



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 17, 2026 – 08:12 pm BST

PDB ID : 9IBM / pdb_00009ibm
Title : OleP mutant F84Q in complex with LCA
Authors : Montemiglio, L.C.; Fata, F.; Costanzo, A.; Di Renzo, M.; Savino, C.; Vallone, B.; Bulfaro, G.; Barbizzi, L.; Lardieri, A.
Deposited on : 2025-02-12
Resolution : 2.78 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

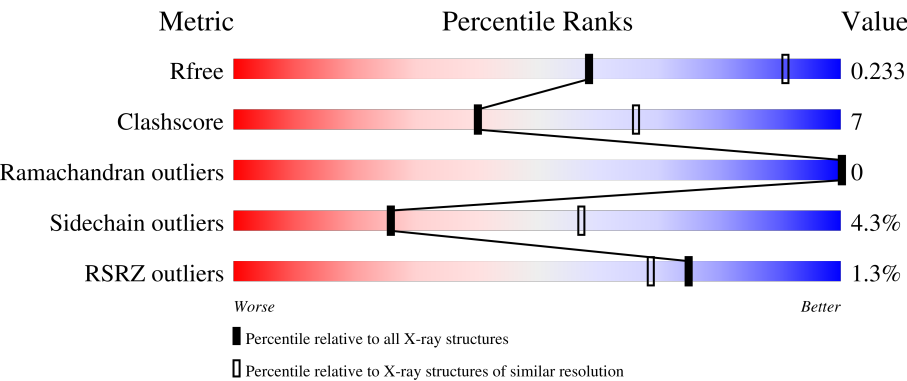
MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.4, CSD as541be (2020)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.015 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.78 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R _{free}	180053	5248 (2.80-2.76)
Clashscore	190562	5693 (2.80-2.76)
Ramachandran outliers	187476	5590 (2.80-2.76)
Sidechain outliers	187428	5592 (2.80-2.76)
RSRZ outliers	180081	5251 (2.80-2.76)

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	427	% 77%14%• 7%
1	B	427	% 77%14%• 7%
1	C	427	% 78%13%• 7%
1	D	427	% 78%13%• 7%
1	E	427	% 77%14%• 7%

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Mol	Chain	Length	Quality of chain
1	F	427	 2% 81% 11% 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
5	FMT	B	507	-	-	X	-
5	FMT	C	507	-	-	X	-

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 19279 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 Cytochrome P-450.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	396	Total	C	N	O	S	0	4	0
			3115	1956	560	585	14			
1	B	396	Total	C	N	O	S	0	2	0
			3100	1947	557	583	13			
1	C	396	Total	C	N	O	S	0	0	0
			3084	1937	554	580	13			
1	D	396	Total	C	N	O	S	0	1	0
			3092	1942	557	580	13			
1	E	396	Total	C	N	O	S	0	0	0
			3084	1937	554	580	13			
1	F	395	Total	C	N	O	S	0	1	0
			3084	1938	556	577	13			

There are 126 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-19	MET	-	initiating methionine	UNP Q59819
A	-18	GLY	-	expression tag	UNP Q59819
A	-17	SER	-	expression tag	UNP Q59819
A	-16	SER	-	expression tag	UNP Q59819
A	-15	HIS	-	expression tag	UNP Q59819
A	-14	HIS	-	expression tag	UNP Q59819
A	-13	HIS	-	expression tag	UNP Q59819
A	-12	HIS	-	expression tag	UNP Q59819
A	-11	HIS	-	expression tag	UNP Q59819
A	-10	HIS	-	expression tag	UNP Q59819
A	-9	SER	-	expression tag	UNP Q59819
A	-8	SER	-	expression tag	UNP Q59819
A	-7	GLY	-	expression tag	UNP Q59819
A	-6	LEU	-	expression tag	UNP Q59819
A	-5	VAL	-	expression tag	UNP Q59819
A	-4	PRO	-	expression tag	UNP Q59819
A	-3	ARG	-	expression tag	UNP Q59819

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	GLY	-	expression tag	UNP Q59819
A	-1	SER	-	expression tag	UNP Q59819
A	0	HIS	-	expression tag	UNP Q59819
A	84	GLN	PHE	engineered mutation	UNP Q59819
B	-19	MET	-	initiating methionine	UNP Q59819
B	-18	GLY	-	expression tag	UNP Q59819
B	-17	SER	-	expression tag	UNP Q59819
B	-16	SER	-	expression tag	UNP Q59819
B	-15	HIS	-	expression tag	UNP Q59819
B	-14	HIS	-	expression tag	UNP Q59819
B	-13	HIS	-	expression tag	UNP Q59819
B	-12	HIS	-	expression tag	UNP Q59819
B	-11	HIS	-	expression tag	UNP Q59819
B	-10	HIS	-	expression tag	UNP Q59819
B	-9	SER	-	expression tag	UNP Q59819
B	-8	SER	-	expression tag	UNP Q59819
B	-7	GLY	-	expression tag	UNP Q59819
B	-6	LEU	-	expression tag	UNP Q59819
B	-5	VAL	-	expression tag	UNP Q59819
B	-4	PRO	-	expression tag	UNP Q59819
B	-3	ARG	-	expression tag	UNP Q59819
B	-2	GLY	-	expression tag	UNP Q59819
B	-1	SER	-	expression tag	UNP Q59819
B	0	HIS	-	expression tag	UNP Q59819
B	84	GLN	PHE	engineered mutation	UNP Q59819
C	-19	MET	-	initiating methionine	UNP Q59819
C	-18	GLY	-	expression tag	UNP Q59819
C	-17	SER	-	expression tag	UNP Q59819
C	-16	SER	-	expression tag	UNP Q59819
C	-15	HIS	-	expression tag	UNP Q59819
C	-14	HIS	-	expression tag	UNP Q59819
C	-13	HIS	-	expression tag	UNP Q59819
C	-12	HIS	-	expression tag	UNP Q59819
C	-11	HIS	-	expression tag	UNP Q59819
C	-10	HIS	-	expression tag	UNP Q59819
C	-9	SER	-	expression tag	UNP Q59819
C	-8	SER	-	expression tag	UNP Q59819
C	-7	GLY	-	expression tag	UNP Q59819
C	-6	LEU	-	expression tag	UNP Q59819
C	-5	VAL	-	expression tag	UNP Q59819
C	-4	PRO	-	expression tag	UNP Q59819
C	-3	ARG	-	expression tag	UNP Q59819

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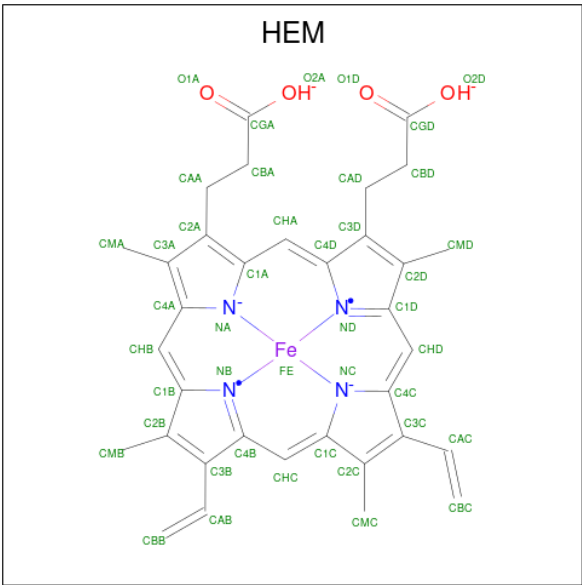
Chain	Residue	Modelled	Actual	Comment	Reference
C	-2	GLY	-	expression tag	UNP Q59819
C	-1	SER	-	expression tag	UNP Q59819
C	0	HIS	-	expression tag	UNP Q59819
C	84	GLN	PHE	engineered mutation	UNP Q59819
D	-19	MET	-	initiating methionine	UNP Q59819
D	-18	GLY	-	expression tag	UNP Q59819
D	-17	SER	-	expression tag	UNP Q59819
D	-16	SER	-	expression tag	UNP Q59819
D	-15	HIS	-	expression tag	UNP Q59819
D	-14	HIS	-	expression tag	UNP Q59819
D	-13	HIS	-	expression tag	UNP Q59819
D	-12	HIS	-	expression tag	UNP Q59819
D	-11	HIS	-	expression tag	UNP Q59819
D	-10	HIS	-	expression tag	UNP Q59819
D	-9	SER	-	expression tag	UNP Q59819
D	-8	SER	-	expression tag	UNP Q59819
D	-7	GLY	-	expression tag	UNP Q59819
D	-6	LEU	-	expression tag	UNP Q59819
D	-5	VAL	-	expression tag	UNP Q59819
D	-4	PRO	-	expression tag	UNP Q59819
D	-3	ARG	-	expression tag	UNP Q59819
D	-2	GLY	-	expression tag	UNP Q59819
D	-1	SER	-	expression tag	UNP Q59819
D	0	HIS	-	expression tag	UNP Q59819
D	84	GLN	PHE	engineered mutation	UNP Q59819
E	-19	MET	-	initiating methionine	UNP Q59819
E	-18	GLY	-	expression tag	UNP Q59819
E	-17	SER	-	expression tag	UNP Q59819
E	-16	SER	-	expression tag	UNP Q59819
E	-15	HIS	-	expression tag	UNP Q59819
E	-14	HIS	-	expression tag	UNP Q59819
E	-13	HIS	-	expression tag	UNP Q59819
E	-12	HIS	-	expression tag	UNP Q59819
E	-11	HIS	-	expression tag	UNP Q59819
E	-10	HIS	-	expression tag	UNP Q59819
E	-9	SER	-	expression tag	UNP Q59819
E	-8	SER	-	expression tag	UNP Q59819
E	-7	GLY	-	expression tag	UNP Q59819
E	-6	LEU	-	expression tag	UNP Q59819
E	-5	VAL	-	expression tag	UNP Q59819
E	-4	PRO	-	expression tag	UNP Q59819
E	-3	ARG	-	expression tag	UNP Q59819

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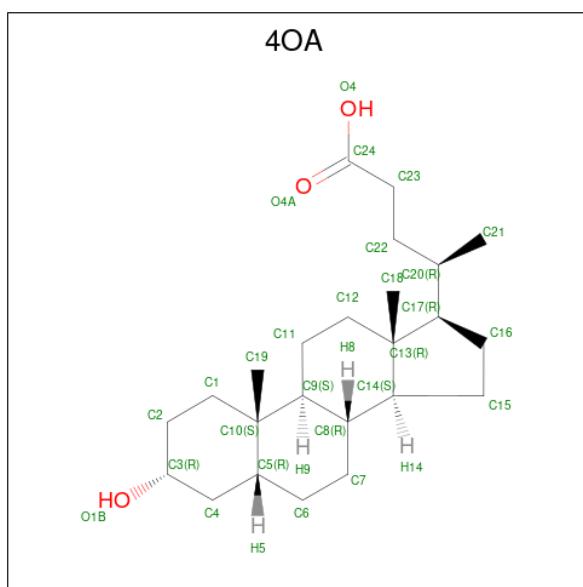
Chain	Residue	Modelled	Actual	Comment	Reference
E	-2	GLY	-	expression tag	UNP Q59819
E	-1	SER	-	expression tag	UNP Q59819
E	0	HIS	-	expression tag	UNP Q59819
E	84	GLN	PHE	engineered mutation	UNP Q59819
F	-19	MET	-	initiating methionine	UNP Q59819
F	-18	GLY	-	expression tag	UNP Q59819
F	-17	SER	-	expression tag	UNP Q59819
F	-16	SER	-	expression tag	UNP Q59819
F	-15	HIS	-	expression tag	UNP Q59819
F	-14	HIS	-	expression tag	UNP Q59819
F	-13	HIS	-	expression tag	UNP Q59819
F	-12	HIS	-	expression tag	UNP Q59819
F	-11	HIS	-	expression tag	UNP Q59819
F	-10	HIS	-	expression tag	UNP Q59819
F	-9	SER	-	expression tag	UNP Q59819
F	-8	SER	-	expression tag	UNP Q59819
F	-7	GLY	-	expression tag	UNP Q59819
F	-6	LEU	-	expression tag	UNP Q59819
F	-5	VAL	-	expression tag	UNP Q59819
F	-4	PRO	-	expression tag	UNP Q59819
F	-3	ARG	-	expression tag	UNP Q59819
F	-2	GLY	-	expression tag	UNP Q59819
F	-1	SER	-	expression tag	UNP Q59819
F	0	HIS	-	expression tag	UNP Q59819
F	84	GLN	PHE	engineered mutation	UNP Q59819

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	C	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	D	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	E	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	F	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 3 is (3beta,5beta,14beta,17alpha)-3-hydroxycholelan-24-oic acid (CCD ID: 4OA) (formula: C₂₄H₄₀O₃).

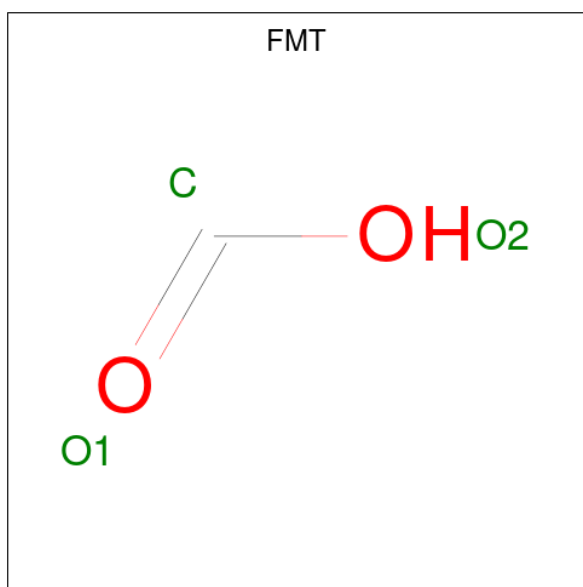


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			27	24	3		
3	B	1	Total	C	O	0	1
			54	48	6		
3	C	1	Total	C	O	0	0
			27	24	3		
3	D	1	Total	C	O	0	0
			27	24	3		
3	E	1	Total	C	O	0	0
			27	24	3		
3	F	1	Total	C	O	0	0
			27	24	3		

- Molecule 4 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Na	0	0
			1	1		
4	C	1	Total	Na	0	0
			1	1		

- Molecule 5 is FORMIC ACID (CCD ID: FMT) (formula: CH₂O₂).



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

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	C	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0
5	D	1	Total C O 3 1 2	0	0
5	E	1	Total C O 3 1 2	0	0
5	E	1	Total C O 3 1 2	0	0
5	F	1	Total C O 3 1 2	0	0
5	F	1	Total C O 3 1 2	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	44	Total O 44 44	0	0
6	B	47	Total O 47 47	0	0
6	C	34	Total O 34 34	0	0
6	D	25	Total O 25 25	0	0

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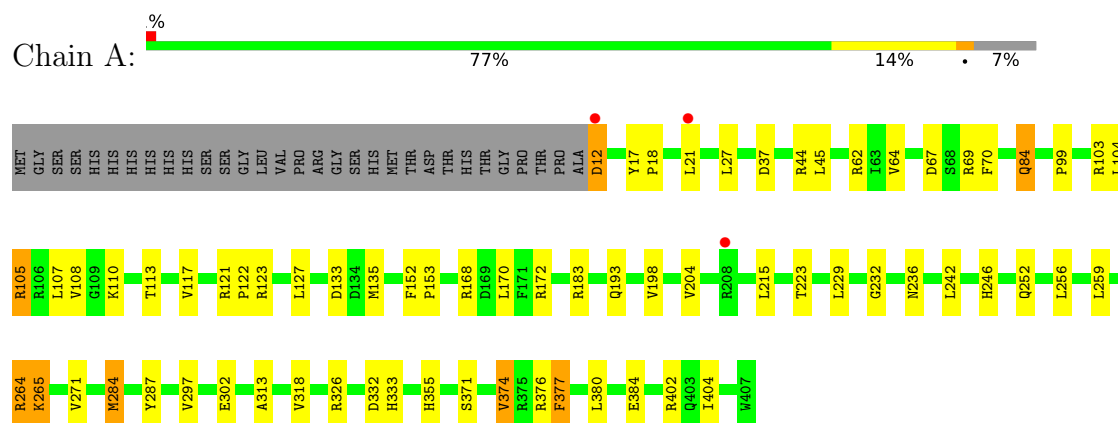
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Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	E	17	Total	O	0	0
			17	17		
6	F	17	Total	O	0	0
			17	17		

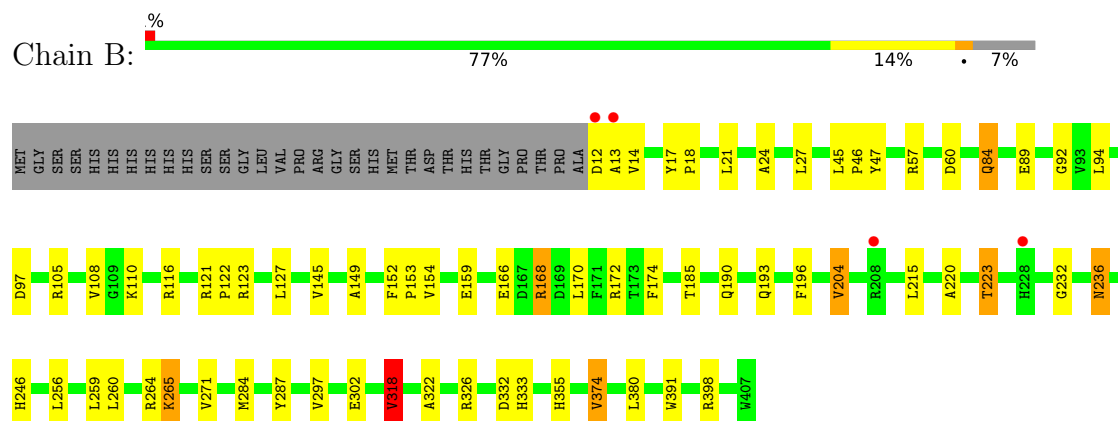
3 Residue-property plots [i](#)

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.

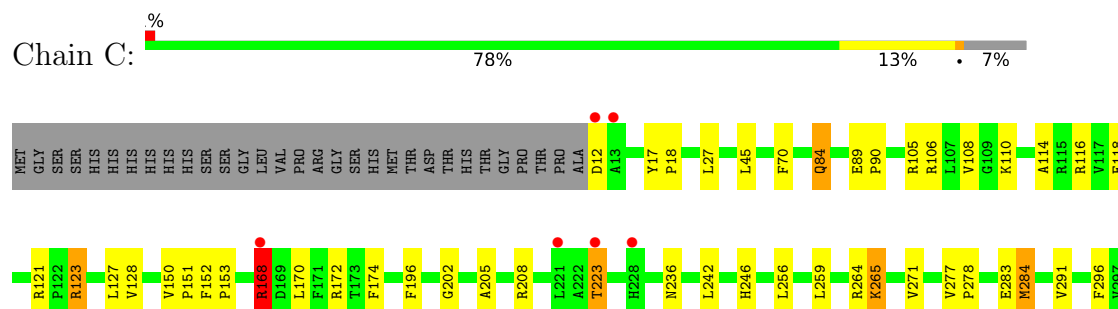
• Molecule 1: Cytochrome P-450



• Molecule 1: Cytochrome P-450

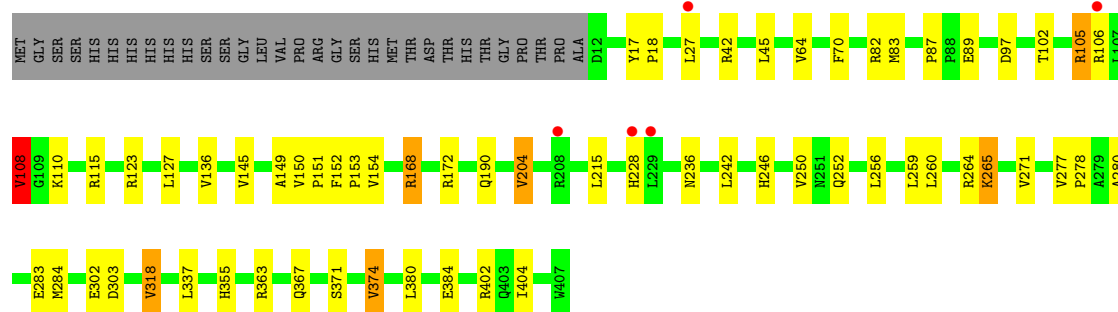
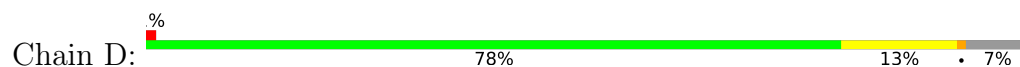


• Molecule 1: Cytochrome P-450

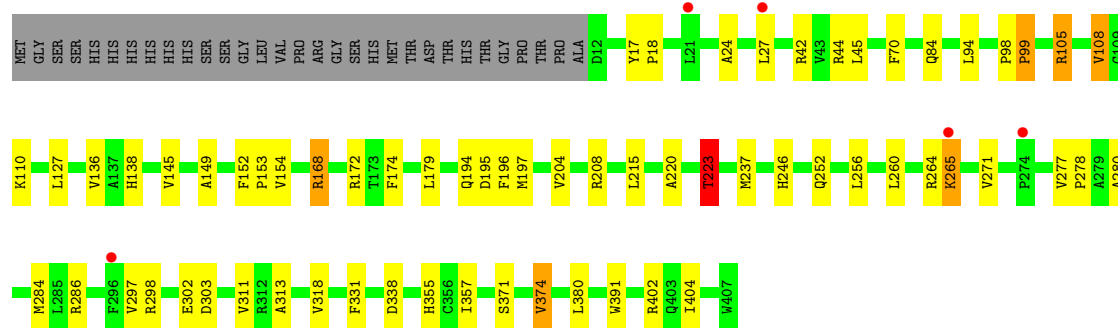
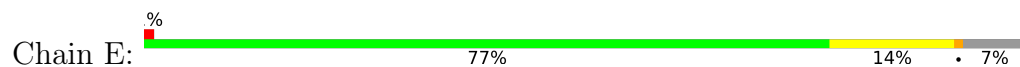




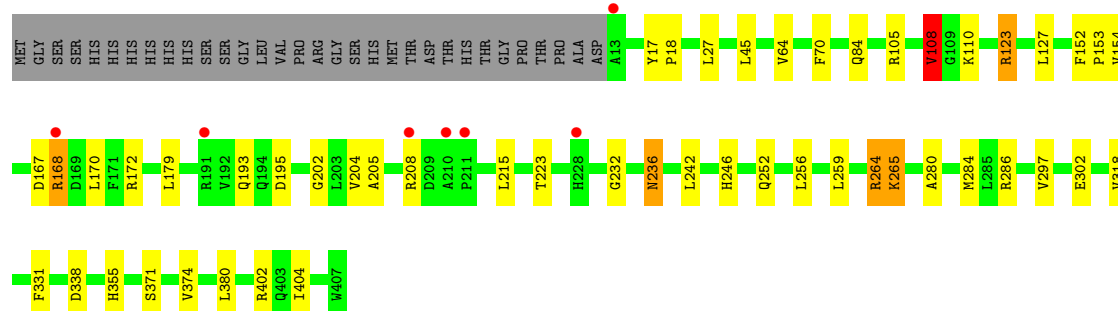
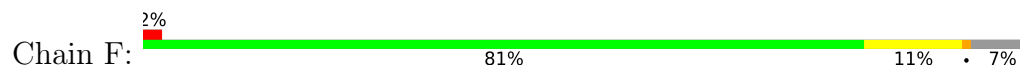
• Molecule 1: Cytochrome P-450



• Molecule 1: Cytochrome P-450



• Molecule 1: Cytochrome P-450



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	250.06Å 108.34Å 162.12Å 90.00° 129.95° 90.00°	Depositor
Resolution (Å)	61.72 – 2.78 61.72 – 2.78	Depositor EDS
% Data completeness (in resolution range)	99.6 (61.72-2.78) 99.6 (61.72-2.78)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.28 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.8.0425	Depositor
R, R_{free}	0.183 , 0.228 0.187 , 0.233	Depositor DCC
R_{free} test set	4048 reflections (4.83%)	wwPDB-VP
Wilson B-factor (Å ²)	56.2	Xtriage
Anisotropy	0.252	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 45.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	0.014 for -h-2*k,l	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	19279	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 39.35 % 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 3.2172e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NA, HEM, FMT, 4OA

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	0.60	0/3184	1.19	11/4336 (0.3%)
1	B	0.57	0/3170	1.15	11/4318 (0.3%)
1	C	0.56	0/3150	1.16	9/4291 (0.2%)
1	D	0.56	0/3161	1.16	11/4305 (0.3%)
1	E	0.53	0/3150	1.15	10/4291 (0.2%)
1	F	0.52	0/3153	1.11	8/4294 (0.2%)
All	All	0.56	0/18968	1.15	60/25835 (0.2%)

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

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	4
1	B	0	3
1	C	0	3
1	D	0	2
1	E	0	2
1	F	0	2
All	All	0	16

There are no bond length outliers.

All (60) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	105	ARG	CB-CA-C	-7.39	98.29	110.85
1	F	195	ASP	CA-CB-CG	7.35	119.95	112.60
1	D	87	PRO	N-CA-CB	7.35	107.04	103.22
1	A	105	ARG	CB-CA-C	-6.65	99.54	110.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	284	MET	CG-SD-CE	-6.53	86.53	100.90
1	D	108	VAL	N-CA-CB	-6.50	102.73	112.67
1	C	284	MET	CG-SD-CE	-6.46	86.69	100.90
1	E	98	PRO	N-CA-C	-6.46	102.82	110.70
1	E	223	THR	CA-CB-OG1	-6.40	100.00	109.60
1	D	136	VAL	N-CA-CB	6.38	120.14	110.58
1	F	108	VAL	N-CA-CB	-6.26	103.09	112.67
1	C	12	ASP	CA-CB-CG	6.20	118.80	112.60
1	A	193	GLN	CB-CA-C	-6.17	101.20	110.88
1	D	265	LYS	N-CA-CB	6.03	119.11	110.06
1	E	136	VAL	N-CA-CB	5.99	119.56	110.58
1	D	87	PRO	N-CA-C	-5.87	104.30	110.58
1	A	84	GLN	CB-CA-C	5.86	117.65	108.63
1	D	97	ASP	CA-CB-CG	5.83	118.43	112.60
1	A	123	ARG	NE-CZ-NH2	5.78	124.40	119.20
1	F	123	ARG	CD-NE-CZ	5.78	132.49	124.40
1	B	60	ASP	CA-CB-CG	5.77	118.37	112.60
1	C	168	ARG	CB-CA-C	-5.75	101.86	110.88
1	D	303	ASP	CB-CA-C	5.73	119.45	109.65
1	F	193	GLN	CB-CA-C	-5.71	101.67	110.81
1	C	12	ASP	CB-CA-C	5.70	120.92	110.10
1	F	84	GLN	CB-CA-C	-5.68	99.92	108.61
1	E	265	LYS	N-CA-CB	5.66	118.44	110.12
1	A	123	ARG	CD-NE-CZ	5.61	132.25	124.40
1	B	97	ASP	CA-CB-CG	5.60	118.20	112.60
1	B	265	LYS	N-CA-CB	5.55	118.29	110.12
1	B	84	GLN	CB-CA-C	5.51	117.11	108.63
1	A	12	ASP	CB-CA-C	5.48	120.52	110.10
1	E	195	ASP	CA-CB-CG	5.48	118.08	112.60
1	A	107	LEU	N-CA-CB	-5.47	102.08	110.12
1	E	99	PRO	N-CA-CB	-5.44	96.62	102.60
1	A	133	ASP	CA-CB-CG	5.38	117.98	112.60
1	A	265	LYS	N-CA-CB	5.36	118.11	110.06
1	C	265	LYS	N-CA-CB	5.36	118.10	110.06
1	B	193	GLN	N-CA-CB	5.31	117.85	109.94
1	D	318	VAL	N-CA-CB	-5.27	102.81	111.45
1	B	12	ASP	CB-CA-C	5.25	120.07	110.10
1	C	108	VAL	N-CA-CB	-5.23	104.67	112.67
1	C	338	ASP	CA-CB-CG	5.22	117.82	112.60
1	B	204	VAL	N-CA-CB	5.21	120.20	110.77
1	B	159	GLU	CB-CG-CD	5.21	121.46	112.60
1	D	105	ARG	CB-CA-C	-5.20	102.01	110.85

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	338	ASP	CA-CB-CG	5.20	117.80	112.60
1	F	265	LYS	N-CA-CB	5.20	118.22	110.22
1	F	338	ASP	CA-CB-CG	5.17	117.77	112.60
1	B	123	ARG	CD-NE-CZ	5.16	131.62	124.40
1	B	123	ARG	NE-CZ-NH2	5.16	123.84	119.20
1	B	318	VAL	N-CA-CB	-5.16	102.27	111.92
1	A	37	ASP	CA-CB-CG	5.13	117.73	112.60
1	F	84	GLN	N-CA-CB	5.11	118.58	110.10
1	C	223	THR	CA-CB-OG1	-5.08	101.98	109.60
1	E	108	VAL	N-CA-CB	-5.06	104.93	112.67
1	E	237	MET	CG-SD-CE	-5.03	89.83	100.90
1	C	123	ARG	CB-CG-CD	5.03	122.86	111.30
1	D	204	VAL	N-CA-CB	5.02	119.85	110.77
1	D	123	ARG	N-CA-CB	5.00	117.56	110.16

There are no chirality outliers.

All (16) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	168	ARG	Sidechain
1	A	264	ARG	Sidechain
1	A	44	ARG	Sidechain
1	A	62[A]	ARG	Sidechain
1	B	116	ARG	Sidechain
1	B	168	ARG	Sidechain
1	B	398	ARG	Sidechain
1	C	116	ARG	Sidechain
1	C	123	ARG	Sidechain
1	C	168	ARG	Sidechain
1	D	168	ARG	Sidechain
1	D	82	ARG	Sidechain
1	E	168	ARG	Sidechain
1	E	208	ARG	Sidechain
1	F	168	ARG	Sidechain
1	F	264	ARG	Sidechain

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	3115	0	3091	57	0
1	B	3100	0	3071	45	0
1	C	3084	0	3059	40	0
1	D	3092	0	3072	37	0
1	E	3084	0	3059	32	0
1	F	3084	0	3068	47	0
2	A	43	0	30	5	0
2	B	43	0	30	1	0
2	C	43	0	30	3	0
2	D	43	0	30	3	0
2	E	43	0	30	2	0
2	F	43	0	30	3	0
3	A	27	0	39	2	0
3	B	54	0	78	8	0
3	C	27	0	39	0	0
3	D	27	0	39	2	0
3	E	27	0	39	0	0
3	F	27	0	39	0	0
4	A	1	0	0	0	0
4	C	1	0	0	0	0
5	A	27	0	14	0	0
5	B	15	0	7	2	0
5	C	18	0	9	4	0
5	D	15	0	9	0	0
5	E	6	0	2	0	0
5	F	6	0	2	0	0
6	A	44	0	0	3	0
6	B	47	0	0	1	0
6	C	34	0	0	1	0
6	D	25	0	0	0	0
6	E	17	0	0	4	0
6	F	17	0	0	1	0
All	All	19279	0	18916	250	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 (250) 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:302:GLU:HG2	1:F:208:ARG:HD3	1.59	0.84
1:A:69:ARG:HG2	1:F:208:ARG:CZ	2.09	0.83
1:A:69:ARG:HG2	1:F:208:ARG:NH2	1.94	0.82
1:A:302:GLU:OE2	1:F:208:ARG:HG2	1.81	0.81
1:B:154:VAL:HG11	1:B:168:ARG:HD3	1.62	0.81
2:C:501:HEM:HBB2	2:C:501:HEM:HMB2	1.64	0.79
3:A:502:4OA:H18B	3:A:502:4OA:H21A	1.66	0.78
1:A:69:ARG:HA	1:F:208:ARG:NH1	1.99	0.78
1:C:296:PHE:HB3	5:C:505:FMT:O1	1.86	0.76
1:A:69:ARG:HA	1:F:208:ARG:CZ	2.17	0.75
1:A:69:ARG:CG	1:F:208:ARG:NH2	2.53	0.72
1:C:291:VAL:HB	5:C:507:FMT:H	1.72	0.71
1:A:302:GLU:HG2	1:F:208:ARG:CD	2.21	0.71
3:B:502[A]:4OA:H21A	3:B:502[A]:4OA:H18B	1.73	0.71
1:E:286:ARG:HD2	1:E:331:PHE:CE2	2.26	0.70
1:B:92:GLY:HA3	5:B:507:FMT:C	2.22	0.69
1:A:376:ARG:C	1:A:377:PHE:HD1	2.00	0.69
2:D:501:HEM:HBB2	2:D:501:HEM:HMB2	1.75	0.69
1:E:286:ARG:HD2	1:E:331:PHE:CD2	2.28	0.69
1:D:264:ARG:NH1	1:D:380:LEU:O	2.25	0.68
1:E:264:ARG:NH1	1:E:380:LEU:O	2.26	0.68
1:A:27:LEU:HD13	6:A:614:HOH:O	1.94	0.67
1:A:302:GLU:CG	1:F:208:ARG:HD3	2.24	0.67
1:B:170:LEU:HD11	1:D:102:THR:HG22	1.77	0.67
1:B:172:ARG:HD2	1:B:246:HIS:HE1	1.59	0.67
1:C:205:ALA:HB1	1:C:208:ARG:NH2	2.10	0.66
1:B:168:ARG:HG3	1:B:172:ARG:HG3	1.78	0.66
1:E:194:GLN:OE1	6:E:602:HOH:O	2.12	0.66
1:B:152:PHE:HB3	1:B:153:PRO:HD3	1.76	0.66
2:A:501:HEM:O2A	6:A:601:HOH:O	2.14	0.66
1:B:170:LEU:HA	1:D:106:ARG:HD3	1.79	0.65
1:C:152:PHE:HB3	1:C:153:PRO:HD3	1.78	0.65
1:C:202:GLY:O	1:C:205:ALA:HB3	1.97	0.65
1:A:302:GLU:OE2	1:F:208:ARG:CG	2.45	0.64
1:A:69:ARG:HG2	1:F:208:ARG:NE	2.13	0.64
2:A:501:HEM:HBB2	2:A:501:HEM:HMB2	1.78	0.63
1:E:44:ARG:NH2	6:E:601:HOH:O	1.93	0.63
1:A:103:ARG:NH2	1:F:167:ASP:OD1	2.32	0.63
1:B:236:ASN:ND2	3:B:502[B]:4OA:O4A	2.32	0.62
1:C:256:LEU:HD22	1:C:284:MET:HB3	1.81	0.62
1:D:154:VAL:HG11	1:D:168:ARG:HD3	1.81	0.61
1:A:259:LEU:HB2	1:A:284:MET:CE	2.31	0.61

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:123:ARG:NH1	6:F:602:HOH:O	2.34	0.60
1:F:152:PHE:HB3	1:F:153:PRO:HD3	1.82	0.60
1:A:21:LEU:HG	1:B:21:LEU:HB2	1.84	0.59
1:A:302:GLU:HB3	1:F:208:ARG:HB3	1.84	0.59
1:E:105:ARG:NH2	1:E:355:HIS:O	2.34	0.59
1:F:205:ALA:HB1	1:F:208:ARG:NH2	2.18	0.58
1:B:264:ARG:NH1	1:B:380:LEU:O	2.36	0.58
1:B:172:ARG:HD2	1:B:246:HIS:CE1	2.37	0.58
1:C:264:ARG:NH1	1:C:380:LEU:O	2.37	0.58
1:A:264:ARG:NH1	1:A:380:LEU:O	2.37	0.58
2:C:501:HEM:HBB2	2:C:501:HEM:CMB	2.32	0.58
1:D:105:ARG:NH2	1:D:355:HIS:O	2.37	0.58
1:E:154:VAL:HG11	1:E:168:ARG:HD3	1.86	0.58
1:C:291:VAL:HB	5:C:507:FMT:C	2.34	0.58
1:B:57:ARG:HD3	6:B:615:HOH:O	2.03	0.57
1:C:259:LEU:HB2	1:C:284:MET:CE	2.34	0.57
1:A:12:ASP:O	1:B:185:THR:HG21	2.04	0.57
1:E:138:HIS:NE2	6:E:603:HOH:O	2.32	0.57
1:B:105:ARG:NH2	1:B:355:HIS:O	2.38	0.57
1:B:236:ASN:HD21	3:B:502[B]:4OA:C24	2.17	0.57
1:A:17:TYR:CD1	1:A:18:PRO:HA	2.39	0.56
2:D:501:HEM:HBC2	2:D:501:HEM:HMC2	1.86	0.56
1:B:232:GLY:O	1:B:236:ASN:HB2	2.05	0.56
1:E:152:PHE:HB3	1:E:153:PRO:HD3	1.87	0.56
1:A:105:ARG:NH2	1:A:355:HIS:O	2.39	0.56
1:B:236:ASN:ND2	3:B:502[B]:4OA:C24	2.69	0.55
1:D:89:GLU:HB3	3:D:502:4OA:O4A	2.07	0.55
1:D:152:PHE:HB3	1:D:153:PRO:HD3	1.88	0.55
1:D:384:GLU:CD	1:D:402:ARG:HH11	2.15	0.55
1:C:242:LEU:O	1:C:246:HIS:HD2	1.89	0.54
1:D:17:TYR:CD1	1:D:18:PRO:HA	2.43	0.54
1:E:154:VAL:HG11	1:E:168:ARG:CD	2.37	0.54
1:F:264:ARG:NH1	1:F:380:LEU:O	2.40	0.54
2:B:501:HEM:HBB2	2:B:501:HEM:HMB2	1.89	0.53
1:F:105:ARG:NH2	1:F:355:HIS:O	2.42	0.53
1:E:286:ARG:CD	1:E:331:PHE:CE2	2.91	0.53
1:D:259:LEU:HB2	1:D:284:MET:CE	2.39	0.52
1:E:402:ARG:HD3	1:E:404:ILE:HG13	1.92	0.52
1:D:108:VAL:HG22	1:D:215:LEU:HD22	1.91	0.52
1:C:205:ALA:CB	1:C:208:ARG:NH2	2.72	0.52
1:A:152:PHE:HB3	1:A:153:PRO:HD3	1.92	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:46:PRO:HB2	1:B:47:TYR:CD2	2.45	0.52
1:B:236:ASN:ND2	3:B:502[B]:4OA:O4	2.43	0.52
1:A:302:GLU:HG2	1:F:208:ARG:NE	2.25	0.52
1:A:376:ARG:HG2	1:A:377:PHE:CE1	2.45	0.52
1:F:259:LEU:HB2	1:F:284:MET:CE	2.39	0.52
2:F:501:HEM:HMC2	2:F:501:HEM:HBC2	1.91	0.52
1:F:108:VAL:CG2	1:F:215:LEU:HD22	2.39	0.51
1:E:172:ARG:HD2	1:E:246:HIS:CE1	2.46	0.51
1:F:108:VAL:HG23	1:F:215:LEU:HD22	1.91	0.51
1:F:286:ARG:HD2	1:F:331:PHE:CD2	2.46	0.51
1:F:286:ARG:HD2	1:F:331:PHE:CE2	2.46	0.51
1:C:384:GLU:CD	1:C:402:ARG:HH11	2.18	0.51
1:A:236:ASN:HD21	3:A:502:4OA:C24	2.24	0.51
2:A:501:HEM:HMC2	2:A:501:HEM:HBC2	1.92	0.51
1:C:402:ARG:HD3	1:C:404:ILE:HG13	1.92	0.51
1:D:64:VAL:HA	1:D:70:PHE:CD2	2.46	0.51
1:A:271:VAL:HA	1:A:374:VAL:HG13	1.93	0.50
1:B:259:LEU:HB2	1:B:284:MET:CE	2.42	0.50
1:D:17:TYR:HA	1:D:18:PRO:C	2.37	0.50
1:F:172:ARG:HD2	1:F:246:HIS:CE1	2.46	0.50
1:F:17:TYR:CD1	1:F:18:PRO:HA	2.47	0.50
1:C:105:ARG:NH2	1:C:355:HIS:O	2.43	0.49
1:E:271:VAL:HA	1:E:374:VAL:HG13	1.94	0.49
1:A:384:GLU:CD	1:A:402:ARG:HH11	2.21	0.49
1:A:27:LEU:CD1	6:A:614:HOH:O	2.58	0.48
1:C:384:GLU:CD	1:C:402:ARG:NH1	2.71	0.48
1:D:108:VAL:CG2	1:D:215:LEU:HD22	2.43	0.48
1:D:150:VAL:N	1:D:151:PRO:HD2	2.29	0.48
1:D:271:VAL:HA	1:D:374:VAL:HG13	1.95	0.48
2:D:501:HEM:HBB2	2:D:501:HEM:CMB	2.43	0.48
1:C:271:VAL:HA	1:C:374:VAL:HG13	1.96	0.48
1:C:321:PHE:HD2	5:C:507:FMT:H	1.77	0.48
1:C:205:ALA:HB1	1:C:208:ARG:CZ	2.44	0.48
1:E:17:TYR:CD1	1:E:18:PRO:HA	2.49	0.48
1:A:302:GLU:HA	1:A:313:ALA:HB2	1.96	0.48
1:D:384:GLU:CD	1:D:402:ARG:NH1	2.71	0.47
1:E:42:ARG:NH2	6:E:605:HOH:O	2.46	0.47
1:C:150:VAL:N	1:C:151:PRO:HD2	2.30	0.47
1:F:167:ASP:O	1:F:168:ARG:C	2.56	0.47
1:A:69:ARG:HG2	1:F:208:ARG:HH21	1.77	0.47
3:B:502[B]:4OA:H21A	3:B:502[B]:4OA:H12	1.96	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:256:LEU:HD22	1:D:284:MET:HB3	1.96	0.47
1:F:402:ARG:HD3	1:F:404:ILE:HG13	1.96	0.47
2:F:501:HEM:HBC2	2:F:501:HEM:CMC	2.44	0.47
2:F:501:HEM:HMB2	2:F:501:HEM:HBB2	1.95	0.47
1:A:64:VAL:HA	1:A:70:PHE:CD2	2.50	0.47
1:C:205:ALA:O	1:C:208:ARG:CG	2.63	0.47
1:D:115[B]:ARG:HD3	1:D:115[B]:ARG:HA	1.69	0.47
1:F:205:ALA:O	1:F:208:ARG:HG3	2.14	0.47
1:B:166[B]:GLU:HG2	1:D:228:HIS:CE1	2.49	0.47
1:D:402:ARG:HD3	1:D:404:ILE:HG13	1.97	0.47
1:C:205:ALA:O	1:C:208:ARG:HG3	2.15	0.47
1:A:242:LEU:O	1:A:246:HIS:HD2	1.97	0.46
1:F:205:ALA:HB1	1:F:208:ARG:CZ	2.45	0.46
1:A:376:ARG:C	1:A:377:PHE:CD1	2.89	0.46
1:C:259:LEU:HD12	1:C:284:MET:HE2	1.96	0.46
1:A:17:TYR:HA	1:A:18:PRO:C	2.40	0.46
1:C:277:VAL:HB	1:C:278:PRO:HD3	1.97	0.46
1:A:69:ARG:HG2	1:F:208:ARG:HE	1.80	0.46
1:A:332:ASP:O	1:A:333:HIS:C	2.57	0.46
1:A:402:ARG:HD3	1:A:404:ILE:HG13	1.97	0.46
1:F:242:LEU:O	1:F:246:HIS:HD2	1.99	0.46
1:C:170:LEU:HD23	1:C:170:LEU:C	2.41	0.46
1:B:174:PHE:HB3	1:B:196:PHE:CD2	2.51	0.46
1:C:17:TYR:CD1	1:C:18:PRO:HA	2.50	0.46
1:F:205:ALA:O	1:F:208:ARG:CG	2.64	0.46
1:B:287:TYR:O	1:B:326:ARG:NH1	2.49	0.45
2:A:501:HEM:HBB2	2:A:501:HEM:CMB	2.44	0.45
1:E:302:GLU:HA	1:E:313:ALA:HB2	1.98	0.45
2:E:501:HEM:HBB2	2:E:501:HEM:HMB2	1.99	0.45
1:B:14:VAL:HG12	1:C:118:GLU:HG2	1.98	0.45
1:D:260:LEU:HG	1:D:284:MET:HE1	1.98	0.45
1:A:172:ARG:HD2	1:A:246:HIS:HE1	1.81	0.45
3:B:502[A]:4OA:C21	3:B:502[A]:4OA:H12	2.46	0.45
1:C:150:VAL:H	1:C:151:PRO:HD2	1.81	0.45
1:E:220:ALA:O	1:E:223:THR:HB	2.17	0.45
1:E:70:PHE:HB3	1:E:298:ARG:HB3	1.98	0.45
1:F:168:ARG:HG3	1:F:172:ARG:HG3	1.98	0.45
1:B:17:TYR:HA	1:B:18:PRO:C	2.41	0.45
1:F:280:ALA:O	1:F:284:MET:HG3	2.17	0.45
1:A:108:VAL:CG2	1:A:215:LEU:HD22	2.47	0.45
1:A:172:ARG:HD2	1:A:246:HIS:CE1	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:64:VAL:HA	1:F:70:PHE:CD2	2.52	0.44
1:C:332:ASP:O	1:C:333:HIS:C	2.60	0.44
1:F:154:VAL:HG11	1:F:168:ARG:HD3	1.99	0.44
1:B:13:ALA:CB	1:C:114:ALA:HB1	2.47	0.44
1:B:332:ASP:O	1:B:333:HIS:C	2.60	0.44
1:A:302:GLU:CB	1:F:208:ARG:HD3	2.47	0.44
1:B:152:PHE:CB	1:B:153:PRO:HD3	2.46	0.44
1:B:170:LEU:HD11	1:D:102:THR:CG2	2.46	0.44
1:D:252:GLN:OE1	1:D:252:GLN:HA	2.16	0.44
3:D:502:4OA:H21A	3:D:502:4OA:H12	1.99	0.44
1:E:260:LEU:HG	1:E:284:MET:HE1	1.99	0.44
1:C:283:GLU:HG3	1:C:337:LEU:HD12	2.00	0.44
2:C:501:HEM:HBC2	2:C:501:HEM:HMC2	2.00	0.44
1:D:242:LEU:O	1:D:246:HIS:HD2	2.00	0.44
1:F:205:ALA:CB	1:F:208:ARG:NH2	2.80	0.44
1:F:256:LEU:HD22	1:F:284:MET:HB3	2.00	0.44
1:A:252:GLN:O	1:A:256:LEU:HG	2.18	0.44
1:C:168:ARG:C	1:C:170:LEU:N	2.74	0.44
1:E:17:TYR:HA	1:E:18:PRO:C	2.42	0.44
1:A:12:ASP:C	1:B:185:THR:HG21	2.44	0.43
1:D:145:VAL:HA	1:D:149:ALA:HB3	1.99	0.43
1:C:121:ARG:HG3	1:C:364:LEU:HD11	1.99	0.43
1:D:172:ARG:HD2	1:D:246:HIS:CE1	2.54	0.43
1:B:297:VAL:HG22	1:B:318:VAL:HG23	2.00	0.43
1:A:69:ARG:HG3	1:F:208:ARG:NH2	2.31	0.43
1:A:170:LEU:HG	1:C:106:ARG:HD3	2.00	0.43
1:F:232:GLY:O	1:F:236:ASN:HB2	2.19	0.43
1:A:121:ARG:N	1:A:122:PRO:CD	2.81	0.43
1:D:259:LEU:HD12	1:D:284:MET:HE2	2.01	0.43
1:A:135[B]:MET:CE	1:A:377:PHE:HE2	2.31	0.43
1:D:283:GLU:HG3	1:D:337:LEU:HD12	2.01	0.43
1:C:89:GLU:HA	1:C:90:PRO:HD2	1.93	0.43
1:E:105:ARG:HD2	1:E:357:ILE:HD12	2.01	0.42
1:B:271:VAL:HA	1:B:374:VAL:HG13	2.00	0.42
1:D:280:ALA:O	1:D:284:MET:HG3	2.19	0.42
1:B:121:ARG:N	1:B:122:PRO:CD	2.82	0.42
1:B:220:ALA:O	1:B:223:THR:HB	2.19	0.42
1:C:84:GLN:HE21	1:C:84:GLN:HB3	1.62	0.42
1:F:202:GLY:O	1:F:205:ALA:HB3	2.19	0.42
1:F:215:LEU:HD23	1:F:215:LEU:HA	1.83	0.42
1:A:12:ASP:O	1:B:185:THR:CG2	2.67	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:135[A]:MET:CE	1:A:377:PHE:HE2	2.32	0.42
1:B:24:ALA:HA	1:B:391:TRP:CE2	2.54	0.42
1:E:108:VAL:CG2	1:E:215:LEU:HD22	2.50	0.42
1:B:256:LEU:HD22	1:B:284:MET:HB3	2.00	0.42
1:F:170:LEU:C	1:F:170:LEU:HD23	2.44	0.42
1:A:67:ASP:OD1	1:A:69:ARG:HB2	2.20	0.42
1:D:83:MET:HE3	1:D:83:MET:HB3	1.90	0.42
1:A:113:THR:O	1:A:117:VAL:HG23	2.19	0.41
2:A:501:HEM:HBC2	2:A:501:HEM:CMC	2.50	0.41
1:B:260:LEU:HG	1:B:284:MET:HE1	2.02	0.41
1:E:252:GLN:OE1	1:E:252:GLN:HA	2.20	0.41
2:E:501:HEM:HBB2	2:E:501:HEM:CMB	2.50	0.41
1:B:145:VAL:HA	1:B:149:ALA:HB3	2.01	0.41
1:C:172:ARG:HD2	1:C:246:HIS:CE1	2.56	0.41
1:E:24:ALA:HA	1:E:391:TRP:CE2	2.55	0.41
1:E:256:LEU:HD22	1:E:284:MET:HB3	2.03	0.41
1:E:277:VAL:HB	1:E:278:PRO:HD3	2.01	0.41
1:F:252:GLN:OE1	1:F:252:GLN:HA	2.21	0.41
1:E:280:ALA:O	1:E:284:MET:HG3	2.20	0.41
1:E:303:ASP:HA	1:E:311:VAL:O	2.20	0.41
1:A:256:LEU:HD22	1:A:284:MET:HB3	2.02	0.41
1:B:215:LEU:HD23	1:B:215:LEU:HA	1.91	0.41
1:B:94:LEU:HB2	5:B:507:FMT:C	2.50	0.41
1:D:168:ARG:HG3	1:D:172:ARG:HG3	2.03	0.41
1:A:376:ARG:HG2	1:A:377:PHE:HE1	1.86	0.41
1:B:89:GLU:HB3	3:B:502[A]:4OA:O4	2.21	0.41
1:B:170:LEU:HA	1:D:106:ARG:CD	2.50	0.41
1:B:322:ALA:O	1:B:326:ARG:HG2	2.21	0.41
1:C:296:PHE:HD1	6:C:606:HOH:O	2.04	0.41
1:D:215:LEU:HD23	1:D:215:LEU:HA	1.86	0.41
1:D:246:HIS:O	1:D:250:VAL:HG23	2.21	0.41
1:E:145:VAL:HA	1:E:149:ALA:HB3	2.01	0.41
1:D:277:VAL:HB	1:D:278:PRO:HD3	2.02	0.41
1:E:215:LEU:HD23	1:E:215:LEU:HA	1.84	0.41
1:C:70:PHE:HB3	1:C:298:ARG:HB3	2.03	0.40
1:A:232:GLY:O	1:A:236:ASN:HB2	2.21	0.40
1:B:46:PRO:HB2	1:B:47:TYR:CE2	2.56	0.40
1:C:128:VAL:HG23	1:C:152:PHE:CE1	2.57	0.40
1:D:363:ARG:O	1:D:367:GLN:HG3	2.21	0.40
1:E:174:PHE:HB3	1:E:196:PHE:CD2	2.56	0.40
1:A:377:PHE:CD1	1:A:377:PHE:N	2.90	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:174:PHE:HB3	1:C:196:PHE:CD2	2.57	0.40
1:A:104:LEU:HD13	1:A:229:LEU:HD22	2.04	0.40
1:A:287:TYR:O	1:A:326:ARG:NH1	2.54	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	398/427 (93%)	384 (96%)	14 (4%)	0	100	100
1	B	396/427 (93%)	379 (96%)	17 (4%)	0	100	100
1	C	394/427 (92%)	377 (96%)	17 (4%)	0	100	100
1	D	395/427 (92%)	380 (96%)	15 (4%)	0	100	100
1	E	394/427 (92%)	377 (96%)	17 (4%)	0	100	100
1	F	394/427 (92%)	378 (96%)	16 (4%)	0	100	100
All	All	2371/2562 (92%)	2275 (96%)	96 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	336/358 (94%)	320 (95%)	16 (5%)	23	53
1	B	334/358 (93%)	320 (96%)	14 (4%)	26	58
1	C	332/358 (93%)	321 (97%)	11 (3%)	33	66
1	D	333/358 (93%)	319 (96%)	14 (4%)	26	58
1	E	332/358 (93%)	316 (95%)	16 (5%)	23	53
1	F	332/358 (93%)	317 (96%)	15 (4%)	24	55
All	All	1999/2148 (93%)	1913 (96%)	86 (4%)	26	57

All (86) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	45	LEU
1	A	84	GLN
1	A	99	PRO
1	A	110	LYS
1	A	127	LEU
1	A	183	ARG
1	A	198	VAL
1	A	204[A]	VAL
1	A	204[B]	VAL
1	A	223	THR
1	A	265	LYS
1	A	297	VAL
1	A	318	VAL
1	A	371	SER
1	A	374	VAL
1	A	377	PHE
1	B	27	LEU
1	B	45	LEU
1	B	84	GLN
1	B	108	VAL
1	B	110	LYS
1	B	127	LEU
1	B	190	GLN
1	B	204	VAL
1	B	223	THR
1	B	236	ASN
1	B	265	LYS
1	B	302	GLU
1	B	318	VAL
1	B	374	VAL

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Mol	Chain	Res	Type
1	C	27	LEU
1	C	45	LEU
1	C	84	GLN
1	C	110	LYS
1	C	127	LEU
1	C	223	THR
1	C	236	ASN
1	C	265	LYS
1	C	318	VAL
1	C	371	SER
1	C	374	VAL
1	D	27	LEU
1	D	42	ARG
1	D	45	LEU
1	D	108	VAL
1	D	110	LYS
1	D	127	LEU
1	D	190	GLN
1	D	204	VAL
1	D	236	ASN
1	D	265	LYS
1	D	302	GLU
1	D	318	VAL
1	D	371	SER
1	D	374	VAL
1	E	27	LEU
1	E	45	LEU
1	E	84	GLN
1	E	94	LEU
1	E	99	PRO
1	E	110	LYS
1	E	127	LEU
1	E	179	LEU
1	E	197	MET
1	E	204	VAL
1	E	223	THR
1	E	265	LYS
1	E	297	VAL
1	E	318	VAL
1	E	371	SER
1	E	374	VAL
1	F	27	LEU

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Mol	Chain	Res	Type
1	F	45	LEU
1	F	108	VAL
1	F	110	LYS
1	F	127	LEU
1	F	179	LEU
1	F	204	VAL
1	F	223	THR
1	F	236	ASN
1	F	265	LYS
1	F	297	VAL
1	F	302	GLU
1	F	318	VAL
1	F	371	SER
1	F	374	VAL

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (31) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	84	GLN
1	A	138	HIS
1	A	193	GLN
1	A	236	ASN
1	A	246	HIS
1	A	354	HIS
1	B	84	GLN
1	B	190	GLN
1	B	194	GLN
1	B	236	ASN
1	B	246	HIS
1	C	84	GLN
1	C	193	GLN
1	C	228	HIS
1	C	246	HIS
1	D	236	ASN
1	D	246	HIS
1	D	320	HIS
1	E	30	HIS
1	E	84	GLN
1	E	190	GLN
1	E	246	HIS
1	E	351	HIS
1	E	354	HIS

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Mol	Chain	Res	Type
1	F	190	GLN
1	F	193	GLN
1	F	236	ASN
1	F	246	HIS
1	F	351	HIS
1	F	367	GLN
1	F	403	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 44 ligands modelled in this entry, 2 are monoatomic - leaving 42 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	FMT	B	503	-	2,2,2	1.39	0	1,1,1	0.07	0
5	FMT	A	511	-	2,2,2	1.29	0	1,1,1	0.16	0
5	FMT	B	504	-	2,2,2	1.01	0	1,1,1	0.29	0
5	FMT	A	509	-	2,2,2	1.20	0	1,1,1	0.13	0
5	FMT	F	504	-	2,2,2	1.02	0	1,1,1	0.26	0
3	4OA	F	502	-	30,30,30	0.48	0	47,47,47	1.14	3 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	HEM	F	501	1	50,50,50	1.55	8 (16%)	66,82,82	1.61	11 (16%)
5	FMT	A	506	-	2,2,2	1.37	0	1,1,1	0.14	0
5	FMT	A	510	-	2,2,2	0.94	0	1,1,1	0.30	0
5	FMT	C	505	-	2,2,2	0.99	0	1,1,1	0.25	0
2	HEM	D	501	1	50,50,50	1.63	8 (16%)	66,82,82	1.61	11 (16%)
2	HEM	B	501	1	50,50,50	1.82	12 (24%)	66,82,82	1.87	17 (25%)
5	FMT	E	503	-	2,2,2	1.04	0	1,1,1	0.24	0
5	FMT	D	507	-	2,2,2	1.20	0	1,1,1	0.22	0
3	4OA	C	502	-	30,30,30	0.62	0	47,47,47	1.03	1 (2%)
5	FMT	A	505	-	2,2,2	1.42	1 (50%)	1,1,1	0.11	0
3	4OA	B	502[A]	-	30,30,30	0.50	0	47,47,47	0.85	2 (4%)
5	FMT	D	506	-	2,2,2	1.05	0	1,1,1	0.27	0
5	FMT	E	504	-	2,2,2	1.12	0	1,1,1	0.22	0
2	HEM	E	501	1	50,50,50	1.56	8 (16%)	66,82,82	1.69	12 (18%)
2	HEM	A	501	1	50,50,50	1.76	13 (26%)	66,82,82	1.88	18 (27%)
5	FMT	C	506	-	2,2,2	1.34	0	1,1,1	0.18	0
5	FMT	A	507	-	2,2,2	0.94	0	1,1,1	0.25	0
3	4OA	D	502	-	30,30,30	0.47	0	47,47,47	0.87	2 (4%)
5	FMT	F	503	-	2,2,2	0.92	0	1,1,1	0.28	0
5	FMT	B	506	-	2,2,2	1.00	0	1,1,1	0.29	0
5	FMT	D	505	-	2,2,2	1.17	0	1,1,1	0.22	0
5	FMT	B	505	-	2,2,2	1.12	0	1,1,1	0.22	0
5	FMT	C	504	-	2,2,2	0.99	0	1,1,1	0.28	0
5	FMT	C	508	-	2,2,2	1.35	0	1,1,1	0.05	0
5	FMT	C	509	-	2,2,2	1.13	0	1,1,1	0.23	0
3	4OA	A	502	-	30,30,30	0.59	0	47,47,47	0.61	0
5	FMT	B	507	-	2,2,2	1.20	0	1,1,1	0.06	0
2	HEM	C	501	1	50,50,50	1.68	8 (16%)	66,82,82	1.69	14 (21%)
5	FMT	D	503	-	2,2,2	1.23	0	1,1,1	0.17	0
5	FMT	A	508	-	2,2,2	1.08	0	1,1,1	0.22	0
5	FMT	C	507	-	2,2,2	1.39	0	1,1,1	0.04	0
5	FMT	A	512	-	2,2,2	1.13	0	1,1,1	0.20	0
5	FMT	A	504	-	2,2,2	1.25	0	1,1,1	0.17	0
3	4OA	E	502	-	30,30,30	0.54	0	47,47,47	0.84	1 (2%)
3	4OA	B	502[B]	-	30,30,30	0.50	0	47,47,47	0.77	0
5	FMT	D	504	-	2,2,2	1.25	0	1,1,1	0.16	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	4OA	A	502	-	-	4/9/67/67	0/4/4/4
3	4OA	C	502	-	-	4/9/67/67	0/4/4/4
3	4OA	D	502	-	-	3/9/67/67	0/4/4/4
3	4OA	E	502	-	-	3/9/67/67	0/4/4/4
2	HEM	C	501	1	-	0/14/54/54	-
3	4OA	B	502[A]	-	-	8/9/67/67	0/4/4/4
2	HEM	E	501	1	-	0/14/54/54	-
3	4OA	F	502	-	-	2/9/67/67	0/4/4/4
2	HEM	F	501	1	-	2/14/54/54	-
2	HEM	A	501	1	-	0/14/54/54	-
2	HEM	D	501	1	-	0/14/54/54	-
2	HEM	B	501	1	-	0/14/54/54	-
3	4OA	B	502[B]	-	-	0/9/67/67	0/4/4/4

All (58) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501	HEM	C1B-NB	-4.86	1.31	1.40
2	F	501	HEM	FE-NB	4.72	2.09	1.94
2	B	501	HEM	C1B-NB	-4.69	1.32	1.40
2	C	501	HEM	FE-NB	4.69	2.09	1.94
2	D	501	HEM	FE-NB	4.37	2.08	1.94
2	E	501	HEM	FE-NB	4.37	2.08	1.94
2	A	501	HEM	C4B-NB	-4.29	1.30	1.38
2	B	501	HEM	FE-NB	4.27	2.08	1.94
2	C	501	HEM	FE-NC	4.14	2.09	1.95
2	D	501	HEM	C1B-NB	-3.96	1.33	1.40
2	F	501	HEM	FE-NC	3.90	2.08	1.95
2	B	501	HEM	FE-NC	3.75	2.07	1.95
2	E	501	HEM	FE-NC	3.70	2.07	1.95
2	F	501	HEM	C4B-NB	-3.65	1.31	1.38
2	C	501	HEM	C1B-NB	-3.65	1.34	1.40
2	B	501	HEM	C4B-NB	-3.65	1.31	1.38
2	C	501	HEM	C1C-C2C	-3.60	1.38	1.45
2	E	501	HEM	C1B-NB	-3.60	1.34	1.40
2	F	501	HEM	C1B-NB	-3.52	1.34	1.40
2	A	501	HEM	FE-NB	3.51	2.05	1.94
2	D	501	HEM	C4B-NB	-3.46	1.31	1.38
2	D	501	HEM	C4D-ND	-3.37	1.34	1.40
2	C	501	HEM	C4D-ND	-3.23	1.34	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	D	501	HEM	FE-NC	3.23	2.06	1.95
2	A	501	HEM	FE-NC	3.17	2.05	1.95
2	A	501	HEM	C1C-NC	-3.12	1.33	1.39
2	A	501	HEM	C4D-ND	-3.04	1.35	1.40
2	C	501	HEM	C1D-ND	-2.99	1.32	1.38
2	B	501	HEM	C4C-NC	-2.96	1.34	1.39
2	C	501	HEM	C4B-NB	-2.93	1.32	1.38
2	F	501	HEM	C4D-ND	-2.93	1.35	1.40
2	E	501	HEM	C4B-NB	-2.90	1.32	1.38
2	B	501	HEM	CHB-C1B	2.88	1.44	1.38
2	A	501	HEM	C1A-C2A	-2.86	1.38	1.44
2	B	501	HEM	C1A-C2A	-2.74	1.39	1.44
2	B	501	HEM	C1C-C2C	-2.68	1.40	1.45
2	B	501	HEM	C1D-ND	-2.63	1.33	1.38
2	E	501	HEM	C1C-NC	-2.50	1.34	1.39
2	B	501	HEM	C1C-NC	-2.49	1.34	1.39
2	A	501	HEM	C4C-NC	-2.47	1.35	1.39
2	B	501	HEM	C4D-C3D	2.44	1.49	1.45
2	D	501	HEM	C1D-ND	-2.42	1.33	1.38
2	D	501	HEM	C1C-NC	-2.38	1.35	1.39
2	A	501	HEM	C3C-C4C	-2.37	1.41	1.46
2	B	501	HEM	C4D-ND	-2.31	1.36	1.40
2	F	501	HEM	C1C-NC	-2.31	1.35	1.39
2	E	501	HEM	C4D-ND	-2.27	1.36	1.40
2	A	501	HEM	C1C-C2C	-2.22	1.40	1.45
2	E	501	HEM	C1C-C2C	-2.22	1.40	1.45
2	A	501	HEM	C4D-C3D	2.20	1.48	1.45
2	F	501	HEM	C1D-ND	-2.19	1.34	1.38
2	A	501	HEM	CHA-C1A	-2.17	1.34	1.39
2	C	501	HEM	C4C-NC	-2.15	1.35	1.39
2	E	501	HEM	C1D-ND	-2.14	1.34	1.38
2	A	501	HEM	C1D-ND	-2.14	1.34	1.38
2	D	501	HEM	C1C-C2C	-2.02	1.41	1.45
5	A	505	FMT	O2-C	2.00	1.38	1.28
2	F	501	HEM	C1C-C2C	-2.00	1.41	1.45

All (92) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	501	HEM	CHC-C4B-NB	7.03	132.06	124.42
2	C	501	HEM	CHC-C4B-NB	6.09	131.04	124.42
2	D	501	HEM	CHC-C4B-NB	5.91	130.84	124.42

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501	HEM	CHC-C4B-NB	5.78	130.70	124.42
2	E	501	HEM	CHC-C4B-NB	5.32	130.19	124.42
2	F	501	HEM	CHC-C4B-NB	5.30	130.18	124.42
2	E	501	HEM	C1B-NB-C4B	5.09	110.33	105.07
2	A	501	HEM	C1B-NB-C4B	5.07	110.31	105.07
2	B	501	HEM	C1B-NB-C4B	5.02	110.26	105.07
2	F	501	HEM	C1B-NB-C4B	4.99	110.22	105.07
2	D	501	HEM	C1B-NB-C4B	4.18	109.39	105.07
2	C	501	HEM	C1B-NB-C4B	4.11	109.32	105.07
3	F	502	4OA	C1-C2-C3	3.92	115.50	110.47
2	A	501	HEM	CHD-C1D-C2D	-3.81	119.03	124.98
2	F	501	HEM	CHD-C1D-C2D	-3.58	119.38	124.98
2	A	501	HEM	C3C-C2C-C1C	-3.54	103.70	107.08
2	A	501	HEM	CHD-C1D-ND	3.51	128.24	124.42
2	E	501	HEM	CHD-C1D-ND	3.45	128.17	124.42
2	B	501	HEM	C4A-NA-C1A	3.20	108.48	105.35
2	B	501	HEM	O2A-CGA-CBA	3.18	124.24	114.03
2	A	501	HEM	CHD-C4C-NC	3.14	127.83	124.44
2	F	501	HEM	CHD-C1D-ND	3.12	127.81	124.42
2	B	501	HEM	CHD-C4C-NC	3.05	127.73	124.44
2	B	501	HEM	C3C-C2C-C1C	-3.03	104.19	107.08
2	E	501	HEM	C4B-C3B-C2B	-2.99	104.74	107.11
2	B	501	HEM	C4C-NC-C1C	2.97	108.25	105.35
2	A	501	HEM	CHA-C4D-ND	2.95	128.01	124.37
2	E	501	HEM	CHA-C4D-ND	2.91	127.97	124.37
2	E	501	HEM	CHD-C1D-C2D	-2.90	120.45	124.98
2	C	501	HEM	C4C-NC-C1C	2.90	108.19	105.35
2	D	501	HEM	CHD-C1D-ND	2.86	127.52	124.42
2	C	501	HEM	C4A-NA-C1A	2.83	108.12	105.35
2	E	501	HEM	CHD-C4C-NC	2.81	127.48	124.44
2	E	501	HEM	C4C-NC-C1C	2.67	107.96	105.35
2	D	501	HEM	CHD-C1D-C2D	-2.66	120.82	124.98
2	B	501	HEM	C4A-C3A-C2A	2.64	109.92	106.83
2	D	501	HEM	CAD-C3D-C4D	2.63	129.25	124.66
2	B	501	HEM	CHA-C1A-NA	2.60	128.63	123.85
2	C	501	HEM	CHD-C1D-ND	2.58	127.22	124.42
2	B	501	HEM	C1A-CHA-C4D	-2.54	120.32	126.34
2	A	501	HEM	CHA-C4D-C3D	-2.52	120.59	125.33
3	B	502[A]	4OA	C16-C17-C13	-2.51	100.81	103.84
2	E	501	HEM	CAD-C3D-C4D	2.51	129.04	124.66
3	D	502	4OA	C22-C23-C24	2.51	119.16	112.51
2	D	501	HEM	C4C-NC-C1C	2.50	107.79	105.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	501	HEM	CBD-CAD-C3D	-2.49	105.72	112.63
2	B	501	HEM	CHD-C1D-C2D	-2.45	121.15	124.98
2	F	501	HEM	C2D-C1D-ND	2.45	112.81	109.88
2	C	501	HEM	O2A-CGA-O1A	-2.45	117.20	123.30
2	F	501	HEM	C1D-C2D-C3D	-2.43	104.40	106.96
2	B	501	HEM	CHC-C4B-C3B	-2.43	119.90	125.13
2	E	501	HEM	CHB-C1B-NB	2.41	127.35	124.37
2	A	501	HEM	C2D-C1D-ND	2.37	112.73	109.88
2	C	501	HEM	CHD-C1D-C2D	-2.36	121.30	124.98
2	E	501	HEM	CHA-C4D-C3D	-2.35	120.91	125.33
2	D	501	HEM	CMB-C2B-C1B	2.33	128.59	125.04
2	D	501	HEM	CHD-C4C-NC	2.33	126.96	124.44
2	C	501	HEM	CHA-C1A-NA	2.33	128.13	123.85
3	C	502	4OA	C22-C23-C24	2.31	118.63	112.51
2	E	501	HEM	C1A-CHA-C4D	-2.30	120.88	126.34
2	A	501	HEM	C4C-NC-C1C	2.30	107.60	105.35
2	F	501	HEM	C4C-NC-C1C	2.30	107.60	105.35
2	C	501	HEM	CAD-C3D-C4D	2.30	128.67	124.66
2	D	501	HEM	CHC-C4B-C3B	-2.27	120.25	125.13
2	B	501	HEM	CAD-C3D-C4D	2.27	128.62	124.66
2	A	501	HEM	CMB-C2B-C1B	2.24	128.45	125.04
2	F	501	HEM	O2A-CGA-CBA	2.24	121.21	114.03
2	A	501	HEM	C1A-CHA-C4D	-2.23	121.06	126.34
2	A	501	HEM	C4C-C3C-C2C	2.22	108.57	106.75
3	D	502	4OA	O4A-C24-C23	-2.22	115.96	123.08
2	F	501	HEM	CHA-C4D-ND	2.21	127.10	124.37
3	F	502	4OA	C2-C1-C10	2.20	116.56	112.78
2	A	501	HEM	C4C-CHD-C1D	-2.20	121.32	126.06
2	C	501	HEM	CHD-C4C-NC	2.19	126.81	124.44
2	C	501	HEM	CHC-C4B-C3B	-2.18	120.44	125.13
2	A	501	HEM	CAA-CBA-CGA	-2.17	108.92	113.60
3	B	502[A]	4OA	C11-C12-C13	-2.16	109.07	112.78
2	D	501	HEM	C3C-C2C-C1C	-2.15	105.02	107.08
2	B	501	HEM	CBA-CAA-C2A	2.15	118.59	112.63
2	A	501	HEM	C4A-NA-C1A	2.15	107.45	105.35
2	B	501	HEM	C3A-C4A-NA	-2.14	106.82	110.08
2	A	501	HEM	O2A-CGA-CBA	2.10	120.79	114.03
2	F	501	HEM	CHD-C4C-NC	2.10	126.71	124.44
2	D	501	HEM	CBA-CAA-C2A	2.08	118.41	112.63
2	C	501	HEM	CHB-C1B-NB	2.07	126.93	124.37
2	B	501	HEM	C2D-C1D-ND	2.07	112.36	109.88
2	B	501	HEM	C1C-CHC-C4B	-2.05	121.62	126.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	F	502	4OA	C9-C8-C14	-2.05	106.34	109.09
2	C	501	HEM	CAA-CBA-CGA	-2.04	109.22	113.60
3	E	502	4OA	C21-C20-C22	2.02	113.53	110.36
2	A	501	HEM	CHC-C1C-NC	-2.02	122.25	124.44
2	C	501	HEM	O2D-CGD-CBD	2.01	120.47	114.03

There are no chirality outliers.

All (26) torsion outliers are listed below:

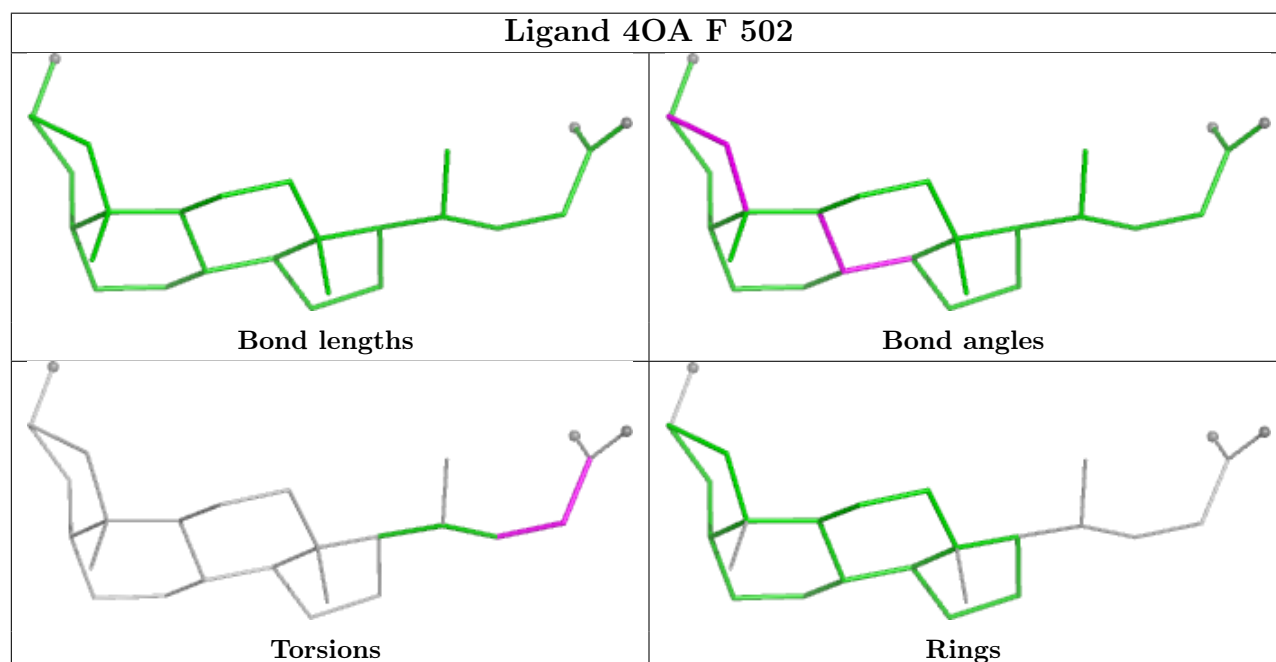
Mol	Chain	Res	Type	Atoms
3	A	502	4OA	C13-C17-C20-C21
3	A	502	4OA	C16-C17-C20-C22
3	A	502	4OA	C16-C17-C20-C21
3	B	502[A]	4OA	C13-C17-C20-C21
3	B	502[A]	4OA	C21-C20-C22-C23
3	E	502	4OA	C21-C20-C22-C23
3	B	502[A]	4OA	C16-C17-C20-C21
3	B	502[A]	4OA	C16-C17-C20-C22
3	A	502	4OA	C13-C17-C20-C22
3	E	502	4OA	C17-C20-C22-C23
3	C	502	4OA	C21-C20-C22-C23
3	D	502	4OA	C17-C20-C22-C23
3	B	502[A]	4OA	C17-C20-C22-C23
3	B	502[A]	4OA	C13-C17-C20-C22
3	F	502	4OA	C20-C22-C23-C24
3	D	502	4OA	C21-C20-C22-C23
3	B	502[A]	4OA	C22-C23-C24-O4
3	B	502[A]	4OA	C22-C23-C24-O4A
3	C	502	4OA	C20-C22-C23-C24
3	E	502	4OA	C20-C22-C23-C24
2	F	501	HEM	CAA-CBA-CGA-O2A
2	F	501	HEM	CAA-CBA-CGA-O1A
3	C	502	4OA	C22-C23-C24-O4A
3	C	502	4OA	C22-C23-C24-O4
3	F	502	4OA	C22-C23-C24-O4A
3	D	502	4OA	C22-C23-C24-O4A

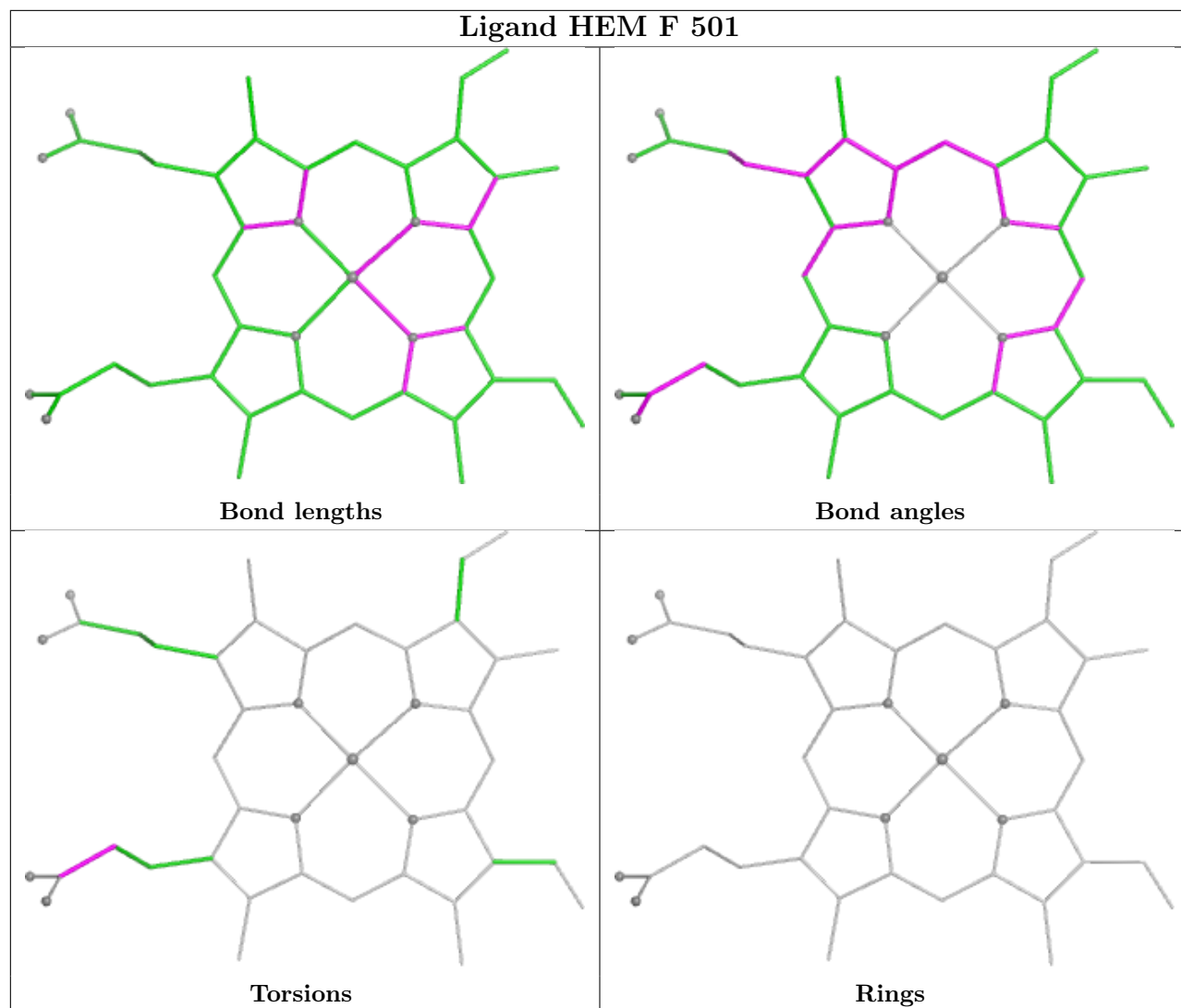
There are no ring outliers.

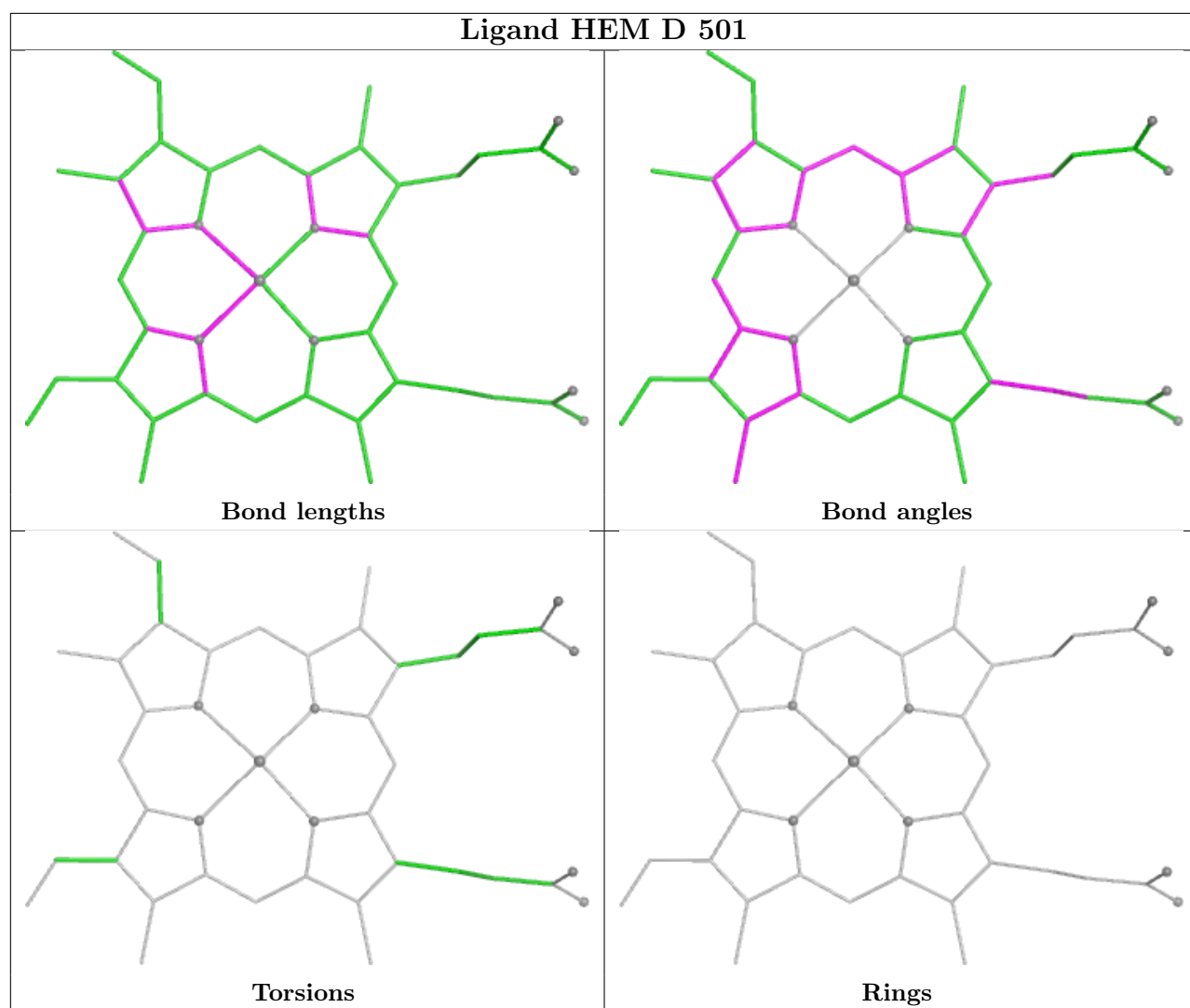
13 monomers are involved in 35 short contacts:

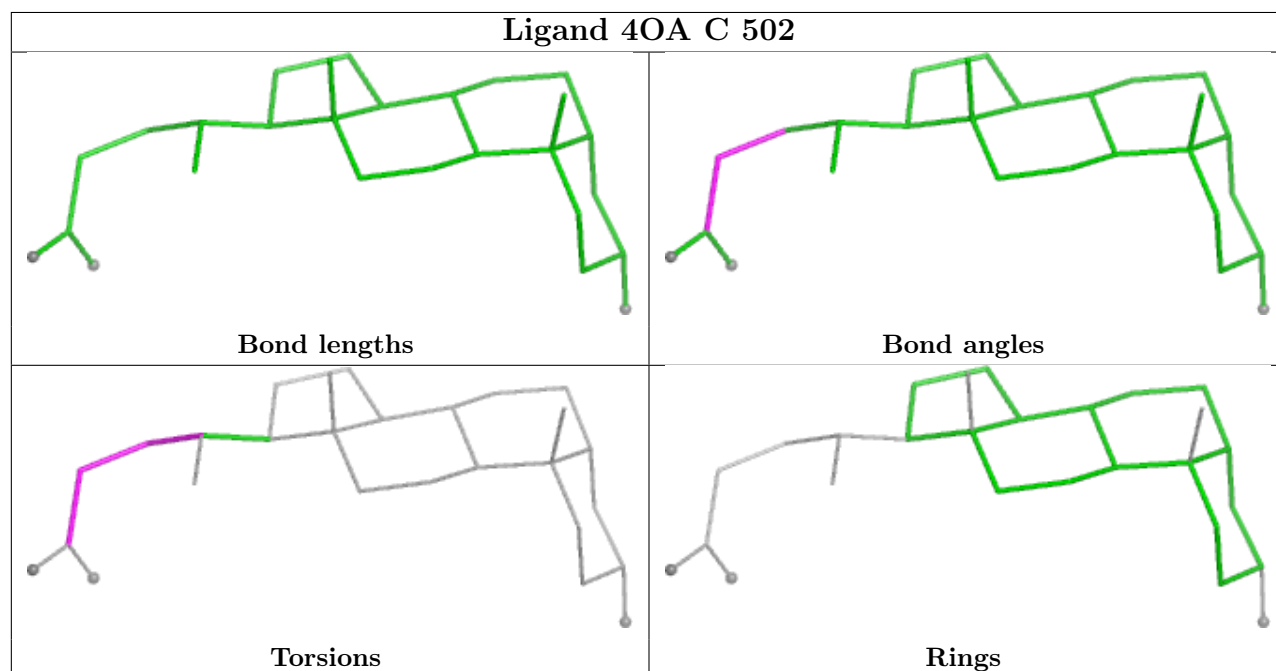
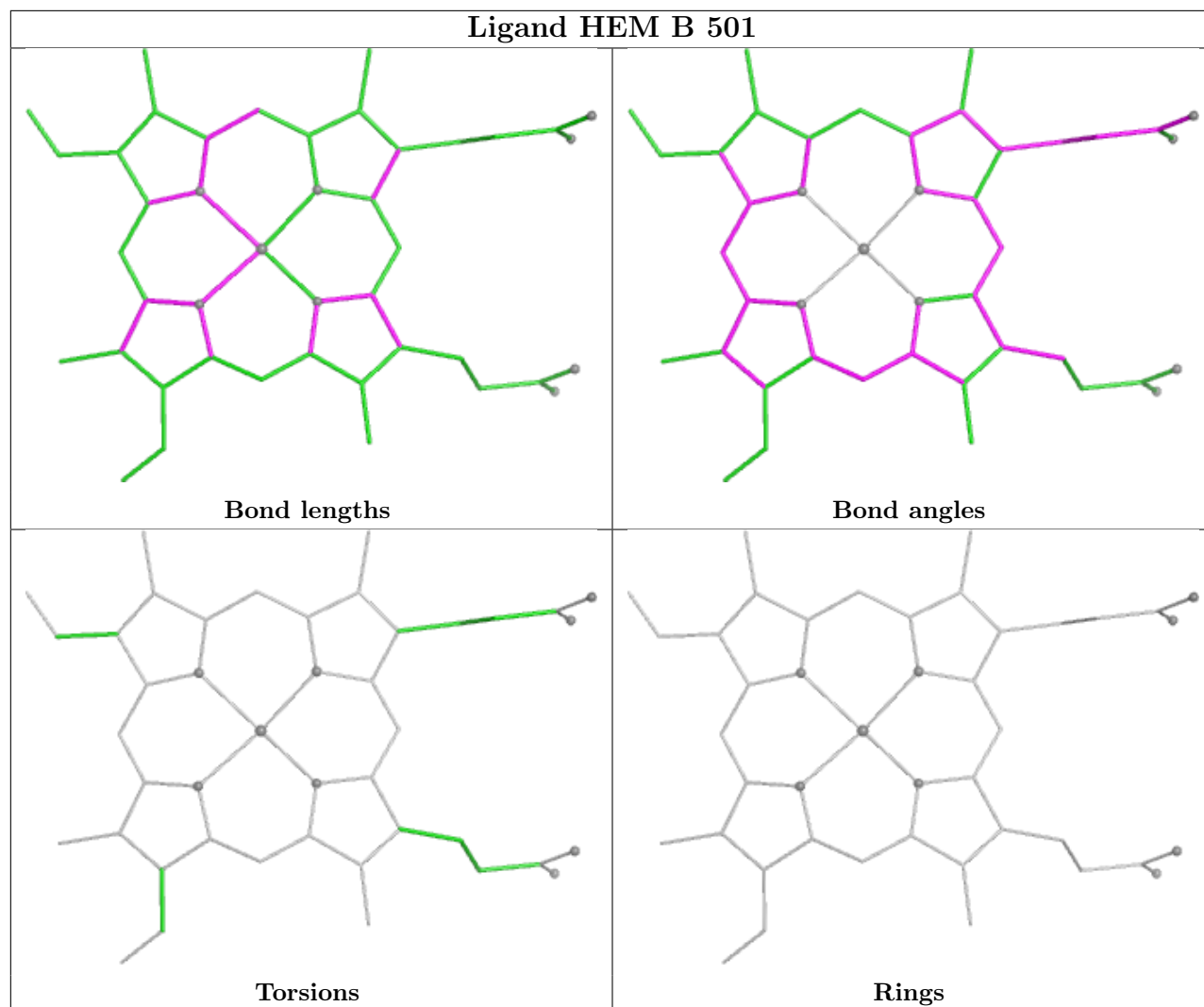
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	F	501	HEM	3	0
5	C	505	FMT	1	0
2	D	501	HEM	3	0
2	B	501	HEM	1	0
3	B	502[A]	4OA	3	0
2	E	501	HEM	2	0
2	A	501	HEM	5	0
3	D	502	4OA	2	0
3	A	502	4OA	2	0
5	B	507	FMT	2	0
2	C	501	HEM	3	0
5	C	507	FMT	3	0
3	B	502[B]	4OA	5	0

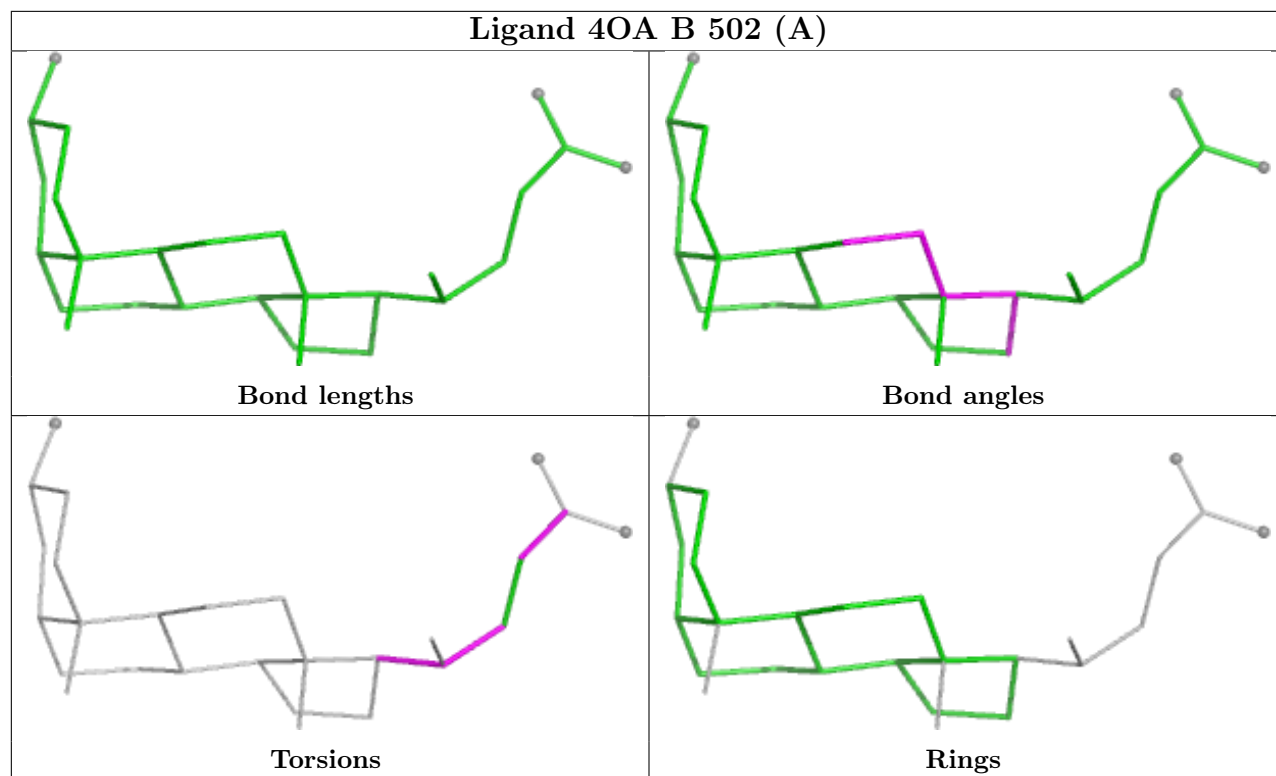
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

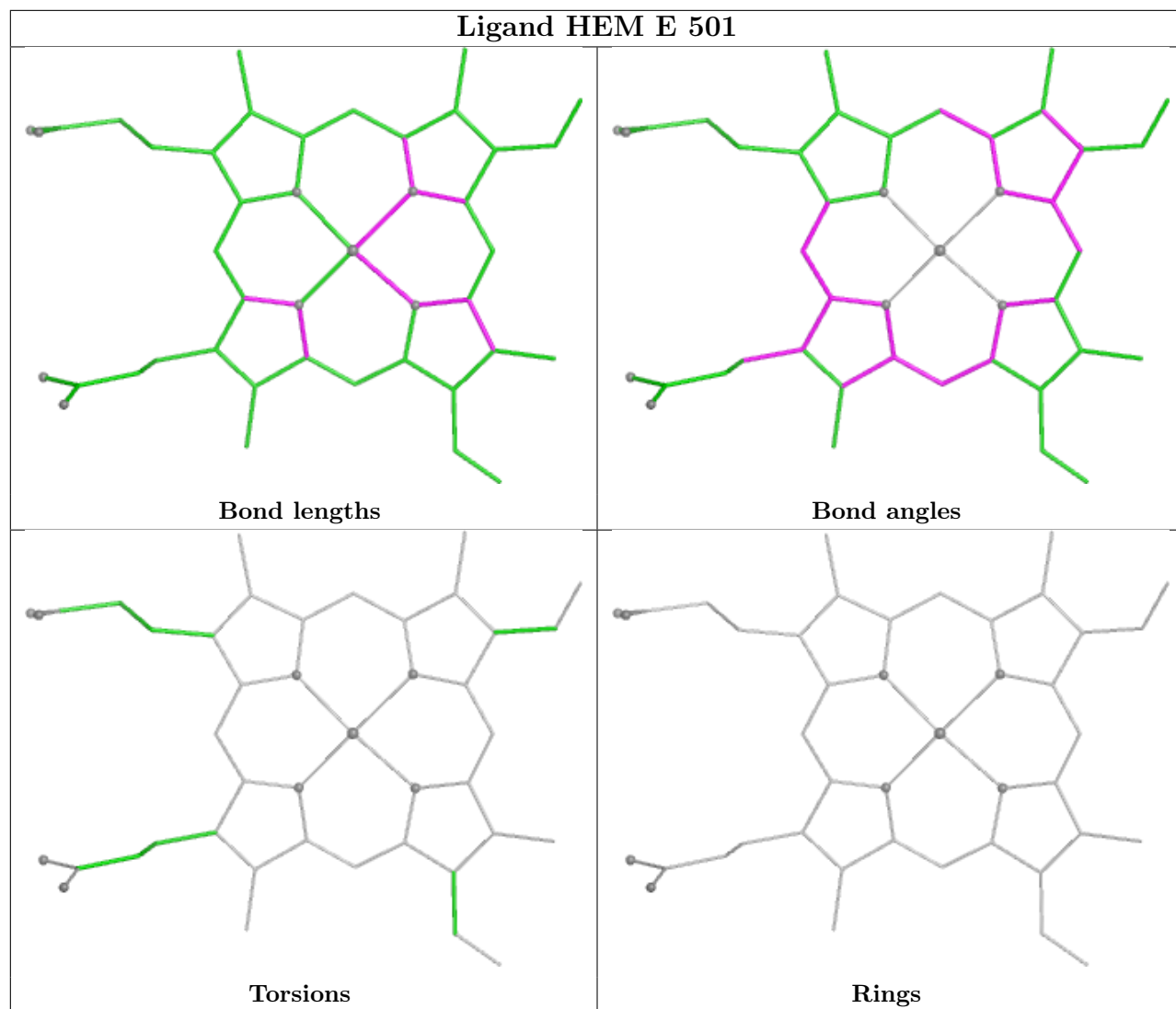


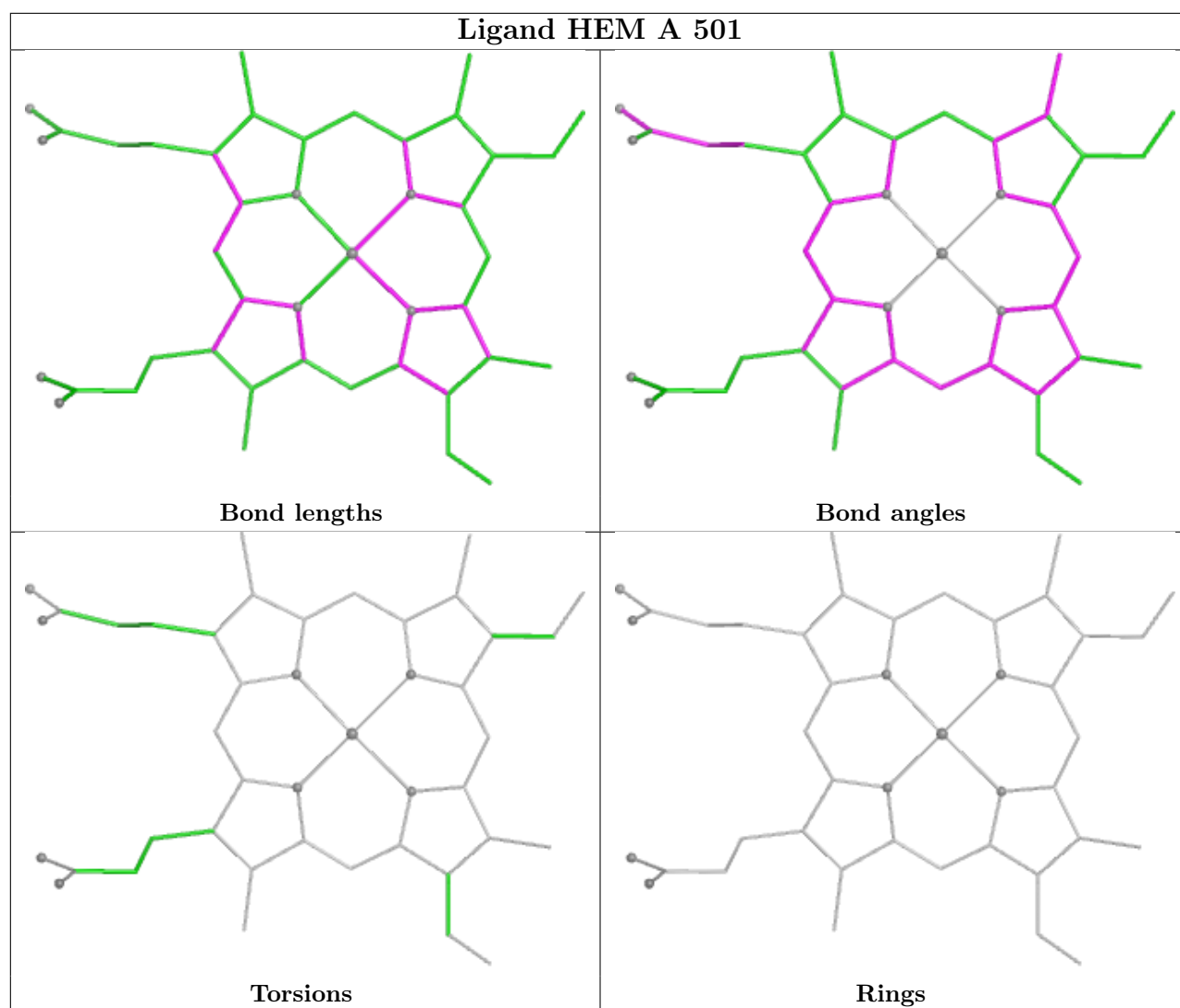


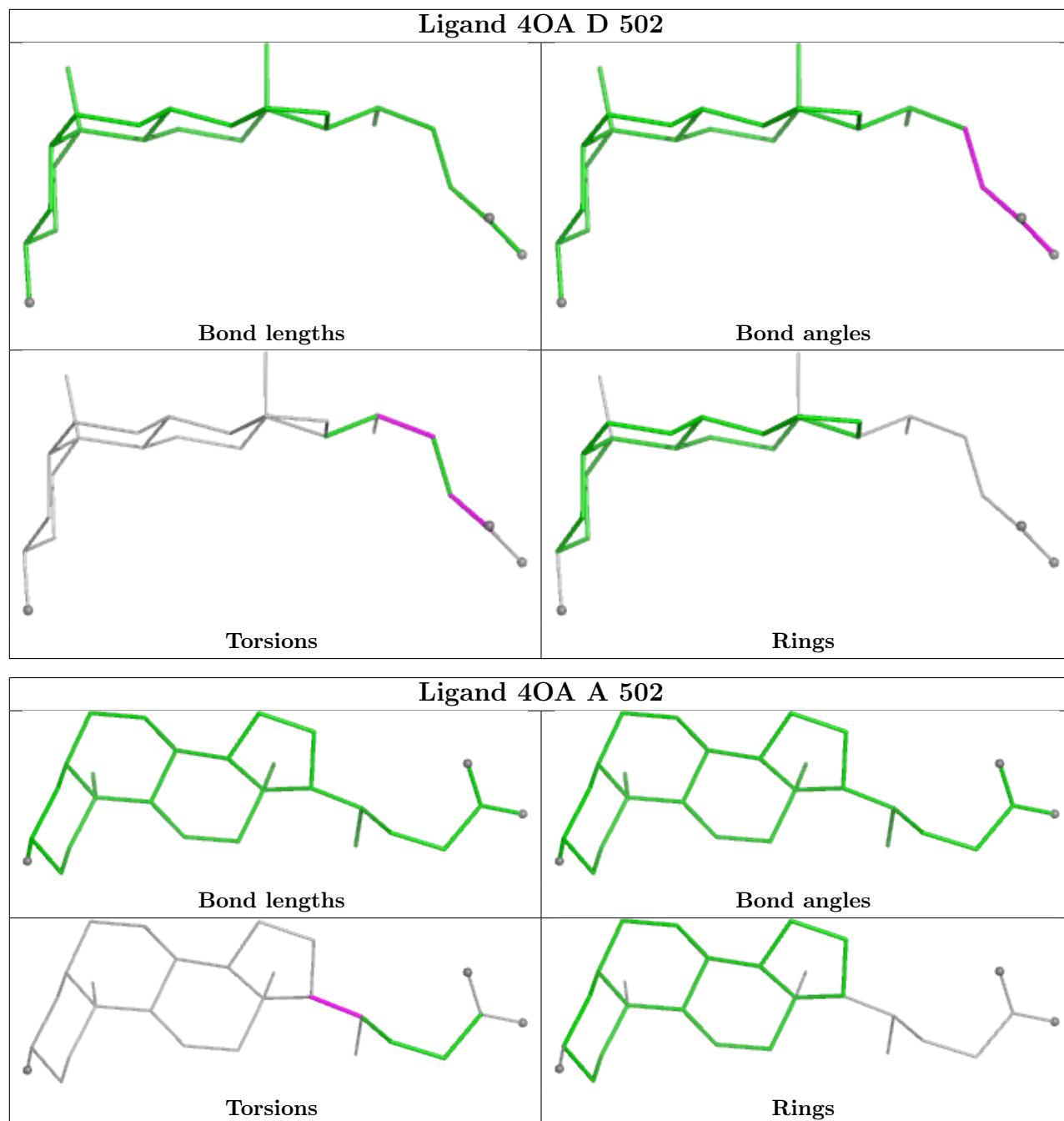


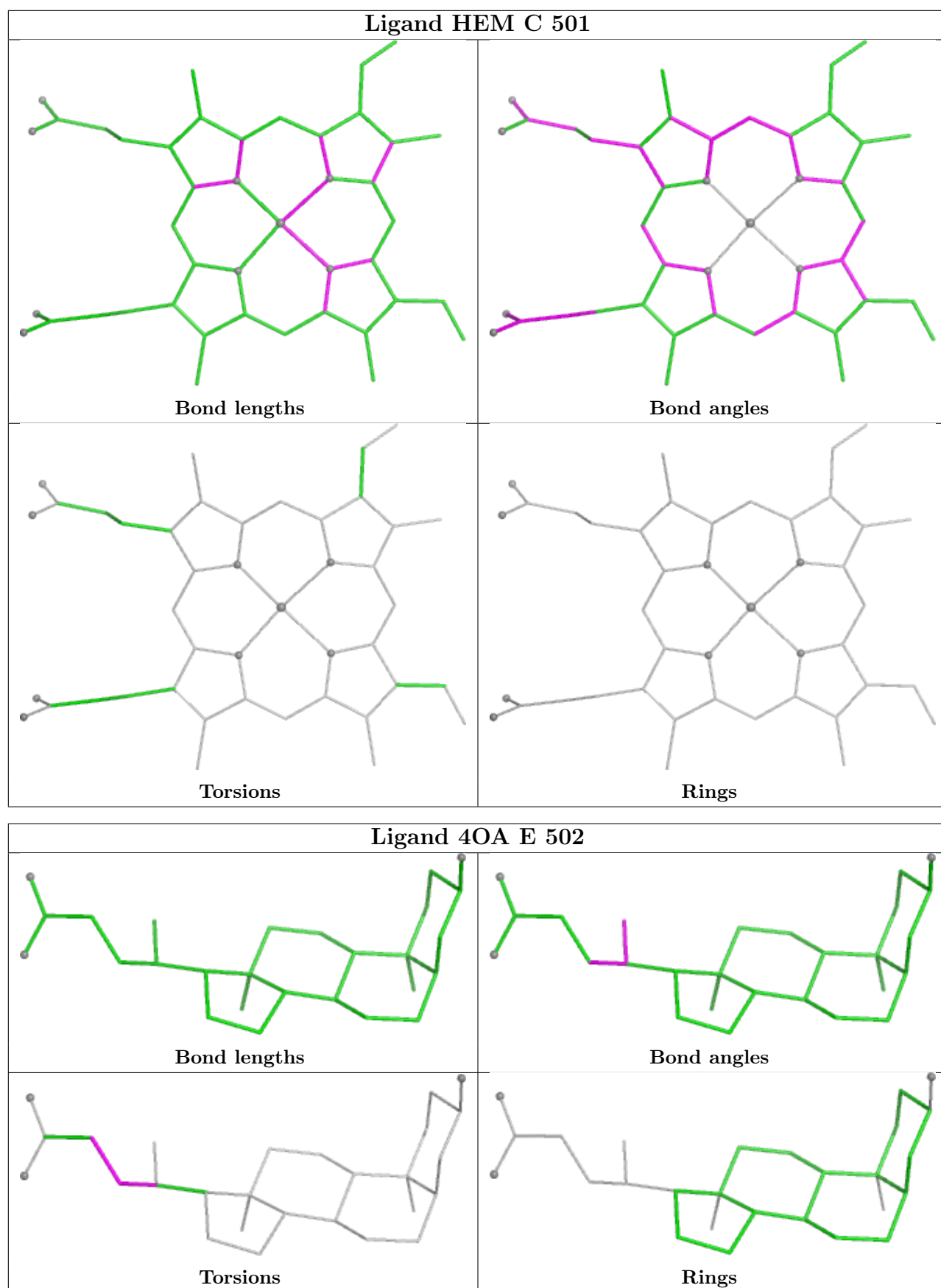












5.7 Other polymers [i](#)

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	396/427 (92%)	-0.36	3 (0%) 82 77	23, 51, 77, 114	4 (1%)
1	B	396/427 (92%)	-0.37	4 (1%) 79 74	32, 51, 79, 123	2 (0%)
1	C	396/427 (92%)	-0.34	6 (1%) 72 65	33, 55, 97, 189	0
1	D	396/427 (92%)	-0.24	5 (1%) 75 69	39, 60, 91, 157	1 (0%)
1	E	396/427 (92%)	0.25	5 (1%) 75 69	44, 80, 124, 156	0
1	F	395/427 (92%)	0.17	7 (1%) 67 60	41, 77, 118, 194	1 (0%)
All	All	2375/2562 (92%)	-0.15	30 (1%) 75 69	23, 62, 111, 194	8 (0%)

All (30) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	12	ASP	4.5
1	F	13	ALA	4.3
1	E	21	LEU	4.2
1	E	27	LEU	4.0
1	B	13	ALA	3.6
1	E	296	PHE	3.5
1	F	228	HIS	3.4
1	F	208	ARG	3.3
1	C	168	ARG	3.1
1	F	191[A]	ARG	3.0
1	D	228	HIS	3.0
1	B	12	ASP	3.0
1	A	21	LEU	2.8
1	B	208	ARG	2.8
1	F	210	ALA	2.7
1	C	228	HIS	2.6
1	B	228[A]	HIS	2.4
1	F	211	PRO	2.4
1	D	208	ARG	2.4

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Mol	Chain	Res	Type	RSRZ
1	F	168	ARG	2.4
1	D	27	LEU	2.3
1	C	12	ASP	2.3
1	E	274	PRO	2.2
1	D	229	LEU	2.2
1	E	265	LYS	2.2
1	C	223	THR	2.1
1	D	106	ARG	2.1
1	C	13	ALA	2.1
1	A	208	ARG	2.0
1	C	221	LEU	2.0

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

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

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
5	FMT	C	504	3/3	0.38	0.13	85,85,89,93	0
5	FMT	B	504	3/3	0.60	0.20	76,76,77,78	0
5	FMT	F	504	3/3	0.63	0.12	81,81,90,91	0
5	FMT	E	504	3/3	0.66	0.16	77,77,84,85	0
5	FMT	A	510	3/3	0.71	0.17	83,83,84,85	0
5	FMT	D	506	3/3	0.72	0.12	73,73,82,82	0
5	FMT	D	503	3/3	0.78	0.10	68,68,71,79	0
5	FMT	A	506	3/3	0.78	0.18	68,68,73,80	0
5	FMT	A	509	3/3	0.79	0.30	97,97,97,102	0
5	FMT	E	503	3/3	0.79	0.09	79,79,85,87	0
5	FMT	A	504	3/3	0.81	0.14	76,76,78,85	0
5	FMT	C	508	3/3	0.82	0.19	71,71,75,79	0

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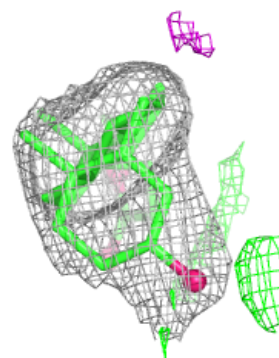
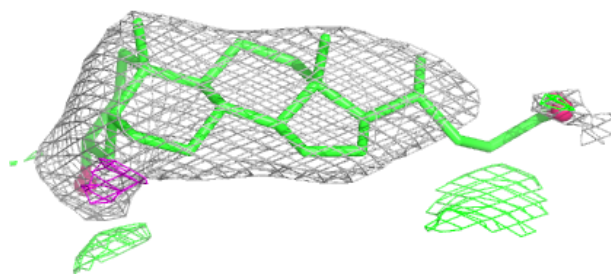
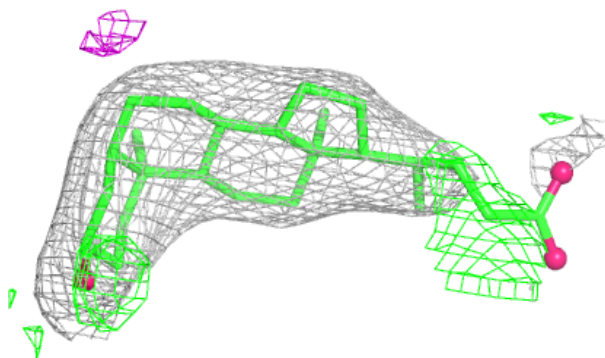
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	FMT	C	509	3/3	0.84	0.15	73,73,77,78	0
4	NA	A	503	1/1	0.85	0.17	75,75,75,75	0
5	FMT	D	504	3/3	0.85	0.18	73,73,77,83	0
5	FMT	C	506	3/3	0.87	0.19	71,71,81,86	0
5	FMT	D	505	3/3	0.87	0.16	73,73,77,84	0
5	FMT	A	511	3/3	0.89	0.16	65,65,73,75	0
5	FMT	B	505	3/3	0.91	0.10	80,80,84,87	0
5	FMT	B	507	3/3	0.92	0.16	79,79,87,90	0
5	FMT	A	512	3/3	0.92	0.15	63,63,72,77	0
5	FMT	B	503	3/3	0.92	0.21	60,60,72,79	0
3	4OA	E	502	27/27	0.93	0.13	61,64,108,118	0
5	FMT	A	505	3/3	0.93	0.12	57,57,60,66	0
5	FMT	B	506	3/3	0.93	0.14	66,66,69,73	0
5	FMT	D	507	3/3	0.94	0.14	78,78,78,87	0
5	FMT	C	507	3/3	0.94	0.14	61,61,62,69	0
3	4OA	F	502	27/27	0.95	0.13	52,57,100,120	0
5	FMT	A	508	3/3	0.95	0.08	58,58,66,67	0
5	FMT	F	503	3/3	0.95	0.11	71,71,80,85	0
3	4OA	C	502	27/27	0.95	0.11	31,37,74,84	0
4	NA	C	503	1/1	0.96	0.17	67,67,67,67	0
3	4OA	A	502	27/27	0.96	0.12	38,41,96,111	0
5	FMT	C	505	3/3	0.96	0.12	73,73,77,77	0
5	FMT	A	507	3/3	0.96	0.17	54,54,54,56	0
3	4OA	B	502[B]	27/27	0.97	0.09	36,37,45,45	27
2	HEM	E	501	43/43	0.97	0.08	53,60,66,72	0
3	4OA	D	502	27/27	0.97	0.10	42,47,72,82	0
3	4OA	B	502[A]	27/27	0.97	0.09	30,32,44,45	27
2	HEM	C	501	43/43	0.98	0.06	34,37,44,50	0
2	HEM	F	501	43/43	0.98	0.07	46,52,59,64	0
2	HEM	A	501	43/43	0.99	0.06	34,37,41,43	0
2	HEM	D	501	43/43	0.99	0.06	37,42,49,55	0
2	HEM	B	501	43/43	0.99	0.05	31,33,40,48	0

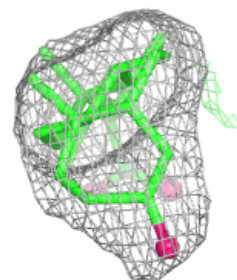
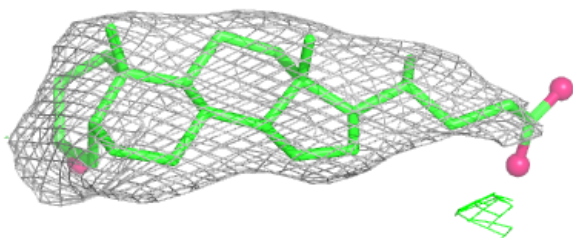
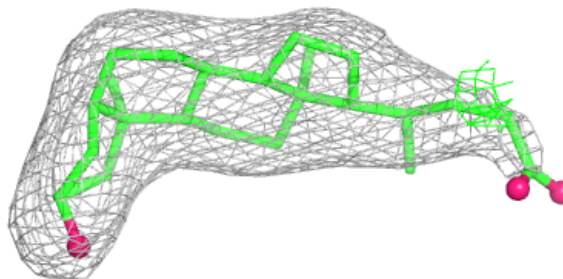
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around 4OA E 502:

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

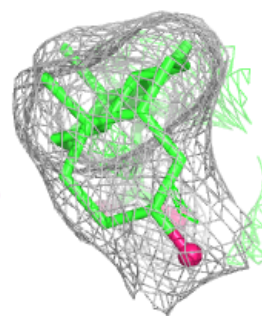
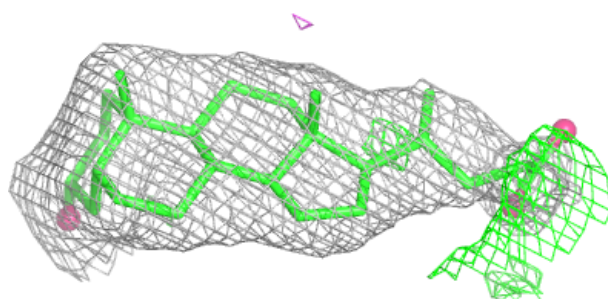
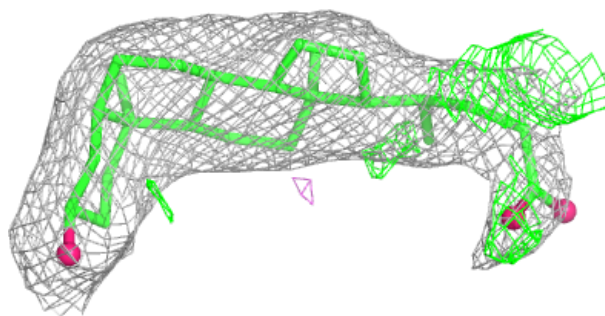
**Electron density around 4OA F 502:**

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

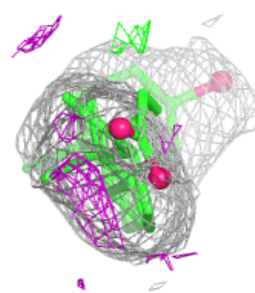
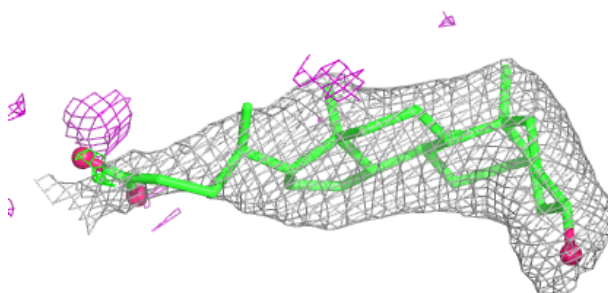
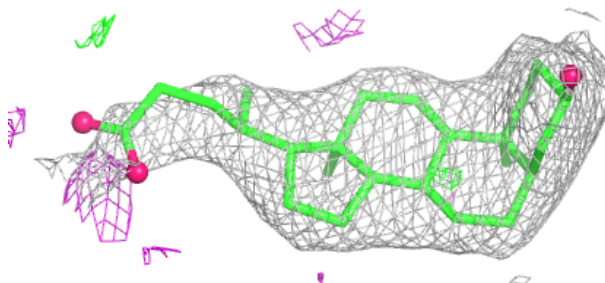


Electron density around 4OA C 502:

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

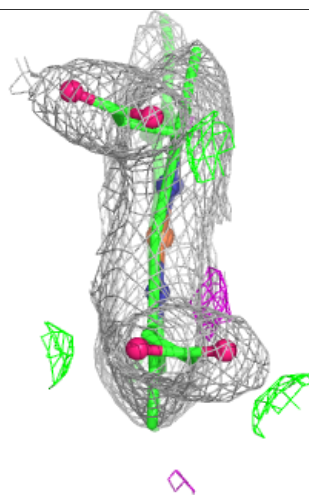
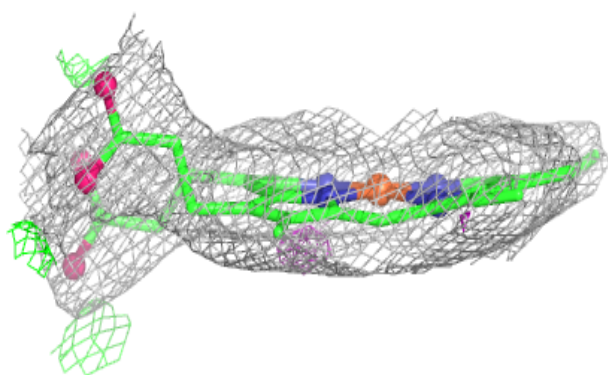
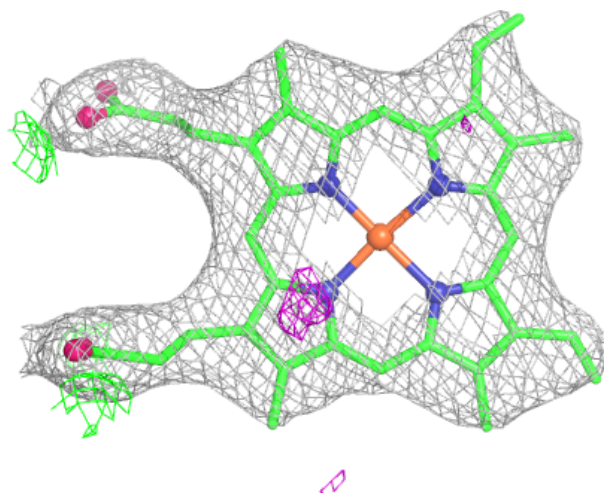
**Electron density around 4OA A 502:**

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



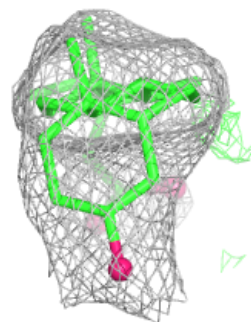
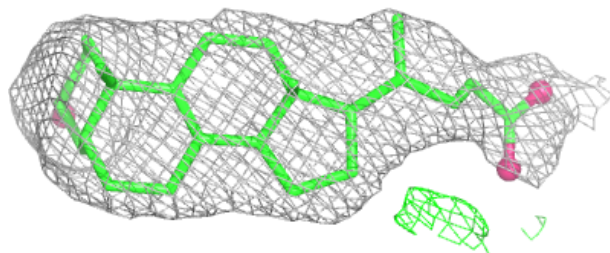
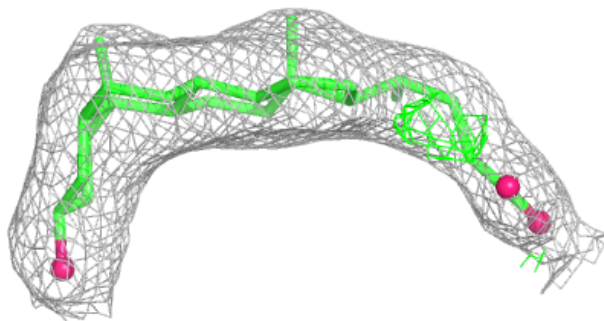
Electron density around HEM E 501:

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

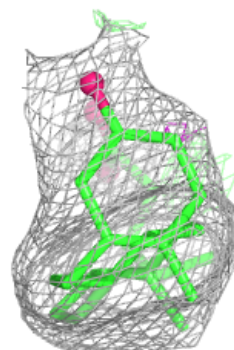
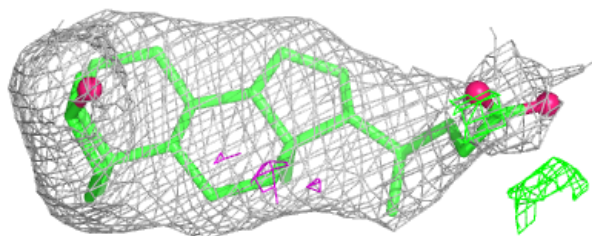
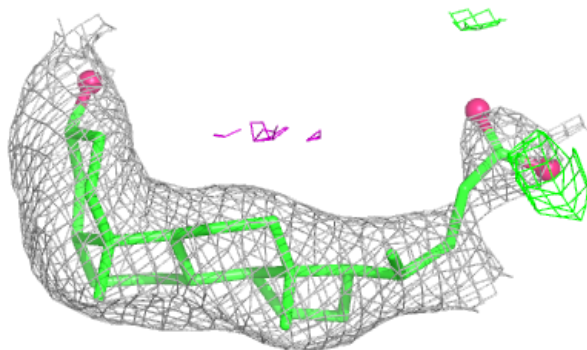


Electron density around 4OA D 502:

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

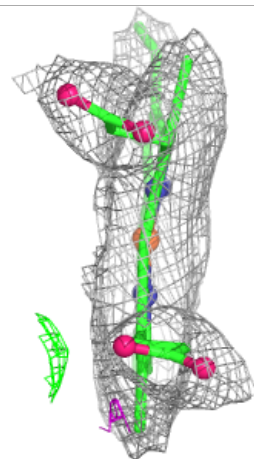
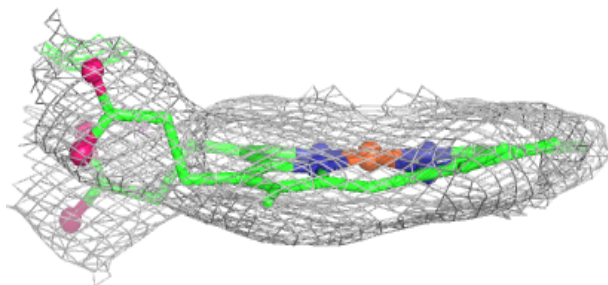
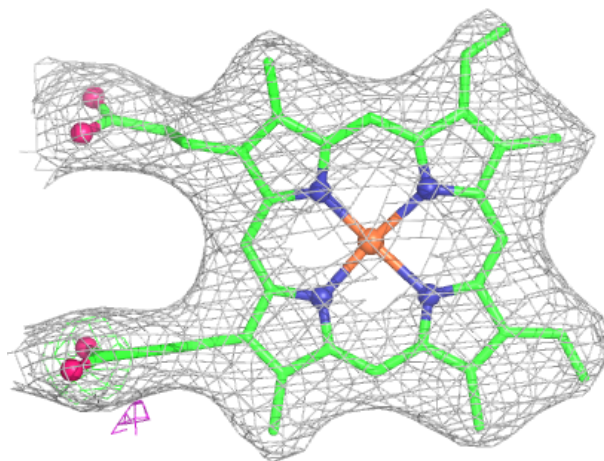
**Electron density around 4OA B 502 (A):**

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



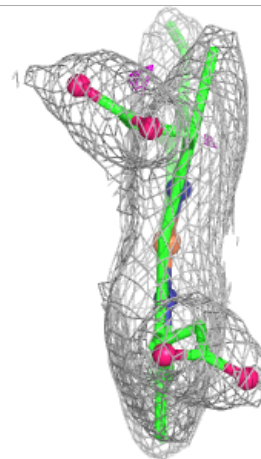
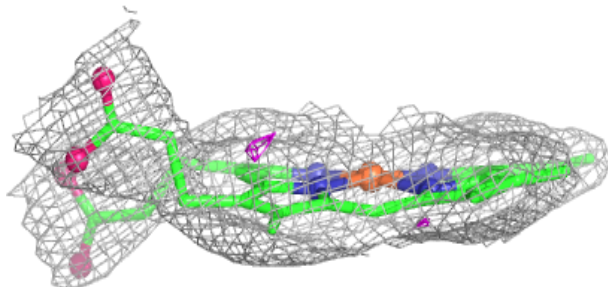
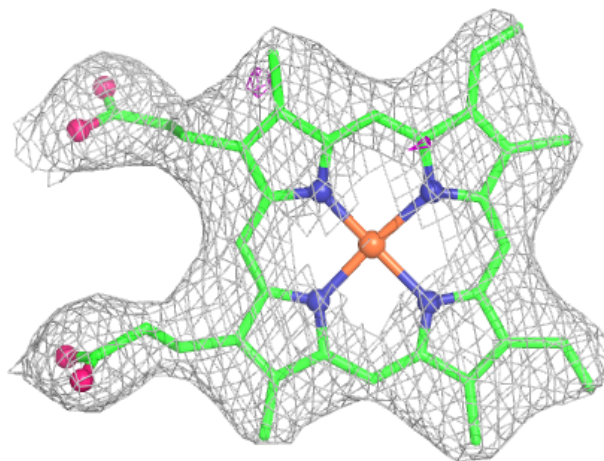
Electron density around HEM C 501:

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



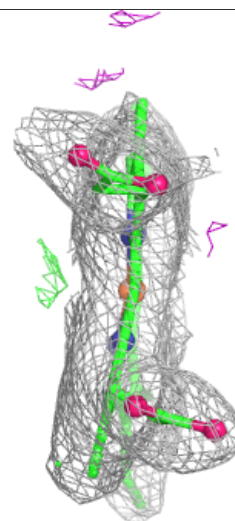
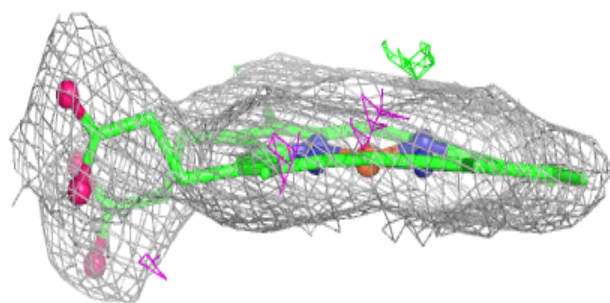
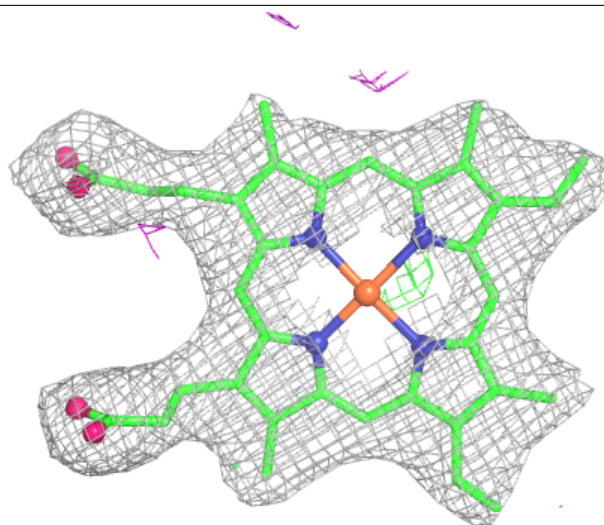
Electron density around HEM F 501:

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



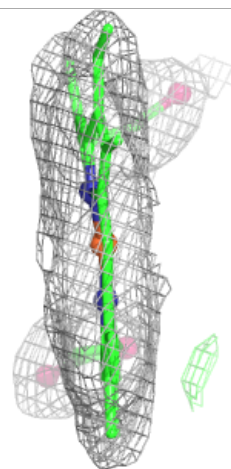
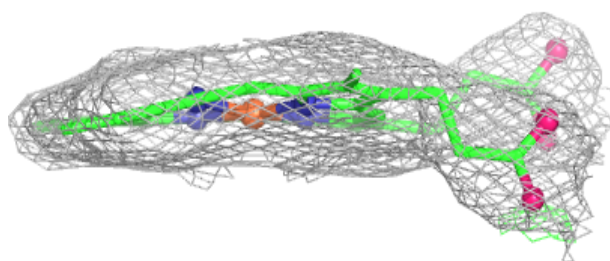
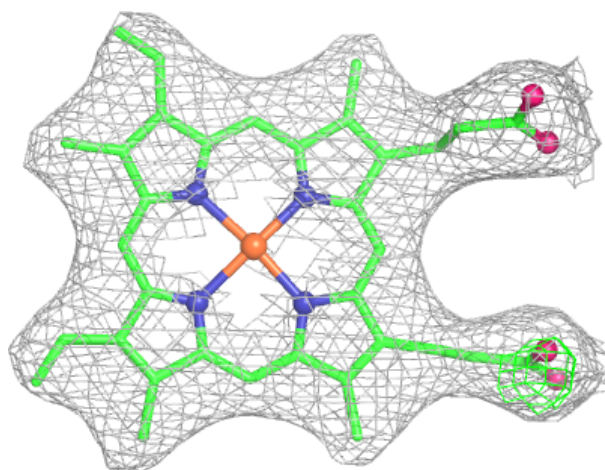
Electron density around HEM A 501:

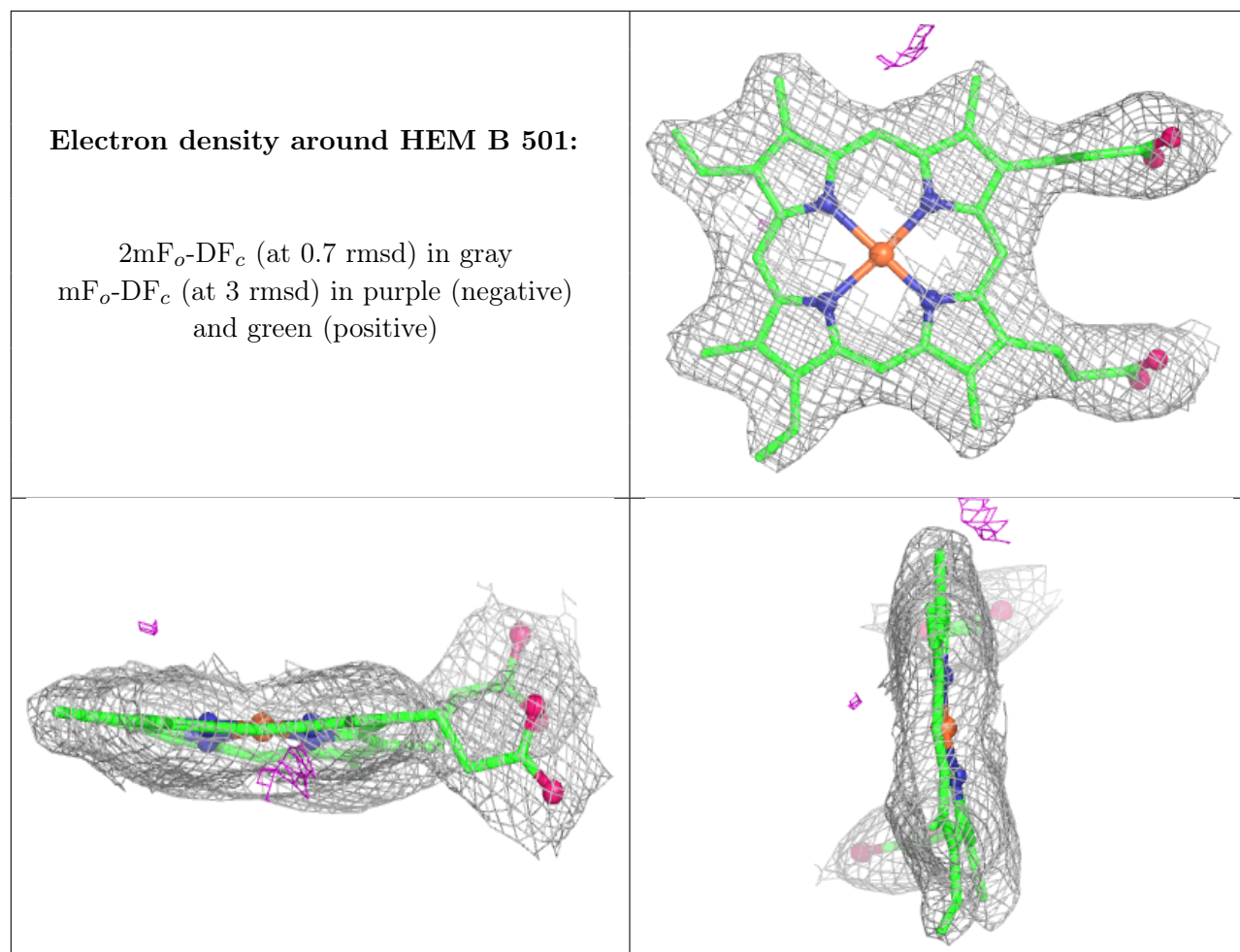
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEM D 501:

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





6.5 Other polymers [i](#)

There are no such residues in this entry.