



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 07:58 PM UTC

PDB ID : 3FMW / pdb_00003fmw
Title : The crystal structure of MtmOIV, a Baeyer-Villiger monooxygenase from the mithramycin biosynthetic pathway in *Streptomyces argillaceus*.
Authors : Noinaj, N.; Beam, M.P.; Wang, C.; Rohr, J.
Deposited on : 2008-12-22
Resolution : 2.89 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

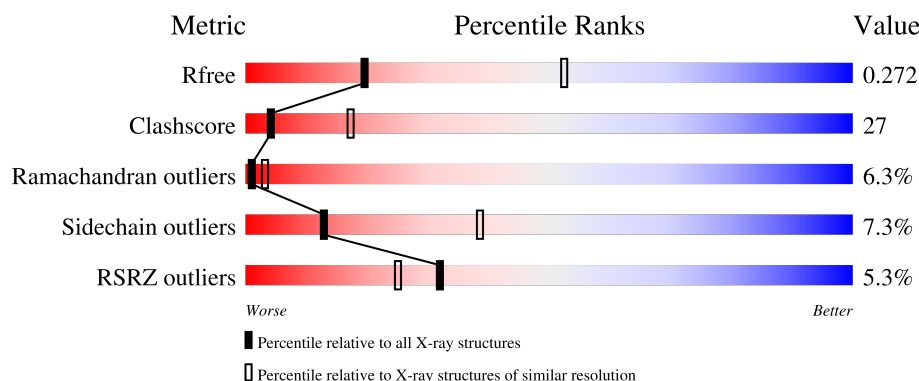
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.89 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

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	570	4% 55% 24% 5% 15%
1	B	570	5% 53% 26% • 16%
1	C	570	5% 56% 23% 6% 14%

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
2	FAD	A	534	X	-	-	-
2	FAD	B	534	X	-	-	-
2	FAD	C	534	X	-	-	-
3	EDO	A	535	-	X	-	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 10370 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 Oxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	482	Total	C	N	O	S	0	0	0
			3379	2139	605	631	4			
1	B	479	Total	C	N	O	S	0	1	0
			3363	2118	614	627	4			
1	C	489	Total	C	N	O	S	0	0	0
			3443	2173	628	638	4			

There are 111 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-36	MET	-	expression tag	UNP Q194P4
A	-35	ARG	-	expression tag	UNP Q194P4
A	-34	GLY	-	expression tag	UNP Q194P4
A	-33	SER	-	expression tag	UNP Q194P4
A	-32	HIS	-	expression tag	UNP Q194P4
A	-31	HIS	-	expression tag	UNP Q194P4
A	-30	HIS	-	expression tag	UNP Q194P4
A	-29	HIS	-	expression tag	UNP Q194P4
A	-28	HIS	-	expression tag	UNP Q194P4
A	-27	HIS	-	expression tag	UNP Q194P4
A	-26	GLY	-	expression tag	UNP Q194P4
A	-25	MET	-	expression tag	UNP Q194P4
A	-24	ALA	-	expression tag	UNP Q194P4
A	-23	SER	-	expression tag	UNP Q194P4
A	-22	MET	-	expression tag	UNP Q194P4
A	-21	THR	-	expression tag	UNP Q194P4
A	-20	GLY	-	expression tag	UNP Q194P4
A	-19	GLY	-	expression tag	UNP Q194P4
A	-18	ASN	-	expression tag	UNP Q194P4
A	-17	ASN	-	expression tag	UNP Q194P4
A	-16	MET	-	expression tag	UNP Q194P4
A	-15	GLY	-	expression tag	UNP Q194P4
A	-14	ARG	-	expression tag	UNP Q194P4

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-13	ASP	-	expression tag	UNP Q194P4
A	-12	LEU	-	expression tag	UNP Q194P4
A	-11	TYR	-	expression tag	UNP Q194P4
A	-10	ASP	-	expression tag	UNP Q194P4
A	-9	ASP	-	expression tag	UNP Q194P4
A	-8	ASP	-	expression tag	UNP Q194P4
A	-7	ASP	-	expression tag	UNP Q194P4
A	-6	LYS	-	expression tag	UNP Q194P4
A	-5	ASP	-	expression tag	UNP Q194P4
A	-4	PRO	-	expression tag	UNP Q194P4
A	-3	GLY	-	expression tag	UNP Q194P4
A	-2	ARG	-	expression tag	UNP Q194P4
A	-1	ARG	-	expression tag	UNP Q194P4
A	0	MET	-	expression tag	UNP Q194P4
B	-36	MET	-	expression tag	UNP Q194P4
B	-35	ARG	-	expression tag	UNP Q194P4
B	-34	GLY	-	expression tag	UNP Q194P4
B	-33	SER	-	expression tag	UNP Q194P4
B	-32	HIS	-	expression tag	UNP Q194P4
B	-31	HIS	-	expression tag	UNP Q194P4
B	-30	HIS	-	expression tag	UNP Q194P4
B	-29	HIS	-	expression tag	UNP Q194P4
B	-28	HIS	-	expression tag	UNP Q194P4
B	-27	HIS	-	expression tag	UNP Q194P4
B	-26	GLY	-	expression tag	UNP Q194P4
B	-25	MET	-	expression tag	UNP Q194P4
B	-24	ALA	-	expression tag	UNP Q194P4
B	-23	SER	-	expression tag	UNP Q194P4
B	-22	MET	-	expression tag	UNP Q194P4
B	-21	THR	-	expression tag	UNP Q194P4
B	-20	GLY	-	expression tag	UNP Q194P4
B	-19	GLY	-	expression tag	UNP Q194P4
B	-18	ASN	-	expression tag	UNP Q194P4
B	-17	ASN	-	expression tag	UNP Q194P4
B	-16	MET	-	expression tag	UNP Q194P4
B	-15	GLY	-	expression tag	UNP Q194P4
B	-14	ARG	-	expression tag	UNP Q194P4
B	-13	ASP	-	expression tag	UNP Q194P4
B	-12	LEU	-	expression tag	UNP Q194P4
B	-11	TYR	-	expression tag	UNP Q194P4
B	-10	ASP	-	expression tag	UNP Q194P4
B	-9	ASP	-	expression tag	UNP Q194P4

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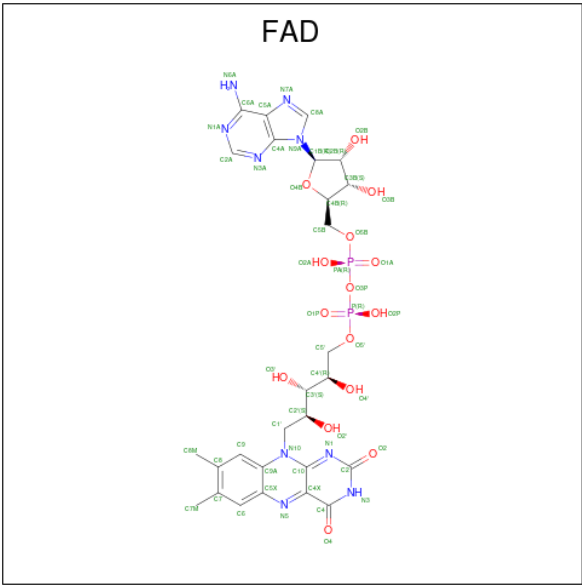
Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	ASP	-	expression tag	UNP Q194P4
B	-7	ASP	-	expression tag	UNP Q194P4
B	-6	LYS	-	expression tag	UNP Q194P4
B	-5	ASP	-	expression tag	UNP Q194P4
B	-4	PRO	-	expression tag	UNP Q194P4
B	-3	GLY	-	expression tag	UNP Q194P4
B	-2	ARG	-	expression tag	UNP Q194P4
B	-1	ARG	-	expression tag	UNP Q194P4
B	0	MET	-	expression tag	UNP Q194P4
C	-36	MET	-	expression tag	UNP Q194P4
C	-35	ARG	-	expression tag	UNP Q194P4
C	-34	GLY	-	expression tag	UNP Q194P4
C	-33	SER	-	expression tag	UNP Q194P4
C	-32	HIS	-	expression tag	UNP Q194P4
C	-31	HIS	-	expression tag	UNP Q194P4
C	-30	HIS	-	expression tag	UNP Q194P4
C	-29	HIS	-	expression tag	UNP Q194P4
C	-28	HIS	-	expression tag	UNP Q194P4
C	-27	HIS	-	expression tag	UNP Q194P4
C	-26	GLY	-	expression tag	UNP Q194P4
C	-25	MET	-	expression tag	UNP Q194P4
C	-24	ALA	-	expression tag	UNP Q194P4
C	-23	SER	-	expression tag	UNP Q194P4
C	-22	MET	-	expression tag	UNP Q194P4
C	-21	THR	-	expression tag	UNP Q194P4
C	-20	GLY	-	expression tag	UNP Q194P4
C	-19	GLY	-	expression tag	UNP Q194P4
C	-18	ASN	-	expression tag	UNP Q194P4
C	-17	ASN	-	expression tag	UNP Q194P4
C	-16	MET	-	expression tag	UNP Q194P4
C	-15	GLY	-	expression tag	UNP Q194P4
C	-14	ARG	-	expression tag	UNP Q194P4
C	-13	ASP	-	expression tag	UNP Q194P4
C	-12	LEU	-	expression tag	UNP Q194P4
C	-11	TYR	-	expression tag	UNP Q194P4
C	-10	ASP	-	expression tag	UNP Q194P4
C	-9	ASP	-	expression tag	UNP Q194P4
C	-8	ASP	-	expression tag	UNP Q194P4
C	-7	ASP	-	expression tag	UNP Q194P4
C	-6	LYS	-	expression tag	UNP Q194P4
C	-5	ASP	-	expression tag	UNP Q194P4
C	-4	PRO	-	expression tag	UNP Q194P4

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Chain	Residue	Modelled	Actual	Comment	Reference
C	-3	GLY	-	expression tag	UNP Q194P4
C	-2	ARG	-	expression tag	UNP Q194P4
C	-1	ARG	-	expression tag	UNP Q194P4
C	0	MET	-	expression tag	UNP Q194P4

- Molecule 2 is FLAVIN-ADENINE DINUCLEOTIDE (CCD ID: FAD) (formula: C₂₇H₃₃N₉O₁₅P₂).

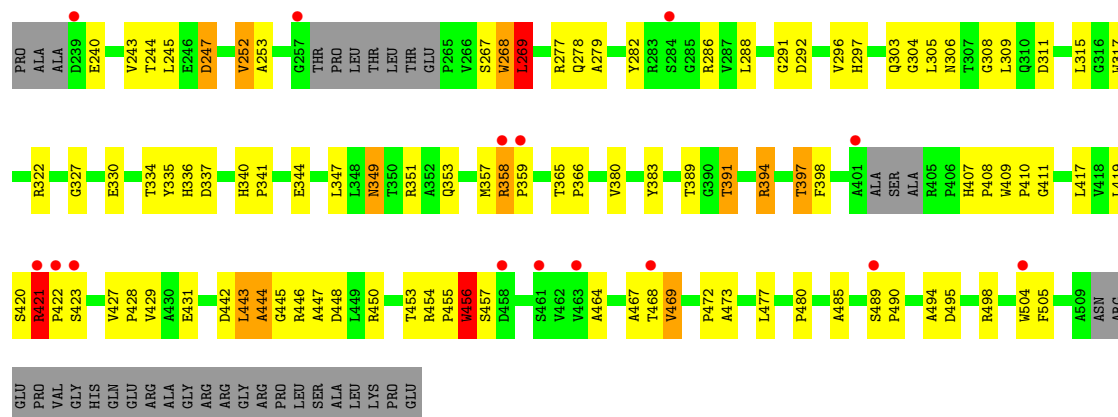




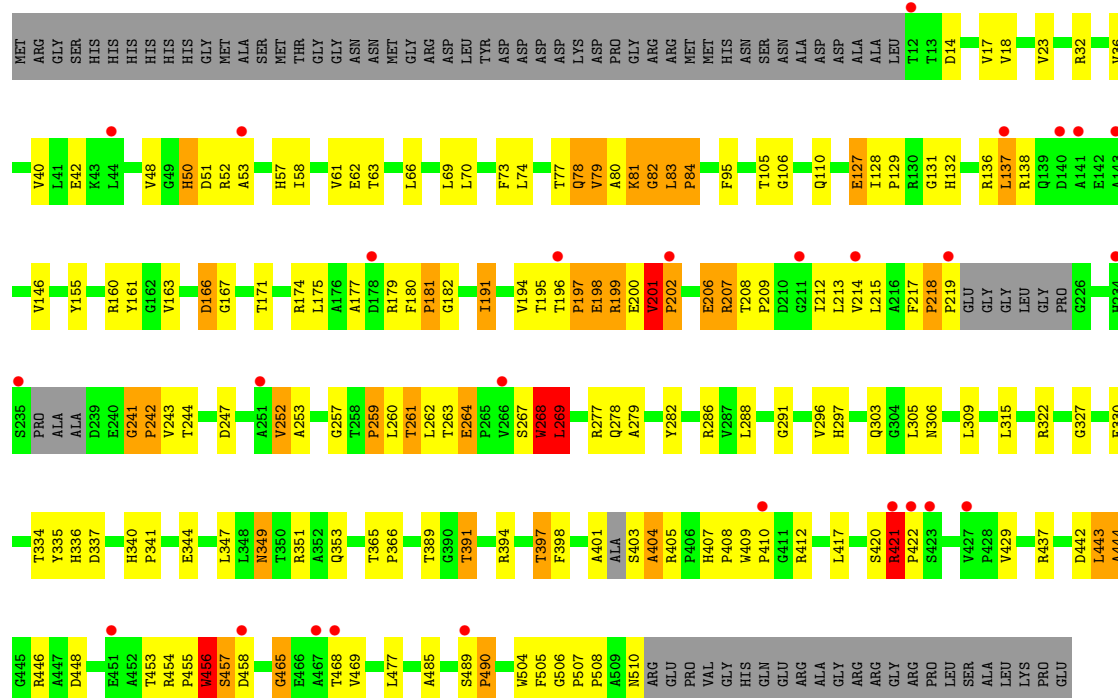
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			4	2	2		
3	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 4 is water.

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



• Molecule 1: Oxygenase



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	145.26Å 114.44Å 138.56Å 90.00° 103.03° 90.00°	Depositor
Resolution (Å)	29.68 – 2.89 29.68 – 2.89	Depositor EDS
% Data completeness (in resolution range)	95.4 (29.68-2.89) 95.5 (29.68-2.89)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.29 (at 2.90Å)	Xtriage
Refinement program	PHENIX 1.4 _4	Depositor
R, R_{free}	0.235 , 0.273 0.233 , 0.272	Depositor DCC
R_{free} test set	2422 reflections (5.11%)	wwPDB-VP
Wilson B-factor (Å ²)	81.2	Xtriage
Anisotropy	0.333	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.24 , 101.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	10370	wwPDB-VP
Average B, all atoms (Å ²)	119.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.50% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: EDO, FAD

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	0.38	0/3458	0.86	11/4747 (0.2%)
1	B	0.36	0/3436	0.85	10/4706 (0.2%)
1	C	0.36	0/3522	0.85	11/4832 (0.2%)
All	All	0.37	0/10416	0.85	32/14285 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	3
1	B	0	3
1	C	0	2
All	All	0	8

There are no bond length outliers.

All (32) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	394	ARG	NE-CZ-NH2	8.35	126.72	119.20
1	B	72	ARG	NE-CZ-NH2	8.17	126.55	119.20
1	B	394	ARG	NE-CZ-NH1	-7.93	113.57	121.50
1	C	217	PHE	CA-C-N	7.64	128.25	120.38
1	C	217	PHE	C-N-CA	7.64	128.25	120.38
1	B	72	ARG	NE-CZ-NH1	-7.58	113.92	121.50
1	A	201	VAL	CA-C-N	-7.15	110.90	119.84
1	A	201	VAL	C-N-CA	-7.15	110.90	119.84
1	C	201	VAL	CA-C-N	6.98	128.57	119.84
1	C	201	VAL	C-N-CA	6.98	128.57	119.84

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	217	PHE	CA-C-N	6.94	127.52	120.38
1	A	217	PHE	C-N-CA	6.94	127.52	120.38
1	B	72	ARG	CD-NE-CZ	5.74	132.44	124.40
1	A	72	ARG	NE-CZ-NH2	-5.59	114.17	119.20
1	A	72	ARG	CD-NE-CZ	5.38	131.93	124.40
1	A	58	ILE	N-CA-C	5.37	115.51	110.30
1	B	421	ARG	CA-C-N	-5.32	114.25	119.99
1	B	421	ARG	C-N-CA	-5.32	114.25	119.99
1	A	217	PHE	C-N-CD	-5.32	103.19	125.00
1	C	241	GLY	CA-C-N	5.29	126.45	119.84
1	C	241	GLY	C-N-CA	5.29	126.45	119.84
1	A	421	ARG	CA-C-N	-5.26	114.31	119.99
1	A	421	ARG	C-N-CA	-5.26	114.31	119.99
1	C	457	SER	N-CA-C	-5.24	99.63	110.80
1	A	253	ALA	N-CA-C	-5.22	106.87	113.18
1	B	489	SER	CA-C-N	5.07	126.18	119.84
1	B	489	SER	C-N-CA	5.07	126.18	119.84
1	C	421	ARG	CA-C-N	-5.03	114.56	119.99
1	C	421	ARG	C-N-CA	-5.03	114.56	119.99
1	B	253	ALA	N-CA-C	-5.00	107.13	113.18
1	C	506	GLY	CA-C-N	5.00	125.53	120.38
1	C	506	GLY	C-N-CA	5.00	125.53	120.38

There are no chirality outliers.

All (8) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	217	PHE	Peptide
1	A	456	TRP	Peptide
1	A	81	LYS	Peptide
1	B	456	TRP	Peptide
1	B	79	VAL	Peptide
1	B	81	LYS	Peptide
1	C	456	TRP	Peptide
1	C	81	LYS	Peptide

5.2 Too-close contacts

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

the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3379	0	3178	227	0
1	B	3363	0	3154	166	0
1	C	3443	0	3256	160	0
2	A	53	0	28	9	0
2	B	53	0	29	9	0
2	C	53	0	29	7	0
3	A	4	0	6	0	0
3	B	4	0	6	1	0
4	A	4	0	0	0	0
4	B	7	0	0	0	0
4	C	7	0	0	1	0
All	All	10370	0	9686	548	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 27.

All (548) 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)
2:B:534:FAD:O3B	2:B:534:FAD:C3B	1.63	1.43
2:A:534:FAD:O3B	2:A:534:FAD:C3B	1.72	1.36
1:A:194:VAL:HG12	1:A:197:PRO:HG2	1.23	1.16
1:A:195:THR:HG21	1:A:218:PRO:HB2	1.18	1.15
1:A:447:ALA:HB2	1:B:445:GLY:H	1.10	1.14
1:C:179:ARG:HA	1:C:180:PHE:HB3	1.32	1.11
1:A:179:ARG:HA	1:A:180:PHE:HB3	1.32	1.10
1:B:195:THR:HG22	1:B:196:THR:H	1.16	1.08
1:B:358:ARG:HB3	1:B:359:PRO:HA	1.35	1.08
1:A:208:THR:CB	1:A:358:ARG:HD3	1.83	1.07
1:A:194:VAL:CG1	1:A:197:PRO:HG2	1.85	1.07
1:B:469:VAL:HG23	1:B:472:PRO:HA	1.36	1.06
1:A:195:THR:HA	1:A:197:PRO:HD2	1.04	1.03
1:B:179:ARG:HA	1:B:180:PHE:HB3	1.34	1.03
1:A:195:THR:CA	1:A:197:PRO:HD2	1.93	0.98
1:A:195:THR:HA	1:A:197:PRO:CD	1.94	0.97
1:A:208:THR:HB	1:A:358:ARG:HD3	1.47	0.97
1:A:358:ARG:HH22	1:A:364:THR:HG22	1.27	0.96
1:A:78:GLN:O	1:A:79:VAL:HG23	1.65	0.95
2:B:534:FAD:O3B	2:B:534:FAD:H3B	1.66	0.95
1:C:201:VAL:H	1:C:202:PRO:HD3	1.31	0.92

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:79:VAL:HG22	1:C:244:THR:HB	1.51	0.92
1:A:197:PRO:HB3	1:A:262:LEU:N	1.85	0.92
1:A:79:VAL:CG1	1:A:80:ALA:H	1.85	0.90
1:A:447:ALA:HB2	1:B:445:GLY:N	1.88	0.89
1:A:195:THR:HG21	1:A:218:PRO:CB	2.03	0.88
2:A:534:FAD:O3B	2:A:534:FAD:H3B	1.73	0.88
1:C:179:ARG:HA	1:C:180:PHE:CB	2.03	0.87
1:C:197:PRO:HG3	1:C:264:GLU:HG3	1.54	0.87
1:A:469:VAL:HG13	1:A:472:PRO:HA	1.56	0.86
1:C:253:ALA:HA	4:C:539:HOH:O	1.74	0.86
1:A:179:ARG:HA	1:A:180:PHE:CB	2.03	0.86
1:A:79:VAL:HG13	1:A:80:ALA:H	1.38	0.86
1:A:204:ARG:HH21	1:A:218:PRO:HA	1.39	0.85
1:B:179:ARG:HA	1:B:180:PHE:CB	2.04	0.85
1:A:79:VAL:HG22	1:C:244:THR:CB	2.07	0.84
1:B:358:ARG:CB	1:B:359:PRO:HA	2.06	0.84
1:A:57:HIS:HD2	1:A:105:THR:HG21	1.43	0.84
1:B:57:HIS:HD2	1:B:105:THR:HG21	1.44	0.82
1:C:57:HIS:HD2	1:C:105:THR:HG21	1.44	0.82
1:C:137:LEU:HG	1:C:146:VAL:HG12	1.60	0.82
1:A:197:PRO:HB3	1:A:261:THR:C	2.05	0.82
1:B:195:THR:HG22	1:B:196:THR:N	1.95	0.80
1:C:171:THR:HG22	1:C:174:ARG:HH12	1.46	0.79
1:A:358:ARG:CB	1:A:359:PRO:HA	2.12	0.79
1:A:79:VAL:CG1	1:A:80:ALA:N	2.42	0.79
1:A:197:PRO:HG3	1:A:264:GLU:CB	2.13	0.79
1:A:358:ARG:NH1	1:A:365:THR:OG1	2.16	0.79
1:A:358:ARG:NH2	1:A:368:ARG:HD2	1.97	0.79
1:B:304:GLY:HA3	2:B:534:FAD:H1'2	1.65	0.79
1:A:180:PHE:N	1:A:181:PRO:HD3	1.99	0.78
1:B:421:ARG:CB	1:B:422:PRO:HD3	2.13	0.78
1:A:358:ARG:HG2	1:A:358:ARG:HH21	1.48	0.77
1:B:195:THR:CG2	1:B:196:THR:H	1.96	0.77
1:C:421:ARG:CB	1:C:422:PRO:HD3	2.14	0.77
1:A:469:VAL:CG1	1:A:472:PRO:HA	2.14	0.77
1:C:180:PHE:N	1:C:181:PRO:HD3	2.00	0.77
1:B:180:PHE:N	1:B:181:PRO:HD3	1.99	0.77
1:A:421:ARG:CB	1:A:422:PRO:HD3	2.15	0.76
1:A:417:LEU:O	1:A:429:VAL:HG12	1.85	0.76
1:B:202:PRO:HG2	1:B:218:PRO:HG2	1.69	0.75
1:A:469:VAL:HG13	1:A:473:ALA:H	1.52	0.74

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:82:GLY:HA3	1:C:95:PHE:CE2	2.22	0.74
1:A:50:HIS:CD2	1:A:268:TRP:HB3	2.22	0.74
1:A:78:GLN:O	1:A:79:VAL:CG2	2.36	0.74
1:C:417:LEU:O	1:C:429:VAL:HG12	1.87	0.74
1:A:194:VAL:HG12	1:A:197:PRO:CG	2.13	0.74
1:A:78:GLN:CB	1:A:106:GLY:HA2	2.17	0.74
1:B:196:THR:OG1	1:B:197:PRO:HD2	1.88	0.74
1:C:78:GLN:CB	1:C:106:GLY:HA2	2.18	0.73
1:B:78:GLN:CB	1:B:106:GLY:HA2	2.19	0.73
1:C:50:HIS:CD2	1:C:268:TRP:HB3	2.23	0.73
1:A:407:HIS:O	1:A:410:PRO:HD2	1.89	0.72
1:A:82:GLY:HA3	1:A:95:PHE:CE2	2.24	0.72
1:A:208:THR:OG1	1:A:358:ARG:HD3	1.89	0.72
1:B:417:LEU:O	1:B:429:VAL:HG12	1.88	0.72
1:C:303:GLN:HE22	1:C:349:ASN:HD21	1.36	0.71
1:B:303:GLN:HE22	1:B:349:ASN:HD21	1.39	0.71
1:B:407:HIS:O	1:B:410:PRO:HD2	1.90	0.70
1:A:57:HIS:HD2	1:A:105:THR:CG2	2.05	0.70
1:A:303:GLN:HE22	1:A:349:ASN:HD21	1.38	0.69
1:A:358:ARG:HB2	1:A:359:PRO:HA	1.73	0.69
1:A:77:THR:O	1:A:77:THR:HG22	1.92	0.69
1:A:204:ARG:NH2	1:A:218:PRO:HA	2.08	0.69
1:A:453:THR:O	1:A:456:TRP:HD1	1.76	0.69
1:B:397:THR:HG22	1:B:398:PHE:CD1	2.28	0.69
1:C:57:HIS:HD2	1:C:105:THR:CG2	2.05	0.69
1:A:195:THR:HG22	1:A:196:THR:HA	1.74	0.69
1:B:428:PRO:HB2	1:B:431:GLU:HG3	1.75	0.69
1:B:453:THR:O	1:B:456:TRP:HD1	1.75	0.69
1:C:407:HIS:O	1:C:410:PRO:HD2	1.92	0.69
1:B:282:TYR:HB2	1:B:336:HIS:HB2	1.75	0.69
1:C:282:TYR:HB2	1:C:336:HIS:HB2	1.75	0.68
1:C:453:THR:O	1:C:456:TRP:HD1	1.76	0.68
1:B:214:VAL:HG22	1:B:215:LEU:H	1.59	0.68
1:C:397:THR:HG22	1:C:398:PHE:CD1	2.28	0.68
1:A:397:THR:HG22	1:A:398:PHE:CD1	2.28	0.68
1:B:57:HIS:HD2	1:B:105:THR:CG2	2.06	0.68
1:A:468:THR:HA	1:A:469:VAL:HB	1.75	0.68
1:A:201:VAL:H	1:A:202:PRO:HD3	1.59	0.67
1:A:282:TYR:HB2	1:A:336:HIS:HB2	1.76	0.67
1:A:358:ARG:NH2	1:A:368:ARG:CD	2.57	0.67
1:A:52:ARG:HG2	2:A:534:FAD:C8	2.25	0.67

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:468:THR:CA	1:A:469:VAL:HB	2.24	0.67
1:A:428:PRO:HB2	1:A:431:GLU:HG3	1.77	0.67
1:A:358:ARG:NH2	1:A:364:THR:HG22	2.06	0.66
1:A:407:HIS:C	1:A:410:PRO:HD2	2.21	0.66
1:A:50:HIS:HD2	1:A:268:TRP:HB3	1.59	0.66
1:C:303:GLN:HE22	1:C:349:ASN:ND2	1.93	0.66
1:C:80:ALA:C	1:C:82:GLY:HA2	2.20	0.66
1:B:52:ARG:HA	2:B:534:FAD:C6	2.26	0.65
1:A:79:VAL:HG12	1:A:80:ALA:N	2.10	0.65
1:A:214:VAL:HG22	1:A:215:LEU:H	1.62	0.65
1:A:365:THR:HB	1:A:366:PRO:HD3	1.79	0.65
1:A:304:GLY:HA3	2:A:534:FAD:H1'2	1.79	0.65
1:C:214:VAL:HG22	1:C:215:LEU:H	1.62	0.64
1:C:407:HIS:C	1:C:410:PRO:HD2	2.22	0.64
1:C:50:HIS:HD2	1:C:268:TRP:HB3	1.60	0.64
1:B:292:ASP:CG	2:B:534:FAD:H5'1	2.22	0.64
1:C:171:THR:HG22	1:C:174:ARG:NH1	2.10	0.64
1:A:95:PHE:CE2	1:A:105:THR:HG23	2.33	0.64
1:A:303:GLN:HE22	1:A:349:ASN:ND2	1.95	0.64
1:A:357:MET:C	1:A:358:ARG:CG	2.71	0.64
1:B:95:PHE:CE2	1:B:105:THR:HG23	2.33	0.64
1:B:407:HIS:C	1:B:410:PRO:HD2	2.22	0.63
1:C:365:THR:HB	1:C:366:PRO:HD3	1.80	0.63
1:A:197:PRO:HB3	1:A:262:LEU:H	1.61	0.63
1:A:180:PHE:H	1:A:181:PRO:HD3	1.63	0.63
1:B:58:ILE:HG12	1:B:389:THR:HB	1.80	0.63
1:B:303:GLN:HE22	1:B:349:ASN:ND2	1.95	0.63
1:C:180:PHE:H	1:C:181:PRO:HD3	1.64	0.63
1:A:464:ALA:HB2	1:B:422:PRO:HG3	1.81	0.63
1:B:365:THR:HB	1:B:366:PRO:HD3	1.80	0.63
1:C:58:ILE:HG12	1:C:389:THR:HB	1.81	0.63
1:C:95:PHE:CE2	1:C:105:THR:HG23	2.34	0.62
1:A:195:THR:CG2	1:A:218:PRO:HB2	2.12	0.62
1:C:136:ARG:HA	1:C:175:LEU:HD13	1.82	0.62
1:A:419:LEU:HD13	1:A:464:ALA:HB3	1.82	0.62
1:A:58:ILE:HG12	1:A:389:THR:HB	1.80	0.62
1:C:303:GLN:NE2	1:C:349:ASN:HD21	1.97	0.62
1:B:297:HIS:HB3	1:B:347:LEU:HD22	1.81	0.62
2:B:534:FAD:H9	3:B:535:EDO:O2	1.99	0.62
1:A:58:ILE:HG13	1:A:391:THR:HG23	1.82	0.61
1:A:468:THR:HA	1:A:469:VAL:C	2.25	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:180:PHE:H	1:B:181:PRO:HD3	1.63	0.61
1:B:358:ARG:HB3	1:B:359:PRO:CA	2.22	0.61
2:B:534:FAD:C3B	2:B:534:FAD:HO3A	2.07	0.61
1:A:297:HIS:HB3	1:A:347:LEU:HD22	1.81	0.61
1:B:468:THR:HA	1:B:469:VAL:C	2.25	0.61
1:A:358:ARG:HH21	1:A:358:ARG:CG	2.11	0.61
1:A:468:THR:HG23	1:A:470:GLU:CB	2.30	0.61
1:C:261:THR:H	1:C:262:LEU:CA	2.14	0.61
1:A:136:ARG:HA	1:A:175:LEU:HD13	1.83	0.61
1:C:197:PRO:CG	1:C:264:GLU:HG3	2.28	0.61
1:B:214:VAL:HG22	1:B:215:LEU:N	2.16	0.60
1:C:58:ILE:HG13	1:C:391:THR:HG23	1.83	0.60
1:C:297:HIS:HB3	1:C:347:LEU:HD22	1.83	0.60
1:C:263:THR:HA	1:C:264:GLU:O	2.02	0.60
1:B:58:ILE:HG13	1:B:391:THR:HG23	1.84	0.60
1:C:468:THR:HA	1:C:469:VAL:C	2.26	0.60
1:C:214:VAL:HG22	1:C:215:LEU:N	2.17	0.60
1:A:194:VAL:CG1	1:A:197:PRO:CG	2.73	0.59
1:A:462:VAL:CG2	1:B:422:PRO:HA	2.32	0.59
1:C:179:ARG:CA	1:C:180:PHE:CB	2.80	0.59
1:A:261:THR:H	1:A:262:LEU:CA	2.14	0.59
1:B:494:ALA:O	1:B:498:ARG:HG2	2.02	0.59
1:A:263:THR:HA	1:A:264:GLU:O	2.02	0.59
1:C:397:THR:HG22	1:C:398:PHE:HD1	1.68	0.59
1:A:194:VAL:O	1:A:195:THR:HG23	2.03	0.59
1:B:13:THR:O	1:B:14:ASP:HB2	2.00	0.59
1:C:261:THR:H	1:C:262:LEU:CB	2.16	0.59
1:C:171:THR:HA	1:C:174:ARG:NH1	2.18	0.59
1:A:261:THR:H	1:A:262:LEU:CB	2.16	0.58
1:A:78:GLN:O	1:A:79:VAL:CB	2.51	0.58
1:C:407:HIS:HB3	1:C:410:PRO:CD	2.34	0.58
1:A:303:GLN:NE2	1:A:349:ASN:HD21	2.00	0.58
1:B:200:GLU:C	1:B:202:PRO:HD3	2.29	0.58
1:C:166:ASP:HA	2:C:534:FAD:O4B	2.02	0.58
1:C:201:VAL:H	1:C:202:PRO:CD	2.11	0.58
1:A:407:HIS:HB3	1:A:410:PRO:CD	2.34	0.58
1:A:195:THR:CB	1:A:196:THR:HA	2.34	0.58
1:B:136:ARG:HA	1:B:175:LEU:HD13	1.84	0.58
1:C:305:LEU:HD23	1:C:309:LEU:HG	1.86	0.58
1:B:75:GLU:N	1:B:75:GLU:CD	2.62	0.58
1:B:397:THR:HG22	1:B:398:PHE:HD1	1.68	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:80:ALA:C	1:A:82:GLY:HA2	2.29	0.57
1:A:179:ARG:CA	1:A:180:PHE:CB	2.80	0.57
1:A:214:VAL:HG22	1:A:215:LEU:N	2.18	0.57
1:B:303:GLN:NE2	1:B:349:ASN:HD21	2.00	0.57
1:C:244:THR:HG23	1:C:247:ASP:HB2	1.86	0.57
1:B:340:HIS:HB3	1:B:341:PRO:HD3	1.86	0.57
1:A:489:SER:OG	1:A:490:PRO:HD2	2.05	0.57
1:A:340:HIS:HB3	1:A:341:PRO:HD3	1.87	0.57
1:A:358:ARG:HB3	1:A:359:PRO:HA	1.86	0.57
1:A:257:GLY:O	1:A:259:PRO:HD3	2.05	0.57
1:A:409:TRP:N	1:A:410:PRO:HD2	2.20	0.57
1:B:305:LEU:HD23	1:B:309:LEU:HG	1.86	0.57
1:B:409:TRP:N	1:B:410:PRO:HD2	2.20	0.57
1:C:166:ASP:HB2	2:C:534:FAD:C8A	2.35	0.57
1:C:409:TRP:N	1:C:410:PRO:HD2	2.20	0.57
1:A:50:HIS:HD2	1:A:268:TRP:CB	2.17	0.56
1:C:260:LEU:N	1:C:261:THR:HA	2.21	0.56
1:B:419:LEU:HD13	1:B:464:ALA:HB3	1.86	0.56
1:A:407:HIS:HB3	1:A:410:PRO:HD3	1.88	0.56
1:A:397:THR:HG22	1:A:398:PHE:HD1	1.69	0.56
1:B:208:THR:HB	1:B:358:ARG:HG3	1.86	0.56
1:B:407:HIS:HB3	1:B:410:PRO:CD	2.35	0.56
1:A:57:HIS:CD2	1:A:105:THR:HG21	2.33	0.56
1:C:50:HIS:HD2	1:C:268:TRP:CB	2.18	0.56
1:A:51:ASP:HB3	1:A:268:TRP:CE3	2.41	0.56
1:C:78:GLN:O	1:C:79:VAL:CB	2.54	0.56
1:C:244:THR:CG2	1:C:247:ASP:HB2	2.36	0.56
1:C:407:HIS:HB3	1:C:410:PRO:HD3	1.88	0.56
1:A:421:ARG:CB	1:A:422:PRO:CD	2.84	0.56
1:C:180:PHE:HA	1:C:278:GLN:O	2.06	0.56
1:A:358:ARG:CB	1:A:359:PRO:CA	2.81	0.56
1:B:334:THR:HA	1:B:337:ASP:HB2	1.87	0.56
1:B:467:ALA:O	1:B:469:VAL:HG22	2.06	0.56
1:A:358:ARG:HB2	1:A:359:PRO:CA	2.36	0.55
1:B:407:HIS:HB3	1:B:410:PRO:HD3	1.89	0.55
1:C:334:THR:HA	1:C:337:ASP:HB2	1.89	0.55
1:A:50:HIS:CD2	1:A:51:ASP:H	2.24	0.55
1:B:215:LEU:HD23	1:B:215:LEU:O	2.07	0.55
1:B:358:ARG:CB	1:B:359:PRO:CA	2.77	0.55
1:C:51:ASP:HB3	1:C:268:TRP:CE3	2.41	0.55
1:A:180:PHE:N	1:A:181:PRO:CD	2.69	0.55

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:180:PHE:HA	1:A:278:GLN:O	2.06	0.55
1:B:78:GLN:O	1:B:79:VAL:CB	2.54	0.55
1:B:421:ARG:CB	1:B:422:PRO:CD	2.83	0.55
1:A:305:LEU:HD23	1:A:309:LEU:HG	1.88	0.55
1:C:340:HIS:O	1:C:344:GLU:HG3	2.07	0.55
1:B:244:THR:HG23	1:B:247:ASP:HB2	1.89	0.55
1:C:50:HIS:CD2	1:C:51:ASP:H	2.24	0.55
1:C:340:HIS:HB3	1:C:341:PRO:HD3	1.89	0.55
1:A:334:THR:HA	1:A:337:ASP:HB2	1.88	0.55
1:A:180:PHE:HD1	1:A:279:ALA:N	2.05	0.55
1:B:180:PHE:HD1	1:B:279:ALA:N	2.05	0.55
1:B:171:THR:HG22	1:B:174[A]:ARG:HH12	1.72	0.54
1:A:217:PHE:CB	1:A:218:PRO:CD	2.85	0.54
1:A:244:THR:HG23	1:A:247:ASP:HB2	1.89	0.54
1:A:50:HIS:CG	1:A:51:ASP:H	2.25	0.54
1:A:201:VAL:N	1:A:202:PRO:HD3	2.22	0.54
1:A:260:LEU:N	1:A:261:THR:HA	2.21	0.54
1:C:180:PHE:HD1	1:C:279:ALA:N	2.05	0.54
1:C:468:THR:HA	1:C:469:VAL:O	2.08	0.54
1:A:462:VAL:HG23	1:B:422:PRO:HA	1.90	0.54
1:C:50:HIS:CG	1:C:51:ASP:H	2.25	0.54
1:C:180:PHE:N	1:C:181:PRO:CD	2.70	0.54
1:C:489:SER:OG	1:C:490:PRO:HD2	2.07	0.54
1:A:244:THR:CG2	1:A:247:ASP:HB2	2.38	0.53
1:A:469:VAL:HG13	1:A:473:ALA:N	2.21	0.53
1:B:57:HIS:ND1	1:B:306:ASN:ND2	2.56	0.53
1:C:182:GLY:HA3	1:C:277:ARG:HA	1.91	0.53
1:A:467:ALA:C	1:A:469:VAL:HB	2.33	0.53
1:B:468:THR:HA	1:B:469:VAL:O	2.08	0.53
1:B:57:HIS:CD2	1:B:105:THR:HG21	2.34	0.53
1:C:421:ARG:CB	1:C:422:PRO:CD	2.84	0.53
1:A:409:TRP:H	1:A:410:PRO:HD2	1.74	0.53
1:B:179:ARG:CA	1:B:180:PHE:CB	2.82	0.53
1:B:180:PHE:HA	1:B:278:GLN:O	2.08	0.53
1:A:454:ARG:N	1:A:455:PRO:CD	2.72	0.53
1:B:174[B]:ARG:HG3	1:B:175:LEU:N	2.23	0.53
1:C:407:HIS:CG	1:C:408:PRO:HD2	2.43	0.53
1:A:469:VAL:HG12	1:A:469:VAL:O	2.08	0.53
1:C:57:HIS:CD2	1:C:105:THR:HG21	2.34	0.53
1:A:195:THR:CG2	1:A:196:THR:HA	2.38	0.53
1:A:198:GLU:O	1:A:199:ARG:O	2.28	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:244:THR:CG2	1:B:247:ASP:HB2	2.39	0.52
2:C:534:FAD:H2'	2:C:534:FAD:H9	1.92	0.52
1:A:358:ARG:HH12	1:A:365:THR:N	2.07	0.52
1:C:215:LEU:O	1:C:215:LEU:HD23	2.10	0.52
1:A:81:LYS:N	1:A:82:GLY:HA2	2.24	0.52
1:A:288:LEU:HD13	1:A:315:LEU:HD11	1.92	0.52
1:A:468:THR:HA	1:A:469:VAL:O	2.10	0.52
1:B:454:ARG:N	1:B:455:PRO:CD	2.73	0.52
1:C:454:ARG:N	1:C:455:PRO:CD	2.73	0.52
1:A:182:GLY:HA3	1:A:277:ARG:HA	1.91	0.52
1:C:409:TRP:H	1:C:410:PRO:HD2	1.74	0.52
1:C:81:LYS:N	1:C:82:GLY:HA2	2.26	0.51
1:C:198:GLU:O	1:C:199:ARG:O	2.27	0.51
1:C:200:GLU:O	1:C:201:VAL:CB	2.57	0.51
1:A:358:ARG:NH2	1:A:358:ARG:CG	2.71	0.51
1:A:407:HIS:CG	1:A:408:PRO:HD2	2.45	0.51
1:C:288:LEU:HD13	1:C:315:LEU:HD11	1.91	0.51
1:A:52:ARG:HA	2:A:534:FAD:C6	2.39	0.51
1:B:75:GLU:CD	1:B:75:GLU:H	2.17	0.51
1:B:180:PHE:N	1:B:181:PRO:CD	2.69	0.51
1:B:288:LEU:HD13	1:B:315:LEU:HD11	1.92	0.51
1:C:32:ARG:HD2	1:C:36:VAL:O	2.11	0.51
1:B:495:ASP:HA	1:B:498:ARG:HG3	1.93	0.51
1:C:257:GLY:O	1:C:259:PRO:HD3	2.10	0.51
1:B:182:GLY:HA3	1:B:277:ARG:HA	1.92	0.51
1:B:407:HIS:CG	1:B:408:PRO:HD2	2.45	0.51
1:B:95:PHE:HE2	1:B:105:THR:HG23	1.76	0.51
1:B:208:THR:CB	1:B:358:ARG:HG3	2.41	0.51
1:A:197:PRO:HB3	1:A:261:THR:O	2.09	0.51
1:C:52:ARG:O	1:C:53:ALA:C	2.54	0.51
1:A:23:VAL:HG21	1:A:291:GLY:HA3	1.93	0.51
2:A:534:FAD:H3B	2:A:534:FAD:HO3A	1.74	0.51
1:B:52:ARG:O	1:B:53:ALA:C	2.53	0.51
1:B:23:VAL:HG21	1:B:291:GLY:HA3	1.93	0.51
1:A:215:LEU:O	1:A:215:LEU:HD23	2.10	0.50
1:A:263:THR:HA	1:A:264:GLU:CB	2.41	0.50
1:B:166:ASP:HA	2:B:534:FAD:O4B	2.11	0.50
1:A:196:THR:HG23	1:A:196:THR:O	2.12	0.50
1:A:208:THR:CG2	1:A:358:ARG:HD3	2.40	0.50
1:A:95:PHE:HE2	1:A:105:THR:HG23	1.75	0.50
1:C:201:VAL:N	1:C:202:PRO:HD3	2.07	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:202:PRO:HD2	1:C:218:PRO:HG2	1.93	0.50
1:A:446:ARG:HG2	1:A:448:ASP:OD1	2.12	0.50
1:A:208:THR:HG22	1:A:213:LEU:HB2	1.93	0.50
1:C:23:VAL:HG21	1:C:291:GLY:HA3	1.94	0.50
1:C:263:THR:HA	1:C:264:GLU:CB	2.42	0.50
1:C:443:LEU:O	1:C:465:GLY:HA2	2.11	0.50
1:A:32:ARG:HD2	1:A:36:VAL:O	2.12	0.50
1:B:83:LEU:CB	1:B:84:PRO:HA	2.42	0.50
1:B:409:TRP:H	1:B:410:PRO:HD2	1.75	0.50
1:A:83:LEU:CB	1:A:84:PRO:HA	2.42	0.49
1:A:358:ARG:HH21	1:A:368:ARG:HD2	1.73	0.49
1:C:62:GLU:O	1:C:66:LEU:HD13	2.12	0.49
1:A:57:HIS:ND1	1:A:306:ASN:ND2	2.60	0.49
1:A:195:THR:CA	1:A:197:PRO:CD	2.73	0.49
1:A:365:THR:HB	1:A:366:PRO:CD	2.42	0.49
1:C:52:ARG:HG2	2:C:534:FAD:HM82	1.93	0.49
1:C:446:ARG:HG2	1:C:448:ASP:OD1	2.11	0.49
1:A:357:MET:C	1:A:358:ARG:HG2	2.36	0.49
1:B:196:THR:O	1:B:197:PRO:C	2.55	0.49
1:B:202:PRO:CG	1:B:218:PRO:HG2	2.40	0.49
1:B:219:PRO:C	1:B:220:GLU:HG3	2.36	0.49
1:B:446:ARG:HG2	1:B:448:ASP:OD1	2.11	0.49
1:C:252:VAL:HG12	1:C:252:VAL:O	2.11	0.49
1:A:261:THR:H	1:A:262:LEU:HA	1.78	0.49
1:A:468:THR:N	1:A:469:VAL:HB	2.28	0.49
1:C:137:LEU:CG	1:C:146:VAL:HG12	2.37	0.49
1:C:82:GLY:HA3	1:C:95:PHE:CZ	2.47	0.49
1:C:160:ARG:HH11	1:C:161:TYR:HE1	1.60	0.49
1:A:52:ARG:O	1:A:53:ALA:C	2.54	0.49
1:A:422:PRO:O	1:A:423:SER:HB3	2.13	0.49
1:A:79:VAL:O	1:A:80:ALA:HB3	2.12	0.49
1:C:83:LEU:CB	1:C:84:PRO:HA	2.43	0.49
1:A:166:ASP:C	2:A:534:FAD:H52A	2.37	0.48
1:B:52:ARG:HG2	2:B:534:FAD:C8	2.42	0.48
1:C:315:LEU:HB2	1:C:335:TYR:CE1	2.48	0.48
1:A:197:PRO:HD3	1:A:264:GLU:CB	2.43	0.48
1:C:57:HIS:ND1	1:C:306:ASN:ND2	2.61	0.48
1:B:32:ARG:HD2	1:B:36:VAL:O	2.12	0.48
1:B:62:GLU:O	1:B:66:LEU:HD13	2.13	0.48
1:C:365:THR:HB	1:C:366:PRO:CD	2.43	0.48
1:A:217:PHE:CB	1:A:218:PRO:HD2	2.44	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:315:LEU:HB2	1:A:335:TYR:CE1	2.48	0.48
1:C:261:THR:N	1:C:262:LEU:HA	2.27	0.48
1:A:261:THR:N	1:A:262:LEU:HA	2.27	0.48
1:C:261:THR:H	1:C:262:LEU:HA	1.77	0.48
1:A:398:PHE:HD1	1:A:398:PHE:N	2.12	0.48
1:B:75:GLU:HG2	1:B:112:ARG:HH22	1.79	0.48
1:C:241:GLY:O	1:C:242:PRO:O	2.31	0.48
1:A:358:ARG:HA	1:A:364:THR:HG21	1.96	0.48
1:A:409:TRP:N	1:A:410:PRO:CD	2.77	0.48
1:B:469:VAL:HB	1:B:473:ALA:H	1.78	0.48
1:C:477:LEU:HD21	1:C:505:PHE:HE2	1.79	0.48
1:B:75:GLU:N	1:B:75:GLU:OE2	2.47	0.47
1:A:477:LEU:HD21	1:A:505:PHE:HE2	1.79	0.47
1:B:195:THR:O	1:B:196:THR:O	2.32	0.47
1:C:196:THR:O	1:C:196:THR:HG23	2.14	0.47
1:A:398:PHE:CD1	1:A:398:PHE:N	2.82	0.47
1:B:422:PRO:O	1:B:423:SER:HB3	2.13	0.47
1:B:143:ALA:C	1:B:286:ARG:HH22	2.22	0.47
1:B:349:ASN:OD1	1:B:349:ASN:C	2.58	0.47
1:C:349:ASN:OD1	1:C:349:ASN:C	2.58	0.47
1:C:349:ASN:O	1:C:353:GLN:HB2	2.14	0.47
1:C:409:TRP:N	1:C:410:PRO:CD	2.78	0.47
1:C:437:ARG:HG2	1:C:458:ASP:OD1	2.15	0.47
1:C:95:PHE:HE2	1:C:105:THR:HG23	1.77	0.47
1:C:208:THR:HG22	1:C:213:LEU:HB2	1.97	0.47
1:C:398:PHE:HD1	1:C:398:PHE:N	2.13	0.47
1:A:62:GLU:O	1:A:66:LEU:HD13	2.14	0.47
1:A:457:SER:HA	1:A:458:ASP:HA	1.62	0.47
1:B:208:THR:HG22	1:B:213:LEU:HB2	1.96	0.47
1:B:469:VAL:O	1:B:469:VAL:CG2	2.63	0.47
1:C:201:VAL:N	1:C:202:PRO:CD	2.72	0.47
1:A:444:ALA:C	1:B:450:ARG:NH1	2.73	0.46
1:A:206:GLU:O	1:A:214:VAL:O	2.33	0.46
1:B:206:GLU:O	1:B:214:VAL:O	2.33	0.46
1:B:443:LEU:HD13	1:B:469:VAL:HG12	1.96	0.46
1:B:315:LEU:HB2	1:B:335:TYR:CE1	2.51	0.46
1:B:409:TRP:N	1:B:410:PRO:CD	2.78	0.46
1:B:209:PRO:HD2	1:B:213:LEU:HA	1.98	0.46
1:B:330:GLU:O	1:B:334:THR:HG23	2.16	0.46
1:B:365:THR:HB	1:B:366:PRO:CD	2.45	0.46
1:B:394:ARG:HG3	1:B:411:GLY:C	2.40	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:79:VAL:O	1:C:80:ALA:HB3	2.15	0.46
1:B:144:VAL:HG23	1:B:286:ARG:NH2	2.31	0.46
1:B:398:PHE:CD1	1:B:398:PHE:N	2.83	0.46
1:C:330:GLU:O	1:C:334:THR:HG23	2.15	0.46
1:C:485:ALA:HB1	1:C:504:TRP:CE2	2.50	0.46
1:A:507:PRO:HA	1:A:508:PRO:HD3	1.76	0.46
1:A:330:GLU:O	1:A:334:THR:HG23	2.16	0.46
1:C:401:ALA:HA	1:C:403:SER:HA	1.68	0.46
1:A:79:VAL:HG13	1:C:244:THR:OG1	2.15	0.46
1:B:453:THR:O	1:B:456:TRP:CD1	2.64	0.46
1:B:181:PRO:O	1:B:277:ARG:NE	2.49	0.46
1:C:453:THR:O	1:C:453:THR:HG22	2.15	0.46
1:B:453:THR:O	1:B:453:THR:HG22	2.16	0.46
1:B:485:ALA:HB1	1:B:504:TRP:CE2	2.50	0.46
1:A:252:VAL:HG12	1:A:252:VAL:O	2.16	0.45
1:A:349:ASN:OD1	1:A:349:ASN:C	2.59	0.45
1:A:455:PRO:C	1:A:456:TRP:CG	2.93	0.45
1:A:79:VAL:CG1	1:C:244:THR:OG1	2.65	0.45
1:B:72:ARG:C	1:B:75:GLU:OE2	2.59	0.45
1:A:485:ALA:HB1	1:A:504:TRP:CE2	2.50	0.45
1:B:349:ASN:O	1:B:353:GLN:HB2	2.17	0.45
1:B:477:LEU:HD21	1:B:505:PHE:HE2	1.80	0.45
1:C:263:THR:HA	1:C:264:GLU:C	2.40	0.45
1:A:77:THR:C	1:A:78:GLN:O	2.56	0.45
1:A:166:ASP:HB2	2:A:534:FAD:C8A	2.46	0.45
1:A:197:PRO:CG	1:A:264:GLU:CB	2.91	0.45
1:A:208:THR:OG1	1:A:358:ARG:CD	2.61	0.45
1:A:305:LEU:HD23	1:A:305:LEU:O	2.17	0.45
1:B:77:THR:C	1:B:78:GLN:O	2.60	0.45
1:C:77:THR:C	1:C:78:GLN:O	2.60	0.45
1:B:340:HIS:O	1:B:344:GLU:HG3	2.17	0.45
1:C:398:PHE:CD1	1:C:398:PHE:N	2.83	0.45
1:B:17:VAL:CG1	1:B:40:VAL:HG22	2.47	0.45
1:B:40:VAL:O	1:B:129:PRO:HD2	2.16	0.45
1:B:398:PHE:HD1	1:B:398:PHE:N	2.13	0.45
1:B:455:PRO:C	1:B:456:TRP:CG	2.94	0.45
1:C:69:LEU:O	1:C:73:PHE:HD2	2.00	0.45
1:A:261:THR:CB	1:A:262:LEU:HA	2.46	0.45
1:B:71:ASP:O	1:B:75:GLU:OE2	2.35	0.45
1:C:40:VAL:O	1:C:129:PRO:HD2	2.17	0.44
1:C:437:ARG:NE	1:C:458:ASP:OD1	2.51	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:181:PRO:O	1:C:277:ARG:NE	2.50	0.44
1:C:336:HIS:CD2	1:C:336:HIS:C	2.95	0.44
1:A:263:THR:HA	1:A:264:GLU:C	2.42	0.44
1:A:17:VAL:CG1	1:A:40:VAL:HG22	2.47	0.44
1:A:40:VAL:O	1:A:129:PRO:HD2	2.17	0.44
1:A:82:GLY:HA3	1:A:95:PHE:CZ	2.51	0.44
1:B:322:ARG:HA	1:B:327:GLY:O	2.18	0.44
1:B:161:TYR:CE2	1:B:286:ARG:HG2	2.52	0.44
1:B:210:ASP:N	1:B:210:ASP:OD1	2.51	0.44
1:C:261:THR:N	1:C:262:LEU:CA	2.78	0.44
1:A:463:VAL:O	1:B:421:ARG:CB	2.66	0.44
1:C:261:THR:CB	1:C:262:LEU:HA	2.48	0.44
1:A:181:PRO:O	1:A:277:ARG:NE	2.51	0.44
1:C:305:LEU:HD23	1:C:305:LEU:O	2.18	0.44
1:A:455:PRO:C	1:A:456:TRP:CD1	2.95	0.44
1:B:171:THR:O	1:B:175:LEU:HG	2.18	0.44
1:C:456:TRP:CD1	1:C:456:TRP:N	2.85	0.44
1:C:507:PRO:HA	1:C:508:PRO:HD3	1.76	0.43
1:A:336:HIS:CD2	1:A:336:HIS:C	2.96	0.43
1:C:347:LEU:O	1:C:351:ARG:HG3	2.18	0.43
2:C:534:FAD:H2'	2:C:534:FAD:C9	2.47	0.43
1:A:419:LEU:HB3	1:A:464:ALA:HB1	2.00	0.43
1:B:208:THR:HG21	1:B:358:ARG:HG3	2.01	0.43
1:B:455:PRO:C	1:B:456:TRP:CD1	2.96	0.43
1:C:305:LEU:CD2	1:C:309:LEU:HG	2.49	0.43
1:A:131:GLY:C	1:A:132:HIS:CD2	2.96	0.43
1:A:171:THR:O	1:A:175:LEU:HG	2.19	0.43
1:B:82:GLY:HA2	1:B:95:PHE:CE2	2.54	0.43
1:C:181:PRO:HB2	1:C:182:GLY:H	1.50	0.43
1:A:52:ARG:HD3	2:A:534:FAD:HM82	2.01	0.43
1:A:78:GLN:O	1:A:79:VAL:HB	2.18	0.43
1:B:252:VAL:HG12	1:B:252:VAL:O	2.18	0.43
1:C:17:VAL:CG1	1:C:40:VAL:HG22	2.48	0.43
1:C:52:ARG:HG2	2:C:534:FAD:C8	2.48	0.43
1:C:209:PRO:HD2	1:C:213:LEU:HA	1.99	0.43
1:C:322:ARG:HA	1:C:327:GLY:O	2.18	0.43
1:A:469:VAL:HG12	1:A:472:PRO:HA	1.98	0.43
1:B:208:THR:CG2	1:B:358:ARG:HG3	2.48	0.43
1:B:308:GLY:O	1:B:311:ASP:HB2	2.19	0.43
1:A:197:PRO:CB	1:A:261:THR:O	2.67	0.43
1:B:305:LEU:CD2	1:B:309:LEU:HG	2.49	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:267:SER:O	1:C:268:TRP:C	2.60	0.43
1:A:191:ILE:O	1:A:269:LEU:HA	2.19	0.43
1:C:131:GLY:C	1:C:132:HIS:CD2	2.97	0.42
1:C:455:PRO:C	1:C:456:TRP:CD1	2.97	0.42
1:B:191:ILE:O	1:B:269:LEU:HA	2.18	0.42
1:C:196:THR:HB	1:C:219:PRO:CD	2.49	0.42
1:A:195:THR:C	1:A:197:PRO:CD	2.92	0.42
1:C:166:ASP:HB2	1:C:167:GLY:H	1.71	0.42
1:A:181:PRO:HB2	1:A:182:GLY:H	1.49	0.42
1:C:166:ASP:OD2	1:C:166:ASP:N	2.47	0.42
1:C:455:PRO:C	1:C:456:TRP:CG	2.97	0.42
1:A:267:SER:O	1:A:268:TRP:C	2.62	0.42
1:B:144:VAL:HG23	1:B:286:ARG:HH22	1.83	0.42
1:C:110:GLN:NE2	2:C:534:FAD:O4'	2.48	0.42
1:A:244:THR:HG23	1:A:247:ASP:H	1.84	0.42
1:A:322:ARG:HA	1:A:327:GLY:O	2.19	0.42
1:B:267:SER:O	1:B:268:TRP:C	2.63	0.42
1:A:69:LEU:O	1:A:73:PHE:HD2	2.02	0.42
1:A:196:THR:O	1:A:197:PRO:C	2.62	0.42
1:A:209:PRO:HD2	1:A:213:LEU:HA	2.00	0.42
1:C:206:GLU:O	1:C:214:VAL:O	2.37	0.42
1:B:69:LEU:O	1:B:73:PHE:HD2	2.03	0.42
1:B:131:GLY:C	1:B:132:HIS:CD2	2.98	0.42
1:C:163:VAL:HG22	1:C:288:LEU:HB2	2.02	0.42
1:C:453:THR:O	1:C:456:TRP:CD1	2.65	0.42
1:A:257:GLY:C	1:A:259:PRO:HD3	2.45	0.42
1:A:266:VAL:HG23	1:A:267:SER:N	2.34	0.42
1:B:143:ALA:HA	1:B:286:ARG:NH2	2.34	0.42
1:B:48:VAL:HG13	1:B:48:VAL:O	2.20	0.42
1:B:214:VAL:CG2	1:B:215:LEU:H	2.30	0.42
1:B:243:VAL:HG13	1:B:269:LEU:HD11	2.02	0.42
1:A:102:HIS:HB3	1:A:104:TYR:CE2	2.54	0.41
1:A:445:GLY:H	1:B:447:ALA:HB2	1.84	0.41
1:B:442:ASP:O	1:B:444:ALA:N	2.53	0.41
1:A:442:ASP:O	1:A:444:ALA:N	2.53	0.41
1:B:196:THR:CB	1:B:197:PRO:HD2	2.50	0.41
1:A:98:VAL:O	1:A:100:THR:HG22	2.20	0.41
1:A:358:ARG:NH2	1:A:368:ARG:HD3	2.33	0.41
1:A:447:ALA:N	1:B:445:GLY:O	2.45	0.41
1:A:453:THR:O	1:A:453:THR:HG22	2.20	0.41
1:B:419:LEU:HB3	1:B:464:ALA:HB1	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:191:ILE:O	1:C:269:LEU:HA	2.20	0.41
1:B:317:TRP:CE3	1:B:480:PRO:HG2	2.55	0.41
1:A:166:ASP:HB2	1:A:167:GLY:H	1.71	0.41
1:A:204:ARG:HH21	1:A:218:PRO:CA	2.21	0.41
1:B:155:TYR:O	1:B:155:TYR:CD2	2.74	0.41
1:B:57:HIS:CD2	1:B:105:THR:CG2	2.96	0.41
1:C:155:TYR:CD2	1:C:155:TYR:O	2.73	0.41
1:A:489:SER:O	1:A:490:PRO:C	2.64	0.41
1:B:163:VAL:HG22	1:B:288:LEU:HB2	2.02	0.41
1:C:404:ALA:O	1:C:405:ARG:C	2.64	0.41
1:C:442:ASP:O	1:C:444:ALA:N	2.54	0.41
1:A:163:VAL:HG22	1:A:288:LEU:HB2	2.02	0.41
1:A:446:ARG:NH2	1:A:490:PRO:O	2.52	0.41
1:B:305:LEU:HD23	1:B:305:LEU:O	2.20	0.41
1:B:336:HIS:CD2	1:B:336:HIS:C	2.99	0.41
1:B:357:MET:C	1:B:358:ARG:HG2	2.46	0.41
1:C:127:GLU:C	1:C:129:PRO:HD3	2.46	0.41
1:A:127:GLU:C	1:A:129:PRO:HD3	2.46	0.41
1:A:469:VAL:HG13	1:A:472:PRO:CA	2.39	0.41
1:B:98:VAL:O	1:B:100:THR:HG22	2.22	0.41
1:B:380:VAL:O	1:B:383:TYR:HB3	2.21	0.41
1:A:243:VAL:HG13	1:A:269:LEU:HD11	2.03	0.40
1:A:422:PRO:CB	1:B:427:VAL:HG11	2.51	0.40
1:B:181:PRO:HB2	1:B:182:GLY:H	1.50	0.40
1:C:243:VAL:HG13	1:C:269:LEU:HD11	2.01	0.40
1:B:102:HIS:HB3	1:B:104:TYR:CE2	2.56	0.40
1:A:305:LEU:CD2	1:A:309:LEU:HG	2.51	0.40
1:B:347:LEU:O	1:B:351:ARG:HG3	2.22	0.40
1:C:61:VAL:HG13	1:C:70:LEU:CD1	2.51	0.40
1:C:394:ARG:HG3	1:C:412:ARG:HA	2.04	0.40
1:C:437:ARG:CD	1:C:458:ASP:OD1	2.69	0.40
1:A:349:ASN:O	1:A:353:GLN:HB2	2.21	0.40
1:A:394:ARG:HG3	1:A:412:ARG:HA	2.03	0.40
1:C:244:THR:HG23	1:C:247:ASP:H	1.86	0.40
1:C:206:GLU:CG	1:C:207:ARG:N	2.85	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	474/570 (83%)	392 (83%)	52 (11%)	30 (6%)	1	3
1	B	468/570 (82%)	389 (83%)	51 (11%)	28 (6%)	1	4
1	C	483/570 (85%)	397 (82%)	54 (11%)	32 (7%)	1	3
All	All	1425/1710 (83%)	1178 (83%)	157 (11%)	90 (6%)	1	3

All (90) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	78	GLN
1	A	79	VAL
1	A	181	PRO
1	A	199	ARG
1	A	212	ILE
1	A	218	PRO
1	A	358	ARG
1	A	421	ARG
1	B	78	GLN
1	B	79	VAL
1	B	181	PRO
1	B	212	ILE
1	B	218	PRO
1	B	358	ARG
1	B	421	ARG
1	C	78	GLN
1	C	79	VAL
1	C	181	PRO
1	C	197	PRO
1	C	199	ARG
1	C	201	VAL
1	C	202	PRO
1	C	212	ILE
1	C	218	PRO

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Mol	Chain	Res	Type
1	C	242	PRO
1	C	404	ALA
1	C	421	ARG
1	C	457	SER
1	A	50	HIS
1	A	138	ARG
1	A	202	PRO
1	A	268	TRP
1	A	443	LEU
1	A	444	ALA
1	B	50	HIS
1	B	138	ARG
1	B	196	THR
1	B	202	PRO
1	B	268	TRP
1	B	444	ALA
1	C	14	ASP
1	C	50	HIS
1	C	138	ARG
1	C	195	THR
1	C	268	TRP
1	C	444	ALA
1	A	177	ALA
1	A	197	PRO
1	B	13	THR
1	B	14	ASP
1	B	177	ALA
1	B	443	LEU
1	C	177	ALA
1	C	443	LEU
1	A	83	LEU
1	A	207	ARG
1	A	420	SER
1	B	207	ARG
1	B	420	SER
1	C	83	LEU
1	C	420	SER
1	A	82	GLY
1	A	201	VAL
1	B	80	ALA
1	B	83	LEU
1	B	240	GLU

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Mol	Chain	Res	Type
1	C	82	GLY
1	C	198	GLU
1	C	207	ARG
1	C	490	PRO
1	A	196	THR
1	A	217	PHE
1	A	269	LEU
1	A	457	SER
1	B	252	VAL
1	B	269	LEU
1	B	457	SER
1	C	252	VAL
1	C	269	LEU
1	A	252	VAL
1	C	259	PRO
1	A	259	PRO
1	B	490	PRO
1	C	465	GLY
1	A	180	PHE
1	A	264	GLU
1	B	180	PHE
1	B	84	PRO
1	C	84	PRO
1	A	84	PRO

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	309/436 (71%)	285 (92%)	24 (8%)	11	35
1	B	305/436 (70%)	284 (93%)	21 (7%)	14	41
1	C	315/436 (72%)	292 (93%)	23 (7%)	13	38
All	All	929/1308 (71%)	861 (93%)	68 (7%)	13	38

All (68) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	18	VAL
1	A	42	GLU
1	A	63	THR
1	A	74	LEU
1	A	77	THR
1	A	79	VAL
1	A	128	ILE
1	A	166	ASP
1	A	191	ILE
1	A	195	THR
1	A	197	PRO
1	A	206	GLU
1	A	218	PRO
1	A	235	SER
1	A	247	ASP
1	A	266	VAL
1	A	268	TRP
1	A	269	LEU
1	A	296	VAL
1	A	349	ASN
1	A	358	ARG
1	A	391	THR
1	A	397	THR
1	A	456	TRP
1	B	18	VAL
1	B	63	THR
1	B	74	LEU
1	B	75	GLU
1	B	123	GLU
1	B	128	ILE
1	B	166	ASP
1	B	194	VAL
1	B	196	THR
1	B	206	GLU
1	B	210	ASP
1	B	235	SER
1	B	245	LEU
1	B	247	ASP
1	B	269	LEU
1	B	296	VAL
1	B	349	ASN
1	B	391	THR
1	B	397	THR

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Mol	Chain	Res	Type
1	B	456	TRP
1	B	469	VAL
1	C	18	VAL
1	C	42	GLU
1	C	48	VAL
1	C	63	THR
1	C	74	LEU
1	C	127	GLU
1	C	128	ILE
1	C	137	LEU
1	C	166	ASP
1	C	191	ILE
1	C	194	VAL
1	C	206	GLU
1	C	261	THR
1	C	264	GLU
1	C	268	TRP
1	C	269	LEU
1	C	286	ARG
1	C	296	VAL
1	C	349	ASN
1	C	391	THR
1	C	397	THR
1	C	456	TRP
1	C	510	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	50	HIS
1	A	303	GLN
1	B	303	GLN
1	C	50	HIS
1	C	303	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

5 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	FAD	C	534	-	58,58,58	5.30	36 (62%)	85,89,89	1.91	23 (27%)
3	EDO	A	535	-	3,3,3	2.15	2 (66%)	2,2,2	0.60	0
3	EDO	B	535	-	3,3,3	0.44	0	2,2,2	0.15	0
2	FAD	A	534	-	58,58,58	5.39	36 (62%)	85,89,89	1.97	20 (23%)
2	FAD	B	534	-	58,58,58	5.38	36 (62%)	85,89,89	1.88	20 (23%)

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	C	534	-	4/4/9/9	12/34/50/50	0/6/6/6
3	EDO	A	535	-	-	1/1/1/1	-
3	EDO	B	535	-	-	0/1/1/1	-
2	FAD	A	534	-	4/4/9/9	14/34/50/50	0/6/6/6
2	FAD	B	534	-	5/5/9/9	11/34/50/50	0/6/6/6

All (110) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	534	FAD	C9-C9A	14.61	1.63	1.39
2	C	534	FAD	C9-C9A	14.60	1.63	1.39
2	B	534	FAD	C9-C9A	14.51	1.63	1.39
2	A	534	FAD	O3B-C3B	11.88	1.72	1.43
2	C	534	FAD	C6-C5X	11.81	1.57	1.40
2	C	534	FAD	O2'-C2'	-11.76	1.18	1.43
2	A	534	FAD	O2'-C2'	-11.75	1.18	1.43
2	C	534	FAD	C2A-N1A	11.64	1.54	1.33
2	B	534	FAD	O2'-C2'	-11.60	1.19	1.43
2	A	534	FAD	C6-C5X	11.57	1.57	1.40
2	B	534	FAD	C6-C5X	11.54	1.57	1.40
2	B	534	FAD	C2A-N1A	11.45	1.54	1.33
2	A	534	FAD	C2A-N1A	11.44	1.54	1.33
2	A	534	FAD	C5X-N5	11.16	1.59	1.39
2	C	534	FAD	C5X-N5	11.12	1.59	1.39
2	B	534	FAD	C5X-N5	10.98	1.59	1.39
2	B	534	FAD	P-O3P	9.34	1.69	1.59
2	C	534	FAD	C9A-N10	9.20	1.57	1.41
2	B	534	FAD	C9A-N10	8.88	1.56	1.41
2	A	534	FAD	C9A-N10	8.75	1.56	1.41
2	B	534	FAD	O3B-C3B	8.44	1.63	1.43
2	B	534	FAD	C2-N1	8.04	1.54	1.36
2	C	534	FAD	C2-N1	7.88	1.54	1.36
2	A	534	FAD	C2-N1	7.88	1.54	1.36
2	A	534	FAD	P-O3P	7.84	1.68	1.59
2	B	534	FAD	C8-C7	7.82	1.59	1.40
2	A	534	FAD	O4B-C1B	7.81	1.60	1.42
2	A	534	FAD	C8-C7	7.76	1.59	1.40
2	B	534	FAD	O4B-C1B	7.73	1.59	1.42
2	C	534	FAD	O4B-C1B	7.72	1.59	1.42
2	C	534	FAD	P-O3P	7.60	1.67	1.59
2	B	534	FAD	PA-O3P	7.55	1.67	1.59
2	C	534	FAD	C5A-N7A	7.43	1.52	1.39
2	B	534	FAD	C5A-N7A	7.40	1.52	1.39
2	C	534	FAD	C8-C7	7.38	1.58	1.40
2	C	534	FAD	O3B-C3B	7.35	1.61	1.43
2	A	534	FAD	C5A-N7A	7.14	1.52	1.39
2	C	534	FAD	C8A-N9A	6.94	1.49	1.37
2	B	534	FAD	C8A-N9A	6.79	1.49	1.37
2	A	534	FAD	C8A-N9A	6.66	1.48	1.37
2	A	534	FAD	PA-O3P	6.54	1.66	1.59
2	C	534	FAD	C4A-N3A	6.24	1.46	1.34
2	B	534	FAD	C4A-N3A	6.09	1.45	1.34

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	534	FAD	C4A-N3A	6.08	1.45	1.34
2	A	534	FAD	C2B-C1B	-5.99	1.34	1.53
2	C	534	FAD	PA-O3P	5.98	1.66	1.59
2	C	534	FAD	C2B-C1B	-5.95	1.34	1.53
2	B	534	FAD	C2B-C1B	-5.91	1.34	1.53
2	C	534	FAD	C6A-N6A	5.11	1.47	1.34
2	A	534	FAD	C6A-N6A	5.02	1.47	1.34
2	B	534	FAD	C6A-N6A	4.94	1.46	1.34
2	B	534	FAD	C5B-C4B	-4.89	1.36	1.51
2	B	534	FAD	C5'-C4'	4.74	1.58	1.51
2	A	534	FAD	C4A-N9A	4.63	1.47	1.37
2	C	534	FAD	C4A-N9A	4.56	1.47	1.37
2	B	534	FAD	C2-N3	4.55	1.49	1.39
2	C	534	FAD	C5B-C4B	-4.44	1.38	1.51
2	B	534	FAD	C4A-N9A	4.40	1.46	1.37
2	C	534	FAD	C2-N3	4.39	1.48	1.39
2	A	534	FAD	C5B-C4B	-4.38	1.38	1.51
2	C	534	FAD	C5'-C4'	4.38	1.57	1.51
2	A	534	FAD	C2-N3	4.37	1.48	1.39
2	C	534	FAD	C5A-C6A	4.34	1.53	1.41
2	C	534	FAD	C10-N10	4.32	1.46	1.37
2	B	534	FAD	C5A-C6A	4.17	1.52	1.41
2	A	534	FAD	C5A-C6A	4.12	1.52	1.41
2	B	534	FAD	C10-N10	4.09	1.46	1.37
2	A	534	FAD	C10-N10	4.02	1.46	1.37
2	A	534	FAD	C5'-C4'	3.81	1.57	1.51
2	B	534	FAD	C4X-C10	3.71	1.55	1.44
2	B	534	FAD	O2B-C2B	-3.69	1.33	1.43
2	C	534	FAD	C4X-C10	3.68	1.55	1.44
2	A	534	FAD	C4X-C10	3.60	1.54	1.44
2	C	534	FAD	O2B-C2B	-3.53	1.34	1.43
2	A	534	FAD	O2B-C2B	-3.47	1.34	1.43
2	A	534	FAD	C6A-N1A	-3.44	1.26	1.35
2	B	534	FAD	C6A-N1A	-3.40	1.26	1.35
2	B	534	FAD	C1B-N9A	-3.38	1.37	1.46
2	C	534	FAD	C1'-C2'	3.34	1.57	1.52
2	A	534	FAD	C4X-N5	3.32	1.37	1.30
2	A	534	FAD	C1B-N9A	-3.26	1.37	1.46
2	C	534	FAD	C6A-N1A	-3.26	1.26	1.35
2	B	534	FAD	C4'-C3'	3.24	1.59	1.53
2	C	534	FAD	C1B-N9A	-3.22	1.37	1.46
2	C	534	FAD	C4X-N5	3.16	1.37	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	534	FAD	C4'-C3'	3.09	1.58	1.53
2	B	534	FAD	C1'-C2'	3.07	1.56	1.52
2	B	534	FAD	C4X-N5	3.02	1.37	1.30
2	C	534	FAD	O2-C2	-2.77	1.18	1.24
2	B	534	FAD	O2-C2	-2.73	1.19	1.24
2	A	534	FAD	O2-C2	-2.71	1.19	1.24
2	C	534	FAD	O4-C4	-2.69	1.18	1.23
2	A	534	FAD	C1'-C2'	2.66	1.56	1.52
2	A	534	FAD	C4'-C3'	2.65	1.58	1.53
2	A	534	FAD	O4-C4	-2.64	1.18	1.23
2	B	534	FAD	C2'-C3'	2.63	1.58	1.53
2	B	534	FAD	C9-C8	-2.57	1.36	1.39
3	A	535	EDO	O1-C1	2.51	1.54	1.42
2	B	534	FAD	O4-C4	-2.47	1.18	1.23
2	C	534	FAD	C9-C8	-2.44	1.36	1.39
2	B	534	FAD	P-O5'	2.42	1.68	1.59
2	C	534	FAD	C2'-C3'	2.31	1.57	1.53
3	A	535	EDO	O2-C2	2.29	1.53	1.42
2	A	534	FAD	C9-C8	-2.23	1.36	1.39
2	C	534	FAD	P-O5'	2.22	1.68	1.59
2	C	534	FAD	C4X-C4	2.08	1.52	1.44
2	B	534	FAD	C4X-C4	2.01	1.51	1.44
2	A	534	FAD	P-O5'	2.01	1.67	1.59
2	A	534	FAD	C4X-C4	2.01	1.51	1.44
2	A	534	FAD	P-O2P	-2.00	1.46	1.55

All (63) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	534	FAD	C4B-O4B-C1B	-5.98	96.26	109.47
2	A	534	FAD	C5A-C4A-N3A	-5.81	118.72	126.72
2	A	534	FAD	C4B-O4B-C1B	-5.77	96.73	109.47
2	C	534	FAD	C5A-C4A-N3A	-5.40	119.28	126.72
2	B	534	FAD	N3A-C2A-N1A	-5.38	120.44	128.58
2	B	534	FAD	C5A-C4A-N3A	-5.34	119.36	126.72
2	C	534	FAD	N3A-C2A-N1A	-5.30	120.56	128.58
2	C	534	FAD	C4B-O4B-C1B	-5.14	98.12	109.47
2	A	534	FAD	N3A-C2A-N1A	-5.11	120.84	128.58
2	B	534	FAD	O3B-C3B-C4B	4.76	124.75	111.08
2	A	534	FAD	O4B-C1B-N9A	4.52	116.77	108.09
2	A	534	FAD	O3B-C3B-C4B	4.49	123.97	111.08
2	B	534	FAD	N9A-C8A-N7A	-3.93	108.36	113.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	534	FAD	C2B-C3B-C4B	3.91	110.17	102.61
2	C	534	FAD	O3B-C3B-C4B	3.89	122.24	111.08
2	A	534	FAD	N9A-C8A-N7A	-3.81	108.53	113.94
2	A	534	FAD	N3A-C4A-N9A	3.78	133.60	127.17
2	A	534	FAD	C2B-C3B-C4B	3.74	109.83	102.61
2	C	534	FAD	N9A-C8A-N7A	-3.71	108.68	113.94
2	C	534	FAD	O4B-C1B-N9A	3.68	115.16	108.09
2	C	534	FAD	O3B-C3B-C2B	3.57	123.28	111.82
2	C	534	FAD	C2A-N3A-C4A	3.50	120.37	111.83
2	B	534	FAD	C2A-N3A-C4A	3.49	120.36	111.83
2	A	534	FAD	C2A-N3A-C4A	3.49	120.35	111.83
2	A	534	FAD	C5'-C4'-C3'	-3.47	105.67	112.22
2	A	534	FAD	O3B-C3B-C2B	3.36	122.59	111.82
2	B	534	FAD	O4B-C1B-N9A	3.32	114.47	108.09
2	B	534	FAD	C2B-C3B-C4B	3.30	108.99	102.61
2	C	534	FAD	N3A-C4A-N9A	3.26	132.71	127.17
2	B	534	FAD	O3B-C3B-C2B	3.24	122.21	111.82
2	A	534	FAD	O4B-C4B-C3B	-3.21	98.78	105.15
2	B	534	FAD	N3A-C4A-N9A	3.20	132.60	127.17
2	C	534	FAD	O4B-C4B-C3B	-3.17	98.87	105.15
2	A	534	FAD	C5A-N7A-C8A	3.16	108.42	103.45
2	B	534	FAD	C5A-N7A-C8A	3.16	108.42	103.45
2	C	534	FAD	C4-N3-C2	-3.13	120.08	125.64
2	C	534	FAD	C5A-N7A-C8A	3.07	108.27	103.45
2	B	534	FAD	C4-N3-C2	-2.91	120.47	125.64
2	B	534	FAD	O2'-C2'-C3'	2.88	115.99	109.25
2	B	534	FAD	O4B-C4B-C3B	-2.77	99.65	105.15
2	A	534	FAD	C4-N3-C2	-2.72	120.81	125.64
2	A	534	FAD	C6A-C5A-C4A	2.61	120.74	117.18
2	C	534	FAD	C4X-C4-N3	2.48	119.58	113.25
2	A	534	FAD	C4X-C4-N3	2.46	119.51	113.25
2	A	534	FAD	O2'-C2'-C3'	2.42	114.91	109.25
2	C	534	FAD	O4-C4-C4X	-2.40	120.20	126.53
2	B	534	FAD	C4X-C10-N10	2.37	119.87	116.48
2	C	534	FAD	C4X-C10-N10	2.34	119.83	116.48
2	B	534	FAD	O4-C4-C4X	-2.34	120.36	126.53
2	A	534	FAD	O4-C4-C4X	-2.34	120.36	126.53
2	C	534	FAD	O2P-P-O3P	2.26	113.39	107.27
2	B	534	FAD	C4X-C4-N3	2.23	118.92	113.25
2	C	534	FAD	C9A-C5X-N5	-2.20	120.12	122.45
2	C	534	FAD	C5X-C9A-N10	2.19	119.95	117.97
2	C	534	FAD	O5'-C5'-C4'	2.15	115.11	109.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	534	FAD	C6A-C5A-C4A	2.11	120.06	117.18
2	A	534	FAD	C4X-C10-N10	2.09	119.47	116.48
2	B	534	FAD	C6A-C5A-C4A	2.06	119.99	117.18
2	C	534	FAD	C10-C4X-N5	-2.06	120.61	124.81
2	B	534	FAD	C5A-C4A-N9A	2.04	108.04	105.81
2	A	534	FAD	C10-C4X-N5	-2.02	120.68	124.81
2	C	534	FAD	C5A-C4A-N9A	2.01	108.01	105.81
2	B	534	FAD	C4A-C5A-N7A	-2.00	108.30	110.58

All (13) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	534	FAD	C2B
2	A	534	FAD	C3B
2	A	534	FAD	C2'
2	A	534	FAD	C1B
2	B	534	FAD	C1B
2	B	534	FAD	C2B
2	B	534	FAD	C4'
2	B	534	FAD	C3B
2	B	534	FAD	C2'
2	C	534	FAD	C2B
2	C	534	FAD	C3B
2	C	534	FAD	C2'
2	C	534	FAD	C1B

All (38) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	534	FAD	C5B-O5B-PA-O2A
2	A	534	FAD	C5B-O5B-PA-O3P
2	A	534	FAD	C1'-C2'-C3'-O3'
2	A	534	FAD	C1'-C2'-C3'-C4'
2	A	534	FAD	C5'-O5'-P-O1P
2	A	534	FAD	C5'-O5'-P-O3P
2	C	534	FAD	C5B-O5B-PA-O3P
2	C	534	FAD	C1'-C2'-C3'-O3'
2	C	534	FAD	C1'-C2'-C3'-C4'
2	C	534	FAD	O2'-C2'-C3'-C4'
2	C	534	FAD	C5'-O5'-P-O1P
2	A	534	FAD	O2'-C2'-C3'-O3'
2	C	534	FAD	O2'-C2'-C3'-O3'

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Mol	Chain	Res	Type	Atoms
2	A	534	FAD	O2'-C2'-C3'-C4'
2	A	534	FAD	O4B-C4B-C5B-O5B
2	A	534	FAD	C3B-C4B-C5B-O5B
2	C	534	FAD	C3B-C4B-C5B-O5B
2	C	534	FAD	O4B-C4B-C5B-O5B
2	B	534	FAD	O3'-C3'-C4'-O4'
2	B	534	FAD	O3'-C3'-C4'-C5'
2	B	534	FAD	C2'-C3'-C4'-O4'
2	B	534	FAD	O2'-C2'-C3'-O3'
2	B	534	FAD	C3B-C4B-C5B-O5B
2	B	534	FAD	PA-O3P-P-O5'
2	B	534	FAD	P-O3P-PA-O1A
2	C	534	FAD	PA-O3P-P-O2P
2	A	534	FAD	O4'-C4'-C5'-O5'
2	A	534	FAD	C5B-O5B-PA-O1A
2	C	534	FAD	C5B-O5B-PA-O1A
2	C	534	FAD	C2'-C1'-N10-C10
2	C	534	FAD	C5'-O5'-P-O3P
3	A	535	EDO	O1-C1-C2-O2
2	B	534	FAD	O2'-C2'-C3'-C4'
2	A	534	FAD	PA-O3P-P-O1P
2	A	534	FAD	C3'-C4'-C5'-O5'
2	B	534	FAD	O4B-C4B-C5B-O5B
2	B	534	FAD	C2'-C3'-C4'-C5'
2	B	534	FAD	P-O3P-PA-O2A

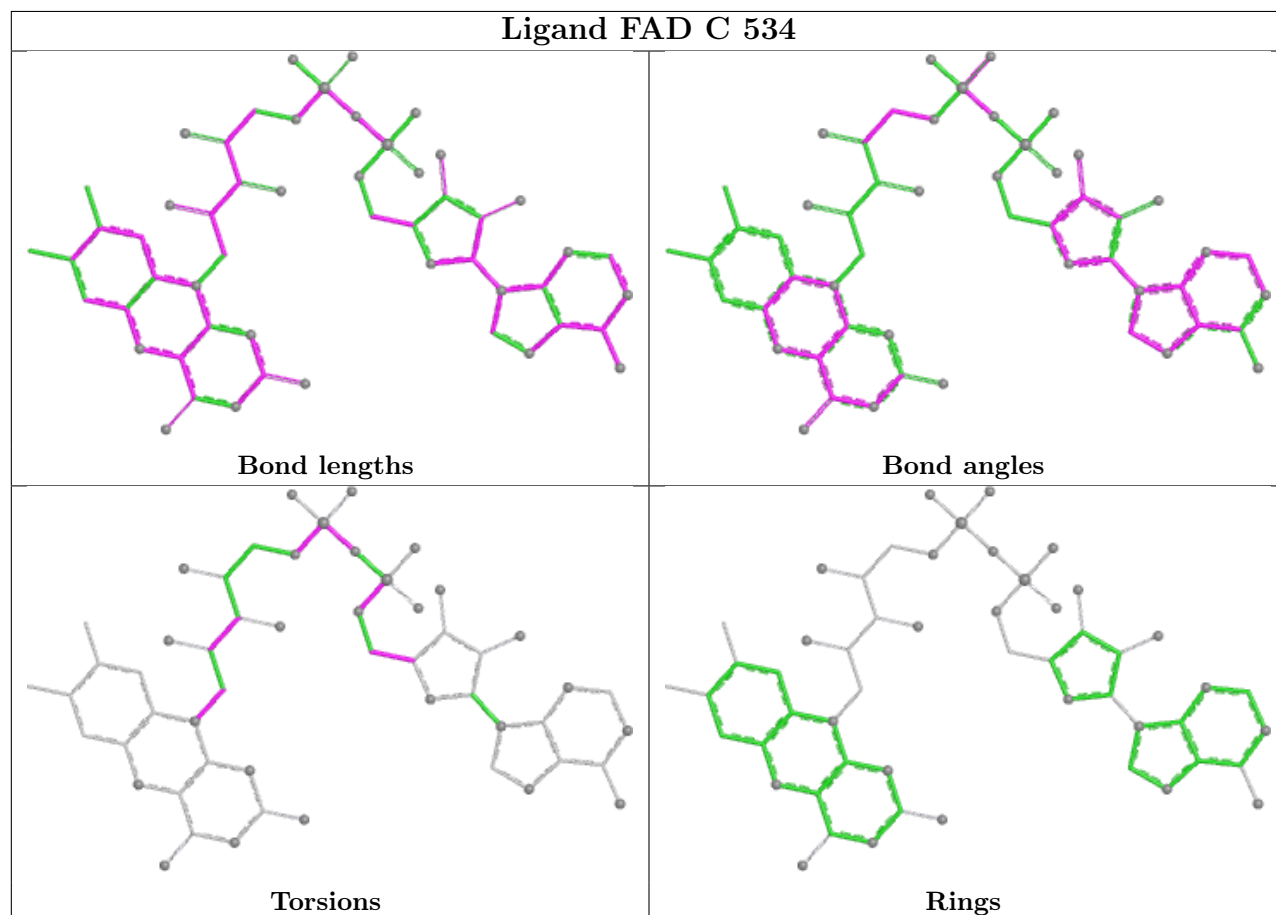
There are no ring outliers.

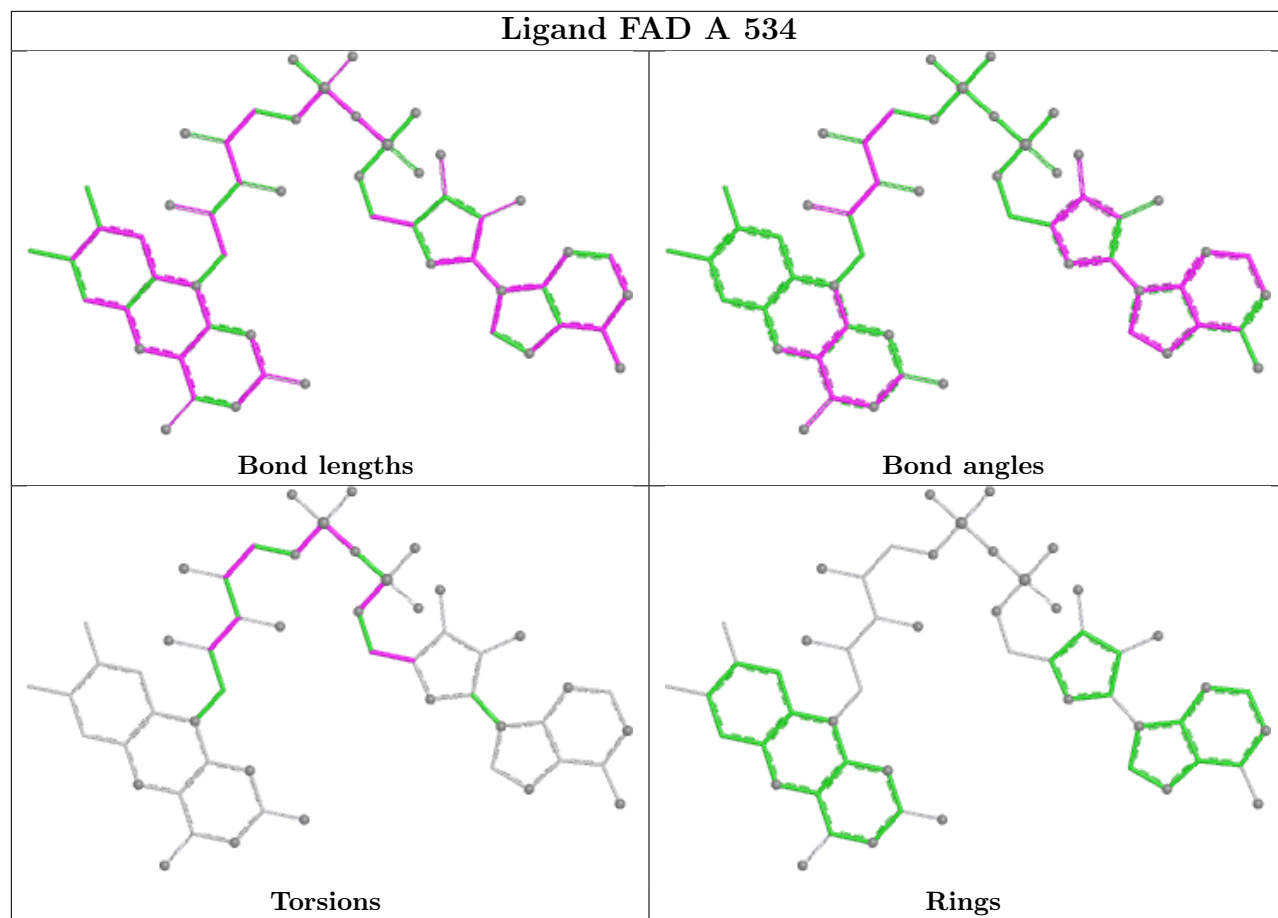
4 monomers are involved in 25 short contacts:

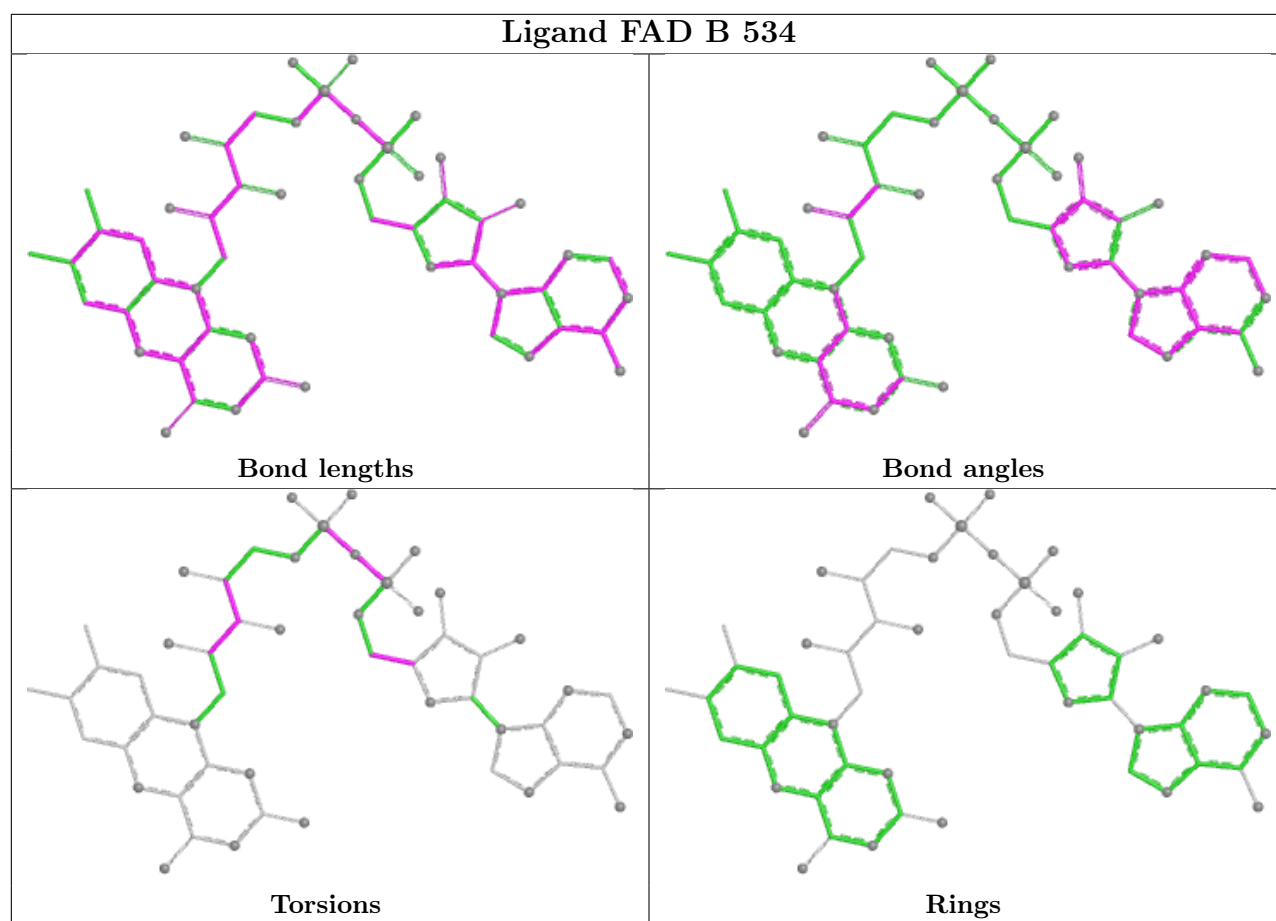
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	534	FAD	7	0
3	B	535	EDO	1	0
2	A	534	FAD	9	0
2	B	534	FAD	9	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring

in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ > 2		OWAB(Å ²)	Q < 0.9
1	A	482/570 (84%)	0.34	21 (4%)	39 30	58, 111, 182, 292	0
1	B	479/570 (84%)	0.36	29 (6%)	27 21	69, 118, 183, 347	1 (0%)
1	C	489/570 (85%)	0.40	27 (5%)	30 24	53, 115, 185, 305	0
All	All	1450/1710 (84%)	0.36	77 (5%)	32 25	53, 115, 184, 347	1 (0%)

All (77) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	218	PRO	5.2
1	C	235	SER	4.8
1	A	458	ASP	4.3
1	C	423	SER	4.1
1	B	401	ALA	4.1
1	B	197	PRO	3.8
1	B	200	GLU	3.7
1	A	266	VAL	3.3
1	A	80	ALA	3.3
1	A	421	ARG	3.2
1	C	211	GLY	3.2
1	C	468	THR	3.2
1	A	178	ASP	3.2
1	B	257	GLY	3.1
1	B	461	SER	3.1
1	C	266	VAL	3.1
1	B	284	SER	3.1
1	B	423	SER	3.0
1	B	463	VAL	3.0
1	C	422	PRO	3.0
1	C	53	ALA	3.0
1	B	458	ASP	2.9
1	B	210	ASP	2.9

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Mol	Chain	Res	Type	RSRZ
1	B	201	VAL	2.8
1	C	178	ASP	2.8
1	A	457	SER	2.8
1	A	179	ARG	2.7
1	C	202	PRO	2.6
1	C	234	HIS	2.6
1	B	202	PRO	2.6
1	B	217	PHE	2.6
1	B	239	ASP	2.6
1	B	174[A]	ARG	2.5
1	A	422	PRO	2.5
1	C	251	ALA	2.5
1	C	458	ASP	2.5
1	C	137	LEU	2.5
1	C	12	THR	2.4
1	C	410	PRO	2.4
1	A	211	GLY	2.4
1	A	235	SER	2.4
1	A	77	THR	2.4
1	A	400	PRO	2.4
1	B	129	PRO	2.4
1	C	214	VAL	2.4
1	A	209	PRO	2.4
1	B	358	ARG	2.3
1	A	159	ALA	2.3
1	C	141	ALA	2.3
1	B	72	ARG	2.3
1	B	359	PRO	2.3
1	A	24	GLY	2.3
1	B	489	SER	2.3
1	B	48	VAL	2.3
1	C	196	THR	2.2
1	C	467	ALA	2.2
1	B	421	ARG	2.2
1	C	44	LEU	2.2
1	B	422	PRO	2.2
1	B	504	TRP	2.2
1	A	158	ARG	2.1
1	C	421	ARG	2.1
1	A	410	PRO	2.1
1	C	140	ASP	2.1
1	A	165	CYS	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	67	ARG	2.1
1	B	211	GLY	2.1
1	B	468	THR	2.1
1	A	254	ARG	2.1
1	C	427	VAL	2.1
1	C	219	PRO	2.1
1	A	291	GLY	2.1
1	C	489	SER	2.1
1	B	135	THR	2.1
1	B	212	ILE	2.0
1	C	451	GLU	2.0
1	C	143	ALA	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](#)

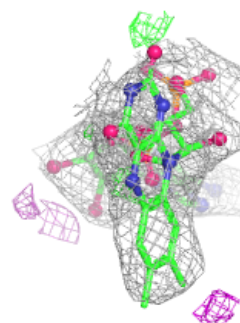
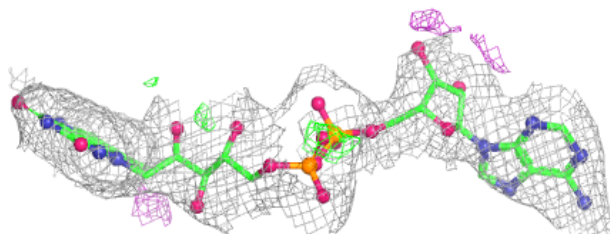
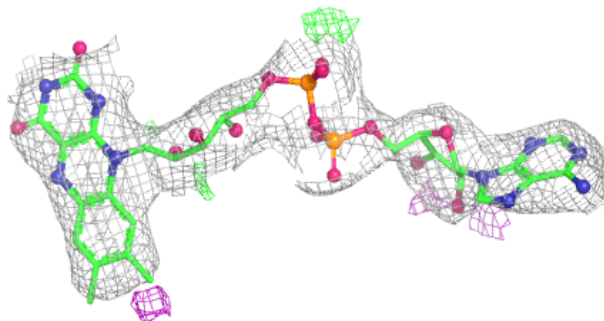
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	EDO	A	535	4/4	0.73	0.34	59,107,154,250	0
3	EDO	B	535	4/4	0.85	0.24	86,87,102,127	0
2	FAD	C	534	53/53	0.93	0.10	51,98,142,170	0
2	FAD	B	534	53/53	0.94	0.09	27,115,177,212	0
2	FAD	A	534	53/53	0.95	0.09	47,101,159,227	0

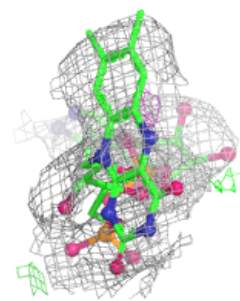
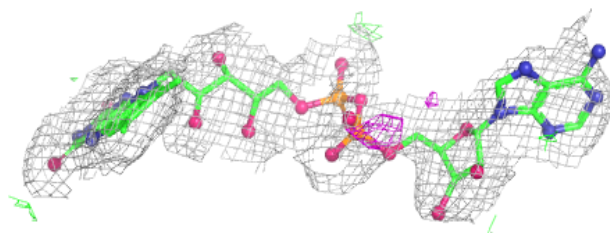
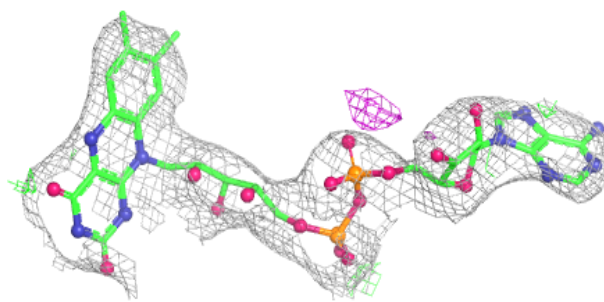
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

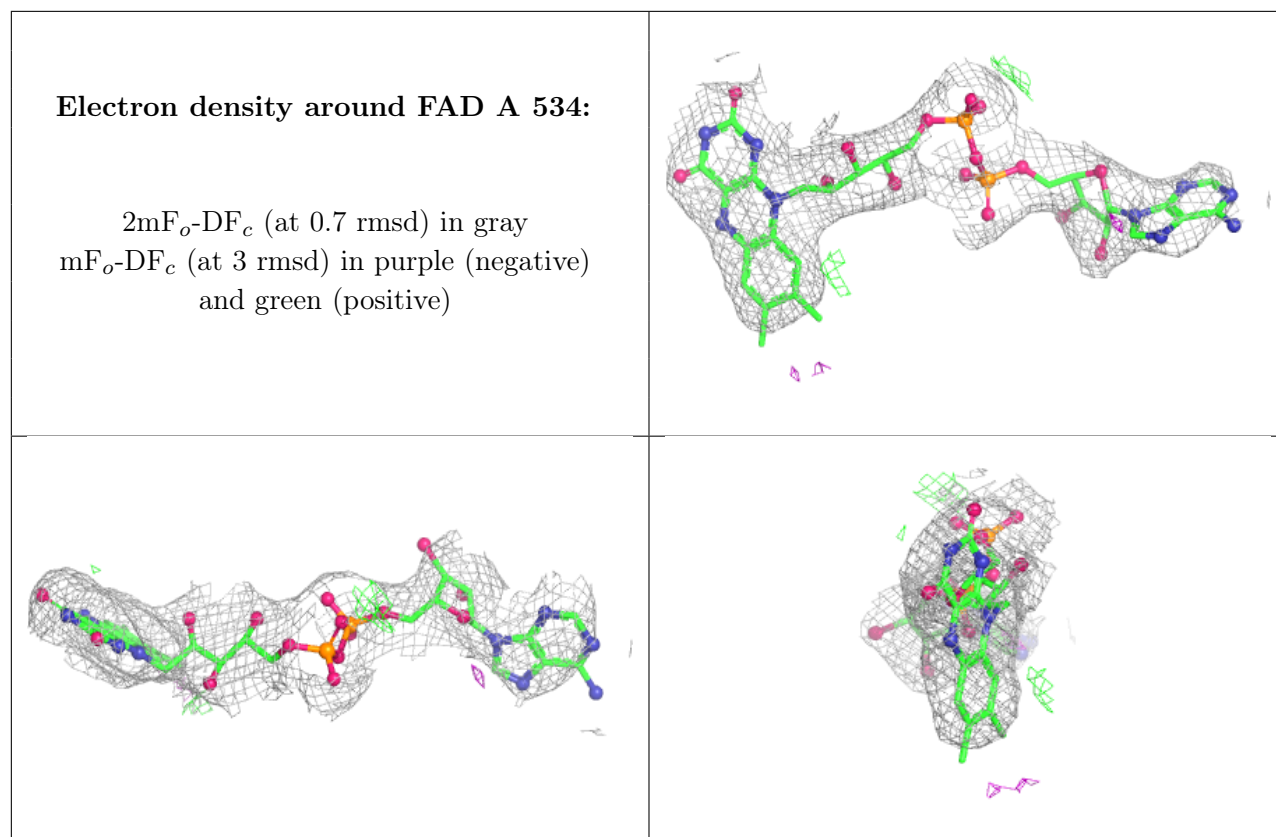
Electron density around FAD C 534:

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

**Electron density around FAD B 534:**

$2mF_o-DF_c$ (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.