



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 18, 2026 – 02:21 AM UTC

PDB ID : 5LO9 / pdb_00005lo9
Title : Thiosulfate dehydrogenase (TsdBA) from Marichromatium purpuratum - "as isolated" form
Authors : Brito, J.A.; Kurth, J.M.; Reuter, J.; Flegler, A.; Koch, T.; Franke, T.; Klein, E.; Rowe, S.; Butt, J.N.; Denkmann, K.; Pereira, I.A.C.; Dahl, C.; Archer, M.
Deposited on : 2016-08-08
Resolution : 2.75 Å(reported)

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

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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

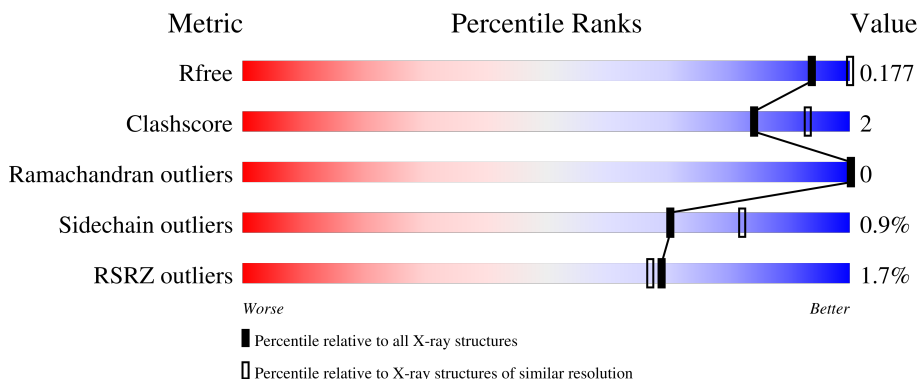
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 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	1009 (2.76-2.76)
Clashscore	190562	1044 (2.76-2.76)
Ramachandran outliers	187476	1024 (2.76-2.76)
Sidechain outliers	187428	1024 (2.76-2.76)
RSRZ outliers	180081	1009 (2.76-2.76)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	526	0% 86% 10%
1	B	526	2% 82% 7% 11%

2 Entry composition

There are 8 unique types of molecules in this entry. The entry contains 7584 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

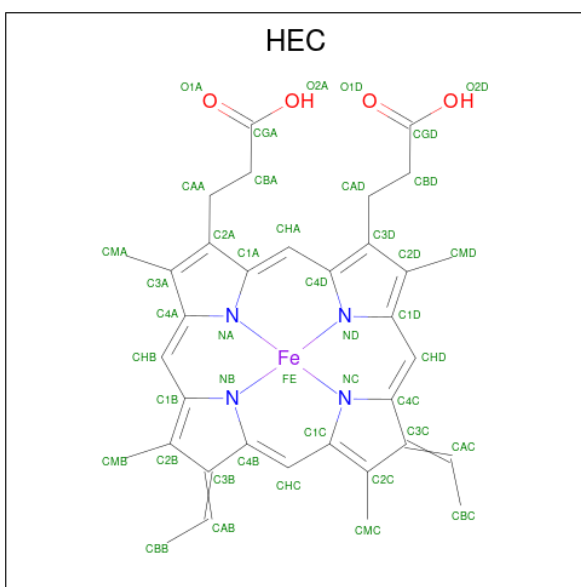
- Molecule 1 is a protein called Cytochrome C.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	471	Total	C	N	O	S	0	0	0
			3524	2192	658	655	19			
1	B	469	Total	C	N	O	S	0	0	0
			3504	2181	653	651	19			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	519	LEU	-	expression tag	UNP W0DW89
A	520	GLU	-	expression tag	UNP W0DW89
A	521	HIS	-	expression tag	UNP W0DW89
A	522	HIS	-	expression tag	UNP W0DW89
A	523	HIS	-	expression tag	UNP W0DW89
A	524	HIS	-	expression tag	UNP W0DW89
A	525	HIS	-	expression tag	UNP W0DW89
A	526	HIS	-	expression tag	UNP W0DW89
B	519	LEU	-	expression tag	UNP W0DW89
B	520	GLU	-	expression tag	UNP W0DW89
B	521	HIS	-	expression tag	UNP W0DW89
B	522	HIS	-	expression tag	UNP W0DW89
B	523	HIS	-	expression tag	UNP W0DW89
B	524	HIS	-	expression tag	UNP W0DW89
B	525	HIS	-	expression tag	UNP W0DW89
B	526	HIS	-	expression tag	UNP W0DW89

- Molecule 2 is HEME C (CCD ID: HEC) (formula: $C_{34}H_{34}FeN_4O_4$).

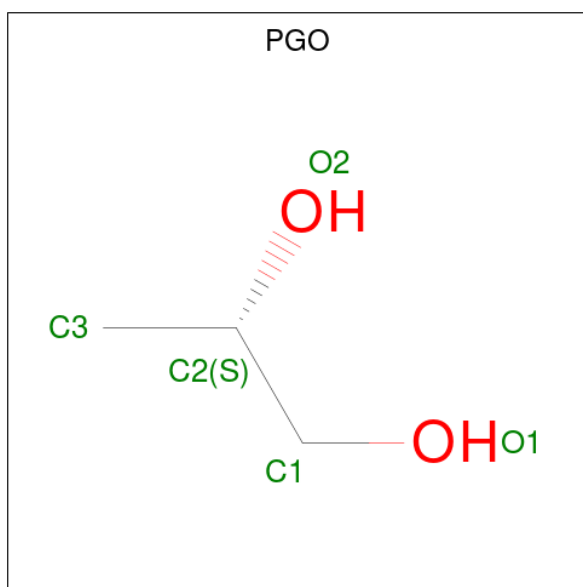


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
2	B	1	Total 43	C 34	Fe 1	N 4	O 4	0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

- Molecule 3 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

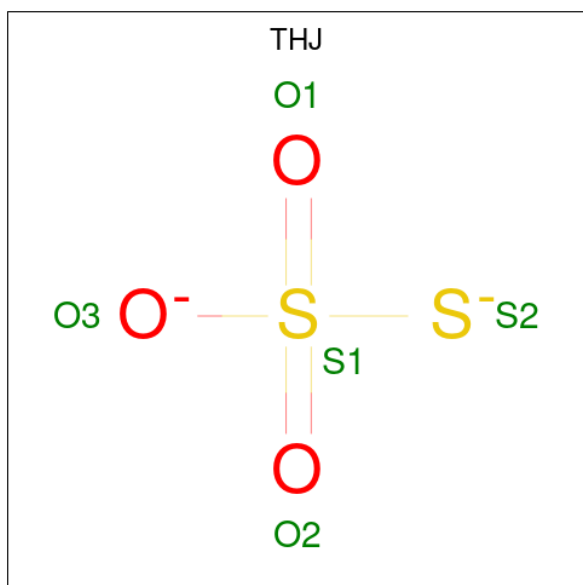
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	7	Total Cl 7 7	0	0
3	B	4	Total Cl 4 4	0	0

- Molecule 4 is S-1,2-PROPANEDIOL (CCD ID: PGO) (formula: $C_3H_8O_2$).



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

- Molecule 5 is THIOSULFATE (CCD ID: THJ) (formula: O_3S_2).



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

- Molecule 6 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: C₂H₆O₂).



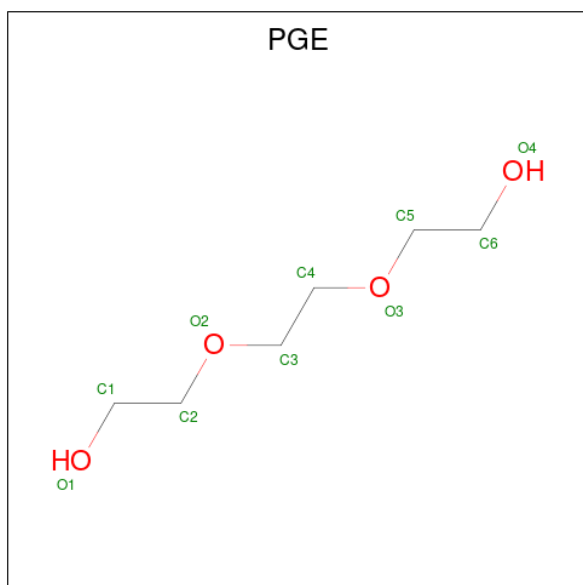
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		
6	A	1	Total	C	O	0	0
			4	2	2		

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

- Molecule 7 is TRIETHYLENE GLYCOL (CCD ID: PGE) (formula: $C_6H_{14}O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	A	1	Total	C	O	0	0
			10	6	4		

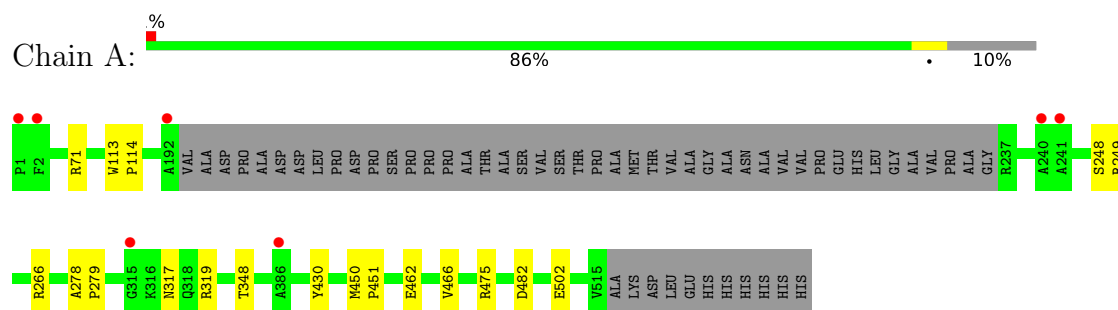
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	69	Total	O	0	0
			69	69		
8	B	44	Total	O	0	0
			44	44		

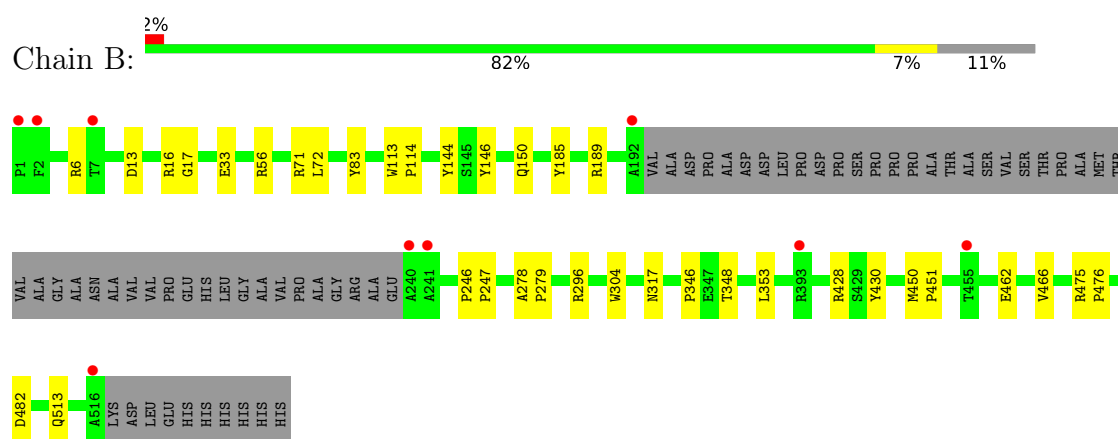
3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

• Molecule 1: Cytochrome C



• Molecule 1: Cytochrome C



4 Data and refinement statistics

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α , β , γ	159.75Å 159.75Å 393.09Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	113.13 – 2.75 113.13 – 2.75	Depositor EDS
% Data completeness (in resolution range)	99.0 (113.13-2.75) 98.7 (113.13-2.75)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.04 (at 2.73Å)	Xtriage
Refinement program	PHENIX (dev_2276: ???), BUSTER-TNT	Depositor
R, R_{free}	0.157 , 0.198 (Not available) , 0.177	Depositor DCC
R_{free} test set	2507 reflections (4.94%)	wwPDB-VP
Wilson B-factor (Å ²)	51.9	Xtriage
Anisotropy	0.277	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 37.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.006 for $-1/3^*h+1/3^*k+1/3^*l,-k,8/3^*h+4/3^*k+1/3^*l$ 0.020 for $-2/3^*h-1/3^*k-1/3^*l,-1/3^*h-2/3^*k+1/3^*l,-4/3^*h+4/3^*k+1/3^*l$ 0.011 for $-h,1/3^*h-1/3^*k-1/3^*l,-4/3^*h-8/3^*k+1/3^*l$	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7584	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.45% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

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

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: THJ, CL, PGE, EDO, HEC, PGO

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	0.61	1/3618 (0.0%)	0.70	0/4930
1	B	0.57	0/3598	0.67	0/4904
All	All	0.59	1/7216 (0.0%)	0.69	0/9834

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	502	GLU	C-N	6.48	1.49	1.33

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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	3524	0	3355	10	0
1	B	3504	0	3336	21	0
2	A	172	0	121	1	0
2	B	172	0	120	0	0
3	A	7	0	0	0	0
3	B	4	0	0	0	0
4	A	10	0	16	0	0
4	B	10	0	16	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	A	5	0	0	0	0
5	B	5	0	0	0	0
6	A	44	0	66	3	0
6	B	4	0	6	0	0
7	A	10	0	14	0	0
8	A	69	0	0	1	0
8	B	44	0	0	2	0
All	All	7584	0	7050	33	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 (33) 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:247:PRO:O	1:B:296:ARG:NH2	2.19	0.76
1:A:462:GLU:O	1:A:466:VAL:HG23	2.08	0.53
1:A:319:ARG:NH2	8:A:1101:HOH:O	2.43	0.51
1:B:462:GLU:O	1:B:466:VAL:HG23	2.11	0.50
1:B:296:ARG:NH1	8:B:1101:HOH:O	2.39	0.49
1:B:13:ASP:OD1	1:B:16:ARG:HG3	2.13	0.48
1:B:450:MET:HA	1:B:451:PRO:C	2.40	0.47
1:A:249:ARG:HG2	6:A:1021:EDO:H22	1.97	0.47
1:A:450:MET:HA	1:A:451:PRO:C	2.40	0.46
1:B:428:ARG:NH1	4:B:1010:PGO:H11	2.31	0.46
1:B:430:TYR:O	1:B:475:ARG:HD3	2.16	0.46
1:A:113:TRP:N	1:A:114:PRO:CD	2.79	0.46
1:B:17:GLY:O	1:B:71:ARG:HD3	2.16	0.45
1:B:13:ASP:CG	1:B:16:ARG:HG3	2.40	0.45
1:B:475:ARG:HB2	1:B:476:PRO:CD	2.47	0.45
1:A:249:ARG:NE	6:A:1021:EDO:H21	2.32	0.44
1:A:430:TYR:O	1:A:475:ARG:HD3	2.18	0.44
1:B:278:ALA:N	1:B:279:PRO:CD	2.81	0.44
2:A:1003:HEC:HMB3	2:A:1003:HEC:HBB3	1.99	0.44
1:B:317:ASN:OD1	1:B:317:ASN:N	2.50	0.44
1:B:6:ARG:HG3	1:B:83:TYR:CE1	2.53	0.43
1:B:346:PRO:HB2	1:B:353:LEU:HD23	2.01	0.43
6:A:1017:EDO:H11	8:B:1131:HOH:O	2.18	0.43
1:A:278:ALA:N	1:A:279:PRO:CD	2.82	0.42
1:B:482:ASP:OD1	1:B:482:ASP:C	2.62	0.42
1:B:33:GLU:OE2	1:B:144:TYR:N	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:71:ARG:HG2	1:A:71:ARG:HH11	1.86	0.41
1:A:317:ASN:OD1	1:A:317:ASN:N	2.53	0.41
1:B:185:TYR:CZ	1:B:189:ARG:HD2	2.56	0.41
1:B:56:ARG:NH1	1:B:72:LEU:O	2.53	0.40
1:B:146:TYR:CE1	1:B:150:GLN:NE2	2.89	0.40
1:B:246:PRO:HG3	1:B:304:TRP:CD1	2.55	0.40
1:B:113:TRP:N	1:B:114:PRO:CD	2.85	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	467/526 (89%)	456 (98%)	11 (2%)	0	100	100
1	B	465/526 (88%)	454 (98%)	11 (2%)	0	100	100
All	All	932/1052 (89%)	910 (98%)	22 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	337/378 (89%)	333 (99%)	4 (1%)	63	78

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	335/378 (89%)	333 (99%)	2 (1%)	78	88
All	All	672/756 (89%)	666 (99%)	6 (1%)	70	82

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	248	SER
1	A	266	ARG
1	A	348	THR
1	A	482	ASP
1	B	348	THR
1	B	513	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	152	GLN
1	B	285	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 38 ligands modelled in this entry, 11 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
6	EDO	A	1022	-	3,3,3	0.62	0	2,2,2	0.39	0
2	HEC	A	1002	1	46,50,50	2.60	24 (52%)	58,82,82	2.38	24 (41%)
2	HEC	A	1003	1	46,50,50	2.61	23 (50%)	58,82,82	2.63	23 (39%)
6	EDO	A	1015	-	3,3,3	0.83	0	2,2,2	0.30	0
2	HEC	A	1001	1	46,50,50	2.58	23 (50%)	58,82,82	2.64	26 (44%)
6	EDO	A	1020	-	3,3,3	0.48	0	2,2,2	0.33	0
2	HEC	A	1004	1	46,50,50	2.64	24 (52%)	58,82,82	2.41	26 (44%)
2	HEC	B	1001	1	46,50,50	2.69	24 (52%)	58,82,82	2.61	25 (43%)
6	EDO	A	1024	-	3,3,3	0.69	0	2,2,2	0.13	0
6	EDO	A	1025	-	3,3,3	1.06	0	2,2,2	0.82	0
7	PGE	A	1026	-	9,9,9	0.71	0	8,8,8	0.92	0
6	EDO	A	1017	-	3,3,3	1.05	0	2,2,2	0.06	0
2	HEC	B	1004	1	46,50,50	2.69	23 (50%)	58,82,82	2.56	23 (39%)
6	EDO	A	1023	-	3,3,3	0.39	0	2,2,2	0.59	0
5	THJ	A	1008	1	3,4,4	1.40	0	2,6,6	0.62	0
4	PGO	A	1014	-	4,4,4	0.94	0	4,4,4	0.83	0
6	EDO	A	1018	-	3,3,3	0.85	0	2,2,2	0.50	0
6	EDO	A	1019	-	3,3,3	0.52	0	2,2,2	0.54	0
4	PGO	B	1010	-	4,4,4	0.92	0	4,4,4	1.32	1 (25%)
2	HEC	B	1003	1	46,50,50	2.66	24 (52%)	58,82,82	2.35	20 (34%)
6	EDO	A	1021	-	3,3,3	0.57	0	2,2,2	0.87	0
4	PGO	B	1011	-	4,4,4	0.96	0	4,4,4	0.92	0
6	EDO	A	1016	-	3,3,3	0.52	0	2,2,2	0.28	0
6	EDO	B	1012	-	3,3,3	0.55	0	2,2,2	0.58	0
4	PGO	A	1007	-	4,4,4	1.04	0	4,4,4	0.65	0
2	HEC	B	1002	1	46,50,50	2.70	23 (50%)	58,82,82	2.45	22 (37%)
5	THJ	B	1006	1	3,4,4	1.38	1 (33%)	2,6,6	0.89	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
6	EDO	A	1022	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	HEC	A	1002	1	-	6/14/54/54	-
2	HEC	A	1003	1	-	7/14/54/54	-
6	EDO	A	1015	-	-	1/1/1/1	-
2	HEC	A	1001	1	-	4/14/54/54	-
6	EDO	A	1020	-	-	0/1/1/1	-
2	HEC	A	1004	1	-	8/14/54/54	-
2	HEC	B	1001	1	-	5/14/54/54	-
6	EDO	A	1024	-	-	1/1/1/1	-
6	EDO	A	1025	-	-	1/1/1/1	-
7	PGE	A	1026	-	-	5/7/7/7	-
6	EDO	A	1017	-	-	0/1/1/1	-
2	HEC	B	1004	1	-	10/14/54/54	-
6	EDO	A	1023	-	-	1/1/1/1	-
4	PGO	A	1014	-	-	1/2/2/2	-
6	EDO	A	1018	-	-	0/1/1/1	-
6	EDO	A	1019	-	-	1/1/1/1	-
4	PGO	B	1010	-	-	2/2/2/2	-
2	HEC	B	1003	1	-	4/14/54/54	-
6	EDO	A	1021	-	-	1/1/1/1	-
4	PGO	B	1011	-	-	2/2/2/2	-
6	EDO	A	1016	-	-	1/1/1/1	-
6	EDO	B	1012	-	-	1/1/1/1	-
4	PGO	A	1007	-	-	2/2/2/2	-
2	HEC	B	1002	1	-	5/14/54/54	-

All (189) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1002	HEC	CHD-C4C	5.62	1.49	1.38
2	A	1003	HEC	CHB-C4A	5.45	1.49	1.38
2	B	1003	HEC	C2A-C3A	5.34	1.48	1.36
2	B	1001	HEC	CAC-C3C	5.32	1.52	1.35
2	B	1003	HEC	CAC-C3C	5.31	1.52	1.35
2	B	1001	HEC	C2A-C3A	5.30	1.48	1.36
2	A	1003	HEC	CAC-C3C	5.30	1.52	1.35
2	B	1003	HEC	CHA-C1A	5.22	1.48	1.38
2	A	1002	HEC	CAC-C3C	5.13	1.51	1.35
2	B	1002	HEC	CHA-C1A	5.10	1.48	1.38
2	B	1004	HEC	CHB-C4A	5.09	1.48	1.38
2	B	1004	HEC	CAB-C3B	5.09	1.51	1.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1004	HEC	CAC-C3C	4.98	1.51	1.35
2	B	1002	HEC	CAC-C3C	4.98	1.51	1.35
2	A	1004	HEC	CAB-C3B	4.94	1.51	1.35
2	A	1004	HEC	CHA-C1A	4.94	1.48	1.38
2	B	1002	HEC	CAB-C3B	4.92	1.51	1.35
2	B	1002	HEC	CHB-C4A	4.89	1.48	1.38
2	B	1001	HEC	CHC-C4B	4.89	1.48	1.38
2	B	1004	HEC	CAC-C3C	4.84	1.50	1.35
2	A	1002	HEC	CAB-C3B	4.83	1.50	1.35
2	B	1001	HEC	CHA-C1A	4.83	1.47	1.38
2	A	1001	HEC	CHA-C1A	4.79	1.47	1.38
2	A	1001	HEC	CAC-C3C	4.78	1.50	1.35
2	A	1002	HEC	C2A-C3A	4.75	1.47	1.36
2	B	1001	HEC	CHB-C4A	4.73	1.47	1.38
2	B	1004	HEC	CHD-C4C	4.72	1.47	1.38
2	A	1004	HEC	CHB-C4A	4.72	1.47	1.38
2	B	1002	HEC	C2A-C3A	4.71	1.46	1.36
2	A	1002	HEC	CHD-C4C	4.71	1.47	1.38
2	B	1002	HEC	CHC-C4B	4.69	1.47	1.38
2	A	1004	HEC	CHD-C4C	4.69	1.47	1.38
2	A	1001	HEC	CAB-C3B	4.61	1.49	1.35
2	A	1001	HEC	C2A-C3A	4.59	1.46	1.36
2	A	1003	HEC	CAB-C3B	4.57	1.49	1.35
2	B	1001	HEC	CHD-C4C	4.55	1.47	1.38
2	B	1001	HEC	CAB-C3B	4.53	1.49	1.35
2	B	1004	HEC	C2A-C3A	4.45	1.46	1.36
2	B	1003	HEC	CHD-C1D	4.45	1.49	1.39
2	A	1001	HEC	CHC-C4B	4.44	1.47	1.38
2	A	1003	HEC	CHD-C4C	4.40	1.47	1.38
2	B	1004	HEC	CHA-C1A	4.37	1.46	1.38
2	B	1003	HEC	CHC-C4B	4.28	1.46	1.38
2	B	1003	HEC	CAB-C3B	4.27	1.48	1.35
2	A	1001	HEC	CHD-C4C	4.24	1.46	1.38
2	A	1002	HEC	CHB-C4A	4.22	1.46	1.38
2	B	1004	HEC	CHC-C4B	4.20	1.46	1.38
2	A	1003	HEC	C2A-C3A	4.15	1.45	1.36
2	B	1002	HEC	CHD-C1D	4.13	1.48	1.39
2	A	1004	HEC	CHC-C4B	4.11	1.46	1.38
2	A	1004	HEC	C2A-C3A	4.07	1.45	1.36
2	B	1004	HEC	CHD-C1D	4.07	1.48	1.39
2	B	1001	HEC	CHC-C1C	4.06	1.48	1.39
2	A	1001	HEC	CHB-C4A	4.05	1.46	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1003	HEC	CHD-C4C	4.01	1.46	1.38
2	A	1001	HEC	CHA-C4D	3.92	1.48	1.39
2	B	1004	HEC	CHB-C1B	3.89	1.48	1.39
2	A	1001	HEC	CHC-C1C	3.87	1.48	1.39
2	A	1004	HEC	CHD-C1D	3.85	1.48	1.39
2	B	1001	HEC	CHA-C4D	3.81	1.48	1.39
2	A	1002	HEC	CHC-C4B	3.80	1.45	1.38
2	B	1001	HEC	CHD-C1D	3.78	1.47	1.39
2	B	1003	HEC	C1C-NC	-3.78	1.32	1.39
2	A	1003	HEC	CHA-C1A	3.73	1.45	1.38
2	B	1004	HEC	CHC-C1C	3.70	1.47	1.39
2	B	1004	HEC	C1C-NC	-3.69	1.32	1.39
2	A	1002	HEC	C1D-ND	-3.66	1.32	1.39
2	B	1003	HEC	CHB-C4A	3.66	1.45	1.38
2	A	1003	HEC	C1D-ND	-3.61	1.32	1.39
2	A	1004	HEC	C1C-NC	-3.55	1.32	1.39
2	A	1003	HEC	C4B-NB	-3.52	1.33	1.39
2	B	1002	HEC	CHB-C1B	3.52	1.47	1.39
2	B	1003	HEC	CHC-C1C	3.49	1.47	1.39
2	B	1001	HEC	CHB-C1B	3.47	1.47	1.39
2	A	1003	HEC	CHC-C4B	3.46	1.45	1.38
2	A	1002	HEC	C1A-NA	-3.45	1.33	1.39
2	A	1004	HEC	C1B-NB	-3.45	1.33	1.39
2	A	1003	HEC	CHB-C1B	3.44	1.47	1.39
2	B	1002	HEC	C3D-C2D	3.42	1.47	1.38
2	A	1003	HEC	C3D-C2D	3.42	1.47	1.38
2	A	1002	HEC	C1C-NC	-3.42	1.33	1.39
2	A	1003	HEC	C4C-NC	-3.42	1.33	1.39
2	A	1003	HEC	CHC-C1C	3.38	1.47	1.39
2	A	1003	HEC	C1A-NA	-3.37	1.33	1.39
2	B	1003	HEC	C3D-C2D	3.35	1.47	1.38
2	B	1002	HEC	CHC-C1C	3.34	1.46	1.39
2	A	1002	HEC	CHA-C4D	3.33	1.46	1.39
2	B	1003	HEC	CHA-C4D	3.31	1.46	1.39
2	B	1002	HEC	CHA-C4D	3.27	1.46	1.39
2	B	1003	HEC	C1D-ND	-3.26	1.33	1.39
2	A	1002	HEC	CHA-C1A	3.20	1.44	1.38
2	B	1004	HEC	C1D-C2D	3.20	1.50	1.43
2	B	1001	HEC	C3D-C2D	3.20	1.47	1.38
2	A	1003	HEC	CHD-C1D	3.20	1.46	1.39
2	A	1002	HEC	CHD-C1D	3.19	1.46	1.39
2	A	1004	HEC	C4B-NB	-3.16	1.33	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1002	HEC	CHC-C1C	3.14	1.46	1.39
2	A	1001	HEC	CHD-C1D	3.11	1.46	1.39
2	A	1002	HEC	CHB-C1B	3.11	1.46	1.39
2	A	1004	HEC	CHB-C1B	3.11	1.46	1.39
2	B	1004	HEC	C1D-ND	-3.08	1.33	1.39
2	A	1004	HEC	C4A-NA	-3.06	1.33	1.39
2	A	1002	HEC	C4C-NC	-3.06	1.33	1.39
2	B	1004	HEC	C4D-ND	-3.05	1.33	1.39
2	B	1003	HEC	C4B-NB	-3.04	1.33	1.39
2	A	1001	HEC	CHB-C1B	3.04	1.46	1.39
2	B	1001	HEC	C4D-ND	-3.04	1.33	1.39
2	A	1004	HEC	CHC-C1C	3.03	1.46	1.39
2	A	1002	HEC	C1B-NB	-3.02	1.33	1.39
2	A	1001	HEC	C4C-NC	-2.99	1.34	1.39
2	B	1004	HEC	CHA-C4D	2.98	1.46	1.39
2	A	1004	HEC	C4C-NC	-2.97	1.34	1.39
2	A	1002	HEC	C4B-NB	-2.97	1.34	1.39
2	A	1001	HEC	C1D-ND	-2.96	1.34	1.39
2	A	1002	HEC	C4D-ND	-2.96	1.34	1.39
2	A	1001	HEC	C1B-NB	-2.95	1.34	1.39
2	A	1001	HEC	C4A-NA	-2.92	1.34	1.39
2	B	1003	HEC	C1B-NB	-2.88	1.34	1.39
2	A	1003	HEC	C4D-ND	-2.88	1.34	1.39
2	A	1002	HEC	C4A-NA	-2.87	1.34	1.39
2	B	1004	HEC	C4C-NC	-2.85	1.34	1.39
2	A	1001	HEC	C4D-ND	-2.85	1.34	1.39
2	B	1002	HEC	C1C-NC	-2.80	1.34	1.39
2	A	1001	HEC	C1C-NC	-2.80	1.34	1.39
2	B	1003	HEC	CBD-CGD	2.76	1.57	1.50
2	B	1002	HEC	C4D-ND	-2.75	1.34	1.39
2	B	1004	HEC	C4B-NB	-2.72	1.34	1.39
2	B	1003	HEC	CHB-C1B	2.68	1.45	1.39
2	A	1004	HEC	C1D-ND	-2.68	1.34	1.39
2	B	1004	HEC	C1A-NA	-2.68	1.34	1.39
2	B	1004	HEC	C1B-C2B	2.66	1.49	1.43
2	A	1001	HEC	C3D-C2D	2.66	1.45	1.38
2	A	1004	HEC	C1A-NA	-2.65	1.34	1.39
2	A	1003	HEC	C1C-NC	-2.62	1.34	1.39
2	A	1004	HEC	C3D-C2D	2.61	1.45	1.38
2	B	1002	HEC	C4B-NB	-2.61	1.34	1.39
2	B	1001	HEC	C1D-ND	-2.60	1.34	1.39
2	A	1004	HEC	C1D-C2D	2.59	1.49	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1004	HEC	C3D-C2D	2.56	1.45	1.38
2	B	1002	HEC	C4A-NA	-2.55	1.34	1.39
2	B	1004	HEC	C1B-NB	-2.54	1.34	1.39
2	A	1004	HEC	C4D-ND	-2.54	1.34	1.39
2	B	1002	HEC	C1A-NA	-2.54	1.34	1.39
2	A	1001	HEC	C1A-C2A	2.53	1.49	1.45
2	A	1002	HEC	C1B-C2B	2.52	1.49	1.43
2	A	1003	HEC	C4A-NA	-2.52	1.34	1.39
2	B	1001	HEC	C1A-NA	-2.52	1.34	1.39
2	B	1002	HEC	C1B-C2B	2.51	1.49	1.43
2	B	1001	HEC	C1C-C2C	2.47	1.48	1.43
2	A	1001	HEC	C4B-NB	-2.47	1.35	1.39
2	B	1001	HEC	C4B-NB	-2.47	1.35	1.39
2	B	1001	HEC	C1B-NB	-2.46	1.35	1.39
2	A	1004	HEC	CHA-C4D	2.45	1.44	1.39
2	B	1003	HEC	C4C-NC	-2.45	1.35	1.39
2	A	1002	HEC	C4D-C3D	2.41	1.49	1.44
2	B	1003	HEC	C4D-C3D	2.40	1.49	1.44
2	B	1001	HEC	C1C-NC	-2.39	1.35	1.39
2	A	1003	HEC	C4D-C3D	2.38	1.49	1.44
2	B	1004	HEC	C4A-NA	-2.35	1.35	1.39
2	B	1002	HEC	C1D-ND	-2.34	1.35	1.39
2	A	1004	HEC	C1A-C2A	2.34	1.49	1.45
2	B	1003	HEC	C4D-ND	-2.33	1.35	1.39
2	A	1003	HEC	C1C-C2C	2.32	1.48	1.43
2	B	1002	HEC	C1D-C2D	2.31	1.48	1.43
2	A	1002	HEC	C3D-C2D	2.30	1.44	1.38
2	A	1001	HEC	C4D-C3D	2.27	1.49	1.44
2	A	1004	HEC	C1B-C2B	2.27	1.48	1.43
2	B	1001	HEC	C1A-C2A	2.25	1.49	1.45
2	B	1002	HEC	C1B-NB	-2.24	1.35	1.39
2	B	1001	HEC	C4A-NA	-2.23	1.35	1.39
2	B	1003	HEC	C1C-C2C	2.21	1.48	1.43
2	B	1004	HEC	C4D-C3D	2.21	1.49	1.44
2	A	1001	HEC	C1A-NA	-2.20	1.35	1.39
2	B	1003	HEC	C1A-C2A	2.20	1.49	1.45
2	B	1003	HEC	C1D-C2D	2.18	1.48	1.43
2	A	1003	HEC	C1B-NB	-2.16	1.35	1.39
5	B	1006	THJ	O2-S1	2.16	1.52	1.45
2	B	1001	HEC	C1B-C2B	2.14	1.48	1.43
2	A	1002	HEC	C1C-C2C	2.12	1.48	1.43
2	A	1003	HEC	CHA-C4D	2.12	1.44	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1004	HEC	O2D-CGD	-2.09	1.23	1.30
2	A	1001	HEC	C1C-C2C	2.09	1.48	1.43
2	A	1002	HEC	C1D-C2D	2.09	1.48	1.43
2	B	1002	HEC	C4A-C3A	2.05	1.49	1.45
2	B	1002	HEC	C1A-C2A	2.04	1.48	1.45
2	B	1001	HEC	C3C-C2C	2.04	1.48	1.41
2	B	1003	HEC	C4A-NA	-2.04	1.35	1.39
2	B	1001	HEC	C4D-C3D	2.01	1.48	1.44
2	A	1003	HEC	C1D-C2D	2.01	1.47	1.43

All (190) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	HEC	CBB-CAB-C3B	-11.14	105.17	127.43
2	A	1004	HEC	CBB-CAB-C3B	-10.25	106.94	127.43
2	B	1004	HEC	CBB-CAB-C3B	-10.24	106.97	127.43
2	A	1003	HEC	CBB-CAB-C3B	-9.94	107.56	127.43
2	B	1002	HEC	CBB-CAB-C3B	-9.76	107.92	127.43
2	A	1001	HEC	CBB-CAB-C3B	-9.65	108.14	127.43
2	B	1003	HEC	CBB-CAB-C3B	-8.89	109.67	127.43
2	A	1002	HEC	CBB-CAB-C3B	-8.77	109.91	127.43
2	B	1001	HEC	CBC-CAC-C3C	-8.39	110.67	127.43
2	A	1001	HEC	CBC-CAC-C3C	-8.01	111.43	127.43
2	A	1003	HEC	CBC-CAC-C3C	-7.85	111.75	127.43
2	B	1002	HEC	CBC-CAC-C3C	-6.73	113.98	127.43
2	B	1004	HEC	CBC-CAC-C3C	-5.99	115.46	127.43
2	B	1003	HEC	CBC-CAC-C3C	-5.25	116.94	127.43
2	B	1004	HEC	CMD-C2D-C1D	5.00	133.03	125.42
2	A	1004	HEC	CBC-CAC-C3C	-4.97	117.51	127.43
2	A	1003	HEC	C3D-C4D-ND	4.46	115.10	110.15
2	A	1002	HEC	CBC-CAC-C3C	-4.40	118.64	127.43
2	A	1003	HEC	CHA-C1A-C2A	-4.29	118.09	124.86
2	A	1003	HEC	C4D-C3D-C2D	-4.24	100.31	106.87
2	B	1004	HEC	CAD-C3D-C4D	4.20	133.13	124.94
2	B	1003	HEC	C3D-C4D-ND	4.10	114.70	110.15
2	B	1003	HEC	C4D-C3D-C2D	-4.06	100.58	106.87
2	B	1004	HEC	C3D-C4D-ND	4.03	114.62	110.15
2	A	1001	HEC	CHD-C4C-C3C	-4.01	118.45	125.21
2	A	1002	HEC	CHC-C4B-C3B	-3.82	118.77	125.21
2	B	1004	HEC	CHC-C4B-C3B	-3.80	118.80	125.21
2	A	1002	HEC	CHA-C1A-C2A	-3.76	118.92	124.86
2	A	1002	HEC	C2A-C1A-NA	3.74	113.93	110.32

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1003	HEC	CHA-C1A-NA	3.70	128.48	124.45
2	A	1004	HEC	CHC-C4B-C3B	-3.70	118.98	125.21
2	B	1002	HEC	CHA-C1A-C2A	-3.66	119.08	124.86
2	B	1001	HEC	CBA-CAA-C2A	-3.61	102.56	112.53
2	A	1001	HEC	C1A-C2A-C3A	-3.57	102.41	107.11
2	A	1003	HEC	CHC-C4B-C3B	-3.53	119.26	125.21
2	B	1002	HEC	CMA-C3A-C4A	3.48	130.86	124.73
2	B	1003	HEC	CHD-C4C-C3C	-3.46	119.37	125.21
2	A	1004	HEC	CHD-C4C-C3C	-3.44	119.40	125.21
2	B	1002	HEC	CHC-C4B-C3B	-3.44	119.42	125.21
2	B	1004	HEC	CHD-C4C-C3C	-3.43	119.43	125.21
2	A	1002	HEC	CHD-C4C-C3C	-3.33	119.60	125.21
2	A	1001	HEC	CHC-C4B-C3B	-3.27	119.69	125.21
2	B	1003	HEC	CHB-C1B-C2B	-3.27	117.93	127.43
2	A	1001	HEC	CBD-CAD-C3D	-3.26	103.51	112.53
2	A	1004	HEC	CMA-C3A-C4A	3.24	130.44	124.73
2	A	1001	HEC	CHA-C1A-C2A	-3.23	119.76	124.86
2	A	1003	HEC	C2A-C1A-NA	3.21	113.42	110.32
2	A	1003	HEC	C1A-C2A-C3A	-3.20	102.89	107.11
2	B	1004	HEC	CHA-C4D-C3D	-3.19	118.32	125.30
2	A	1002	HEC	C3D-C4D-ND	3.18	113.68	110.15
2	B	1003	HEC	CHA-C1A-NA	3.18	127.92	124.45
2	A	1001	HEC	CHD-C1D-C2D	-3.18	118.20	127.43
2	A	1002	HEC	C1A-C2A-C3A	-3.16	102.94	107.11
2	B	1002	HEC	CHA-C4D-C3D	-3.15	118.41	125.30
2	A	1001	HEC	CHB-C1B-C2B	-3.13	118.33	127.43
2	B	1003	HEC	CHB-C4A-C3A	-3.12	119.00	125.49
2	A	1001	HEC	CHD-C4C-NC	3.11	127.83	124.45
2	A	1002	HEC	C4D-C3D-C2D	-3.09	102.09	106.87
2	B	1004	HEC	C4D-C3D-C2D	-3.08	102.10	106.87
2	B	1002	HEC	C3D-C4D-ND	3.07	113.56	110.15
2	B	1001	HEC	CHD-C4C-C3C	-3.07	120.03	125.21
2	B	1002	HEC	C2A-C1A-NA	3.06	113.28	110.32
2	B	1003	HEC	CAD-C3D-C4D	3.05	130.89	124.94
2	A	1002	HEC	CHB-C4A-NA	3.04	127.77	124.45
2	A	1001	HEC	C2A-C1A-NA	3.03	113.25	110.32
2	A	1003	HEC	CHC-C4B-NB	3.03	127.75	124.45
2	B	1003	HEC	CHB-C4A-NA	3.01	127.73	124.45
2	A	1002	HEC	CMA-C3A-C4A	2.99	130.00	124.73
2	A	1002	HEC	CAD-C3D-C4D	2.99	130.78	124.94
2	A	1001	HEC	CHC-C4B-NB	2.99	127.71	124.45
2	A	1004	HEC	CHA-C4D-C3D	-2.99	118.76	125.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	HEC	CHC-C4B-C3B	-2.98	120.18	125.21
2	A	1001	HEC	CAD-C3D-C4D	2.96	130.72	124.94
2	A	1004	HEC	C3D-C4D-ND	2.96	113.44	110.15
2	B	1001	HEC	CHB-C1B-C2B	-2.94	118.89	127.43
2	B	1002	HEC	CHA-C1A-NA	2.92	127.64	124.45
2	A	1003	HEC	CHD-C4C-C3C	-2.91	120.31	125.21
2	B	1002	HEC	CHC-C4B-NB	2.89	127.60	124.45
2	B	1004	HEC	C1A-C2A-C3A	-2.89	103.31	107.11
2	A	1001	HEC	CMA-C3A-C4A	2.88	129.80	124.73
2	A	1003	HEC	CHB-C1B-C2B	-2.88	119.08	127.43
2	B	1004	HEC	O2D-CGD-CBD	2.87	123.07	114.00
2	B	1001	HEC	CHD-C1D-C2D	-2.86	119.12	127.43
2	A	1004	HEC	CAA-C2A-C1A	2.84	130.63	124.85
2	A	1004	HEC	CAD-C3D-C4D	2.84	130.49	124.94
2	B	1003	HEC	CHA-C1A-C2A	-2.83	120.40	124.86
2	B	1001	HEC	CHC-C4B-NB	2.82	127.53	124.45
2	A	1003	HEC	CHA-C4D-C3D	-2.82	119.12	125.30
2	B	1003	HEC	O2D-CGD-CBD	2.82	122.91	114.00
2	A	1001	HEC	CAA-C2A-C1A	2.81	130.56	124.85
2	A	1004	HEC	CHC-C4B-NB	2.79	127.49	124.45
2	B	1002	HEC	CHC-C1C-C2C	-2.79	119.34	127.43
2	A	1002	HEC	CHC-C1C-C2C	-2.77	119.39	127.43
2	B	1004	HEC	CHB-C4A-NA	2.76	127.46	124.45
2	B	1001	HEC	CHB-C4A-C3A	-2.76	119.75	125.49
2	B	1002	HEC	C1A-C2A-C3A	-2.74	103.50	107.11
2	A	1002	HEC	CHB-C4A-C3A	-2.74	119.79	125.49
2	A	1001	HEC	CHB-C1B-NB	2.72	128.80	123.86
2	A	1001	HEC	C1D-C2D-C3D	-2.69	103.74	106.82
2	B	1003	HEC	CHB-C1B-NB	2.68	128.72	123.86
2	B	1003	HEC	CHD-C1D-C2D	-2.68	119.65	127.43
2	A	1004	HEC	CHB-C4A-C3A	-2.68	119.91	125.49
2	A	1001	HEC	CHD-C1D-ND	2.67	128.70	123.86
2	B	1002	HEC	C1D-C2D-C3D	-2.66	103.77	106.82
2	B	1004	HEC	CAA-C2A-C1A	2.65	130.24	124.85
2	B	1001	HEC	CHD-C1D-ND	2.65	128.66	123.86
2	A	1002	HEC	CHD-C1D-C2D	-2.64	119.77	127.43
2	A	1003	HEC	CHB-C4A-NA	2.63	127.32	124.45
2	A	1001	HEC	CHC-C1C-C2C	-2.63	119.79	127.43
2	B	1001	HEC	C1A-C2A-C3A	-2.63	103.65	107.11
2	A	1004	HEC	CHB-C4A-NA	2.62	127.31	124.45
2	A	1004	HEC	CHC-C1C-C2C	-2.62	119.83	127.43
2	B	1002	HEC	CHB-C1B-C2B	-2.62	119.83	127.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1001	HEC	CHB-C4A-NA	2.62	127.30	124.45
2	B	1004	HEC	CHD-C4C-NC	2.60	127.29	124.45
2	A	1002	HEC	CAA-C2A-C1A	2.59	130.12	124.85
2	A	1002	HEC	CHC-C4B-NB	2.58	127.27	124.45
2	B	1004	HEC	C2A-C1A-NA	2.57	112.80	110.32
2	A	1002	HEC	CHA-C4D-C3D	-2.56	119.70	125.30
2	B	1004	HEC	CHC-C1C-C2C	-2.56	120.00	127.43
2	B	1002	HEC	CHD-C1D-C2D	-2.55	120.02	127.43
2	A	1001	HEC	CHB-C4A-C3A	-2.55	120.18	125.49
2	B	1001	HEC	CHC-C1C-C2C	-2.55	120.03	127.43
2	A	1004	HEC	CMD-C2D-C1D	2.54	129.28	125.42
2	A	1003	HEC	CHD-C1D-C2D	-2.53	120.09	127.43
2	A	1003	HEC	CHC-C1C-C2C	-2.52	120.11	127.43
2	B	1003	HEC	CHA-C4D-C3D	-2.52	119.79	125.30
2	A	1002	HEC	CHB-C1B-C2B	-2.49	120.19	127.43
2	B	1001	HEC	CHA-C4D-C3D	-2.46	119.90	125.30
2	A	1002	HEC	CHA-C1A-NA	2.46	127.13	124.45
2	B	1003	HEC	C4A-C3A-C2A	-2.45	103.33	106.97
2	A	1004	HEC	C4A-C3A-C2A	-2.45	103.34	106.97
2	A	1004	HEC	CHB-C1B-C2B	-2.43	120.37	127.43
2	B	1004	HEC	CMA-C3A-C4A	2.43	129.00	124.73
2	B	1001	HEC	C1D-C2D-C3D	-2.42	104.04	106.82
2	A	1004	HEC	C4D-C3D-C2D	-2.42	103.12	106.87
2	B	1001	HEC	C4A-C3A-C2A	-2.41	103.39	106.97
2	B	1002	HEC	CHB-C4A-C3A	-2.41	120.48	125.49
2	B	1004	HEC	CHA-C1A-C2A	-2.40	121.07	124.86
2	B	1002	HEC	C4A-C3A-C2A	-2.38	103.44	106.97
2	A	1001	HEC	CHB-C4A-NA	2.37	127.03	124.45
2	B	1004	HEC	CHB-C1B-C2B	-2.36	120.56	127.43
2	B	1004	HEC	CBA-CAA-C2A	-2.36	106.01	112.53
2	B	1001	HEC	C2A-C1A-NA	2.35	112.59	110.32
2	A	1002	HEC	O1D-CGD-CBD	-2.35	115.64	123.09
2	B	1002	HEC	C4D-C3D-C2D	-2.35	103.23	106.87
2	B	1003	HEC	CHC-C4B-C3B	-2.35	121.25	125.21
2	A	1001	HEC	O2A-CGA-CBA	2.34	121.41	114.00
2	B	1001	HEC	CHA-C1A-C2A	-2.34	121.17	124.86
2	A	1001	HEC	CHA-C1A-NA	2.32	126.98	124.45
2	B	1001	HEC	C4D-C3D-C2D	-2.32	103.27	106.87
2	A	1002	HEC	C4A-C3A-C2A	-2.32	103.53	106.97
2	A	1003	HEC	CMA-C3A-C4A	2.32	128.81	124.73
2	B	1003	HEC	CHD-C1D-ND	2.31	128.05	123.86
2	A	1001	HEC	CBA-CAA-C2A	-2.30	106.18	112.53

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	1002	HEC	CHD-C4C-C3C	-2.30	121.34	125.21
2	B	1001	HEC	CAA-C2A-C1A	2.29	129.51	124.85
2	B	1002	HEC	CHA-C4D-ND	2.29	128.01	123.86
2	A	1004	HEC	C2C-C1C-NC	2.29	113.81	110.14
2	B	1001	HEC	CBD-CAD-C3D	-2.27	106.26	112.53
2	A	1003	HEC	CHB-C1B-NB	2.25	127.94	123.86
2	A	1003	HEC	CAD-C3D-C4D	2.24	129.32	124.94
2	A	1004	HEC	CBD-CAD-C3D	-2.24	106.33	112.53
2	A	1004	HEC	CHA-C1A-C2A	-2.24	121.33	124.86
2	B	1004	HEC	CHB-C4A-C3A	-2.23	120.85	125.49
2	A	1004	HEC	CHD-C1D-C2D	-2.23	120.96	127.43
2	A	1004	HEC	CHA-C1A-NA	2.19	126.84	124.45
2	A	1004	HEC	CHD-C4C-NC	2.18	126.83	124.45
2	B	1001	HEC	CHB-C1B-NB	2.18	127.81	123.86
2	B	1003	HEC	CHC-C1C-C2C	-2.17	121.12	127.43
2	B	1003	HEC	C1A-C2A-C3A	-2.16	104.27	107.11
2	A	1004	HEC	C1A-C2A-C3A	-2.14	104.29	107.11
2	B	1002	HEC	C2C-C1C-NC	2.12	113.55	110.14
2	A	1004	HEC	CHA-C4D-ND	2.12	127.70	123.86
2	B	1001	HEC	C3D-C4D-ND	2.12	112.50	110.15
2	A	1002	HEC	O2D-CGD-CBD	2.12	120.69	114.00
2	B	1001	HEC	CMA-C3A-C4A	2.11	128.45	124.73
2	A	1001	HEC	CHC-C1C-NC	2.11	127.69	123.86
2	A	1003	HEC	CMD-C2D-C3D	2.11	130.09	125.62
2	A	1003	HEC	CHB-C4A-C3A	-2.09	121.13	125.49
2	A	1003	HEC	CHD-C4C-NC	2.07	126.71	124.45
2	B	1002	HEC	CHD-C1D-ND	2.07	127.61	123.86
2	A	1001	HEC	C4D-C3D-C2D	-2.06	103.68	106.87
2	A	1002	HEC	C2C-C1C-NC	2.06	113.44	110.14
4	B	1010	PGO	O2-C2-C3	2.05	118.30	109.45
2	B	1001	HEC	CHA-C4D-ND	2.04	127.56	123.86
2	B	1004	HEC	CHC-C4B-NB	2.03	126.66	124.45
2	A	1004	HEC	CHD-C1D-ND	2.01	127.51	123.86
2	B	1004	HEC	C1D-C2D-C3D	-2.01	104.51	106.82
2	A	1003	HEC	O2A-CGA-CBA	2.01	120.35	114.00

There are no chirality outliers.

All (70) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001	HEC	C2B-C3B-CAB-CBB
2	A	1001	HEC	C4B-C3B-CAB-CBB

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Mol	Chain	Res	Type	Atoms
2	A	1001	HEC	C2C-C3C-CAC-CBC
2	A	1001	HEC	C4C-C3C-CAC-CBC
2	A	1002	HEC	C2B-C3B-CAB-CBB
2	A	1002	HEC	C4B-C3B-CAB-CBB
2	A	1002	HEC	C2C-C3C-CAC-CBC
2	A	1002	HEC	C4C-C3C-CAC-CBC
2	A	1003	HEC	C2B-C3B-CAB-CBB
2	A	1003	HEC	C4B-C3B-CAB-CBB
2	A	1003	HEC	C2C-C3C-CAC-CBC
2	A	1003	HEC	C4C-C3C-CAC-CBC
2	A	1004	HEC	C2B-C3B-CAB-CBB
2	A	1004	HEC	C4B-C3B-CAB-CBB
2	A	1004	HEC	C2C-C3C-CAC-CBC
2	A	1004	HEC	C4C-C3C-CAC-CBC
2	B	1001	HEC	C2B-C3B-CAB-CBB
2	B	1001	HEC	C4B-C3B-CAB-CBB
2	B	1001	HEC	C2C-C3C-CAC-CBC
2	B	1001	HEC	C4C-C3C-CAC-CBC
2	B	1002	HEC	C2B-C3B-CAB-CBB
2	B	1002	HEC	C4B-C3B-CAB-CBB
2	B	1002	HEC	C2C-C3C-CAC-CBC
2	B	1002	HEC	C4C-C3C-CAC-CBC
2	B	1003	HEC	C2B-C3B-CAB-CBB
2	B	1003	HEC	C4B-C3B-CAB-CBB
2	B	1003	HEC	C2C-C3C-CAC-CBC
2	B	1003	HEC	C4C-C3C-CAC-CBC
2	B	1004	HEC	C2B-C3B-CAB-CBB
2	B	1004	HEC	C4B-C3B-CAB-CBB
2	B	1004	HEC	C2C-C3C-CAC-CBC
2	B	1004	HEC	C4C-C3C-CAC-CBC
4	A	1007	PGO	O1-C1-C2-C3
4	A	1007	PGO	O1-C1-C2-O2
4	B	1010	PGO	O1-C1-C2-O2
4	B	1011	PGO	O1-C1-C2-O2
2	B	1004	HEC	C2A-CAA-CBA-CGA
7	A	1026	PGE	O2-C3-C4-O3
2	A	1004	HEC	C2A-CAA-CBA-CGA
2	B	1004	HEC	C3A-C2A-CAA-CBA
6	A	1016	EDO	O1-C1-C2-O2
6	A	1021	EDO	O1-C1-C2-O2
6	B	1012	EDO	O1-C1-C2-O2
2	A	1004	HEC	C3D-CAD-CBD-CGD

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Mol	Chain	Res	Type	Atoms
2	B	1004	HEC	C1A-C2A-CAA-CBA
7	A	1026	PGE	O1-C1-C2-O2
6	A	1019	EDO	O1-C1-C2-O2
2	A	1004	HEC	C1A-C2A-CAA-CBA
6	A	1023	EDO	O1-C1-C2-O2
4	B	1010	PGO	O1-C1-C2-C3
4	B	1011	PGO	O1-C1-C2-C3
7	A	1026	PGE	C6-C5-O3-C4
7	A	1026	PGE	C3-C4-O3-C5
2	A	1004	HEC	C3A-C2A-CAA-CBA
7	A	1026	PGE	O3-C5-C6-O4
4	A	1014	PGO	O1-C1-C2-O2
2	B	1004	HEC	C3D-CAD-CBD-CGD
6	A	1022	EDO	O1-C1-C2-O2
6	A	1025	EDO	O1-C1-C2-O2
2	B	1004	HEC	CAD-CBD-CGD-O2D
2	A	1003	HEC	CAD-CBD-CGD-O2D
2	B	1004	HEC	CAD-CBD-CGD-O1D
2	A	1003	HEC	CAD-CBD-CGD-O1D
6	A	1015	EDO	O1-C1-C2-O2
6	A	1024	EDO	O1-C1-C2-O2
2	A	1002	HEC	CAD-CBD-CGD-O1D
2	A	1002	HEC	CAD-CBD-CGD-O2D
2	A	1003	HEC	C2D-C3D-CAD-CBD
2	B	1001	HEC	CAD-CBD-CGD-O2D
2	B	1002	HEC	CAD-CBD-CGD-O2D

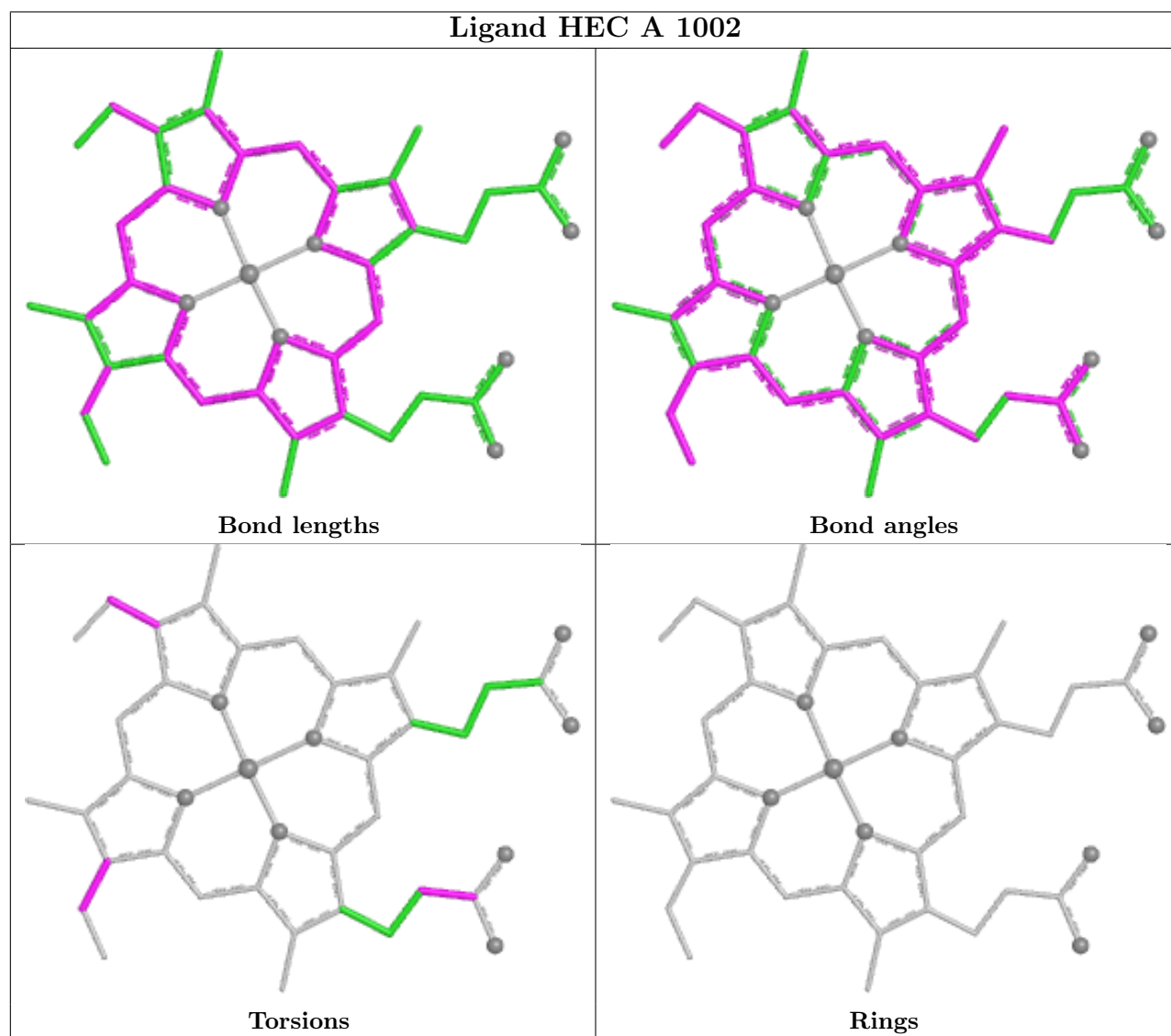
There are no ring outliers.

4 monomers are involved in 5 short contacts:

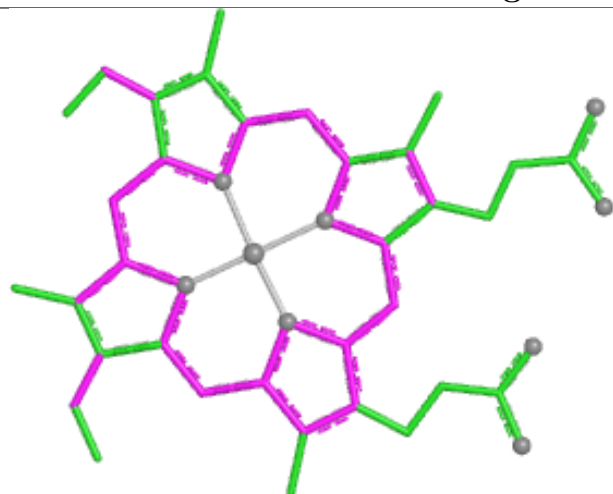
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1003	HEC	1	0
6	A	1017	EDO	1	0
4	B	1010	PGO	1	0
6	A	1021	EDO	2	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be

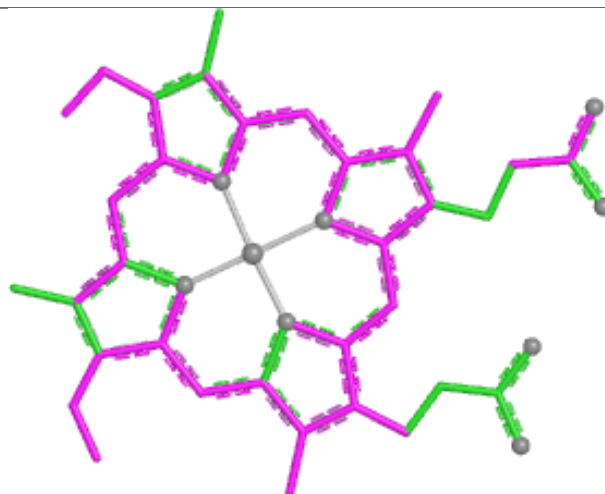
highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified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



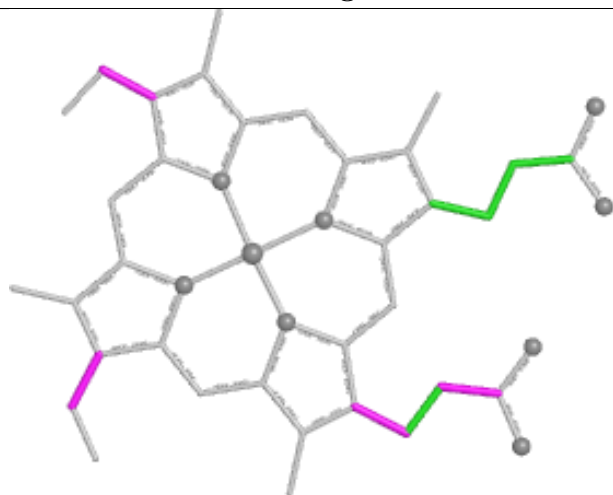
Ligand HEC A 1003



Bond lengths



Bond angles

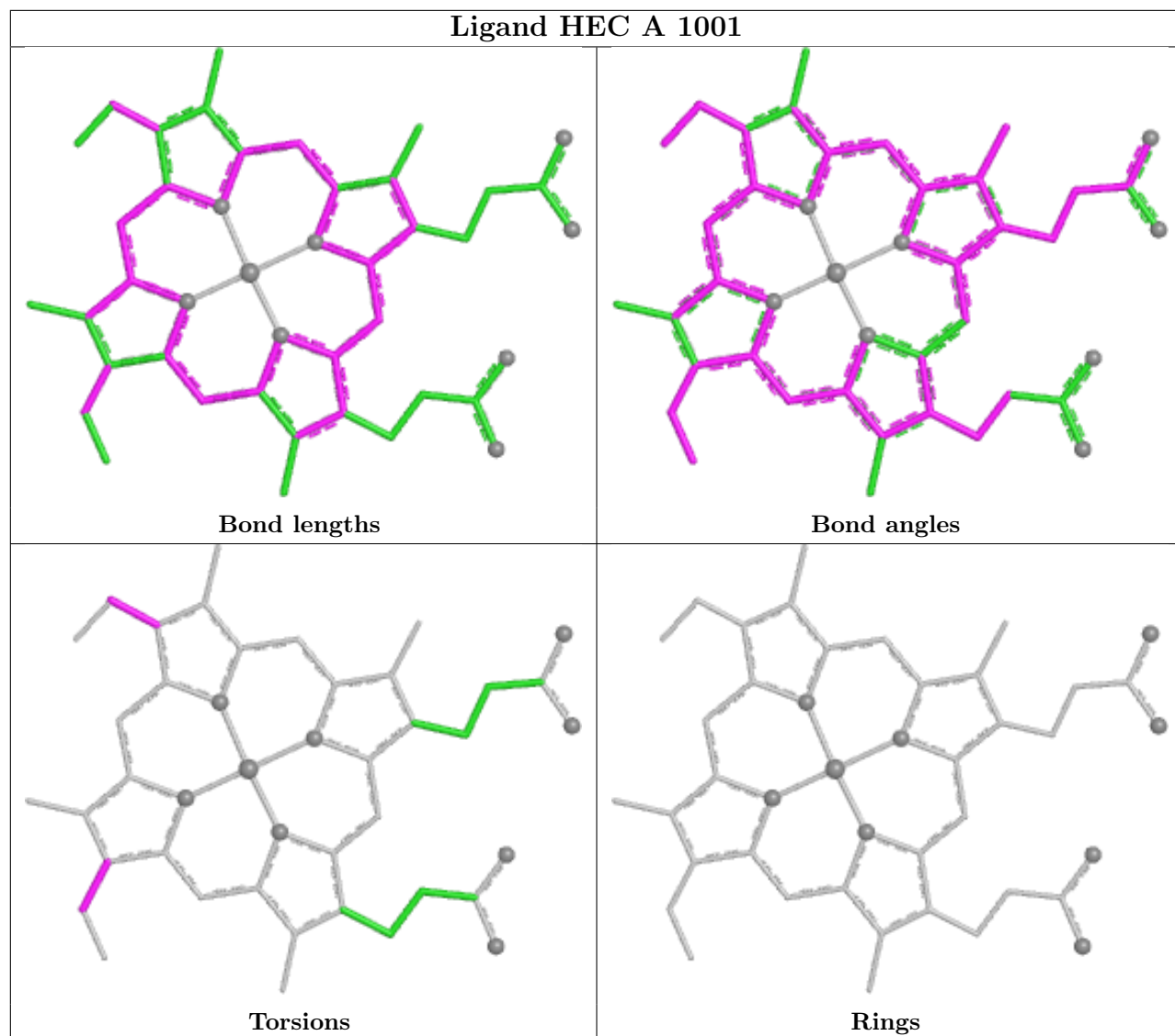


Torsions

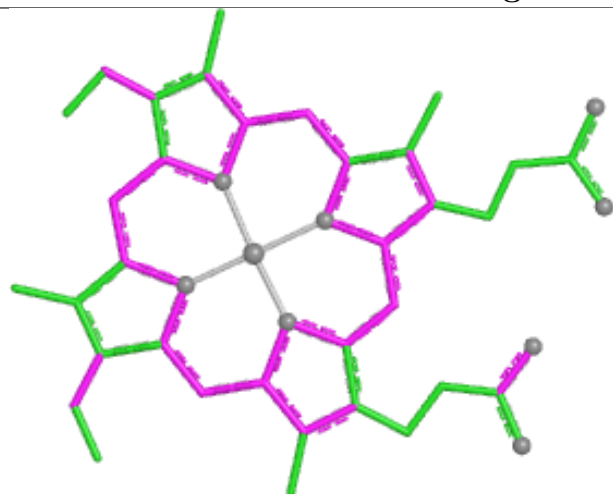


Rings

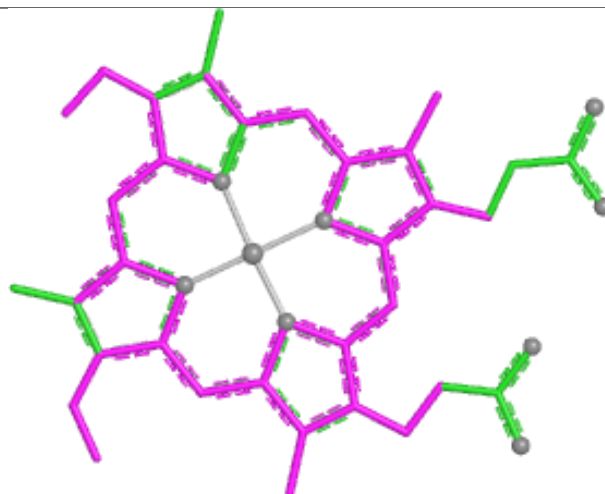
Ligand HEC A 1001



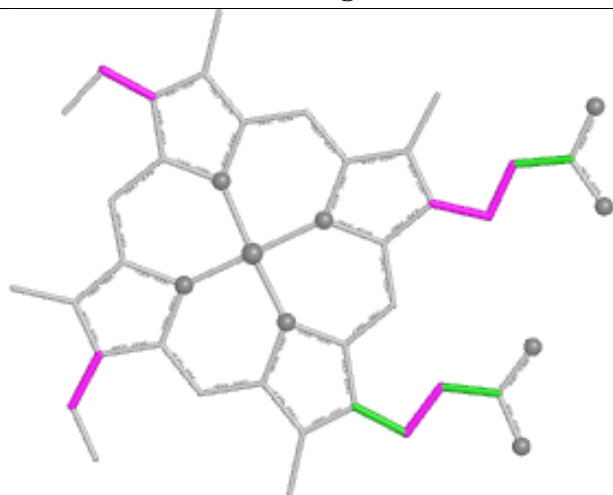
Ligand HEC A 1004



Bond lengths



Bond angles

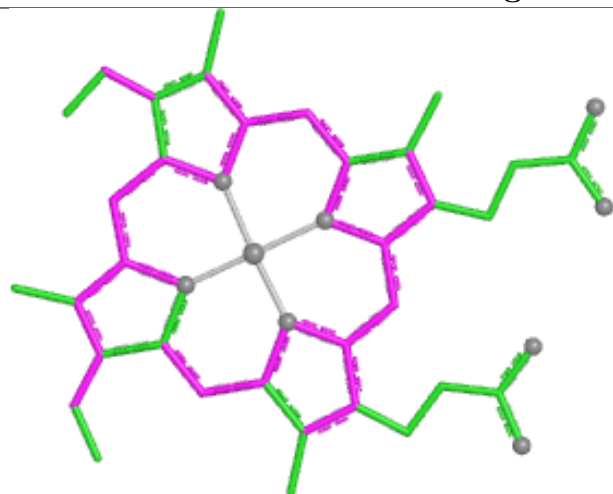


Torsions

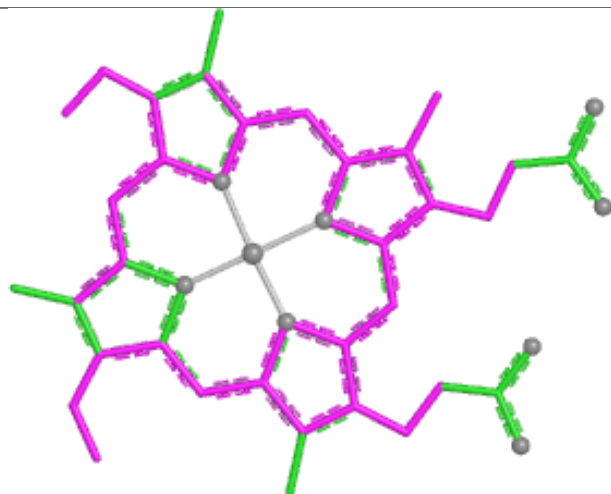


Rings

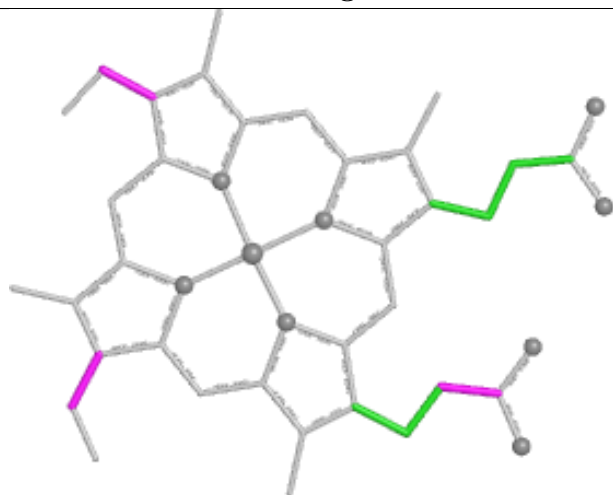
Ligand HEC B 1001



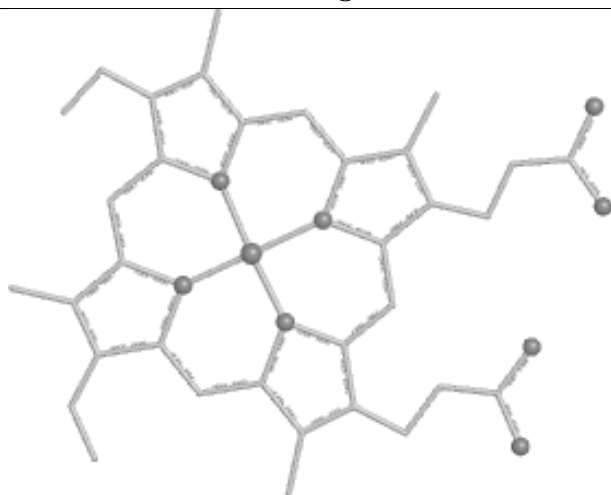
Bond lengths



Bond angles

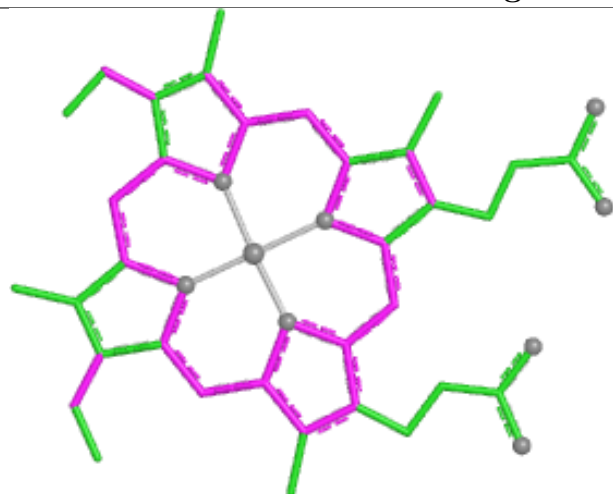


Torsions

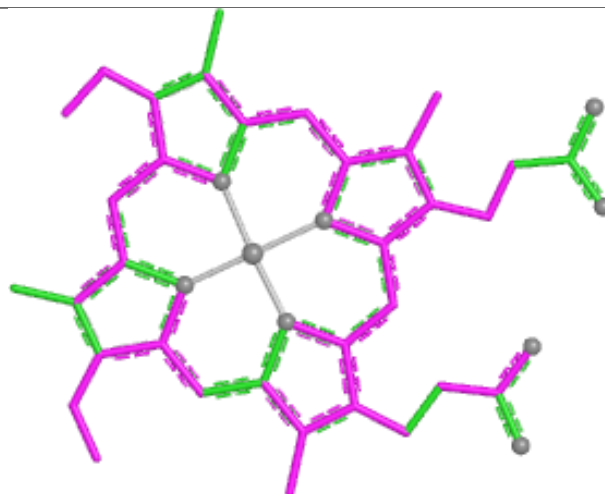


Rings

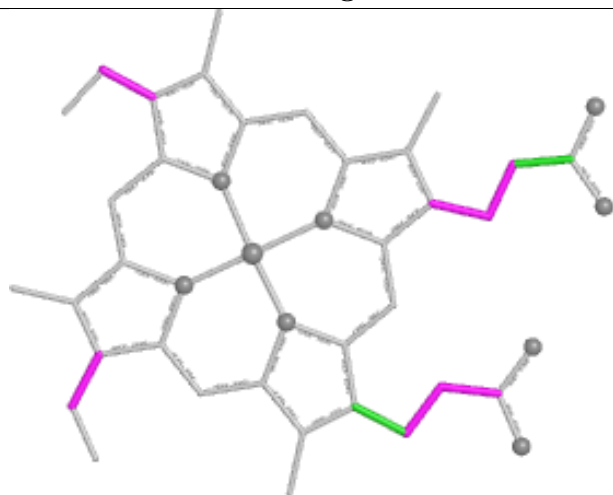
Ligand HEC B 1004



Bond lengths



Bond angles

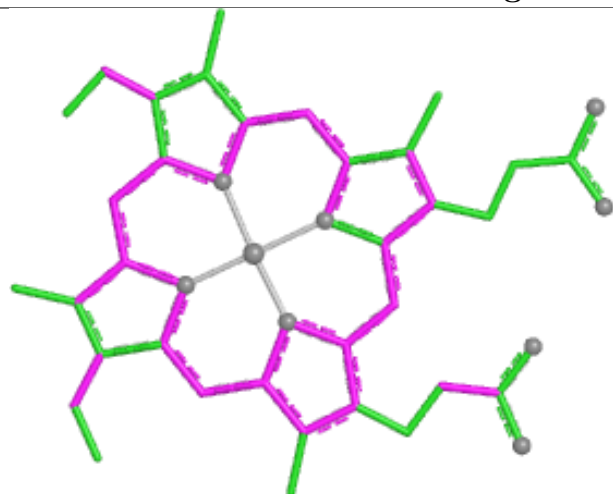


Torsions

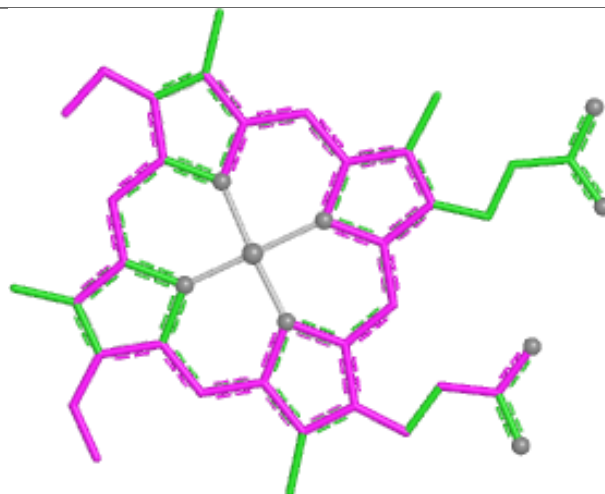


Rings

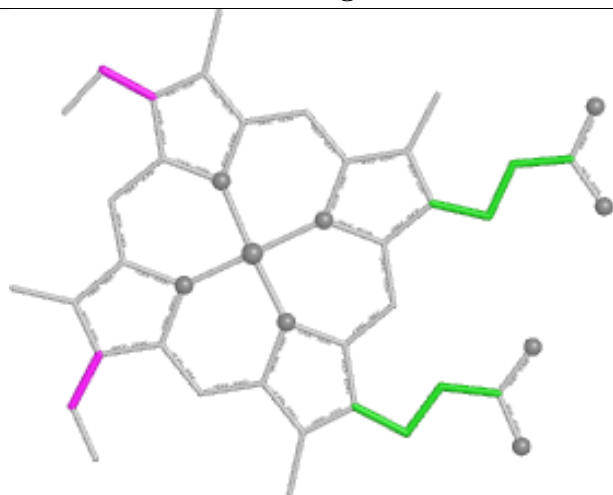
Ligand HEC B 1003



Bond lengths



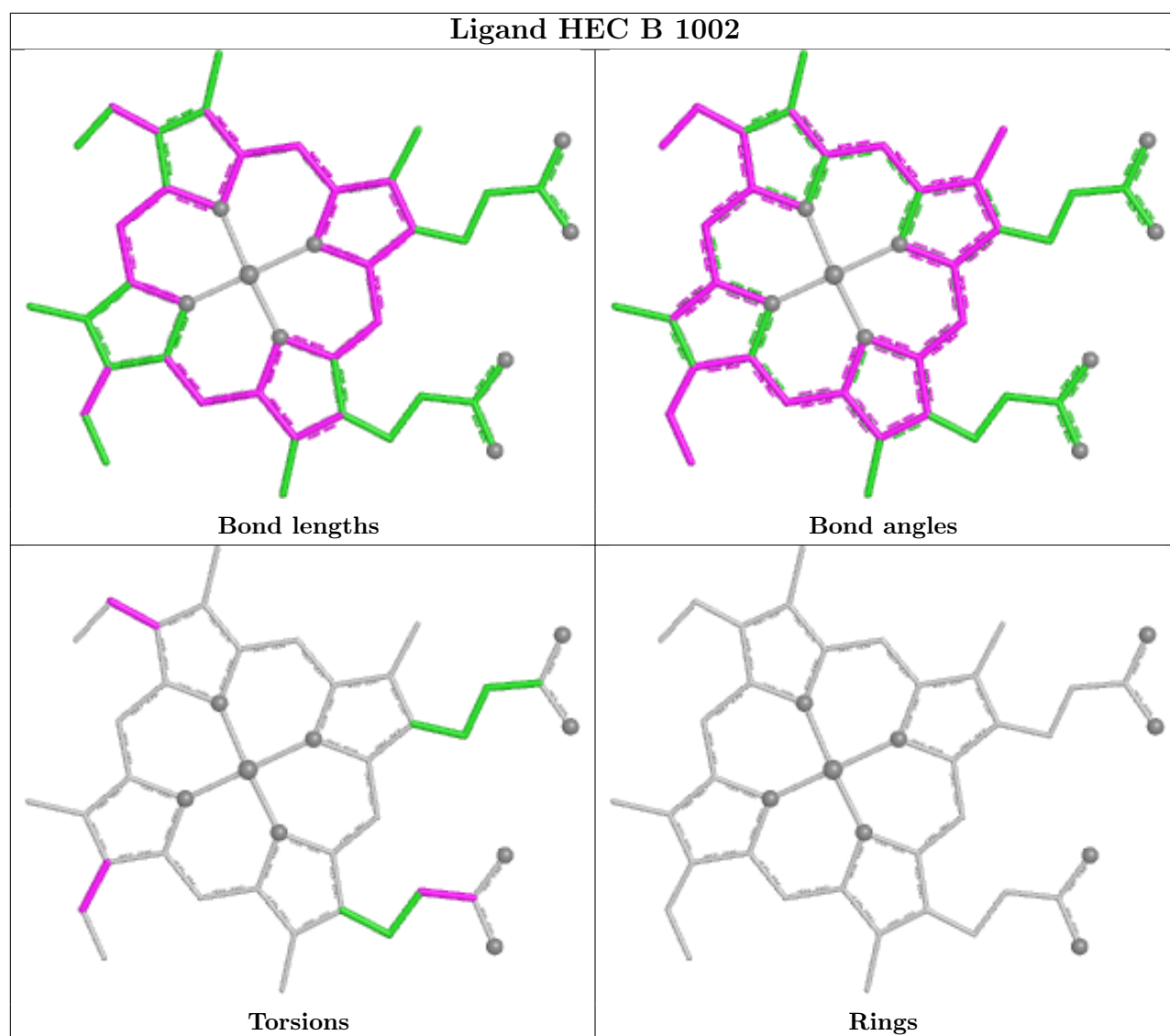
Bond angles



Torsions



Rings



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	471/526 (89%)	-0.43	7 (1%) 72 71	33, 44, 74, 97	0
1	B	469/526 (89%)	-0.20	9 (1%) 66 64	35, 53, 84, 104	0
All	All	940/1052 (89%)	-0.31	16 (1%) 69 67	33, 48, 80, 104	0

All (16) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1	PRO	7.5
1	B	192	ALA	6.5
1	A	1	PRO	6.1
1	A	192	ALA	5.7
1	B	241	ALA	5.3
1	B	240	ALA	4.7
1	B	516	ALA	4.0
1	A	315	GLY	3.3
1	B	2	PHE	3.0
1	B	7	THR	2.9
1	A	2	PHE	2.6
1	B	393	ARG	2.4
1	B	455	THR	2.4
1	A	240	ALA	2.3
1	A	241	ALA	2.3
1	A	386	ALA	2.2

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($\text{\AA}^2$)	Q<0.9
4	PGO	B	1011	5/5	0.80	0.27	61,67,68,72	0
6	EDO	A	1019	4/4	0.80	0.22	70,74,84,89	0
6	EDO	A	1025	4/4	0.82	0.26	52,64,65,65	0
4	PGO	A	1007	5/5	0.83	0.21	54,60,70,74	0
3	CL	B	1007	1/1	0.84	0.29	92,92,92,92	0
6	EDO	A	1023	4/4	0.84	0.22	61,66,66,73	0
6	EDO	A	1018	4/4	0.84	0.18	49,53,58,61	0
4	PGO	A	1014	5/5	0.85	0.21	65,75,86,86	5
6	EDO	A	1017	4/4	0.86	0.24	48,55,64,68	0
6	EDO	A	1020	4/4	0.86	0.22	57,64,68,71	0
6	EDO	A	1022	4/4	0.87	0.20	51,58,64,66	0
7	PGE	A	1026	10/10	0.87	0.22	61,68,80,81	0
6	EDO	A	1024	4/4	0.89	0.27	70,78,78,79	0
4	PGO	B	1010	5/5	0.91	0.16	57,59,65,65	0
5	THJ	A	1008	5/5	0.91	0.18	58,62,68,106	5
6	EDO	A	1015	4/4	0.91	0.16	49,53,54,65	0
3	CL	A	1013	1/1	0.92	0.19	99,99,99,99	0
3	CL	A	1012	1/1	0.92	0.25	93,93,93,93	0
6	EDO	A	1016	4/4	0.92	0.15	55,55,63,71	0
6	EDO	A	1021	4/4	0.93	0.13	32,44,51,56	0
6	EDO	B	1012	4/4	0.93	0.17	54,58,65,68	0
5	THJ	B	1006	5/5	0.93	0.16	52,55,64,112	5
3	CL	B	1009	1/1	0.94	0.19	93,93,93,93	0
3	CL	A	1009	1/1	0.94	0.17	91,91,91,91	0
3	CL	A	1011	1/1	0.96	0.16	85,85,85,85	0
3	CL	A	1006	1/1	0.96	0.37	92,92,92,92	1
3	CL	A	1005	1/1	0.97	0.18	63,63,63,63	0
3	CL	A	1010	1/1	0.97	0.27	83,83,83,83	0
3	CL	B	1005	1/1	0.97	0.16	74,74,74,74	0
2	HEC	A	1003	43/43	0.97	0.08	28,36,69,93	0
3	CL	B	1008	1/1	0.97	0.20	96,96,96,96	0
2	HEC	A	1001	43/43	0.98	0.06	35,43,49,56	0

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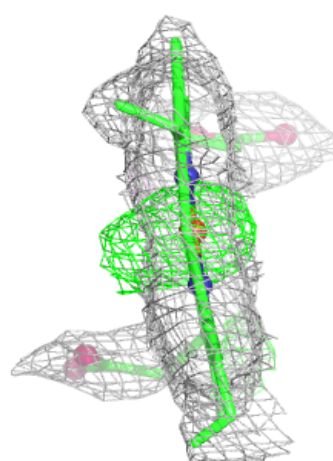
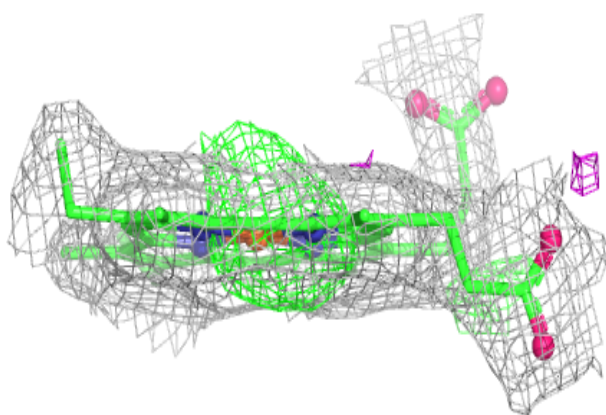
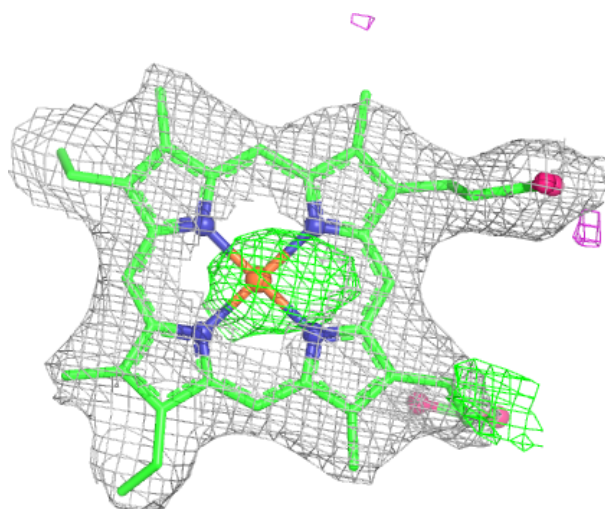
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	HEC	A	1004	43/43	0.98	0.06	30,36,44,49	0
2	HEC	B	1001	43/43	0.98	0.08	46,61,73,76	0
2	HEC	B	1002	43/43	0.98	0.07	40,52,59,69	0
2	HEC	B	1003	43/43	0.98	0.08	31,39,56,94	0
2	HEC	B	1004	43/43	0.98	0.07	32,45,52,60	0
2	HEC	A	1002	43/43	0.99	0.06	28,35,43,45	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.

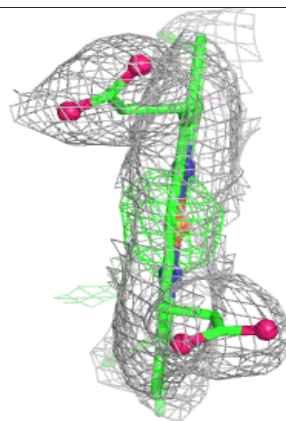
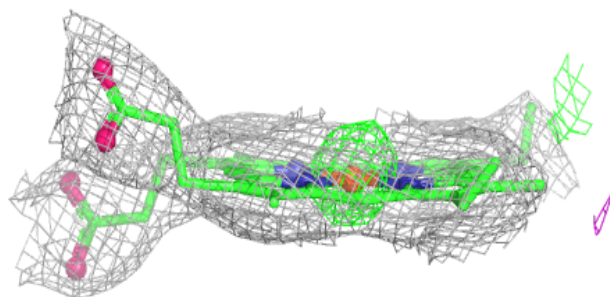
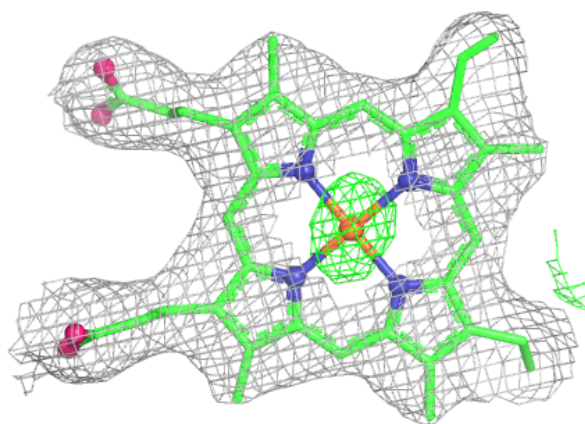
Electron density around HEC A 1003:

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



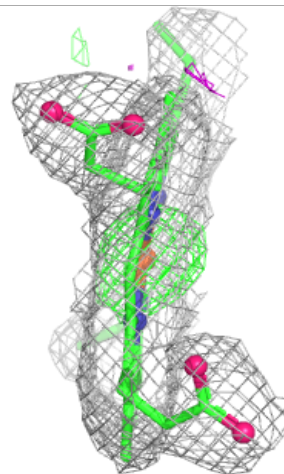
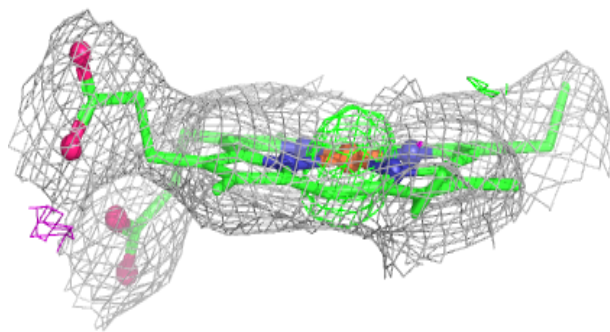
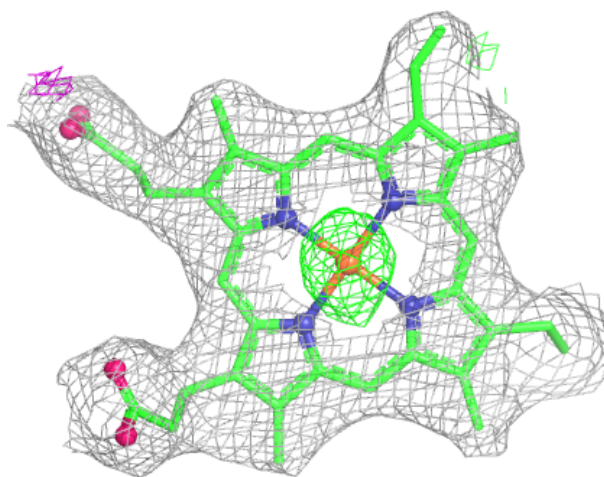
Electron density around HEC A 1001:

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



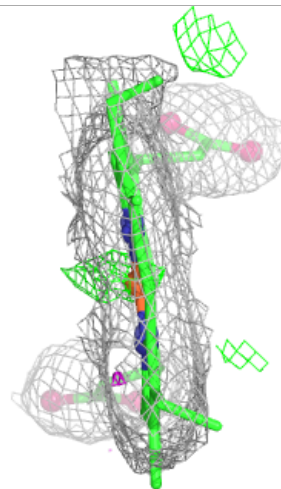
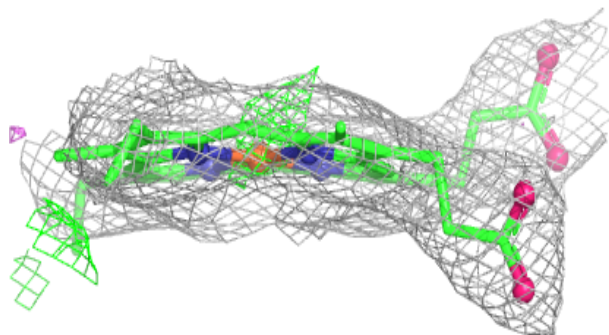
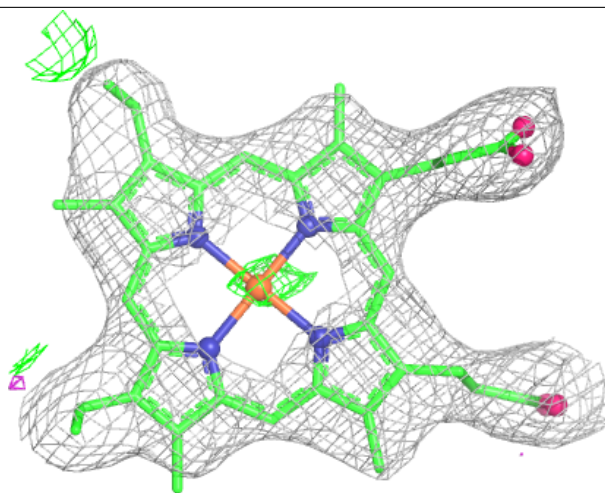
Electron density around HEC A 1004:

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



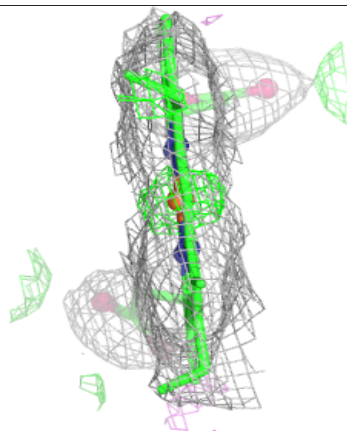
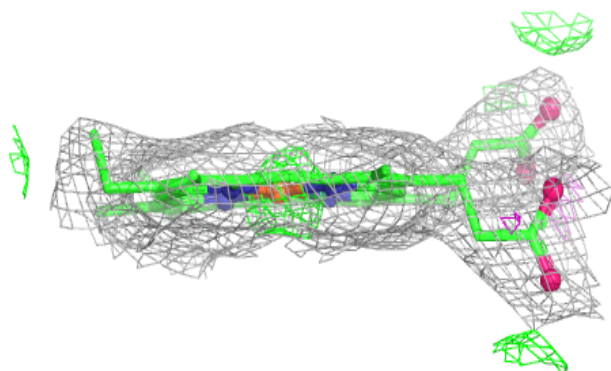
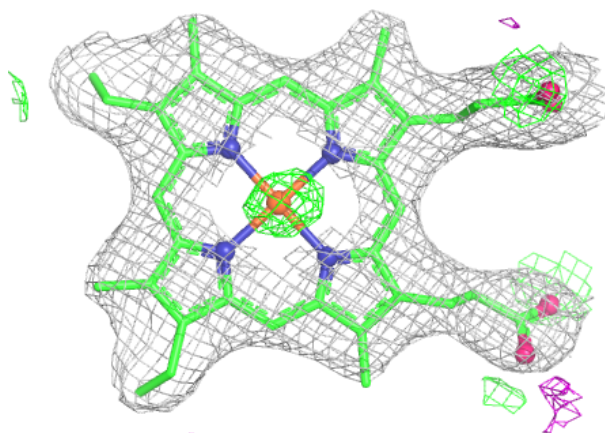
Electron density around HEC B 1001:

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and green (positive)



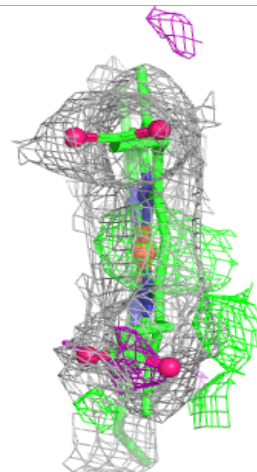
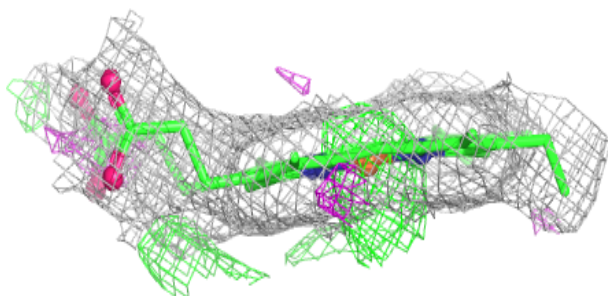
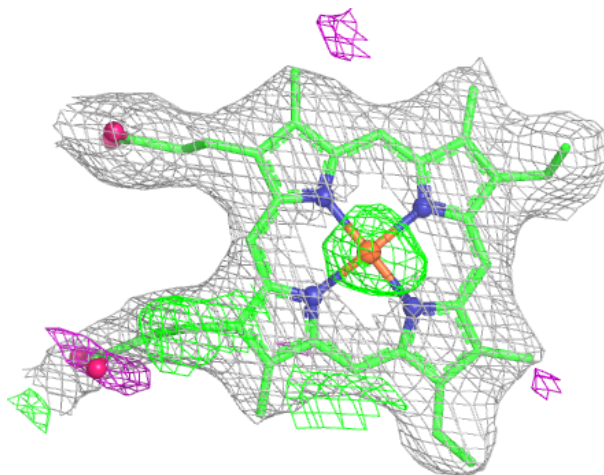
Electron density around HEC B 1002:

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



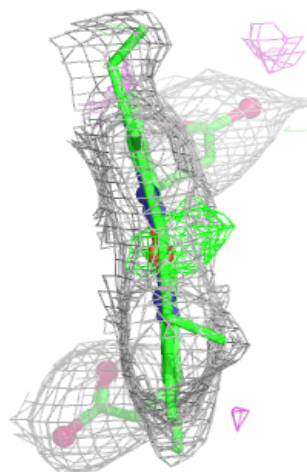
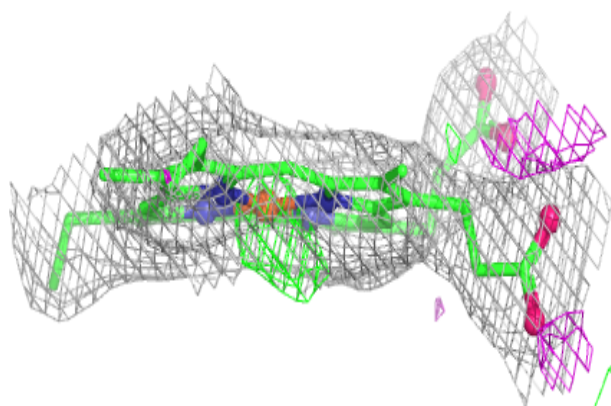
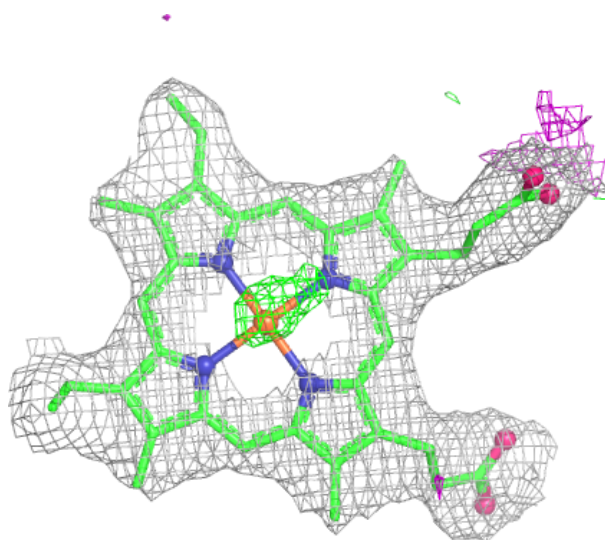
Electron density around HEC B 1003:

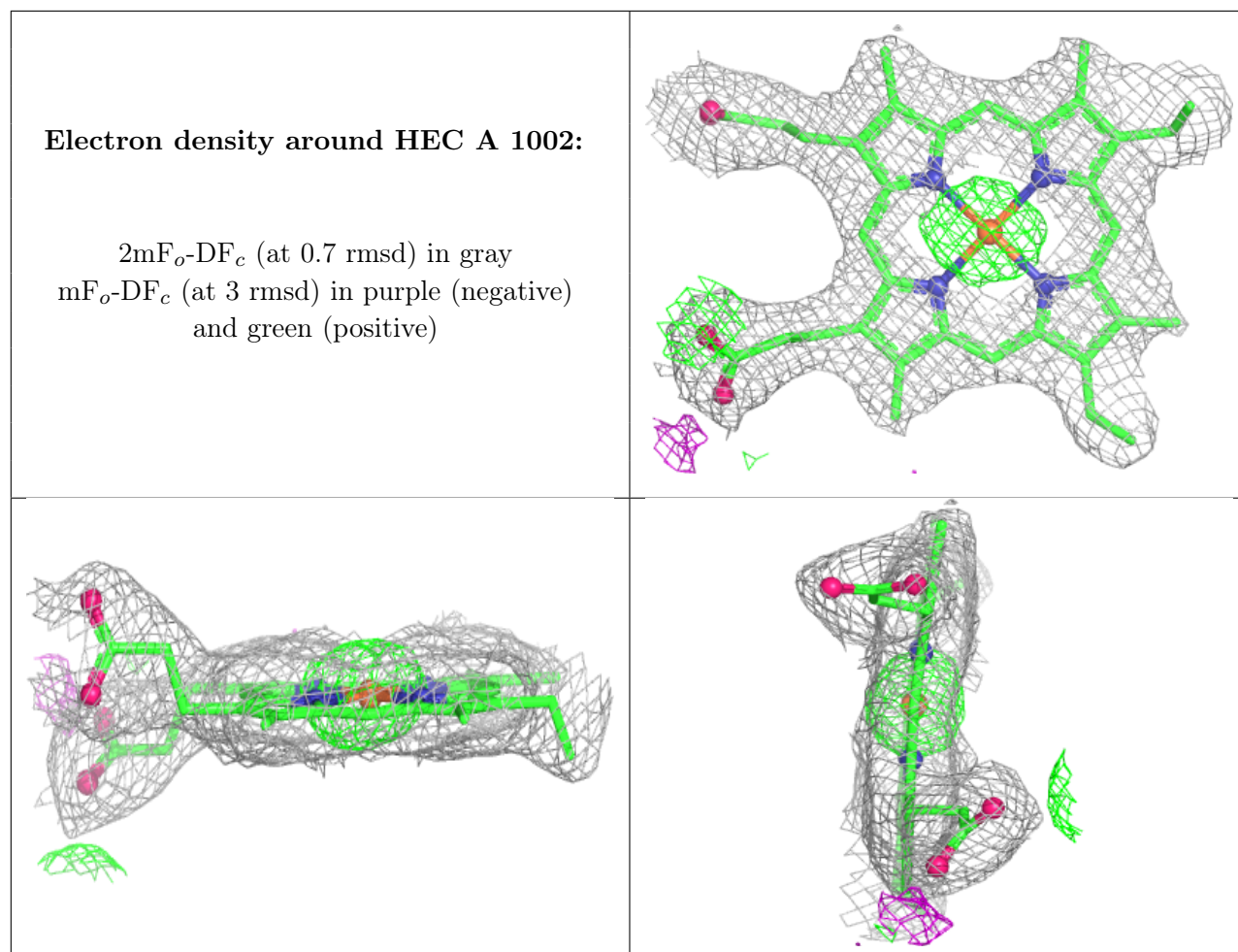
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around HEC B 1004:

$2mF_o-DF_c$ (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.