



Full wwPDB X-ray Structure Validation Report ⓘ

May 14, 2020 – 09:21 am BST

PDB ID : 4TM3
Title : Kutzneria sp. 744 ornithine N-hydroxylase, KtzI-FADox-Br
Authors : Setser, J.W.; Drennan, C.L.
Deposited on : 2014-05-30
Resolution : 2.09 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

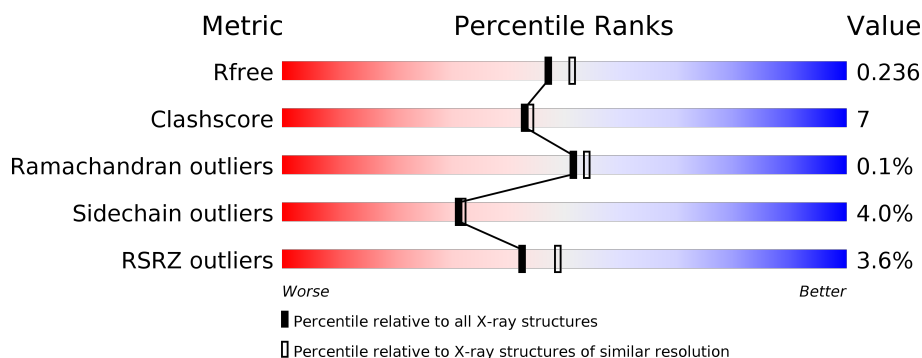
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.09 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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	443	<div> <div>3%</div> <div>84%</div> <div>8%</div> <div>7%</div> </div>
1	B	443	<div> <div>3%</div> <div>77%</div> <div>15%</div> <div>7%</div> </div>
1	C	443	<div> <div>5%</div> <div>80%</div> <div>11%</div> <div>7%</div> </div>
1	D	443	<div> <div>2%</div> <div>79%</div> <div>13%</div> <div>7%</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 crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	BR	A	512	-	-	X	-
3	BR	A	514	-	-	X	-
3	BR	D	512	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 13457 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 KtzI.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	414	Total	C	N	O	S	0	0	0
			3188	2007	564	607	10			
1	B	414	Total	C	N	O	S	0	0	0
			3200	2012	575	603	10			
1	C	414	Total	C	N	O	S	0	0	0
			3161	1994	559	598	10			
1	D	414	Total	C	N	O	S	0	0	0
			3185	2004	568	603	10			

There are 84 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-18	MET	-	initiating methionine	UNP A8CF85
A	-17	GLY	-	expression tag	UNP A8CF85
A	-16	SER	-	expression tag	UNP A8CF85
A	-15	SER	-	expression tag	UNP A8CF85
A	-14	HIS	-	expression tag	UNP A8CF85
A	-13	HIS	-	expression tag	UNP A8CF85
A	-12	HIS	-	expression tag	UNP A8CF85
A	-11	HIS	-	expression tag	UNP A8CF85
A	-10	HIS	-	expression tag	UNP A8CF85
A	-9	HIS	-	expression tag	UNP A8CF85
A	-8	SER	-	expression tag	UNP A8CF85
A	-7	SER	-	expression tag	UNP A8CF85
A	-6	GLY	-	expression tag	UNP A8CF85
A	-5	LEU	-	expression tag	UNP A8CF85
A	-4	VAL	-	expression tag	UNP A8CF85
A	-3	PRO	-	expression tag	UNP A8CF85
A	-2	ARG	-	expression tag	UNP A8CF85
A	-1	GLY	-	expression tag	UNP A8CF85
A	0	SER	-	expression tag	UNP A8CF85
A	1	HIS	-	expression tag	UNP A8CF85
A	2	MET	-	expression tag	UNP A8CF85

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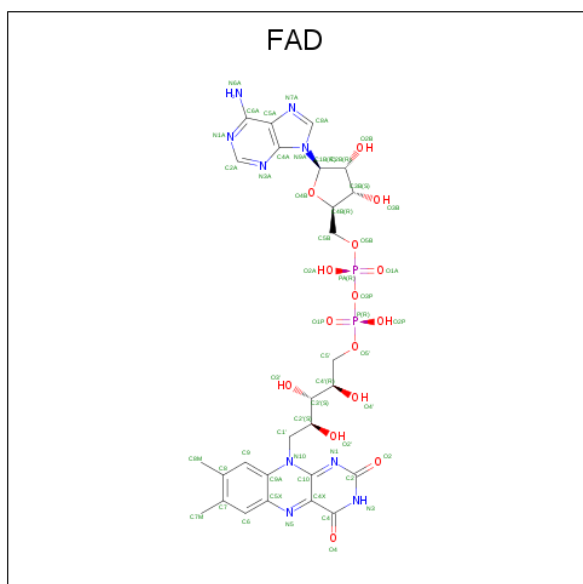
Chain	Residue	Modelled	Actual	Comment	Reference
B	-18	MET	-	initiating methionine	UNP A8CF85
B	-17	GLY	-	expression tag	UNP A8CF85
B	-16	SER	-	expression tag	UNP A8CF85
B	-15	SER	-	expression tag	UNP A8CF85
B	-14	HIS	-	expression tag	UNP A8CF85
B	-13	HIS	-	expression tag	UNP A8CF85
B	-12	HIS	-	expression tag	UNP A8CF85
B	-11	HIS	-	expression tag	UNP A8CF85
B	-10	HIS	-	expression tag	UNP A8CF85
B	-9	HIS	-	expression tag	UNP A8CF85
B	-8	SER	-	expression tag	UNP A8CF85
B	-7	SER	-	expression tag	UNP A8CF85
B	-6	GLY	-	expression tag	UNP A8CF85
B	-5	LEU	-	expression tag	UNP A8CF85
B	-4	VAL	-	expression tag	UNP A8CF85
B	-3	PRO	-	expression tag	UNP A8CF85
B	-2	ARG	-	expression tag	UNP A8CF85
B	-1	GLY	-	expression tag	UNP A8CF85
B	0	SER	-	expression tag	UNP A8CF85
B	1	HIS	-	expression tag	UNP A8CF85
B	2	MET	-	expression tag	UNP A8CF85
C	-18	MET	-	initiating methionine	UNP A8CF85
C	-17	GLY	-	expression tag	UNP A8CF85
C	-16	SER	-	expression tag	UNP A8CF85
C	-15	SER	-	expression tag	UNP A8CF85
C	-14	HIS	-	expression tag	UNP A8CF85
C	-13	HIS	-	expression tag	UNP A8CF85
C	-12	HIS	-	expression tag	UNP A8CF85
C	-11	HIS	-	expression tag	UNP A8CF85
C	-10	HIS	-	expression tag	UNP A8CF85
C	-9	HIS	-	expression tag	UNP A8CF85
C	-8	SER	-	expression tag	UNP A8CF85
C	-7	SER	-	expression tag	UNP A8CF85
C	-6	GLY	-	expression tag	UNP A8CF85
C	-5	LEU	-	expression tag	UNP A8CF85
C	-4	VAL	-	expression tag	UNP A8CF85
C	-3	PRO	-	expression tag	UNP A8CF85
C	-2	ARG	-	expression tag	UNP A8CF85
C	-1	GLY	-	expression tag	UNP A8CF85
C	0	SER	-	expression tag	UNP A8CF85
C	1	HIS	-	expression tag	UNP A8CF85
C	2	MET	-	expression tag	UNP A8CF85

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-18	MET	-	initiating methionine	UNP A8CF85
D	-17	GLY	-	expression tag	UNP A8CF85
D	-16	SER	-	expression tag	UNP A8CF85
D	-15	SER	-	expression tag	UNP A8CF85
D	-14	HIS	-	expression tag	UNP A8CF85
D	-13	HIS	-	expression tag	UNP A8CF85
D	-12	HIS	-	expression tag	UNP A8CF85
D	-11	HIS	-	expression tag	UNP A8CF85
D	-10	HIS	-	expression tag	UNP A8CF85
D	-9	HIS	-	expression tag	UNP A8CF85
D	-8	SER	-	expression tag	UNP A8CF85
D	-7	SER	-	expression tag	UNP A8CF85
D	-6	GLY	-	expression tag	UNP A8CF85
D	-5	LEU	-	expression tag	UNP A8CF85
D	-4	VAL	-	expression tag	UNP A8CF85
D	-3	PRO	-	expression tag	UNP A8CF85
D	-2	ARG	-	expression tag	UNP A8CF85
D	-1	GLY	-	expression tag	UNP A8CF85
D	0	SER	-	expression tag	UNP A8CF85
D	1	HIS	-	expression tag	UNP A8CF85
D	2	MET	-	expression tag	UNP A8CF85

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (three-letter code: FAD) (formula: $C_{27}H_{33}N_9O_{15}P_2$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is BROMIDE ION (three-letter code: BR) (formula: Br).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	11	Total	Br	0	0
			11	11		
3	A	14	Total	Br	0	0
			14	14		
3	D	12	Total	Br	0	0
			12	12		
3	C	9	Total	Br	0	0
			9	9		

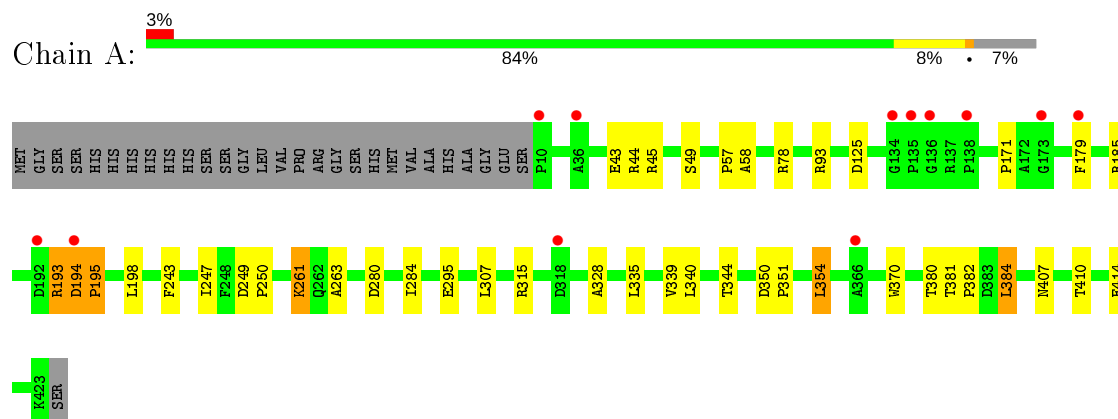
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	133	Total	O	0	0
			133	133		
4	B	113	Total	O	0	0
			113	113		
4	C	111	Total	O	0	0
			111	111		
4	D	108	Total	O	0	0
			108	108		

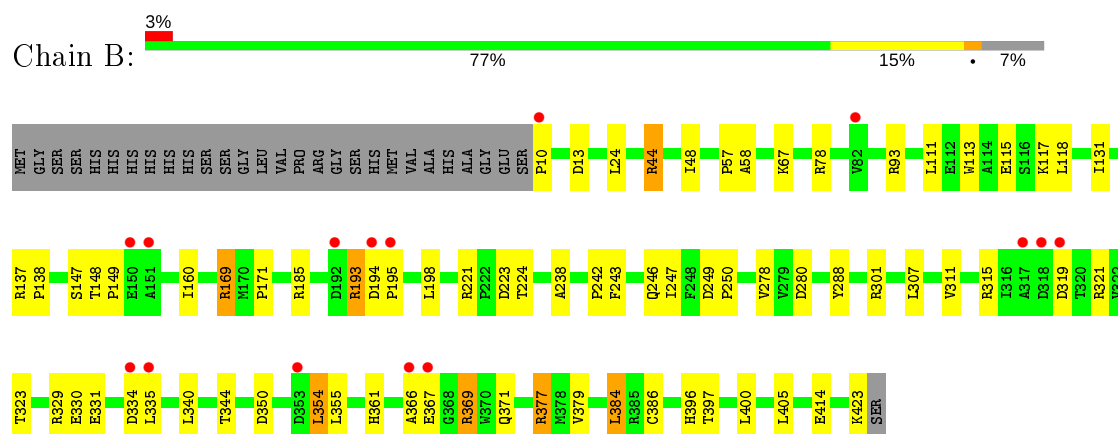
3 Residue-property plots [i](#)

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.

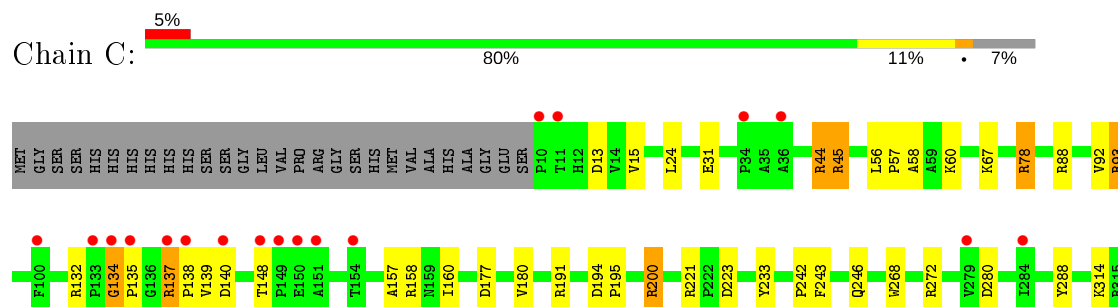
• Molecule 1: KtzI

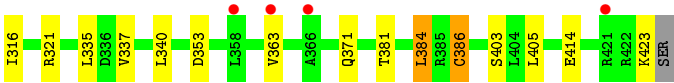


• Molecule 1: KtzI

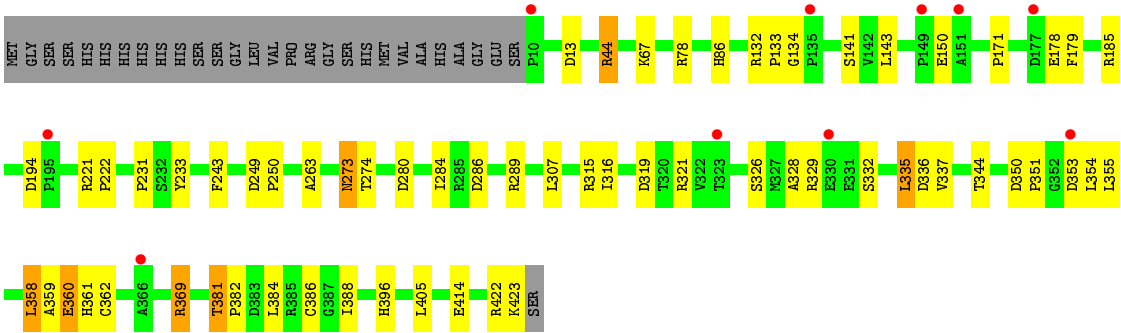
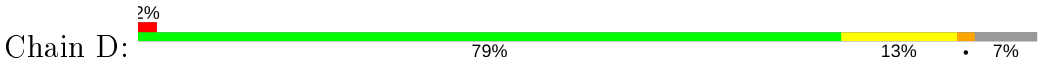


• Molecule 1: KtzI





● Molecule 1: Ktztl



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	79.81Å 151.94Å 161.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	45.51 – 2.09 48.34 – 2.09	Depositor EDS
% Data completeness (in resolution range)	99.3 (45.51-2.09) 99.3 (48.34-2.09)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.09	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.43 (at 2.08Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.9_1692)	Depositor
R, R_{free}	0.205 , 0.236 0.208 , 0.236	Depositor DCC
R_{free} test set	5814 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	36.0	Xtriage
Anisotropy	0.537	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 42.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	13457	wwPDB-VP
Average B, all atoms (Å ²)	37.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.00% 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: FAD, BR

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	0.59	2/3268 (0.1%)	0.66	5/4457 (0.1%)
1	B	0.70	2/3279 (0.1%)	0.67	4/4468 (0.1%)
1	C	0.76	1/3240 (0.0%)	0.71	5/4421 (0.1%)
1	D	0.70	3/3263 (0.1%)	0.69	7/4448 (0.2%)
All	All	0.69	8/13050 (0.1%)	0.68	21/17794 (0.1%)

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	195	PRO	N-CD	5.79	1.55	1.47
1	D	382	PRO	N-CD	5.38	1.55	1.47
1	B	386	CYS	CB-SG	-5.30	1.73	1.81
1	A	382	PRO	N-CD	5.27	1.55	1.47
1	C	135	PRO	N-CD	5.26	1.55	1.47
1	D	351	PRO	N-CD	5.23	1.55	1.47
1	D	222	PRO	N-CD	5.22	1.55	1.47
1	B	195	PRO	N-CD	5.16	1.55	1.47

All (21) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	221	ARG	C-N-CD	5.81	140.60	128.40
1	C	381	THR	C-N-CD	5.76	140.50	128.40
1	D	194	ASP	C-N-CD	5.75	140.48	128.40
1	B	194	ASP	C-N-CD	5.62	140.21	128.40
1	A	93	ARG	NE-CZ-NH2	-5.62	117.49	120.30
1	C	132	ARG	C-N-CD	5.59	140.14	128.40
1	B	377	ARG	NE-CZ-NH1	5.59	123.09	120.30
1	B	377	ARG	NE-CZ-NH2	-5.57	117.51	120.30
1	D	221	ARG	C-N-CD	5.51	139.97	128.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	350	ASP	C-N-CD	5.49	139.94	128.40
1	D	381	THR	C-N-CD	5.45	139.84	128.40
1	C	56	LEU	C-N-CD	5.43	139.81	128.40
1	D	350	ASP	C-N-CD	5.41	139.76	128.40
1	A	381	THR	C-N-CD	5.32	139.57	128.40
1	A	194	ASP	C-N-CD	5.28	139.49	128.40
1	C	134	GLY	C-N-CD	5.27	139.46	128.40
1	D	249	ASP	C-N-CD	5.26	139.44	128.40
1	A	350	ASP	C-N-CD	5.24	139.40	128.40
1	D	150	GLU	CB-CA-C	-5.15	100.10	110.40
1	A	93	ARG	NE-CZ-NH1	5.11	122.86	120.30
1	D	150	GLU	N-CA-C	5.05	124.64	111.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3188	0	3001	37	0
1	B	3200	0	3033	48	0
1	C	3161	0	2970	40	0
1	D	3185	0	3013	53	0
2	A	53	0	31	2	0
2	B	53	0	28	2	0
2	C	53	0	28	4	0
2	D	53	0	28	4	0
3	A	14	0	0	10	0
3	B	11	0	0	5	0
3	C	9	0	0	3	0
3	D	12	0	0	5	0
4	A	133	0	0	2	0
4	B	113	0	0	4	0
4	C	111	0	0	3	0
4	D	108	0	0	5	0
All	All	13457	0	12132	170	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 7.

All (170) 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:367:GLU:OE2	1:B:367:GLU:N	1.95	0.98
1:B:366:ALA:HB3	1:B:367:GLU:OE2	1.64	0.97
1:B:67:LYS:HE3	3:B:506:BR:BR	2.23	0.93
1:A:78:ARG:NH1	3:A:509:BR:BR	2.61	0.88
1:D:405:LEU:HD21	2:D:501:FAD:H5'1	1.54	0.88
1:A:193:ARG:HH11	1:A:193:ARG:HG2	1.35	0.88
1:B:193:ARG:HG2	1:B:193:ARG:HH11	1.40	0.87
1:A:179:PHE:HB2	3:A:512:BR:BR	2.30	0.86
1:A:261:LYS:HE3	1:A:261:LYS:HA	1.59	0.84
1:B:315:ARG:HD2	1:B:319:ASP:O	1.80	0.82
1:A:410:THR:O	1:A:414:GLU:HG2	1.79	0.81
1:C:93:ARG:HG2	1:C:93:ARG:HH21	1.48	0.77
1:D:67:LYS:HE3	3:D:505:BR:BR	2.41	0.76
1:A:179:PHE:HD2	3:A:512:BR:BR	2.24	0.76
1:C:13:ASP:CG	1:C:423:LYS:HZ1	1.88	0.75
1:D:422:ARG:NH2	4:D:686:HOH:O	2.21	0.73
1:C:93:ARG:HG2	1:C:93:ARG:NH2	2.01	0.73
1:D:179:PHE:HD2	3:D:512:BR:BR	2.27	0.73
1:D:132:ARG:HB2	1:D:133:PRO:CD	2.22	0.69
1:D:243:PHE:HB2	4:D:696:HOH:O	1.93	0.69
1:D:133:PRO:HG3	1:D:358:LEU:HD12	1.75	0.68
1:D:316:ILE:CD1	1:D:321:ARG:HD3	2.24	0.67
1:A:250:PRO:HD2	3:A:514:BR:BR	2.49	0.67
1:C:13:ASP:OD1	1:C:423:LYS:NZ	2.27	0.66
1:B:361:HIS:HB2	1:B:384:LEU:HD12	1.77	0.66
1:B:354:LEU:HD22	3:B:512:BR:BR	2.51	0.66
1:C:414:GLU:OE1	3:C:506:BR:BR	2.69	0.66
1:A:179:PHE:CD2	1:A:315:ARG:HD3	2.31	0.66
1:C:158:ARG:O	1:C:386:CYS:HB3	1.96	0.65
1:C:137:ARG:HH11	1:C:137:ARG:HG2	1.61	0.65
1:B:113:TRP:CZ2	1:B:117:LYS:HE3	2.32	0.65
1:B:78:ARG:HG3	4:B:659:HOH:O	1.96	0.64
1:D:273:ASN:HD22	1:D:273:ASN:N	1.96	0.64
1:D:369:ARG:CZ	1:D:396:HIS:NE2	2.61	0.64
1:D:273:ASN:HD22	1:D:273:ASN:H	1.45	0.63
1:D:78:ARG:NH2	4:D:671:HOH:O	2.30	0.63
1:D:315:ARG:HD2	1:D:319:ASP:O	1.99	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:193:ARG:HG2	1:B:193:ARG:NH1	2.11	0.62
1:B:321:ARG:HD3	1:B:334:ASP:OD2	1.99	0.62
1:D:134:GLY:HA2	1:D:143:LEU:CD2	2.29	0.61
1:A:179:PHE:CD2	3:A:512:BR:BR	3.06	0.61
1:D:414:GLU:OE1	3:D:508:BR:BR	2.74	0.61
1:B:148:THR:HB	1:B:149:PRO:CD	2.31	0.60
1:C:15:VAL:HG23	1:C:157:ALA:HB2	1.84	0.59
1:D:179:PHE:HB2	3:D:512:BR:BR	2.58	0.59
1:B:48:ILE:HD11	1:B:115:GLU:HG3	1.85	0.59
1:A:45:ARG:NH2	1:A:49:SER:O	2.30	0.58
1:B:307:LEU:HD12	3:B:511:BR:BR	2.57	0.58
1:C:45:ARG:NH1	2:C:501:FAD:O3B	2.36	0.58
1:A:380:THR:HG21	1:A:384:LEU:HD13	1.85	0.58
1:C:363:VAL:HG12	1:C:371:GLN:NE2	2.19	0.57
1:A:198:LEU:HD21	1:A:339:VAL:CG2	2.35	0.57
1:B:44:ARG:HG2	2:B:501:FAD:C4A	2.34	0.57
1:A:193:ARG:CG	1:A:193:ARG:HH11	2.13	0.57
1:C:137:ARG:HH11	1:C:137:ARG:CG	2.17	0.57
1:D:134:GLY:HA2	1:D:143:LEU:HD21	1.88	0.55
1:C:44:ARG:HG2	2:C:501:FAD:C4A	2.36	0.55
1:C:57:PRO:O	1:C:58:ALA:HB3	2.07	0.55
1:D:132:ARG:HB2	1:D:133:PRO:HD2	1.88	0.55
1:A:351:PRO:HG2	1:A:370:TRP:CD1	2.43	0.54
1:B:131:ILE:HD13	1:B:160:ILE:CD1	2.38	0.53
1:A:249:ASP:HB3	3:A:514:BR:BR	2.64	0.53
1:B:366:ALA:CB	1:B:367:GLU:OE2	2.47	0.53
1:D:141:SER:HA	1:D:386:CYS:SG	2.49	0.53
1:A:193:ARG:CG	1:A:193:ARG:NH1	2.72	0.52
1:C:78:ARG:HG3	4:C:705:HOH:O	2.09	0.52
1:A:261:LYS:CA	1:A:261:LYS:HE3	2.29	0.52
1:D:405:LEU:HD21	2:D:501:FAD:C5'	2.34	0.52
1:B:367:GLU:HB2	1:B:369:ARG:HD3	1.92	0.52
1:A:45:ARG:HE	1:A:49:SER:HB3	1.74	0.52
1:B:329:ARG:HB2	1:B:331:GLU:HG2	1.92	0.52
1:C:200:ARG:HG3	1:C:337:VAL:HA	1.92	0.52
1:A:263:ALA:HB2	1:D:328:ALA:HA	1.90	0.51
1:A:179:PHE:CB	3:A:512:BR:BR	3.10	0.51
1:B:414:GLU:OE2	3:B:507:BR:BR	2.84	0.51
1:A:295:GLU:HG3	3:A:515:BR:BR	2.66	0.51
1:B:137:ARG:HA	1:B:138:PRO:C	2.30	0.50
1:B:193:ARG:CG	1:B:193:ARG:NH1	2.74	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:137:ARG:HA	1:C:138:PRO:C	2.31	0.50
1:B:371:GLN:HB3	1:B:379:VAL:HB	1.93	0.50
1:C:194:ASP:OD2	1:C:195:PRO:HD2	2.11	0.50
1:D:231:PRO:O	1:D:307:LEU:HA	2.11	0.50
1:D:134:GLY:HA2	1:D:143:LEU:HD22	1.93	0.50
1:A:328:ALA:HA	1:D:263:ALA:HB2	1.93	0.50
1:D:179:PHE:CD2	3:D:512:BR:BR	3.15	0.50
1:D:141:SER:CA	1:D:386:CYS:SG	3.00	0.50
1:B:57:PRO:O	1:B:58:ALA:HB3	2.10	0.49
1:B:223:ASP:OD1	1:B:224:THR:N	2.45	0.49
1:D:405:LEU:CD2	2:D:501:FAD:H5'1	2.33	0.49
1:B:311:VAL:CG2	1:B:323:THR:HG22	2.42	0.49
1:C:67:LYS:HE3	3:C:505:BR:BR	2.67	0.49
1:D:44:ARG:HG2	2:D:501:FAD:C4A	2.41	0.49
1:B:10:PRO:O	4:B:643:HOH:O	2.20	0.49
1:A:57:PRO:O	1:A:58:ALA:HB3	2.12	0.49
1:C:93:ARG:CG	1:C:93:ARG:HH21	2.16	0.49
1:C:268:TRP:O	1:C:272:ARG:HB3	2.13	0.49
1:D:273:ASN:H	1:D:273:ASN:ND2	2.08	0.49
1:B:169:ARG:O	1:B:169:ARG:HG3	2.13	0.49
1:D:316:ILE:HD12	1:D:321:ARG:HD3	1.93	0.48
1:B:131:ILE:HD13	1:B:160:ILE:HD13	1.96	0.47
1:A:193:ARG:NH1	1:A:193:ARG:HG2	2.11	0.47
1:B:185:ARG:HG3	3:B:509:BR:BR	2.70	0.47
1:A:307:LEU:HD12	3:A:513:BR:BR	2.69	0.47
1:C:423:LYS:NZ	4:C:696:HOH:O	2.28	0.47
1:D:286:ASP:OD1	1:D:289:ARG:NH2	2.28	0.47
1:A:295:GLU:OE1	4:A:705:HOH:O	2.21	0.47
1:C:45:ARG:HG3	1:C:45:ARG:HH11	1.80	0.47
1:A:243:PHE:HD2	1:D:284:ILE:HG23	1.79	0.47
1:D:335:LEU:HD22	1:D:337:VAL:HG13	1.96	0.47
1:A:44:ARG:HD3	2:A:501:FAD:C5A	2.45	0.46
1:D:231:PRO:O	1:D:307:LEU:HD23	2.15	0.46
1:A:44:ARG:O	1:A:125:ASP:HA	2.16	0.46
1:D:185:ARG:NH2	4:D:667:HOH:O	2.47	0.46
1:B:221:ARG:NH1	1:B:223:ASP:OD2	2.48	0.46
1:C:137:ARG:NH1	1:C:137:ARG:CG	2.76	0.46
1:C:92:VAL:HG23	3:C:503:BR:BR	2.70	0.46
1:D:178:GLU:OE2	1:D:179:PHE:CE2	2.69	0.46
1:A:43:GLU:OE2	1:A:45:ARG:HD3	2.16	0.46
1:D:359:ALA:O	1:D:361:HIS:N	2.49	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:LEU:HD21	1:A:339:VAL:HG21	1.97	0.45
1:B:93:ARG:HG3	4:B:628:HOH:O	2.16	0.45
1:D:358:LEU:CD2	1:D:388:ILE:HD11	2.47	0.45
1:B:48:ILE:HG13	4:B:686:HOH:O	2.16	0.45
1:C:243:PHE:O	1:C:246:GLN:HB2	2.16	0.45
1:B:171:PRO:HG3	1:B:344:THR:HG21	1.99	0.45
1:B:148:THR:HB	1:B:149:PRO:HD2	1.97	0.44
1:C:405:LEU:HD21	2:C:501:FAD:H4'	1.99	0.44
1:B:243:PHE:O	1:B:246:GLN:HB2	2.17	0.44
1:C:13:ASP:CG	1:C:423:LYS:NZ	2.66	0.44
1:C:15:VAL:O	1:C:160:ILE:HG13	2.17	0.44
1:C:314:LYS:CE	1:C:316:ILE:HD11	2.48	0.44
1:A:44:ARG:HD3	2:A:501:FAD:C4A	2.47	0.44
1:A:171:PRO:HG3	1:A:344:THR:HG21	1.99	0.44
1:A:407:ASN:ND2	3:A:506:BR:BR	3.00	0.44
1:D:361:HIS:O	1:D:381:THR:N	2.40	0.44
1:D:326:SER:OG	1:D:329:ARG:HG2	2.19	0.43
1:B:242:PRO:HB2	1:C:288:TYR:CD1	2.52	0.43
1:A:354:LEU:HB2	4:A:662:HOH:O	2.19	0.43
1:D:86:HIS:ND1	4:D:695:HOH:O	2.36	0.43
1:D:355:LEU:HD22	1:D:358:LEU:HD23	2.00	0.43
1:D:335:LEU:HD23	1:D:336:ASP:N	2.33	0.43
1:C:134:GLY:H	1:C:139:VAL:HG13	1.84	0.43
1:C:13:ASP:OD2	1:C:423:LYS:NZ	2.52	0.43
1:D:335:LEU:CD2	1:D:335:LEU:C	2.87	0.43
1:B:238:ALA:HA	1:B:278:VAL:HG21	2.00	0.43
1:D:133:PRO:O	1:D:143:LEU:CD2	2.67	0.42
1:A:284:ILE:HG23	1:D:243:PHE:HD2	1.84	0.42
1:B:405:LEU:HD21	2:B:501:FAD:H4'	2.01	0.42
1:B:396:HIS:CD2	1:B:397:THR:HG23	2.54	0.42
1:B:24:LEU:HD23	1:B:111:LEU:HD22	2.02	0.42
1:D:171:PRO:HG3	1:D:344:THR:HG21	2.02	0.42
1:D:358:LEU:HD21	1:D:388:ILE:HD11	2.02	0.42
1:D:13:ASP:OD1	1:D:423:LYS:NZ	2.53	0.42
1:C:88:ARG:HD3	1:C:88:ARG:HA	1.92	0.42
1:A:247:ILE:HG22	1:D:233:TYR:HD2	1.85	0.42
1:C:403:SER:OG	2:C:501:FAD:O2	2.31	0.41
1:B:224:THR:O	1:B:301:ARG:HD2	2.20	0.41
1:B:247:ILE:HG22	1:C:233:TYR:CD2	2.55	0.41
1:B:355:LEU:HA	1:B:355:LEU:HD23	1.79	0.41
1:B:288:TYR:CD1	1:C:242:PRO:HB2	2.55	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:139:VAL:HB	1:C:384:LEU:HD23	2.01	0.41
1:D:359:ALA:O	1:D:362:CYS:N	2.33	0.41
1:D:335:LEU:HD23	1:D:335:LEU:C	2.42	0.40
1:B:13:ASP:OD1	1:B:423:LYS:HE3	2.22	0.40
1:B:249:ASP:HB2	1:B:250:PRO:HD2	2.02	0.40
1:B:247:ILE:CD1	1:B:400:LEU:HD22	2.52	0.40
1:C:177:ASP:OD1	1:C:180:VAL:N	2.55	0.40
1:D:359:ALA:O	1:D:360:GLU:C	2.59	0.40
1:C:31:GLU:OE2	1:C:78:ARG:NH2	2.50	0.40
1:C:321:ARG:NH1	4:C:601:HOH:O	2.51	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	412/443 (93%)	393 (95%)	19 (5%)	0	100	100
1	B	412/443 (93%)	394 (96%)	18 (4%)	0	100	100
1	C	412/443 (93%)	394 (96%)	17 (4%)	1 (0%)	47	49
1	D	412/443 (93%)	394 (96%)	17 (4%)	1 (0%)	47	49
All	All	1648/1772 (93%)	1575 (96%)	71 (4%)	2 (0%)	51	54

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	191	ARG
1	D	360	GLU

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	332/372 (89%)	322 (97%)	10 (3%)	41	44
1	B	333/372 (90%)	319 (96%)	14 (4%)	30	30
1	C	325/372 (87%)	308 (95%)	17 (5%)	23	21
1	D	331/372 (89%)	319 (96%)	12 (4%)	35	36
All	All	1321/1488 (89%)	1268 (96%)	53 (4%)	31	32

All (53) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	185	ARG
1	A	193	ARG
1	A	194	ASP
1	A	195	PRO
1	A	261	LYS
1	A	280	ASP
1	A	335	LEU
1	A	340	LEU
1	A	354	LEU
1	A	384	LEU
1	B	44	ARG
1	B	118	LEU
1	B	147	SER
1	B	169	ARG
1	B	193	ARG
1	B	198	LEU
1	B	280	ASP
1	B	330	GLU
1	B	335	LEU
1	B	340	LEU
1	B	354	LEU
1	B	369	ARG
1	B	377	ARG
1	B	384	LEU

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Mol	Chain	Res	Type
1	C	24	LEU
1	C	44	ARG
1	C	45	ARG
1	C	60	LYS
1	C	78	ARG
1	C	93	ARG
1	C	137	ARG
1	C	140	ASP
1	C	148	THR
1	C	200	ARG
1	C	223	ASP
1	C	280	ASP
1	C	335	LEU
1	C	340	LEU
1	C	353	ASP
1	C	384	LEU
1	C	386	CYS
1	D	44	ARG
1	D	250	PRO
1	D	273	ASN
1	D	274	THR
1	D	280	ASP
1	D	332	SER
1	D	335	LEU
1	D	353	ASP
1	D	354	LEU
1	D	358	LEU
1	D	369	ARG
1	D	384	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	62	GLN
1	A	120	HIS
1	A	262	GLN
1	B	62	GLN
1	B	309	HIS
1	C	62	GLN
1	C	371	GLN
1	D	62	GLN
1	D	240	ASN

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Mol	Chain	Res	Type
1	D	273	ASN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

Of 50 ligands modelled in this entry, 46 are monoatomic - leaving 4 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	D	501	-	51,58,58	2.89	15 (29%)	60,89,89	2.94	23 (38%)
2	FAD	C	501	-	51,58,58	2.68	13 (25%)	60,89,89	2.24	17 (28%)
2	FAD	B	501	-	51,58,58	2.78	17 (33%)	60,89,89	1.80	12 (20%)
2	FAD	A	501	-	51,58,58	2.68	17 (33%)	60,89,89	1.64	7 (11%)

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	D	501	-	-	11/30/50/50	0/6/6/6
2	FAD	C	501	-	-	10/30/50/50	0/6/6/6
2	FAD	B	501	-	-	8/30/50/50	0/6/6/6
2	FAD	A	501	-	-	5/30/50/50	0/6/6/6

All (62) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	FAD	C4X-C10	12.15	1.51	1.38
2	D	501	FAD	C4X-C10	11.01	1.49	1.38
2	C	501	FAD	C4X-C10	10.82	1.49	1.38
2	B	501	FAD	C4X-C10	10.73	1.49	1.38
2	D	501	FAD	C2'-C3'	-7.73	1.38	1.53
2	C	501	FAD	C5X-N5	7.13	1.47	1.35
2	A	501	FAD	C5X-N5	7.02	1.47	1.35
2	D	501	FAD	C5X-N5	6.85	1.46	1.35
2	B	501	FAD	O3'-C3'	-6.74	1.27	1.43
2	B	501	FAD	C5X-N5	6.65	1.46	1.35
2	D	501	FAD	O2'-C2'	-5.55	1.31	1.43
2	C	501	FAD	C2-N1	5.40	1.48	1.38
2	A	501	FAD	C2-N1	5.27	1.48	1.38
2	D	501	FAD	C2-N1	4.99	1.48	1.38
2	B	501	FAD	C2B-C1B	-4.82	1.46	1.53
2	B	501	FAD	PA-O5B	-4.70	1.40	1.59
2	B	501	FAD	C2-N1	4.55	1.47	1.38
2	C	501	FAD	C9A-N10	4.55	1.44	1.38
2	C	501	FAD	C4-N3	4.40	1.40	1.33
2	A	501	FAD	C5'-C4'	4.18	1.57	1.51
2	D	501	FAD	C4'-C3'	4.04	1.61	1.53
2	D	501	FAD	C2B-C1B	-3.91	1.47	1.53
2	D	501	FAD	C4-N3	3.90	1.39	1.33
2	C	501	FAD	O2'-C2'	-3.86	1.35	1.43
2	C	501	FAD	O3'-C3'	-3.79	1.34	1.43
2	A	501	FAD	C9A-N10	3.64	1.43	1.38
2	D	501	FAD	C9A-N10	3.50	1.43	1.38
2	B	501	FAD	O4B-C4B	-3.37	1.37	1.45
2	C	501	FAD	C2B-C1B	-3.16	1.49	1.53
2	A	501	FAD	PA-O2A	-3.11	1.40	1.55
2	A	501	FAD	C4-N3	3.09	1.38	1.33
2	C	501	FAD	C2A-N3A	3.09	1.37	1.32
2	B	501	FAD	C1'-N10	-3.05	1.45	1.48
2	B	501	FAD	O3B-C3B	-2.89	1.36	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	FAD	O2'-C2'	-2.86	1.37	1.43
2	A	501	FAD	C6A-N6A	2.83	1.44	1.34
2	A	501	FAD	C2B-C1B	-2.82	1.49	1.53
2	C	501	FAD	O4'-C4'	-2.81	1.37	1.43
2	D	501	FAD	C6A-N6A	2.81	1.44	1.34
2	C	501	FAD	C6A-N6A	2.77	1.44	1.34
2	B	501	FAD	C6A-N6A	2.69	1.43	1.34
2	B	501	FAD	O2B-C2B	-2.63	1.36	1.43
2	D	501	FAD	O3'-C3'	2.61	1.49	1.43
2	D	501	FAD	C4-C4X	2.60	1.45	1.41
2	C	501	FAD	C4-C4X	2.60	1.45	1.41
2	A	501	FAD	C2A-N3A	2.58	1.36	1.32
2	A	501	FAD	O2'-C2'	-2.37	1.38	1.43
2	A	501	FAD	C4-C4X	2.36	1.45	1.41
2	B	501	FAD	O4'-C4'	-2.35	1.38	1.43
2	B	501	FAD	C8A-N7A	-2.31	1.30	1.34
2	A	501	FAD	PA-O1A	-2.27	1.42	1.50
2	A	501	FAD	P-O1P	-2.27	1.42	1.50
2	B	501	FAD	C5A-N7A	-2.19	1.31	1.39
2	D	501	FAD	O3B-C3B	-2.16	1.37	1.43
2	A	501	FAD	O4'-C4'	-2.16	1.38	1.43
2	D	501	FAD	C2A-N3A	2.14	1.35	1.32
2	D	501	FAD	O5'-C5'	-2.10	1.36	1.44
2	A	501	FAD	P-O2P	-2.10	1.45	1.55
2	A	501	FAD	C2'-C3'	2.09	1.57	1.53
2	B	501	FAD	C6-C7	2.04	1.42	1.37
2	C	501	FAD	PA-O1A	-2.02	1.43	1.50
2	B	501	FAD	O4B-C1B	-2.00	1.38	1.41

All (59) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	FAD	O4'-C4'-C3'	8.05	128.68	109.10
2	D	501	FAD	O5B-PA-O1A	-7.73	78.88	109.07
2	D	501	FAD	O5'-C5'-C4'	7.72	129.98	109.36
2	B	501	FAD	C4-N3-C2	7.04	121.09	115.14
2	D	501	FAD	C4-N3-C2	6.88	120.95	115.14
2	C	501	FAD	P-O3P-PA	6.54	155.26	132.83
2	A	501	FAD	C4-N3-C2	6.52	120.65	115.14
2	D	501	FAD	O2A-PA-O1A	-6.50	80.11	112.24
2	C	501	FAD	C4-N3-C2	6.48	120.61	115.14
2	C	501	FAD	O3'-C3'-C2'	6.06	123.45	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	501	FAD	N3A-C2A-N1A	-6.06	119.21	128.68
2	D	501	FAD	C5'-C4'-C3'	5.82	123.44	112.20
2	A	501	FAD	N3A-C2A-N1A	-5.55	120.01	128.68
2	C	501	FAD	N3A-C2A-N1A	-5.25	120.48	128.68
2	D	501	FAD	O3'-C3'-C4'	-4.89	96.99	108.81
2	D	501	FAD	O2'-C2'-C1'	4.68	120.85	109.59
2	B	501	FAD	O3'-C3'-C4'	4.42	119.49	108.81
2	B	501	FAD	N3A-C2A-N1A	-4.23	122.07	128.68
2	C	501	FAD	C4X-C10-N10	-4.20	115.99	120.30
2	B	501	FAD	C4A-C5A-N7A	-4.07	105.16	109.40
2	C	501	FAD	C5'-C4'-C3'	3.93	119.79	112.20
2	B	501	FAD	O2'-C2'-C3'	3.81	118.37	109.10
2	D	501	FAD	O5'-P-O1P	-3.70	94.62	109.07
2	D	501	FAD	C4X-C4-N3	-3.68	118.39	123.43
2	A	501	FAD	C4'-C3'-C2'	3.48	120.60	113.36
2	A	501	FAD	C4X-C4-N3	-3.47	118.69	123.43
2	B	501	FAD	C4X-C4-N3	-3.34	118.86	123.43
2	C	501	FAD	O2'-C2'-C3'	3.34	117.22	109.10
2	C	501	FAD	O4'-C4'-C5'	-3.32	102.46	109.92
2	D	501	FAD	O2P-P-O5'	3.11	122.20	107.75
2	C	501	FAD	O5B-PA-O1A	-3.07	97.06	109.07
2	C	501	FAD	C4X-N5-C5X	3.07	119.84	116.77
2	B	501	FAD	O5B-PA-O1A	2.98	120.71	109.07
2	D	501	FAD	O5B-C5B-C4B	2.89	118.93	108.99
2	D	501	FAD	C4X-C10-N10	-2.85	117.37	120.30
2	C	501	FAD	C4X-C4-N3	-2.83	119.56	123.43
2	D	501	FAD	P-O3P-PA	2.75	142.25	132.83
2	A	501	FAD	C4X-C10-N10	-2.67	117.56	120.30
2	C	501	FAD	C4A-C5A-N7A	-2.59	106.70	109.40
2	B	501	FAD	O4'-C4'-C5'	-2.53	104.23	109.92
2	B	501	FAD	C5'-C4'-C3'	2.53	117.09	112.20
2	D	501	FAD	C4'-C3'-C2'	2.52	118.61	113.36
2	B	501	FAD	O2A-PA-O1A	-2.48	100.00	112.24
2	D	501	FAD	O4B-C1B-C2B	-2.45	103.35	106.93
2	D	501	FAD	O4'-C4'-C5'	-2.35	104.64	109.92
2	A	501	FAD	O2'-C2'-C3'	-2.26	103.60	109.10
2	D	501	FAD	P-O5'-C5'	2.26	134.92	121.68
2	D	501	FAD	C1'-N10-C9A	-2.21	116.55	118.29
2	D	501	FAD	C4X-N5-C5X	2.20	118.97	116.77
2	D	501	FAD	O3'-C3'-C2'	2.19	114.11	108.81
2	C	501	FAD	O5'-C5'-C4'	2.16	115.14	109.36
2	C	501	FAD	O3'-C3'-C4'	2.13	113.97	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	501	FAD	C1'-C2'-C3'	-2.10	103.91	109.79
2	D	501	FAD	C2A-N1A-C6A	2.08	122.31	118.75
2	C	501	FAD	O2'-C2'-C1'	2.07	114.57	109.59
2	C	501	FAD	O2A-PA-O5B	2.05	117.28	107.75
2	B	501	FAD	C4X-N5-C5X	2.03	118.80	116.77
2	A	501	FAD	C4X-N5-C5X	2.03	118.80	116.77
2	B	501	FAD	C1'-C2'-C3'	2.02	115.44	109.79

There are no chirality outliers.

All (34) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	501	FAD	C2'-C1'-N10-C10
2	C	501	FAD	PA-O3P-P-O5'
2	D	501	FAD	C5B-O5B-PA-O2A
2	D	501	FAD	P-O3P-PA-O5B
2	D	501	FAD	C3'-C4'-C5'-O5'
2	A	501	FAD	O3'-C3'-C4'-C5'
2	C	501	FAD	O3'-C3'-C4'-C5'
2	D	501	FAD	O3'-C3'-C4'-C5'
2	D	501	FAD	C2'-C3'-C4'-C5'
2	A	501	FAD	O3'-C3'-C4'-O4'
2	C	501	FAD	O3'-C3'-C4'-O4'
2	D	501	FAD	O3'-C3'-C4'-O4'
2	D	501	FAD	O3'-C3'-C4'-O4'
2	D	501	FAD	C2'-C3'-C4'-O4'
2	D	501	FAD	C4'-C5'-O5'-P
2	C	501	FAD	C5B-O5B-PA-O3P
2	D	501	FAD	C5B-O5B-PA-O3P
2	C	501	FAD	C1'-C2'-C3'-O3'
2	A	501	FAD	N10-C1'-C2'-O2'
2	B	501	FAD	O4'-C4'-C5'-O5'
2	B	501	FAD	N10-C1'-C2'-C3'
2	C	501	FAD	N10-C1'-C2'-C3'
2	D	501	FAD	PA-O3P-P-O2P
2	D	501	FAD	O4B-C4B-C5B-O5B
2	B	501	FAD	O3'-C3'-C4'-O4'
2	B	501	FAD	C3'-C4'-C5'-O5'
2	C	501	FAD	PA-O3P-P-O1P
2	C	501	FAD	O4B-C4B-C5B-O5B
2	A	501	FAD	C2'-C3'-C4'-C5'
2	B	501	FAD	O2'-C2'-C3'-C4'
2	A	501	FAD	O4B-C4B-C5B-O5B

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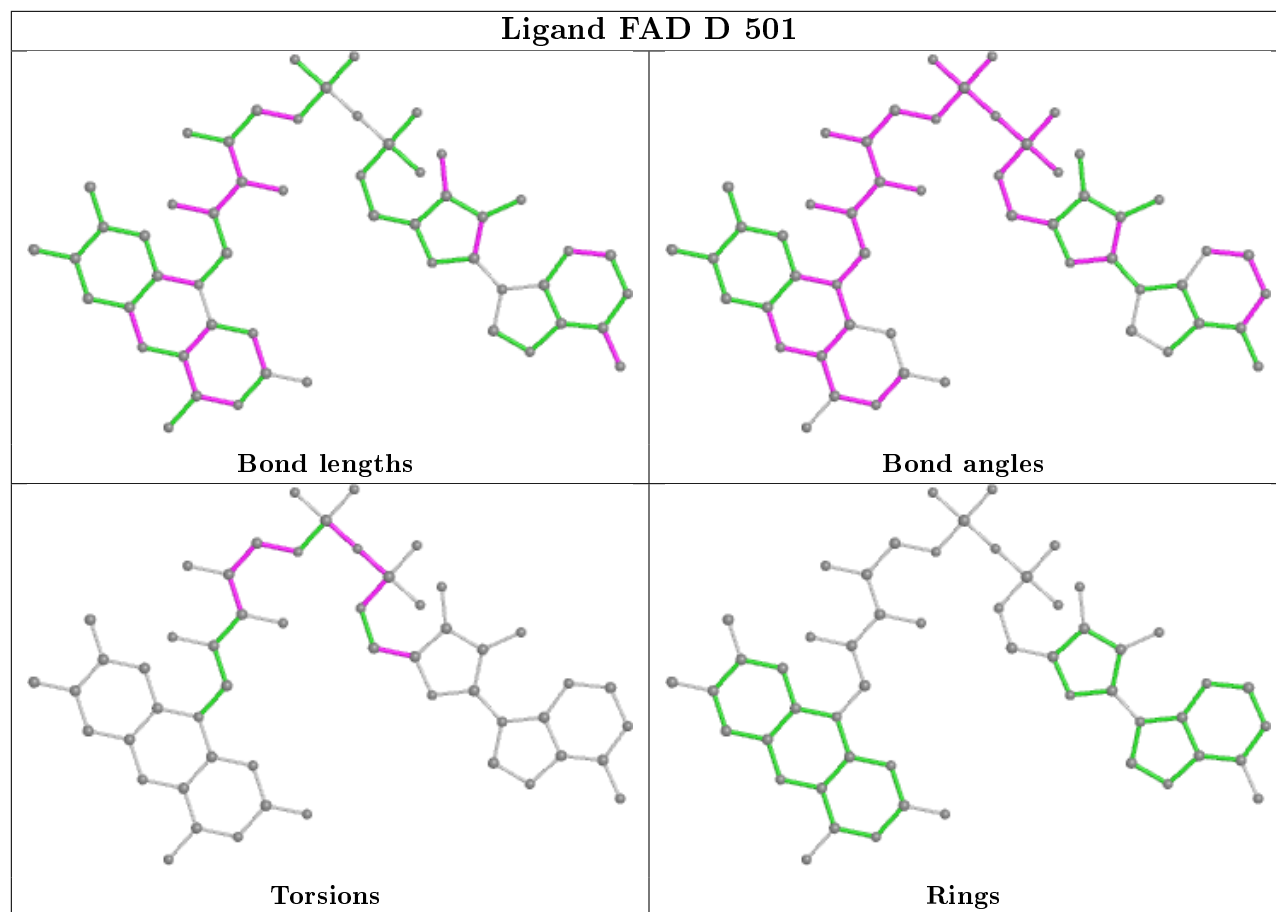
Mol	Chain	Res	Type	Atoms
2	B	501	FAD	O4B-C4B-C5B-O5B
2	C	501	FAD	P-O3P-PA-O2A
2	B	501	FAD	C5'-O5'-P-O1P
2	C	501	FAD	C5B-O5B-PA-O1A

There are no ring outliers.

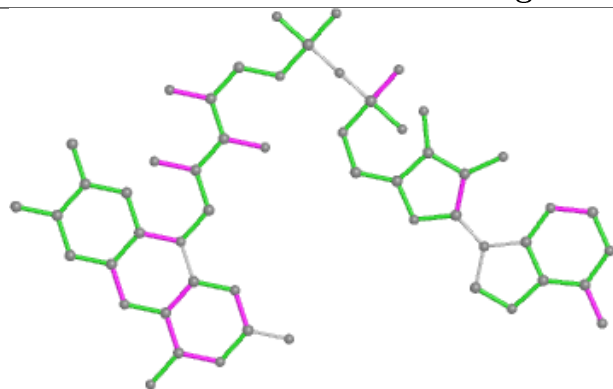
4 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	501	FAD	4	0
2	C	501	FAD	4	0
2	B	501	FAD	2	0
2	A	501	FAD	2	0

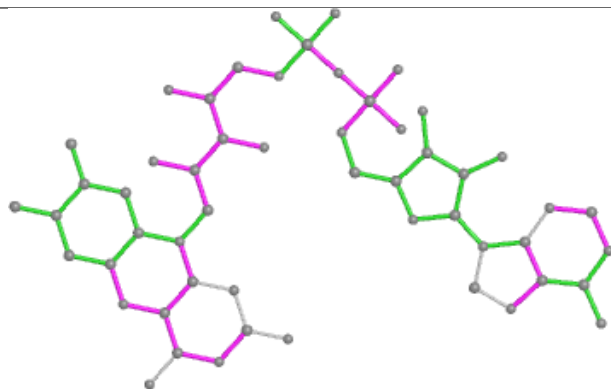
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



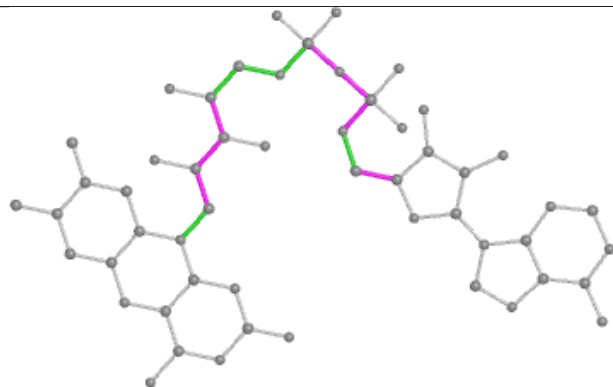
Ligand FAD C 501



Bond lengths



Bond angles

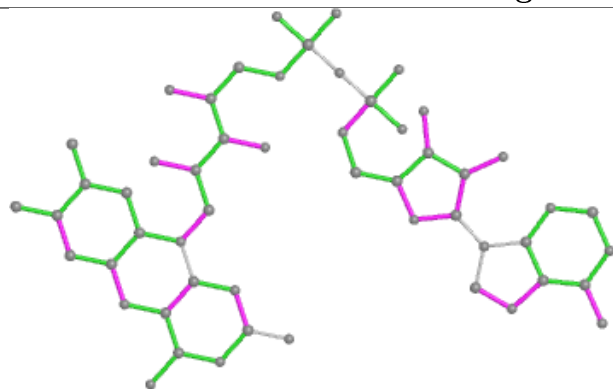


Torsions

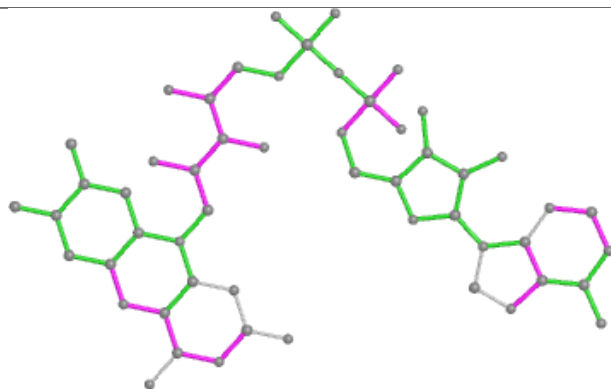


Rings

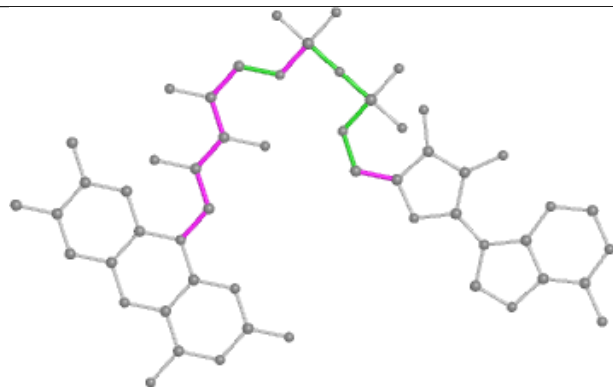
Ligand FAD B 501



Bond lengths



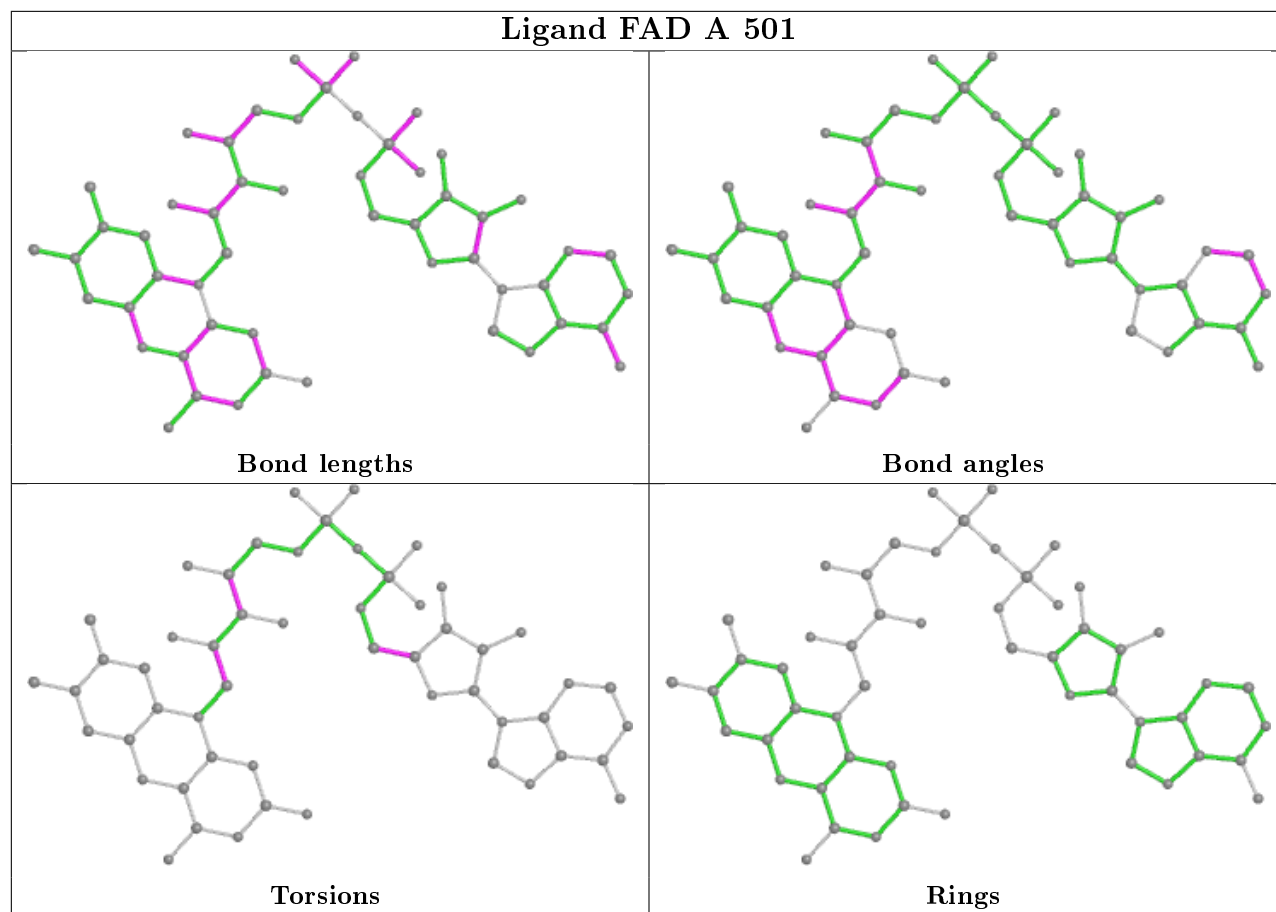
Bond angles



Torsions



Rings



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	414/443 (93%)	0.19	12 (2%) 51 57	22, 33, 56, 73	0
1	B	414/443 (93%)	0.28	15 (3%) 42 49	23, 35, 60, 77	0
1	C	414/443 (93%)	0.30	22 (5%) 26 32	21, 35, 57, 72	0
1	D	414/443 (93%)	0.25	10 (2%) 59 64	25, 37, 61, 74	0
All	All	1656/1772 (93%)	0.26	59 (3%) 42 49	21, 35, 59, 77	0

All (59) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	135	PRO	5.9
1	C	151	ALA	5.8
1	B	317	ALA	5.3
1	C	135	PRO	5.0
1	D	366	ALA	5.0
1	B	195	PRO	4.7
1	A	36	ALA	4.6
1	A	366	ALA	4.5
1	C	36	ALA	4.0
1	D	151	ALA	3.8
1	C	11	THR	3.8
1	B	318	ASP	3.6
1	A	138	PRO	3.6
1	D	10	PRO	3.4
1	A	135	PRO	3.2
1	C	134	GLY	3.2
1	B	366	ALA	3.2
1	B	192	ASP	3.1
1	A	136	GLY	3.1
1	A	173	GLY	3.1
1	C	149	PRO	3.1

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Mol	Chain	Res	Type	RSRZ
1	B	335	LEU	3.0
1	A	194	ASP	2.9
1	B	151	ALA	2.9
1	D	177	ASP	2.8
1	A	10	PRO	2.7
1	D	195	PRO	2.7
1	B	319	ASP	2.7
1	A	192	ASP	2.7
1	C	138	PRO	2.6
1	C	150	GLU	2.6
1	D	323	THR	2.6
1	C	140	ASP	2.6
1	B	194	ASP	2.5
1	A	179	PHE	2.5
1	C	148	THR	2.4
1	C	154	THR	2.3
1	B	10	PRO	2.3
1	B	334	ASP	2.3
1	D	149	PRO	2.3
1	C	137	ARG	2.3
1	C	34	PRO	2.3
1	C	363	VAL	2.2
1	B	150	GLU	2.2
1	A	134	GLY	2.2
1	D	330	GLU	2.2
1	C	10	PRO	2.1
1	C	100	PHE	2.1
1	C	133	PRO	2.1
1	C	366	ALA	2.1
1	C	284	ILE	2.1
1	B	82	VAL	2.1
1	B	353	ASP	2.0
1	A	318	ASP	2.0
1	B	367	GLU	2.0
1	C	358	LEU	2.0
1	C	279	VAL	2.0
1	C	421	ARG	2.0
1	D	353	ASP	2.0

6.2 Non-standard residues in protein, DNA, RNA chains ⓘ

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

6.3 Carbohydrates ⓘ

There are no carbohydrates in this entry.

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	BR	D	512	1/1	0.86	0.07	55,55,55,55	1
3	BR	A	513	1/1	0.89	0.08	61,61,61,61	1
3	BR	B	511	1/1	0.91	0.08	69,69,69,69	1
3	BR	D	513	1/1	0.91	0.10	59,59,59,59	1
3	BR	A	512	1/1	0.92	0.05	57,57,57,57	1
3	BR	C	510	1/1	0.93	0.07	50,50,50,50	1
3	BR	A	515	1/1	0.94	0.10	54,54,54,54	1
2	FAD	C	501	53/53	0.95	0.11	24,30,38,46	0
2	FAD	A	501	53/53	0.95	0.12	22,27,34,36	0
3	BR	D	511	1/1	0.95	0.17	33,33,33,33	1
3	BR	D	509	1/1	0.95	0.06	46,46,46,46	1
2	FAD	B	501	53/53	0.95	0.10	22,28,34,37	0
3	BR	C	506	1/1	0.96	0.10	38,38,38,38	1
3	BR	C	508	1/1	0.96	0.10	50,50,50,50	1
3	BR	A	505	1/1	0.96	0.15	31,31,31,31	1
3	BR	B	510	1/1	0.96	0.29	37,37,37,37	1
3	BR	B	503	1/1	0.97	0.13	34,34,34,34	1
3	BR	A	510	1/1	0.97	0.06	55,55,55,55	1
3	BR	A	514	1/1	0.97	0.11	44,44,44,44	1
2	FAD	D	501	53/53	0.97	0.11	28,32,41,44	0
3	BR	D	504	1/1	0.98	0.11	35,35,35,35	1
3	BR	A	509	1/1	0.98	0.07	47,47,47,47	1
3	BR	C	507	1/1	0.98	0.11	39,39,39,39	1
3	BR	B	512	1/1	0.98	0.07	41,41,41,41	1
3	BR	C	502	1/1	0.98	0.12	35,35,35,35	0
3	BR	A	506	1/1	0.98	0.13	36,36,36,36	1
3	BR	B	509	1/1	0.98	0.09	43,43,43,43	1
3	BR	D	503	1/1	0.98	0.12	37,37,37,37	1
3	BR	C	509	1/1	0.98	0.21	38,38,38,38	1
3	BR	B	508	1/1	0.98	0.09	36,36,36,36	1
3	BR	D	510	1/1	0.98	0.13	42,42,42,42	1
3	BR	B	502	1/1	0.99	0.16	31,31,31,31	1

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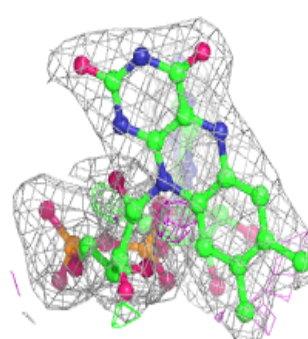
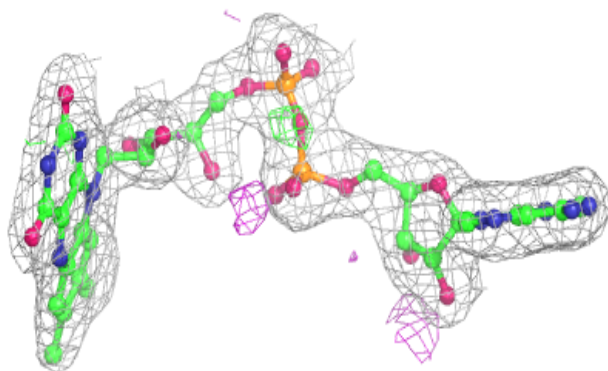
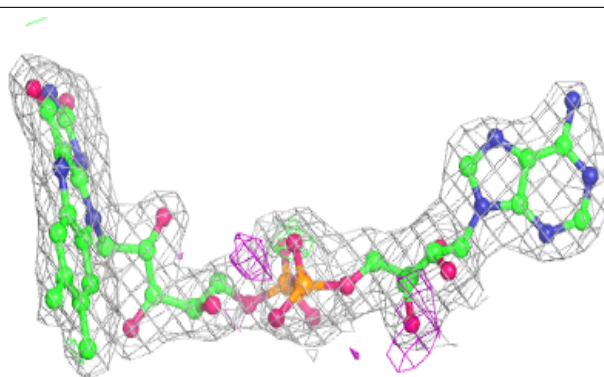
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
3	BR	C	503	1/1	0.99	0.14	33,33,33,33	1
3	BR	D	507	1/1	0.99	0.13	35,35,35,35	1
3	BR	D	502	1/1	0.99	0.12	35,35,35,35	1
3	BR	A	511	1/1	0.99	0.24	36,36,36,36	1
3	BR	A	502	1/1	0.99	0.14	27,27,27,27	1
3	BR	A	508	1/1	0.99	0.14	34,34,34,34	1
3	BR	B	507	1/1	0.99	0.11	34,34,34,34	1
3	BR	D	508	1/1	0.99	0.09	35,35,35,35	1
3	BR	D	506	1/1	0.99	0.08	41,41,41,41	1
3	BR	C	504	1/1	0.99	0.14	25,25,25,25	1
3	BR	A	507	1/1	0.99	0.10	35,35,35,35	1
3	BR	B	504	1/1	0.99	0.12	32,32,32,32	1
3	BR	C	505	1/1	0.99	0.13	37,37,37,37	1
3	BR	B	505	1/1	1.00	0.13	33,33,33,33	1
3	BR	B	506	1/1	1.00	0.18	30,30,30,30	1
3	BR	A	503	1/1	1.00	0.14	26,26,26,26	1
3	BR	D	505	1/1	1.00	0.14	32,32,32,32	1
3	BR	A	504	1/1	1.00	0.14	28,28,28,28	1

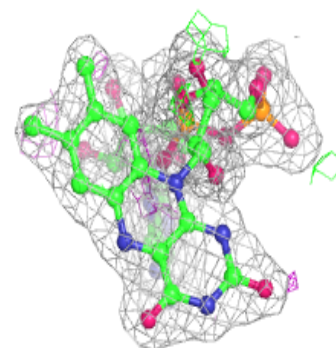
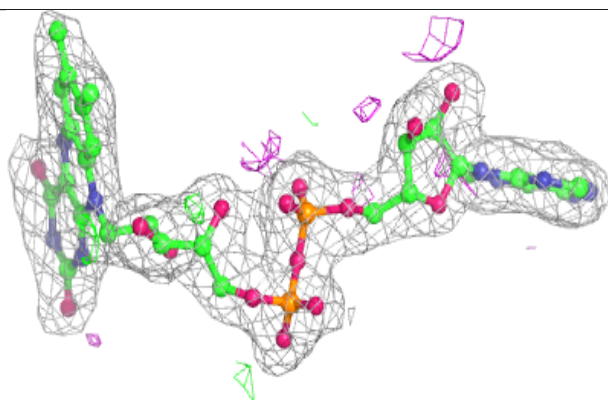
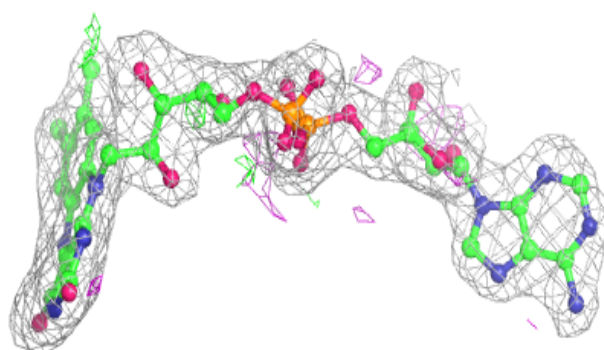
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around FAD C 501:

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

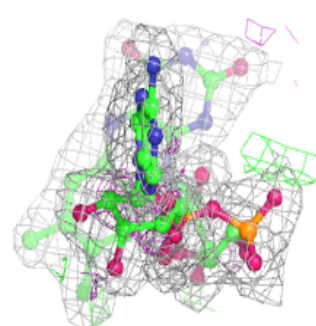
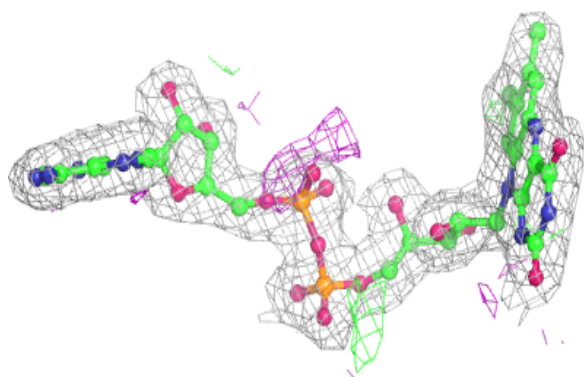
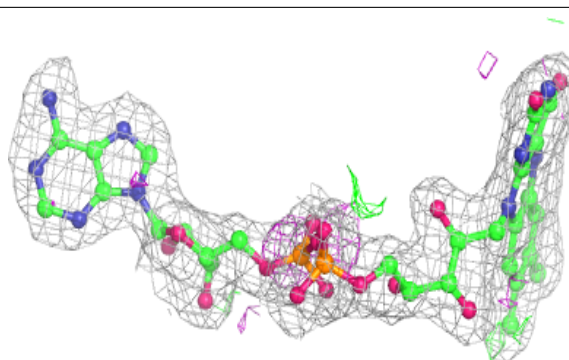
**Electron density around FAD A 501:**

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 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

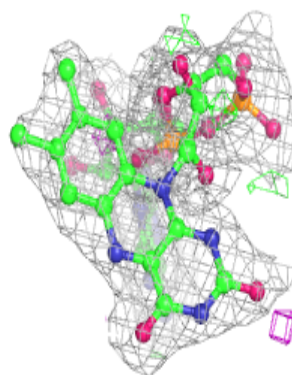
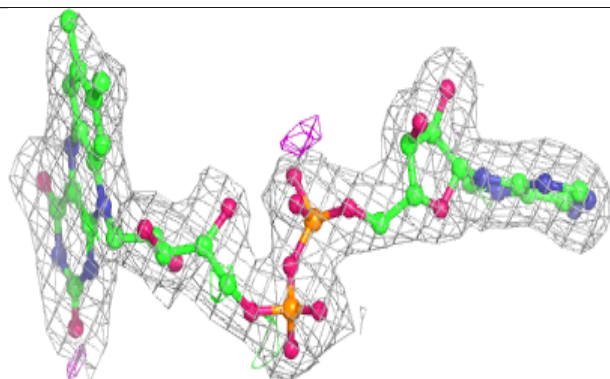
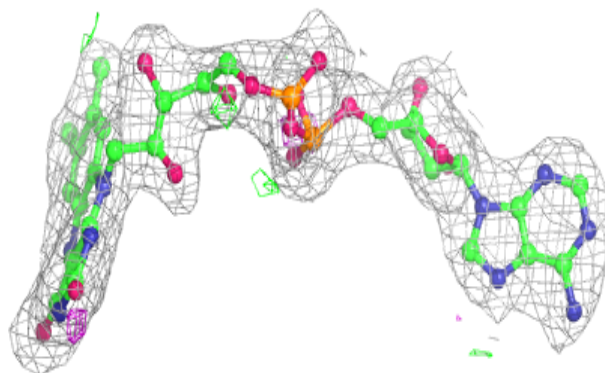


Electron density around FAD B 501:

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

**Electron density around FAD D 501:**

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



6.5 Other polymers

There are no such residues in this entry.