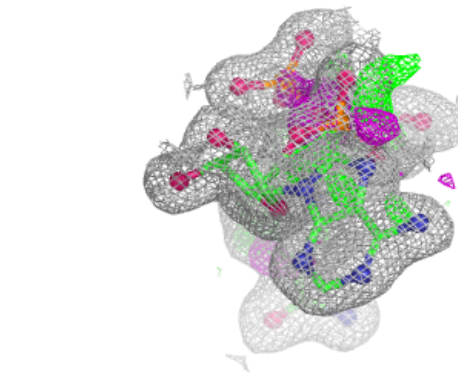
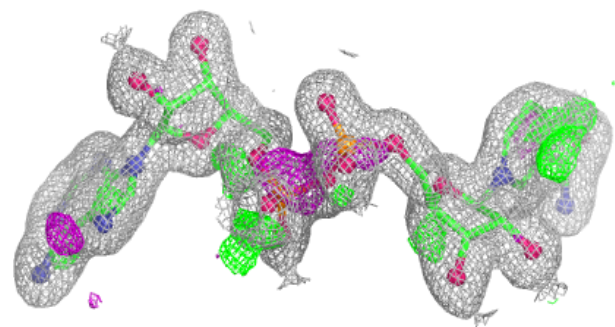
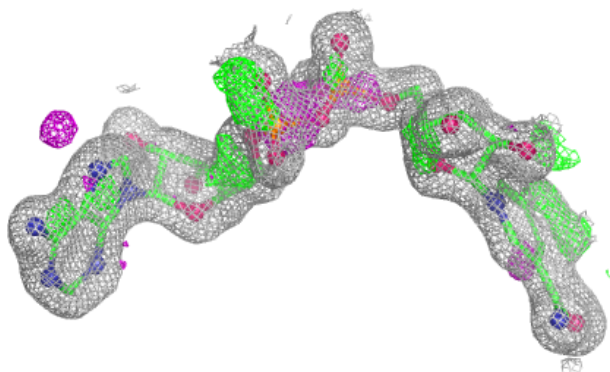


Electron density around A1BDX B 1310:

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

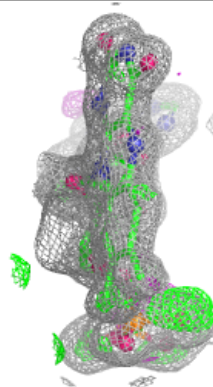
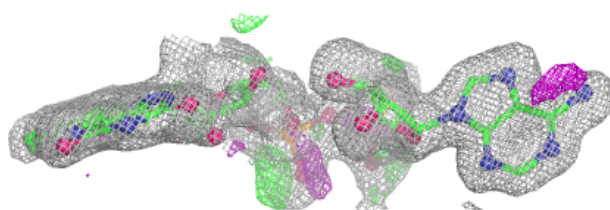
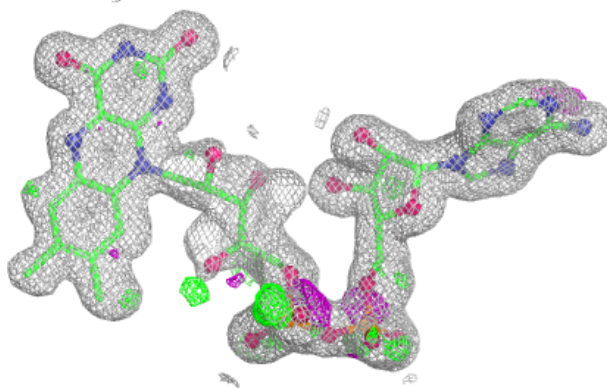
**Electron density around NAD A 1305:**

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

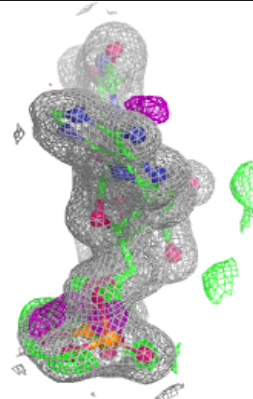
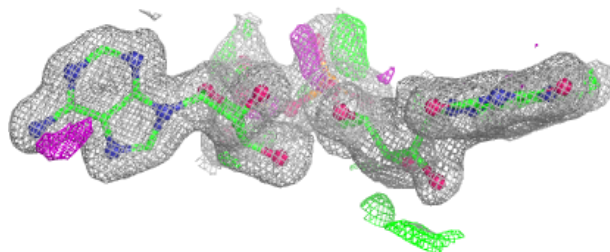
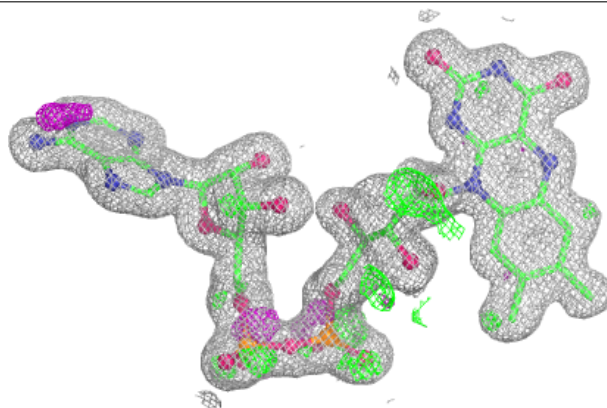


Electron density around FAD B 1301 (B):

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

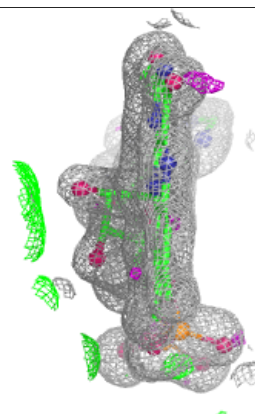
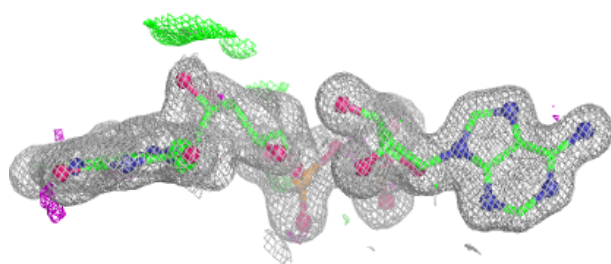
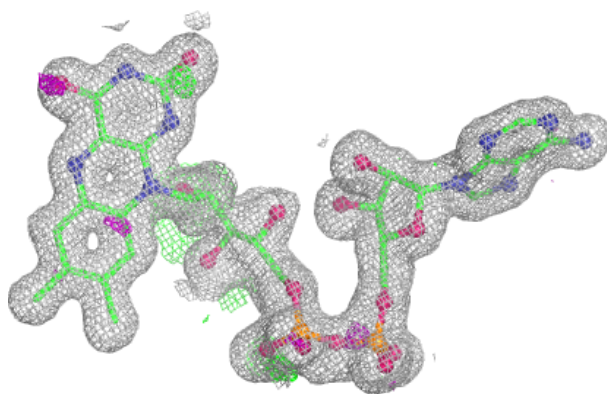
**Electron density around FAD B 1301 (A):**

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

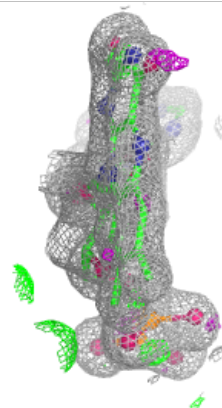
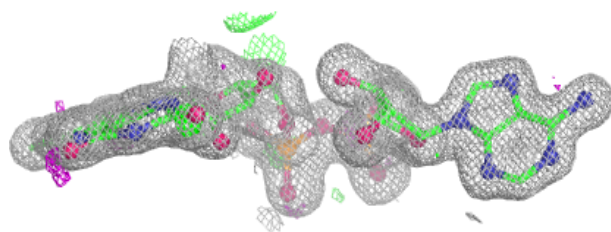
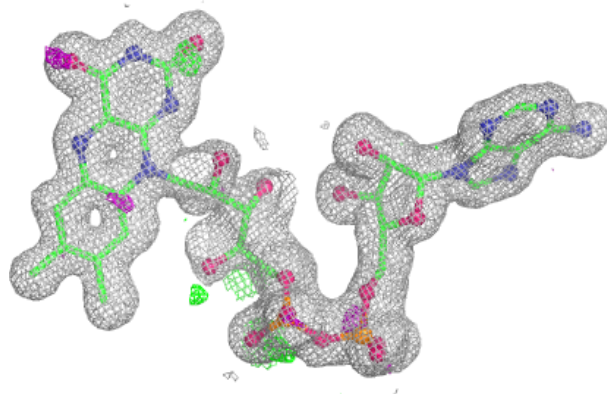


Electron density around FAD A 1301 (B):

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

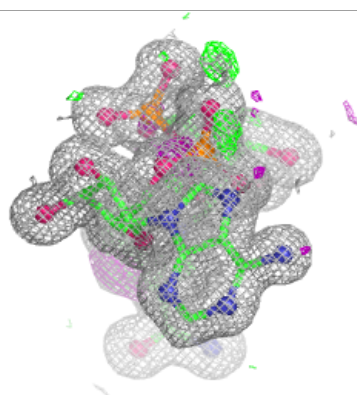
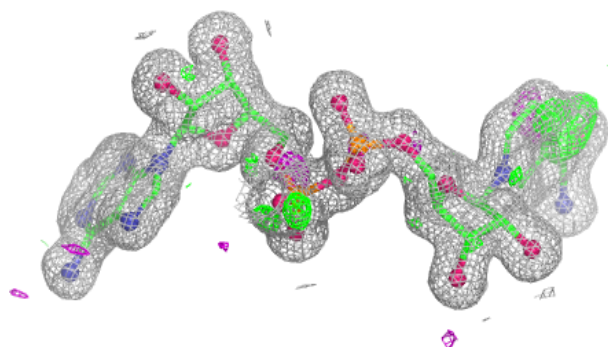
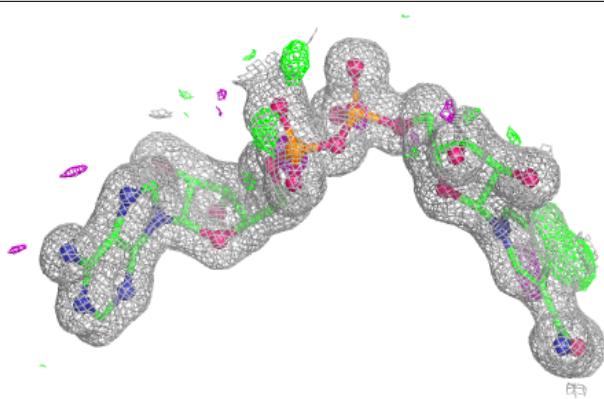
**Electron density around FAD A 1301 (A):**

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



Electron density around NAD B 1311:

$2mF_o-DF_c$ (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.