WORLDWIDE
wwPDB
PROTEIN DATA BANK

Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2025 – 04:13 PM JST

PDB ID	:	9KT5
Title	:	Synchrotron X-ray crystal structure of oxygen-bound F87A/F393H P450BM3 with decoy C7ProPhe (N-enanthyl-L-prolyl-L-phenylalanine) and substrate styrene at 2 MGy X-ray dose
Authors	:	Nagao, S.; Kuwano, W.; Tosha, T.; Yamashita, K.; Stanfield, J.K.; Kasai, C.; Ariyasu, S.; Shoji, O.; Sugimoto, H.; Kubo, M.
Deposited on	:	2024-12-01
Resolution	:	1.60 Å(reported)

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

We welcome your comments at *validation@mail.wwpdb.org*
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 ①) were used in the production of this report:

|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.4

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 1.60 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
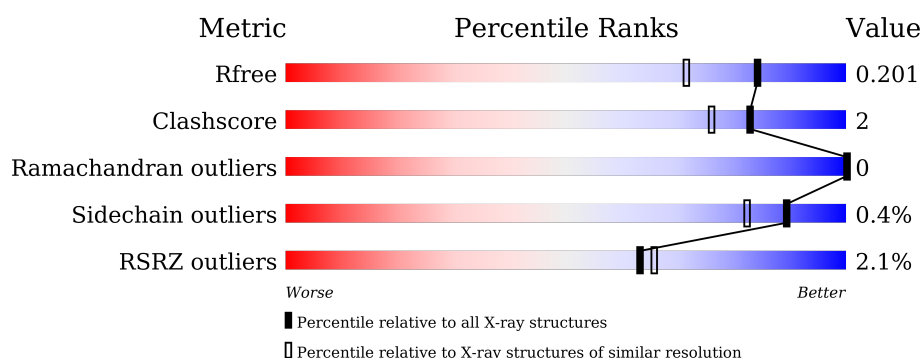
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	4274 (1.60-1.60)
Clashscore	180529	4682 (1.60-1.60)
Ramachandran outliers	177936	4583 (1.60-1.60)
Sidechain outliers	177891	4582 (1.60-1.60)
RSRZ outliers	164620	4272 (1.60-1.60)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for >=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 <=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	456	
1	B	456	

2 Entry composition ⓘ

There are 7 unique types of molecules in this entry. The entry contains 8461 atoms, of which 1 is hydrogen 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.
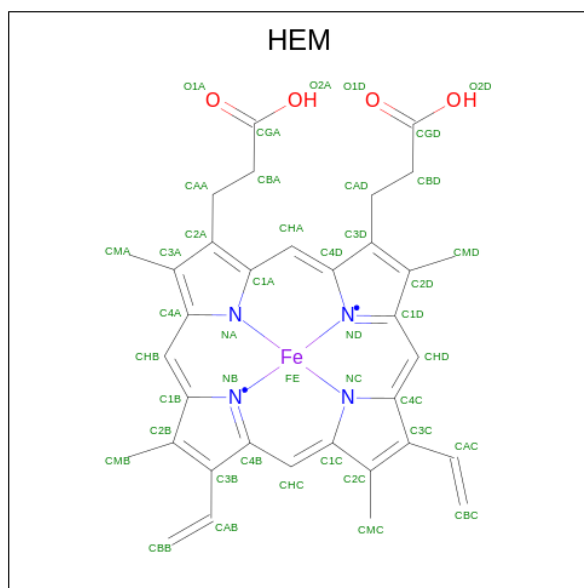
- Molecule 1 is a protein called Bifunctional cytochrome P450/NADPH–P450 reductase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	455	3688	2350	630	690	18	0	3	0
			Total	C	N	O	S			
1	B	455	3708	2364	633	693	18	0	6	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	87	ALA	PHE	engineered mutation	UNP P14779
A	393	HIS	PHE	engineered mutation	UNP P14779
B	87	ALA	PHE	engineered mutation	UNP P14779
B	393	HIS	PHE	engineered mutation	UNP P14779

- Molecule 2 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$) (labeled as "Ligand of Interest" by depositor).


HEM

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Fe	N	O	0	1
			44	34	2	4	4		
2	B	1	Total	C	Fe	N	O	0	1
			44	34	2	4	4		

- Molecule 3 is ethenylbenzene (three-letter code: SYN) (formula: C_8H_8) (labeled as "Ligand of Interest" by depositor).
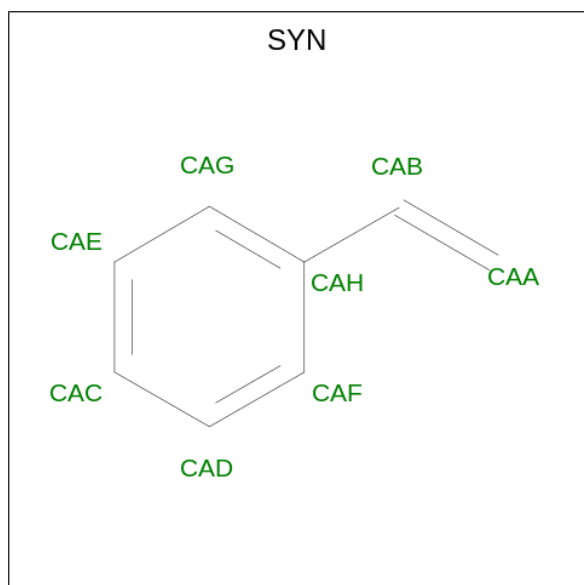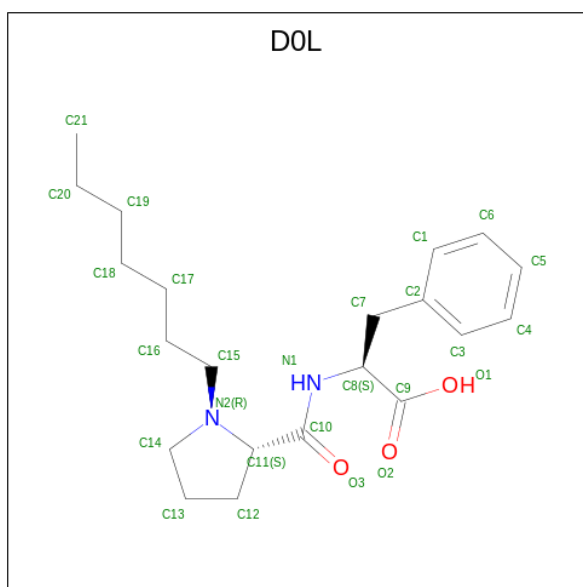

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	C	0	1
			8	8		
3	B	1	Total	C	0	1
			8	8		

- Molecule 4 is OXYGEN MOLECULE (three-letter code: OXY) (formula: O_2) (labeled as "Ligand of Interest" by depositor).

OXY

O1 O ═══ O O2
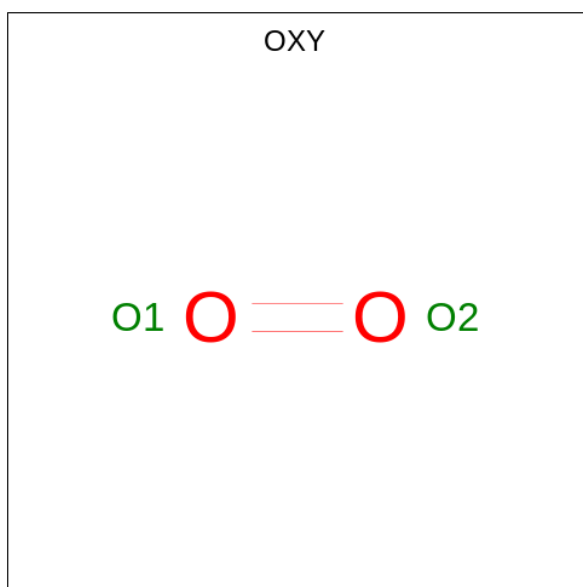
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total 2	O 2	0	1
4	B	1	Total 2	O 2	0	1

- Molecule 5 is (2S)-2-[[(2S)-1-heptylpyrrolidin-2-yl]carbonylamino]-3-phenyl-propanoic acid (three-letter code: D0L) (formula: $C_{21}H_{32}N_2O_3$) (labeled as "Ligand of Interest" by depositor).
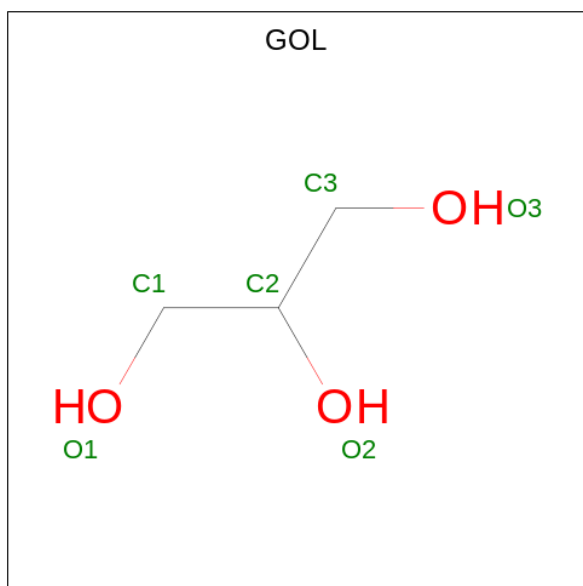
D0L

C21
C20 C19
C18 C17
C16 C15 N1 C6 C1 C5
HN C8(S) C9 OH O1 C4 C3 C2 C7
N2(R) C10 C4 C3
C14 N O2
C11(S) O3
C13 C12

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total 26	C 21	N 2	O 3	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	B	1	Total 26	C 21	N 2	O 3	0	0

- Molecule 6 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

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

- Molecule 7 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	411	Total 411	O 411	0	3
7	B	469	Total 469	O 469	0	3

3 Residue-property plots ⓘ

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: Bifunctional cytochrome P450/NADPH–P450 reductase
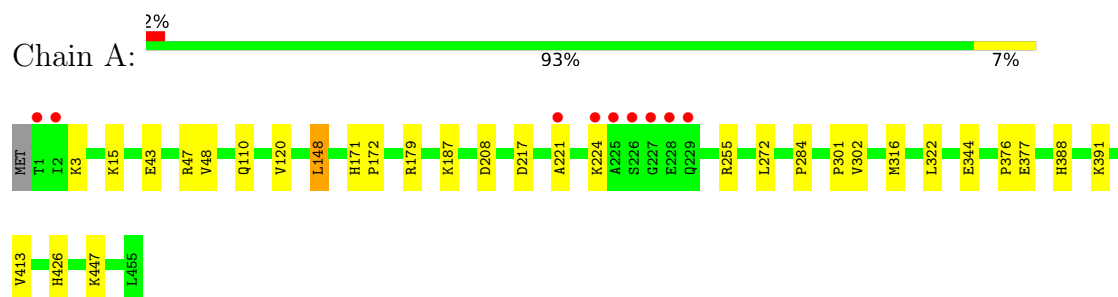
• Molecule 1: Bifunctional cytochrome P450/NADPH–P450 reductase
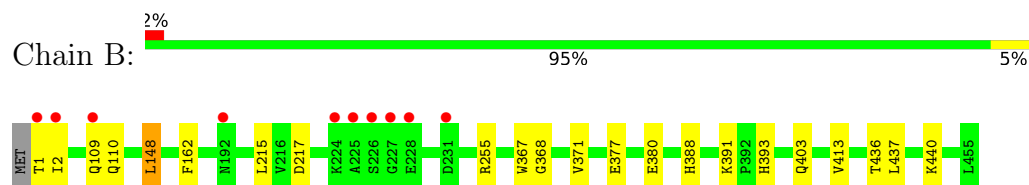
4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	59.13Å 129.34Å 150.15Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.64 – 1.60 43.64 – 1.60	Depositor EDS
% Data completeness (in resolution range)	97.8 (43.64-1.60) 97.7 (43.64-1.60)	Depositor EDS
R_{merge}	0.30	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.20 (at 1.60Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, R_{free}	0.149 , 0.200 0.150 , 0.201	Depositor DCC
R_{free} test set	10780 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	16.9	Xtriage
Anisotropy	0.293	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 46.5	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	8461	wwPDB-VP
Average B, all atoms (Å^2)	22.0	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 38.34 % 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 3.7394e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ 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: D0L, SYN, OXY, GOL, HEM

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	0.34	0/3773	0.55	0/5100
1	B	0.36	0/3802	0.55	0/5139
All	All	0.35	0/7575	0.55	0/10239

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3688	0	3657	21	0
1	B	3708	0	3686	13	0
2	A	44	0	0	0	0
2	B	44	0	0	0	0
3	A	8	0	8	0	0
3	B	8	0	8	0	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
5	A	26	0	0	0	0
5	B	26	0	0	0	0
6	A	6	0	8	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	18	1	24	0	0
7	A	411	0	0	5	0
7	B	469	0	0	0	0
All	All	8460	1	7391	34	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 2.

All (34) 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:B:162:PHE:HE1	1:B:215:LEU:HD21	1.48	0.80
1:B:162:PHE:CE1	1:B:215:LEU:HD21	2.22	0.74
1:A:120:VAL:HG11	1:A:302:VAL:HG13	1.70	0.73
1:B:109:GLN:HG3	1:B:110:GLN:N	2.13	0.62
1:B:388:HIS:HA	1:B:391:LYS:HD3	1.80	0.62
1:A:221:ALA:HA	1:A:224:LYS:HE2	1.83	0.59
1:B:217:ASP:OD1	1:B:255:ARG:NH1	2.31	0.58
1:A:217:ASP:OD1	1:A:255:ARG:NH2	2.36	0.57
1:A:43:GLU:HG2	1:A:48:VAL:HG22	1.89	0.55
1:A:3:LYS:NZ	1:A:344:GLU:OE2	2.39	0.54
1:B:148:LEU:HD21	1:B:413:VAL:HG21	1.92	0.52
1:A:217:ASP:OD1	1:A:255:ARG:NH1	2.42	0.49
1:A:187:LYS:NZ	7:A:601:HOH:O	2.34	0.49
1:A:316:MET:HE3	1:A:376:PRO:O	2.13	0.48
1:A:15:LYS:NZ	7:A:611:HOH:O	2.45	0.47
1:A:148:LEU:HD21	1:A:413:VAL:HG21	1.96	0.47
1:B:1:THR:HG23	1:B:2:ILE:N	2.31	0.46
1:A:120:VAL:HG11	1:A:302:VAL:CG1	2.42	0.45
1:A:171:HIS:ND1	1:A:172:PRO:HD2	2.32	0.45
1:A:110:GLN:NE2	7:A:606:HOH:O	2.39	0.45
1:A:47:ARG:HG3	1:A:48:VAL:N	2.31	0.45
1:B:162:PHE:HE1	1:B:215:LEU:CD2	2.23	0.45
1:A:316:MET:CE	1:A:377:GLU:HA	2.47	0.44
1:A:179:ARG:HB3	1:A:208:ASP:OD2	2.17	0.43
1:B:436:THR:O	1:B:437:LEU:HB2	2.19	0.42
1:B:367:TRP:HB2	1:B:371:VAL:HG12	2.00	0.42
1:B:393[B]:HIS:CE1	1:B:403:GLN:HG3	2.55	0.42
1:B:368:GLY:O	1:B:371:VAL:HG13	2.20	0.42
1:A:301:PRO:HD2	7:A:892:HOH:O	2.20	0.41
1:B:377:GLU:HA	1:B:380:GLU:HG3	2.02	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:426:HIS:CD2	1:A:447:LYS:HE3	2.56	0.41
1:A:272:LEU:HD13	1:A:322:LEU:HG	2.03	0.41
1:A:388:HIS:HA	1:A:391:LYS:HD3	2.03	0.41
1:A:284:PRO:HD2	7:A:930:HOH:O	2.21	0.40

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	456/456 (100%)	444 (97%)	12 (3%)	0	100	100
1	B	459/456 (101%)	445 (97%)	14 (3%)	0	100	100
All	All	915/912 (100%)	889 (97%)	26 (3%)	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	401/399 (100%)	400 (100%)	1 (0%)	92	86
1	B	404/399 (101%)	402 (100%)	2 (0%)	86	78
All	All	805/798 (101%)	802 (100%)	3 (0%)	89	82

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	148	LEU
1	B	148	LEU
1	B	440	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3   RNA (i)

There are no RNA molecules in this entry.

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

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

5.5   Carbohydrates (i)

There are no oligosaccharides in this entry.

5.6   Ligand geometry (i)

14 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
5	D0L	A	504	-	27,27,27	0.56	0	34,34,34	0.85	1 (2%)
6	GOL	B	507	-	5,5,5	0.90	0	5,5,5	0.98	0
3	SYN	B	502[A]	-	8,8,8	0.21	0	9,9,9	0.14	0
6	GOL	B	506	-	5,5,5	0.92	0	5,5,5	1.03	0
2	HEM	A	501[B]	1	41,50,50	1.28	6 (14%)	45,82,82	2.02	11 (24%)
4	OXY	B	503[A]	2	1,1,1	0.88	0	-		

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
2	HEM	A	501[A]	1,4	41,50,50	1.28	6 (14%)	45,82,82	2.02	11 (24%)
3	SYN	A	502[A]	-	8,8,8	0.21	0	9,9,9	0.15	0
4	OXY	A	503[A]	2	1,1,1	0.59	0	-		
2	HEM	B	501[B]	1	41,50,50	1.27	6 (14%)	45,82,82	2.00	12 (26%)
5	D0L	B	504	-	27,27,27	0.59	0	34,34,34	0.82	1 (2%)
6	GOL	B	505	-	5,5,5	0.99	0	5,5,5	0.97	0
2	HEM	B	501[A]	1,4	41,50,50	1.26	6 (14%)	45,82,82	2.00	12 (26%)
6	GOL	A	505	-	5,5,5	0.91	0	5,5,5	0.98	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
5	D0L	A	504	-	-	3/23/33/33	0/2/2/2
6	GOL	B	507	-	-	4/4/4/4	-
3	SYN	B	502[A]	-	-	0/2/2/2	0/1/1/1
6	GOL	B	506	-	-	0/4/4/4	-
2	HEM	A	501[B]	1	-	2/12/54/54	-
2	HEM	A	501[A]	1,4	-	2/12/54/54	-
3	SYN	A	502[A]	-	-	0/2/2/2	0/1/1/1
5	D0L	B	504	-	-	2/23/33/33	0/2/2/2
2	HEM	B	501[B]	1	-	2/12/54/54	-
6	GOL	B	505	-	-	0/4/4/4	-
2	HEM	B	501[A]	1,4	-	2/12/54/54	-
6	GOL	A	505	-	-	2/4/4/4	-

All (24) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	501[A]	HEM	C4D-ND	-3.06	1.35	1.40
2	A	501[B]	HEM	C4D-ND	-3.06	1.35	1.40
2	B	501[A]	HEM	CHB-C1B	2.86	1.42	1.35
2	B	501[B]	HEM	CHB-C1B	2.86	1.42	1.35
2	A	501[A]	HEM	CHB-C1B	2.81	1.42	1.35
2	A	501[B]	HEM	CHB-C1B	2.81	1.42	1.35
2	A	501[A]	HEM	C1B-NB	-2.81	1.35	1.40
2	A	501[B]	HEM	C1B-NB	-2.81	1.35	1.40

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501[A]	HEM	C4D-ND	-2.72	1.35	1.40
2	B	501[B]	HEM	C4D-ND	-2.72	1.35	1.40
2	B	501[A]	HEM	C1B-NB	-2.67	1.35	1.40
2	B	501[B]	HEM	C1B-NB	-2.67	1.35	1.40
2	B	501[A]	HEM	C1D-ND	-2.50	1.33	1.38
2	B	501[B]	HEM	C1D-ND	-2.50	1.33	1.38
2	A	501[A]	HEM	C1D-ND	-2.45	1.33	1.38
2	A	501[B]	HEM	C1D-ND	-2.45	1.33	1.38
2	A	501[B]	HEM	FE-NB	2.26	2.08	1.96
2	B	501[B]	HEM	FE-NB	2.25	2.08	1.96
2	B	501[A]	HEM	FE-ND	2.25	2.08	1.96
2	B	501[A]	HEM	CHA-C4D	2.20	1.40	1.35
2	B	501[B]	HEM	CHA-C4D	2.20	1.40	1.35
2	A	501[A]	HEM	CHA-C4D	2.19	1.40	1.35
2	A	501[B]	HEM	CHA-C4D	2.19	1.40	1.35
2	A	501[A]	HEM	FE-ND	2.07	2.07	1.96

All (48) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	501[A]	HEM	CHC-C4B-NB	5.60	130.52	124.43
2	B	501[B]	HEM	CHC-C4B-NB	5.60	130.52	124.43
2	A	501[A]	HEM	CHC-C4B-NB	5.41	130.30	124.43
2	A	501[B]	HEM	CHC-C4B-NB	5.41	130.30	124.43
2	A	501[A]	HEM	C4D-ND-C1D	4.83	110.06	105.07
2	A	501[B]	HEM	C4D-ND-C1D	4.83	110.06	105.07
2	A	501[A]	HEM	C1B-NB-C4B	4.81	110.05	105.07
2	A	501[B]	HEM	C1B-NB-C4B	4.81	110.05	105.07
2	B	501[A]	HEM	C4D-ND-C1D	4.68	109.91	105.07
2	B	501[B]	HEM	C4D-ND-C1D	4.68	109.91	105.07
2	B	501[A]	HEM	C1B-NB-C4B	4.66	109.89	105.07
2	B	501[B]	HEM	C1B-NB-C4B	4.66	109.89	105.07
2	A	501[A]	HEM	CHB-C1B-NB	4.39	129.81	124.38
2	A	501[B]	HEM	CHB-C1B-NB	4.39	129.81	124.38
2	B	501[A]	HEM	CHB-C1B-NB	4.04	129.38	124.38
2	B	501[B]	HEM	CHB-C1B-NB	4.04	129.38	124.38
2	A	501[A]	HEM	CHA-C4D-ND	3.72	128.97	124.38
2	A	501[B]	HEM	CHA-C4D-ND	3.72	128.97	124.38
2	B	501[A]	HEM	CHA-C4D-ND	3.72	128.97	124.38
2	B	501[B]	HEM	CHA-C4D-ND	3.72	128.97	124.38
2	A	501[A]	HEM	CHD-C1D-ND	2.79	127.47	124.43
2	A	501[B]	HEM	CHD-C1D-ND	2.79	127.47	124.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	501[A]	HEM	CBD-CAD-C3D	-2.71	105.10	112.63
2	A	501[B]	HEM	CBD-CAD-C3D	-2.71	105.10	112.63
2	B	501[A]	HEM	O2A-CGA-CBA	2.64	122.50	114.03
2	B	501[B]	HEM	O2A-CGA-CBA	2.64	122.50	114.03
2	A	501[A]	HEM	O2A-CGA-CBA	2.56	122.27	114.03
2	A	501[B]	HEM	O2A-CGA-CBA	2.56	122.27	114.03
2	B	501[A]	HEM	CMA-C3A-C4A	-2.48	124.66	128.46
2	B	501[B]	HEM	CMA-C3A-C4A	-2.48	124.66	128.46
2	B	501[A]	HEM	CHD-C1D-ND	2.31	126.94	124.43
2	B	501[B]	HEM	CHD-C1D-ND	2.31	126.94	124.43
5	B	504	D0L	C15-N2-C11	-2.26	106.80	112.88
2	A	501[A]	HEM	CMA-C3A-C4A	-2.25	125.01	128.46
2	A	501[B]	HEM	CMA-C3A-C4A	-2.25	125.01	128.46
2	B	501[A]	HEM	C3C-C4C-NC	-2.19	106.81	110.94
2	B	501[B]	HEM	C3C-C4C-NC	-2.19	106.81	110.94
2	B	501[A]	HEM	CBD-CAD-C3D	-2.18	106.58	112.63
2	B	501[B]	HEM	CBD-CAD-C3D	-2.18	106.58	112.63
2	A	501[A]	HEM	C3C-C4C-NC	-2.17	106.84	110.94
2	A	501[B]	HEM	C3C-C4C-NC	-2.17	106.84	110.94
2	B	501[A]	HEM	O2D-CGD-CBD	2.16	120.97	114.03
2	B	501[B]	HEM	O2D-CGD-CBD	2.16	120.97	114.03
5	A	504	D0L	C10-C11-N2	-2.10	109.59	112.36
2	B	501[A]	HEM	C3D-C4D-ND	-2.02	107.92	110.17
2	B	501[B]	HEM	C3D-C4D-ND	-2.02	107.92	110.17
2	A	501[A]	HEM	C3D-C4D-ND	-2.01	107.92	110.17
2	A	501[B]	HEM	C3D-C4D-ND	-2.01	107.92	110.17

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	507	GOL	O1-C1-C2-C3
6	B	507	GOL	C1-C2-C3-O3
6	B	507	GOL	O2-C2-C3-O3
6	A	505	GOL	O1-C1-C2-C3
6	B	507	GOL	O1-C1-C2-O2
5	B	504	D0L	C18-C19-C20-C21
5	A	504	D0L	C18-C19-C20-C21
5	A	504	D0L	C16-C17-C18-C19
5	B	504	D0L	N2-C15-C16-C17
6	A	505	GOL	O1-C1-C2-O2
5	A	504	D0L	C15-C16-C17-C18

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Mol	Chain	Res	Type	Atoms
2	A	501[A]	HEM	CAD-CBD-CGD-O2D
2	A	501[B]	HEM	CAD-CBD-CGD-O2D
2	A	501[A]	HEM	CAD-CBD-CGD-O1D
2	A	501[B]	HEM	CAD-CBD-CGD-O1D
2	B	501[A]	HEM	CAD-CBD-CGD-O2D
2	B	501[B]	HEM	CAD-CBD-CGD-O2D
2	B	501[A]	HEM	CAD-CBD-CGD-O1D
2	B	501[B]	HEM	CAD-CBD-CGD-O1D
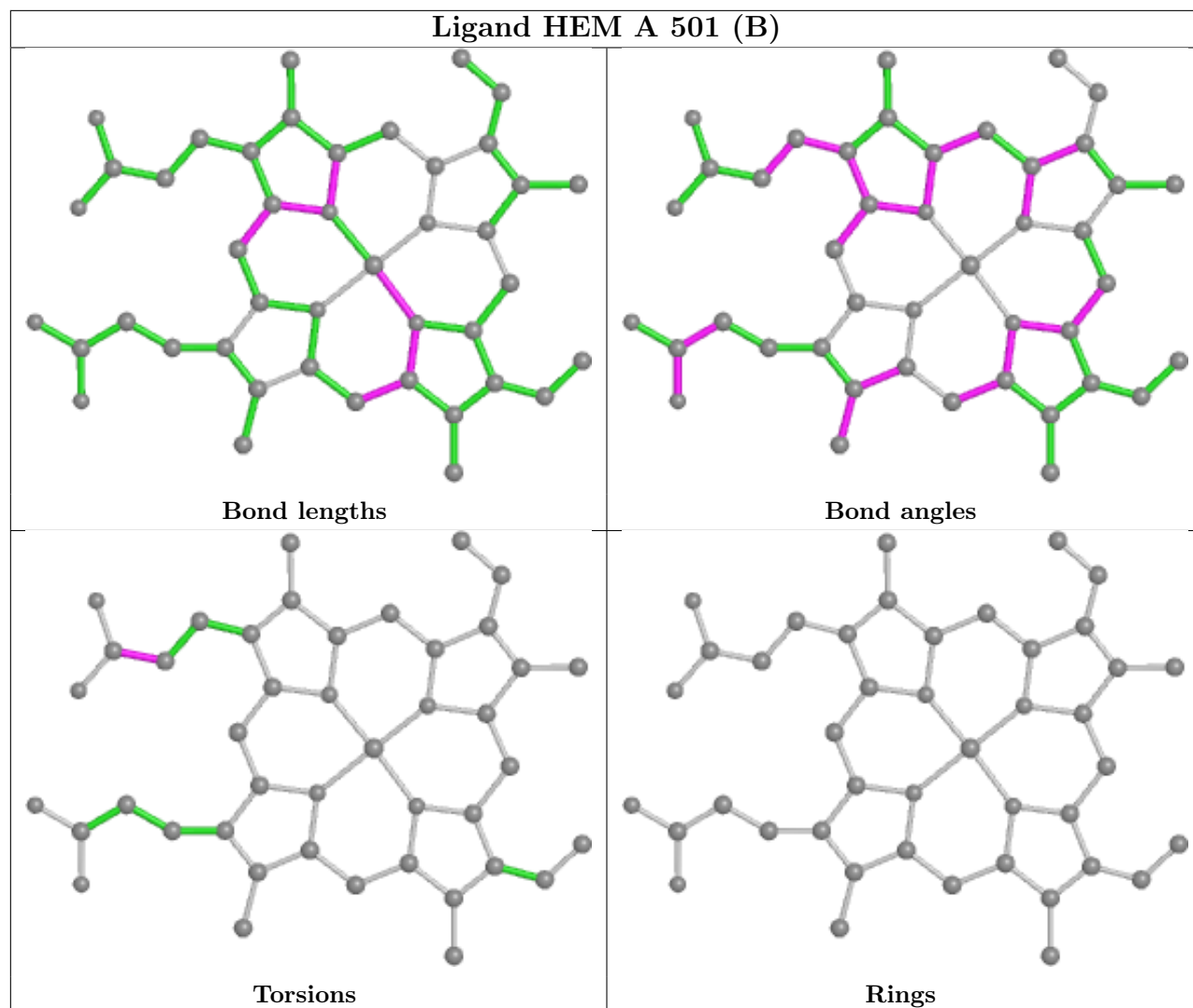
There are no ring outliers.

No monomer is involved in short contacts.
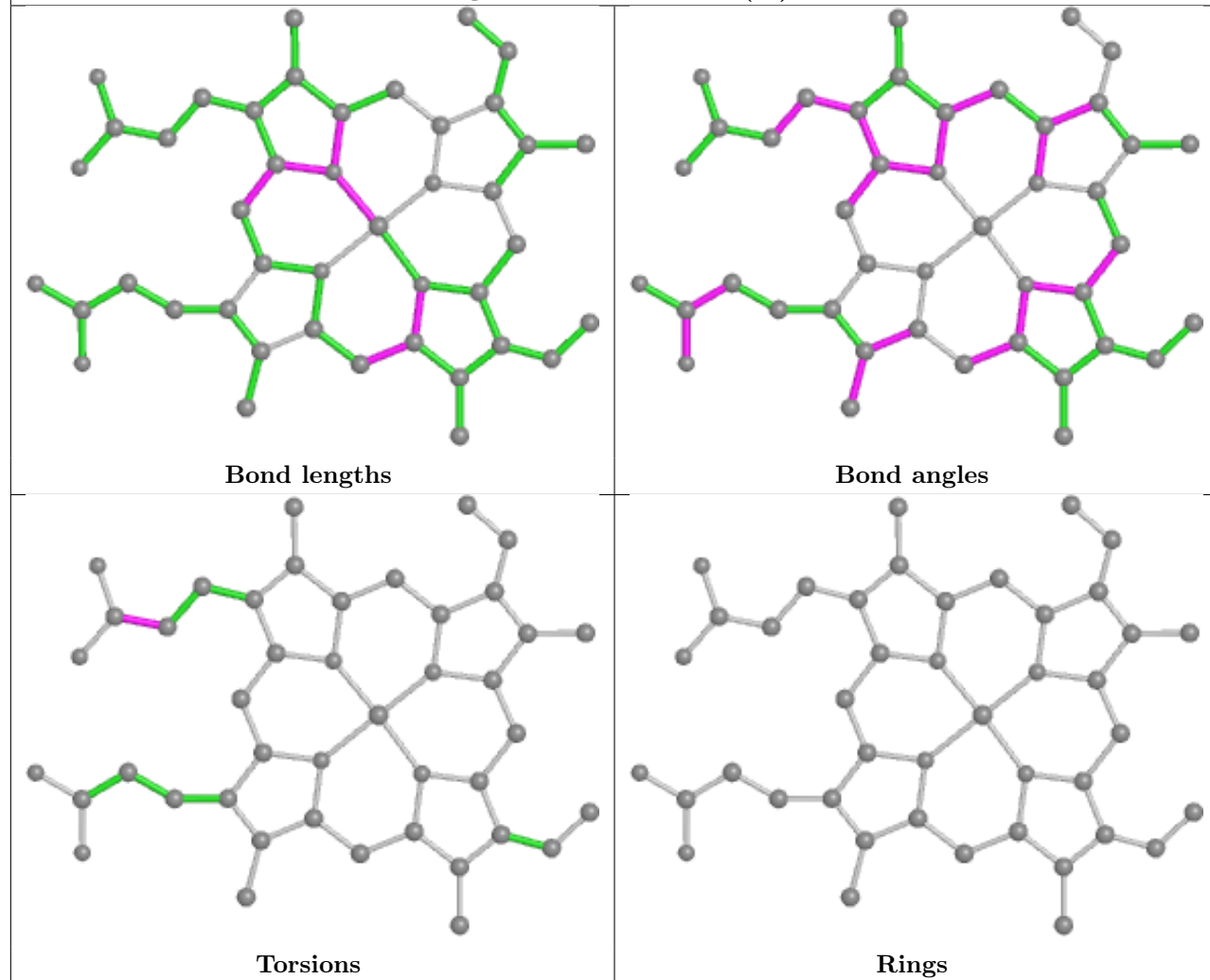
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 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.

Ligand D0L A 504

Bond lengths

Bond angles

Torsions

Rings

Ligand SYN B 502 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 501 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand OXY B 503 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 501 (A)

Bond lengths

Bond angles

Torsions

Rings

Ligand SYN A 502 (A)	
Bond lengths	Bond angles
Torsions	Rings

Ligand OXY A 503 (A)	
Bond lengths	Bond angles
Torsions	Rings

Ligand HEM B 501 (B)

Bond lengths

Bond angles

Torsions

Rings

Ligand D0L B 504

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM B 501 (A)

Bond lengths

Bond angles

Torsions

Rings

5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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(Å²)	Q<0.9
1	A	455/456 (99%)	-0.41	9 (1%)	64	67	6, 19, 45, 85	3 (0%)
1	B	455/456 (99%)	-0.61	10 (2%)	62	65	7, 16, 36, 83	6 (1%)
All	All	910/912 (99%)	-0.51	19 (2%)	63	66	6, 18, 41, 85	9 (0%)

All (19) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	2	ILE	4.3
1	B	227	GLY	4.1
1	A	227	GLY	4.0
1	A	225	ALA	3.6
1	B	1	THR	3.6
1	A	1	THR	3.1
1	A	228	GLU	2.6
1	A	2	ILE	2.6
1	B	224	LYS	2.6
1	B	225	ALA	2.5
1	B	192[A]	ASN	2.4
1	A	221	ALA	2.3
1	B	109	GLN	2.3
1	B	228	GLU	2.3
1	A	226	SER	2.2
1	B	226	SER	2.2
1	A	224	LYS	2.1
1	A	229	GLN	2.1
1	B	231	ASP	2.1

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

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

W O R L D W I D E
wwPDB
PROTEIN DATA BANK

6.3 Carbohydrates ⓘ

There are no monosaccharides in this entry.

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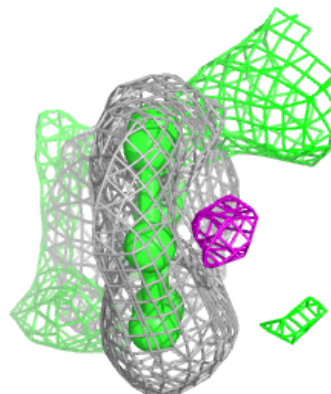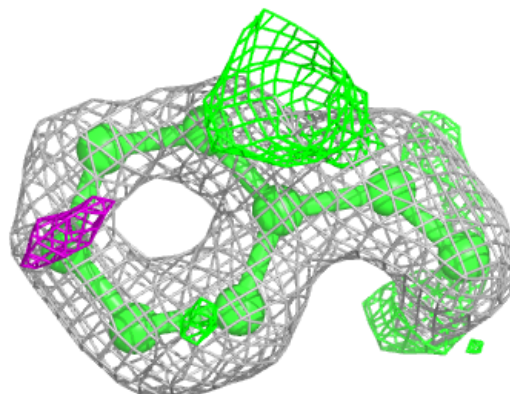
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	GOL	B	507	6/6	0.72	0.29	26,28,32,34	7
3	SYN	A	502[A]	8/8	0.84	0.15	15,21,23,24	8
6	GOL	B	505	6/6	0.87	0.17	41,46,50,51	0
3	SYN	B	502[A]	8/8	0.87	0.12	16,19,20,21	8
6	GOL	A	505	6/6	0.89	0.13	31,39,42,44	0
6	GOL	B	506	6/6	0.91	0.11	29,36,38,38	0
4	OXY	B	503[A]	2/2	0.96	0.05	10,10,10,13	2
5	D0L	B	504	26/26	0.96	0.08	13,19,32,37	0
4	OXY	A	503[A]	2/2	0.96	0.05	11,11,11,14	2
5	D0L	A	504	26/26	0.97	0.07	14,21,37,42	0
2	HEM	A	501[A]	43/43	0.98	0.04	8,11,13,16	1
2	HEM	A	501[B]	43/43	0.98	0.04	8,11,13,16	1
2	HEM	B	501[A]	43/43	0.99	0.04	9,11,13,15	1
2	HEM	B	501[B]	43/43	0.99	0.04	9,11,13,15	1
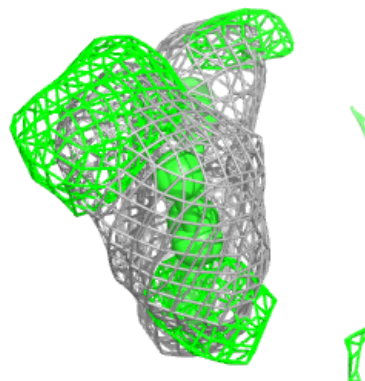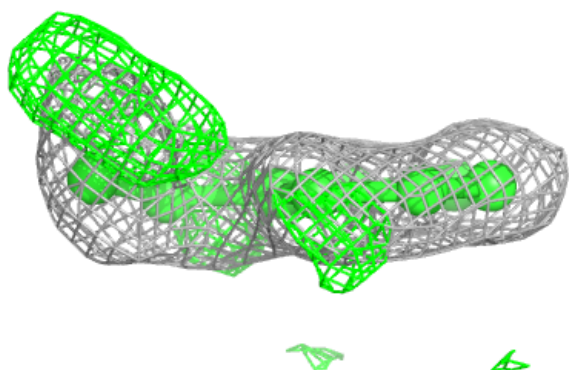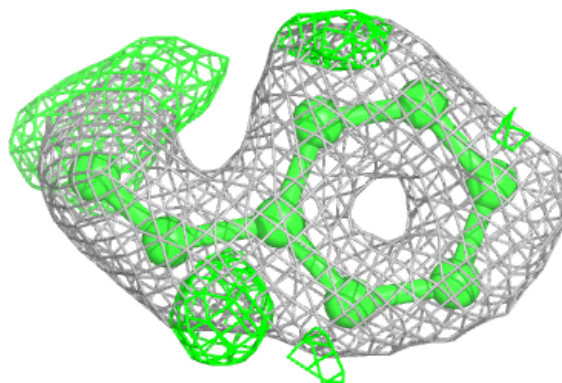
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.
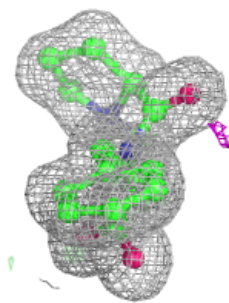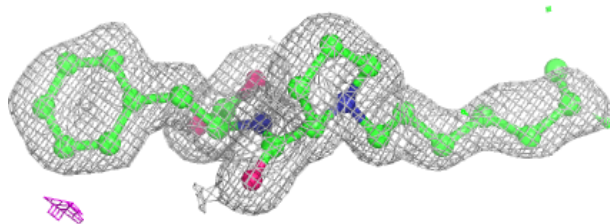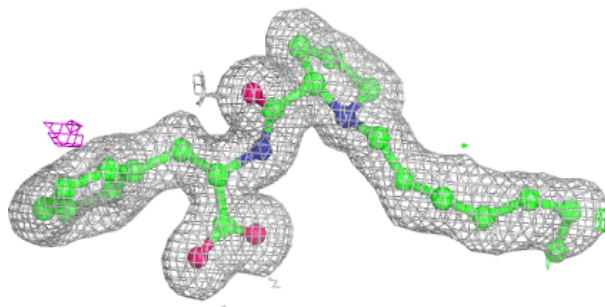
Electron density around SYN A 502 (A):

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)
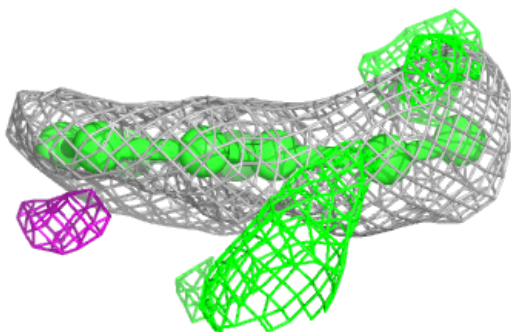
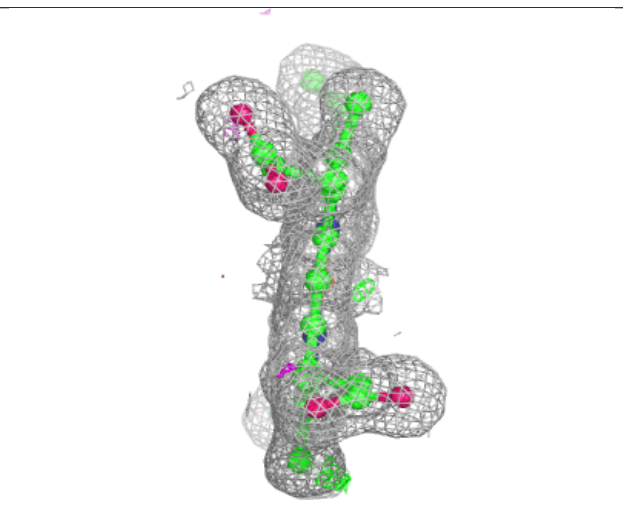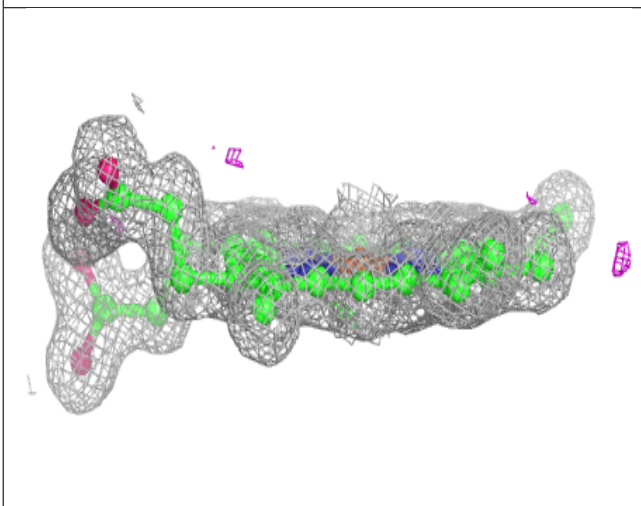

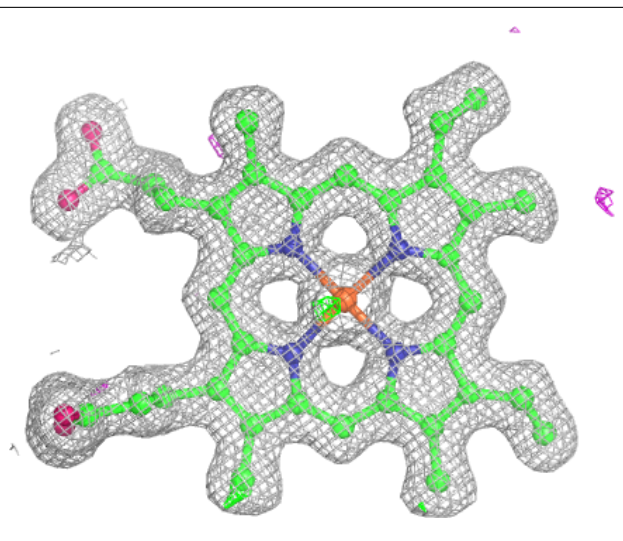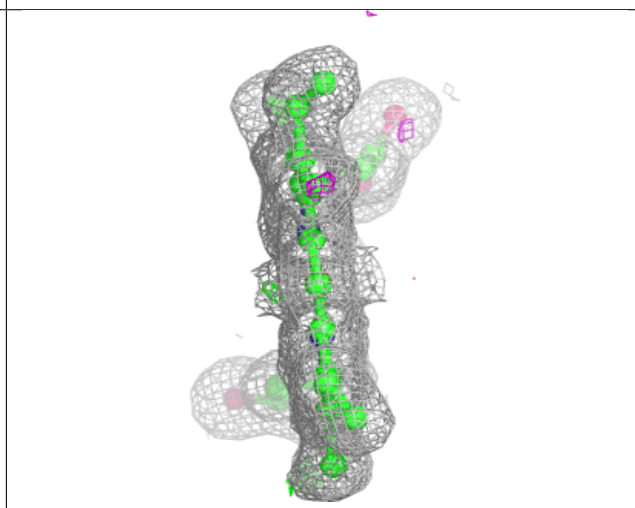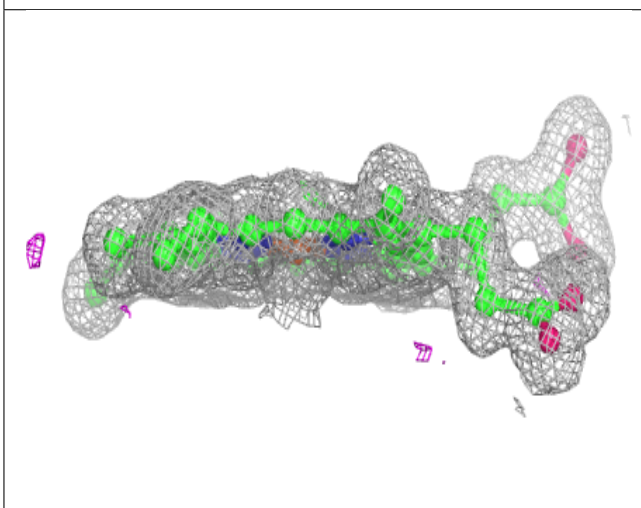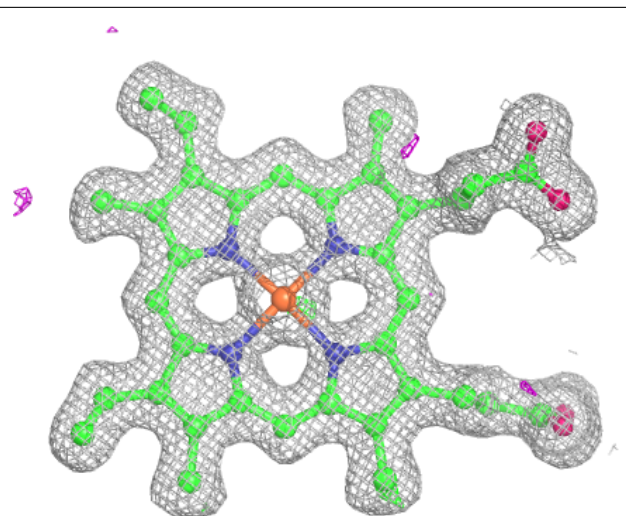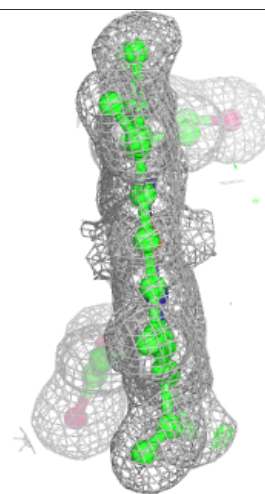Electron density around SYN B 502 (A):

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 OXY B 503 (A):

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
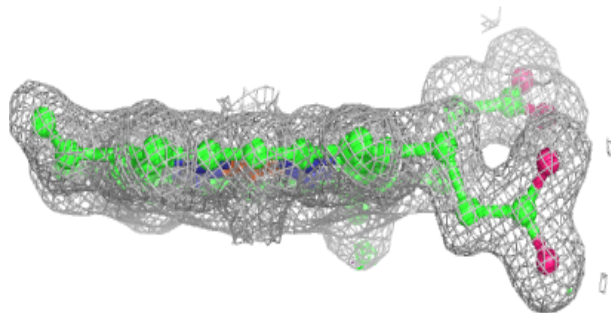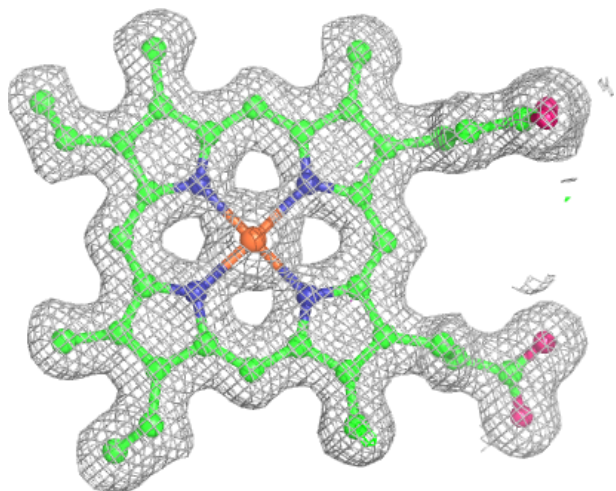and green (positive)
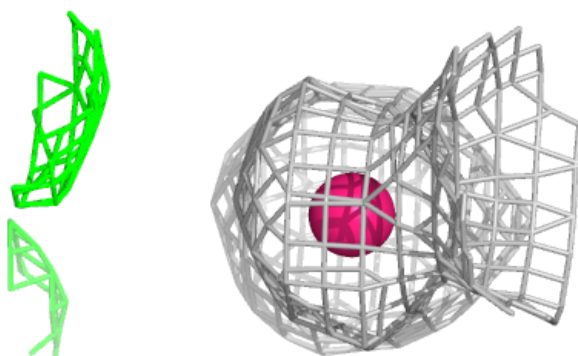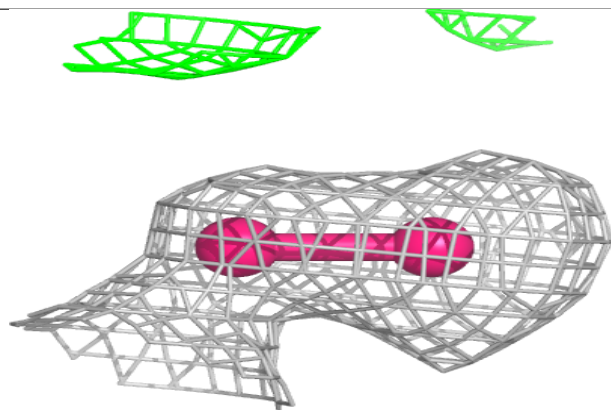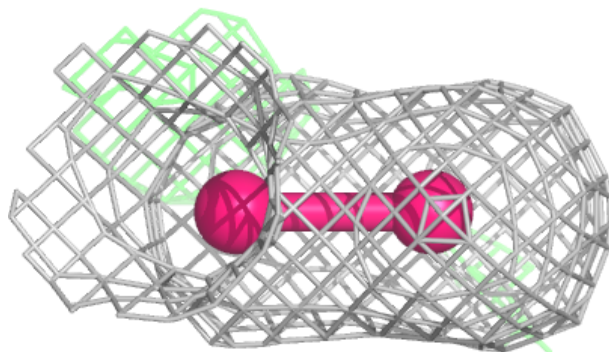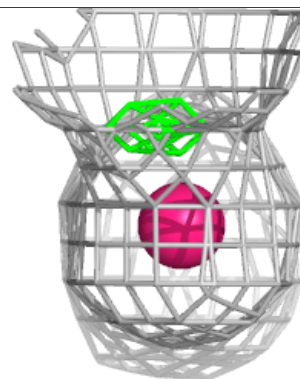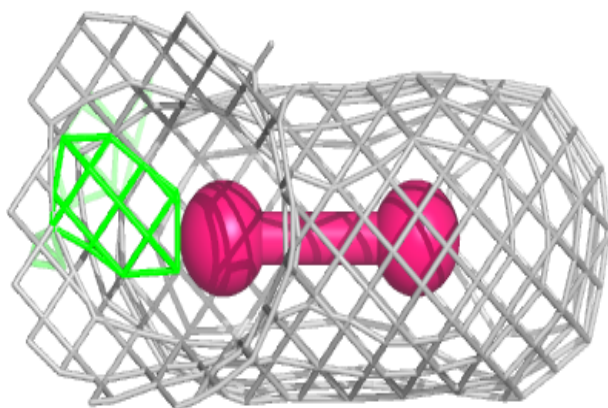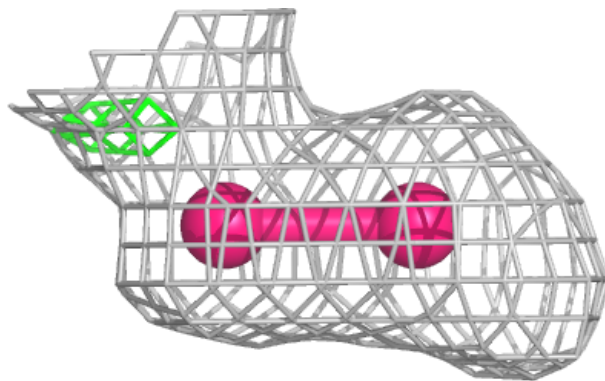
Electron density around D0L B 504:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
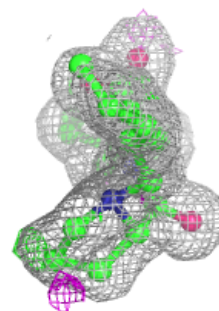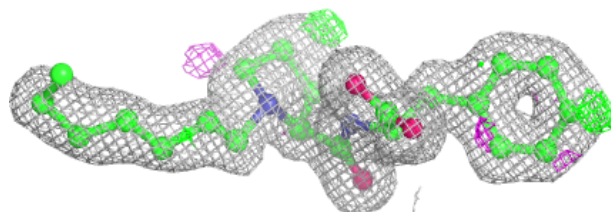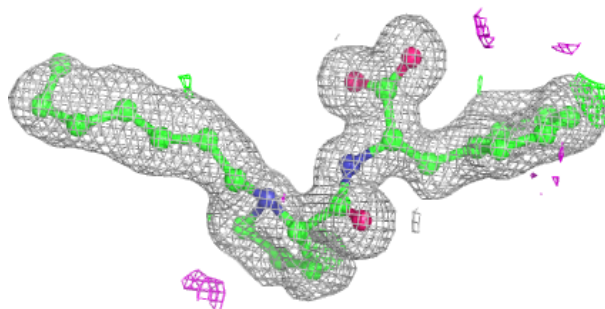
Electron density around OXY A 503 (A):

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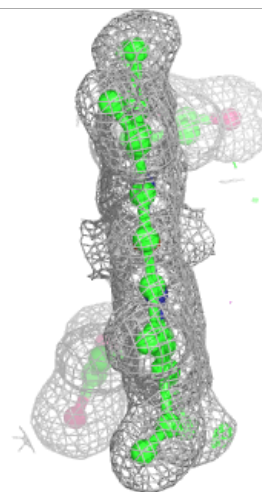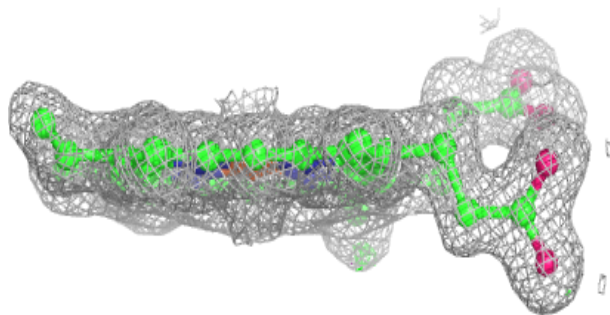and green (positive)

Electron density around D0L A 504:

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 (A):

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

Electron density around HEM A 501 (B):

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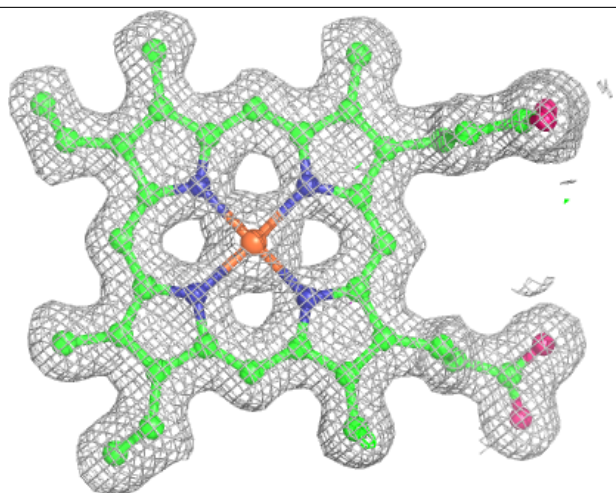$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around HEM B 501 (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 B 501 (B):

$2mF_o$-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 ⓘ

There are no such residues in this entry.