



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 13, 2023 – 06:56 pm GMT

PDB ID : 4C5O  
Title : Flavin monooxygenase from *Stenotrophomonas maltophilia*. Q193R H194T mutant  
Authors : Jensen, C.N.; Ali, S.T.; Allen, M.J.; Grogan, G.  
Deposited on : 2013-09-13  
Resolution : 2.60 Å (reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto:validation@mail.wwpdb.org)

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467  
Mogul : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.36  
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) : 2.36

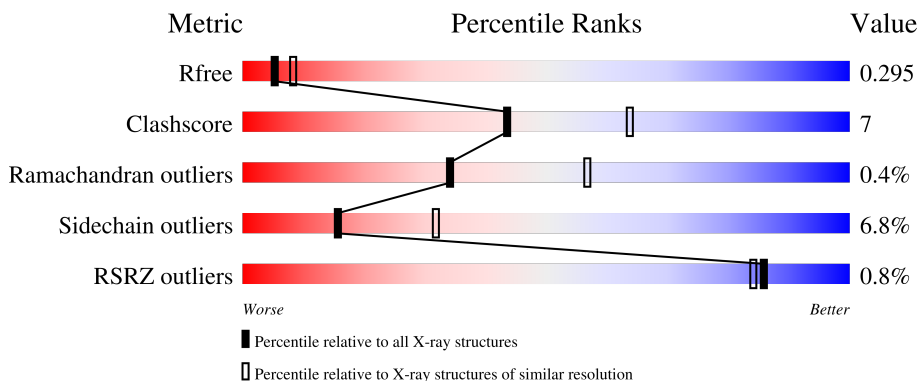
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.60 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	3163 (2.60-2.60)
Clashscore	141614	3518 (2.60-2.60)
Ramachandran outliers	138981	3455 (2.60-2.60)
Sidechain outliers	138945	3455 (2.60-2.60)
RSRZ outliers	127900	3104 (2.60-2.60)

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  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions  $\leq 5\%$ . The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	357	 4% 78% 12% 8%
1	B	357	 % 77% 14% 8%
1	C	357	 78% 13% 8%
1	D	357	 76% 16% 7%
1	E	357	 79% 13% 8%

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Mol	Chain	Length	Quality of chain
1	F	357	 79% 12% 8%
1	G	357	 77% 14% 8%
1	H	357	 78% 14% 7%

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
3	SO4	A	1355	-	-	-	X
3	SO4	F	1357	-	-	X	-
3	SO4	G	1355	-	-	-	X

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 20137 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 FLAVIN MONOOXYGENASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	327	Total 2256	C 1444	N 392	O 414	S 6	0	0	0
1	B	330	Total 2388	C 1533	N 414	O 434	S 7	0	0	0
1	C	330	Total 2475	C 1588	N 436	O 443	S 8	0	0	0
1	D	333	Total 2495	C 1599	N 438	O 451	S 7	0	0	0
1	E	330	Total 2448	C 1574	N 429	O 437	S 8	0	0	0
1	F	330	Total 2436	C 1567	N 422	O 440	S 7	0	0	0
1	G	330	Total 2450	C 1575	N 432	O 436	S 7	0	0	0
1	H	331	Total 2494	C 1597	N 441	O 448	S 8	0	0	0

There are 16 discrepancies between the modelled and reference sequences:

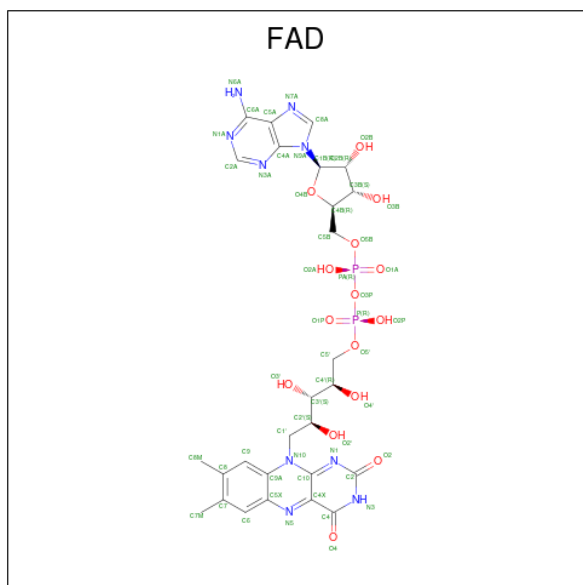
Chain	Residue	Modelled	Actual	Comment	Reference
A	193	ARG	GLN	engineered mutation	UNP B2FRL2
A	194	THR	HIS	engineered mutation	UNP B2FRL2
B	193	ARG	GLN	engineered mutation	UNP B2FRL2
B	194	THR	HIS	engineered mutation	UNP B2FRL2
C	193	ARG	GLN	engineered mutation	UNP B2FRL2
C	194	THR	HIS	engineered mutation	UNP B2FRL2
D	193	ARG	GLN	engineered mutation	UNP B2FRL2
D	194	THR	HIS	engineered mutation	UNP B2FRL2
E	193	ARG	GLN	engineered mutation	UNP B2FRL2
E	194	THR	HIS	engineered mutation	UNP B2FRL2
F	193	ARG	GLN	engineered mutation	UNP B2FRL2
F	194	THR	HIS	engineered mutation	UNP B2FRL2
G	193	ARG	GLN	engineered mutation	UNP B2FRL2

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Chain	Residue	Modelled	Actual	Comment	Reference
G	194	THR	HIS	engineered mutation	UNP B2FRL2
H	193	ARG	GLN	engineered mutation	UNP B2FRL2
H	194	THR	HIS	engineered mutation	UNP B2FRL2

- 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	
			Total	C	N	O	P			
2	A	1	Total	53	27	9	15	2	0	0
2	B	1	Total	53	27	9	15	2	0	0
2	C	1	Total	53	27	9	15	2	0	0
2	D	1	Total	53	27	9	15	2	0	0
2	E	1	Total	53	27	9	15	2	0	0
2	F	1	Total	53	27	9	15	2	0	0
2	G	1	Total	53	27	9	15	2	0	0
2	H	1	Total	53	27	9	15	2	0	0

- Molecule 3 is SULFATE ION (three-letter code: SO4) (formula:  $O_4S$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	A	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	B	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	C	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	D	1	Total	O	S	0	0
			5	4	1		
3	E	1	Total	O	S	0	0
			5	4	1		
3	E	1	Total	O	S	0	0
			5	4	1		
3	E	1	Total	O	S	0	0
			5	4	1		
3	F	1	Total	O	S	0	0
			5	4	1		
3	F	1	Total	O	S	0	0
			5	4	1		
3	F	1	Total	O	S	0	0
			5	4	1		
3	F	1	Total	O	S	0	0
			5	4	1		
3	F	1	Total	O	S	0	0
			5	4	1		
3	G	1	Total	O	S	0	0
			5	4	1		
3	G	1	Total	O	S	0	0
			5	4	1		
3	G	1	Total	O	S	0	0
			5	4	1		
3	G	1	Total	O	S	0	0
			5	4	1		
3	H	1	Total	O	S	0	0
			5	4	1		
3	H	1	Total	O	S	0	0
			5	4	1		
3	H	1	Total	O	S	0	0
			5	4	1		

- Molecule 4 is water.

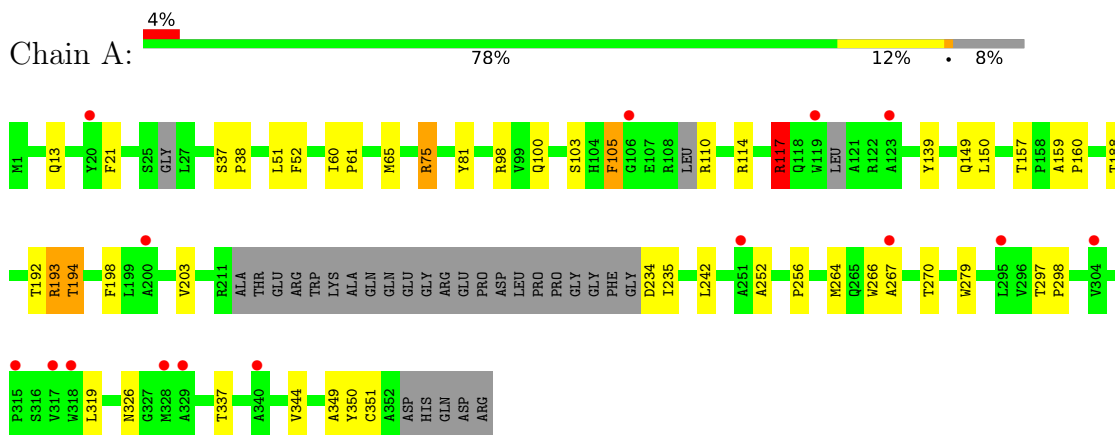
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	5	Total O 5 5	0	0
4	B	4	Total O 4 4	0	0
4	C	18	Total O 18 18	0	0
4	D	12	Total O 12 12	0	0
4	E	13	Total O 13 13	0	0
4	F	18	Total O 18 18	0	0
4	G	15	Total O 15 15	0	0
4	H	21	Total O 21 21	0	0



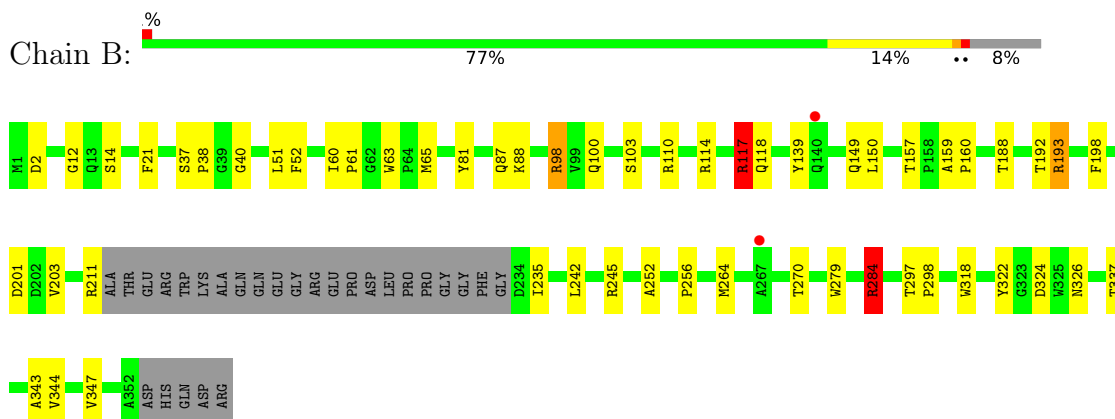
### 3 Residue-property plots [i](#)

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

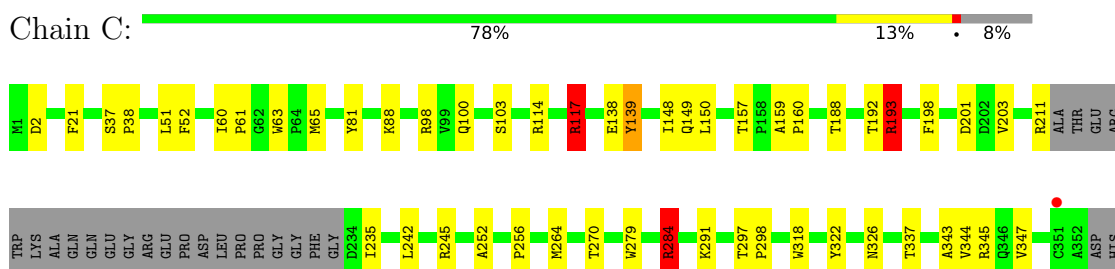
#### • Molecule 1: FLAVIN MONOOXYGENASE



#### • Molecule 1: FLAVIN MONOOXYGENASE



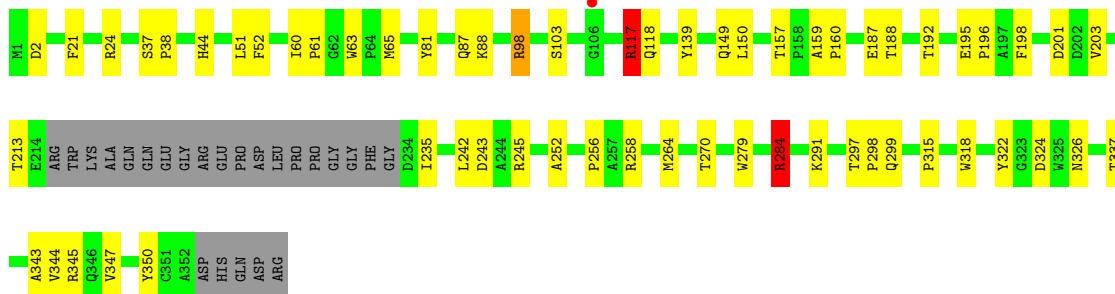
#### • Molecule 1: FLAVIN MONOOXYGENASE



GLN  
ASP  
ARG

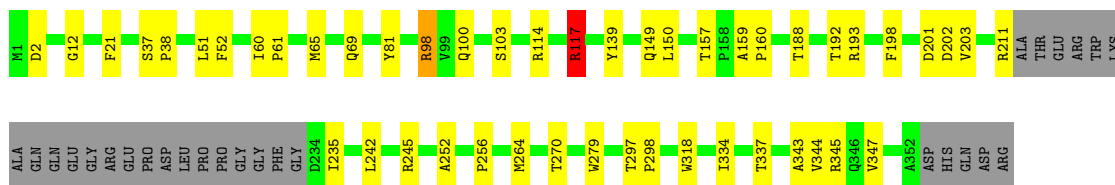
• Molecule 1: FLAVIN MONOOXYGENASE

Chain D: 76% 16% 7%



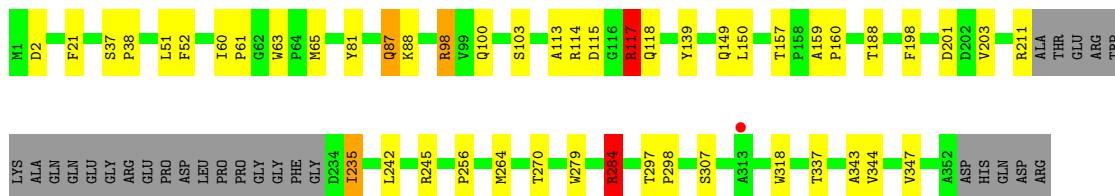
• Molecule 1: FLAVIN MONOOXYGENASE

Chain E: 79% 13% 8%



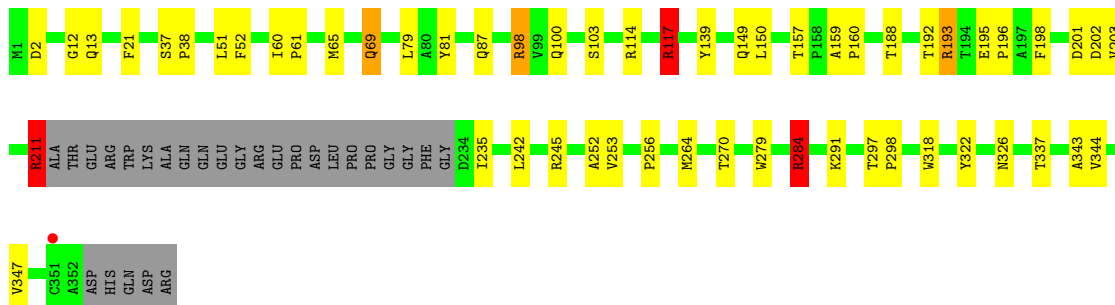
• Molecule 1: FLAVIN MONOOXYGENASE

Chain F: 79% 12% 8%




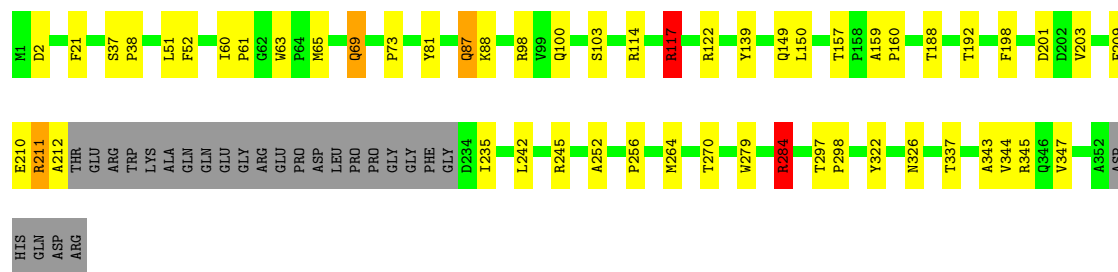
• Molecule 1: FLAVIN MONOOXYGENASE

Chain G: 77% 14% 8%



- Molecule 1: FLAVIN MONOOXYGENASE

Chain H:  78% 14% 7%



## 4 Data and refinement statistics i

Property	Value	Source
Space group	P 32	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	170.54Å 170.54Å 101.76Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	147.69 – 2.60 49.23 – 2.40	Depositor EDS
% Data completeness (in resolution range)	97.2 (147.69-2.60) 97.6 (49.23-2.40)	Depositor EDS
$R_{merge}$	0.15	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.78 (at 2.39Å)	Xtrriage
Refinement program	REFMAC 5.8.0033	Depositor
R, $R_{free}$	0.255 , 0.295 0.258 , 0.295	Depositor DCC
$R_{free}$ test set	6398 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	46.4	Xtrriage
Anisotropy	0.101	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.28 , 9.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.46$ , $\langle L^2 \rangle = 0.29$	Xtrriage
Estimated twinning fraction	0.039 for -h,-k,l 0.057 for h,-h-k,-l 0.044 for -k,-h,-l	Xtrriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	20137	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 71.77 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 2.4807e-06. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

## 5 Model quality i

### 5.1 Standard geometry i

Bond lengths and bond angles in the following residue types are not validated in this section: FAD, SO4

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	0/2318	0.77	7/3187 (0.2%)
1	B	0.60	0/2457	0.78	6/3377 (0.2%)
1	C	0.64	0/2546	0.77	6/3483 (0.2%)
1	D	0.65	0/2566	0.79	3/3512 (0.1%)
1	E	0.65	0/2519	0.74	1/3451 (0.0%)
1	F	0.65	0/2507	0.77	4/3439 (0.1%)
1	G	0.64	0/2521	0.77	4/3454 (0.1%)
1	H	0.67	0/2565	0.78	3/3508 (0.1%)
All	All	0.64	0/19999	0.77	34/27411 (0.1%)

There are no bond length outliers.

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	211	ARG	N-CA-C	8.91	135.06	111.00
1	H	117	ARG	NE-CZ-NH1	8.48	124.54	120.30
1	C	284	ARG	NE-CZ-NH1	8.34	124.47	120.30
1	D	284	ARG	NE-CZ-NH1	8.33	124.47	120.30
1	G	117	ARG	NE-CZ-NH1	8.12	124.36	120.30
1	H	284	ARG	NE-CZ-NH1	8.01	124.31	120.30
1	B	117	ARG	NE-CZ-NH1	7.89	124.25	120.30
1	C	193	ARG	NE-CZ-NH1	7.89	124.25	120.30
1	A	117	ARG	NE-CZ-NH1	7.74	124.17	120.30
1	F	117	ARG	NE-CZ-NH1	7.65	124.13	120.30
1	B	193	ARG	CA-CB-CG	7.61	130.13	113.40
1	D	117	ARG	NE-CZ-NH1	7.49	124.05	120.30
1	B	284	ARG	NE-CZ-NH1	7.48	124.04	120.30
1	F	284	ARG	NE-CZ-NH1	7.34	123.97	120.30
1	E	117	ARG	NE-CZ-NH1	7.29	123.95	120.30
1	G	284	ARG	NE-CZ-NH1	6.96	123.78	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	193	ARG	N-CA-C	-6.75	92.78	111.00
1	C	117	ARG	NE-CZ-NH1	6.71	123.66	120.30
1	B	193	ARG	CB-CG-CD	-6.68	94.23	111.60
1	A	105	PHE	CB-CG-CD1	6.21	125.15	120.80
1	A	105	PHE	CB-CG-CD2	-5.90	116.67	120.80
1	C	284	ARG	NE-CZ-NH2	-5.81	117.39	120.30
1	A	75	ARG	NE-CZ-NH2	-5.75	117.42	120.30
1	C	193	ARG	NE-CZ-NH2	-5.65	117.48	120.30
1	B	193	ARG	N-CA-CB	-5.58	100.56	110.60
1	B	284	ARG	NE-CZ-NH2	-5.54	117.53	120.30
1	A	110	ARG	CA-CB-CG	5.46	125.40	113.40
1	F	118	GLN	N-CA-CB	-5.37	100.93	110.60
1	H	69	GLN	CB-CA-C	5.28	120.97	110.40
1	F	284	ARG	NE-CZ-NH2	-5.26	117.67	120.30
1	G	69	GLN	CB-CA-C	5.20	120.81	110.40
1	D	258	ARG	NE-CZ-NH1	5.19	122.89	120.30
1	A	75	ARG	NE-CZ-NH1	5.13	122.87	120.30
1	C	193	ARG	CD-NE-CZ	5.11	130.75	123.60

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	2256	0	2032	29	0
1	B	2388	0	2265	34	0
1	C	2475	0	2413	31	0
1	D	2495	0	2425	35	0
1	E	2448	0	2370	27	0
1	F	2436	0	2339	30	0
1	G	2450	0	2375	35	0
1	H	2494	0	2434	39	0
2	A	53	0	31	4	0
2	B	53	0	31	4	0
2	C	53	0	31	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	53	0	31	1	0
2	E	53	0	31	2	0
2	F	53	0	31	0	0
2	G	53	0	31	3	0
2	H	53	0	31	2	0
3	A	15	0	0	1	0
3	B	20	0	0	2	0
3	C	25	0	0	1	0
3	D	30	0	0	3	0
3	E	15	0	0	2	0
3	F	20	0	0	3	0
3	G	20	0	0	2	0
3	H	20	0	0	1	0
4	A	5	0	0	1	0
4	B	4	0	0	1	0
4	C	18	0	0	0	0
4	D	12	0	0	1	0
4	E	13	0	0	0	0
4	F	18	0	0	1	0
4	G	15	0	0	0	0
4	H	21	0	0	0	0
All	All	20137	0	18901	259	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 (259) 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:H:210:GLU:C	1:H:212:ALA:HB3	1.59	1.22
1:H:210:GLU:O	1:H:212:ALA:HB3	1.52	1.10
1:A:266:TRP:O	1:D:315:PRO:HG2	1.68	0.92
1:H:210:GLU:C	1:H:212:ALA:CB	2.40	0.89
1:D:117:ARG:HG3	1:D:117:ARG:HH11	1.39	0.86
1:H:117:ARG:HG3	1:H:117:ARG:HH11	1.41	0.85
1:B:117:ARG:HH11	1:B:117:ARG:HG3	1.42	0.85
1:F:117:ARG:HG3	1:F:117:ARG:HH11	1.40	0.85
1:F:87:GLN:HE22	1:G:202:ASP:HB3	1.43	0.84
1:H:211:ARG:N	1:H:212:ALA:HB3	1.94	0.82
1:G:117:ARG:HG3	1:G:117:ARG:HH11	1.42	0.82
1:C:117:ARG:HG3	1:C:117:ARG:HH11	1.45	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:117:ARG:HG3	1:E:117:ARG:HH11	1.45	0.81
1:A:267:ALA:O	1:D:315:PRO:HD2	1.81	0.81
1:A:117:ARG:HG3	1:A:117:ARG:HH11	1.45	0.80
1:A:193:ARG:O	1:A:194:THR:OG1	2.01	0.78
1:H:198:PHE:CE1	1:H:235:ILE:HD11	2.21	0.75
1:D:198:PHE:CE1	1:D:235:ILE:HD11	2.23	0.74
1:H:211:ARG:CA	1:H:212:ALA:HB3	2.16	0.73
1:H:210:GLU:O	1:H:212:ALA:CB	2.33	0.73
1:B:193:ARG:CZ	1:B:193:ARG:HB3	2.09	0.72
1:A:157:THR:HG22	1:A:159:ALA:H	1.55	0.72
1:B:198:PHE:CE1	1:B:235:ILE:HD11	2.24	0.71
1:F:198:PHE:CE1	1:F:235:ILE:HD11	2.25	0.71
1:A:198:PHE:CE1	1:A:235:ILE:HD11	2.26	0.71
1:G:198:PHE:CE1	1:G:235:ILE:HD11	2.25	0.70
1:C:198:PHE:CE1	1:C:235:ILE:HD11	2.27	0.70
1:E:198:PHE:CE1	1:E:235:ILE:HD11	2.27	0.69
1:A:60:ILE:HB	1:A:61:PRO:HD2	1.76	0.68
1:B:60:ILE:HB	1:B:61:PRO:HD2	1.75	0.68
1:D:284:ARG:HG2	1:D:284:ARG:HH11	1.59	0.68
1:D:60:ILE:HB	1:D:61:PRO:HD2	1.76	0.67
1:C:60:ILE:HB	1:C:61:PRO:HD2	1.76	0.67
1:H:284:ARG:HG2	1:H:284:ARG:HH11	1.59	0.67
1:E:60:ILE:HB	1:E:61:PRO:HD2	1.76	0.66
1:C:157:THR:HG22	1:C:159:ALA:H	1.60	0.66
1:B:284:ARG:HG2	1:B:284:ARG:HH11	1.60	0.66
1:H:209:PHE:O	1:H:212:ALA:HB2	1.96	0.66
1:G:60:ILE:HB	1:G:61:PRO:HD2	1.77	0.65
1:H:60:ILE:HB	1:H:61:PRO:HD2	1.77	0.65
1:E:157:THR:HG22	1:E:159:ALA:H	1.62	0.64
1:F:284:ARG:HG2	1:F:284:ARG:HH11	1.62	0.64
1:F:60:ILE:HB	1:F:61:PRO:HD2	1.78	0.64
1:G:284:ARG:HG2	1:G:284:ARG:HH11	1.63	0.63
1:H:149:GLN:HE21	1:H:279:TRP:HE1	1.47	0.62
1:C:149:GLN:HE21	1:C:279:TRP:HE1	1.47	0.62
1:D:157:THR:HG22	1:D:159:ALA:H	1.64	0.62
1:D:149:GLN:HE21	1:D:279:TRP:HE1	1.48	0.61
1:E:149:GLN:HE21	1:E:279:TRP:HE1	1.49	0.61
1:A:319:LEU:CB	1:A:326:ASN:HD21	2.14	0.61
1:B:149:GLN:HE21	1:B:279:TRP:HE1	1.49	0.61
1:G:149:GLN:HE21	1:G:279:TRP:HE1	1.49	0.61
1:D:117:ARG:HG3	1:D:117:ARG:NH1	2.13	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:193:ARG:HG2	1:C:193:ARG:HH11	1.65	0.61
1:H:211:ARG:HA	1:H:212:ALA:HB3	1.83	0.61
1:F:157:THR:HG22	1:F:159:ALA:H	1.66	0.60
1:G:157:THR:HG22	1:G:159:ALA:H	1.66	0.60
1:A:149:GLN:HE21	1:A:279:TRP:HE1	1.49	0.60
1:B:14:SER:HB2	4:B:2001:HOH:O	2.02	0.60
1:B:157:THR:HG22	1:B:159:ALA:H	1.67	0.59
1:C:284:ARG:HH11	1:C:284:ARG:HG2	1.66	0.59
1:F:149:GLN:HE21	1:F:279:TRP:HE1	1.50	0.59
1:A:13:GLN:NE2	2:A:1353:FAD:H4'	2.16	0.59
1:C:148:ILE:HA	3:C:1356:SO4:O1	2.03	0.58
1:D:324:ASP:N	3:D:1358:SO4:O4	2.36	0.58
1:B:284:ARG:HH11	1:B:284:ARG:CG	2.17	0.58
1:F:307:SER:O	4:F:2018:HOH:O	2.17	0.58
1:A:319:LEU:HB3	1:A:326:ASN:HD21	1.70	0.57
1:E:117:ARG:HG3	1:E:117:ARG:NH1	2.18	0.57
1:H:157:THR:HG22	1:H:159:ALA:H	1.70	0.56
1:H:284:ARG:HH11	1:H:284:ARG:CG	2.18	0.56
1:G:201:ASP:OD2	1:G:245:ARG:NH2	2.38	0.56
1:H:201:ASP:OD2	1:H:245:ARG:NH2	2.38	0.56
1:F:284:ARG:HH11	1:F:284:ARG:CG	2.18	0.56
1:C:201:ASP:OD2	1:C:245:ARG:NH2	2.39	0.56
1:F:113:ALA:HB1	3:F:1357:SO4:O4	2.06	0.55
1:B:324:ASP:N	3:B:1357:SO4:O3	2.39	0.55
1:C:284:ARG:HH11	1:C:284:ARG:CG	2.20	0.55
1:D:60:ILE:HB	1:D:61:PRO:CD	2.37	0.55
1:G:245:ARG:HH11	1:G:245:ARG:HG2	1.72	0.55
1:E:69:GLN:HG2	1:G:79:LEU:HD13	1.89	0.55
1:F:87:GLN:NE2	1:G:202:ASP:HB3	2.18	0.55
1:G:284:ARG:HH11	1:G:284:ARG:CG	2.20	0.55
1:B:201:ASP:OD2	1:B:245:ARG:NH2	2.40	0.55
1:F:245:ARG:HG2	1:F:245:ARG:HH11	1.72	0.54
1:D:284:ARG:HH11	1:D:284:ARG:CG	2.20	0.54
1:E:202:ASP:HB3	1:H:87:GLN:HE22	1.71	0.54
1:E:192:THR:OG1	3:E:1356:SO4:O3	2.23	0.54
1:C:60:ILE:HB	1:C:61:PRO:CD	2.38	0.54
1:E:201:ASP:OD2	1:E:245:ARG:NH2	2.41	0.54
1:D:201:ASP:OD2	1:D:245:ARG:NH2	2.41	0.53
1:F:201:ASP:OD2	1:F:245:ARG:NH2	2.41	0.53
1:H:211:ARG:CA	1:H:212:ALA:CB	2.86	0.53
1:H:60:ILE:HB	1:H:61:PRO:CD	2.38	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:13:GLN:CD	2:A:1353:FAD:H4'	2.28	0.53
1:A:234:ASP:N	4:A:2005:HOH:O	2.42	0.53
1:E:60:ILE:HB	1:E:61:PRO:CD	2.38	0.53
1:D:245:ARG:HH11	1:D:245:ARG:HG2	1.72	0.53
1:A:349:ALA:O	1:A:351:CYS:N	2.42	0.53
1:E:98:ARG:NH1	3:E:1354:SO4:O3	2.32	0.53
1:A:60:ILE:HB	1:A:61:PRO:CD	2.38	0.52
1:B:245:ARG:HH11	1:B:245:ARG:HG2	1.74	0.52
1:H:284:ARG:HG2	1:H:284:ARG:NH1	2.25	0.52
1:C:117:ARG:HG3	1:C:117:ARG:NH1	2.19	0.52
1:B:60:ILE:HB	1:B:61:PRO:CD	2.37	0.52
1:F:159:ALA:HB3	1:F:160:PRO:HD3	1.92	0.52
1:F:60:ILE:HB	1:F:61:PRO:CD	2.40	0.52
1:H:245:ARG:HG2	1:H:245:ARG:HH11	1.73	0.52
1:G:60:ILE:HB	1:G:61:PRO:CD	2.39	0.52
1:C:148:ILE:HD11	1:D:118:GLN:CD	2.30	0.51
1:G:98:ARG:HD2	3:G:1354:SO4:O3	2.10	0.51
1:C:193:ARG:HH11	1:C:193:ARG:CG	2.22	0.51
1:C:245:ARG:HG2	1:C:245:ARG:HH11	1.75	0.51
1:B:63:TRP:HB2	1:B:88:LYS:HE3	1.92	0.51
1:B:117:ARG:HG3	1:B:117:ARG:NH1	2.16	0.51
1:G:12:GLY:HA3	2:G:1353:FAD:H52A	1.93	0.50
1:H:63:TRP:HB2	1:H:88:LYS:HE3	1.93	0.50
1:B:193:ARG:CZ	1:B:193:ARG:CB	2.86	0.50
1:D:63:TRP:HB2	1:D:88:LYS:HE3	1.94	0.50
1:B:98:ARG:HD2	3:B:1354:SO4:O3	2.11	0.50
1:C:37:SER:HB3	1:C:38:PRO:HD2	1.94	0.50
1:D:159:ALA:HB3	1:D:160:PRO:HD3	1.94	0.50
1:E:245:ARG:HG2	1:E:245:ARG:HH11	1.76	0.50
1:G:37:SER:HB3	1:G:38:PRO:HD2	1.93	0.50
1:H:37:SER:HB3	1:H:38:PRO:HD2	1.95	0.49
1:E:202:ASP:HB3	1:H:87:GLN:NE2	2.27	0.49
1:D:37:SER:HB3	1:D:38:PRO:HD2	1.94	0.48
1:A:37:SER:HB3	1:A:38:PRO:HD2	1.95	0.48
1:A:159:ALA:HB3	1:A:160:PRO:HD3	1.96	0.48
1:E:37:SER:HB3	1:E:38:PRO:HD2	1.94	0.48
1:F:37:SER:HB3	1:F:38:PRO:HD2	1.95	0.48
1:F:117:ARG:HG3	1:F:117:ARG:NH1	2.15	0.48
1:H:211:ARG:N	1:H:212:ALA:CB	2.72	0.48
1:B:110:ARG:HE	1:B:118:GLN:NE2	2.11	0.48
1:G:211:ARG:HD3	1:G:211:ARG:N	2.29	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:343:ALA:O	1:B:347:VAL:HG13	2.14	0.48
1:F:117:ARG:HH11	1:F:117:ARG:CG	2.21	0.47
1:F:63:TRP:HB2	1:F:88:LYS:HE3	1.95	0.47
1:H:117:ARG:HG3	1:H:117:ARG:NH1	2.15	0.47
1:A:117:ARG:HG3	1:A:117:ARG:NH1	2.18	0.47
2:A:1353:FAD:H9	2:A:1353:FAD:H1'1	1.72	0.47
1:E:343:ALA:O	1:E:347:VAL:HG13	2.15	0.47
1:E:297:THR:HB	1:E:298:PRO:HD2	1.97	0.47
1:H:297:THR:HB	1:H:298:PRO:HD2	1.96	0.47
1:B:159:ALA:HB3	1:B:160:PRO:HD3	1.97	0.47
1:B:297:THR:HB	1:B:298:PRO:HD2	1.96	0.47
1:C:63:TRP:HB2	1:C:88:LYS:HE3	1.95	0.47
1:G:297:THR:HB	1:G:298:PRO:HD2	1.96	0.47
1:E:12:GLY:HA3	2:E:1353:FAD:H52A	1.97	0.47
1:F:343:ALA:O	1:F:347:VAL:HG13	2.15	0.47
1:A:61:PRO:HG3	1:A:337:THR:HG23	1.97	0.47
1:B:65:MET:HG3	1:B:81:TYR:CD2	2.50	0.46
1:D:65:MET:HG3	1:D:81:TYR:CD2	2.51	0.46
1:E:159:ALA:HB3	1:E:160:PRO:HD3	1.98	0.46
1:B:117:ARG:HH11	1:B:117:ARG:CG	2.22	0.46
1:F:297:THR:HB	1:F:298:PRO:HD2	1.98	0.46
1:H:343:ALA:O	1:H:347:VAL:HG13	2.15	0.46
1:D:44:HIS:O	3:D:1355:SO4:O3	2.33	0.46
1:F:284:ARG:HG2	1:F:284:ARG:NH1	2.29	0.46
1:G:117:ARG:HG3	1:G:117:ARG:NH1	2.16	0.46
1:A:267:ALA:HB2	1:D:350:TYR:OH	2.15	0.46
1:B:37:SER:HB3	1:B:38:PRO:HD2	1.96	0.46
1:C:322:TYR:H	1:C:326:ASN:HD22	1.64	0.46
1:D:343:ALA:O	1:D:347:VAL:HG13	2.15	0.46
1:F:21:PHE:HB2	1:F:344:VAL:HG21	1.98	0.46
1:B:40:GLY:HA2	2:B:1353:FAD:O3B	2.15	0.46
2:E:1353:FAD:N1	2:E:1353:FAD:O2'	2.39	0.46
1:A:114:ARG:NH1	3:A:1354:SO4:O3	2.43	0.46
1:D:284:ARG:HG2	1:D:284:ARG:NH1	2.23	0.46
1:D:61:PRO:HG3	1:D:337:THR:HG23	1.98	0.46
1:G:343:ALA:O	1:G:347:VAL:HG13	2.16	0.46
1:A:65:MET:HG3	1:A:81:TYR:CD2	2.51	0.45
1:A:297:THR:HB	1:A:298:PRO:HD2	1.98	0.45
1:B:12:GLY:HA3	2:B:1353:FAD:H52A	1.97	0.45
1:E:61:PRO:HG3	1:E:337:THR:HG23	1.98	0.45
1:G:318:TRP:CD2	1:G:347:VAL:HG12	2.52	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:61:PRO:HG3	1:F:337:THR:HG23	1.98	0.45
1:C:297:THR:HB	1:C:298:PRO:HD2	1.99	0.45
1:E:21:PHE:HB2	1:E:344:VAL:HG21	1.99	0.45
1:G:61:PRO:HG3	1:G:337:THR:HG23	1.98	0.45
1:B:284:ARG:HG2	1:B:284:ARG:NH1	2.27	0.45
1:C:343:ALA:O	1:C:347:VAL:HG13	2.16	0.45
1:G:117:ARG:HH11	1:G:117:ARG:CG	2.22	0.45
1:F:115:ASP:HB3	3:F:1357:SO4:O2	2.17	0.45
1:H:322:TYR:H	1:H:326:ASN:HD22	1.65	0.45
1:H:159:ALA:HB3	1:H:160:PRO:HD3	1.98	0.45
1:D:297:THR:HB	1:D:298:PRO:HD2	1.99	0.45
1:D:318:TRP:CD2	1:D:347:VAL:HG12	2.52	0.45
1:G:256:PRO:HG3	1:G:264:MET:SD	2.57	0.45
1:H:61:PRO:HG3	1:H:337:THR:HG23	1.98	0.45
1:A:21:PHE:HB2	1:A:344:VAL:HG21	1.99	0.45
1:A:267:ALA:CB	1:D:350:TYR:OH	2.65	0.45
1:C:61:PRO:HG3	1:C:337:THR:HG23	1.97	0.45
1:D:117:ARG:HH11	1:D:117:ARG:CG	2.21	0.45
1:A:256:PRO:HG3	1:A:264:MET:SD	2.57	0.44
1:D:21:PHE:HB2	1:D:344:VAL:HG21	2.00	0.44
1:H:65:MET:HG3	1:H:81:TYR:CD2	2.52	0.44
1:F:256:PRO:HG3	1:F:264:MET:SD	2.57	0.44
1:G:65:MET:HG3	1:G:81:TYR:CD2	2.53	0.44
1:C:284:ARG:HG2	1:C:284:ARG:NH1	2.32	0.44
1:G:322:TYR:H	1:G:326:ASN:HD22	1.64	0.44
2:G:1353:FAD:H9	2:G:1353:FAD:H1'1	1.84	0.44
1:A:319:LEU:HB2	1:A:326:ASN:HD21	1.81	0.44
1:D:322:TYR:H	1:D:326:ASN:HD22	1.65	0.44
1:F:318:TRP:CD2	1:F:347:VAL:HG12	2.53	0.44
1:G:21:PHE:HB2	1:G:344:VAL:HG21	2.00	0.44
1:B:192:THR:HG22	1:B:252:ALA:HB1	1.99	0.44
1:C:159:ALA:HB3	1:C:160:PRO:HD3	1.99	0.44
1:D:195:GLU:HA	1:D:196:PRO:HD3	1.91	0.44
1:B:21:PHE:HB2	1:B:344:VAL:HG21	2.00	0.44
1:E:117:ARG:HH11	1:E:117:ARG:CG	2.24	0.44
1:H:192:THR:HG22	1:H:252:ALA:HB1	1.99	0.44
1:D:98:ARG:NH1	3:D:1354:SO4:O3	2.51	0.43
1:C:192:THR:HG22	1:C:252:ALA:HB1	2.00	0.43
1:E:256:PRO:HG3	1:E:264:MET:SD	2.59	0.43
1:G:193:ARG:HH11	1:G:193:ARG:HB2	1.83	0.43
1:B:256:PRO:HG3	1:B:264:MET:SD	2.59	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:1353:FAD:N1	2:B:1353:FAD:O2'	2.46	0.43
2:D:1353:FAD:H51A	4:D:2002:HOH:O	2.18	0.43
1:H:21:PHE:HB2	1:H:344:VAL:HG21	1.99	0.43
1:C:21:PHE:HB2	1:C:344:VAL:HG21	2.00	0.43
1:E:65:MET:HG3	1:E:81:TYR:CD2	2.54	0.43
1:G:100:GLN:HG3	1:G:114:ARG:HA	2.01	0.43
1:E:192:THR:HG22	1:E:252:ALA:HB1	2.00	0.43
1:H:65:MET:HE1	1:H:73:PRO:HG3	2.01	0.43
1:B:61:PRO:HG3	1:B:337:THR:HG23	2.00	0.42
1:D:192:THR:HG22	1:D:252:ALA:HB1	2.01	0.42
1:D:256:PRO:HG3	1:D:264:MET:SD	2.60	0.42
2:H:1353:FAD:N1	2:H:1353:FAD:O2'	2.49	0.42
1:A:192:THR:HG22	1:A:252:ALA:HB1	2.00	0.42
2:H:1353:FAD:H2'	2:H:1353:FAD:H5'2	1.87	0.42
1:C:318:TRP:CD2	1:C:347:VAL:HG12	2.55	0.42
1:G:159:ALA:HB3	1:G:160:PRO:HD3	2.02	0.42
1:H:256:PRO:HG3	1:H:264:MET:SD	2.59	0.42
2:A:1353:FAD:N1	2:A:1353:FAD:O2'	2.42	0.42
1:B:322:TYR:H	1:B:326:ASN:HD22	1.66	0.42
1:C:100:GLN:HG3	1:C:114:ARG:HA	2.01	0.42
1:B:100:GLN:HG3	1:B:114:ARG:HA	2.02	0.42
1:H:192:THR:OG1	3:H:1357:SO4:O3	2.36	0.42
1:C:65:MET:HG3	1:C:81:TYR:CD2	2.54	0.42
1:C:256:PRO:HG3	1:C:264:MET:SD	2.60	0.42
1:F:98:ARG:HD2	3:F:1354:SO4:O3	2.20	0.42
1:H:117:ARG:HH11	1:H:117:ARG:CG	2.23	0.41
1:B:318:TRP:CD2	1:B:347:VAL:HG12	2.56	0.41
1:G:284:ARG:HG2	1:G:284:ARG:NH1	2.31	0.41
1:G:13:GLN:OE1	2:G:1353:FAD:H4'	2.20	0.41
1:G:192:THR:HG22	1:G:252:ALA:HB1	2.02	0.41
1:G:193:ARG:NH1	3:G:1356:SO4:O4	2.53	0.41
1:C:117:ARG:HH11	1:C:117:ARG:CG	2.25	0.41
1:E:100:GLN:HG3	1:E:114:ARG:HA	2.03	0.41
2:B:1353:FAD:H9	2:B:1353:FAD:H1'1	1.74	0.41
1:C:138:GLU:O	1:C:139:TYR:O	2.39	0.41
1:F:65:MET:HG3	1:F:81:TYR:CD2	2.56	0.40
1:D:245:ARG:HG2	1:D:245:ARG:NH1	2.36	0.40
1:A:100:GLN:HG3	1:A:114:ARG:HA	2.03	0.40
1:E:318:TRP:CD2	1:E:347:VAL:HG12	2.57	0.40
1:F:100:GLN:HG3	1:F:114:ARG:HA	2.04	0.40
1:G:195:GLU:HA	1:G:196:PRO:HD3	1.97	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:100:GLN:HG3	1:H:114:ARG:HA	2.04	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

### 5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	317/357 (89%)	296 (93%)	18 (6%)	3 (1%)	17	35
1	B	326/357 (91%)	309 (95%)	16 (5%)	1 (0%)	41	64
1	C	326/357 (91%)	310 (95%)	15 (5%)	1 (0%)	41	64
1	D	329/357 (92%)	316 (96%)	12 (4%)	1 (0%)	41	64
1	E	326/357 (91%)	311 (95%)	14 (4%)	1 (0%)	41	64
1	F	326/357 (91%)	311 (95%)	14 (4%)	1 (0%)	41	64
1	G	326/357 (91%)	312 (96%)	13 (4%)	1 (0%)	41	64
1	H	327/357 (92%)	312 (95%)	14 (4%)	1 (0%)	41	64
All	All	2603/2856 (91%)	2477 (95%)	116 (4%)	10 (0%)	34	57

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	139	TYR
1	A	350	TYR
1	B	139	TYR
1	C	139	TYR
1	D	139	TYR
1	E	139	TYR
1	F	139	TYR
1	G	139	TYR
1	H	139	TYR

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Mol	Chain	Res	Type
1	A	194	THR

### 5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	193/272 (71%)	181 (94%)	12 (6%)	18	37
1	B	225/272 (83%)	211 (94%)	14 (6%)	18	37
1	C	244/272 (90%)	228 (93%)	16 (7%)	16	33
1	D	246/272 (90%)	226 (92%)	20 (8%)	11	23
1	E	238/272 (88%)	223 (94%)	15 (6%)	18	36
1	F	235/272 (86%)	220 (94%)	15 (6%)	17	35
1	G	237/272 (87%)	219 (92%)	18 (8%)	13	26
1	H	247/272 (91%)	230 (93%)	17 (7%)	15	31
All	All	1865/2176 (86%)	1738 (93%)	127 (7%)	16	32

All (127) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	51	LEU
1	A	52	PHE
1	A	75	ARG
1	A	98	ARG
1	A	103	SER
1	A	105	PHE
1	A	117	ARG
1	A	150	LEU
1	A	188	THR
1	A	203	VAL
1	A	242	LEU
1	A	270	THR
1	B	2	ASP
1	B	51	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	B	52	PHE
1	B	87	GLN
1	B	98	ARG
1	B	103	SER
1	B	117	ARG
1	B	150	LEU
1	B	188	THR
1	B	203	VAL
1	B	211	ARG
1	B	242	LEU
1	B	270	THR
1	B	284	ARG
1	C	2	ASP
1	C	51	LEU
1	C	52	PHE
1	C	98	ARG
1	C	103	SER
1	C	117	ARG
1	C	150	LEU
1	C	188	THR
1	C	193	ARG
1	C	203	VAL
1	C	211	ARG
1	C	242	LEU
1	C	270	THR
1	C	284	ARG
1	C	291	LYS
1	C	345	ARG
1	D	2	ASP
1	D	24	ARG
1	D	51	LEU
1	D	52	PHE
1	D	87	GLN
1	D	98	ARG
1	D	103	SER
1	D	117	ARG
1	D	150	LEU
1	D	187	GLU
1	D	188	THR
1	D	203	VAL
1	D	213	THR
1	D	242	LEU

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<b>Mol</b>	<b>Chain</b>	<b>Res</b>	<b>Type</b>
1	D	243	ASP
1	D	270	THR
1	D	284	ARG
1	D	291	LYS
1	D	299	GLN
1	D	345	ARG
1	E	2	ASP
1	E	51	LEU
1	E	52	PHE
1	E	98	ARG
1	E	103	SER
1	E	117	ARG
1	E	150	LEU
1	E	188	THR
1	E	193	ARG
1	E	203	VAL
1	E	211	ARG
1	E	242	LEU
1	E	270	THR
1	E	334	ILE
1	E	345	ARG
1	F	2	ASP
1	F	51	LEU
1	F	52	PHE
1	F	87	GLN
1	F	98	ARG
1	F	103	SER
1	F	117	ARG
1	F	150	LEU
1	F	188	THR
1	F	203	VAL
1	F	211	ARG
1	F	235	ILE
1	F	242	LEU
1	F	270	THR
1	F	284	ARG
1	G	2	ASP
1	G	51	LEU
1	G	52	PHE
1	G	69	GLN
1	G	87	GLN
1	G	98	ARG

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Mol	Chain	Res	Type
1	G	103	SER
1	G	117	ARG
1	G	150	LEU
1	G	188	THR
1	G	193	ARG
1	G	203	VAL
1	G	211	ARG
1	G	242	LEU
1	G	253	VAL
1	G	270	THR
1	G	284	ARG
1	G	291	LYS
1	H	2	ASP
1	H	51	LEU
1	H	52	PHE
1	H	69	GLN
1	H	87	GLN
1	H	98	ARG
1	H	103	SER
1	H	117	ARG
1	H	122	ARG
1	H	150	LEU
1	H	188	THR
1	H	203	VAL
1	H	211	ARG
1	H	242	LEU
1	H	270	THR
1	H	284	ARG
1	H	345	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (32) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	149	GLN
1	A	326	ASN
1	B	118	GLN
1	B	149	GLN
1	B	301	GLN
1	B	326	ASN
1	C	118	GLN
1	C	149	GLN
1	C	301	GLN

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Mol	Chain	Res	Type
1	C	326	ASN
1	D	118	GLN
1	D	149	GLN
1	D	299	GLN
1	D	301	GLN
1	D	326	ASN
1	E	118	GLN
1	E	149	GLN
1	E	301	GLN
1	E	326	ASN
1	F	87	GLN
1	F	149	GLN
1	F	301	GLN
1	F	326	ASN
1	G	149	GLN
1	G	301	GLN
1	G	326	ASN
1	H	87	GLN
1	H	118	GLN
1	H	149	GLN
1	H	299	GLN
1	H	301	GLN
1	H	326	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 monosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

41 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
3	SO4	D	1355	-	4,4,4	0.51	0	6,6,6	0.33	0
3	SO4	B	1355	-	4,4,4	0.51	0	6,6,6	0.30	0
3	SO4	G	1357	-	4,4,4	0.49	0	6,6,6	0.43	0
3	SO4	F	1355	-	4,4,4	0.39	0	6,6,6	0.63	0
3	SO4	A	1356	-	4,4,4	0.50	0	6,6,6	0.54	0
3	SO4	C	1355	-	4,4,4	0.43	0	6,6,6	0.42	0
3	SO4	D	1356	-	4,4,4	0.47	0	6,6,6	0.21	0
2	FAD	A	1353	-	53,58,58	1.68	8 (15%)	68,89,89	1.83	17 (25%)
3	SO4	C	1358	-	4,4,4	0.41	0	6,6,6	0.47	0
2	FAD	H	1353	-	53,58,58	1.64	12 (22%)	68,89,89	2.01	21 (30%)
3	SO4	H	1355	-	4,4,4	0.42	0	6,6,6	0.37	0
3	SO4	B	1357	-	4,4,4	0.37	0	6,6,6	0.29	0
3	SO4	H	1356	-	4,4,4	0.40	0	6,6,6	0.28	0
2	FAD	B	1353	-	53,58,58	1.65	9 (16%)	68,89,89	1.90	18 (26%)
3	SO4	F	1356	-	4,4,4	0.48	0	6,6,6	0.52	0
3	SO4	D	1354	-	4,4,4	0.49	0	6,6,6	0.51	0
3	SO4	C	1357	-	4,4,4	0.46	0	6,6,6	0.45	0
3	SO4	C	1354	-	4,4,4	0.32	0	6,6,6	0.50	0
3	SO4	E	1356	-	4,4,4	0.60	0	6,6,6	1.09	0
3	SO4	F	1357	-	4,4,4	0.50	0	6,6,6	0.48	0
3	SO4	G	1354	-	4,4,4	0.28	0	6,6,6	0.23	0
3	SO4	G	1356	-	4,4,4	0.56	0	6,6,6	0.65	0
2	FAD	E	1353	-	53,58,58	1.76	12 (22%)	68,89,89	1.67	15 (22%)
3	SO4	D	1359	-	4,4,4	0.31	0	6,6,6	0.89	0
3	SO4	H	1357	-	4,4,4	0.36	0	6,6,6	1.10	0
3	SO4	G	1355	-	4,4,4	0.39	0	6,6,6	0.33	0
3	SO4	D	1358	-	4,4,4	0.36	0	6,6,6	0.20	0
3	SO4	A	1355	-	4,4,4	0.44	0	6,6,6	0.15	0
2	FAD	C	1353	-	53,58,58	1.63	9 (16%)	68,89,89	1.99	21 (30%)
3	SO4	D	1357	-	4,4,4	0.57	0	6,6,6	0.29	0
3	SO4	F	1354	-	4,4,4	0.37	0	6,6,6	0.75	0
3	SO4	H	1354	-	4,4,4	0.54	0	6,6,6	0.56	0
3	SO4	E	1355	-	4,4,4	0.51	0	6,6,6	0.70	0
3	SO4	C	1356	-	4,4,4	0.35	0	6,6,6	0.22	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	FAD	F	1353	-	53,58,58	1.53	9 (16%)	68,89,89	1.81	18 (26%)
3	SO4	B	1356	-	4,4,4	0.50	0	6,6,6	0.61	0
2	FAD	D	1353	-	53,58,58	1.55	8 (15%)	68,89,89	1.97	23 (33%)
3	SO4	E	1354	-	4,4,4	0.60	0	6,6,6	0.42	0
3	SO4	B	1354	-	4,4,4	0.36	0	6,6,6	0.77	0
3	SO4	A	1354	-	4,4,4	0.36	0	6,6,6	0.89	0
2	FAD	G	1353	-	53,58,58	1.67	11 (20%)	68,89,89	1.71	17 (25%)

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	H	1353	-	-	9/30/50/50	0/6/6/6
2	FAD	E	1353	-	-	11/30/50/50	0/6/6/6
2	FAD	C	1353	-	-	6/30/50/50	0/6/6/6
2	FAD	B	1353	-	-	9/30/50/50	0/6/6/6
2	FAD	F	1353	-	-	13/30/50/50	0/6/6/6
2	FAD	D	1353	-	-	3/30/50/50	0/6/6/6
2	FAD	A	1353	-	-	17/30/50/50	0/6/6/6
2	FAD	G	1353	-	-	7/30/50/50	0/6/6/6

All (78) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1353	FAD	C9A-C5X	7.27	1.53	1.41
2	G	1353	FAD	C9A-C5X	6.25	1.51	1.41
2	C	1353	FAD	C9A-C5X	5.63	1.50	1.41
2	D	1353	FAD	C9A-C5X	5.60	1.50	1.41
2	B	1353	FAD	C9A-C5X	5.49	1.50	1.41
2	H	1353	FAD	C9A-C5X	5.34	1.50	1.41
2	E	1353	FAD	O4B-C1B	5.05	1.48	1.41
2	F	1353	FAD	O4B-C1B	4.81	1.47	1.41
2	G	1353	FAD	C8-C7	4.65	1.52	1.40
2	F	1353	FAD	C9A-C5X	4.53	1.48	1.41
2	E	1353	FAD	C9A-C5X	4.18	1.48	1.41
2	B	1353	FAD	C1'-C2'	-4.11	1.46	1.52
2	A	1353	FAD	C8-C7	3.95	1.50	1.40
2	B	1353	FAD	O4-C4	3.71	1.30	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	1353	FAD	C8-C7	3.70	1.50	1.40
2	B	1353	FAD	C8-C7	3.61	1.49	1.40
2	H	1353	FAD	O4-C4	3.59	1.30	1.23
2	D	1353	FAD	C5X-N5	-3.57	1.32	1.39
2	C	1353	FAD	C5A-C4A	3.42	1.50	1.40
2	E	1353	FAD	O4-C4	3.40	1.30	1.23
2	E	1353	FAD	C8-C7	3.36	1.49	1.40
2	G	1353	FAD	C4X-N5	3.32	1.37	1.30
2	G	1353	FAD	C1'-C2'	-3.29	1.48	1.52
2	D	1353	FAD	C8-C7	3.28	1.49	1.40
2	C	1353	FAD	O4B-C1B	3.23	1.45	1.41
2	E	1353	FAD	C1'-C2'	-3.21	1.48	1.52
2	H	1353	FAD	C4'-C3'	-3.13	1.47	1.53
2	F	1353	FAD	O4-C4	3.12	1.29	1.23
2	H	1353	FAD	C8-C7	3.09	1.48	1.40
2	E	1353	FAD	C4-N3	-3.04	1.33	1.38
2	A	1353	FAD	C2A-N3A	3.01	1.36	1.32
2	H	1353	FAD	O4B-C1B	2.97	1.45	1.41
2	F	1353	FAD	C8A-N7A	2.92	1.39	1.34
2	B	1353	FAD	C5A-C4A	2.89	1.48	1.40
2	D	1353	FAD	C1'-C2'	-2.86	1.48	1.52
2	H	1353	FAD	C1'-C2'	-2.83	1.48	1.52
2	A	1353	FAD	C5A-C4A	2.78	1.48	1.40
2	D	1353	FAD	O5B-C5B	-2.78	1.34	1.44
2	D	1353	FAD	O4-C4	2.78	1.28	1.23
2	C	1353	FAD	C8A-N7A	2.77	1.39	1.34
2	A	1353	FAD	C10-N10	2.72	1.43	1.37
2	D	1353	FAD	C2-N3	-2.67	1.32	1.39
2	H	1353	FAD	C4-N3	-2.67	1.33	1.38
2	G	1353	FAD	C4-N3	-2.64	1.33	1.38
2	B	1353	FAD	O5B-C5B	-2.63	1.34	1.44
2	E	1353	FAD	C2A-N3A	2.62	1.36	1.32
2	E	1353	FAD	C5X-N5	-2.60	1.34	1.39
2	F	1353	FAD	C5A-C4A	2.57	1.47	1.40
2	G	1353	FAD	C5A-N7A	-2.56	1.30	1.39
2	C	1353	FAD	C5X-N5	-2.55	1.34	1.39
2	H	1353	FAD	O4B-C4B	-2.55	1.39	1.45
2	A	1353	FAD	C4X-N5	2.54	1.35	1.30
2	E	1353	FAD	C5A-N7A	-2.45	1.30	1.39
2	F	1353	FAD	C8-C7	2.45	1.47	1.40
2	F	1353	FAD	C4X-N5	2.44	1.35	1.30
2	D	1353	FAD	C5A-C4A	2.42	1.47	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	1353	FAD	C2B-C1B	-2.42	1.50	1.53
2	E	1353	FAD	C4'-C3'	-2.42	1.48	1.53
2	B	1353	FAD	C4'-C3'	-2.38	1.49	1.53
2	E	1353	FAD	PA-O2A	-2.35	1.44	1.55
2	F	1353	FAD	C2A-N3A	2.34	1.35	1.32
2	B	1353	FAD	C2A-N3A	2.32	1.35	1.32
2	A	1353	FAD	O4B-C1B	2.30	1.44	1.41
2	C	1353	FAD	O4-C4	2.27	1.27	1.23
2	E	1353	FAD	C5A-C4A	2.24	1.46	1.40
2	H	1353	FAD	C5X-N5	-2.24	1.35	1.39
2	G	1353	FAD	C2A-N3A	2.22	1.35	1.32
2	H	1353	FAD	C5A-C4A	2.21	1.46	1.40
2	G	1353	FAD	O4B-C1B	2.19	1.44	1.41
2	C	1353	FAD	C4-N3	-2.19	1.34	1.38
2	C	1353	FAD	C2B-C1B	-2.18	1.50	1.53
2	B	1353	FAD	O4B-C1B	2.17	1.44	1.41
2	G	1353	FAD	C2-N3	-2.12	1.34	1.39
2	G	1353	FAD	C5'-C4'	2.12	1.54	1.51
2	G	1353	FAD	C5X-N5	-2.11	1.35	1.39
2	H	1353	FAD	C1'-N10	-2.08	1.42	1.48
2	F	1353	FAD	C5X-N5	-2.02	1.35	1.39
2	A	1353	FAD	C2-N3	-2.01	1.34	1.39

All (150) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	1353	FAD	O2-C2-N1	-5.95	111.96	121.83
2	B	1353	FAD	O2'-C2'-C3'	5.54	122.58	109.10
2	G	1353	FAD	O2'-C2'-C3'	5.51	122.49	109.10
2	B	1353	FAD	O2-C2-N1	-4.98	113.58	121.83
2	F	1353	FAD	O2-C2-N1	-4.72	114.01	121.83
2	C	1353	FAD	C4X-C10-N10	4.64	123.27	116.48
2	F	1353	FAD	O4B-C1B-C2B	-4.52	100.33	106.93
2	A	1353	FAD	C4X-C10-N1	-4.43	114.44	124.73
2	D	1353	FAD	N3A-C2A-N1A	-4.43	121.75	128.68
2	C	1353	FAD	O4B-C1B-C2B	-4.43	100.45	106.93
2	D	1353	FAD	O4-C4-C4X	-4.42	114.88	126.60
2	H	1353	FAD	O2-C2-N1	-4.41	114.52	121.83
2	H	1353	FAD	O4B-C1B-C2B	-4.34	100.59	106.93
2	A	1353	FAD	C4X-C10-N10	4.32	122.81	116.48
2	C	1353	FAD	O4B-C4B-C5B	4.28	123.47	109.37
2	E	1353	FAD	O2'-C2'-C3'	4.27	119.47	109.10

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1353	FAD	C10-N1-C2	4.23	125.36	116.90
2	B	1353	FAD	O5B-PA-O1A	3.98	124.62	109.07
2	H	1353	FAD	C4X-C10-N1	-3.97	115.51	124.73
2	C	1353	FAD	O2'-C2'-C3'	3.95	118.69	109.10
2	H	1353	FAD	N3-C2-N1	3.94	127.11	119.38
2	H	1353	FAD	C4-N3-C2	-3.88	118.47	125.64
2	D	1353	FAD	C9A-N10-C10	-3.84	114.78	120.77
2	F	1353	FAD	O4-C4-C4X	-3.84	116.41	126.60
2	H	1353	FAD	N3A-C2A-N1A	-3.82	122.71	128.68
2	D	1353	FAD	O4B-C4B-C5B	3.81	121.90	109.37
2	H	1353	FAD	C5X-N5-C4X	3.80	124.39	118.07
2	A	1353	FAD	N3A-C2A-N1A	-3.75	122.81	128.68
2	G	1353	FAD	N3A-C2A-N1A	-3.74	122.84	128.68
2	B	1353	FAD	N3A-C2A-N1A	-3.72	122.87	128.68
2	E	1353	FAD	O4B-C1B-C2B	-3.69	101.53	106.93
2	E	1353	FAD	N3A-C2A-N1A	-3.68	122.93	128.68
2	A	1353	FAD	O2-C2-N1	-3.68	115.73	121.83
2	C	1353	FAD	C9A-N10-C10	-3.66	115.06	120.77
2	F	1353	FAD	O5B-PA-O1A	3.66	123.35	109.07
2	B	1353	FAD	N3-C2-N1	3.66	126.56	119.38
2	H	1353	FAD	C4X-C10-N10	3.64	121.81	116.48
2	A	1353	FAD	C4-N3-C2	-3.61	118.97	125.64
2	D	1353	FAD	O5B-PA-O1A	3.54	122.89	109.07
2	F	1353	FAD	O4-C4-N3	3.54	126.90	120.12
2	D	1353	FAD	O4-C4-N3	3.54	126.90	120.12
2	H	1353	FAD	O5B-PA-O1A	3.52	122.81	109.07
2	G	1353	FAD	O4B-C1B-C2B	-3.49	101.83	106.93
2	G	1353	FAD	O5B-PA-O1A	3.44	122.51	109.07
2	D	1353	FAD	C1'-N10-C9A	3.44	126.25	120.51
2	D	1353	FAD	C5X-C9A-N10	3.37	121.44	117.95
2	B	1353	FAD	O4-C4-N3	3.36	126.56	120.12
2	G	1353	FAD	O3'-C3'-C2'	-3.35	100.73	108.81
2	C	1353	FAD	C4X-C10-N1	-3.34	116.97	124.73
2	C	1353	FAD	N3A-C2A-N1A	-3.31	123.50	128.68
2	C	1353	FAD	N3-C2-N1	3.31	125.87	119.38
2	E	1353	FAD	C4A-C5A-N7A	-3.28	105.98	109.40
2	A	1353	FAD	O2'-C2'-C3'	3.25	117.00	109.10
2	D	1353	FAD	P-O3P-PA	-3.25	121.68	132.83
2	D	1353	FAD	O2-C2-N1	-3.23	116.47	121.83
2	H	1353	FAD	O2'-C2'-C3'	3.22	116.92	109.10
2	A	1353	FAD	O4-C4-C4X	-3.20	118.12	126.60
2	H	1353	FAD	C9A-C5X-N5	-3.14	119.02	122.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1353	FAD	C2A-N1A-C6A	3.10	124.06	118.75
2	C	1353	FAD	C4-N3-C2	-3.03	120.04	125.64
2	E	1353	FAD	C4X-C10-N1	-3.02	117.73	124.73
2	A	1353	FAD	C9A-N10-C10	-3.01	116.08	120.77
2	G	1353	FAD	P-O3P-PA	-3.00	122.54	132.83
2	B	1353	FAD	O3'-C3'-C4'	-2.97	101.64	108.81
2	B	1353	FAD	C4X-C10-N1	-2.95	117.89	124.73
2	B	1353	FAD	O4-C4-C4X	-2.95	118.78	126.60
2	F	1353	FAD	O2A-PA-O5B	-2.94	94.11	107.75
2	F	1353	FAD	O4B-C4B-C5B	2.92	118.98	109.37
2	A	1353	FAD	C3B-C2B-C1B	2.91	105.36	100.98
2	A	1353	FAD	O5B-C5B-C4B	2.88	118.89	108.99
2	H	1353	FAD	C10-C4X-N5	-2.80	118.92	124.86
2	C	1353	FAD	C4'-C3'-C2'	2.80	119.18	113.36
2	B	1353	FAD	C1'-C2'-C3'	-2.79	101.98	109.79
2	G	1353	FAD	C4X-C4-N3	2.77	120.23	113.19
2	G	1353	FAD	C4-N3-C2	-2.76	120.55	125.64
2	C	1353	FAD	C4A-C5A-N7A	-2.75	106.53	109.40
2	E	1353	FAD	O2-C2-N1	-2.75	117.27	121.83
2	B	1353	FAD	C4X-C10-N10	2.74	120.49	116.48
2	D	1353	FAD	C4X-C10-N1	-2.74	118.38	124.73
2	B	1353	FAD	O4B-C4B-C5B	2.73	118.36	109.37
2	D	1353	FAD	C1'-C2'-C3'	-2.71	102.21	109.79
2	G	1353	FAD	C4-C4X-N5	2.71	122.09	118.23
2	H	1353	FAD	O2B-C2B-C3B	2.70	120.54	111.82
2	D	1353	FAD	C1B-N9A-C4A	-2.67	121.95	126.64
2	G	1353	FAD	C4X-C10-N1	-2.67	118.55	124.73
2	G	1353	FAD	O4-C4-C4X	-2.66	119.54	126.60
2	E	1353	FAD	C9A-C5X-N5	-2.65	119.55	122.43
2	F	1353	FAD	O2'-C2'-C3'	2.64	115.53	109.10
2	E	1353	FAD	C5X-N5-C4X	2.64	122.46	118.07
2	D	1353	FAD	O3B-C3B-C4B	-2.64	103.42	111.05
2	F	1353	FAD	O3'-C3'-C4'	2.60	115.08	108.81
2	H	1353	FAD	P-O3P-PA	-2.59	123.93	132.83
2	A	1353	FAD	C4X-C4-N3	2.56	119.69	113.19
2	F	1353	FAD	N3A-C2A-N1A	-2.55	124.69	128.68
2	F	1353	FAD	C4A-C5A-N7A	-2.53	106.77	109.40
2	F	1353	FAD	C1'-N10-C9A	2.49	124.67	120.51
2	B	1353	FAD	C5'-C4'-C3'	-2.48	107.41	112.20
2	H	1353	FAD	O2A-PA-O5B	-2.47	96.29	107.75
2	H	1353	FAD	C4-C4X-C10	2.46	120.92	116.79
2	G	1353	FAD	C4'-C3'-C2'	2.45	118.46	113.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	1353	FAD	O4B-C1B-C2B	-2.45	103.35	106.93
2	D	1353	FAD	O4'-C4'-C3'	-2.45	103.15	109.10
2	C	1353	FAD	C10-N1-C2	2.44	121.78	116.90
2	A	1353	FAD	O5B-PA-O1A	-2.44	99.54	109.07
2	D	1353	FAD	O2'-C2'-C3'	2.43	115.02	109.10
2	E	1353	FAD	N3-C2-N1	2.42	124.14	119.38
2	H	1353	FAD	O5B-C5B-C4B	2.42	117.31	108.99
2	C	1353	FAD	C4-C4X-N5	2.41	121.67	118.23
2	B	1353	FAD	O2'-C2'-C1'	-2.36	104.08	109.80
2	F	1353	FAD	C4'-C3'-C2'	-2.34	108.50	113.36
2	F	1353	FAD	N3-C2-N1	2.32	123.94	119.38
2	F	1353	FAD	P-O3P-PA	-2.32	124.87	132.83
2	H	1353	FAD	O2B-C2B-C1B	-2.31	102.31	110.85
2	H	1353	FAD	C9A-N10-C10	-2.31	117.17	120.77
2	E	1353	FAD	C4X-C10-N10	2.30	119.85	116.48
2	D	1353	FAD	N3-C2-N1	2.30	123.90	119.38
2	D	1353	FAD	C4-N3-C2	-2.29	121.41	125.64
2	E	1353	FAD	C5X-C9A-N10	2.29	120.31	117.95
2	G	1353	FAD	C10-N1-C2	2.28	121.46	116.90
2	C	1353	FAD	O4-C4-C4X	-2.27	120.58	126.60
2	C	1353	FAD	C10-C4X-N5	-2.25	120.08	124.86
2	E	1353	FAD	O4'-C4'-C5'	-2.25	104.86	109.92
2	C	1353	FAD	O5B-PA-O1A	2.23	117.80	109.07
2	E	1353	FAD	C10-C4X-N5	-2.23	120.13	124.86
2	B	1353	FAD	C4-N3-C2	-2.21	121.56	125.64
2	A	1353	FAD	N6A-C6A-N1A	2.18	123.09	118.57
2	F	1353	FAD	O5'-P-O1P	2.18	117.57	109.07
2	G	1353	FAD	N6A-C6A-N1A	2.18	123.09	118.57
2	G	1353	FAD	O2-C2-N1	-2.17	118.24	121.83
2	D	1353	FAD	C4A-C5A-N7A	-2.15	107.16	109.40
2	F	1353	FAD	C4X-C10-N10	2.14	119.60	116.48
2	E	1353	FAD	O2A-PA-O1A	2.13	122.79	112.24
2	A	1353	FAD	N3-C2-N1	2.12	123.55	119.38
2	A	1353	FAD	C4A-C5A-N7A	-2.12	107.19	109.40
2	D	1353	FAD	C4X-C10-N10	2.12	119.58	116.48
2	B	1353	FAD	O4B-C4B-C3B	2.11	109.29	105.11
2	C	1353	FAD	O3'-C3'-C4'	-2.10	103.73	108.81
2	C	1353	FAD	O2'-C2'-C1'	-2.10	104.72	109.80
2	B	1353	FAD	C4A-C5A-N7A	-2.10	107.22	109.40
2	C	1353	FAD	C1'-N10-C9A	2.09	124.00	120.51
2	G	1353	FAD	N3-C2-N1	2.07	123.44	119.38
2	B	1353	FAD	O4B-C1B-C2B	-2.05	103.93	106.93

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1353	FAD	C4-C4X-N5	2.05	121.15	118.23
2	H	1353	FAD	C4A-C5A-N7A	-2.04	107.27	109.40
2	D	1353	FAD	O2'-C2'-C1'	-2.02	104.91	109.80
2	F	1353	FAD	C4-N3-C2	-2.02	121.92	125.64
2	C	1353	FAD	N6A-C6A-N1A	2.01	122.75	118.57
2	G	1353	FAD	C4X-C10-N10	2.01	119.42	116.48
2	H	1353	FAD	O4-C4-C4X	-2.00	121.29	126.60
2	E	1353	FAD	O4-C4-C4X	-2.00	121.29	126.60

There are no chirality outliers.

All (75) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1353	FAD	C5B-O5B-PA-O1A
2	A	1353	FAD	C2'-C1'-N10-C10
2	A	1353	FAD	N10-C1'-C2'-C3'
2	A	1353	FAD	C1'-C2'-C3'-O3'
2	A	1353	FAD	C1'-C2'-C3'-C4'
2	A	1353	FAD	C5'-O5'-P-O1P
2	A	1353	FAD	C5'-O5'-P-O2P
2	A	1353	FAD	C5'-O5'-P-O3P
2	B	1353	FAD	C5B-O5B-PA-O1A
2	B	1353	FAD	N10-C1'-C2'-C3'
2	B	1353	FAD	C5'-O5'-P-O1P
2	B	1353	FAD	C5'-O5'-P-O3P
2	C	1353	FAD	C5B-O5B-PA-O1A
2	C	1353	FAD	C5B-O5B-PA-O2A
2	D	1353	FAD	C5B-O5B-PA-O1A
2	E	1353	FAD	C5B-O5B-PA-O1A
2	E	1353	FAD	N10-C1'-C2'-C3'
2	E	1353	FAD	C5'-O5'-P-O1P
2	E	1353	FAD	C5'-O5'-P-O3P
2	F	1353	FAD	C5B-O5B-PA-O1A
2	F	1353	FAD	C5B-O5B-PA-O2A
2	F	1353	FAD	C5'-O5'-P-O3P
2	G	1353	FAD	C5B-O5B-PA-O1A
2	G	1353	FAD	C5B-O5B-PA-O2A
2	H	1353	FAD	C5B-O5B-PA-O1A
2	H	1353	FAD	N10-C1'-C2'-C3'
2	H	1353	FAD	C5'-O5'-P-O1P
2	H	1353	FAD	C5'-O5'-P-O3P
2	A	1353	FAD	O2'-C2'-C3'-O3'

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Mol	Chain	Res	Type	Atoms
2	F	1353	FAD	O3'-C3'-C4'-O4'
2	E	1353	FAD	O4'-C4'-C5'-O5'
2	F	1353	FAD	O4'-C4'-C5'-O5'
2	F	1353	FAD	O3'-C3'-C4'-C5'
2	F	1353	FAD	C2'-C3'-C4'-O4'
2	A	1353	FAD	O4B-C4B-C5B-O5B
2	A	1353	FAD	O2'-C2'-C3'-C4'
2	F	1353	FAD	C3'-C4'-C5'-O5'
2	F	1353	FAD	C2'-C3'-C4'-C5'
2	E	1353	FAD	PA-O3P-P-O1P
2	G	1353	FAD	PA-O3P-P-O1P
2	H	1353	FAD	PA-O3P-P-O1P
2	A	1353	FAD	C3B-C4B-C5B-O5B
2	A	1353	FAD	C4B-C5B-O5B-PA
2	A	1353	FAD	C4'-C5'-O5'-P
2	A	1353	FAD	C5B-O5B-PA-O2A
2	B	1353	FAD	C5B-O5B-PA-O2A
2	D	1353	FAD	C5B-O5B-PA-O2A
2	E	1353	FAD	C5B-O5B-PA-O2A
2	E	1353	FAD	C5'-O5'-P-O2P
2	H	1353	FAD	C5B-O5B-PA-O2A
2	F	1353	FAD	C3B-C4B-C5B-O5B
2	B	1353	FAD	PA-O3P-P-O1P
2	A	1353	FAD	C3'-C4'-C5'-O5'
2	E	1353	FAD	C3'-C4'-C5'-O5'
2	G	1353	FAD	PA-O3P-P-O2P
2	H	1353	FAD	PA-O3P-P-O2P
2	F	1353	FAD	O4B-C4B-C5B-O5B
2	B	1353	FAD	O4'-C4'-C5'-O5'
2	C	1353	FAD	O4'-C4'-C5'-O5'
2	H	1353	FAD	O4'-C4'-C5'-O5'
2	A	1353	FAD	C5B-O5B-PA-O3P
2	B	1353	FAD	C5B-O5B-PA-O3P
2	C	1353	FAD	C5B-O5B-PA-O3P
2	D	1353	FAD	C5B-O5B-PA-O3P
2	E	1353	FAD	C5B-O5B-PA-O3P
2	F	1353	FAD	C5B-O5B-PA-O3P
2	G	1353	FAD	C5B-O5B-PA-O3P
2	G	1353	FAD	C5'-O5'-P-O3P
2	H	1353	FAD	C5B-O5B-PA-O3P
2	B	1353	FAD	PA-O3P-P-O2P
2	E	1353	FAD	PA-O3P-P-O2P

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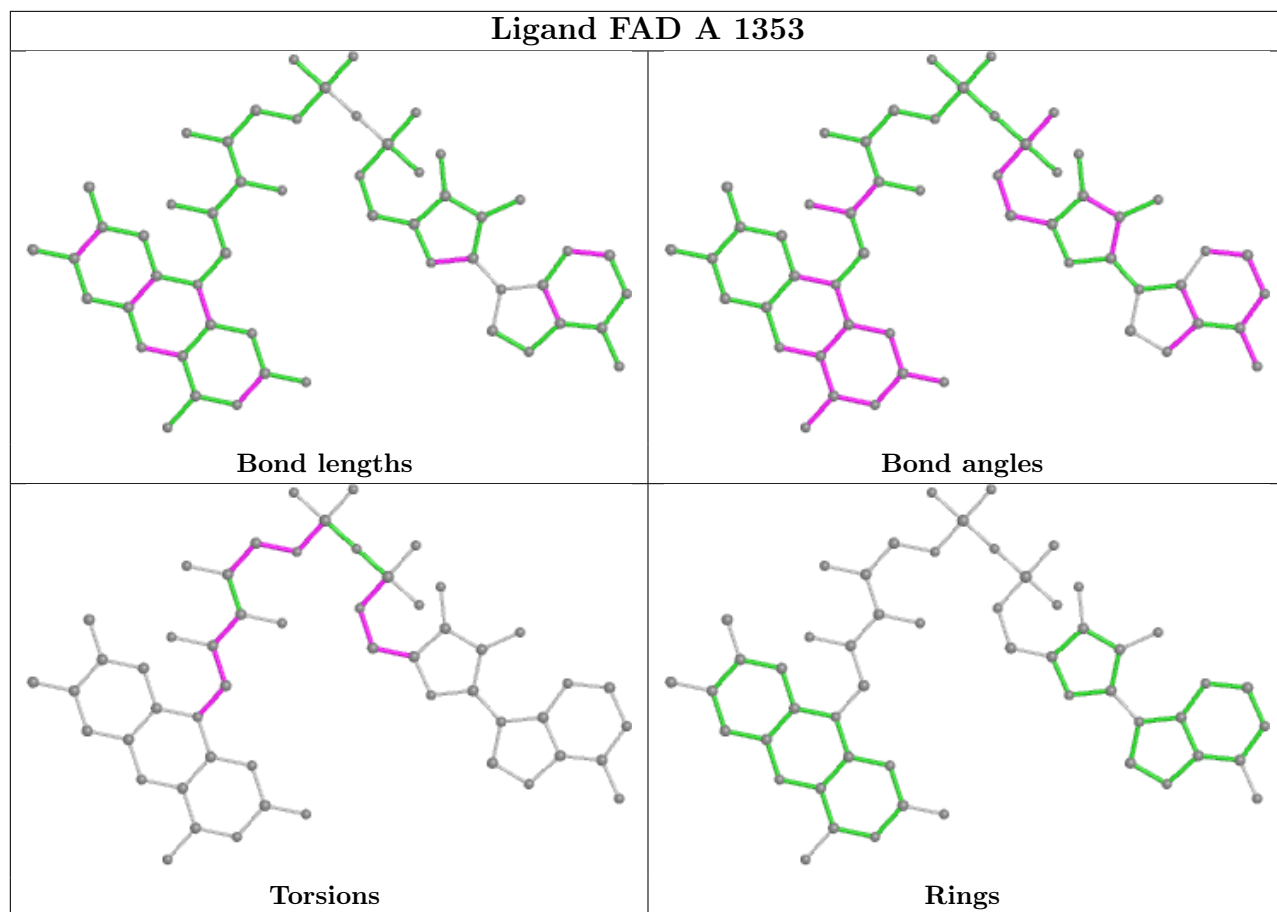
Mol	Chain	Res	Type	Atoms
2	C	1353	FAD	C3'-C4'-C5'-O5'
2	C	1353	FAD	C5'-O5'-P-O1P
2	F	1353	FAD	C5'-O5'-P-O1P
2	G	1353	FAD	C5'-O5'-P-O1P

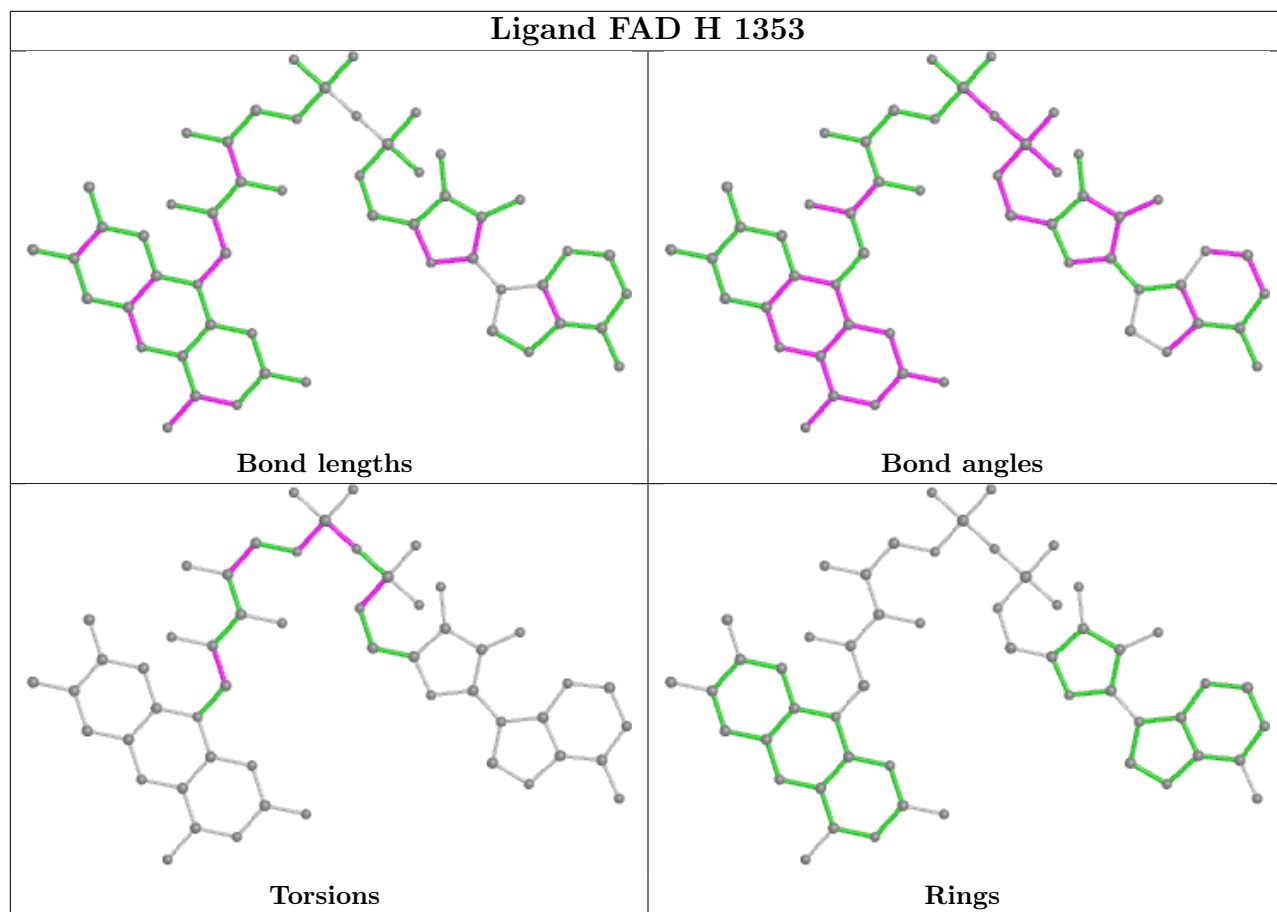
There are no ring outliers.

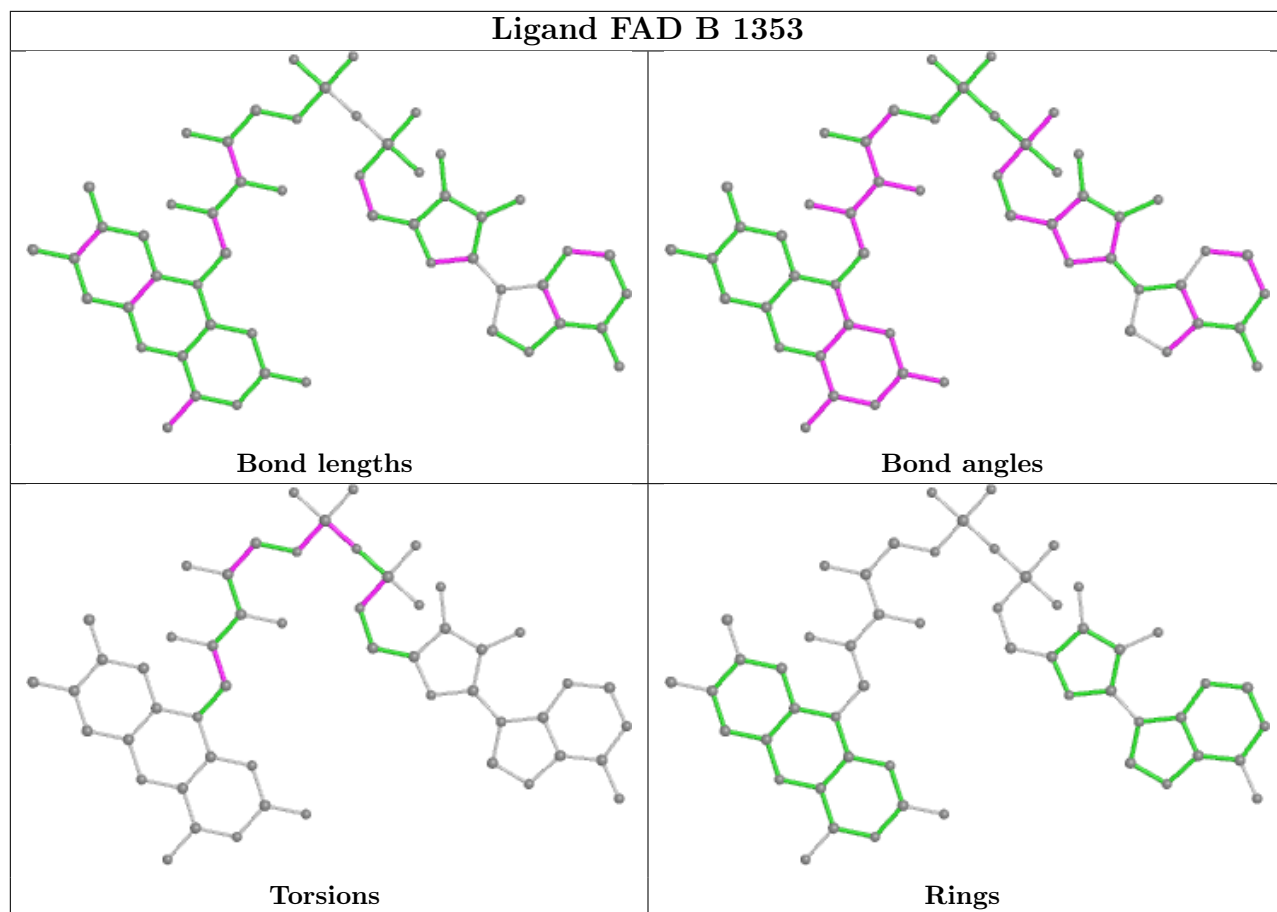
20 monomers are involved in 31 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	1355	SO4	1	0
2	A	1353	FAD	4	0
2	H	1353	FAD	2	0
3	B	1357	SO4	1	0
2	B	1353	FAD	4	0
3	D	1354	SO4	1	0
3	E	1356	SO4	1	0
3	F	1357	SO4	2	0
3	G	1354	SO4	1	0
3	G	1356	SO4	1	0
2	E	1353	FAD	2	0
3	H	1357	SO4	1	0
3	D	1358	SO4	1	0
3	F	1354	SO4	1	0
3	C	1356	SO4	1	0
2	D	1353	FAD	1	0
3	E	1354	SO4	1	0
3	B	1354	SO4	1	0
3	A	1354	SO4	1	0
2	G	1353	FAD	3	0

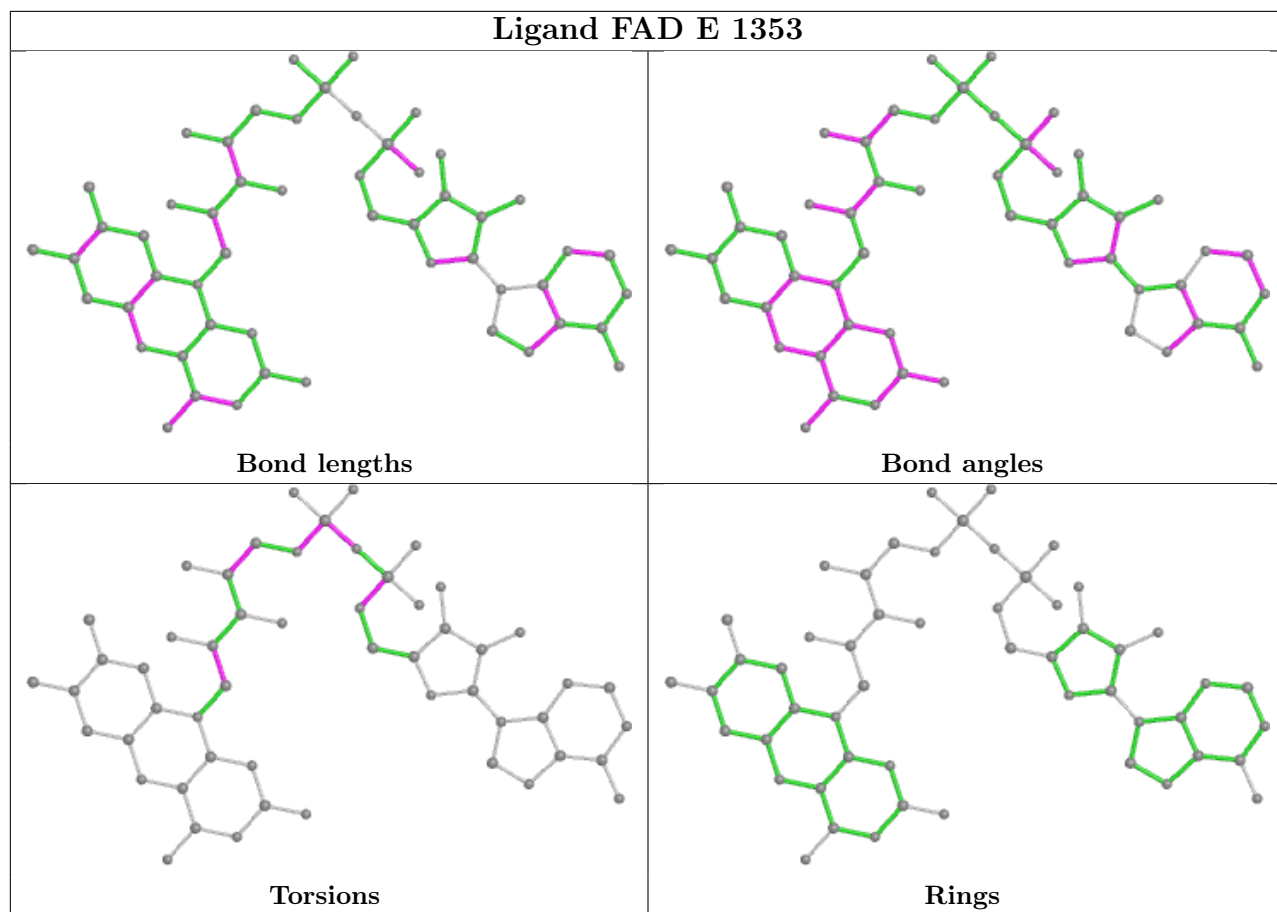
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

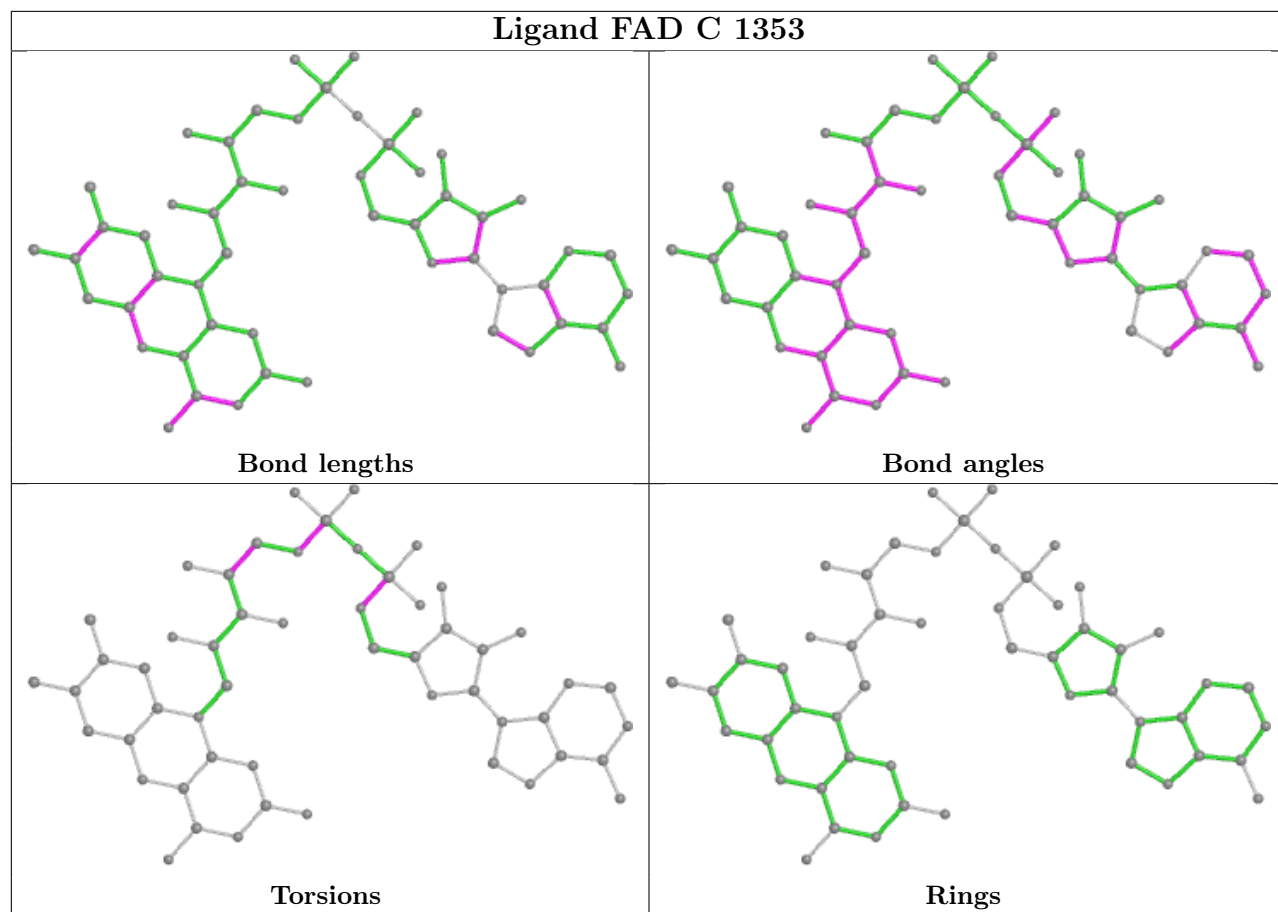


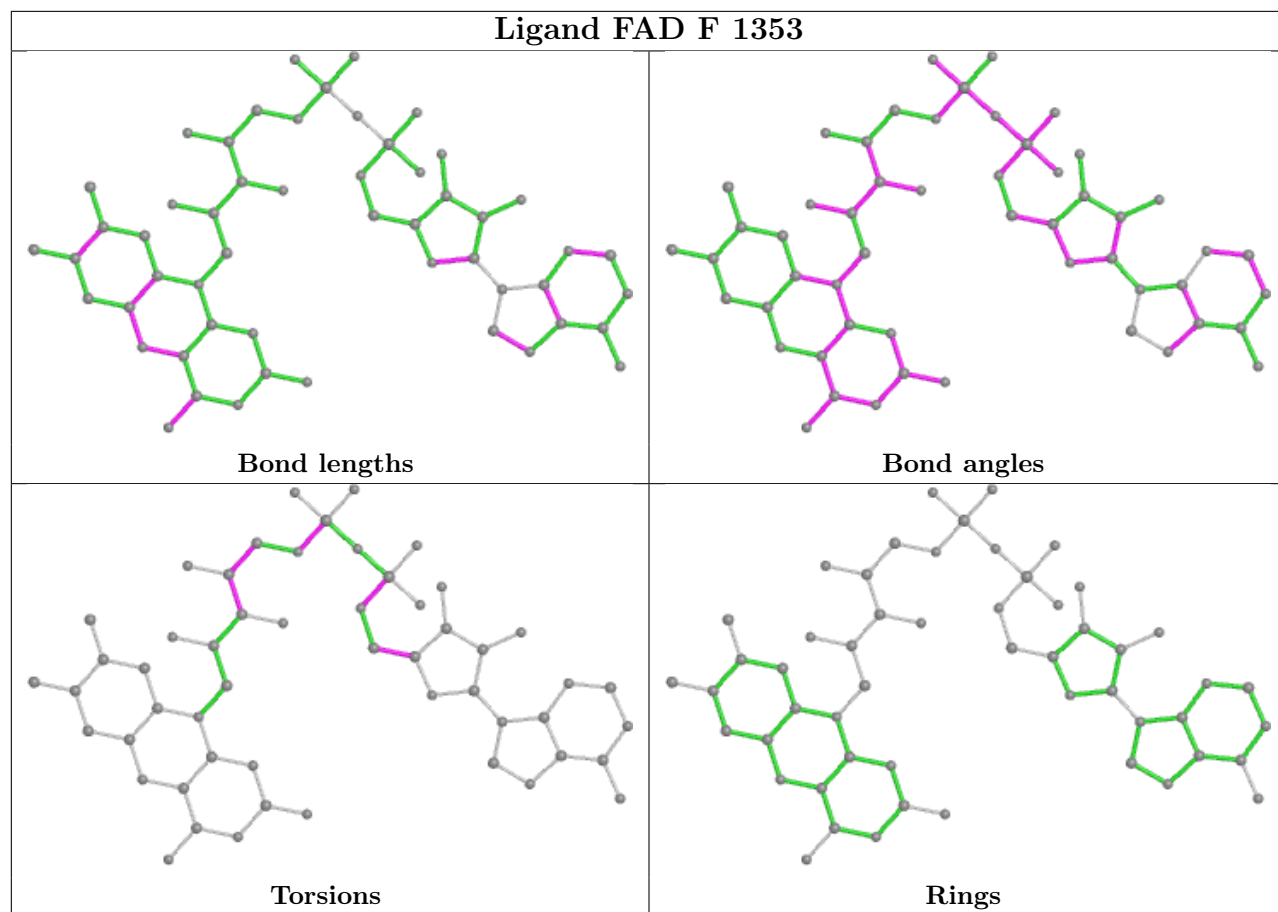


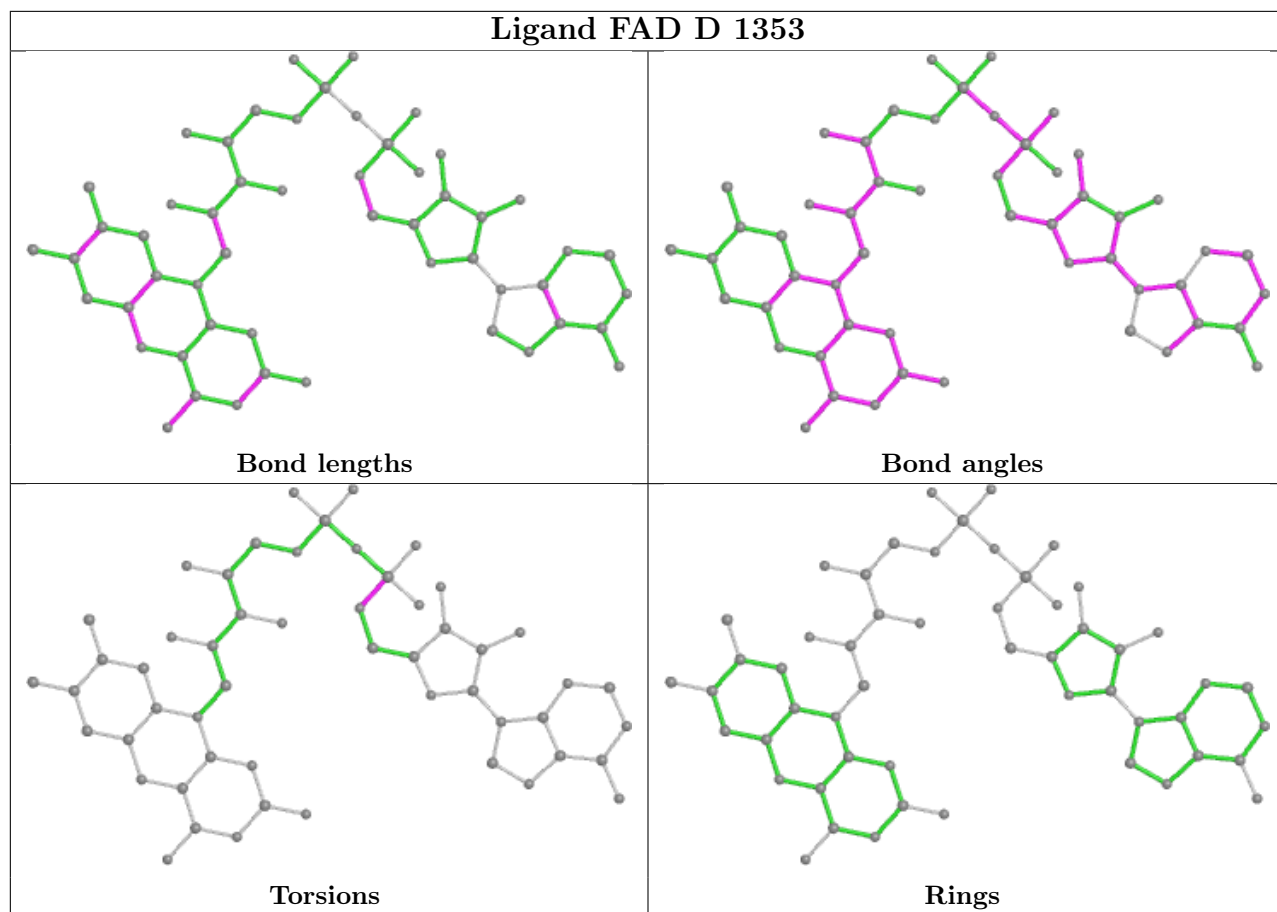


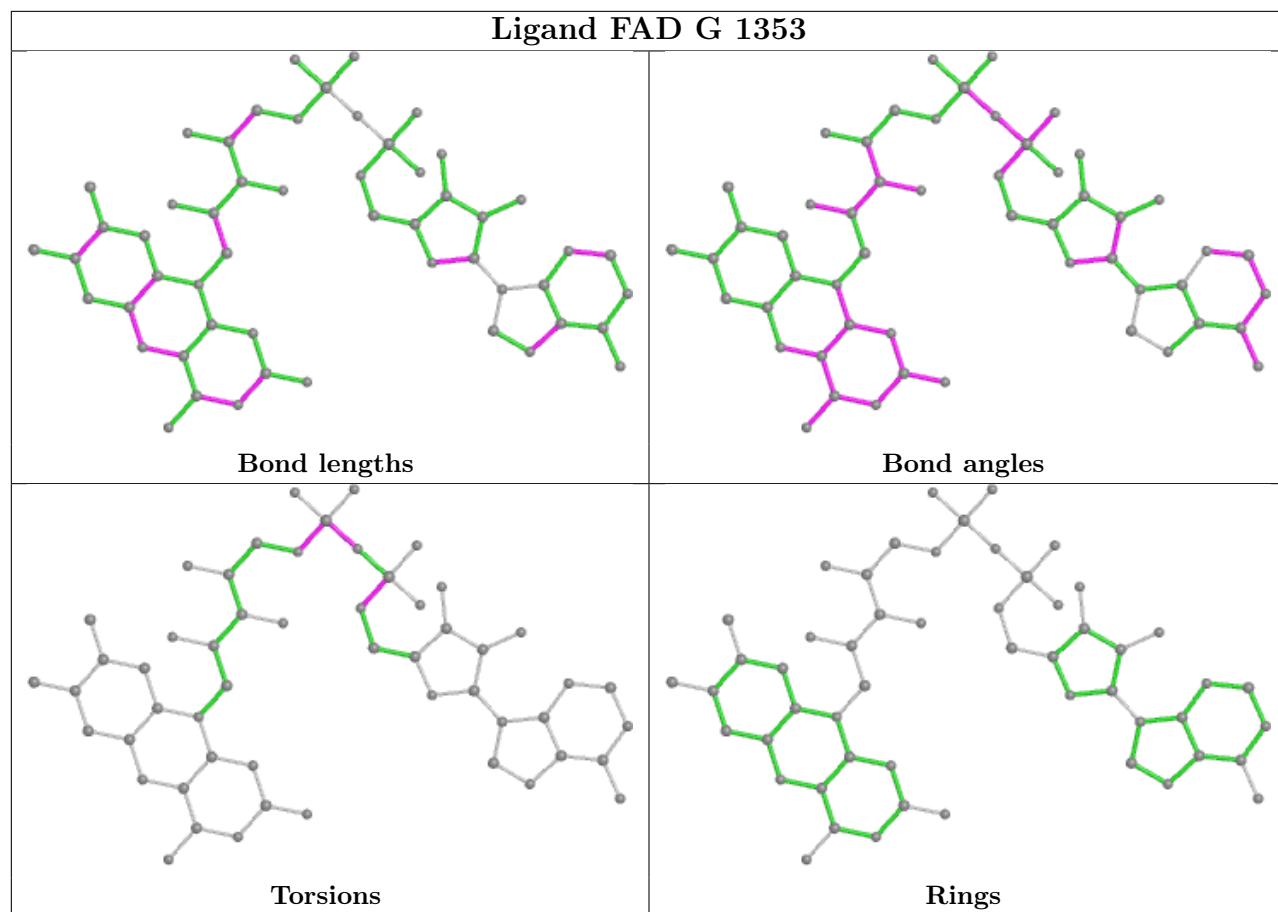












## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 Fit of model and data

### 6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å <sup>2</sup> )	Q<0.9
1	A	327/357 (91%)	0.16	15 (4%) 32 26	40, 79, 111, 127	0
1	B	330/357 (92%)	-0.30	2 (0%) 89 88	31, 65, 95, 135	0
1	C	330/357 (92%)	-0.55	1 (0%) 94 93	26, 45, 69, 86	0
1	D	333/357 (93%)	-0.52	1 (0%) 94 93	25, 46, 74, 94	0
1	E	330/357 (92%)	-0.56	0 100 100	22, 46, 70, 110	0
1	F	330/357 (92%)	-0.41	1 (0%) 94 93	29, 48, 74, 101	0
1	G	330/357 (92%)	-0.52	1 (0%) 94 93	24, 46, 77, 108	0
1	H	331/357 (92%)	-0.63	0 100 100	20, 40, 67, 96	0
All	All	2641/2856 (92%)	-0.42	21 (0%) 86 84	20, 49, 90, 135	0

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	318	TRP	7.4
1	A	251	ALA	6.3
1	A	304	VAL	4.6
1	A	267	ALA	3.7
1	B	267	ALA	3.5
1	G	351	CYS	3.5
1	A	123	ALA	3.4
1	A	20	TYR	3.4
1	A	119	TRP	3.1
1	A	329	ALA	3.1
1	F	313	ALA	2.8
1	A	340	ALA	2.8
1	A	295	LEU	2.5
1	A	317	VAL	2.4
1	A	315	PRO	2.3
1	D	106	GLY	2.2

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Mol	Chain	Res	Type	RSRZ
1	B	140	GLN	2.1
1	A	200	ALA	2.1
1	C	351	CYS	2.1
1	A	106	GLY	2.1
1	A	328	MET	2.1

## 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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å <sup>2</sup> )	Q<0.9
3	SO4	B	1355	5/5	0.62	0.39	112,113,123,131	0
3	SO4	B	1357	5/5	0.63	0.35	132,135,144,151	0
3	SO4	D	1356	5/5	0.63	0.40	145,150,156,159	0
3	SO4	A	1355	5/5	0.71	0.53	137,139,145,159	0
3	SO4	D	1358	5/5	0.73	0.34	137,141,153,154	0
3	SO4	G	1355	5/5	0.73	0.44	132,142,147,158	0
3	SO4	B	1356	5/5	0.74	0.21	87,90,105,107	0
3	SO4	C	1357	5/5	0.80	0.21	90,91,104,108	0
3	SO4	E	1355	5/5	0.82	0.31	93,94,105,111	0
3	SO4	C	1355	5/5	0.83	0.60	98,122,126,127	0
3	SO4	H	1355	5/5	0.87	0.26	105,117,124,131	0
3	SO4	H	1356	5/5	0.87	0.33	123,129,130,138	0
3	SO4	F	1356	5/5	0.89	0.23	76,83,93,111	0
3	SO4	D	1355	5/5	0.89	0.20	86,89,99,100	0
2	FAD	A	1353	53/53	0.92	0.13	33,48,57,59	0
3	SO4	A	1356	5/5	0.93	0.09	57,66,83,83	0
3	SO4	G	1357	5/5	0.93	0.11	66,73,80,83	0
3	SO4	C	1356	5/5	0.95	0.38	106,114,117,127	0

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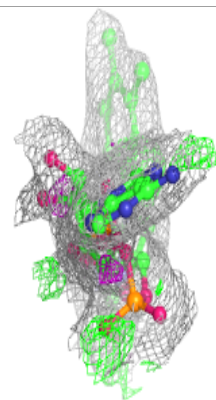
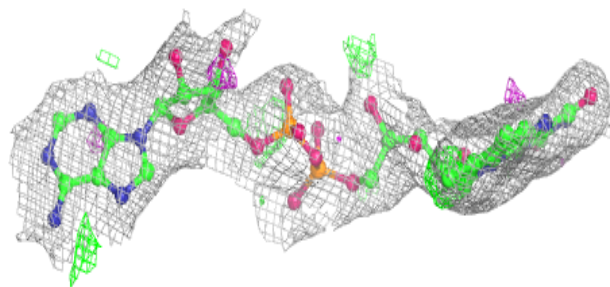
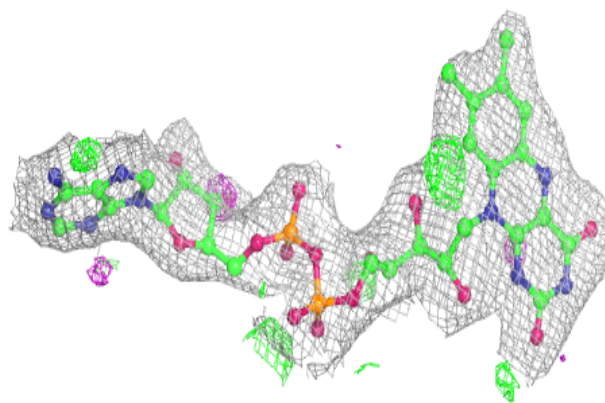
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	SO4	F	1357	5/5	0.95	0.27	83,88,97,113	0
3	SO4	G	1356	5/5	0.96	0.08	54,56,67,75	0
3	SO4	D	1357	5/5	0.96	0.08	58,60,68,69	0
2	FAD	H	1353	53/53	0.97	0.12	18,25,30,32	0
3	SO4	E	1356	5/5	0.97	0.10	42,50,51,55	0
3	SO4	A	1354	5/5	0.97	0.15	50,52,61,62	0
2	FAD	B	1353	53/53	0.97	0.10	25,31,39,44	0
2	FAD	C	1353	53/53	0.97	0.11	23,29,37,38	0
2	FAD	D	1353	53/53	0.97	0.11	22,28,36,44	0
2	FAD	F	1353	53/53	0.97	0.12	23,29,33,43	0
2	FAD	G	1353	53/53	0.97	0.10	24,30,34,39	0
3	SO4	D	1359	5/5	0.97	0.12	50,56,58,64	0
3	SO4	C	1358	5/5	0.98	0.08	59,60,68,70	0
2	FAD	E	1353	53/53	0.98	0.11	21,26,33,36	0
3	SO4	F	1355	5/5	0.98	0.10	46,56,58,68	0
3	SO4	B	1354	5/5	0.98	0.09	48,49,59,63	0
3	SO4	E	1354	5/5	0.98	0.12	36,42,44,45	0
3	SO4	H	1357	5/5	0.98	0.11	42,47,51,54	0
3	SO4	F	1354	5/5	0.99	0.08	33,36,41,45	0
3	SO4	H	1354	5/5	0.99	0.07	34,41,44,45	0
3	SO4	G	1354	5/5	0.99	0.09	47,48,52,52	0
3	SO4	C	1354	5/5	0.99	0.11	37,39,40,42	0
3	SO4	D	1354	5/5	0.99	0.07	36,40,49,50	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.

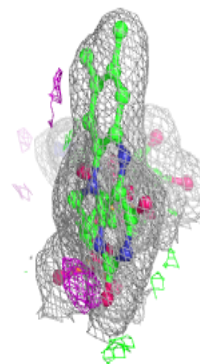
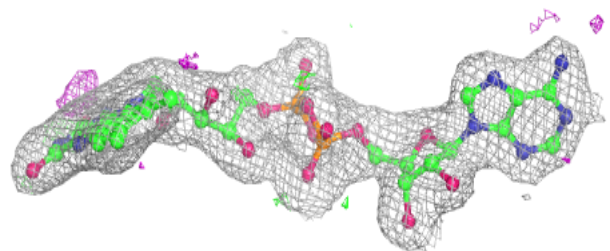
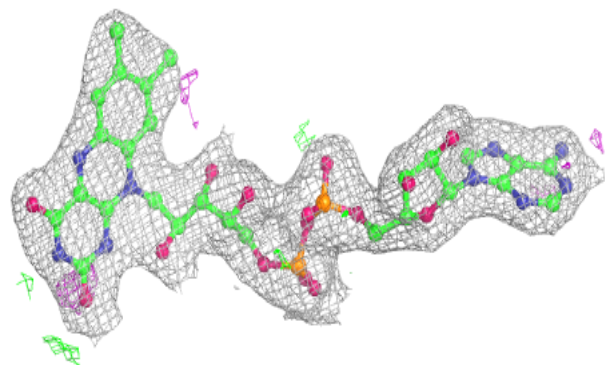


**Electron density around FAD A 1353:**

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

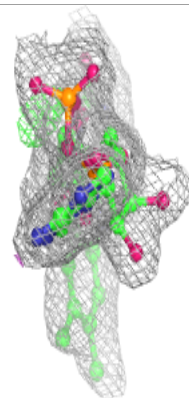
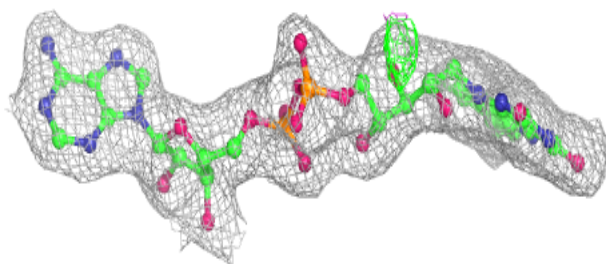
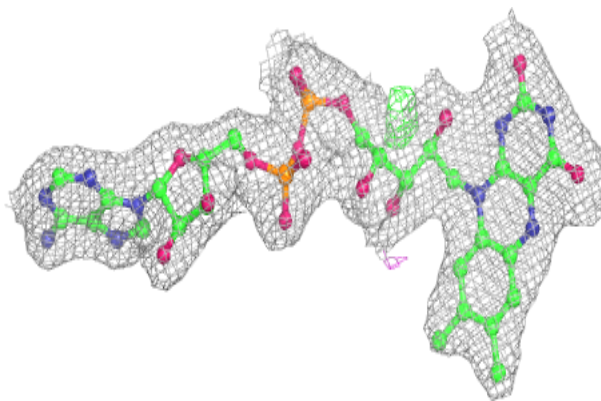
**Electron density around FAD H 1353:**

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

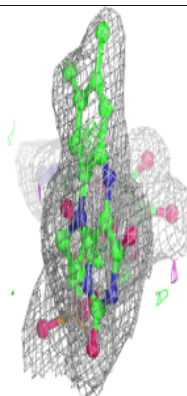
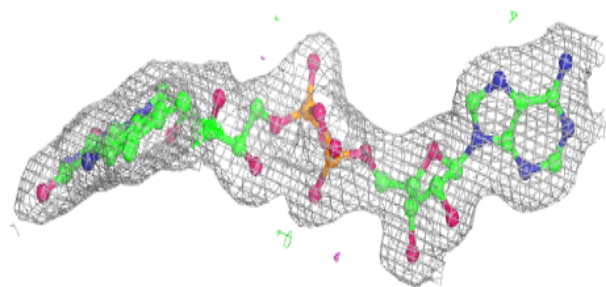
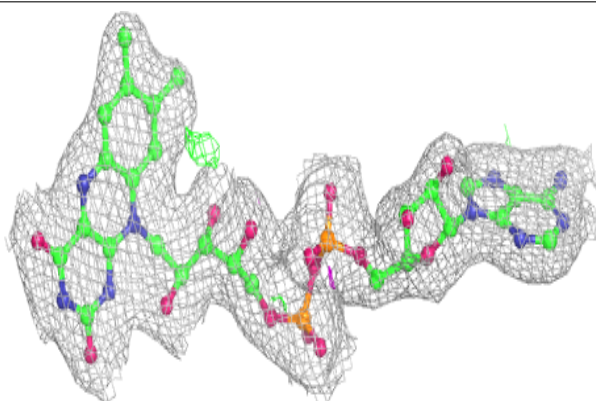


**Electron density around FAD B 1353:**

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

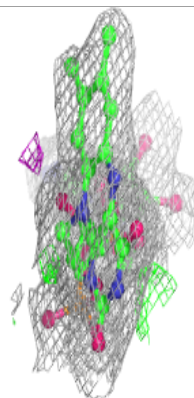
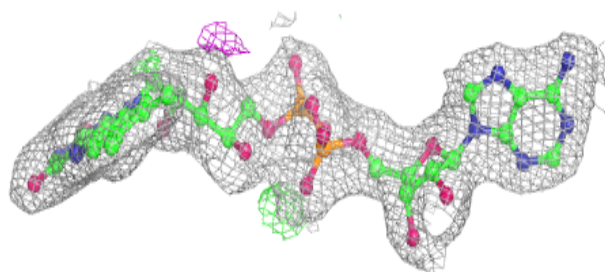
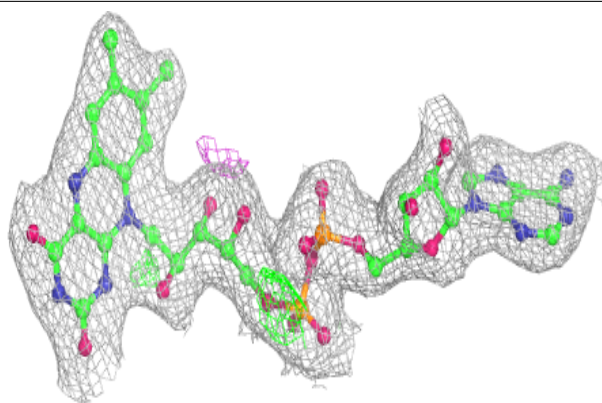
**Electron density around FAD C 1353:**

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

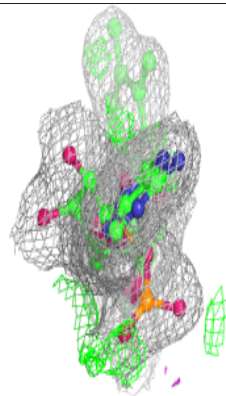
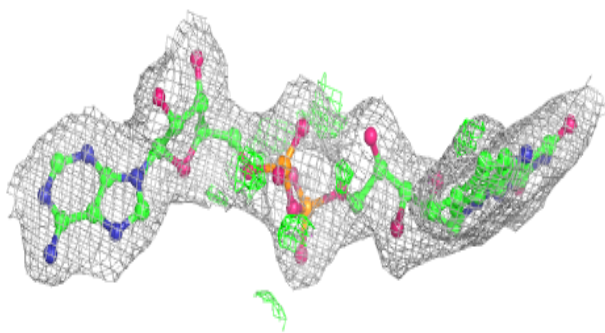
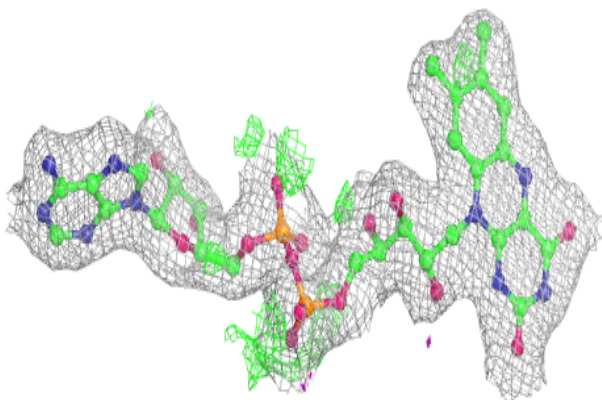


**Electron density around FAD D 1353:**

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

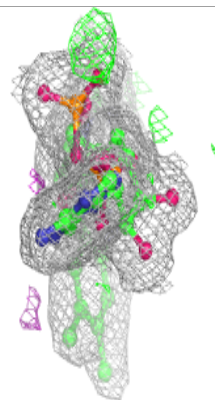
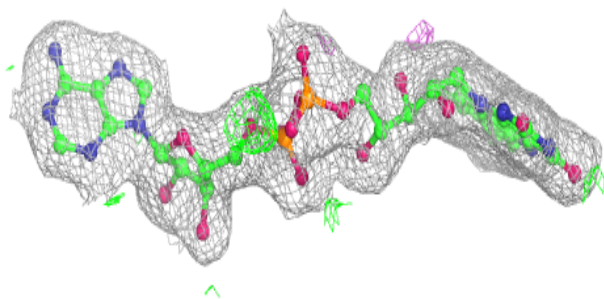
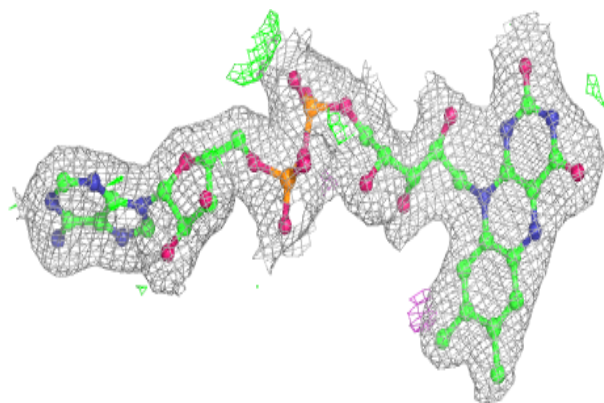
**Electron density around FAD F 1353:**

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

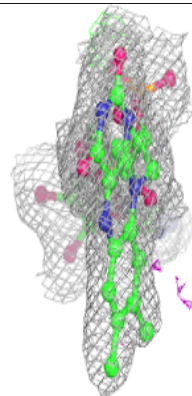
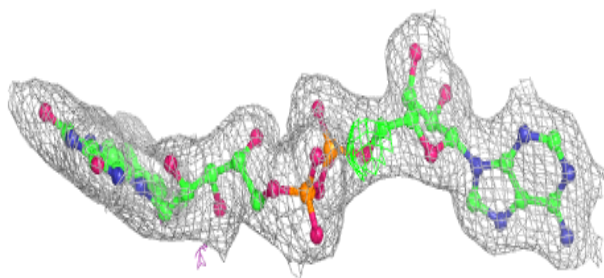
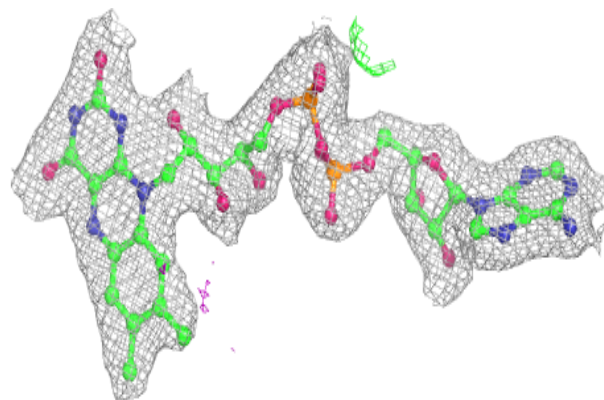


**Electron density around FAD G 1353:**

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

**Electron density around FAD E 1353:**

$2mF_o-DF_c$  (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.