WORLDWIDE PDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report ⓘ

Nov 18, 2025 – 10:42 AM EST

PDB ID	:	9MWX / pdb_00009mwx
Title	:	Structure of human endothelial nitric oxide synthase heme domain bound wit hN-(4-(2-((3-(thiazole-5-carboximidamido)benzyl)amino)ethyl)phenyl)thiazol e-5-carboximidamide
Authors	:	Li, H.; Poulos, T.L.
Deposited on	:	2025-01-17
Resolution	:	1.84 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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:

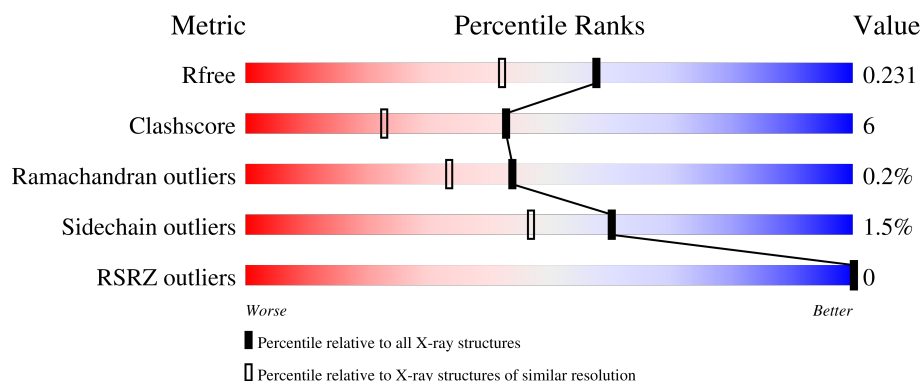|		
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

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 1.84 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	Percentile Ranks	Value
Rfree		0.231
Clashscore		6
Ramachandran outliers		0.2%
Sidechain outliers		1.5%
RSRZ outliers		0

Worse   *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	164625	1150 (1.84-1.84)
Clashscore	180529	1248 (1.84-1.84)
Ramachandran outliers	177936	1240 (1.84-1.84)
Sidechain outliers	177891	1240 (1.84-1.84)
RSRZ outliers	164620	1149 (1.84-1.84)

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	440	78% 13% • 8%
1	B	440	82% 9% 8%
1	C	440	77% 14% 9%
1	D	440	82% 10% 8%

2 Entity composition ⓘ

There are 11 unique types of molecules in this entry. The entry contains 14269 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 Nitric oxide synthase, endothelial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	403	Total	C	N	O	S	0	1	0
			3223	2052	569	586	16			
1	B	403	Total	C	N	O	S	0	2	0
			3226	2054	569	587	16			
1	C	401	Total	C	N	O	S	0	1	0
			3207	2043	564	584	16			
1	D	403	Total	C	N	O	S	0	2	0
			3226	2054	569	587	16			

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	298	GLU	ASP	variant	UNP P29474
B	298	GLU	ASP	variant	UNP P29474
C	298	GLU	ASP	variant	UNP P29474
D	298	GLU	ASP	variant	UNP P29474

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

HEM

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

- Molecule 3 is 5,6,7,8-TETRAHYDROBIOPTERIN (CCD ID: H4B) (formula: $C_9H_{15}N_5O_3$).

H4B

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 17	C 9	N 5	O 3	0	0
3	B	1	Total 17	C 9	N 5	O 3	0	0
3	C	1	Total 17	C 9	N 5	O 3	0	0
3	D	1	Total 17	C 9	N 5	O 3	0	0

- Molecule 4 is N-[3-({[2-(4-{[(Z)-imino(1,3-thiazol-5-yl)methyl]amino}phenyl)ethyl]amino} methyl)phenyl]-1,3-thiazole-5-carboximidamide (CCD ID: A1BT5) (formula: $C_{23}H_{23}N_7S_2$) (labeled as "Ligand of Interest" by depositor).

A1BT5
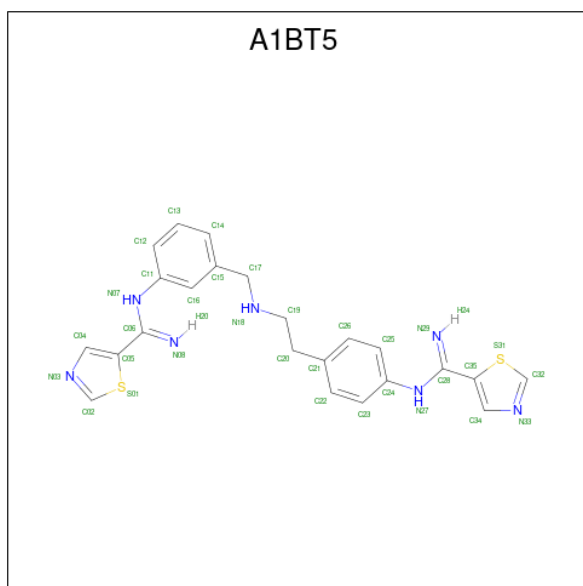
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total 32	C 23	N 7	S 2	0	0
4	B	1	Total 32	C 23	N 7	S 2	0	0
4	C	1	Total 32	C 23	N 7	S 2	0	0
4	D	1	Total 32	C 23	N 7	S 2	0	0

- Molecule 5 is 2-[BIS-(2-HYDROXY-ETHYL)-AMINO]-2-HYDROXYMETHYL-PROPANE-1,3-DIOL (CCD ID: BTB) (formula: $C_8H_{19}NO_5$).

BTB

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

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).

GOL

C3

OH O3

C1   C2

HO

O1

OH

O2

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

- Molecule 7 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total 1	Cl 1	0	0
7	B	1	Total 1	Cl 1	0	0
7	C	1	Total 1	Cl 1	0	0
7	D	1	Total 1	Cl 1	0	0

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- Molecule 8 is GADOLINIUM ATOM (CCD ID: GD) (formula: Gd).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total 1	Gd 1	0	0
8	B	1	Total 1	Gd 1	0	0
8	D	1	Total 1	Gd 1	0	0

- Molecule 9 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	1	Total 1	Zn 1	0	0
9	C	1	Total 1	Zn 1	0	0

- Molecule 10 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
10	A	1	Total 1	Ca 1	0	0
10	B	1	Total 1	Ca 1	0	0
10	C	2	Total 2	Ca 2	0	0

- Molecule 11 is water.

| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	185	Total 185	O 185	0	0
11	B	258	Total 258	O 258	0	0
11	C	179	Total 179	O 179	0	0
11	D	238	Total 238	O 238	0	0

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.
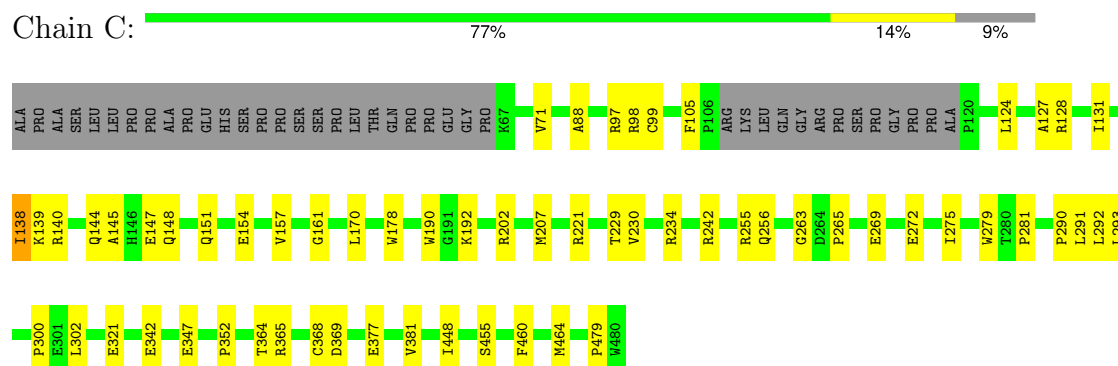
• Molecule 1: Nitric oxide synthase, endothelial
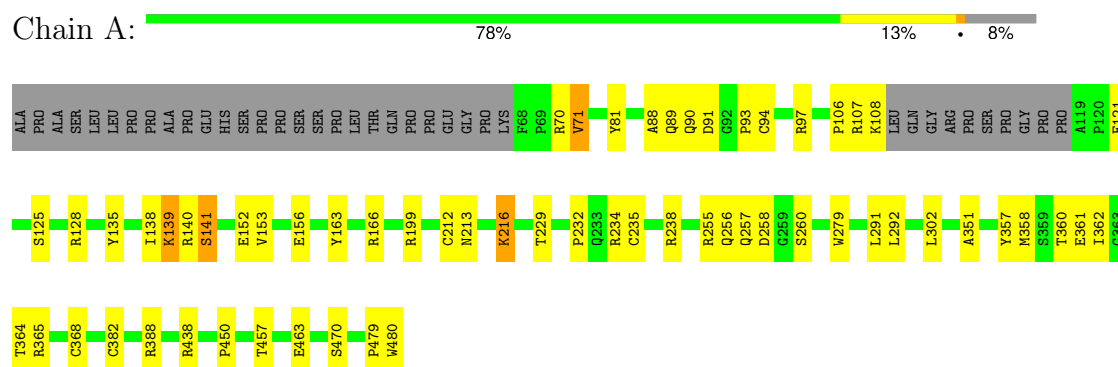
Chain A:

• Molecule 1: Nitric oxide synthase, endothelial
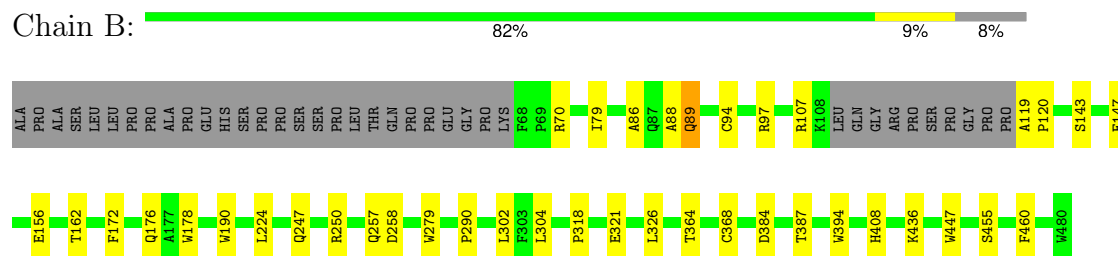
Chain B:

• Molecule 1: Nitric oxide synthase, endothelial

Chain C:

• Molecule 1: Nitric oxide synthase, endothelial

Chain D:

82% 10% 8%

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	59.52Å 153.03Å 108.52Å 90.00° 90.63° 90.00°	Depositor
Resolution (Å)	38.99 – 1.84 38.99 – 1.84	Depositor EDS
% Data completeness (in resolution range)	97.9 (38.99-1.84) 98.0 (38.99-1.84)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.60 (at 1.84Å)	Xtriage
Refinement program	PHENIX (1.11.1_2575: ???)	Depositor
R, R_{free}	0.198 , 0.234 0.195 , 0.231	Depositor DCC
R_{free} test set	8267 reflections (4.06%)	wwPDB-VP
Wilson B-factor (Å^2)	29.1	Xtriage
Anisotropy	0.554	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 42.8	EDS
L-test for twinning[2]	$< |L| > = 0.48, < L^2 > = 0.31$	Xtriage
Estimated twinning fraction	0.118 for h,-k,-l	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	14269	wwPDB-VP
Average B, all atoms (Å^2)	41.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.34% of the height of the origin peak. No significant pseudotranslation is detected.*

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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: CL, BTB, CA, H4B, HEM, A1BT5, GD, GOL, ZN

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	0.28	0/3318	0.49	0/4520
1	B	0.34	0/3324	0.53	0/4528
1	C	0.27	0/3302	0.49	0/4498
1	D	0.40	1/3324 (0.0%)	0.54	2/4528 (0.0%)
All	All	0.33	1/13268 (0.0%)	0.51	2/18074 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	67	LYS	C-N	13.33	1.50	1.33

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	D	67	LYS	CA-C-N	5.72	131.54	123.30
1	D	67	LYS	C-N-CA	5.72	131.54	123.30

There are no chirality outliers.

There are no planarity outliers.

5.2   Too-close contacts ⓘ

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3223	0	3129	43	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	B	3226	0	3134	30	0
1	C	3207	0	3112	41	0
1	D	3226	0	3134	31	0
2	A	43	0	30	2	0
2	B	43	0	30	2	0
2	C	43	0	30	2	0
2	D	43	0	30	2	0
3	A	17	0	15	1	0
3	B	17	0	15	1	0
3	C	17	0	15	0	0
3	D	17	0	15	2	0
4	A	32	0	0	2	0
4	B	32	0	0	0	0
4	C	32	0	0	0	0
4	D	32	0	0	2	0
5	A	28	0	37	4	0
5	B	28	0	36	3	0
5	C	14	0	19	1	0
5	D	28	0	36	8	0
6	A	18	0	24	0	0
6	B	6	0	8	0	0
6	C	12	0	16	0	0
6	D	12	0	16	0	0
7	A	1	0	0	0	0
7	B	1	0	0	0	0
7	C	1	0	0	0	0
7	D	1	0	0	0	0
8	A	1	0	0	0	0
8	B	1	0	0	0	0
8	D	1	0	0	0	0
9	A	1	0	0	0	0
9	C	1	0	0	0	0
10	A	1	0	0	0	0
10	B	1	0	0	0	0
10	C	2	0	0	0	0
11	A	185	0	0	9	0
11	B	258	0	0	4	0
11	C	179	0	0	6	0
11	D	238	0	0	6	0
All	All	14269	0	12881	159	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.

The worst 5 of 159 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:C:192:LYS:NZ	11:C:601:HOH:O	2.04	0.90
1:C:139:LYS:NZ	11:C:604:HOH:O	2.15	0.78
1:A:279:TRP:HB2	1:A:302:LEU:HD21	1.65	0.78
5:A:504:BTB:O3	11:A:601:HOH:O	2.01	0.77
1:B:107:ARG:NH2	11:B:601:HOH:O	2.18	0.76

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	400/440 (91%)	383 (96%)	17 (4%)	0	100	100
1	B	401/440 (91%)	393 (98%)	7 (2%)	1 (0%)	44	33
1	C	398/440 (90%)	384 (96%)	14 (4%)	0	100	100
1	D	401/440 (91%)	393 (98%)	6 (2%)	2 (0%)	25	12
All	All	1600/1760 (91%)	1553 (97%)	44 (3%)	3 (0%)	44	33

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	258	ASP
1	D	89	GLN
1	B	89	GLN

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	343/373 (92%)	331 (96%)	12 (4%)	31	13
1	B	344/373 (92%)	341 (99%)	3 (1%)	75	67
1	C	342/373 (92%)	338 (99%)	4 (1%)	67	57
1	D	344/373 (92%)	342 (99%)	2 (1%)	84	79
All	All	1373/1492 (92%)	1352 (98%)	21 (2%)	60	47

5 of 21 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	384	ASP
1	C	202	ARG
1	D	309	LEU
1	C	342	GLU
1	C	138	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 8 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	213	ASN
1	D	148	GLN
1	C	87	GLN
1	B	148	GLN
1	C	403	ASN

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 (i)

Of 40 ligands modelled in this entry, 13 are monoatomic - leaving 27 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	#$|Z| > 2$
4	A1BT5	A	503	-	31,35,35	1.29	6 (19%)	29,46,46	2.29	8 (27%)
5	BTB	C	504	-	13,13,13	0.45	0	7,16,16	0.58	0
5	BTB	B	504	8	13,13,13	0.51	0	7,16,16	0.61	0
4	A1BT5	D	503	-	31,35,35	1.15	5 (16%)	29,46,46	2.29	6 (20%)
6	GOL	B	506	-	5,5,5	0.36	0	5,5,5	0.38	0
5	BTB	B	505	-	13,13,13	0.45	0	7,16,16	1.12	0
6	GOL	C	505	-	5,5,5	0.36	0	5,5,5	0.73	0
6	GOL	C	506	-	5,5,5	0.37	0	5,5,5	0.34	0
2	HEM	C	501	1	42,50,50	1.53	4 (9%)	46,82,82	1.52	8 (17%)
6	GOL	A	507	-	5,5,5	0.34	0	5,5,5	0.41	0
2	HEM	B	501	1	42,50,50	1.54	7 (16%)	46,82,82	1.60	5 (10%)
3	H4B	C	502	-	16,18,18	0.83	0	14,26,26	2.34	5 (35%)
2	HEM	A	501	1	42,50,50	1.49	5 (11%)	46,82,82	1.68	9 (19%)
3	H4B	A	502	-	16,18,18	0.72	0	14,26,26	2.44	5 (35%)
2	HEM	D	501	1	42,50,50	1.53	7 (16%)	46,82,82	1.66	6 (13%)
6	GOL	D	507	-	5,5,5	0.32	0	5,5,5	0.36	0
3	H4B	D	502	-	16,18,18	0.84	0	14,26,26	2.43	5 (35%)
4	A1BT5	B	503	-	31,35,35	1.18	2 (6%)	29,46,46	2.24	5 (17%)
4	A1BT5	C	503	-	31,35,35	1.18	6 (19%)	29,46,46	2.18	6 (20%)
6	GOL	A	506	-	5,5,5	0.37	0	5,5,5	0.21	0
5	BTB	D	504	8	13,13,13	0.48	0	7,16,16	1.16	1 (14%)
6	GOL	D	506	-	5,5,5	0.39	0	5,5,5	0.29	0
3	H4B	B	502	-	16,18,18	0.85	0	14,26,26	2.45	5 (35%)
6	GOL	A	508	-	5,5,5	0.35	0	5,5,5	0.45	0
5	BTB	A	505	-	13,13,13	0.52	0	7,16,16	0.80	0
5	BTB	D	505	-	13,13,13	0.48	0	7,16,16	0.78	0
5	BTB	A	504	8	13,13,13	0.47	0	7,16,16	0.56	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
4	A1BT5	A	503	-	-	3/15/23/23	0/4/4/4
5	BTB	C	504	-	-	13/21/21/21	-
5	BTB	B	504	8	-	3/21/21/21	-
4	A1BT5	D	503	-	-	0/15/23/23	0/4/4/4
6	GOL	B	506	-	-	2/4/4/4	-
5	BTB	B	505	-	-	11/21/21/21	-
6	GOL	C	505	-	-	4/4/4/4	-
6	GOL	C	506	-	-	2/4/4/4	-
2	HEM	C	501	1	-	2/12/54/54	-
6	GOL	A	507	-	-	1/4/4/4	-
2	HEM	B	501	1	-	0/12/54/54	-
3	H4B	C	502	-	-	0/8/17/17	0/2/2/2
2	HEM	A	501	1	-	0/12/54/54	-
3	H4B	A	502	-	-	0/8/17/17	0/2/2/2
2	HEM	D	501	1	-	0/12/54/54	-
6	GOL	D	507	-	-	2/4/4/4	-
3	H4B	D	502	-	-	0/8/17/17	0/2/2/2
4	A1BT5	B	503	-	-	1/15/23/23	0/4/4/4
4	A1BT5	C	503	-	-	2/15/23/23	0/4/4/4
6	GOL	A	506	-	-	3/4/4/4	-
5	BTB	D	504	8	-	5/21/21/21	-
6	GOL	D	506	-	-	0/4/4/4	-
3	H4B	B	502	-	-	0/8/17/17	0/2/2/2
6	GOL	A	508	-	-	2/4/4/4	-
5	BTB	A	505	-	-	4/21/21/21	-
5	BTB	D	505	-	-	10/21/21/21	-
5	BTB	A	504	8	-	5/21/21/21	-

The worst 5 of 42 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	501	HEM	C3C-C2C	-4.25	1.34	1.40
2	C	501	HEM	C3C-C2C	-3.97	1.35	1.40
2	A	501	HEM	C3C-C2C	-3.76	1.35	1.40
2	D	501	HEM	C3C-C4C	3.76	1.46	1.41
2	C	501	HEM	C3C-CAC	3.47	1.55	1.47

The worst 5 of 74 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	503	A1BT5	C04-N03-C02	8.07	118.48	105.72
4	B	503	A1BT5	C34-N33-C32	7.35	117.35	105.72
4	C	503	A1BT5	C04-N03-C02	7.22	117.14	105.72
4	A	503	A1BT5	C04-N03-C02	7.17	117.06	105.72
4	B	503	A1BT5	C04-N03-C02	7.08	116.92	105.72

There are no chirality outliers.

5 of 75 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	503	A1BT5	N18-C19-C20-C21
5	A	504	BTB	O1-C1-C2-C3
5	A	504	BTB	O1-C1-C2-N
5	A	504	BTB	C1-C2-C4-O4
5	A	504	BTB	C3-C2-C4-O4

There are no ring outliers.

16 monomers are involved in 32 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	503	A1BT5	2	0
5	C	504	BTB	1	0
5	B	504	BTB	1	0
4	D	503	A1BT5	2	0
5	B	505	BTB	2	0
2	C	501	HEM	2	0
2	B	501	HEM	2	0
2	A	501	HEM	2	0
3	A	502	H4B	1	0
2	D	501	HEM	2	0
3	D	502	H4B	2	0
5	D	504	BTB	5	0
3	B	502	H4B	1	0
5	A	505	BTB	1	0
5	D	505	BTB	3	0
5	A	504	BTB	3	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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 A1BT5 A 503

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BT5 D 503

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM C 501

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM B 501

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 501

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM D 501

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BT5 B 503

Bond lengths

Bond angles

Torsions

Rings

Ligand A1BT5 C 503

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(Å^2)	Q<0.9
1	A	403/440 (91%)	-1.12	0	100	100	18, 41, 80, 113	1 (0%)
1	B	403/440 (91%)	-1.33	0	100	100	19, 31, 55, 99	2 (0%)
1	C	401/440 (91%)	-1.08	0	100	100	20, 43, 80, 102	1 (0%)
1	D	403/440 (91%)	-1.29	0	100	100	19, 32, 63, 103	2 (0%)
All	All	1610/1760 (91%)	-1.21	0	100	100	18, 36, 74, 113	6 (0%)

There are no RSRZ outliers to report.

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

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
6	GOL	C	506	6/6	0.94	0.05	71,71,74,75	0
6	GOL	D	506	6/6	0.94	0.07	67,74,75,76	0
5	BTB	B	505	14/14	0.95	0.07	72,76,80,81	0
5	BTB	C	504	14/14	0.95	0.06	65,74,79,80	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å²)	Q<0.9
6	GOL	B	506	6/6	0.97	0.04	63,67,69,70	0
6	GOL	C	505	6/6	0.97	0.06	59,70,79,82	0
6	GOL	A	506	6/6	0.97	0.05	55,66,69,69	0
6	GOL	A	507	6/6	0.97	0.04	71,74,76,76	0
5	BTB	A	504	14/14	0.98	0.06	26,63,87,91	0
5	BTB	A	505	14/14	0.98	0.05	43,61,67,67	0
6	GOL	A	508	6/6	0.98	0.07	62,68,70,73	0
5	BTB	B	504	14/14	0.98	0.07	35,62,76,81	0
4	A1BT5	A	503	32/32	0.98	0.06	21,56,100,106	0
4	A1BT5	C	503	32/32	0.98	0.06	22,60,103,108	0
5	BTB	D	505	14/14	0.98	0.04	33,62,68,73	0
3	H4B	C	502	17/17	0.99	0.04	35,43,51,58	0
3	H4B	D	502	17/17	0.99	0.03	21,32,39,43	0
3	H4B	A	502	17/17	0.99	0.04	28,38,46,48	0
4	A1BT5	B	503	32/32	0.99	0.06	11,45,105,113	0
3	H4B	B	502	17/17	0.99	0.03	25,35,41,41	0
5	BTB	D	504	14/14	0.99	0.05	31,53,60,62	0
4	A1BT5	D	503	32/32	0.99	0.05	12,55,111,115	0
6	GOL	D	507	6/6	0.99	0.04	55,57,61,63	0
2	HEM	D	501	43/43	1.00	0.02	15,22,35,45	0
2	HEM	A	501	43/43	1.00	0.03	21,32,44,60	0
2	HEM	B	501	43/43	1.00	0.03	13,21,38,44	0
2	HEM	C	501	43/43	1.00	0.04	24,35,44,50	0
7	CL	A	509	1/1	1.00	0.03	42,42,42,42	0
7	CL	B	507	1/1	1.00	0.03	37,37,37,37	0
7	CL	C	507	1/1	1.00	0.02	43,43,43,43	0
7	CL	D	508	1/1	1.00	0.05	34,34,34,34	0
8	GD	A	510	1/1	1.00	0.08	97,97,97,97	0
8	GD	B	508	1/1	1.00	0.02	37,37,37,37	0
8	GD	D	509	1/1	1.00	0.01	35,35,35,35	0
9	ZN	A	511	1/1	1.00	0.01	28,28,28,28	0
9	ZN	C	508	1/1	1.00	0.01	31,31,31,31	0
10	CA	A	512	1/1	1.00	0.01	54,54,54,54	0
10	CA	B	509	1/1	1.00	0.02	37,37,37,37	0
10	CA	C	509	1/1	1.00	0.01	31,31,31,31	0
10	CA	C	510	1/1	1.00	0.01	36,36,36,36	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 A1BT5 A 503:

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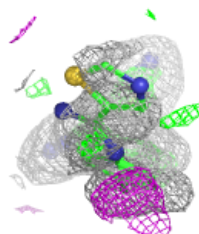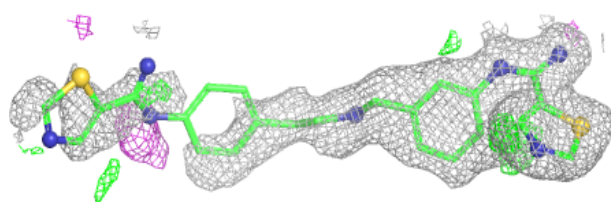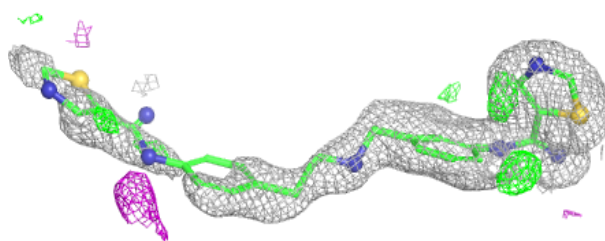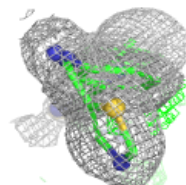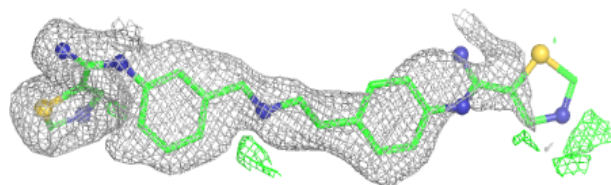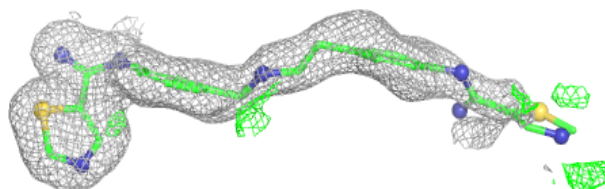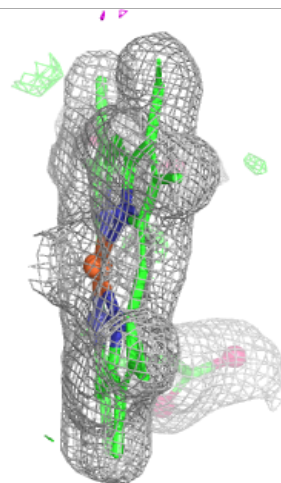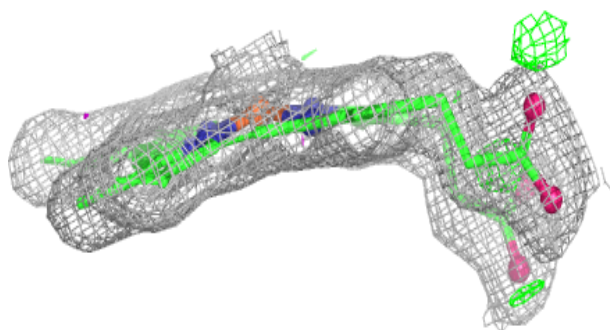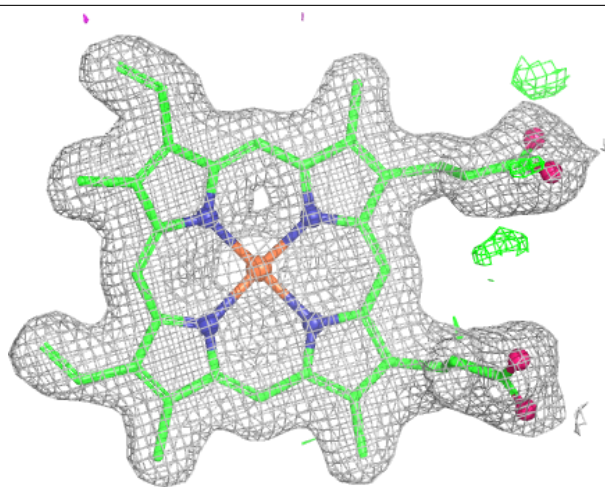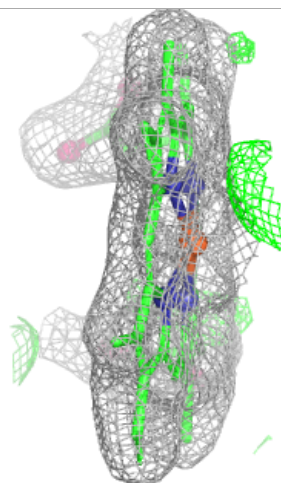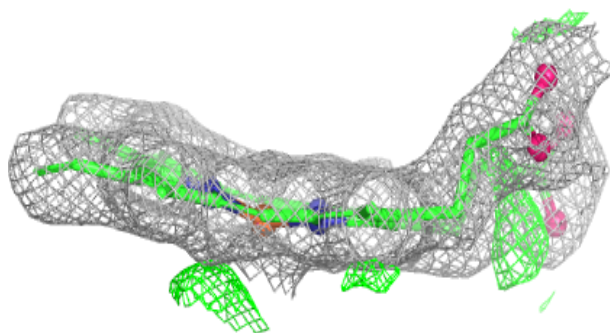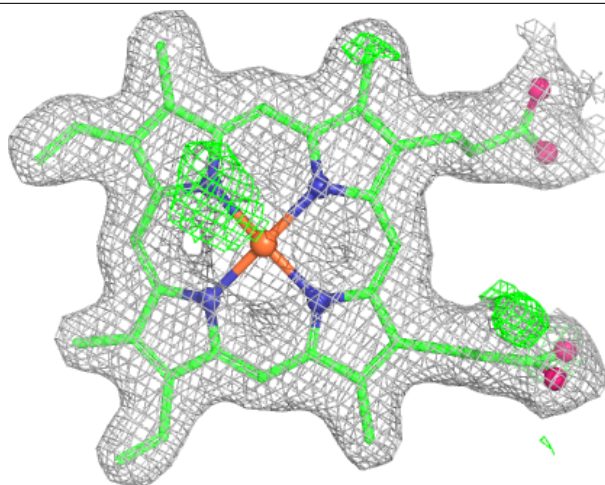mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)
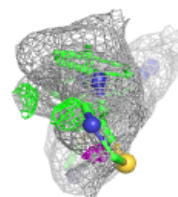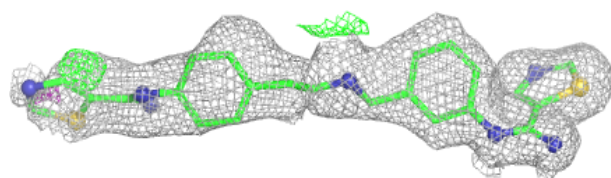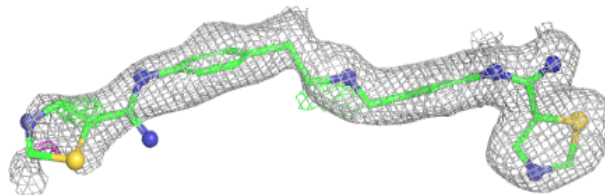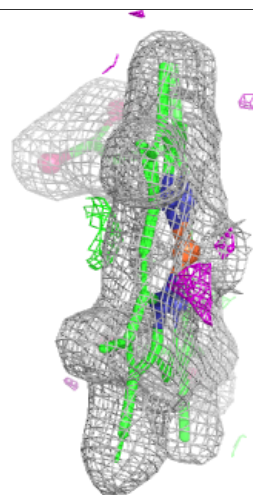

Electron density around A1BT5 C 503:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)
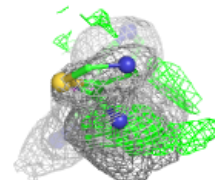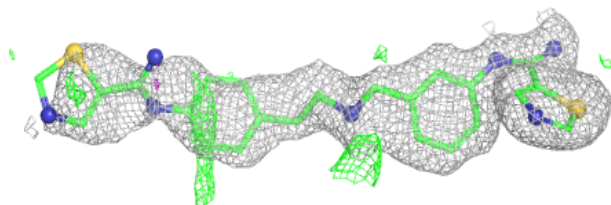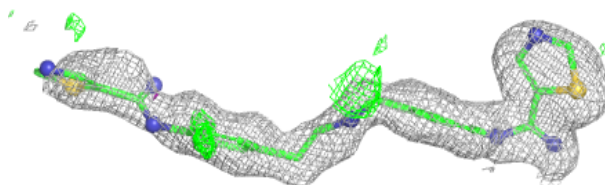
Electron density around A1BT5 B 503:

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

Electron density around A1BT5 D 503:

$2mF_o$-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)

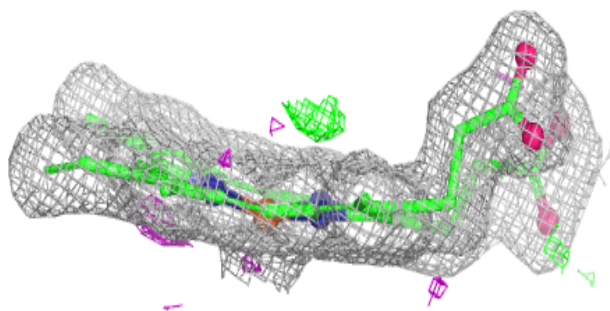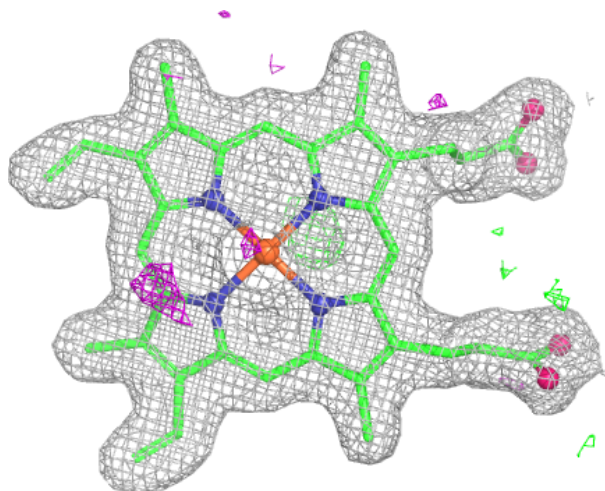**Electron density around HEM A 501:**

$2mF_o$-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 B 501:

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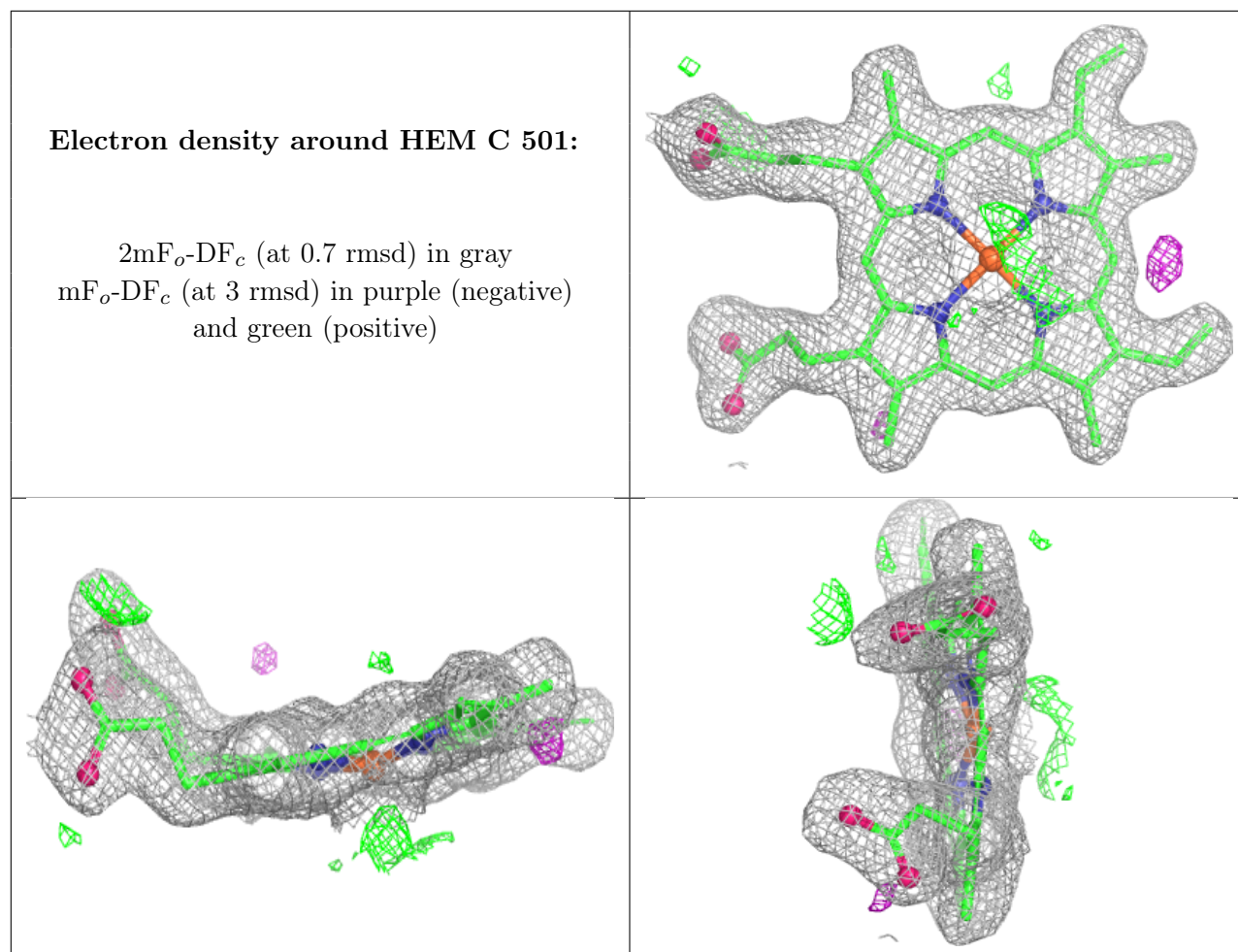and green (positive)

Electron density around HEM 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)

6.5 Other polymers ⓘ

There are no such residues in this entry.