



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 6, 2026 – 09:00 AM UTC

PDB ID : 8RNN / pdb_00008rnn
Title : Unspecific peroxygenase from *Marasmius wettsteinii* (MweUPO-1) in complex with prednisone
Authors : Fernandez-Garcia, A.; Sanz-Aparicio, J.
Deposited on : 2024-01-10
Resolution : 1.58 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

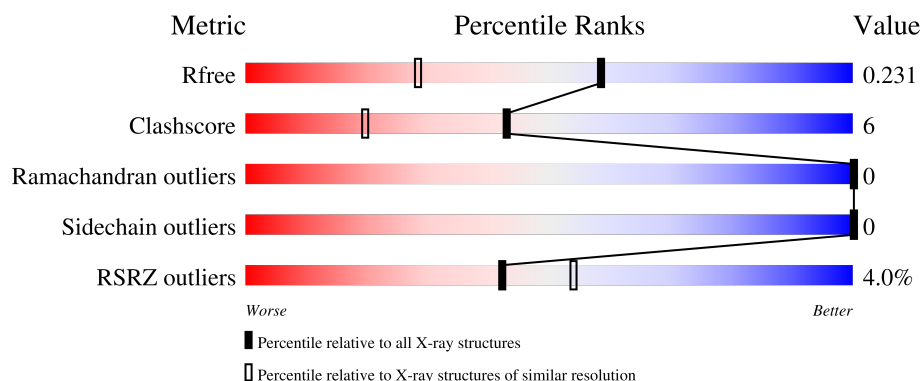
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.58 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	1094 (1.58-1.58)
Clashscore	190562	1105 (1.58-1.58)
Ramachandran outliers	187476	1082 (1.58-1.58)
Sidechain outliers	187428	1081 (1.58-1.58)
RSRZ outliers	180081	1094 (1.58-1.58)

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	240	3% 94% 6%
1	B	240	5% 91% 9%

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
6	PEG	B	308	-	-	X	-
9	DMS	B	304	-	-	X	-
9	DMS	B	310	-	-	X	-

2 Entry composition [i](#)

There are 10 unique types of molecules in this entry. The entry contains 4569 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 Unspecific peroxygenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	240	Total	C	N	O	S	0	7	0
			1857	1164	328	359	6			
1	B	240	Total	C	N	O	S	0	4	0
			1839	1153	324	356	6			

- Molecule 2 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



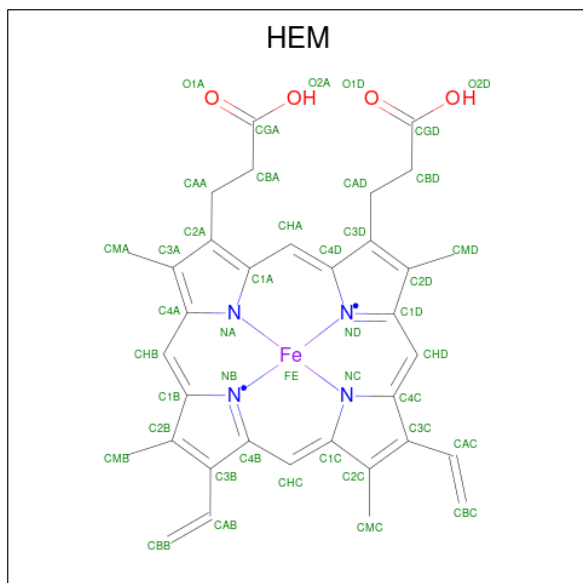
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		

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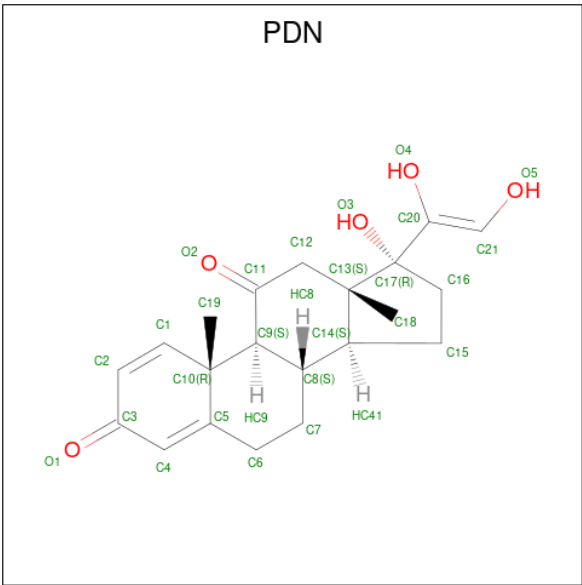
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	B	1	Total	C	N	O	0	0
			14	8	1	5		
2	B	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is PROTOPORPHYRIN IX CONTAINING FE (CCD ID: HEM) (formula: $C_{34}H_{32}FeN_4O_4$) (labeled as "Ligand of Interest" by depositor).



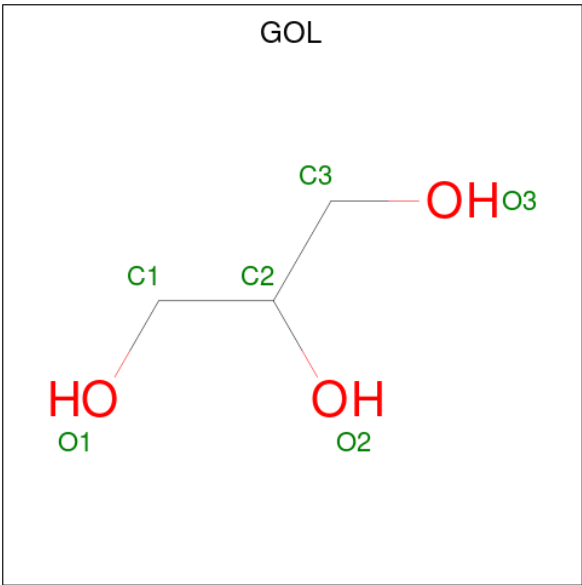
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
3	B	1	Total	C	Fe	N	O	0
			43	34	1	4	4	

- Molecule 4 is 17,21-DIHYDROXPREGNA-1,4-DIENE-3,11,20-TRIONE (CCD ID: PDN) (formula: $C_{21}H_{26}O_5$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			26	21	5		
4	B	1	Total	C	O	0	0
			26	21	5		

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



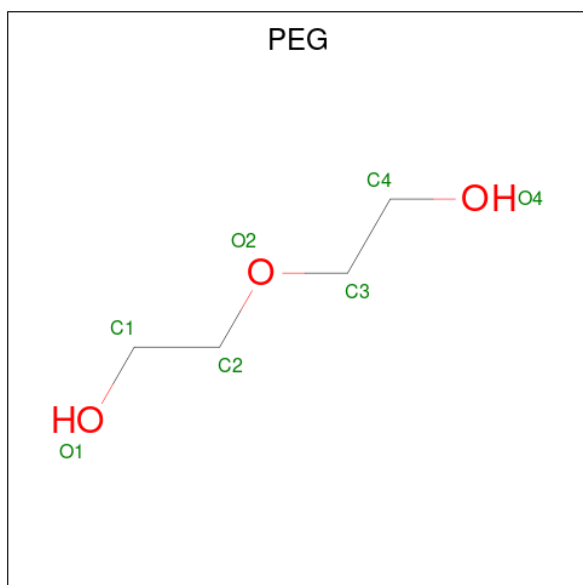
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			6	3	3		
5	A	1	Total	C	O	0	0
			6	3	3		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C₄H₁₀O₃).

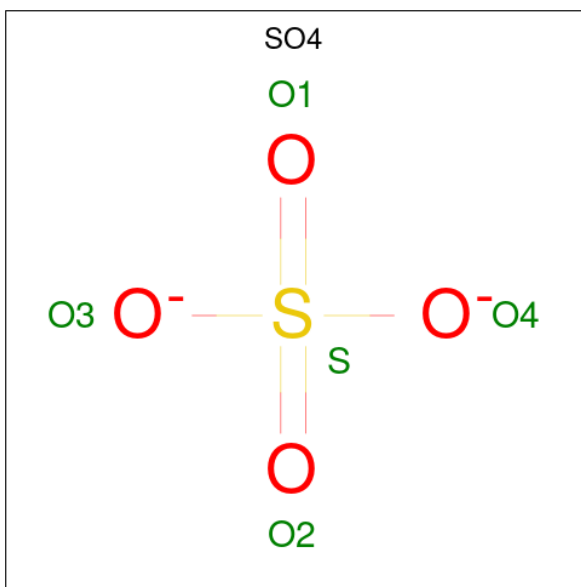


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			7	4	3		
6	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 7 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

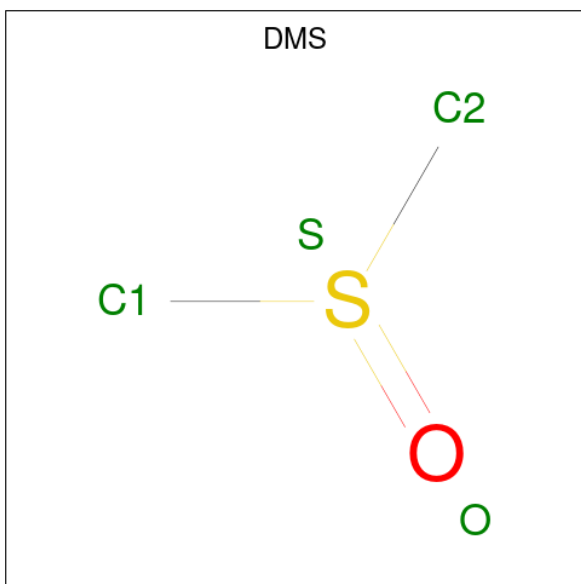
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Mg	0	0
			1	1		
7	B	1	Total	Mg	0	0
			1	1		

- Molecule 8 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



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

- Molecule 9 is DIMETHYL SULFOXIDE (CCD ID: DMS) (formula: C_2H_6OS).



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

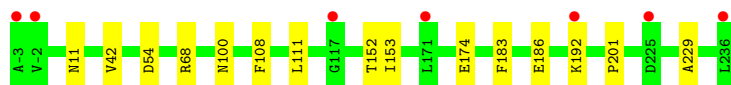
- Molecule 10 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
10	A	337	Total O 337 337	0	0
10	B	237	Total O 237 237	0	0

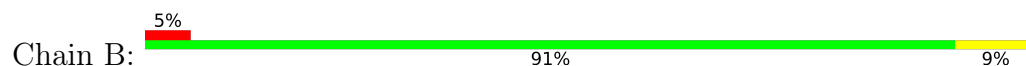
3 Residue-property plots [i](#)

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: Unspecific peroxygenase



- Molecule 1: Unspecific peroxygenase



4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, α , β , γ	76.13Å 76.13Å 186.72Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.68 – 1.58 46.68 – 1.58	Depositor EDS
% Data completeness (in resolution range)	97.2 (46.68-1.58) 97.2 (46.68-1.58)	Depositor EDS
R_{merge}	0.04	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.38 (at 1.58Å)	Xtriage
Refinement program	REFMAC 5.8.0403	Depositor
R, R_{free}	0.182 , 0.218 0.195 , 0.231	Depositor DCC
R_{free} test set	3666 reflections (4.82%)	wwPDB-VP
Wilson B-factor (Å ²)	23.1	Xtriage
Anisotropy	0.378	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 31.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	4569	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.47% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PDN, NAG, GOL, MG, DMS, HEM, SO4, PEG

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	0.51	0/1918	0.83	1/2611 (0.0%)
1	B	0.51	0/1891	0.83	1/2575 (0.0%)
All	All	0.51	0/3809	0.83	2/5186 (0.0%)

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	B	0	1

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	54	ASP	CA-CB-CG	6.37	118.97	112.60
1	B	54	ASP	CA-CB-CG	6.34	118.94	112.60

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	133	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	1857	0	1841	21	0
1	B	1839	0	1818	20	0
2	A	42	0	39	0	0
2	B	42	0	39	0	0
3	A	43	0	30	3	0
3	B	43	0	30	4	0
4	A	26	0	25	6	0
4	B	26	0	25	6	0
5	A	12	0	16	5	0
5	B	12	0	16	1	0
6	A	7	0	10	1	0
6	B	7	0	10	5	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
8	A	15	0	0	0	0
8	B	10	0	0	0	0
9	A	4	0	6	1	0
9	B	8	0	12	9	0
10	A	337	0	0	4	0
10	B	237	0	0	4	0
All	All	4569	0	3917	49	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 6.

All (49) 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)
9:B:304:DMS:H21	10:B:517:HOH:O	1.69	0.92
9:B:310:DMS:H13	10:B:587:HOH:O	1.77	0.85
9:B:304:DMS:C2	10:B:517:HOH:O	2.24	0.82
3:B:305:HEM:HBC2	3:B:305:HEM:HHD	1.62	0.81
1:B:186:GLU:OE2	5:B:309:GOL:H11	1.81	0.79
9:A:313:DMS:H23	10:A:437:HOH:O	1.85	0.75
1:B:116:PRO:HA	9:B:310:DMS:H12	1.68	0.74
1:B:77:ASP:OD1	6:B:308:PEG:H42	1.88	0.73
1:A:174:GLU:CD	10:A:401:HOH:O	2.34	0.70
1:A:152:THR:CG2	4:A:305:PDN:H181	2.23	0.69
1:A:152:THR:HG22	4:A:305:PDN:H181	1.76	0.68

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:42:VAL:HG11	9:B:304:DMS:H12	1.78	0.65
1:A:100:ASN:H	5:A:306:GOL:H32	1.62	0.64
6:B:308:PEG:H12	10:B:445:HOH:O	1.99	0.63
1:A:153:ILE:HG12	4:A:305:PDN:H192	1.82	0.62
1:B:74[B]:SER:OG	6:B:308:PEG:H21	1.98	0.62
1:A:186:GLU:OE2	5:A:307:GOL:H11	1.99	0.62
1:A:183:PHE:HZ	3:A:304:HEM:HBC2	1.68	0.59
1:B:63:GLY:HA3	3:B:305:HEM:HBC1	1.84	0.58
1:A:192:LYS:HG3	10:A:574:HOH:O	2.03	0.58
1:B:116:PRO:HA	9:B:310:DMS:C1	2.34	0.57
1:A:186:GLU:OE2	5:A:307:GOL:C1	2.52	0.57
4:B:307:PDN:O5	4:B:307:PDN:H121	2.06	0.56
1:B:70:ALA:HB2	9:B:304:DMS:S	2.48	0.54
1:B:58:LEU:HD21	4:B:307:PDN:O3	2.10	0.52
1:A:100:ASN:H	5:A:306:GOL:C3	2.24	0.49
1:A:153:ILE:HG12	4:A:305:PDN:C19	2.43	0.49
1:A:68[A]:ARG:NH1	10:A:402:HOH:O	2.40	0.48
1:B:160:PHE:CE2	4:B:307:PDN:HC2	2.48	0.47
1:A:108:PHE:CE1	1:A:111:LEU:HD23	2.50	0.47
1:B:108:PHE:CE1	1:B:111:LEU:HD23	2.51	0.46
1:B:117:GLY:H	9:B:310:DMS:C1	2.29	0.46
1:B:153:ILE:HG12	4:B:307:PDN:H191	1.97	0.45
1:B:158:SER:HA	1:B:161:TYR:CE2	2.52	0.45
1:B:117:GLY:H	9:B:310:DMS:H12	1.82	0.45
4:A:305:PDN:H191	4:A:305:PDN:HC8	1.76	0.44
1:A:183:PHE:HZ	3:A:304:HEM:CBC	2.29	0.44
1:B:156:SER:HB2	4:B:307:PDN:H193	2.00	0.44
1:A:229:ALA:HA	1:B:229:ALA:HA	1.99	0.43
1:A:183:PHE:CZ	3:A:304:HEM:CBC	3.02	0.43
1:B:160:PHE:HE2	4:B:307:PDN:HC2	1.83	0.43
1:A:152:THR:HG22	4:A:305:PDN:C18	2.48	0.43
1:B:34[A]:ARG:NH1	6:B:308:PEG:O1	2.52	0.43
1:A:186:GLU:OE2	5:A:307:GOL:H12	2.19	0.42
1:B:17:CYS:HB2	3:B:305:HEM:C1D	2.55	0.42
1:A:201:PRO:HB3	6:A:308:PEG:H22	2.00	0.42
3:B:305:HEM:HHH	3:B:305:HEM:CBC	2.43	0.42
1:B:76:GLU:HG2	6:B:308:PEG:H41	2.02	0.41

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	245/240 (102%)	239 (98%)	6 (2%)	0	100	100
1	B	242/240 (101%)	239 (99%)	3 (1%)	0	100	100
All	All	487/480 (102%)	478 (98%)	9 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	206/199 (104%)	206 (100%)	0	100	100
1	B	203/199 (102%)	203 (100%)	0	100	100
All	All	409/398 (103%)	409 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	181	ASN

5.3.3 RNA

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 26 ligands modelled in this entry, 2 are monoatomic - leaving 24 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
2	NAG	B	303	1	14,14,15	0.41	0	17,19,21	0.71	0
5	GOL	A	307	-	5,5,5	0.15	0	5,5,5	0.42	0
8	SO4	B	312	-	4,4,4	0.38	0	6,6,6	0.11	0
5	GOL	A	306	-	5,5,5	0.14	0	5,5,5	0.49	0
5	GOL	B	309	-	5,5,5	0.10	0	5,5,5	0.38	0
3	HEM	B	305	1,4,7	50,50,50	1.47	5 (10%)	67,82,82	1.63	17 (25%)
2	NAG	A	301	1	14,14,15	0.45	0	17,19,21	0.72	1 (5%)
3	HEM	A	304	1,10,7	50,50,50	1.47	9 (18%)	67,82,82	1.57	16 (23%)
4	PDN	A	305	-	26,29,29	0.69	1 (3%)	38,48,48	1.66	7 (18%)
2	NAG	B	302	1	14,14,15	0.51	0	17,19,21	1.82	2 (11%)
9	DMS	B	310	-	3,3,3	0.43	0	3,3,3	0.13	0
8	SO4	B	313	-	4,4,4	0.32	0	6,6,6	0.25	0
2	NAG	A	303	1	14,14,15	0.42	0	17,19,21	0.52	0
9	DMS	B	304	-	3,3,3	0.34	0	3,3,3	0.39	0
8	SO4	A	312	-	4,4,4	0.55	0	6,6,6	0.24	0
8	SO4	A	311	-	4,4,4	0.26	0	6,6,6	0.13	0
6	PEG	A	308	-	6,6,6	0.19	0	5,5,5	0.28	0
2	NAG	A	302	1	14,14,15	0.44	0	17,19,21	0.58	0
9	DMS	A	313	-	3,3,3	0.36	0	3,3,3	0.30	0
6	PEG	B	308	-	6,6,6	0.24	0	5,5,5	0.20	0
2	NAG	B	301	1	14,14,15	0.43	0	17,19,21	0.81	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	SO4	A	310	-	4,4,4	0.23	0	6,6,6	0.09	0
5	GOL	B	306	-	5,5,5	0.23	0	5,5,5	0.57	0
4	PDN	B	307	3	26,29,29	0.68	1 (3%)	38,48,48	1.70	9 (23%)

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	PEG	B	308	-	-	2/4/4/4	-
2	NAG	B	303	1	-	0/6/23/26	0/1/1/1
2	NAG	B	301	1	-	2/6/23/26	0/1/1/1
5	GOL	A	307	-	-	3/4/4/4	-
5	GOL	B	306	-	-	2/4/4/4	-
6	PEG	A	308	-	-	3/4/4/4	-
3	HEM	A	304	1,10,7	-	3/14/54/54	-
4	PDN	A	305	-	-	0/0/73/73	0/4/4/4
5	GOL	A	306	-	-	0/4/4/4	-
5	GOL	B	309	-	-	2/4/4/4	-
2	NAG	B	302	1	-	2/6/23/26	0/1/1/1
2	NAG	A	302	1	-	0/6/23/26	0/1/1/1
3	HEM	B	305	1,4,7	-	4/14/54/54	-
2	NAG	A	303	1	-	2/6/23/26	0/1/1/1
2	NAG	A	301	1	-	0/6/23/26	0/1/1/1
4	PDN	B	307	3	-	0/0/73/73	0/4/4/4

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	B	305	HEM	FE-NB	5.00	2.10	1.94
3	B	305	HEM	C1B-NB	-4.25	1.32	1.40
3	A	304	HEM	FE-NB	4.14	2.07	1.94
3	A	304	HEM	FE-NC	3.82	2.07	1.95
3	A	304	HEM	C1B-NB	-3.69	1.33	1.40
3	B	305	HEM	FE-NC	3.49	2.06	1.95
4	A	305	PDN	O4-C20	2.74	1.37	1.31
4	B	307	PDN	O4-C20	2.67	1.37	1.31
3	A	304	HEM	C1C-NC	-2.64	1.34	1.39
3	B	305	HEM	C4D-ND	-2.57	1.35	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	304	HEM	C1D-ND	-2.45	1.34	1.38
3	A	304	HEM	C1D-C2D	2.32	1.49	1.44
3	B	305	HEM	C3B-C4B	2.27	1.49	1.44
3	A	304	HEM	C1C-C2C	-2.14	1.41	1.45
3	A	304	HEM	C4A-NA	-2.05	1.35	1.39
3	A	304	HEM	FE-NA	2.01	2.01	1.95

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	302	NAG	C1-C2-N2	-5.52	101.73	110.43
4	A	305	PDN	C6-C5-C10	4.30	119.25	115.86
4	A	305	PDN	C12-C13-C17	4.25	118.13	116.11
4	B	307	PDN	C1-C10-C5	-4.16	107.72	111.76
3	B	305	HEM	C2D-C1D-ND	3.70	114.19	109.90
2	B	302	NAG	O5-C1-C2	-3.59	105.73	111.29
4	B	307	PDN	C10-C5-C4	-3.59	119.97	122.32
4	B	307	PDN	C12-C13-C17	3.57	117.81	116.11
3	B	305	HEM	CMB-C2B-C1B	3.48	130.47	125.03
3	B	305	HEM	O2A-CGA-CBA	3.43	124.85	114.00
3	A	304	HEM	CHC-C4B-NB	3.42	128.10	124.42
4	A	305	PDN	C10-C9-C8	-3.37	103.27	111.04
3	A	304	HEM	C3B-C4B-NB	-3.19	107.17	109.47
3	B	305	HEM	C1D-C2D-C3D	-3.18	103.63	106.98
3	A	304	HEM	C1B-NB-C4B	3.11	108.89	105.21
3	B	305	HEM	CMD-C2D-C1D	3.07	129.83	125.03
4	A	305	PDN	C1-C10-C5	-3.05	108.80	111.76
4	B	307	PDN	C12-C13-C14	-3.00	106.26	108.66
3	B	305	HEM	CHD-C4C-NC	2.96	127.68	124.45
3	A	304	HEM	C4C-NC-C1C	2.94	110.62	105.82
4	B	307	PDN	C2-C3-C4	-2.81	114.27	117.12
3	B	305	HEM	C1B-NB-C4B	2.73	108.44	105.21
4	A	305	PDN	C1-C2-C3	-2.70	119.21	121.49
3	B	305	HEM	C3D-C4D-ND	2.69	113.12	110.17
2	B	301	NAG	O5-C1-C2	-2.68	107.15	111.29
3	B	305	HEM	CHD-C1D-C2D	-2.64	120.86	125.03
3	A	304	HEM	CHA-C4D-C3D	-2.63	120.38	125.23
4	B	307	PDN	O1-C3-C4	2.61	125.14	121.43
3	B	305	HEM	CBB-CAB-C3B	-2.61	114.50	127.53
3	A	304	HEM	C2D-C1D-ND	2.60	112.91	109.90
3	A	304	HEM	CHD-C4C-NC	2.60	127.28	124.45
4	A	305	PDN	C12-C13-C14	-2.54	106.62	108.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	305	HEM	CHC-C4B-NB	2.52	127.14	124.42
4	A	305	PDN	C9-C8-C14	2.52	112.77	109.01
3	B	305	HEM	O1A-CGA-CBA	-2.51	115.13	123.09
3	A	304	HEM	CMB-C2B-C1B	2.50	128.95	125.03
4	B	307	PDN	C16-C17-C13	-2.48	100.96	103.24
2	A	301	NAG	C1-C2-N2	2.44	114.28	110.43
3	B	305	HEM	C4D-ND-C1D	-2.39	102.38	105.21
3	A	304	HEM	CAC-C3C-C4C	2.38	130.51	124.82
3	A	304	HEM	C3D-C4D-ND	2.31	112.71	110.17
3	B	305	HEM	C4C-NC-C1C	2.26	109.51	105.82
3	B	305	HEM	CMB-C2B-C3B	-2.24	123.02	128.43
3	B	305	HEM	CHA-C1A-NA	2.20	127.86	123.86
3	A	304	HEM	C3B-C2B-C1B	-2.18	104.77	106.41
4	B	307	PDN	C6-C5-C10	2.16	117.56	115.86
3	A	304	HEM	CBB-CAB-C3B	-2.16	116.74	127.53
4	B	307	PDN	C9-C8-C14	2.10	112.15	109.01
3	A	304	HEM	CHD-C1D-C2D	-2.07	121.75	125.03
3	B	305	HEM	CAC-C3C-C4C	2.06	129.74	124.82
3	A	304	HEM	C1D-C2D-C3D	-2.05	104.82	106.98
3	A	304	HEM	CAC-C3C-C2C	-2.05	121.78	128.43
3	A	304	HEM	CHA-C4D-ND	2.04	126.89	124.37

There are no chirality outliers.

All (25) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	302	NAG	C8-C7-N2-C2
2	B	302	NAG	O7-C7-N2-C2
6	A	308	PEG	C1-C2-O2-C3
2	A	303	NAG	C8-C7-N2-C2
2	A	303	NAG	O7-C7-N2-C2
5	B	306	GOL	O2-C2-C3-O3
6	A	308	PEG	O2-C3-C4-O4
5	A	307	GOL	C1-C2-C3-O3
5	B	306	GOL	C1-C2-C3-O3
5	B	309	GOL	C1-C2-C3-O3
6	A	308	PEG	O1-C1-C2-O2
6	B	308	PEG	O2-C3-C4-O4
5	A	307	GOL	O2-C2-C3-O3
5	A	307	GOL	O1-C1-C2-O2
5	B	309	GOL	O2-C2-C3-O3
3	A	304	HEM	C2B-C3B-CAB-CBB

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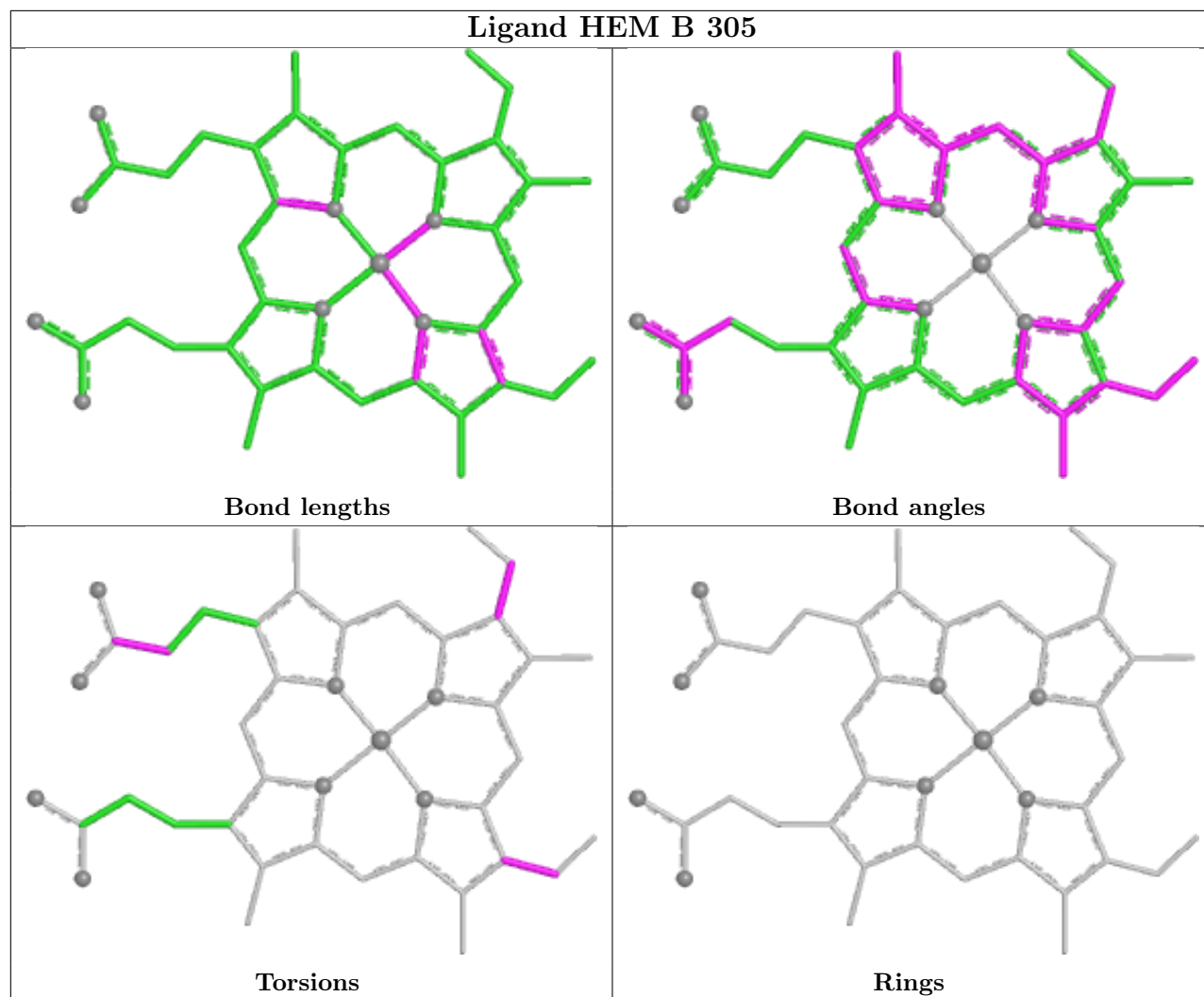
Mol	Chain	Res	Type	Atoms
3	B	305	HEM	C4C-C3C-CAC-CBC
6	B	308	PEG	C1-C2-O2-C3
3	B	305	HEM	CAD-CBD-CGD-O2D
3	A	304	HEM	CAA-CBA-CGA-O2A
3	A	304	HEM	CAA-CBA-CGA-O1A
3	B	305	HEM	C2B-C3B-CAB-CBB
3	B	305	HEM	CAD-CBD-CGD-O1D
2	B	301	NAG	C4-C5-C6-O6
2	B	301	NAG	O5-C5-C6-O6

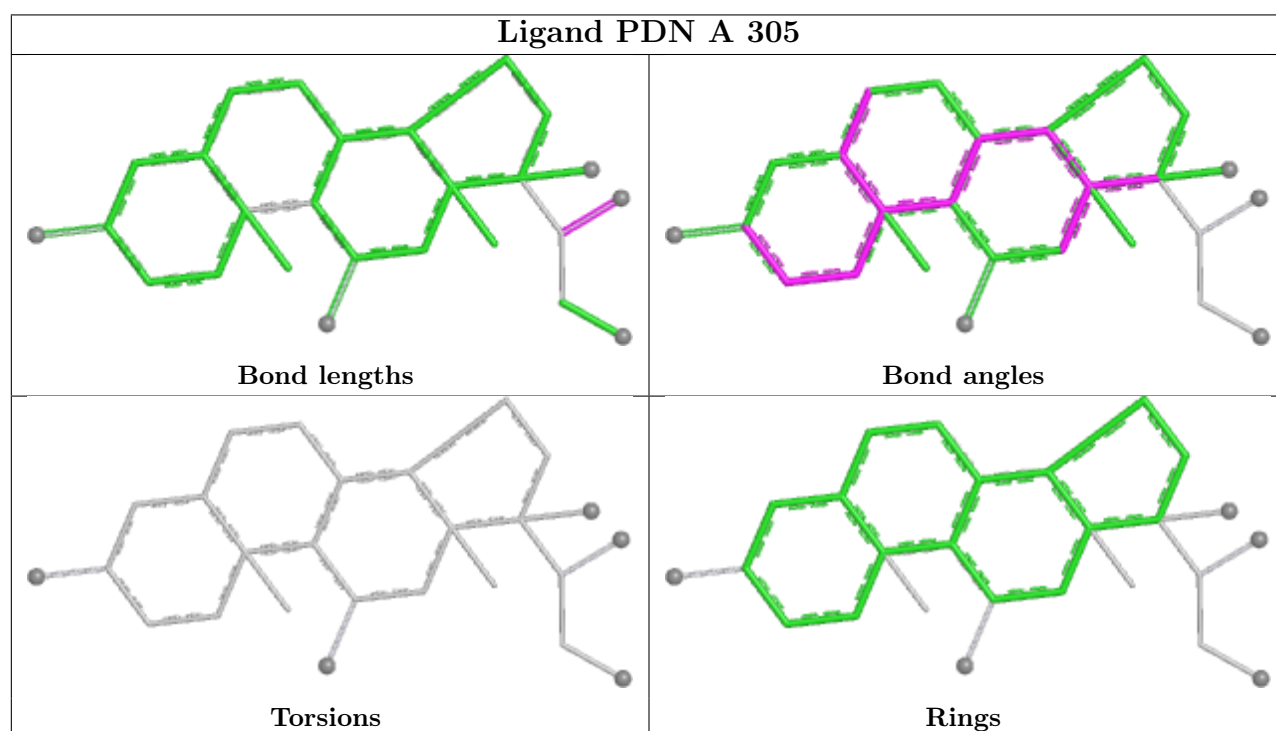
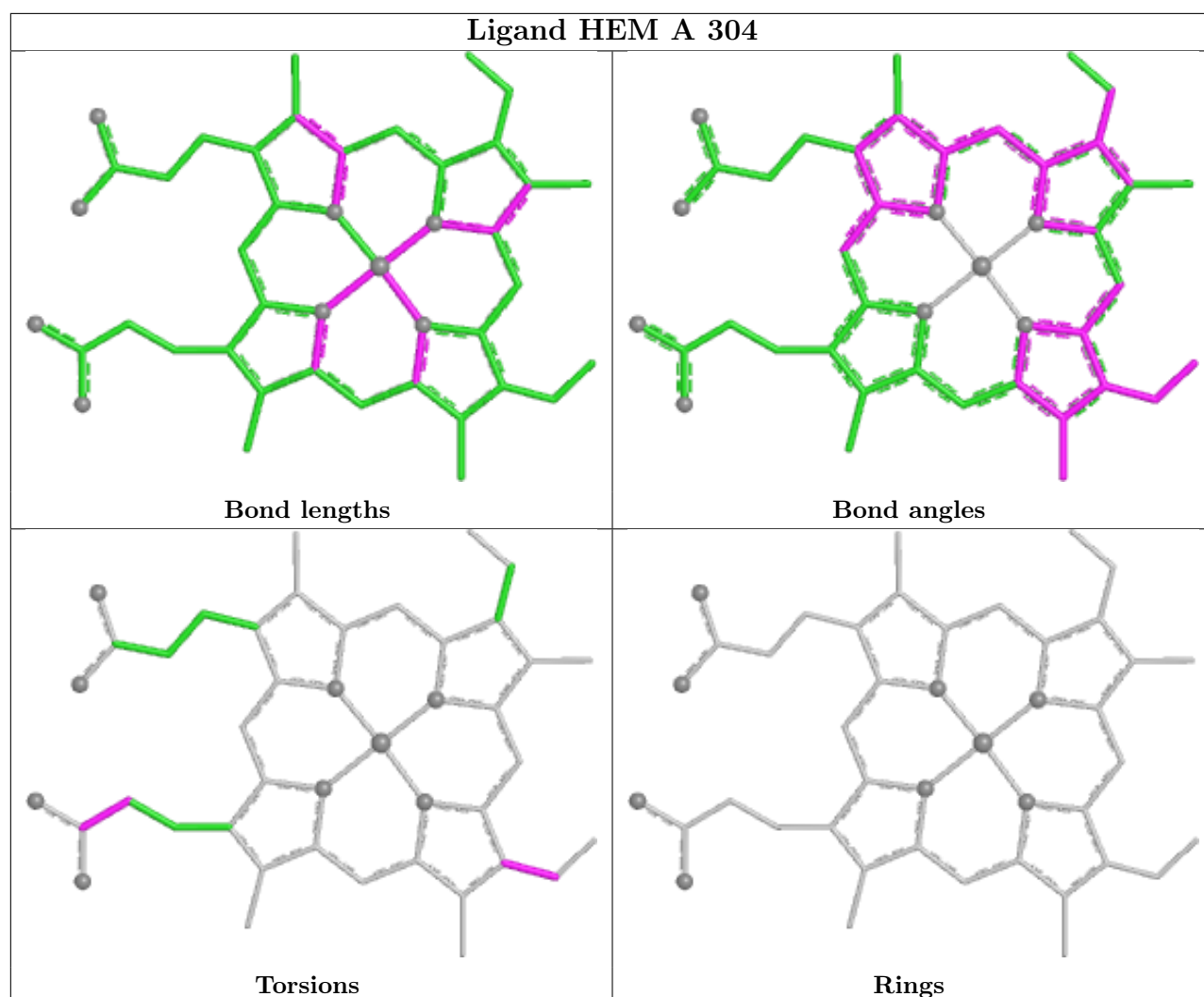
There are no ring outliers.

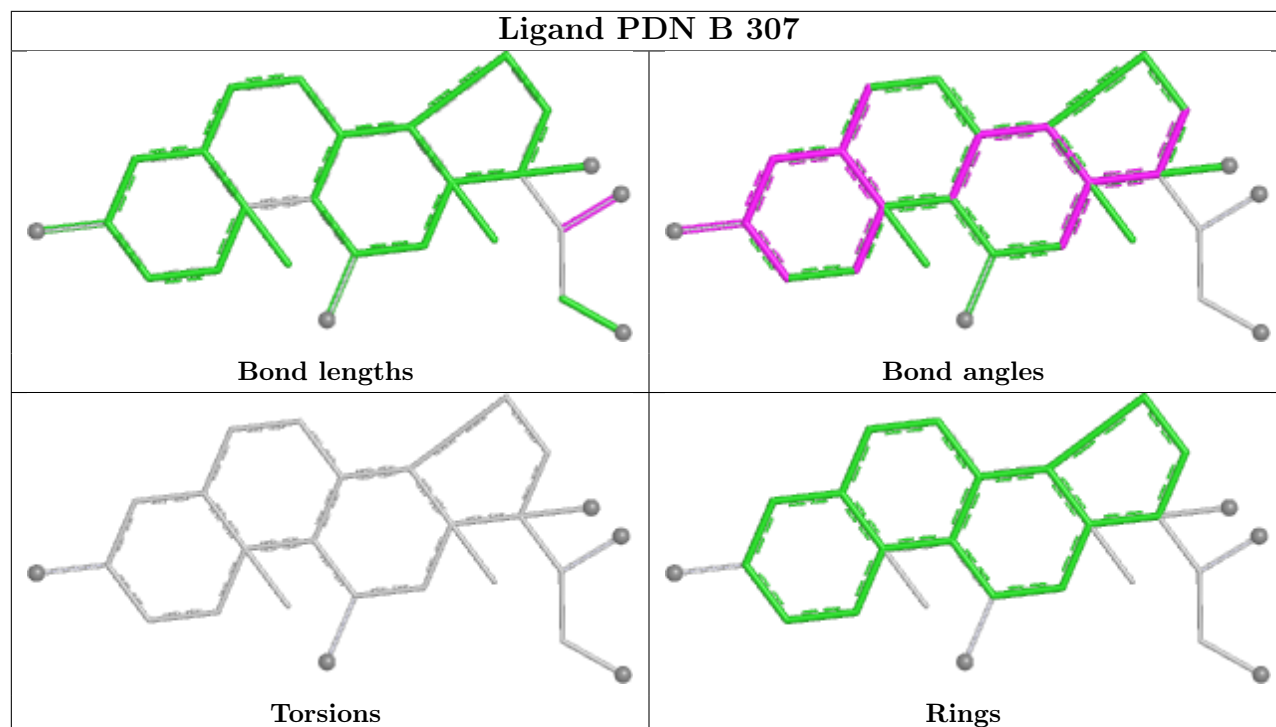
12 monomers are involved in 41 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	307	GOL	3	0
5	A	306	GOL	2	0
5	B	309	GOL	1	0
3	B	305	HEM	4	0
3	A	304	HEM	3	0
4	A	305	PDN	6	0
9	B	310	DMS	5	0
9	B	304	DMS	4	0
6	A	308	PEG	1	0
9	A	313	DMS	1	0
6	B	308	PEG	5	0
4	B	307	PDN	6	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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

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	240/240 (100%)	0.11	7 (2%) 53 66	12, 20, 31, 51	7 (2%)
1	B	240/240 (100%)	0.54	12 (5%) 34 46	15, 24, 40, 56	4 (1%)
All	All	480/480 (100%)	0.32	19 (3%) 42 54	12, 22, 36, 56	11 (2%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	-2	VAL	6.9
1	B	-3	ALA	6.2
1	B	0	PHE	3.9
1	B	10	PRO	3.8
1	B	236	LEU	3.8
1	A	225	ASP	3.7
1	B	-1	ASP	3.4
1	A	236	LEU	3.4
1	A	192	LYS	3.3
1	A	-3	ALA	3.3
1	B	11	ASN	3.2
1	B	117	GLY	2.9
1	A	-2	VAL	2.8
1	B	227	CYS	2.7
1	B	225	ASP	2.4
1	B	171	LEU	2.3
1	B	167	ALA	2.1
1	A	171	LEU	2.1
1	A	117	GLY	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 ⓘ

There are no oligosaccharides in this entry.

6.4 Ligands ⓘ

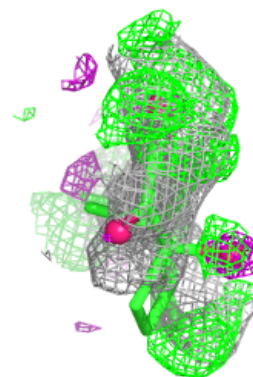
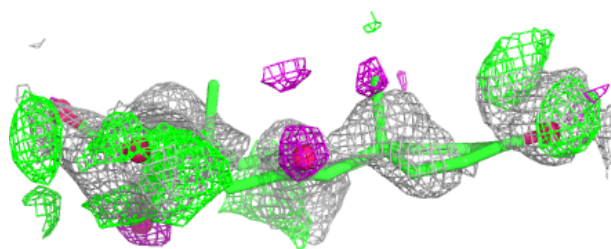
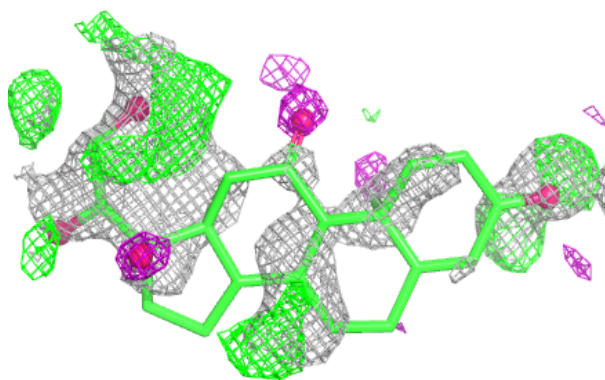
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	B	303	14/15	0.36	0.19	50,52,54,58	0
2	NAG	B	302	14/15	0.51	0.22	39,42,53,55	0
4	PDN	B	307	26/26	0.53	0.26	29,35,39,41	26
4	PDN	A	305	26/26	0.54	0.22	33,35,37,38	26
9	DMS	A	313	4/4	0.62	0.23	32,36,37,37	0
9	DMS	B	304	4/4	0.64	0.27	27,32,35,35	0
2	NAG	A	303	14/15	0.72	0.15	39,42,46,49	0
8	SO4	A	310	5/5	0.72	0.16	33,39,41,42	0
8	SO4	B	313	5/5	0.73	0.20	39,43,46,47	0
6	PEG	A	308	7/7	0.74	0.16	34,35,35,37	0
6	PEG	B	308	7/7	0.76	0.15	31,33,34,35	0
5	GOL	B	306	6/6	0.77	0.15	30,32,35,36	0
5	GOL	A	306	6/6	0.78	0.14	28,31,33,33	0
5	GOL	B	309	6/6	0.78	0.15	34,34,36,37	0
8	SO4	A	311	5/5	0.79	0.17	33,37,42,48	0
5	GOL	A	307	6/6	0.79	0.14	34,36,36,36	0
2	NAG	A	302	14/15	0.82	0.15	28,31,48,49	0
9	DMS	B	310	4/4	0.83	0.21	29,31,35,35	0
8	SO4	A	312	5/5	0.86	0.16	28,29,33,41	0
2	NAG	B	301	14/15	0.89	0.10	29,33,35,35	0
2	NAG	A	301	14/15	0.89	0.11	26,30,34,34	0
8	SO4	B	312	5/5	0.90	0.13	34,35,40,42	0
3	HEM	B	305	43/43	0.97	0.08	17,19,23,30	0
3	HEM	A	304	43/43	0.98	0.07	14,16,20,26	0
7	MG	B	311	1/1	0.98	0.05	22,22,22,22	0
7	MG	A	309	1/1	0.99	0.03	17,17,17,17	0

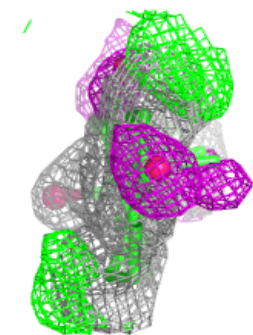
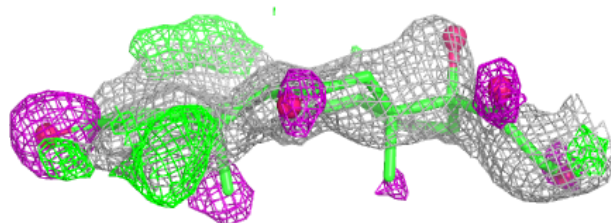
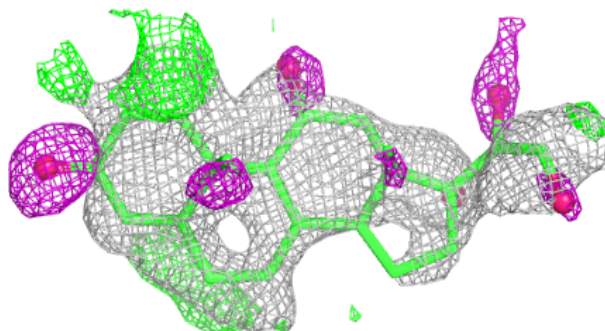
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around PDN B 307:

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

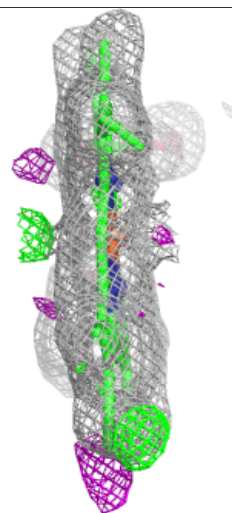
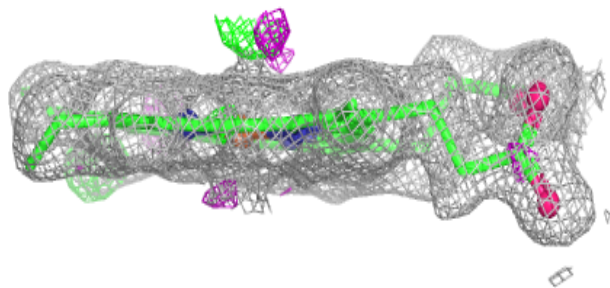
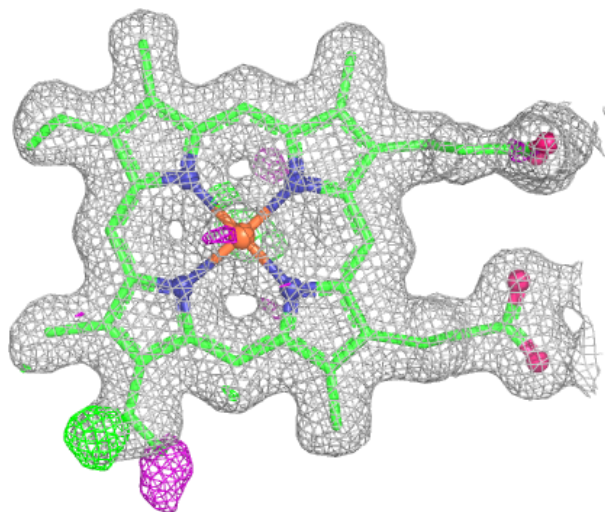
**Electron density around PDN A 305:**

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



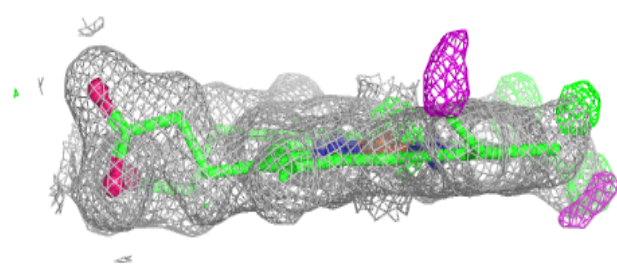
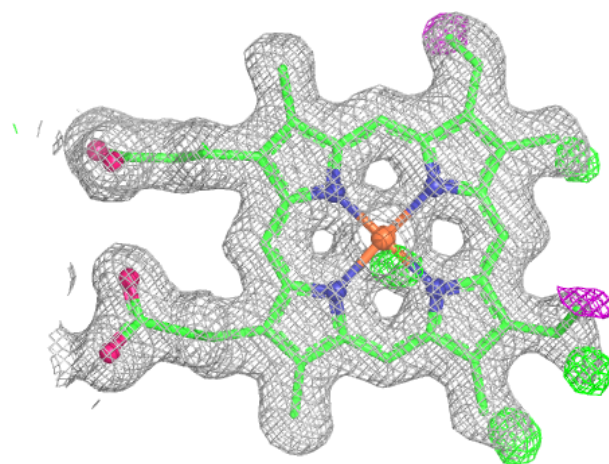
Electron density around HEM B 305:

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



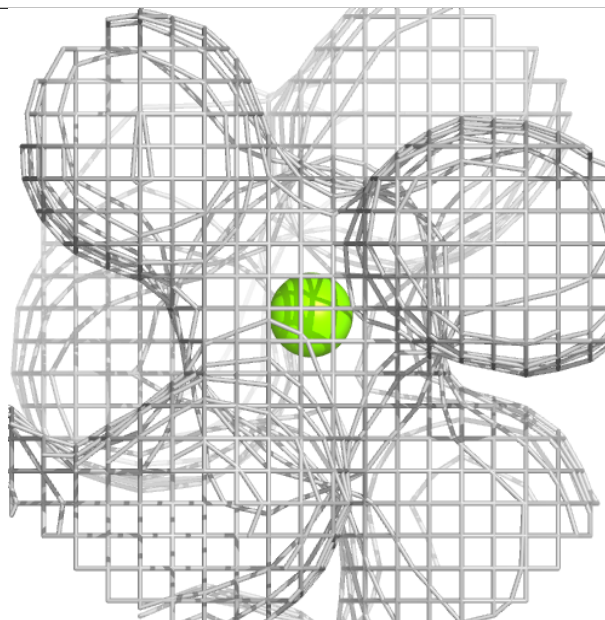
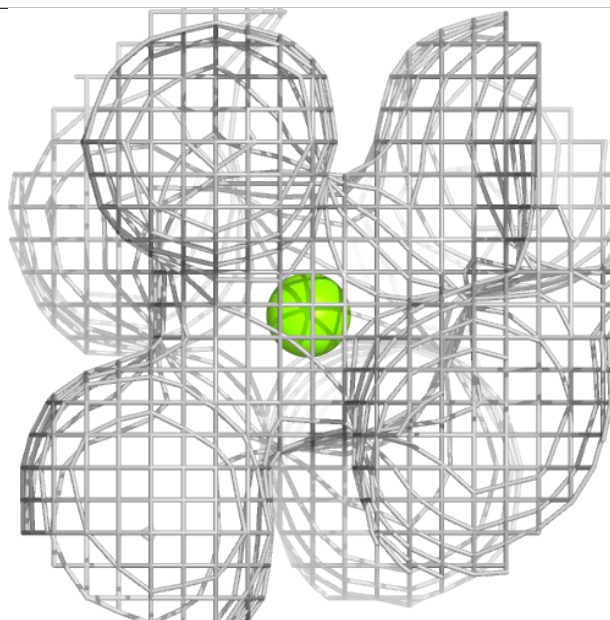
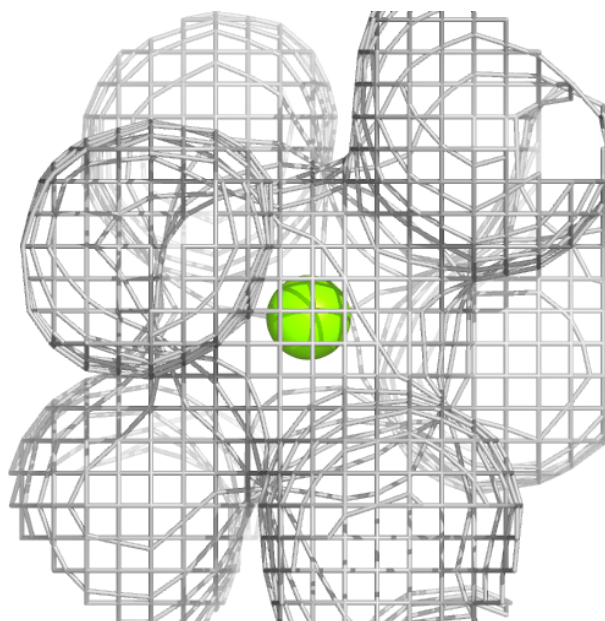
Electron density around HEM A 304:

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



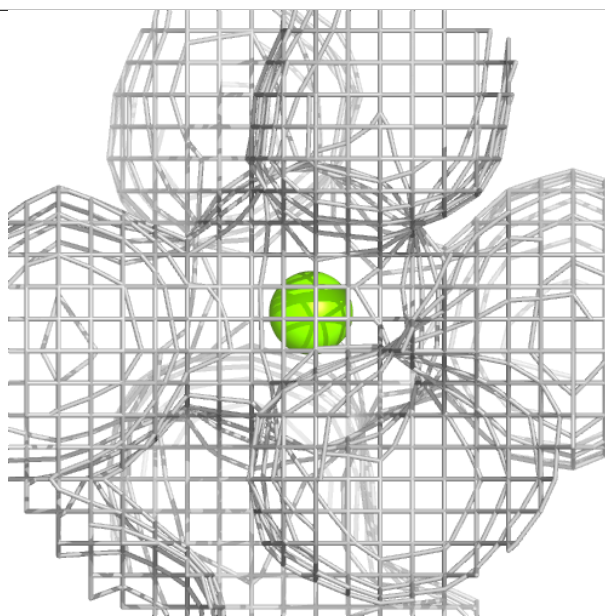
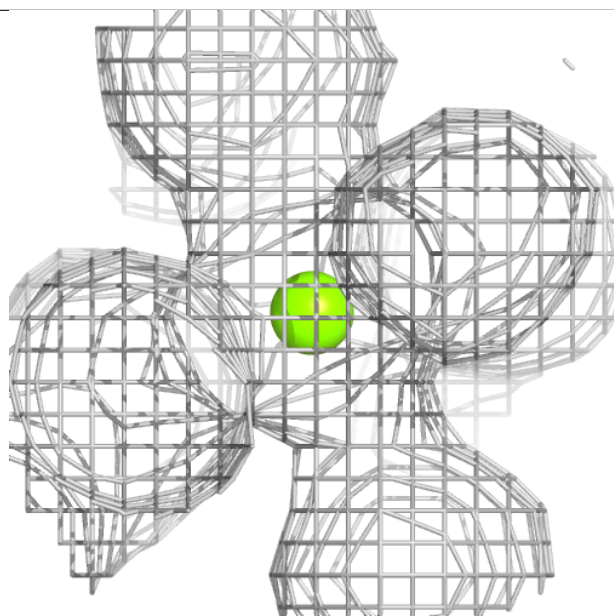
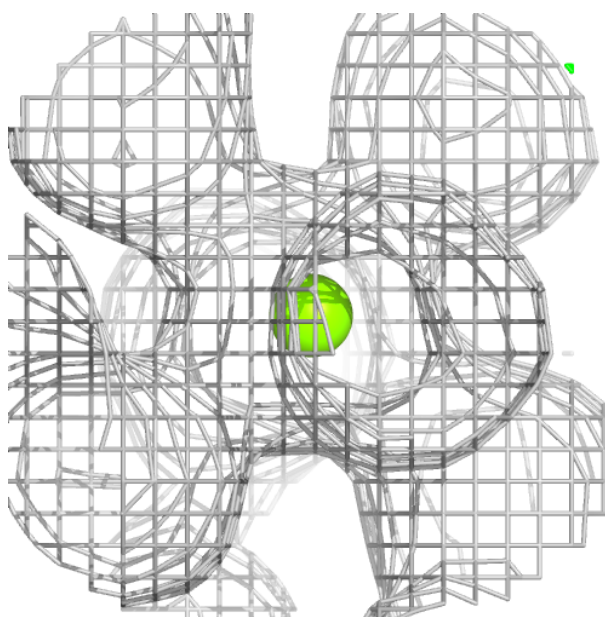
Electron density around MG B 311:

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



Electron density around MG A 309:

$2mF_o-DF_c$ (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.