



Full wwPDB X-ray Structure Validation Report ⓘ

Dec 13, 2023 – 09:46 am GMT

PDB ID : 4A99
Title : STRUCTURE OF THE TETRACYCLINE DEGRADING MONOOXYGENASE TETX IN COMPLEX WITH MINOCYCLINE
Authors : Volkers, G.; Palm, G.J.; Weiss, M.S.; Hinrichs, W.
Deposited on : 2011-11-25
Resolution : 2.18 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 : 4.02b-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

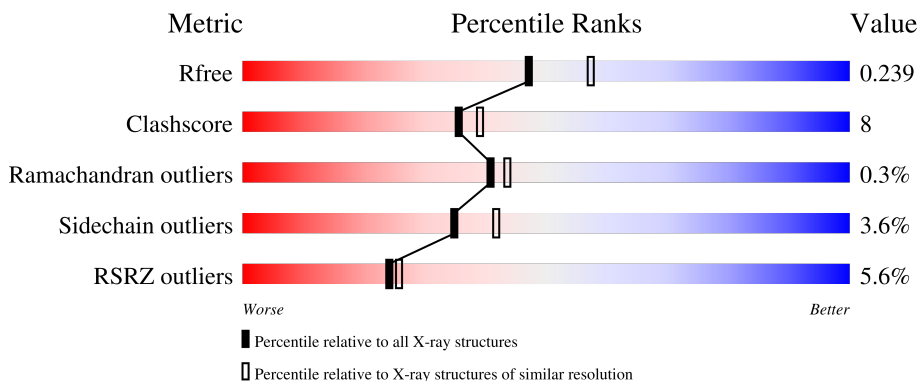
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.18 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	6864 (2.20-2.16)
Clashscore	141614	7689 (2.20-2.16)
Ramachandran outliers	138981	7564 (2.20-2.16)
Sidechain outliers	138945	7564 (2.20-2.16)
RSRZ outliers	127900	6738 (2.20-2.16)

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	398	 3% 79% 12% • 8%
1	B	398	 5% 76% 14% • 8%
1	C	398	 7% 78% 12% • 8%
1	D	398	 6% 78% 12% • 8%

2 Entry composition i

There are 5 unique types of molecules in this entry. The entry contains 12662 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 TETX2 PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	368	2886	1826	489	559	12	0	0	0
1	B	368	2883	1826	489	556	12	0	0	0
1	C	367	2868	1817	485	554	12	0	0	0
1	D	367	2859	1812	485	550	12	0	0	0

There are 80 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-9	MET	-	expression tag	UNP Q93L51
A	-8	GLY	-	expression tag	UNP Q93L51
A	-7	SER	-	expression tag	UNP Q93L51
A	-6	SER	-	expression tag	UNP Q93L51
A	-5	HIS	-	expression tag	UNP Q93L51
A	-4	HIS	-	expression tag	UNP Q93L51
A	-3	HIS	-	expression tag	UNP Q93L51
A	-2	HIS	-	expression tag	UNP Q93L51
A	-1	HIS	-	expression tag	UNP Q93L51
A	0	HIS	-	expression tag	UNP Q93L51
A	1	SER	-	expression tag	UNP Q93L51
A	2	SER	-	expression tag	UNP Q93L51
A	3	GLY	-	expression tag	UNP Q93L51
A	4	LEU	-	expression tag	UNP Q93L51
A	5	VAL	-	expression tag	UNP Q93L51
A	6	PRO	-	expression tag	UNP Q93L51
A	7	ARG	-	expression tag	UNP Q93L51
A	8	GLY	-	expression tag	UNP Q93L51
A	9	SER	-	expression tag	UNP Q93L51
A	10	HIS	-	expression tag	UNP Q93L51
B	-9	MET	-	expression tag	UNP Q93L51

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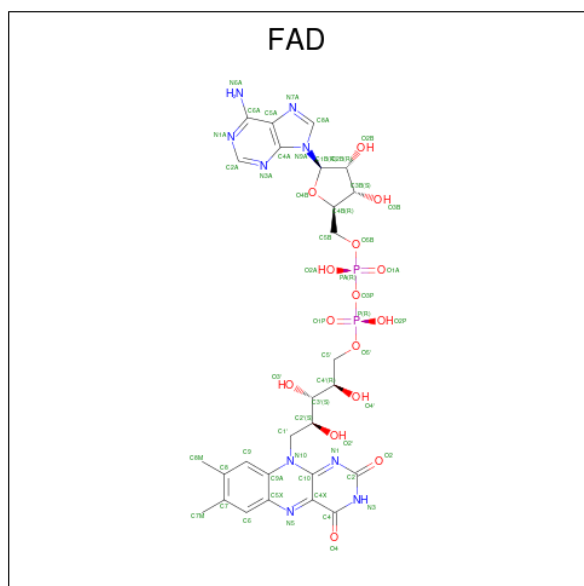
Chain	Residue	Modelled	Actual	Comment	Reference
B	-8	GLY	-	expression tag	UNP Q93L51
B	-7	SER	-	expression tag	UNP Q93L51
B	-6	SER	-	expression tag	UNP Q93L51
B	-5	HIS	-	expression tag	UNP Q93L51
B	-4	HIS	-	expression tag	UNP Q93L51
B	-3	HIS	-	expression tag	UNP Q93L51
B	-2	HIS	-	expression tag	UNP Q93L51
B	-1	HIS	-	expression tag	UNP Q93L51
B	0	HIS	-	expression tag	UNP Q93L51
B	1	SER	-	expression tag	UNP Q93L51
B	2	SER	-	expression tag	UNP Q93L51
B	3	GLY	-	expression tag	UNP Q93L51
B	4	LEU	-	expression tag	UNP Q93L51
B	5	VAL	-	expression tag	UNP Q93L51
B	6	PRO	-	expression tag	UNP Q93L51
B	7	ARG	-	expression tag	UNP Q93L51
B	8	GLY	-	expression tag	UNP Q93L51
B	9	SER	-	expression tag	UNP Q93L51
B	10	HIS	-	expression tag	UNP Q93L51
C	-9	MET	-	expression tag	UNP Q93L51
C	-8	GLY	-	expression tag	UNP Q93L51
C	-7	SER	-	expression tag	UNP Q93L51
C	-6	SER	-	expression tag	UNP Q93L51
C	-5	HIS	-	expression tag	UNP Q93L51
C	-4	HIS	-	expression tag	UNP Q93L51
C	-3	HIS	-	expression tag	UNP Q93L51
C	-2	HIS	-	expression tag	UNP Q93L51
C	-1	HIS	-	expression tag	UNP Q93L51
C	0	HIS	-	expression tag	UNP Q93L51
C	1	SER	-	expression tag	UNP Q93L51
C	2	SER	-	expression tag	UNP Q93L51
C	3	GLY	-	expression tag	UNP Q93L51
C	4	LEU	-	expression tag	UNP Q93L51
C	5	VAL	-	expression tag	UNP Q93L51
C	6	PRO	-	expression tag	UNP Q93L51
C	7	ARG	-	expression tag	UNP Q93L51
C	8	GLY	-	expression tag	UNP Q93L51
C	9	SER	-	expression tag	UNP Q93L51
C	10	HIS	-	expression tag	UNP Q93L51
D	-9	MET	-	expression tag	UNP Q93L51
D	-8	GLY	-	expression tag	UNP Q93L51
D	-7	SER	-	expression tag	UNP Q93L51

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Chain	Residue	Modelled	Actual	Comment	Reference
D	-6	SER	-	expression tag	UNP Q93L51
D	-5	HIS	-	expression tag	UNP Q93L51
D	-4	HIS	-	expression tag	UNP Q93L51
D	-3	HIS	-	expression tag	UNP Q93L51
D	-2	HIS	-	expression tag	UNP Q93L51
D	-1	HIS	-	expression tag	UNP Q93L51
D	0	HIS	-	expression tag	UNP Q93L51
D	1	SER	-	expression tag	UNP Q93L51
D	2	SER	-	expression tag	UNP Q93L51
D	3	GLY	-	expression tag	UNP Q93L51
D	4	LEU	-	expression tag	UNP Q93L51
D	5	VAL	-	expression tag	UNP Q93L51
D	6	PRO	-	expression tag	UNP Q93L51
D	7	ARG	-	expression tag	UNP Q93L51
D	8	GLY	-	expression tag	UNP Q93L51
D	9	SER	-	expression tag	UNP Q93L51
D	10	HIS	-	expression tag	UNP Q93L51

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



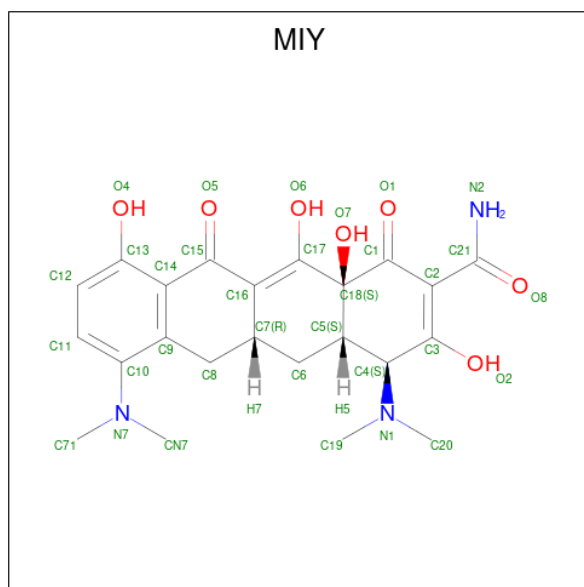
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
			Total	C	N	O			P
2	A	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	B	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

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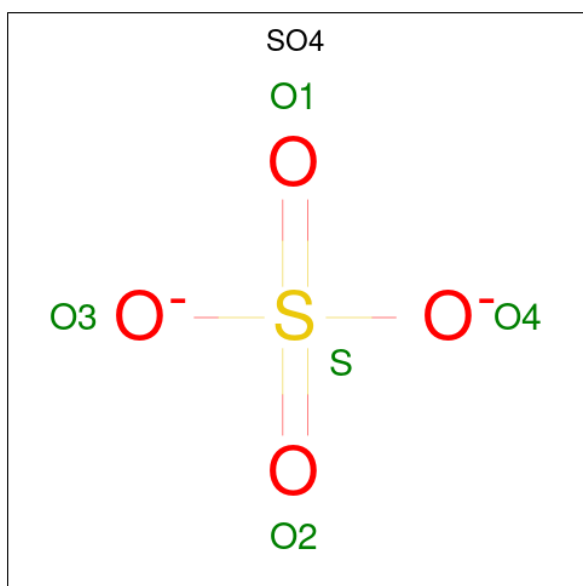
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	C	1	Total	C	N	O	P	0	0
			53	27	9	15	2		
2	D	1	Total	C	N	O	P	0	0
			53	27	9	15	2		

- Molecule 3 is (4S,4AS,5AR,12AS)-4,7-BIS(DIMETHYLAMINO)-3,10,12,12A-TETRAHYDROXY-1,11-DIOXO-1,4,4A,5,5A,6,11,12A-OCTAHYDROTETRACENE-2-CARBOXAMIDE (three-letter code: MIY) (formula: C₂₃H₂₇N₃O₇).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			33	23	3	7		
3	A	1	Total	C	N	O	0	0
			33	23	3	7		
3	B	1	Total	C	N	O	0	0
			33	23	3	7		
3	C	1	Total	C	N	O	0	0
			33	23	3	7		
3	C	1	Total	C	N	O	0	0
			33	23	3	7		
3	D	1	Total	C	N	O	0	0
			33	23	3	7		
3	D	1	Total	C	N	O	0	0
			33	23	3	7		
3	D	1	Total	C	N	O	0	0
			33	23	3	7		

- Molecule 4 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	203	Total O 203 203	0	0

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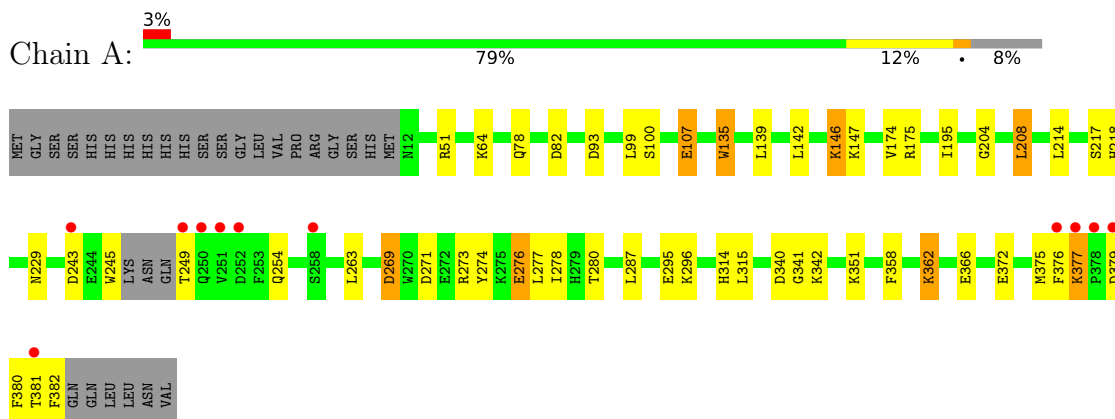
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	B	189	Total 189	O 189	0	0
5	C	134	Total 134	O 134	0	0
5	D	114	Total 114	O 114	0	0

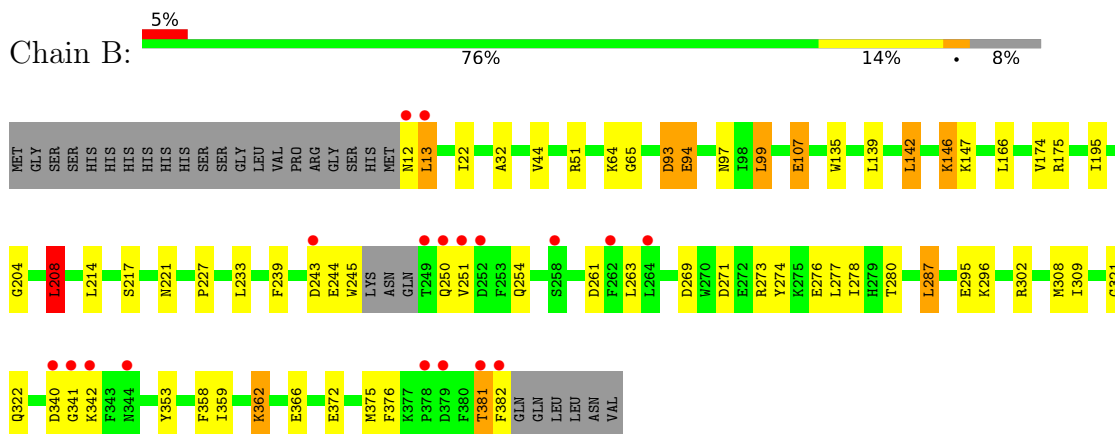
3 Residue-property plots [i](#)

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.

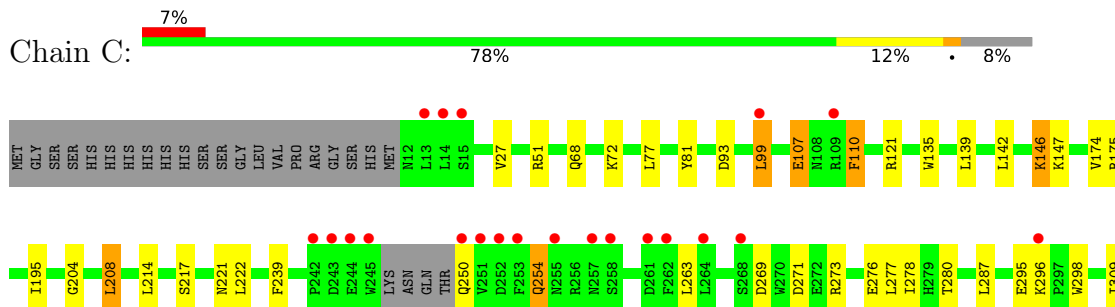
• Molecule 1: TETX2 PROTEIN



• Molecule 1: TETX2 PROTEIN

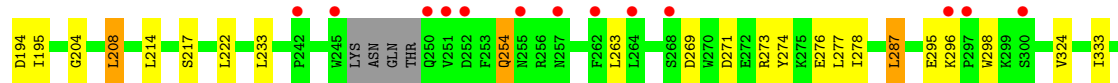
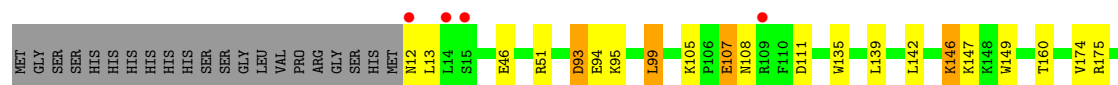
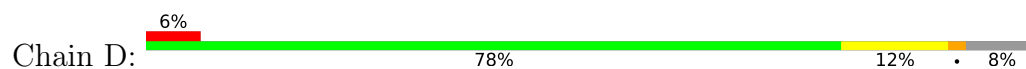


• Molecule 1: TETX2 PROTEIN





● Molecule 1: TETX2 PROTEIN



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	68.88Å 80.33Å 86.63Å 110.82° 90.27° 93.39°	Depositor
Resolution (Å)	80.94 – 2.18 47.66 – 2.18	Depositor EDS
% Data completeness (in resolution range)	95.5 (80.94-2.18) 95.5 (47.66-2.18)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.50 (at 2.18Å)	Xtrriage
Refinement program	REFMAC 5.6.0116	Depositor
R, R_{free}	0.185 , 0.235 0.188 , 0.239	Depositor DCC
R_{free} test set	4301 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	31.1	Xtrriage
Anisotropy	0.278	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 49.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.30$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	12662	wwPDB-VP
Average B, all atoms (Å ²)	53.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.68% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FAD, MIY, 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	0.90	5/2944 (0.2%)	0.89	3/3988 (0.1%)
1	B	0.92	3/2941 (0.1%)	0.99	10/3983 (0.3%)
1	C	0.79	1/2926 (0.0%)	0.83	4/3965 (0.1%)
1	D	0.82	3/2917 (0.1%)	0.85	6/3954 (0.2%)
All	All	0.86	12/11728 (0.1%)	0.89	23/15890 (0.1%)

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	B	94	GLU	CD-OE2	-9.28	1.15	1.25
1	B	94	GLU	CD-OE1	-6.89	1.18	1.25
1	A	135	TRP	CD2-CE2	5.91	1.48	1.41
1	A	78	GLN	CD-NE2	-5.83	1.18	1.32
1	A	276	GLU	CD-OE1	5.72	1.31	1.25
1	D	371	ASN	CG-ND2	-5.59	1.18	1.32
1	A	245	TRP	CD2-CE2	5.40	1.47	1.41
1	B	276	GLU	CD-OE1	5.22	1.31	1.25
1	C	298	TRP	CD2-CE2	5.17	1.47	1.41
1	D	298	TRP	CD2-CE2	5.17	1.47	1.41
1	A	78	GLN	CD-OE1	-5.06	1.12	1.24
1	D	46	GLU	CD-OE2	5.03	1.31	1.25

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	175	ARG	NE-CZ-NH2	-13.46	113.57	120.30
1	A	175	ARG	NE-CZ-NH2	-11.04	114.78	120.30
1	B	94	GLU	OE1-CD-OE2	-10.97	110.13	123.30
1	B	93	ASP	CB-CG-OD2	9.83	127.15	118.30
1	B	175	ARG	NE-CZ-NH1	9.81	125.20	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	287	LEU	CA-CB-CG	9.75	137.72	115.30
1	A	175	ARG	NE-CZ-NH1	9.72	125.16	120.30
1	B	93	ASP	CB-CG-OD1	8.78	126.20	118.30
1	B	93	ASP	OD1-CG-OD2	-8.77	106.64	123.30
1	D	287	LEU	CA-CB-CG	8.54	134.94	115.30
1	D	175	ARG	NE-CZ-NH2	-7.53	116.53	120.30
1	C	175	ARG	NE-CZ-NH2	-6.87	116.87	120.30
1	B	208	LEU	CA-CB-CG	6.61	130.50	115.30
1	C	175	ARG	NE-CZ-NH1	6.35	123.47	120.30
1	B	99	LEU	CA-CB-CG	6.03	129.18	115.30
1	A	82	ASP	CB-CG-OD1	5.86	123.58	118.30
1	D	175	ARG	NE-CZ-NH1	5.86	123.23	120.30
1	D	111	ASP	CB-CG-OD2	-5.85	113.04	118.30
1	D	93	ASP	CB-CG-OD1	5.70	123.43	118.30
1	C	121	ARG	NE-CZ-NH2	-5.50	117.55	120.30
1	C	99	LEU	CA-CB-CG	5.43	127.80	115.30
1	D	94	GLU	OE1-CD-OE2	-5.36	116.86	123.30
1	B	302	ARG	NE-CZ-NH2	-5.04	117.78	120.30

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	2886	0	2800	39	0
1	B	2883	0	2797	51	0
1	C	2868	0	2771	39	0
1	D	2859	0	2761	42	0
2	A	53	0	31	4	0
2	B	53	0	31	3	0
2	C	53	0	31	2	0
2	D	53	0	31	3	0
3	A	66	0	48	3	0
3	B	33	0	24	2	0
3	C	66	0	49	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	99	0	73	7	0
4	A	5	0	0	0	0
4	B	15	0	0	0	0
4	C	15	0	0	0	0
4	D	15	0	0	0	0
5	A	203	0	0	6	0
5	B	189	0	0	10	0
5	C	134	0	0	2	0
5	D	114	0	0	3	0
All	All	12662	0	11447	189	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 8.

All (189) 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:A:269:ASP:HB2	5:A:2163:HOH:O	1.28	1.29
1:A:218:HIS:HD2	5:A:2063:HOH:O	1.43	0.99
1:B:381:THR:HA	5:B:2185:HOH:O	1.64	0.96
1:D:12:ASN:HD21	1:D:341:GLY:CA	1.83	0.92
1:D:12:ASN:HD21	1:D:341:GLY:HA2	1.35	0.91
1:C:333:ILE:HD11	3:C:392:MIY:HN73	1.52	0.91
3:D:392:MIY:O2	3:D:392:MIY:H192	1.70	0.89
1:D:146:LYS:HE2	1:D:147:LYS:H	1.45	0.81
1:A:269:ASP:CB	5:A:2163:HOH:O	2.02	0.80
1:D:139:LEU:HD21	1:D:142:LEU:HD13	1.64	0.79
1:C:139:LEU:HD21	1:C:142:LEU:HD13	1.65	0.78
1:C:146:LYS:HE2	1:C:147:LYS:H	1.50	0.77
1:A:379:ASP:HB3	1:B:65:GLY:O	1.87	0.75
1:B:146:LYS:HE2	1:B:147:LYS:H	1.53	0.74
1:B:174:VAL:HG22	1:B:174:VAL:O	1.87	0.73
1:A:146:LYS:HE2	1:A:147:LYS:H	1.53	0.73
1:A:362:LYS:O	1:A:366:GLU:HG2	1.90	0.71
1:C:250:GLN:N	5:C:2103:HOH:O	2.24	0.70
1:B:322:GLN:OE1	5:B:2176:HOH:O	2.09	0.69
1:C:174:VAL:HG22	1:C:174:VAL:O	1.92	0.69
1:C:362:LYS:O	1:C:366:GLU:HG2	1.92	0.69
1:B:244:GLU:H	1:B:244:GLU:CD	1.96	0.69
1:C:333:ILE:HD11	3:C:392:MIY:CN7	2.23	0.68
1:D:93:ASP:HB3	1:D:99:LEU:HD11	1.75	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:340:ASP:C	1:D:342:LYS:H	1.97	0.68
1:B:321:GLY:O	5:B:2174:HOH:O	2.10	0.68
1:A:99:LEU:HB3	1:B:359:ILE:HG23	1.75	0.67
1:A:99:LEU:HD22	1:B:359:ILE:O	1.94	0.67
1:D:362:LYS:O	1:D:366:GLU:HG2	1.94	0.67
1:D:51:ARG:HG2	5:D:2017:HOH:O	1.94	0.67
1:B:340:ASP:C	1:B:342:LYS:H	1.98	0.66
1:A:372:GLU:O	1:A:376:PHE:HD2	1.79	0.66
1:A:340:ASP:C	1:A:342:LYS:H	1.99	0.65
1:B:139:LEU:HD21	1:B:142:LEU:HD13	1.79	0.65
1:C:208:LEU:HD12	1:C:214:LEU:HD11	1.79	0.65
1:D:174:VAL:O	1:D:174:VAL:HG22	1.96	0.65
3:D:392:MIY:O2	3:D:392:MIY:C19	2.43	0.65
1:D:271:ASP:OD1	1:D:273:ARG:HD3	1.97	0.65
1:C:340:ASP:C	1:C:342:LYS:H	2.00	0.64
1:A:174:VAL:O	1:A:174:VAL:HG22	1.97	0.64
1:C:295:GLU:HG3	1:C:296:LYS:HG2	1.79	0.64
1:C:93:ASP:HB3	1:C:99:LEU:HD21	1.81	0.63
3:D:393:MIY:C8	3:D:393:MIY:H712	2.30	0.62
1:A:263:LEU:HB3	1:A:278:ILE:HD13	1.82	0.62
1:B:263:LEU:HB3	1:B:278:ILE:HD13	1.81	0.62
1:C:217:SER:HB2	1:C:382:PHE:CE2	2.35	0.62
1:D:208:LEU:HD12	1:D:214:LEU:HD11	1.83	0.61
1:B:271:ASP:OD1	1:B:273:ARG:HD3	2.01	0.61
1:D:381:THR:HG23	5:D:2110:HOH:O	2.01	0.61
1:D:358:PHE:O	1:D:362:LYS:HB2	2.01	0.60
2:D:389:FAD:N1	2:D:389:FAD:H2'	2.15	0.60
1:A:358:PHE:O	1:A:362:LYS:HB2	2.00	0.60
1:D:12:ASN:ND2	1:D:341:GLY:CA	2.62	0.60
1:A:139:LEU:HD21	1:A:142:LEU:HD13	1.84	0.59
1:C:271:ASP:OD1	1:C:273:ARG:HD3	2.02	0.59
1:B:358:PHE:O	1:B:362:LYS:HB2	2.01	0.59
1:A:195:ILE:HD12	1:A:277:LEU:HD12	1.85	0.58
1:B:142:LEU:HD22	1:B:174:VAL:CG2	2.34	0.58
1:A:271:ASP:OD1	1:A:273:ARG:HD3	2.03	0.58
2:B:389:FAD:H2'	2:B:389:FAD:N1	2.19	0.58
1:C:195:ILE:HD12	1:C:277:LEU:HD12	1.86	0.57
1:D:217:SER:HB2	1:D:382:PHE:CE2	2.39	0.57
1:B:217:SER:HB2	1:B:382:PHE:CE2	2.39	0.57
1:B:372:GLU:O	1:B:376:PHE:HD2	1.88	0.56
2:C:389:FAD:H2'	2:C:389:FAD:N1	2.19	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:358:PHE:O	1:C:362:LYS:HB2	2.05	0.56
1:D:295:GLU:HG3	1:D:296:LYS:HG2	1.87	0.56
1:B:208:LEU:HD12	1:B:214:LEU:HD11	1.87	0.55
1:B:243:ASP:CB	5:B:2147:HOH:O	2.55	0.55
1:C:333:ILE:CD1	3:C:392:MIY:HN73	2.32	0.55
1:A:274:TYR:O	1:A:277:LEU:HB3	2.07	0.55
1:A:93:ASP:HB3	1:A:99:LEU:HD11	1.89	0.54
1:B:243:ASP:HA	5:B:2147:HOH:O	2.05	0.54
1:B:295:GLU:HG3	1:B:296:LYS:HG2	1.89	0.54
3:C:392:MIY:O5	3:C:392:MIY:O6	2.24	0.54
1:A:204:GLY:HA3	1:A:273:ARG:HG2	1.91	0.53
1:A:295:GLU:HG3	1:A:296:LYS:HG2	1.90	0.53
1:D:105:LYS:HD2	1:D:108:ASN:ND2	2.24	0.53
1:A:142:LEU:HD22	1:A:174:VAL:CG2	2.39	0.52
1:A:379:ASP:CG	1:A:379:ASP:O	2.47	0.52
1:C:204:GLY:HA3	1:C:273:ARG:HG2	1.92	0.52
1:A:64:LYS:NZ	5:A:2039:HOH:O	2.41	0.52
1:B:274:TYR:O	1:B:277:LEU:HB3	2.09	0.52
1:A:217:SER:HB2	1:A:382:PHE:CE1	2.45	0.51
1:C:324:VAL:HG12	2:C:389:FAD:O2	2.10	0.51
3:A:392:MIY:HN72	3:C:392:MIY:N2	2.26	0.50
1:A:229:ASN:ND2	5:A:2028:HOH:O	2.39	0.50
3:D:393:MIY:H712	3:D:393:MIY:H81	1.94	0.50
1:B:362:LYS:O	1:B:366:GLU:HG2	2.11	0.49
1:A:100:SER:HB2	1:B:359:ILE:HG12	1.94	0.49
1:D:274:TYR:O	1:D:277:LEU:HB3	2.11	0.49
1:A:377:LYS:HB2	1:A:377:LYS:NZ	2.28	0.49
1:D:340:ASP:C	1:D:342:LYS:N	2.66	0.49
2:A:389:FAD:H2'	2:A:389:FAD:N1	2.28	0.49
1:D:204:GLY:HA3	1:D:273:ARG:HG2	1.95	0.49
1:B:245:TRP:O	5:B:2148:HOH:O	2.20	0.48
1:B:340:ASP:C	1:B:342:LYS:N	2.66	0.48
1:A:208:LEU:HD12	1:A:214:LEU:HD11	1.96	0.48
1:C:174:VAL:O	1:C:174:VAL:CG2	2.60	0.48
1:D:12:ASN:CG	1:D:13:LEU:H	2.17	0.48
1:B:166:LEU:HB2	1:B:308:MET:HG2	1.96	0.48
1:C:72:LYS:CG	1:C:77:LEU:HD22	2.44	0.48
1:C:195:ILE:HD13	1:C:280:THR:CG2	2.44	0.47
1:D:208:LEU:HD23	1:D:273:ARG:NH2	2.29	0.47
1:D:324:VAL:HG12	2:D:389:FAD:O2	2.14	0.47
1:B:195:ILE:HD12	1:B:277:LEU:HD12	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:340:ASP:C	1:C:342:LYS:N	2.68	0.47
1:B:93:ASP:HB3	1:B:99:LEU:HD21	1.96	0.47
1:A:380:PHE:CZ	1:A:382:PHE:HA	2.49	0.47
1:D:263:LEU:HB3	1:D:278:ILE:HD13	1.97	0.47
1:B:51:ARG:HB3	1:B:135:TRP:CZ2	2.50	0.47
1:A:340:ASP:C	1:A:342:LYS:N	2.68	0.47
1:B:204:GLY:HA3	1:B:273:ARG:HG2	1.97	0.47
1:D:95:LYS:HE3	5:D:2037:HOH:O	2.15	0.46
1:D:195:ILE:HD12	1:D:277:LEU:HD12	1.96	0.46
1:C:342:LYS:HG3	5:C:2123:HOH:O	2.15	0.46
1:C:222:LEU:N	1:C:222:LEU:HD12	2.31	0.46
1:B:243:ASP:CA	5:B:2147:HOH:O	2.63	0.46
1:C:380:PHE:CZ	1:C:382:PHE:HA	2.51	0.46
1:C:208:LEU:HD12	1:C:214:LEU:CD1	2.46	0.46
1:C:51:ARG:HB3	1:C:135:TRP:CZ2	2.51	0.45
3:D:393:MIY:O5	3:D:393:MIY:O6	2.33	0.45
1:B:93:ASP:OD1	1:B:97:ASN:HB2	2.16	0.45
1:C:375:MET:HE3	1:C:375:MET:HB3	1.62	0.45
1:C:107:GLU:H	1:C:107:GLU:HG3	1.34	0.45
1:D:208:LEU:HD12	1:D:214:LEU:CD1	2.46	0.45
1:D:333:ILE:HD11	3:D:393:MIY:H713	1.98	0.45
1:D:51:ARG:HB3	1:D:135:TRP:CZ2	2.52	0.45
1:D:107:GLU:H	1:D:107:GLU:HG3	1.31	0.45
1:D:375:MET:HB3	1:D:375:MET:HE3	1.57	0.45
1:B:375:MET:HB3	1:B:375:MET:HE2	1.62	0.44
3:C:391:MIY:H5	3:C:391:MIY:H203	1.77	0.44
1:D:372:GLU:O	1:D:376:PHE:HD2	2.00	0.44
1:B:174:VAL:O	1:B:174:VAL:CG2	2.57	0.44
1:B:261:ASP:OD1	5:B:2151:HOH:O	2.21	0.44
2:B:389:FAD:H1'1	2:B:389:FAD:H9	1.75	0.44
1:B:227:PRO:HA	1:B:233:LEU:HD12	2.00	0.44
1:A:195:ILE:HD13	1:A:280:THR:CG2	2.48	0.44
1:C:27:VAL:HG12	1:C:309:ILE:HD12	2.00	0.43
1:D:222:LEU:HD22	1:D:375:MET:HE3	2.00	0.43
3:B:391:MIY:O5	3:B:391:MIY:O6	2.35	0.43
1:C:263:LEU:HB3	1:C:278:ILE:HD13	2.00	0.43
1:A:314:HIS:O	1:A:315:LEU:C	2.56	0.43
3:A:391:MIY:O5	3:A:391:MIY:O6	2.35	0.43
1:B:107:GLU:H	1:B:107:GLU:HG3	1.31	0.43
1:B:22:ILE:HG13	1:B:139:LEU:HD22	2.00	0.43
1:B:208:LEU:HD12	1:B:214:LEU:CD1	2.49	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:208:LEU:HD23	1:C:273:ARG:NH2	2.34	0.43
1:C:221:ASN:HD22	1:C:239:PHE:HB3	1.84	0.43
1:B:146:LYS:H	1:B:146:LYS:HG3	1.38	0.43
1:C:72:LYS:HG3	1:C:77:LEU:HD22	2.00	0.43
2:D:389:FAD:H9	2:D:389:FAD:H1'1	1.79	0.43
2:A:389:FAD:H6	3:A:391:MIY:C19	2.48	0.43
1:D:142:LEU:HD12	1:D:142:LEU:HA	1.88	0.43
3:B:391:MIY:H203	3:B:391:MIY:H5	1.74	0.42
1:B:195:ILE:HD13	1:B:280:THR:CG2	2.49	0.42
1:B:245:TRP:HA	1:B:250:GLN:HE21	1.85	0.42
1:C:110:PHE:CD1	1:C:110:PHE:N	2.88	0.42
1:A:51:ARG:HB3	1:A:135:TRP:CZ2	2.54	0.42
1:D:174:VAL:O	1:D:174:VAL:CG2	2.67	0.42
1:C:254:GLN:HE21	1:C:254:GLN:HB3	1.72	0.42
1:B:221:ASN:HD22	1:B:239:PHE:HB3	1.84	0.42
1:A:195:ILE:CD1	1:A:277:LEU:HD12	2.48	0.42
1:A:218:HIS:HE1	1:A:269:ASP:OD2	2.02	0.42
1:C:372:GLU:O	1:C:376:PHE:HD2	2.02	0.42
1:D:254:GLN:HE21	1:D:254:GLN:HB3	1.73	0.42
1:A:142:LEU:HD22	1:A:174:VAL:HG22	2.02	0.42
1:A:107:GLU:H	1:A:107:GLU:HG3	1.20	0.42
1:D:363:GLU:OE1	3:D:393:MIY:O6	2.37	0.41
1:D:380:PHE:CZ	1:D:382:PHE:HA	2.55	0.41
1:B:13:LEU:H	1:B:13:LEU:HG	1.72	0.41
1:D:149:TRP:O	1:D:160:THR:HA	2.20	0.41
1:B:64:LYS:NZ	5:B:2037:HOH:O	2.40	0.41
1:C:142:LEU:HD12	1:C:142:LEU:HA	1.88	0.41
1:C:68:GLN:NE2	1:C:81:TYR:OH	2.53	0.41
2:A:389:FAD:H9	5:A:2185:HOH:O	2.21	0.41
1:B:244:GLU:O	1:B:250:GLN:HG2	2.20	0.41
1:D:295:GLU:HG3	1:D:296:LYS:H	1.85	0.41
1:A:362:LYS:O	1:A:366:GLU:CG	2.65	0.41
1:D:263:LEU:HA	1:D:263:LEU:HD23	1.87	0.41
1:B:244:GLU:CD	1:B:244:GLU:N	2.71	0.41
2:B:389:FAD:H9	5:B:2170:HOH:O	2.21	0.41
1:B:94:GLU:OE1	1:B:94:GLU:N	2.52	0.40
1:D:194:ASP:HA	1:D:233:LEU:O	2.21	0.40
3:C:392:MIY:H203	3:C:392:MIY:H5	1.68	0.40
1:A:375:MET:CE	1:A:376:PHE:CE2	3.05	0.40
2:A:389:FAD:H9	2:A:389:FAD:H1'1	1.81	0.40
1:B:32:ALA:HB2	1:B:44:VAL:CG2	2.51	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:309:ILE:HD13	1:B:309:ILE:HG21	1.91	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	364/398 (92%)	352 (97%)	11 (3%)	1 (0%)	41	43
1	B	364/398 (92%)	350 (96%)	12 (3%)	2 (0%)	29	28
1	C	363/398 (91%)	348 (96%)	14 (4%)	1 (0%)	41	43
1	D	363/398 (91%)	348 (96%)	14 (4%)	1 (0%)	41	43
All	All	1454/1592 (91%)	1398 (96%)	51 (4%)	5 (0%)	41	43

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	13	LEU
1	A	341	GLY
1	B	341	GLY
1	D	341	GLY
1	C	341	GLY

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	312/345 (90%)	299 (96%)	13 (4%)	30	35
1	B	310/345 (90%)	298 (96%)	12 (4%)	32	38
1	C	307/345 (89%)	296 (96%)	11 (4%)	35	42
1	D	305/345 (88%)	296 (97%)	9 (3%)	41	49
All	All	1234/1380 (89%)	1189 (96%)	45 (4%)	35	42

All (45) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	107	GLU
1	A	146	LYS
1	A	208	LEU
1	A	243	ASP
1	A	249	THR
1	A	254	GLN
1	A	269	ASP
1	A	276	GLU
1	A	287	LEU
1	A	351	LYS
1	A	362	LYS
1	A	377	LYS
1	A	381	THR
1	B	12	ASN
1	B	107	GLU
1	B	142	LEU
1	B	146	LYS
1	B	208	LEU
1	B	251	VAL
1	B	254	GLN
1	B	269	ASP
1	B	287	LEU
1	B	353	TYR
1	B	362	LYS
1	B	381	THR
1	C	107	GLU
1	C	110	PHE
1	C	146	LYS
1	C	208	LEU
1	C	254	GLN
1	C	269	ASP
1	C	276	GLU
1	C	287	LEU

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Mol	Chain	Res	Type
1	C	362	LYS
1	C	379	ASP
1	C	381	THR
1	D	99	LEU
1	D	107	GLU
1	D	146	LYS
1	D	208	LEU
1	D	254	GLN
1	D	269	ASP
1	D	276	GLU
1	D	287	LEU
1	D	381	THR

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	68	GLN
1	A	78	GLN
1	A	130	ASN
1	A	190	ASN
1	A	218	HIS
1	A	221	ASN
1	A	254	GLN
1	A	370	GLN
1	A	371	ASN
1	B	108	ASN
1	B	130	ASN
1	B	190	ASN
1	B	221	ASN
1	B	250	GLN
1	B	254	GLN
1	B	370	GLN
1	B	371	ASN
1	C	12	ASN
1	C	68	GLN
1	C	130	ASN
1	C	190	ASN
1	C	218	HIS
1	C	221	ASN
1	C	254	GLN
1	C	279	HIS
1	C	371	ASN

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Mol	Chain	Res	Type
1	D	12	ASN
1	D	108	ASN
1	D	130	ASN
1	D	190	ASN
1	D	221	ASN
1	D	254	GLN

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](#)

22 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$
4	SO4	B	1384	-	4,4,4	0.36	0	6,6,6	0.22	0
3	MIY	A	392	-	35,36,36	1.31	4 (11%)	41,58,58	2.24	12 (29%)
4	SO4	A	1383	-	4,4,4	0.38	0	6,6,6	0.23	0
4	SO4	D	1383	-	4,4,4	0.58	0	6,6,6	0.33	0
3	MIY	C	391	-	35,36,36	1.08	0	41,58,58	1.80	10 (24%)
2	FAD	C	389	-	53,58,58	1.42	6 (11%)	68,89,89	2.30	13 (19%)
2	FAD	B	389	-	53,58,58	1.43	8 (15%)	68,89,89	2.25	12 (17%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	SO4	B	1383	-	4,4,4	0.44	0	6,6,6	0.38	0
3	MIY	D	392	-	35,36,36	1.40	6 (17%)	41,58,58	2.37	15 (36%)
2	FAD	A	389	-	53,58,58	1.30	6 (11%)	68,89,89	1.58	12 (17%)
3	MIY	D	393	-	35,36,36	1.08	3 (8%)	41,58,58	2.45	15 (36%)
4	SO4	D	1384	-	4,4,4	0.33	0	6,6,6	0.28	0
3	MIY	C	392	-	35,36,36	1.51	7 (20%)	41,58,58	2.37	12 (29%)
4	SO4	C	1384	-	4,4,4	0.38	0	6,6,6	0.36	0
4	SO4	B	1385	-	4,4,4	0.43	0	6,6,6	0.25	0
2	FAD	D	389	-	53,58,58	1.40	6 (11%)	68,89,89	2.31	15 (22%)
3	MIY	B	391	-	35,36,36	1.25	5 (14%)	41,58,58	1.67	10 (24%)
4	SO4	D	1385	-	4,4,4	0.43	0	6,6,6	0.28	0
3	MIY	A	391	-	35,36,36	1.41	4 (11%)	41,58,58	1.66	10 (24%)
3	MIY	D	391	-	35,36,36	1.08	2 (5%)	41,58,58	1.79	10 (24%)
4	SO4	C	1383	-	4,4,4	0.57	0	6,6,6	0.20	0
4	SO4	C	1385	-	4,4,4	0.31	0	6,6,6	0.21	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	MIY	A	391	-	-	0/12/70/70	0/4/4/4
3	MIY	D	391	-	-	0/12/70/70	0/4/4/4
3	MIY	C	392	-	-	1/12/70/70	0/4/4/4
2	FAD	C	389	-	-	5/30/50/50	0/6/6/6
3	MIY	A	392	-	-	0/12/70/70	0/4/4/4
3	MIY	C	391	-	-	0/12/70/70	0/4/4/4
2	FAD	D	389	-	-	5/30/50/50	0/6/6/6
2	FAD	B	389	-	-	5/30/50/50	0/6/6/6
3	MIY	D	392	-	-	1/12/70/70	0/4/4/4
2	FAD	A	389	-	-	4/30/50/50	0/6/6/6
3	MIY	D	393	-	-	1/12/70/70	0/4/4/4
3	MIY	B	391	-	-	0/12/70/70	0/4/4/4

All (57) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	389	FAD	C4X-N5	4.93	1.40	1.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	389	FAD	C4X-N5	4.73	1.39	1.30
2	B	389	FAD	C4X-N5	4.72	1.39	1.30
2	A	389	FAD	C4X-N5	4.67	1.39	1.30
3	A	392	MIY	C18-C5	4.64	1.57	1.53
2	D	389	FAD	C10-N1	3.97	1.41	1.33
3	A	391	MIY	C18-C5	3.93	1.56	1.53
2	C	389	FAD	C10-N1	3.81	1.41	1.33
2	D	389	FAD	O5'-C5'	-3.74	1.30	1.44
2	B	389	FAD	O5'-C5'	-3.66	1.30	1.44
2	C	389	FAD	C2A-N1A	3.65	1.40	1.33
3	C	392	MIY	C18-C5	3.64	1.56	1.53
3	C	392	MIY	C16-C17	-3.59	1.31	1.36
2	C	389	FAD	C2A-N3A	3.51	1.37	1.32
2	C	389	FAD	O5'-C5'	-3.41	1.31	1.44
2	D	389	FAD	C2A-N3A	3.39	1.37	1.32
3	A	391	MIY	C6-C5	-3.29	1.48	1.53
2	B	389	FAD	C10-N1	2.98	1.39	1.33
3	D	391	MIY	C18-C5	2.96	1.55	1.53
3	D	393	MIY	O5-C15	2.90	1.29	1.23
2	A	389	FAD	C2A-N3A	2.90	1.36	1.32
3	D	392	MIY	O7-C18	2.78	1.46	1.42
2	A	389	FAD	O5'-C5'	-2.75	1.34	1.44
2	B	389	FAD	O4'-C4'	2.75	1.49	1.43
2	B	389	FAD	C2A-N1A	2.69	1.38	1.33
3	A	391	MIY	C18-C1	-2.69	1.51	1.55
3	C	392	MIY	O5-C15	2.63	1.28	1.23
3	D	392	MIY	C18-C1	-2.63	1.51	1.55
2	B	389	FAD	C2B-C1B	-2.62	1.49	1.53
2	A	389	FAD	O4B-C4B	-2.61	1.39	1.45
3	B	391	MIY	C18-C5	2.61	1.55	1.53
3	D	392	MIY	C14-C13	-2.60	1.37	1.41
2	D	389	FAD	C2A-N1A	2.54	1.38	1.33
3	C	392	MIY	C18-C17	2.52	1.54	1.52
2	A	389	FAD	C2B-C1B	-2.46	1.50	1.53
3	B	391	MIY	C18-C1	-2.45	1.51	1.55
3	D	392	MIY	C14-C15	2.42	1.52	1.46
3	A	392	MIY	C7-C16	2.40	1.54	1.51
3	A	391	MIY	C14-C15	2.39	1.52	1.46
3	D	392	MIY	C4-C3	2.35	1.56	1.51
3	A	392	MIY	C14-C15	2.34	1.52	1.46
3	D	391	MIY	C6-C5	-2.29	1.49	1.53
3	A	392	MIY	O5-C15	2.29	1.28	1.23

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	391	MIY	C11-C10	2.20	1.43	1.39
2	D	389	FAD	O2'-C2'	-2.19	1.38	1.43
2	B	389	FAD	C2A-N3A	2.19	1.35	1.32
3	C	392	MIY	O7-C18	2.18	1.45	1.42
2	C	389	FAD	O2'-C2'	-2.16	1.38	1.43
3	C	392	MIY	C4-C3	2.15	1.56	1.51
3	D	392	MIY	O1-C1	2.14	1.26	1.22
2	B	389	FAD	C4X-C4	-2.14	1.36	1.44
3	D	393	MIY	C14-C9	2.12	1.44	1.40
3	D	393	MIY	O1-C1	2.12	1.26	1.22
3	B	391	MIY	C10-C9	2.11	1.43	1.40
2	A	389	FAD	O2-C2	-2.08	1.20	1.24
3	B	391	MIY	C14-C15	2.06	1.51	1.46
3	C	392	MIY	C19-N1	2.05	1.53	1.46

All (146) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	389	FAD	C5'-C4'-C3'	-13.47	86.19	112.20
2	C	389	FAD	C5'-C4'-C3'	-13.07	86.95	112.20
2	B	389	FAD	C5'-C4'-C3'	-12.73	87.62	112.20
3	D	393	MIY	C9-C10-N7	8.73	129.57	118.91
2	D	389	FAD	N3A-C2A-N1A	-7.36	117.18	128.68
3	C	392	MIY	O6-C17-C16	-6.77	114.63	123.90
2	A	389	FAD	N3A-C2A-N1A	-6.74	118.14	128.68
2	C	389	FAD	N3A-C2A-N1A	-6.58	118.39	128.68
3	C	392	MIY	C20-N1-C4	-6.45	98.95	114.09
2	B	389	FAD	N3A-C2A-N1A	-6.36	118.74	128.68
3	D	391	MIY	C20-N1-C4	-5.73	100.63	114.09
3	D	392	MIY	O7-C18-C5	5.68	117.08	110.09
3	C	391	MIY	C20-N1-C4	-5.65	100.83	114.09
3	C	392	MIY	O6-C17-C18	5.60	121.47	113.37
3	D	393	MIY	C11-C10-N7	-5.58	113.70	121.59
3	D	392	MIY	C18-C5-C4	5.26	118.83	111.64
3	A	392	MIY	C5-C18-C1	-5.25	105.03	111.05
3	A	392	MIY	O7-C18-C5	5.20	116.49	110.09
3	D	392	MIY	C21-C2-C1	-5.12	114.91	120.97
3	A	392	MIY	C7-C6-C5	-5.03	101.64	110.49
2	B	389	FAD	O4-C4-C4X	-4.53	114.59	126.60
3	A	392	MIY	C1-C18-C17	-4.44	104.69	109.88
3	D	392	MIY	C20-N1-C4	-4.36	103.85	114.09
3	A	392	MIY	C20-N1-C4	-4.17	104.29	114.09

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	391	MIY	C20-N1-C4	-4.17	104.30	114.09
3	C	392	MIY	C1-C18-C17	-4.09	105.09	109.88
3	A	391	MIY	C20-N1-C4	-3.98	104.73	114.09
3	D	392	MIY	O8-C21-N2	-3.95	113.63	122.88
3	D	392	MIY	C5-C18-C1	-3.92	106.55	111.05
3	D	391	MIY	O8-C21-N2	-3.84	113.91	122.88
3	C	392	MIY	C19-N1-C4	3.83	123.10	114.09
3	D	393	MIY	C13-C14-C15	-3.80	115.89	121.47
3	A	391	MIY	O8-C21-N2	-3.70	114.23	122.88
2	B	389	FAD	O5'-P-O1P	-3.67	94.74	109.07
3	D	393	MIY	C20-N1-C4	-3.66	105.49	114.09
3	D	392	MIY	C11-C12-C13	-3.65	116.75	120.50
3	B	391	MIY	O6-C17-C16	-3.57	119.01	123.90
3	A	392	MIY	O6-C17-C18	3.54	118.50	113.37
2	A	389	FAD	C5X-C9A-N10	3.48	121.55	117.95
3	D	392	MIY	C71-N7-C10	-3.45	104.47	115.17
3	D	393	MIY	C1-C18-C17	-3.45	105.84	109.88
3	A	391	MIY	C7-C6-C5	-3.44	104.44	110.49
3	D	393	MIY	C13-C14-C9	3.39	122.87	119.05
3	C	391	MIY	C13-C14-C9	3.30	122.77	119.05
3	C	391	MIY	O6-C17-C16	-3.30	119.39	123.90
3	C	391	MIY	O8-C21-N2	-3.29	115.18	122.88
2	B	389	FAD	O4-C4-N3	3.25	126.35	120.12
3	D	393	MIY	O8-C21-N2	-3.18	115.45	122.88
3	D	391	MIY	C7-C6-C5	-3.17	104.92	110.49
3	D	393	MIY	C11-C10-C9	-3.15	116.61	120.47
2	C	389	FAD	C5X-C9A-N10	3.13	121.19	117.95
3	A	392	MIY	C2-C21-N2	3.13	125.09	118.75
3	D	392	MIY	C1-C18-C17	-3.11	106.24	109.88
3	C	392	MIY	O2-C3-C2	-3.02	117.67	122.96
3	D	391	MIY	C2-C21-N2	3.02	124.87	118.75
2	C	389	FAD	O4'-C4'-C3'	3.01	116.41	109.10
3	B	391	MIY	O8-C21-N2	-3.01	115.85	122.88
2	A	389	FAD	O4-C4-C4X	-2.98	118.69	126.60
3	B	391	MIY	C7-C6-C5	-2.98	105.25	110.49
3	B	391	MIY	O7-C18-C5	2.96	113.74	110.09
3	A	392	MIY	C21-C2-C1	-2.95	117.47	120.97
3	A	391	MIY	O7-C18-C17	-2.94	105.44	110.14
3	C	391	MIY	C7-C6-C5	-2.90	105.39	110.49
3	D	392	MIY	C2-C21-N2	2.88	124.59	118.75
2	D	389	FAD	C1B-N9A-C4A	-2.87	121.60	126.64
3	C	392	MIY	C8-C9-C14	2.85	123.10	118.09

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	389	FAD	C1B-N9A-C4A	-2.80	121.72	126.64
2	B	389	FAD	O2-C2-N1	-2.80	117.19	121.83
2	C	389	FAD	C9A-C5X-N5	-2.79	119.39	122.43
2	D	389	FAD	O4-C4-C4X	-2.77	119.25	126.60
2	D	389	FAD	C5X-C9A-N10	2.74	120.79	117.95
3	B	391	MIY	C71-N7-CN7	-2.73	107.33	116.12
2	D	389	FAD	O2-C2-N1	-2.72	117.32	121.83
3	C	392	MIY	O8-C21-N2	-2.72	116.53	122.88
2	D	389	FAD	C4-N3-C2	-2.70	120.66	125.64
2	A	389	FAD	C4-N3-C2	-2.70	120.66	125.64
3	A	392	MIY	O6-C17-C16	-2.69	120.22	123.90
3	C	392	MIY	C2-C21-N2	2.69	124.20	118.75
2	A	389	FAD	C4X-C10-N10	2.67	120.38	116.48
3	B	391	MIY	C1-C18-C17	-2.66	106.77	109.88
2	A	389	FAD	O2-C2-N1	-2.65	117.44	121.83
3	B	391	MIY	O6-C17-C18	2.65	117.20	113.37
2	C	389	FAD	C4-N3-C2	-2.64	120.76	125.64
3	D	391	MIY	O7-C18-C17	-2.63	105.93	110.14
2	C	389	FAD	C2A-N1A-C6A	2.63	123.25	118.75
3	D	393	MIY	C2-C21-N2	2.62	124.07	118.75
3	A	392	MIY	O8-C21-N2	-2.61	116.78	122.88
3	D	393	MIY	C12-C11-C10	2.59	124.51	119.19
3	D	393	MIY	C15-C16-C17	-2.57	116.77	118.80
3	D	392	MIY	O2-C3-C2	-2.56	118.47	122.96
2	C	389	FAD	C4X-C4-N3	2.53	119.61	113.19
3	D	393	MIY	C19-N1-C4	2.50	119.97	114.09
3	C	391	MIY	C13-C14-C15	-2.50	117.81	121.47
3	A	391	MIY	C21-C2-C1	-2.47	118.05	120.97
2	A	389	FAD	O4'-C4'-C3'	2.47	115.09	109.10
3	C	392	MIY	C5-C18-C1	-2.46	108.23	111.05
2	C	389	FAD	O3B-C3B-C4B	-2.43	104.03	111.05
2	D	389	FAD	C4X-C4-N3	2.41	119.32	113.19
3	A	392	MIY	O1-C1-C18	2.41	123.80	119.08
3	A	391	MIY	C71-N7-CN7	-2.41	108.34	116.12
2	C	389	FAD	O5'-P-O1P	-2.41	99.66	109.07
3	D	391	MIY	O6-C17-C16	-2.39	120.63	123.90
3	C	391	MIY	O6-C17-C18	2.37	116.81	113.37
2	D	389	FAD	O4'-C4'-C3'	2.37	114.87	109.10
2	B	389	FAD	C4-N3-C2	-2.37	121.26	125.64
2	A	389	FAD	C1B-N9A-C4A	-2.36	122.50	126.64
3	D	391	MIY	O7-C18-C5	2.33	112.95	110.09
3	A	391	MIY	O7-C18-C5	2.29	112.91	110.09

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	389	FAD	C4X-C4-N3	2.27	118.97	113.19
3	B	391	MIY	C21-C2-C1	-2.27	118.28	120.97
3	A	391	MIY	O6-C17-C18	2.26	116.63	113.37
3	C	391	MIY	O7-C18-C17	-2.24	106.55	110.14
3	C	392	MIY	C8-C9-C10	-2.24	118.10	123.52
3	C	391	MIY	C71-N7-CN7	-2.24	108.91	116.12
2	B	389	FAD	O5B-C5B-C4B	-2.23	101.33	108.99
2	C	389	FAD	O4B-C4B-C3B	2.21	109.48	105.11
3	D	393	MIY	O1-C1-C18	2.20	123.38	119.08
2	A	389	FAD	C2A-N1A-C6A	2.18	122.49	118.75
2	A	389	FAD	C4X-C4-N3	2.18	118.72	113.19
2	C	389	FAD	C8M-C8-C7	2.18	125.20	120.74
3	D	391	MIY	O6-C17-C18	2.16	116.50	113.37
2	D	389	FAD	O2'-C2'-C3'	2.16	114.35	109.10
3	C	392	MIY	CN7-N7-C10	-2.16	108.49	115.17
2	B	389	FAD	O5'-C5'-C4'	2.16	115.12	109.36
2	A	389	FAD	O5'-C5'-C4'	2.11	114.99	109.36
3	D	391	MIY	C15-C16-C17	2.10	120.46	118.80
2	D	389	FAD	C2A-N1A-C6A	2.10	122.34	118.75
2	D	389	FAD	O2B-C2B-C1B	-2.09	103.12	110.85
2	A	389	FAD	O5'-P-O1P	2.09	117.23	109.07
3	D	392	MIY	C13-C14-C15	-2.09	118.41	121.47
3	A	392	MIY	C8-C9-C14	2.09	121.76	118.09
3	D	393	MIY	O2-C3-C2	-2.08	119.31	122.96
3	D	392	MIY	O7-C18-C17	2.06	113.43	110.14
3	A	391	MIY	C2-C21-N2	2.06	122.92	118.75
3	D	391	MIY	C13-C14-C9	2.05	121.36	119.05
2	D	389	FAD	C9-C9A-N10	-2.05	119.06	121.84
3	D	392	MIY	O6-C17-C16	-2.05	121.09	123.90
2	B	389	FAD	C1B-N9A-C4A	-2.05	123.04	126.64
3	B	391	MIY	C2-C21-N2	2.03	122.87	118.75
2	D	389	FAD	C4X-C10-N10	2.03	119.44	116.48
3	D	392	MIY	C11-C10-N7	-2.02	118.73	121.59
3	C	391	MIY	C12-C13-C14	-2.02	117.57	120.17
2	B	389	FAD	O2-C2-N3	2.02	122.57	118.65
3	A	391	MIY	O6-C17-C16	-2.01	121.15	123.90
2	D	389	FAD	C7M-C7-C6	-2.01	115.78	119.49
3	D	393	MIY	C71-N7-CN7	-2.00	109.66	116.12

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	389	FAD	C5'-O5'-P-O2P
2	A	389	FAD	C5'-O5'-P-O3P
2	B	389	FAD	C5'-O5'-P-O3P
2	C	389	FAD	C2'-C1'-N10-C10
2	C	389	FAD	C5'-O5'-P-O2P
2	C	389	FAD	C5'-O5'-P-O3P
2	D	389	FAD	C2'-C1'-N10-C10
2	D	389	FAD	C5'-O5'-P-O3P
2	A	389	FAD	C2'-C1'-N10-C10
2	B	389	FAD	C2'-C1'-N10-C10
2	B	389	FAD	C5'-O5'-P-O2P
2	D	389	FAD	C5'-O5'-P-O2P
3	C	392	MIY	C1-C2-C21-N2
2	A	389	FAD	O4B-C4B-C5B-O5B
2	B	389	FAD	O4B-C4B-C5B-O5B
2	C	389	FAD	O4B-C4B-C5B-O5B
3	D	392	MIY	C5-C4-N1-C19
2	B	389	FAD	C5'-O5'-P-O1P
2	C	389	FAD	C5'-O5'-P-O1P
2	D	389	FAD	C5'-O5'-P-O1P
2	D	389	FAD	O4B-C4B-C5B-O5B
3	D	393	MIY	C9-C10-N7-C71

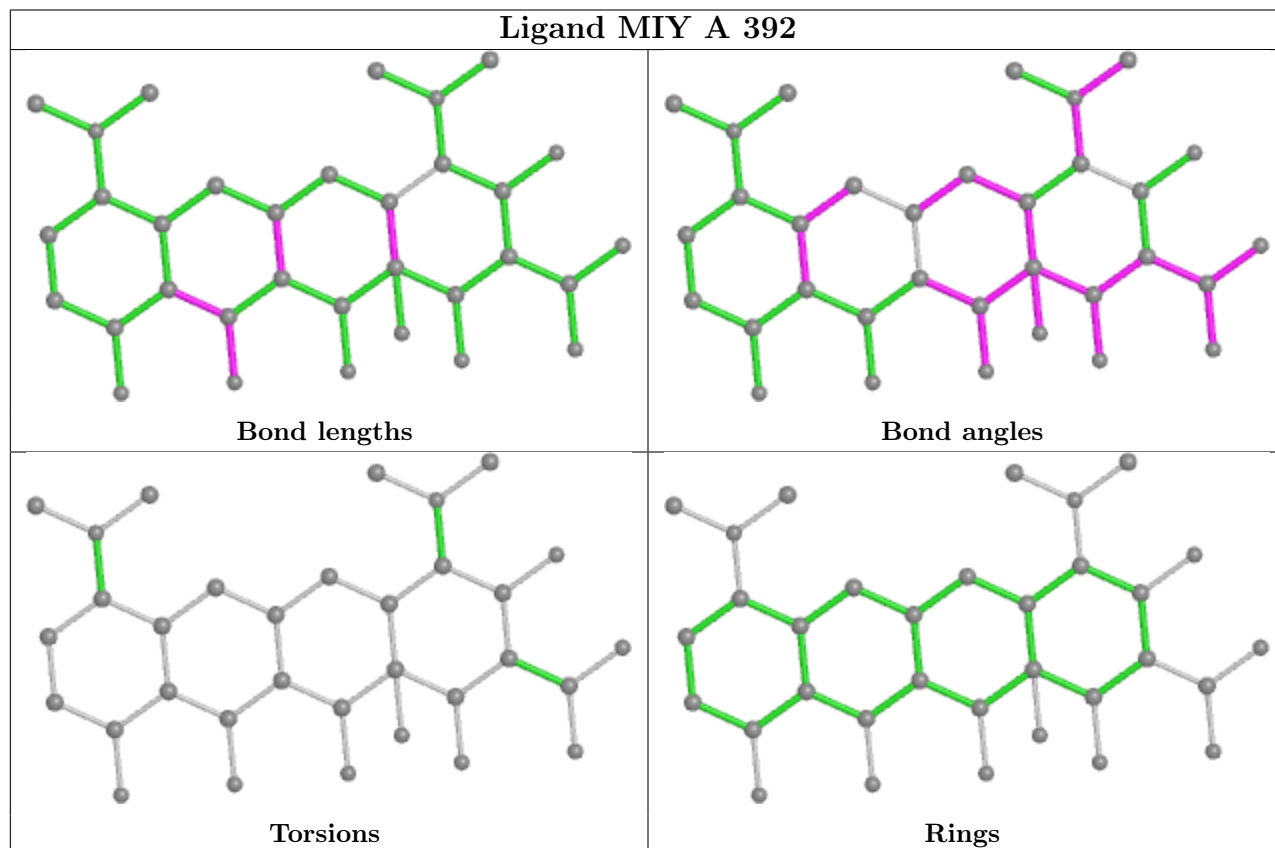
There are no ring outliers.

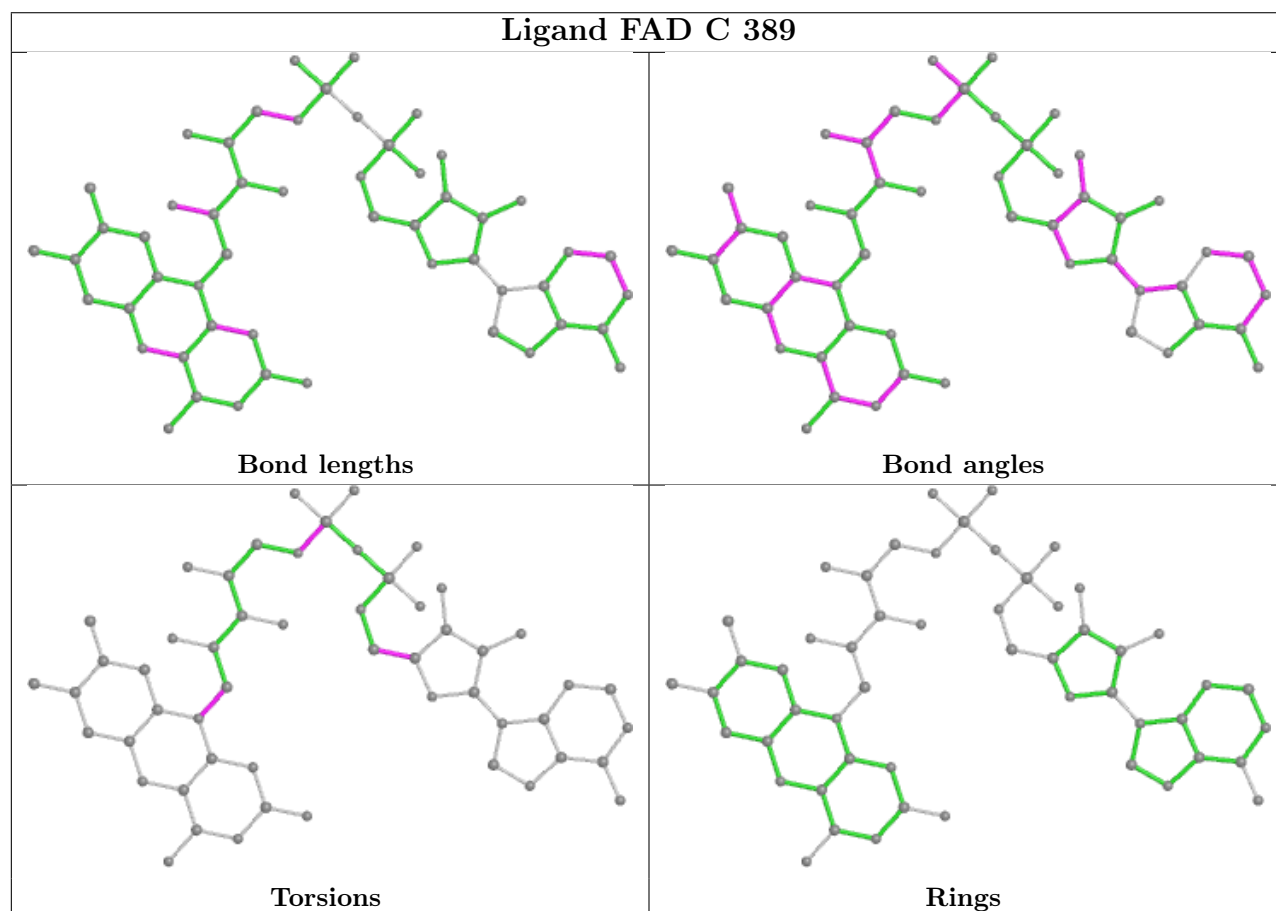
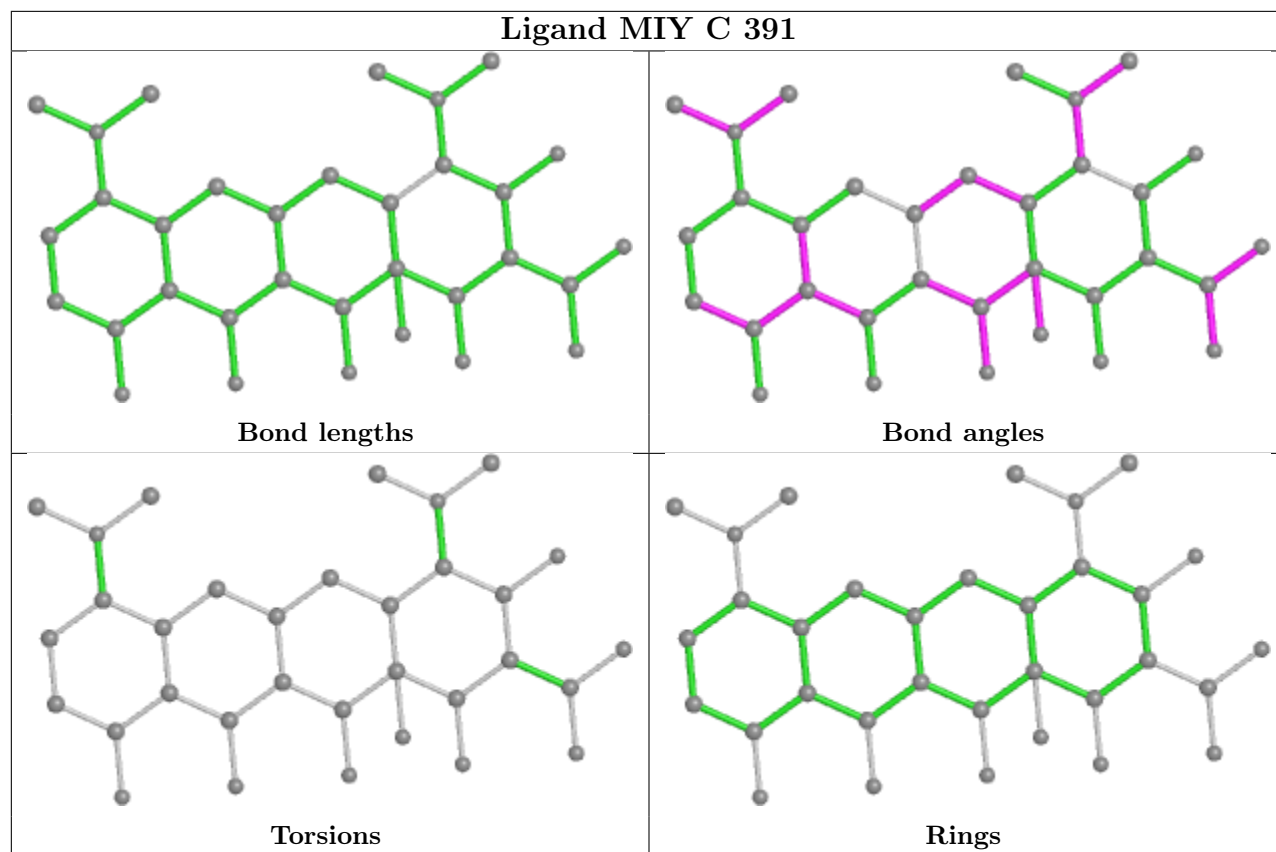
11 monomers are involved in 29 short contacts:

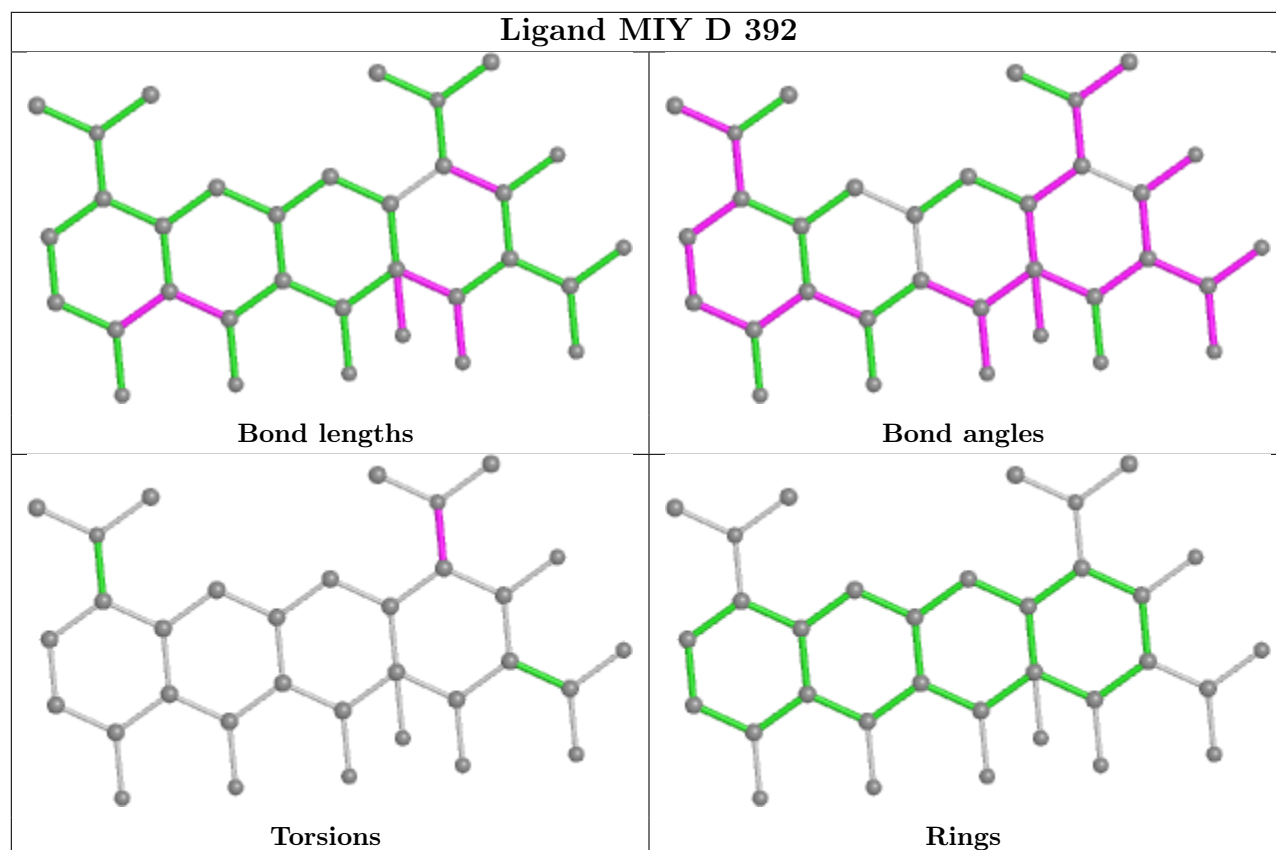
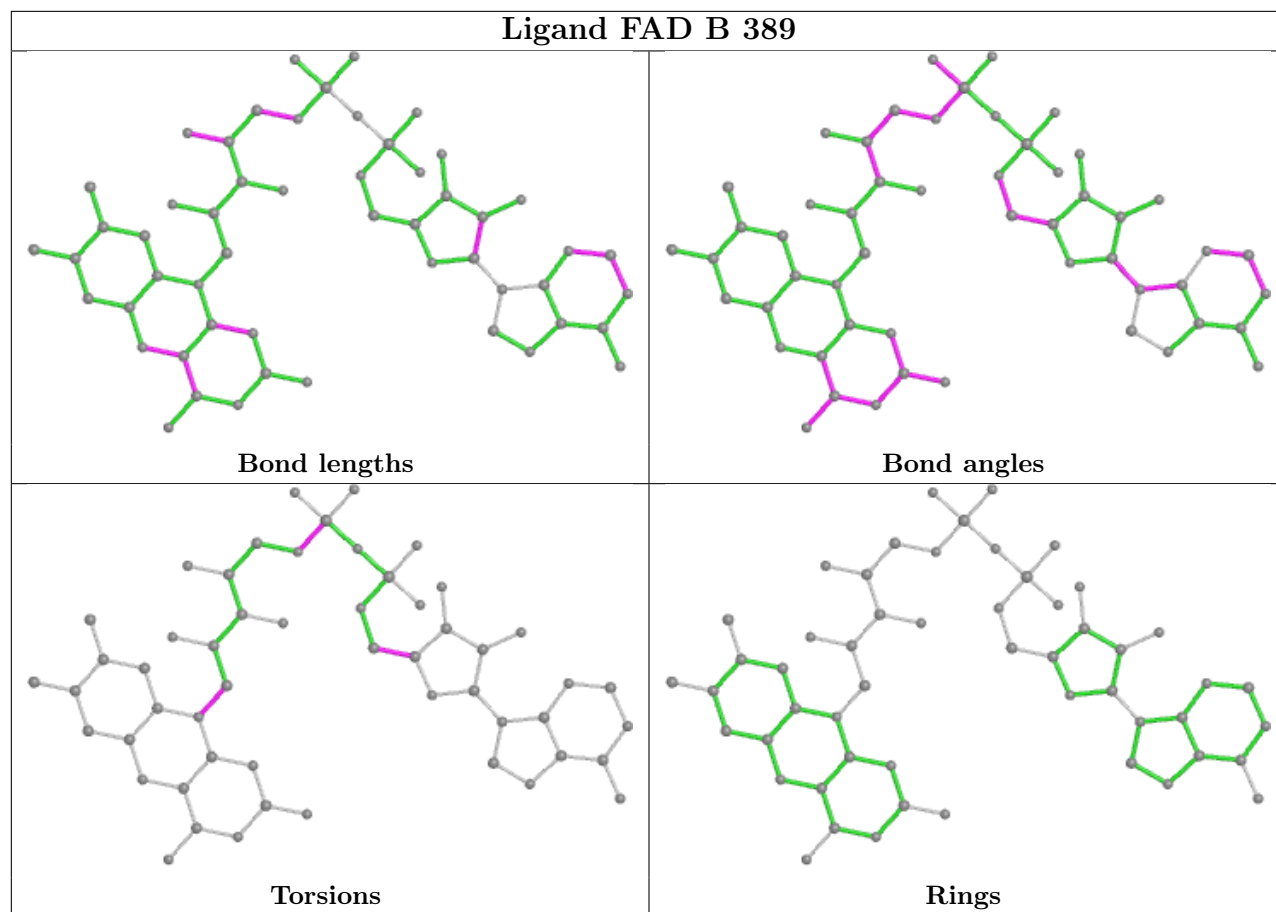
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	392	MIY	1	0
3	C	391	MIY	1	0
2	C	389	FAD	2	0
2	B	389	FAD	3	0
3	D	392	MIY	2	0
2	A	389	FAD	4	0
3	D	393	MIY	5	0
3	C	392	MIY	6	0
2	D	389	FAD	3	0
3	B	391	MIY	2	0
3	A	391	MIY	2	0

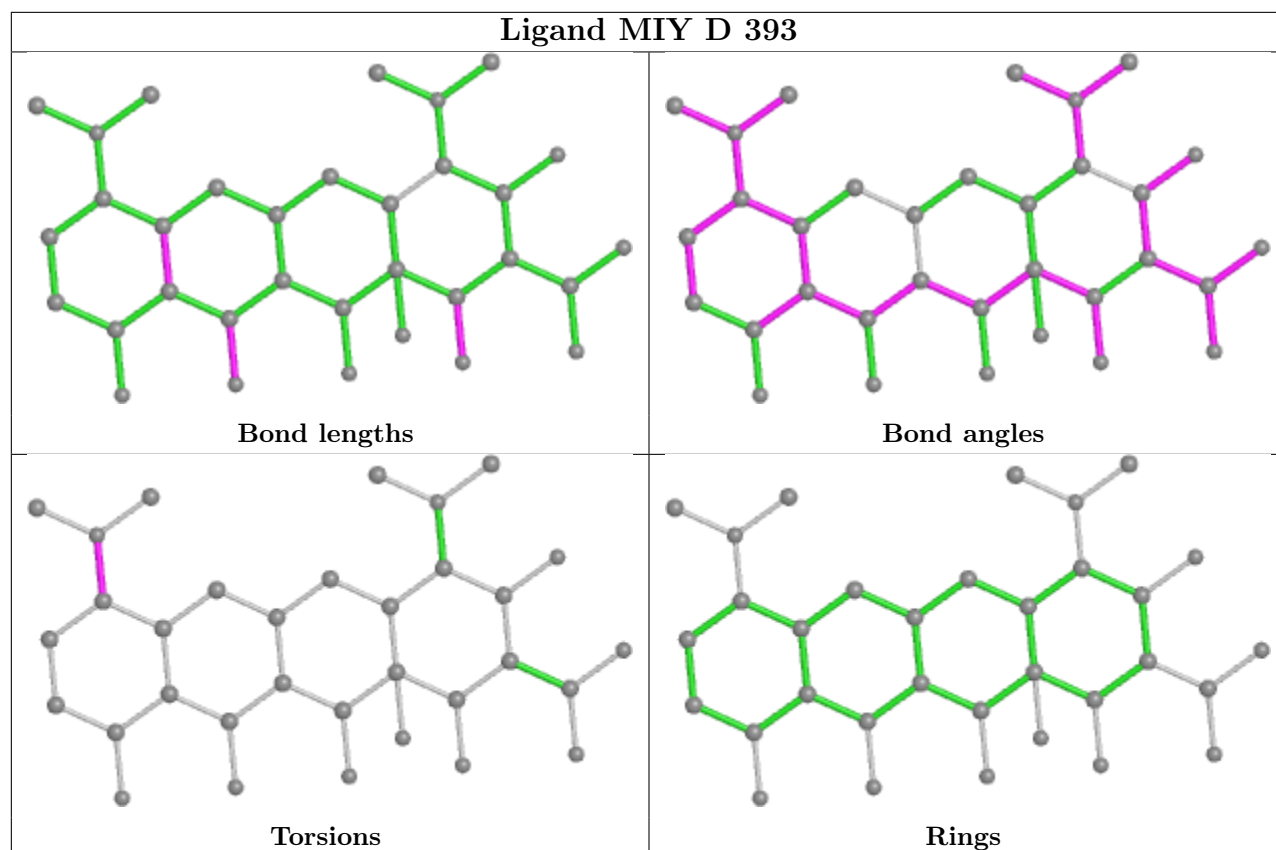
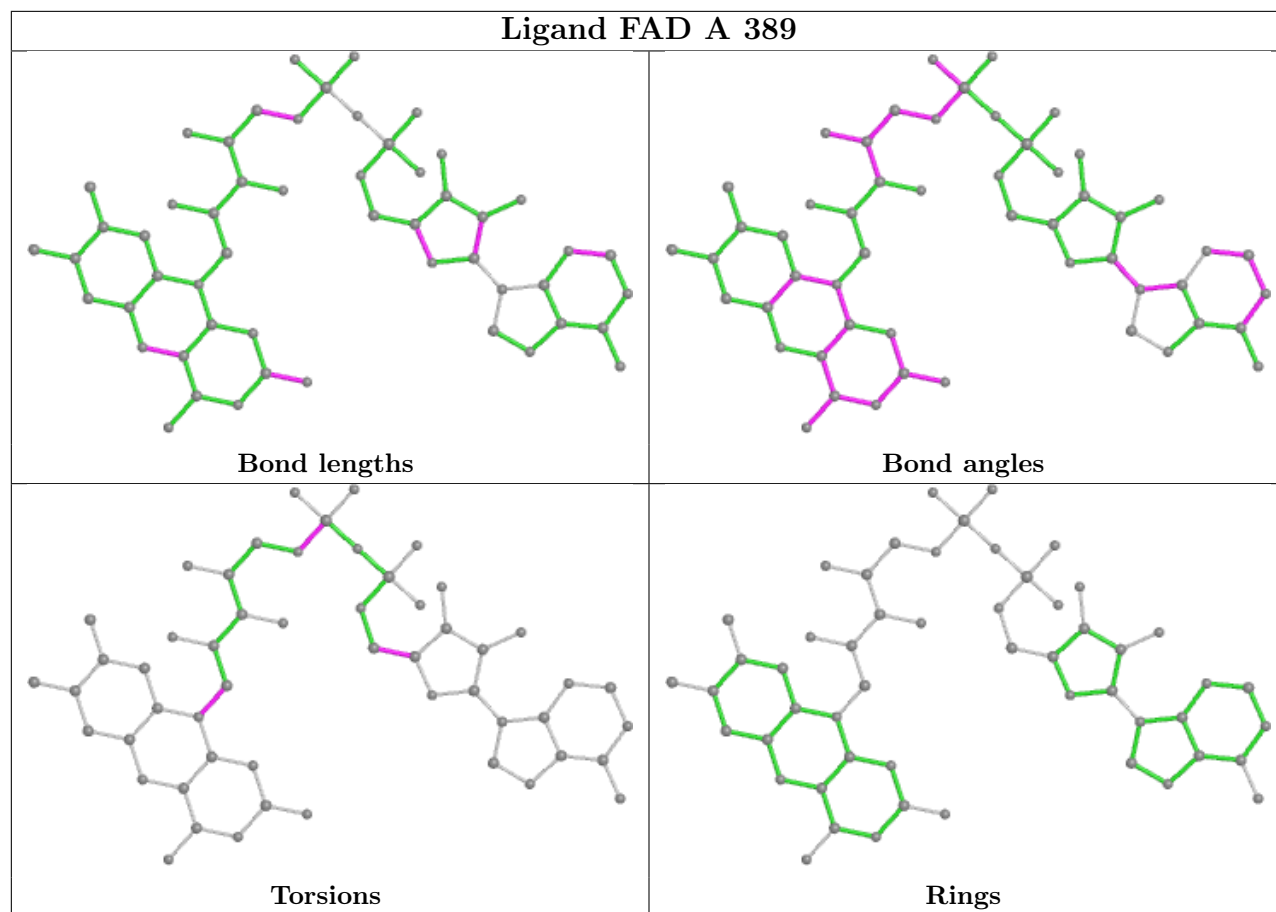
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is

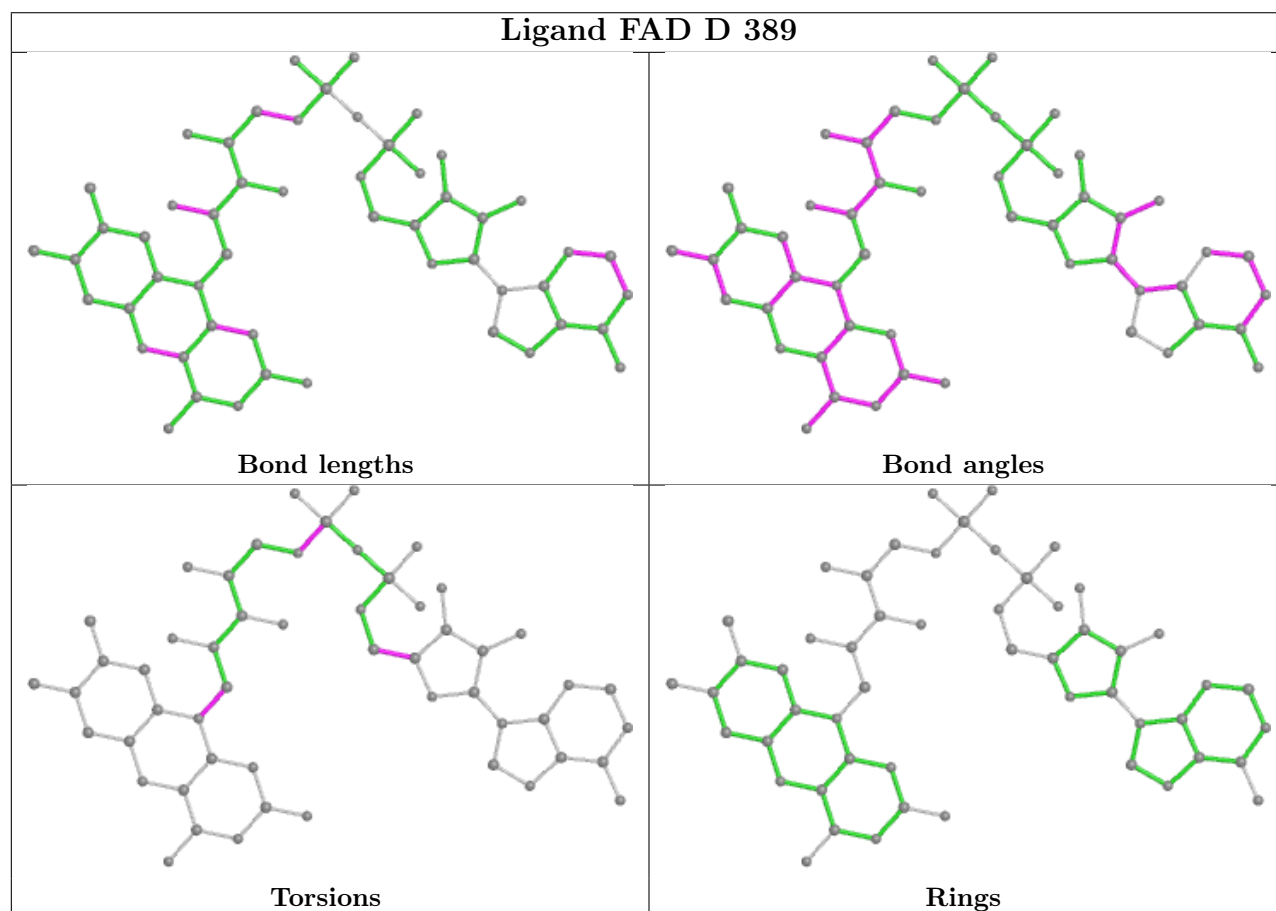
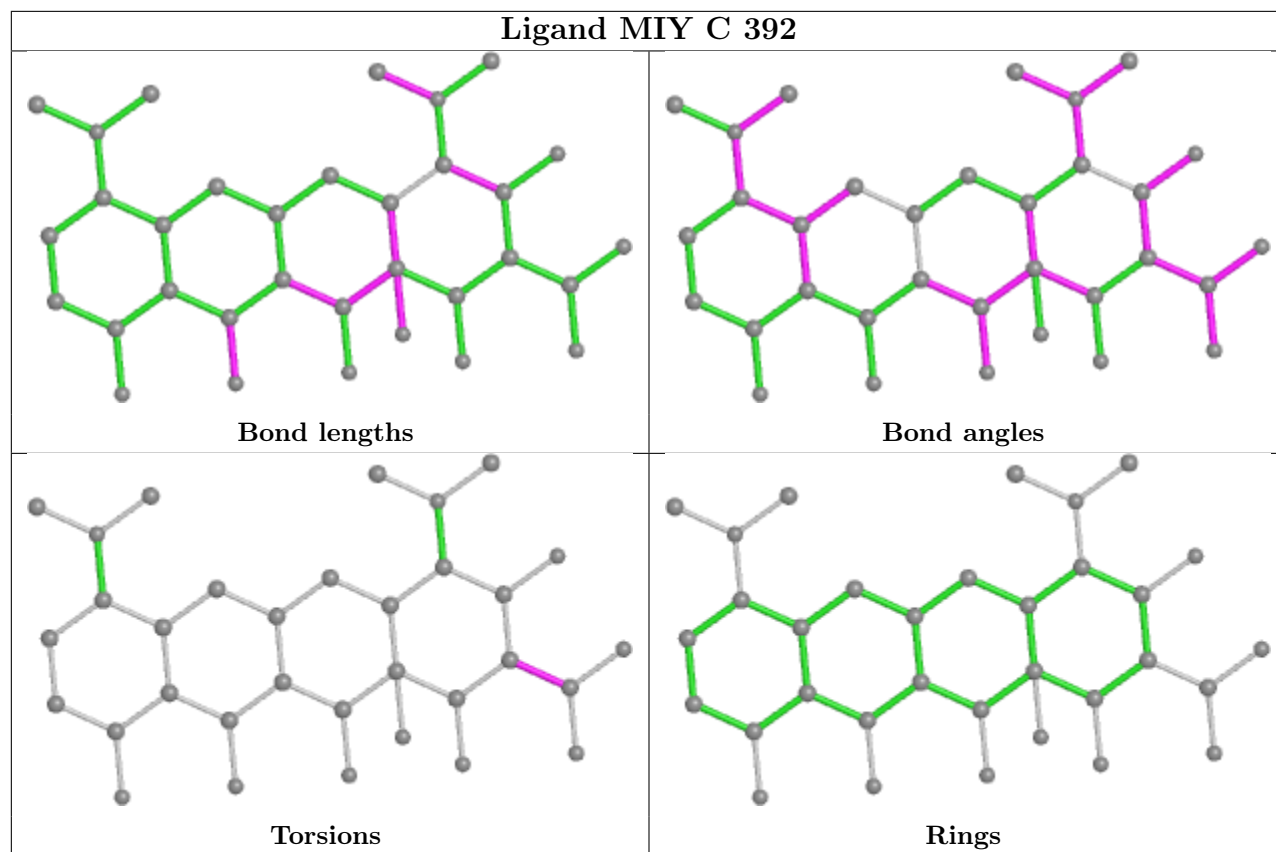
within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

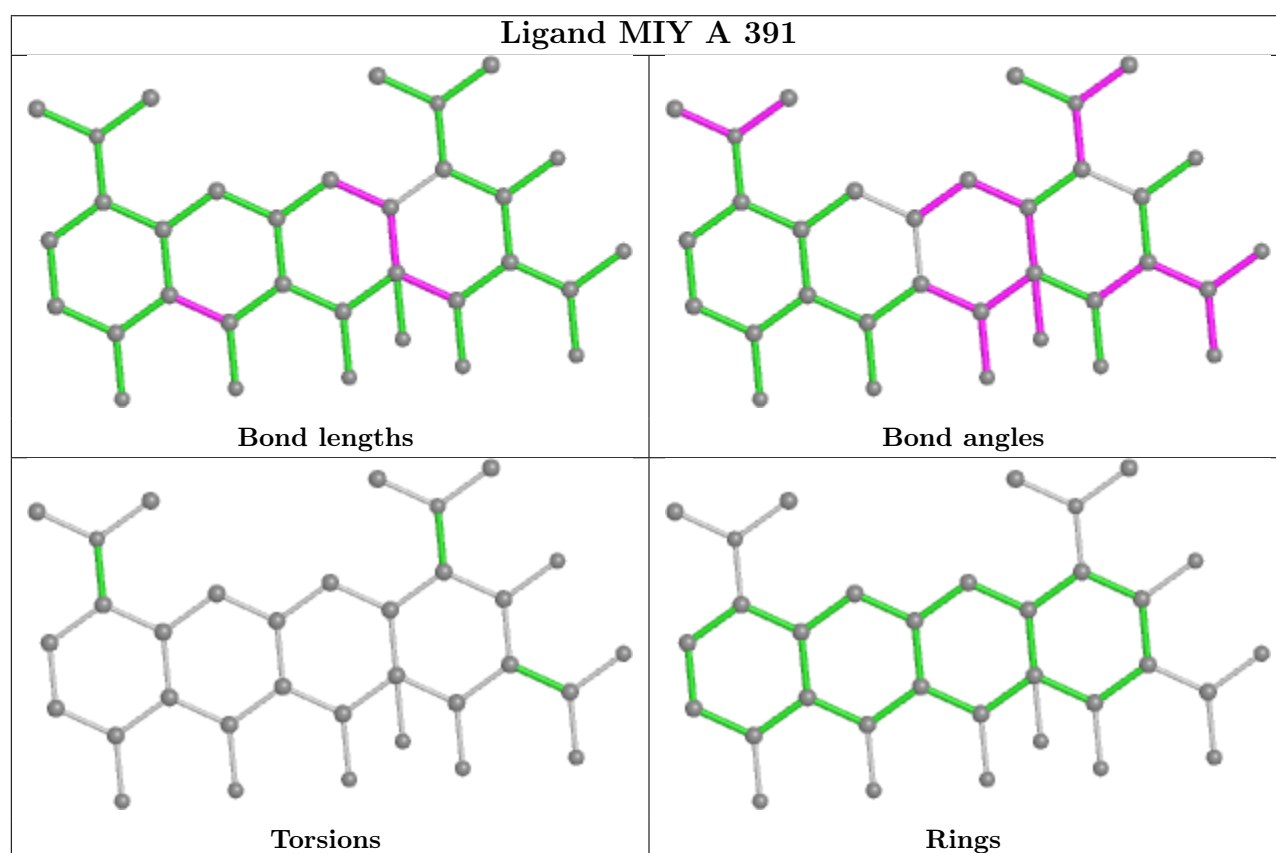
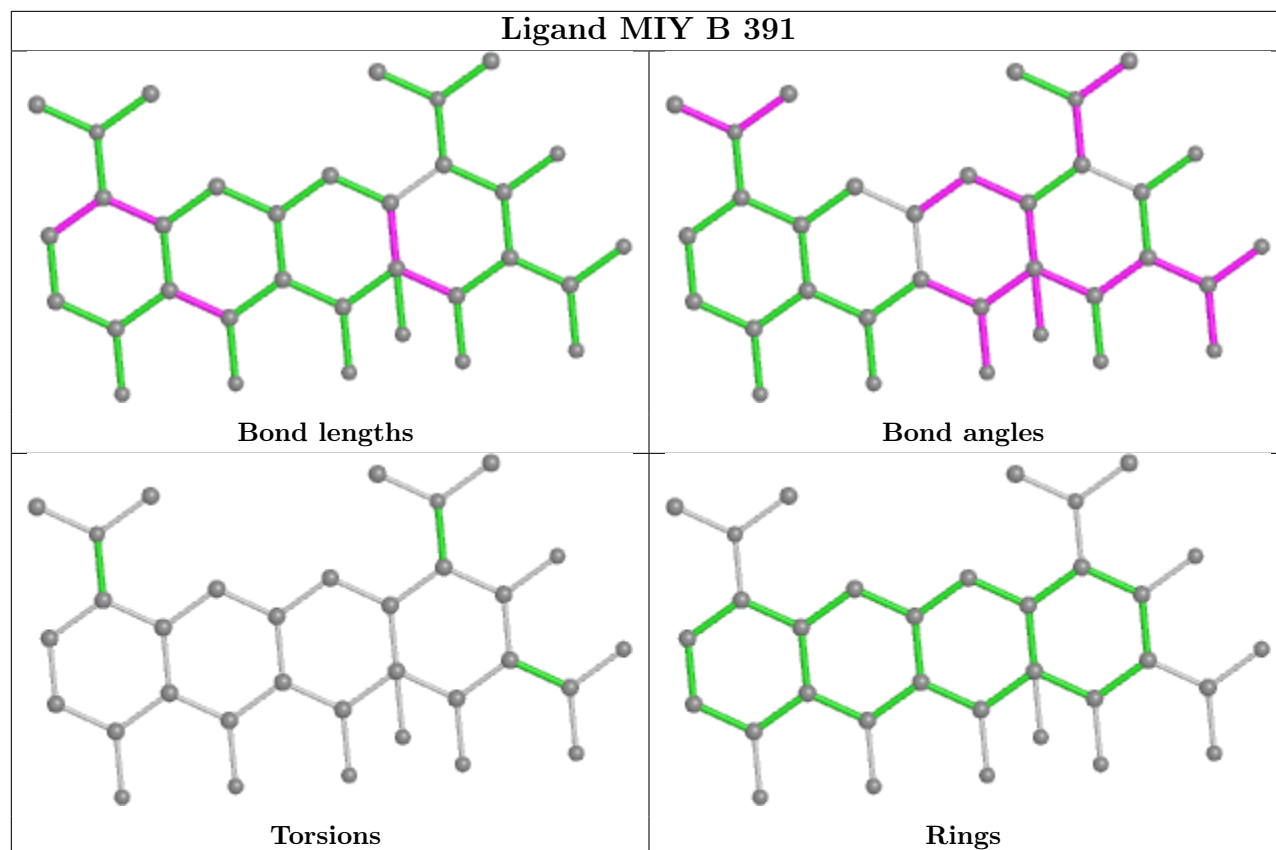


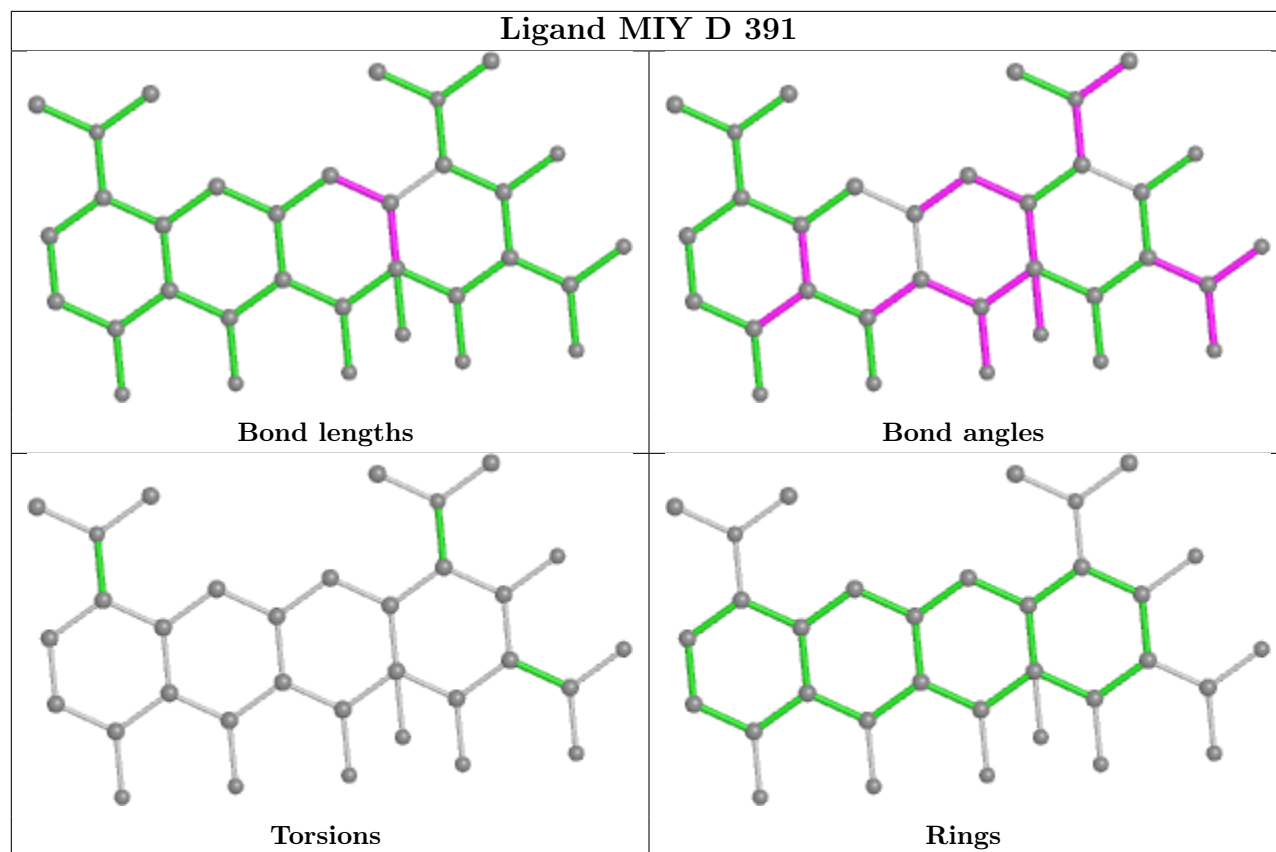












5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data

6.1 Protein, DNA and RNA chains

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	368/398 (92%)	0.22	11 (2%) 50 51	33, 47, 77, 124	0
1	B	368/398 (92%)	0.41	18 (4%) 29 31	32, 48, 80, 124	0
1	C	367/398 (92%)	0.44	29 (7%) 12 13	36, 53, 85, 119	0
1	D	367/398 (92%)	0.40	24 (6%) 18 19	33, 52, 84, 118	0
All	All	1470/1592 (92%)	0.37	82 (5%) 24 26	32, 50, 83, 124	0

All (82) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	249	THR	6.9
1	D	341	GLY	6.7
1	D	251	VAL	5.9
1	C	251	VAL	5.0
1	B	378	PRO	4.9
1	B	249	THR	4.7
1	A	378	PRO	4.7
1	B	251	VAL	4.5
1	B	340	ASP	4.4
1	C	340	ASP	4.2
1	D	252	ASP	4.0
1	A	377	LYS	4.0
1	C	379	ASP	4.0
1	C	380	PHE	4.0
1	C	341	GLY	3.9
1	B	341	GLY	3.9
1	B	243	ASP	3.9
1	B	13	LEU	3.8
1	A	376	PHE	3.7
1	C	257	ASN	3.6
1	C	245	TRP	3.6

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Mol	Chain	Res	Type	RSRZ
1	B	250	GLN	3.6
1	A	379	ASP	3.6
1	C	242	PRO	3.5
1	D	245	TRP	3.4
1	B	379	ASP	3.3
1	C	244	GLU	3.3
1	D	250	GLN	3.3
1	D	342	LYS	3.3
1	D	340	ASP	3.3
1	C	250	GLN	3.2
1	D	12	ASN	3.2
1	C	14	LEU	3.2
1	D	262	PHE	3.1
1	A	251	VAL	3.0
1	C	252	ASP	3.0
1	C	243	ASP	3.0
1	D	339	ALA	3.0
1	B	344	ASN	2.9
1	C	15	SER	2.9
1	C	255	ASN	2.9
1	D	296	LYS	2.8
1	D	300	SER	2.8
1	C	296	LYS	2.8
1	C	264	LEU	2.8
1	C	345	SER	2.8
1	C	382	PHE	2.7
1	B	258	SER	2.7
1	D	257	ASN	2.7
1	D	242	PRO	2.7
1	C	261	ASP	2.7
1	B	382	PHE	2.7
1	D	378	PRO	2.7
1	D	15	SER	2.7
1	C	13	LEU	2.7
1	D	268	SER	2.6
1	C	109	ARG	2.6
1	D	109	ARG	2.6
1	C	262	PHE	2.6
1	A	250	GLN	2.6
1	D	255	ASN	2.5
1	B	12	ASN	2.5
1	A	243	ASP	2.4

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Mol	Chain	Res	Type	RSRZ
1	B	252	ASP	2.4
1	C	268	SER	2.4
1	B	381	THR	2.4
1	B	264	LEU	2.4
1	D	14	LEU	2.4
1	D	343	PHE	2.4
1	C	378	PRO	2.4
1	D	264	LEU	2.3
1	B	342	LYS	2.3
1	D	380	PHE	2.3
1	C	344	ASN	2.3
1	A	252	ASP	2.3
1	D	297	PRO	2.3
1	C	99	LEU	2.3
1	C	258	SER	2.3
1	C	253	PHE	2.2
1	A	258	SER	2.2
1	A	381	THR	2.2
1	B	262	PHE	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, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	SO4	B	1385	5/5	0.67	0.33	74,87,92,95	5
4	SO4	D	1385	5/5	0.81	0.21	81,86,93,98	5
4	SO4	C	1383	5/5	0.85	0.18	81,85,105,109	0
4	SO4	C	1385	5/5	0.89	0.11	101,102,111,113	0

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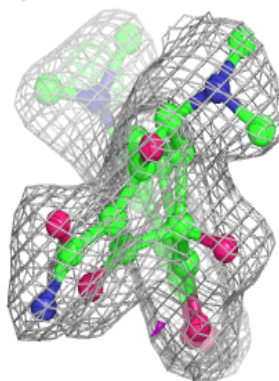
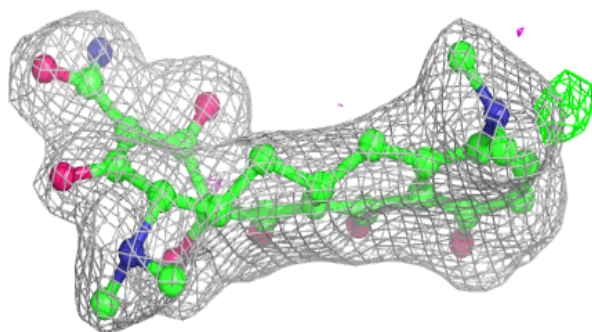
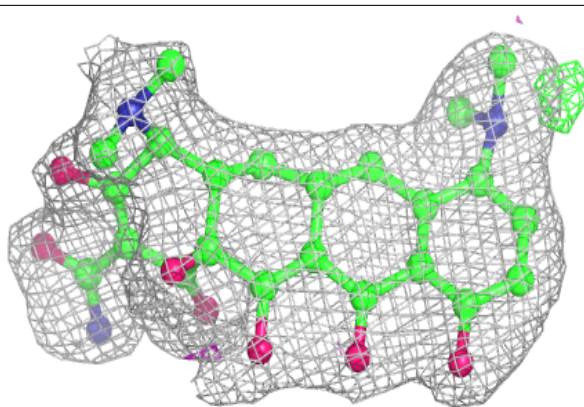
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	SO4	D	1383	5/5	0.91	0.18	72,93,95,102	0
3	MIY	D	393	33/33	0.92	0.12	42,50,54,60	0
3	MIY	B	391	33/33	0.92	0.13	32,47,62,71	0
3	MIY	C	391	33/33	0.93	0.11	41,50,58,63	0
3	MIY	C	392	33/33	0.93	0.11	42,52,55,62	0
3	MIY	D	391	33/33	0.94	0.11	38,55,64,71	0
3	MIY	D	392	33/33	0.94	0.12	38,45,54,69	0
3	MIY	A	392	33/33	0.94	0.11	42,50,55,56	0
3	MIY	A	391	33/33	0.94	0.11	32,43,57,59	0
4	SO4	B	1383	5/5	0.95	0.10	92,94,101,104	0
4	SO4	B	1384	5/5	0.96	0.26	80,81,83,96	0
2	FAD	C	389	53/53	0.96	0.12	33,42,60,68	0
4	SO4	D	1384	5/5	0.96	0.25	65,70,80,83	0
2	FAD	B	389	53/53	0.96	0.14	31,40,55,59	0
2	FAD	D	389	53/53	0.97	0.13	33,42,56,62	0
4	SO4	A	1383	5/5	0.97	0.21	86,88,91,92	0
2	FAD	A	389	53/53	0.97	0.12	29,38,52,67	0
4	SO4	C	1384	5/5	0.97	0.21	79,80,84,87	0

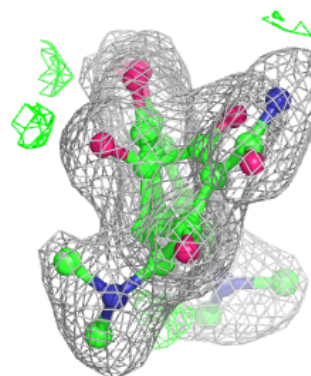
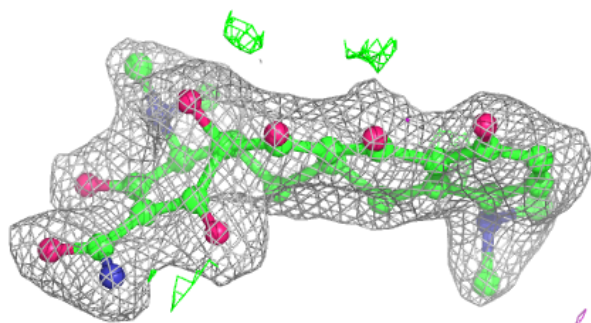
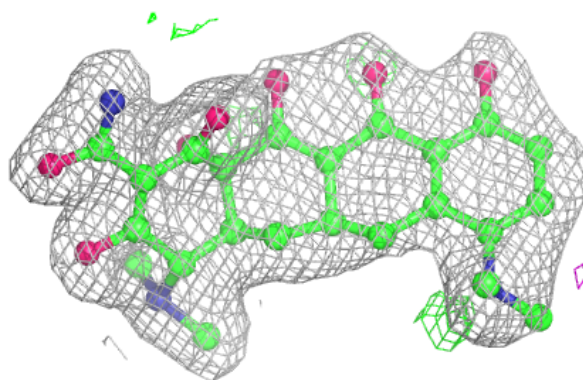
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around MIY D 393:

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

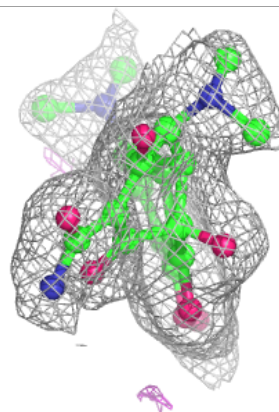
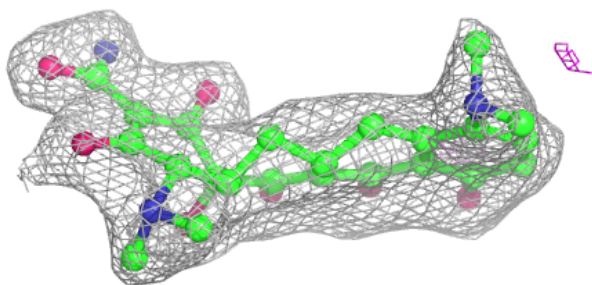
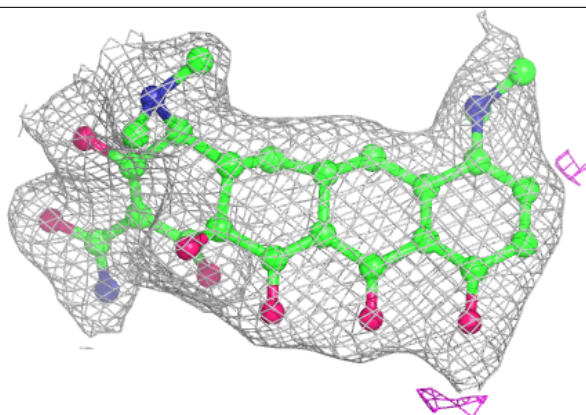
**Electron density around MIY B 391:**

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

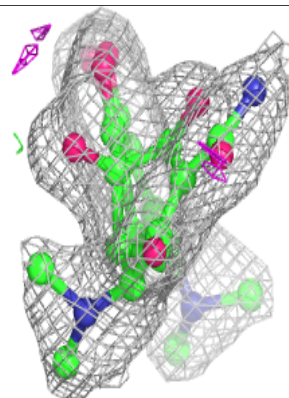
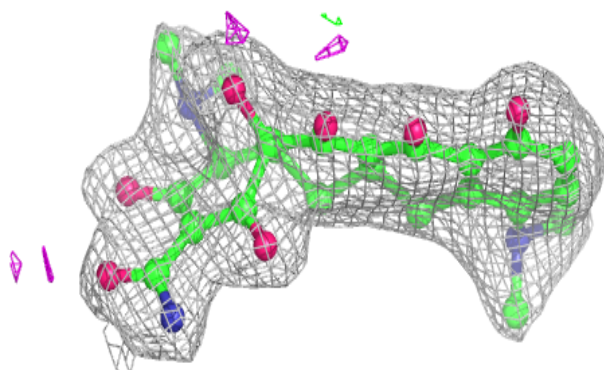
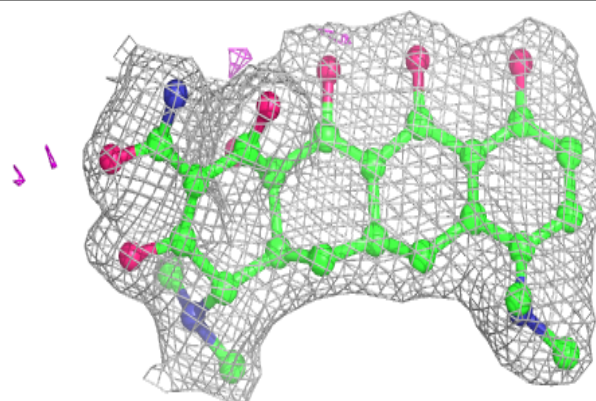


Electron density around MIY C 391:

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

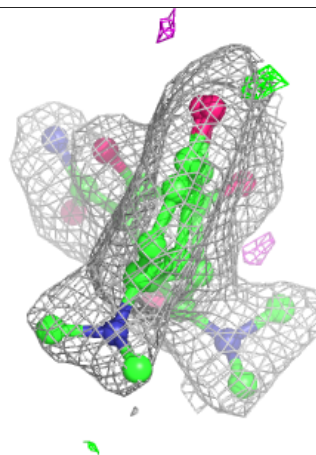
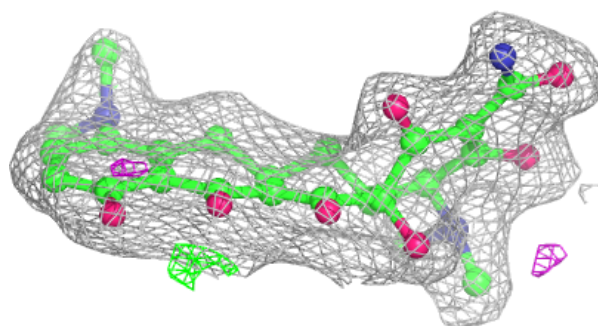
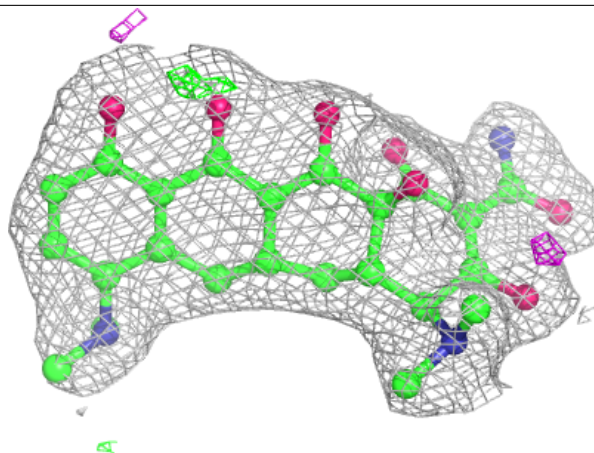
**Electron density around MIY C 392:**

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

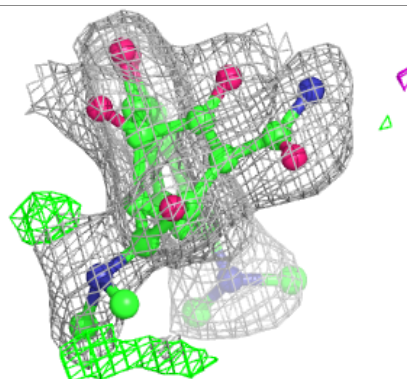
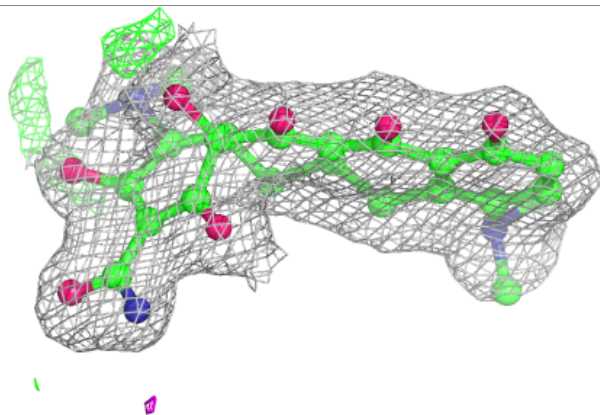
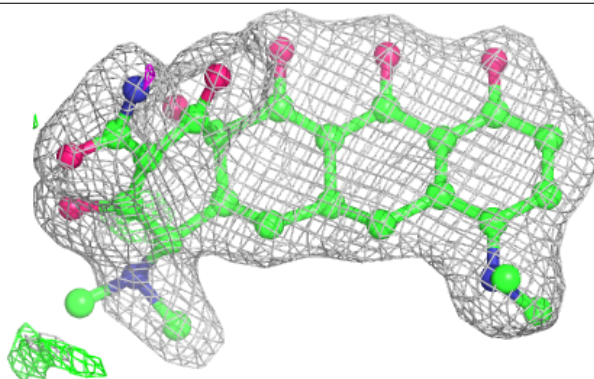


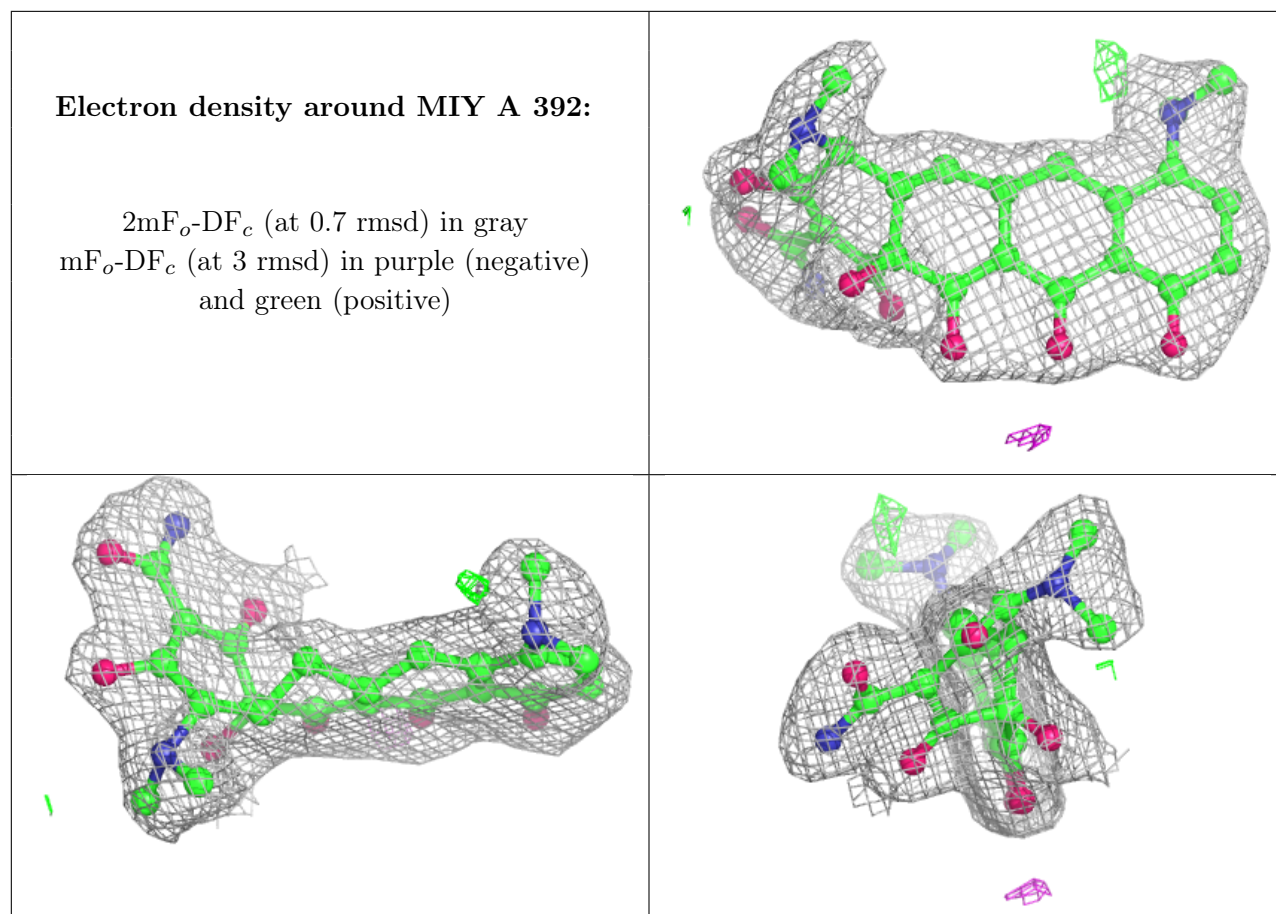
Electron density around MIY D 391:

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

**Electron density around MIY D 392:**

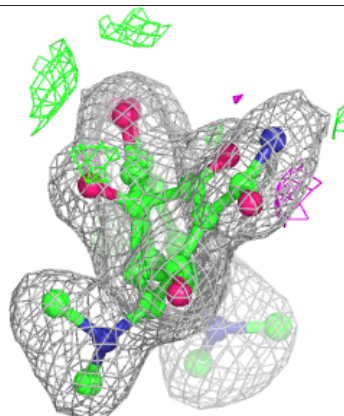
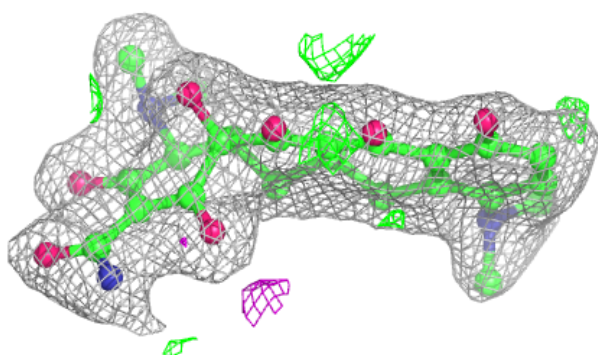
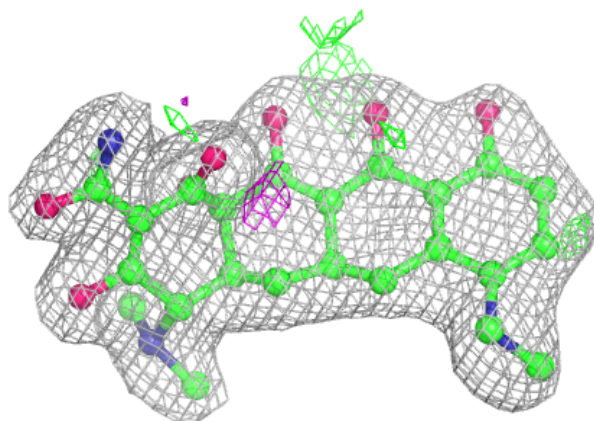
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



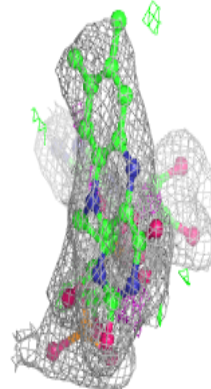
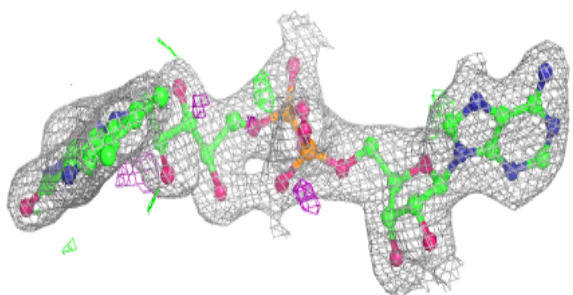
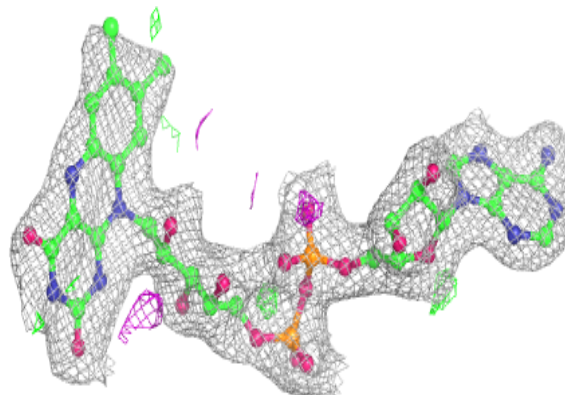


Electron density around MIY A 391:

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

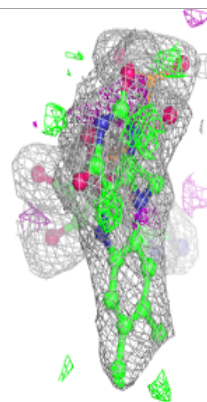
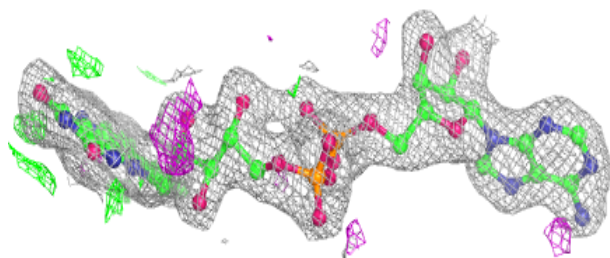
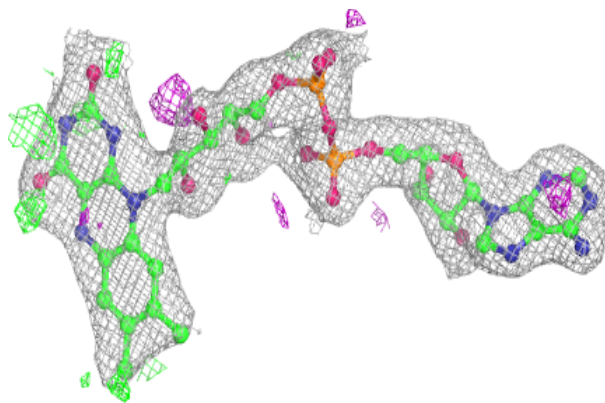
**Electron density around FAD C 389:**

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

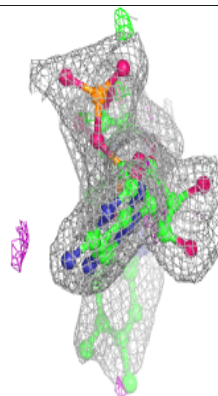
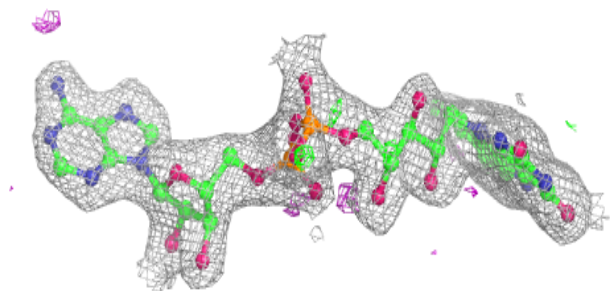
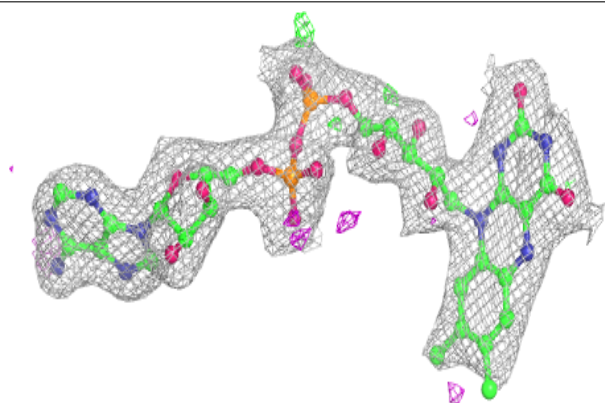


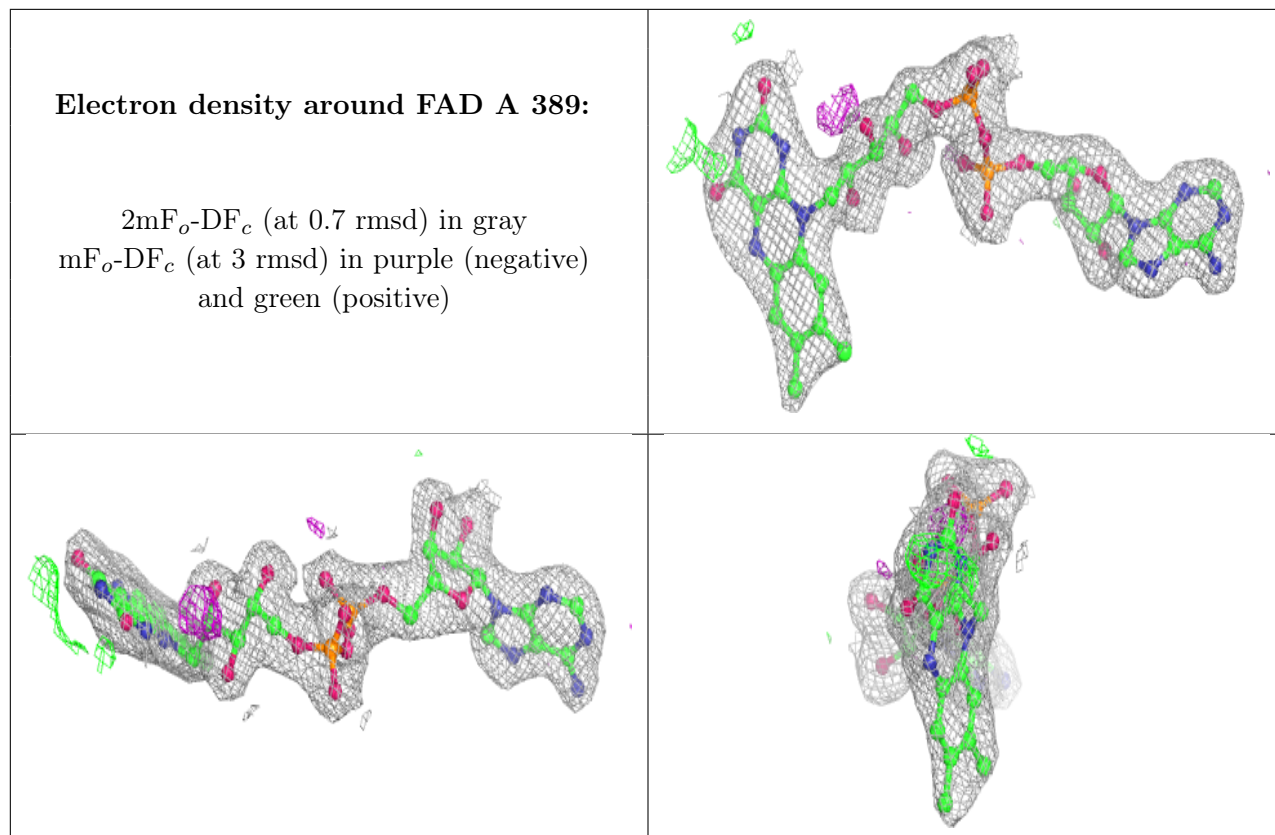
Electron density around FAD B 389:

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

**Electron density around FAD D 389:**

$2mF_o-DF_c$ (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.