Full wwPDB EM Validation Report

Nov 16, 2026 – 02:49 PM EST

PDB ID	:	10RP / pdb_000010rp
EMDB ID	:	EMD-75413
Title	:	Structure of OmcZ-type cytochrome nanowires produced by electrode-associated anaerobic methanotrophic archaea
Authors	:	Shen, C.; Wang, J.; Wissink, M.; Malvankar, N.
Deposited on	:	2026-02-03
Resolution	:	3.29 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
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:

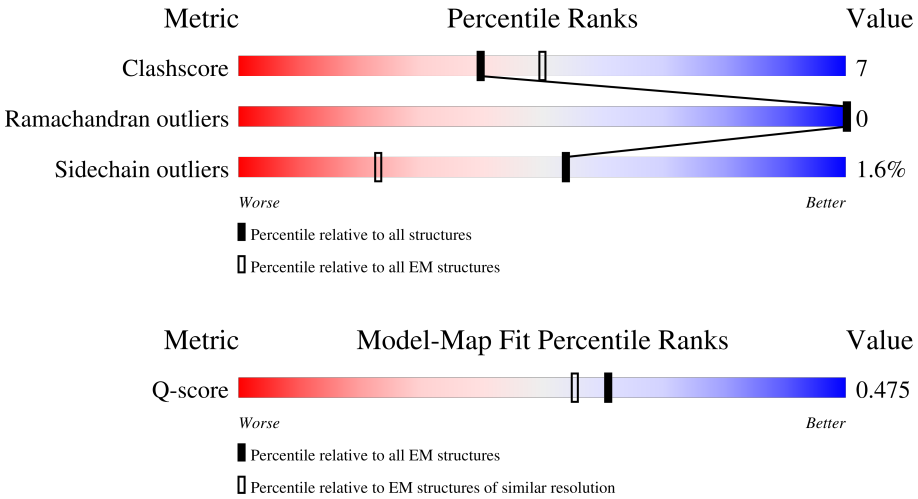
EMDB validation analysis	:	0.0.1.dev133
Mogul	:	2022.3.0, CSD as543be (2022)
MolProbity	:	4-5-2 with Phenix2.2
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics	:	202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ	:	1.9.13
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.51

1 Overall quality at a glance

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.29 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)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	14466 (2.79 - 3.79)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	330	83% 16%
1	J	330	85% 14%
1	S	330	81% 19%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	HEC	A	403	X	-	-	-
2	HEC	A	404	X	-	-	-
2	HEC	A	406	X	-	-	-
2	HEC	A	407	X	-	-	-
2	HEC	A	408	X	-	-	-
2	HEC	J	403	X	-	-	-
2	HEC	J	404	X	-	-	-
2	HEC	J	405	X	-	-	-
2	HEC	J	406	X	-	-	-
2	HEC	J	407	X	-	-	-
2	HEC	S	404	X	-	-	-
2	HEC	S	405	X	-	-	-
2	HEC	S	406	X	-	-	-
2	HEC	S	408	X	-	-	-

2 Entry composition

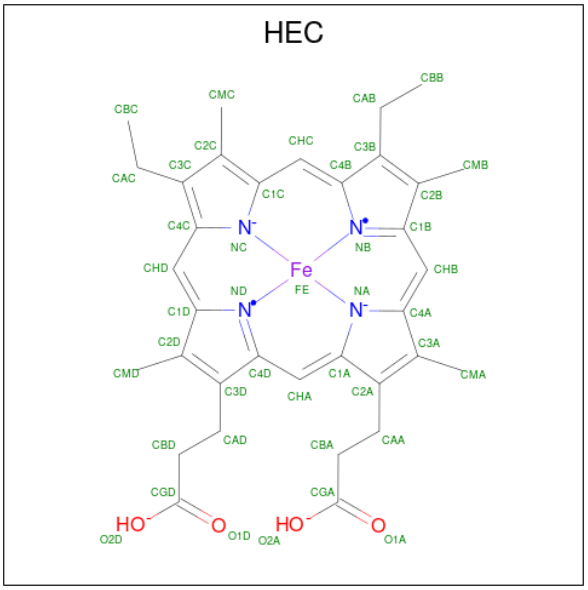
There are 2 unique types of molecules in this entry. The entry contains 8589 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 OmcZ2Mv.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	330	Total	C	N	O	S	0	0
			2519	1551	455	491	22		
1	J	330	Total	C	N	O	S	0	0
			2519	1551	455	491	22		
1	S	330	Total	C	N	O	S	0	0
			2519	1551	455	491	22		

- Molecule 2 is HEME C (CCD ID: HEC) (formula: $C_{34}H_{36}FeN_4O_4$) (labeled as "Ligand of Interest" by depositor).



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

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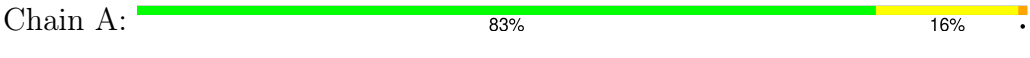
Mol	Chain	Residues	Atoms					AltConf
2	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	A	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	J	1	Total	C	Fe	N	O	0
			43	34	1	4	4	
2	J	1	Total	C	Fe	N	O	0
			43	34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

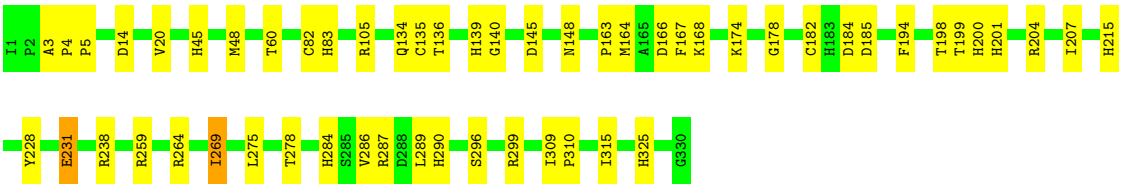
3 Residue-property plots (i)

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 atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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: OmcZ2Mv

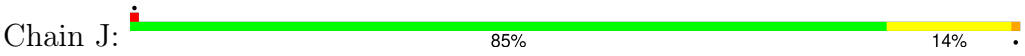
Chain A:

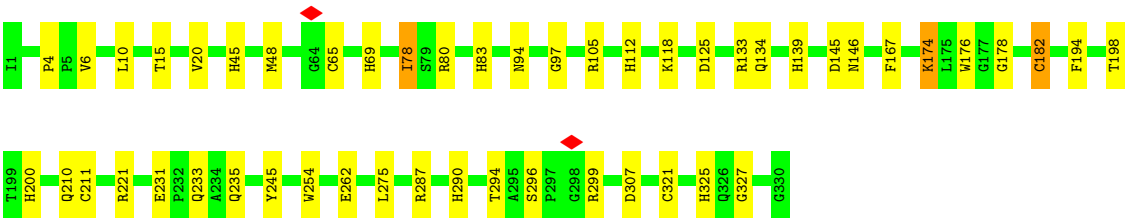




- Molecule 1: OmcZ2Mv

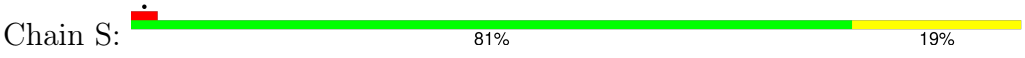
Chain J:

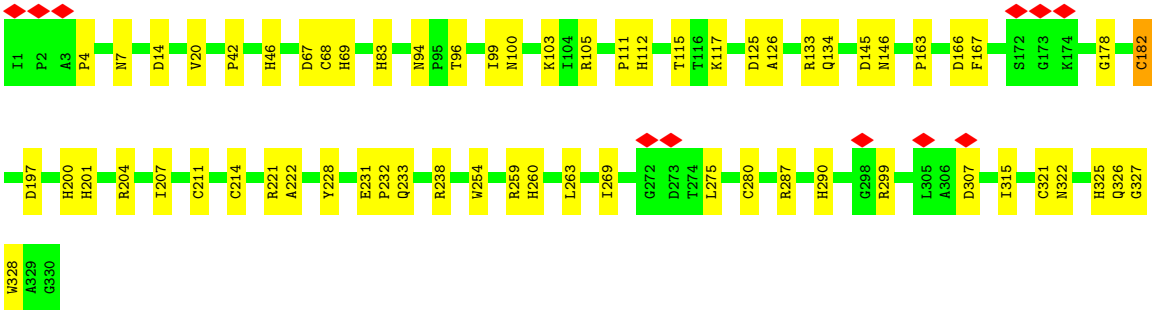




- Molecule 1: OmcZ2Mv

Chain S:





4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	210625	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	40	Depositor
Minimum defocus (nm)	1200	Depositor
Maximum defocus (nm)	2500	Depositor
Magnification	Not provided	
Image detector	GATAN K3 (6k x 4k)	Depositor
Maximum map value	1.319	Depositor
Minimum map value	-0.904	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.021	Depositor
Recommended contour level	0.15	Depositor
Map size (Å)	381.91998, 381.91998, 381.91998	wwPDB
Map dimensions	440, 440, 440	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	0.868, 0.868, 0.868	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: HEC

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	0.22	0/2596	0.55	0/3541
1	J	0.20	0/2596	0.52	1/3541 (0.0%)
1	S	0.23	0/2596	0.56	0/3541
All	All	0.22	0/7788	0.54	1/10623 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	J	174	LYS	CA-CB-CG	6.44	126.98	114.10

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	2519	0	2279	39	0
1	J	2519	0	2279	32	0
1	S	2519	0	2279	39	0
2	A	344	0	233	15	0
2	J	344	0	233	15	0
2	S	344	0	235	11	0
All	All	8589	0	7538	115	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (115) 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:S:200:HIS:CD2	2:S:401:HEC:NC	2.53	0.76
1:J:200:HIS:CD2	2:J:401:HEC:NC	2.54	0.75
1:S:69:HIS:CE1	2:S:403:HEC:NA	2.56	0.72
1:A:139:HIS:CD2	2:A:404:HEC:NC	2.57	0.70
1:J:69:HIS:HE1	2:J:403:HEC:ND	1.89	0.70
1:S:201:HIS:HD2	1:S:204:ARG:HD3	1.58	0.67
1:S:167:PHE:HA	1:S:178:GLY:HA3	1.77	0.66
1:J:4:PRO:HA	1:J:182:CYS:HA	1.77	0.66
1:J:65:CYS:HB2	2:J:403:HEC:HHC	1.78	0.66
1:J:290:HIS:CE1	2:J:402:HEC:ND	2.63	0.65
1:A:269:ILE:HD11	1:A:278:THR:HB	1.79	0.65
1:A:194:PHE:HB3	1:A:198:THR:HG23	1.77	0.65
1:A:48:MET:HB3	1:A:60:THR:HB	1.78	0.65
1:A:231:GLU:HB2	1:A:275:LEU:HD13	1.79	0.64
1:A:167:PHE:HA	1:A:178:GLY:HA3	1.80	0.63
1:J:167:PHE:HA	1:J:178:GLY:HA3	1.79	0.63
1:A:238:ARG:HE	1:A:259:ARG:HG3	1.66	0.61
1:S:299:ARG:HH12	1:S:307:ASP:HB2	1.66	0.60
1:S:4:PRO:HA	1:S:182:CYS:HA	1.85	0.59
1:A:264:ARG:NH2	2:A:402:HEC:O2D	2.35	0.59
1:S:134:GLN:OE1	1:S:146:ASN:ND2	2.36	0.59
1:S:197:ASP:OD2	1:S:201:HIS:ND1	2.33	0.58
1:S:263:LEU:HD12	1:S:280:CYS:HB3	1.85	0.57
1:J:134:GLN:OE1	1:J:146:ASN:ND2	2.37	0.57
1:S:111:PRO:HB2	1:S:112:HIS:HD2	1.70	0.57
1:A:296:SER:HB2	1:A:299:ARG:HB2	1.86	0.57
1:S:231:GLU:HB2	1:S:275:LEU:HD13	1.87	0.56
1:J:94:ASN:HB3	1:J:97:GLY:H	1.71	0.56
1:J:194:PHE:HB3	1:J:198:THR:HG23	1.87	0.56
1:S:20:VAL:O	1:S:83:HIS:NE2	2.37	0.56
1:J:20:VAL:HG21	2:J:404:HEC:HBD2	1.87	0.56
1:J:45:HIS:HD2	2:J:406:HEC:ND	2.05	0.55
1:S:105:ARG:HH22	2:S:406:HEC:HBD2	1.71	0.55
1:S:326:GLN:HE21	1:S:328:TRP:CD1	2.25	0.54
1:A:4:PRO:HA	1:A:182:CYS:HA	1.88	0.54
1:J:145:ASP:OD2	1:J:287:ARG:NH2	2.39	0.54
1:A:135:CYS:HB2	2:A:404:HEC:HHC	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:210:GLN:HA	1:J:233:GLN:HE21	1.73	0.54
1:J:78:ILE:HG21	1:J:80:ARG:HH11	1.73	0.53
1:A:200:HIS:CD2	2:A:401:HEC:NC	2.78	0.52
1:A:207:ILE:HG12	1:A:228:TYR:HB2	1.91	0.52
1:J:105:ARG:NH1	2:J:408:HEC:O1A	2.43	0.52
1:S:221:ARG:HB3	1:S:233:GLN:HG2	1.91	0.52
2:A:401:HEC:HHD	2:A:404:HEC:HMB3	1.91	0.52
1:S:290:HIS:HA	1:S:315:ILE:HD11	1.92	0.51
2:J:402:HEC:CHB	2:S:403:HEC:HHB	2.41	0.51
1:S:238:ARG:HG2	1:S:259:ARG:HB2	1.93	0.50
2:J:401:HEC:HHD	2:J:404:HEC:HMB2	1.94	0.49
1:A:134:GLN:OE1	1:A:148:ASN:ND2	2.45	0.49
1:S:100:ASN:HD22	1:S:103:LYS:HB2	1.78	0.49
1:A:201:HIS:HA	1:A:204:ARG:HG3	1.95	0.48
1:A:145:ASP:OD2	1:A:287:ARG:NH2	2.46	0.48
1:S:207:ILE:HG22	1:S:228:TYR:HB2	1.94	0.48
1:J:10:LEU:HB2	1:J:294:THR:HG22	1.95	0.48
1:S:222:ALA:O	1:S:233:GLN:NE2	2.47	0.47
1:A:20:VAL:O	1:A:83:HIS:NE2	2.47	0.47
1:S:145:ASP:OD2	1:S:287:ARG:NH2	2.47	0.47
1:S:166:ASP:HB2	1:S:260:HIS:HD2	1.80	0.47
2:A:402:HEC:HMB3	1:J:69:HIS:HB2	1.97	0.46
1:S:68:CYS:HB3	1:S:99:ILE:HD12	1.97	0.46
1:A:309:ILE:HG13	1:A:310:PRO:HD2	1.98	0.46
1:J:245:TYR:OH	1:J:262:GLU:OE2	2.34	0.46
1:J:211:CYS:HA	2:J:407:HEC:HBB3	1.84	0.46
1:A:105:ARG:NH2	2:A:408:HEC:O2A	2.49	0.45
1:J:48:MET:HE1	2:J:406:HEC:HHA	1.99	0.45
1:A:290:HIS:CE1	2:A:402:HEC:ND	2.85	0.45
1:A:164:MET:HE2	1:A:168:LYS:HD3	1.97	0.45
1:S:182:CYS:HB2	2:S:405:HEC:HAC	1.71	0.45
1:S:259:ARG:H	1:S:259:ARG:HG2	1.52	0.45
1:A:286:VAL:HG11	2:A:402:HEC:HBA2	1.98	0.45
1:A:290:HIS:HA	1:A:315:ILE:HD11	1.98	0.44
1:A:284:HIS:CD2	2:A:401:HEC:NB	2.84	0.44
1:J:139:HIS:CD2	2:J:404:HEC:NC	2.78	0.44
1:J:321:CYS:O	1:J:325:HIS:HB2	2.18	0.44
1:A:215:HIS:CD2	2:A:407:HEC:NC	2.84	0.43
1:S:211:CYS:HA	2:S:407:HEC:HBB3	1.99	0.43
1:J:296:SER:HB2	1:J:299:ARG:HB2	2.00	0.43
1:S:204:ARG:HE	1:S:204:ARG:HB2	1.68	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:J:174:LYS:HE3	1:J:176:TRP:CD2	2.54	0.43
1:S:254:TRP:NE1	1:S:327:GLY:O	2.39	0.43
1:A:105:ARG:HH11	2:A:406:HEC:HBD2	1.83	0.43
1:A:20:VAL:HG21	2:A:404:HEC:HBD2	2.00	0.43
1:J:299:ARG:NH1	1:J:307:ASP:OD1	2.52	0.43
1:A:184:ASP:OD1	1:A:185:ASP:N	2.45	0.43
1:A:194:PHE:HB2	1:A:199:THR:HG23	2.01	0.43
1:J:118:LYS:HE3	1:J:125:ASP:HB3	2.00	0.43
2:S:401:HEC:HHD	2:S:404:HEC:HMB2	2.00	0.42
1:S:14:ASP:OD1	1:S:14:ASP:N	2.53	0.42
1:A:14:ASP:HB3	2:A:401:HEC:CGA	2.50	0.42
1:A:163:PRO:HD2	2:A:402:HEC:HBD1	2.01	0.42
1:J:254:TRP:NE1	1:J:327:GLY:O	2.40	0.42
1:A:166:ASP:HB3	1:A:167:PHE:H	1.65	0.42
1:S:133:ARG:HA	2:S:404:HEC:HBB1	2.02	0.42
1:S:322:ASN:O	1:S:326:GLN:HB3	2.20	0.42
1:S:163:PRO:HG3	1:S:325:HIS:HA	2.02	0.41
1:A:3:ALA:HB1	1:A:5:PRO:HD2	2.02	0.41
1:A:45:HIS:HA	1:A:48:MET:HE2	2.01	0.41
1:S:125:ASP:OD1	1:S:125:ASP:N	2.48	0.41
1:S:115:THR:OG1	1:S:126:ALA:O	2.25	0.41
1:S:46:HIS:NE2	2:S:403:HEC:C1A	2.83	0.41
1:S:67:ASP:O	1:S:94:ASN:ND2	2.54	0.41
1:J:20:VAL:O	1:J:83:HIS:NE2	2.52	0.41
1:J:112:HIS:HD2	2:J:408:HEC:ND	2.11	0.41
1:A:174:LYS:O	1:A:174:LYS:HD2	2.21	0.41
1:A:259:ARG:H	1:A:259:ARG:HG2	1.64	0.41
1:J:231:GLU:HB2	1:J:275:LEU:HD13	2.02	0.41
1:S:42:PRO:O	1:S:46:HIS:HB2	2.20	0.41
1:S:117:LYS:NZ	2:S:406:HEC:HAA1	2.35	0.41
1:S:231:GLU:HA	1:S:232:PRO:HD3	1.94	0.41
2:J:402:HEC:HHB	2:S:403:HEC:HHB	2.03	0.41
1:A:163:PRO:HD3	1:A:325:HIS:CE1	2.56	0.40
1:J:133:ARG:HA	2:J:404:HEC:HBB1	2.03	0.40
1:A:136:THR:OG1	1:A:140:GLY:O	2.39	0.40
1:A:284:HIS:HB3	1:A:289:LEU:HD11	2.03	0.40
1:J:221:ARG:HD2	1:J:235:GLN:HA	2.04	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 PDB entries followed by that with respect to all EM entries.

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	328/330 (99%)	303 (92%)	25 (8%)	0	100	100
1	J	328/330 (99%)	305 (93%)	23 (7%)	0	100	100
1	S	328/330 (99%)	300 (92%)	28 (8%)	0	100	100
All	All	984/990 (99%)	908 (92%)	76 (8%)	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 PDB entries followed by that with respect to all EM entries.

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	272/272 (100%)	269 (99%)	3 (1%)	65	76
1	J	272/272 (100%)	268 (98%)	4 (2%)	57	72
1	S	272/272 (100%)	266 (98%)	6 (2%)	45	66
All	All	816/816 (100%)	803 (98%)	13 (2%)	54	72

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	82	CYS
1	A	231	GLU
1	A	269	ILE
1	J	6	VAL
1	J	15	THR

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Mol	Chain	Res	Type
1	J	78	ILE
1	J	182	CYS
1	S	7	ASN
1	S	96	THR
1	S	182	CYS
1	S	214	CYS
1	S	269	ILE
1	S	321	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (20) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	GLN
1	A	210	GLN
1	A	212	ASN
1	A	235	GLN
1	A	242	ASN
1	A	318	ASN
1	J	81	ASN
1	J	134	GLN
1	J	146	ASN
1	J	210	GLN
1	J	212	ASN
1	J	242	ASN
1	J	284	HIS
1	J	322	ASN
1	J	326	GLN
1	S	7	ASN
1	S	81	ASN
1	S	146	ASN
1	S	212	ASN
1	S	290	HIS

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)

24 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	$\#\|Z\| > 2$
2	HEC	J	403	1	50,50,50	1.85	6 (12%)	68,82,82	1.32	3 (4%)
2	HEC	S	407	1	50,50,50	1.82	7 (14%)	68,82,82	1.67	10 (14%)
2	HEC	J	406	1	50,50,50	1.81	6 (12%)	68,82,82	1.33	8 (11%)
2	HEC	S	408	1	50,50,50	1.79	6 (12%)	68,82,82	1.40	9 (13%)
2	HEC	S	402	1	50,50,50	2.10	7 (14%)	68,82,82	1.68	9 (13%)
2	HEC	A	408	1	50,50,50	1.84	5 (10%)	68,82,82	1.48	10 (14%)
2	HEC	J	404	1	50,50,50	1.88	5 (10%)	68,82,82	1.39	5 (7%)
2	HEC	A	402	1	50,50,50	1.77	6 (12%)	68,82,82	1.33	4 (5%)
2	HEC	A	403	1	50,50,50	1.87	6 (12%)	68,82,82	1.27	3 (4%)
2	HEC	S	403	1	50,50,50	1.85	5 (10%)	68,82,82	1.71	17 (25%)
2	HEC	A	401	1	50,50,50	1.98	6 (12%)	68,82,82	1.51	9 (13%)
2	HEC	S	401	1	50,50,50	1.94	6 (12%)	68,82,82	1.54	11 (16%)
2	HEC	J	408	1	50,50,50	1.95	5 (10%)	68,82,82	1.30	7 (10%)
2	HEC	J	402	1	50,50,50	1.92	4 (8%)	68,82,82	1.34	5 (7%)
2	HEC	A	404	1	50,50,50	1.86	5 (10%)	68,82,82	1.28	4 (5%)
2	HEC	S	404	1	50,50,50	1.84	5 (10%)	68,82,82	1.36	7 (10%)
2	HEC	J	405	1	50,50,50	1.79	6 (12%)	68,82,82	1.39	8 (11%)
2	HEC	S	406	1	50,50,50	1.81	7 (14%)	68,82,82	1.38	5 (7%)
2	HEC	A	405	1	50,50,50	1.91	7 (14%)	68,82,82	1.93	12 (17%)
2	HEC	A	407	1	50,50,50	1.82	5 (10%)	68,82,82	1.34	5 (7%)
2	HEC	S	405	1	50,50,50	1.86	7 (14%)	68,82,82	1.45	8 (11%)
2	HEC	A	406	1	50,50,50	1.87	7 (14%)	68,82,82	1.37	7 (10%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\|>2$	Counts	RMSZ	$\#\|Z\|>2$
2	HEC	J	407	1	50,50,50	1.81	5 (10%)	68,82,82	1.44	12 (17%)
2	HEC	J	401	1	50,50,50	2.06	6 (12%)	68,82,82	1.80	10 (14%)

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
2	HEC	J	403	1	1/1/3/7	0/14/54/54	-
2	HEC	S	407	1	-	5/14/54/54	-
2	HEC	J	406	1	1/1/3/7	0/14/54/54	-
2	HEC	S	408	1	1/1/3/7	4/14/54/54	-
2	HEC	S	402	1	-	3/14/54/54	-
2	HEC	A	408	1	1/1/3/7	8/14/54/54	-
2	HEC	J	404	1	1/1/3/7	6/14/54/54	-
2	HEC	A	402	1	-	0/14/54/54	-
2	HEC	A	403	1	1/1/3/7	0/14/54/54	-
2	HEC	S	403	1	-	3/14/54/54	-
2	HEC	A	401	1	-	3/14/54/54	-
2	HEC	S	401	1	-	3/14/54/54	-
2	HEC	J	408	1	-	5/14/54/54	-
2	HEC	J	402	1	-	0/14/54/54	-
2	HEC	A	404	1	1/1/3/7	7/14/54/54	-
2	HEC	S	404	1	1/1/3/7	6/14/54/54	-
2	HEC	J	405	1	1/1/3/7	1/14/54/54	-
2	HEC	S	406	1	1/1/3/7	0/14/54/54	-
2	HEC	A	405	1	-	5/14/54/54	-
2	HEC	A	407	1	1/1/3/7	3/14/54/54	-
2	HEC	S	405	1	1/1/3/7	3/14/54/54	-
2	HEC	A	406	1	1/1/3/7	1/14/54/54	-
2	HEC	J	407	1	1/1/3/7	3/14/54/54	-
2	HEC	J	401	1	-	4/14/54/54	-

All (140) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	S	405	HEC	C3D-C2D	8.01	1.54	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	405	HEC	C3D-C2D	7.99	1.54	1.36
2	S	408	HEC	C3D-C2D	7.97	1.54	1.36
2	A	406	HEC	C3D-C2D	7.96	1.53	1.36
2	J	405	HEC	C3D-C2D	7.96	1.53	1.36
2	J	404	HEC	C3D-C2D	7.93	1.53	1.36
2	A	404	HEC	C3D-C2D	7.88	1.53	1.36
2	S	402	HEC	C3D-C2D	7.86	1.53	1.36
2	S	406	HEC	C3D-C2D	7.84	1.53	1.36
2	J	406	HEC	C3D-C2D	7.82	1.53	1.36
2	A	402	HEC	C3D-C2D	7.82	1.53	1.36
2	A	408	HEC	C3D-C2D	7.82	1.53	1.36
2	J	408	HEC	C3D-C2D	7.81	1.53	1.36
2	S	401	HEC	C3D-C2D	7.81	1.53	1.36
2	A	403	HEC	C3D-C2D	7.81	1.53	1.36
2	S	404	HEC	C3D-C2D	7.81	1.53	1.36
2	J	401	HEC	C3D-C2D	7.79	1.53	1.36
2	A	401	HEC	C3D-C2D	7.79	1.53	1.36
2	S	403	HEC	C3D-C2D	7.76	1.53	1.36
2	J	402	HEC	C3D-C2D	7.74	1.53	1.36
2	A	407	HEC	C3D-C2D	7.71	1.53	1.36
2	J	403	HEC	C3D-C2D	7.65	1.53	1.36
2	J	407	HEC	C3D-C2D	7.48	1.52	1.36
2	S	407	HEC	C3D-C2D	7.38	1.52	1.36
2	J	401	HEC	FE-NC	6.91	2.18	1.95
2	S	402	HEC	FE-NB	6.73	2.15	1.94
2	J	408	HEC	FE-ND	5.77	2.12	1.94
2	A	401	HEC	FE-NB	5.66	2.12	1.94
2	J	402	HEC	FE-NB	5.60	2.12	1.94
2	A	405	HEC	FE-NB	5.33	2.11	1.94
2	J	401	HEC	FE-NB	5.31	2.11	1.94
2	S	402	HEC	FE-NC	5.28	2.12	1.95
2	S	403	HEC	FE-NB	5.19	2.10	1.94
2	J	403	HEC	FE-ND	5.08	2.10	1.94
2	J	408	HEC	FE-NB	5.04	2.10	1.94
2	A	408	HEC	FE-ND	4.94	2.10	1.94
2	J	404	HEC	FE-ND	4.94	2.10	1.94
2	S	407	HEC	FE-NA	4.93	2.11	1.95
2	A	403	HEC	FE-ND	4.93	2.10	1.94
2	S	402	HEC	FE-ND	4.91	2.10	1.94
2	J	402	HEC	FE-ND	4.90	2.10	1.94
2	S	401	HEC	FE-ND	4.85	2.09	1.94
2	A	407	HEC	FE-NB	4.85	2.09	1.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	401	HEC	FE-ND	4.84	2.09	1.94
2	J	403	HEC	FE-NB	4.81	2.09	1.94
2	A	404	HEC	FE-NA	4.80	2.11	1.95
2	S	401	HEC	FE-NA	4.79	2.11	1.95
2	J	407	HEC	FE-NB	4.78	2.09	1.94
2	A	406	HEC	FE-ND	4.77	2.09	1.94
2	A	403	HEC	FE-NB	4.75	2.09	1.94
2	S	405	HEC	FE-NB	4.74	2.09	1.94
2	J	402	HEC	FE-NA	4.72	2.10	1.95
2	S	401	HEC	FE-NC	4.71	2.10	1.95
2	S	404	HEC	FE-ND	4.66	2.09	1.94
2	J	404	HEC	FE-NA	4.60	2.10	1.95
2	S	406	HEC	FE-ND	4.54	2.08	1.94
2	A	401	HEC	FE-NA	4.49	2.10	1.95
2	A	408	HEC	FE-NB	4.48	2.08	1.94
2	A	406	HEC	FE-NC	4.38	2.09	1.95
2	A	402	HEC	FE-NB	4.34	2.08	1.94
2	S	403	HEC	FE-NC	4.32	2.09	1.95
2	S	404	HEC	FE-NA	4.31	2.09	1.95
2	A	404	HEC	FE-ND	4.30	2.08	1.94
2	A	406	HEC	FE-NB	4.26	2.08	1.94
2	S	407	HEC	FE-NB	4.26	2.08	1.94
2	J	406	HEC	FE-ND	4.23	2.07	1.94
2	J	405	HEC	FE-NB	4.22	2.07	1.94
2	J	407	HEC	FE-ND	4.22	2.07	1.94
2	J	401	HEC	FE-ND	4.21	2.07	1.94
2	S	405	HEC	FE-ND	4.20	2.07	1.94
2	A	402	HEC	FE-ND	4.15	2.07	1.94
2	S	408	HEC	FE-ND	4.12	2.07	1.94
2	S	402	HEC	FE-NA	4.06	2.08	1.95
2	J	405	HEC	FE-ND	4.06	2.07	1.94
2	A	407	HEC	FE-NA	4.01	2.08	1.95
2	A	405	HEC	FE-ND	4.00	2.07	1.94
2	S	401	HEC	FE-NB	3.96	2.07	1.94
2	S	404	HEC	FE-NB	3.94	2.07	1.94
2	S	406	HEC	FE-NB	3.94	2.07	1.94
2	J	404	HEC	FE-NB	3.92	2.07	1.94
2	S	407	HEC	FE-ND	3.89	2.06	1.94
2	A	405	HEC	FE-NA	3.86	2.07	1.95
2	A	404	HEC	FE-NB	3.80	2.06	1.94
2	A	407	HEC	FE-ND	3.79	2.06	1.94
2	A	403	HEC	FE-NA	3.79	2.07	1.95

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	J	406	HEC	FE-NA	3.78	2.07	1.95
2	S	405	HEC	FE-NA	3.74	2.07	1.95
2	J	401	HEC	FE-NA	3.72	2.07	1.95
2	J	406	HEC	FE-NC	3.65	2.07	1.95
2	S	403	HEC	FE-ND	3.65	2.06	1.94
2	S	406	HEC	FE-NA	3.60	2.07	1.95
2	J	407	HEC	FE-NA	3.59	2.07	1.95
2	S	408	HEC	FE-NC	3.58	2.07	1.95
2	S	408	HEC	FE-NB	3.57	2.05	1.94
2	J	408	HEC	FE-NA	3.57	2.06	1.95
2	A	401	HEC	FE-NC	3.56	2.06	1.95
2	J	406	HEC	FE-NB	3.53	2.05	1.94
2	J	403	HEC	FE-NA	3.48	2.06	1.95
2	J	408	HEC	FE-NC	3.32	2.06	1.95
2	A	405	HEC	FE-NC	3.28	2.06	1.95
2	S	403	HEC	FE-NA	3.24	2.05	1.95
2	A	402	HEC	FE-NA	3.21	2.05	1.95
2	J	407	HEC	FE-NC	3.20	2.05	1.95
2	S	406	HEC	FE-NC	3.20	2.05	1.95
2	A	408	HEC	FE-NA	3.17	2.05	1.95
2	J	405	HEC	FE-NA	3.16	2.05	1.95
2	A	404	HEC	FE-NC	3.14	2.05	1.95
2	S	407	HEC	FE-NC	3.13	2.05	1.95
2	S	405	HEC	FE-NC	3.13	2.05	1.95
2	S	408	HEC	FE-NA	3.10	2.05	1.95
2	A	407	HEC	FE-NC	3.04	2.05	1.95
2	A	408	HEC	FE-NC	2.98	2.05	1.95
2	J	403	HEC	FE-NC	2.90	2.04	1.95
2	J	405	HEC	FE-NC	2.89	2.04	1.95
2	A	406	HEC	FE-NA	2.84	2.04	1.95
2	A	403	HEC	FE-NC	2.79	2.04	1.95
2	J	404	HEC	FE-NC	2.67	2.04	1.95
2	A	402	HEC	FE-NC	2.41	2.03	1.95
2	S	404	HEC	FE-NC	2.40	2.03	1.95
2	S	402	HEC	CMC-C2C	2.38	1.55	1.50
2	S	407	HEC	CMA-C3A	2.21	1.55	1.50
2	J	406	HEC	CMA-C3A	2.17	1.55	1.50
2	J	401	HEC	CMC-C2C	2.15	1.55	1.50
2	A	406	HEC	C3C-C2C	-2.15	1.33	1.38
2	J	405	HEC	CMC-C2C	2.13	1.55	1.50
2	S	406	HEC	CMA-C3A	2.13	1.55	1.50
2	S	406	HEC	C3C-C2C	-2.12	1.33	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	S	401	HEC	CMC-C2C	2.12	1.55	1.50
2	S	405	HEC	CMB-C2B	2.11	1.55	1.50
2	A	405	HEC	CMC-C2C	2.10	1.55	1.50
2	A	402	HEC	C3C-C2C	-2.10	1.33	1.38
2	S	402	HEC	CAB-C3B	2.09	1.56	1.51
2	A	406	HEC	CMA-C3A	2.09	1.55	1.50
2	S	405	HEC	CMC-C2C	2.08	1.55	1.50
2	S	408	HEC	CMA-C3A	2.06	1.55	1.50
2	S	407	HEC	CAA-C2A	2.05	1.56	1.51
2	J	403	HEC	C3C-C2C	-2.04	1.33	1.38
2	A	401	HEC	C3C-C2C	-2.03	1.33	1.38
2	A	403	HEC	C3C-C2C	-2.00	1.33	1.38
2	A	405	HEC	CMA-C3A	2.00	1.54	1.50

All (188) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	J	401	HEC	CAC-C3C-C4C	-6.55	115.91	124.91
2	J	401	HEC	CAC-C3C-C2C	6.21	136.71	126.89
2	A	405	HEC	CAC-C3C-C4C	-6.14	116.47	124.91
2	A	405	HEC	CAC-C3C-C2C	5.94	136.29	126.89
2	A	405	HEC	CAB-C3B-C4B	5.73	132.25	124.79
2	A	402	HEC	C1D-ND-C4D	5.69	111.95	105.21
2	S	407	HEC	C1D-ND-C4D	5.69	111.95	105.21
2	S	408	HEC	C1D-ND-C4D	5.62	111.86	105.21
2	J	406	HEC	C1D-ND-C4D	5.60	111.84	105.21
2	S	403	HEC	C1D-ND-C4D	5.59	111.83	105.21
2	S	405	HEC	C1D-ND-C4D	5.59	111.82	105.21
2	S	402	HEC	C1D-ND-C4D	5.56	111.79	105.21
2	A	407	HEC	C1D-ND-C4D	5.55	111.78	105.21
2	J	407	HEC	C1D-ND-C4D	5.44	111.65	105.21
2	A	405	HEC	C1D-ND-C4D	5.42	111.62	105.21
2	J	405	HEC	C1D-ND-C4D	5.41	111.62	105.21
2	A	406	HEC	C1D-ND-C4D	5.39	111.59	105.21
2	S	406	HEC	C1D-ND-C4D	5.36	111.55	105.21
2	J	402	HEC	C1D-ND-C4D	5.34	111.53	105.21
2	S	401	HEC	C1D-ND-C4D	5.33	111.52	105.21
2	J	401	HEC	C1D-ND-C4D	5.29	111.47	105.21
2	A	404	HEC	C1D-ND-C4D	5.20	111.36	105.21
2	A	403	HEC	C1D-ND-C4D	5.18	111.34	105.21
2	S	404	HEC	C1D-ND-C4D	5.11	111.26	105.21
2	A	401	HEC	C1D-ND-C4D	5.07	111.22	105.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	J	403	HEC	C1D-ND-C4D	5.04	111.18	105.21
2	J	404	HEC	C1D-ND-C4D	5.04	111.17	105.21
2	A	408	HEC	C1D-ND-C4D	5.02	111.15	105.21
2	A	401	HEC	CAB-C3B-C4B	4.87	131.13	124.79
2	J	408	HEC	C1D-ND-C4D	4.85	110.95	105.21
2	S	402	HEC	CMC-C2C-C1C	-4.51	118.56	125.42
2	S	402	HEC	CAC-C3C-C4C	-4.41	118.84	124.91
2	A	405	HEC	CAB-C3B-C2B	-4.30	119.66	127.56
2	S	402	HEC	CMC-C2C-C3C	4.27	134.69	125.62
2	S	407	HEC	CAA-C2A-C3A	4.22	135.76	127.87
2	S	403	HEC	CAB-C3B-C4B	4.20	130.26	124.79
2	A	405	HEC	CBC-CAC-C3C	3.89	122.96	112.42
2	S	401	HEC	CAC-C3C-C2C	3.85	132.98	126.89
2	J	401	HEC	CBC-CAC-C3C	3.84	122.82	112.42
2	S	402	HEC	CAC-C3C-C2C	3.76	132.84	126.89
2	S	401	HEC	CAC-C3C-C4C	-3.73	119.79	124.91
2	S	405	HEC	CAC-C3C-C4C	-3.69	119.83	124.91
2	S	407	HEC	CAA-C2A-C1A	-3.58	117.57	124.85
2	S	407	HEC	CBA-CAA-C2A	3.41	121.97	112.53
2	A	401	HEC	CAB-C3B-C2B	-3.34	121.43	127.56
2	S	403	HEC	C1B-C2B-C3B	3.27	110.42	106.98
2	S	405	HEC	CAC-C3C-C2C	3.26	132.05	126.89
2	S	407	HEC	CMD-C2D-C1D	3.21	130.05	125.03
2	J	408	HEC	CAB-C3B-C4B	3.11	128.84	124.79
2	S	408	HEC	CAB-C3B-C4B	2.99	128.68	124.79
2	S	406	HEC	C2A-C1A-NA	-2.97	107.45	110.32
2	S	403	HEC	CHC-C4B-C3B	2.97	130.71	125.23
2	S	407	HEC	CAD-CBD-CGD	-2.95	105.84	113.67
2	S	402	HEC	CAD-C3D-C4D	2.89	129.74	124.70
2	A	408	HEC	CAA-C2A-C3A	-2.89	122.46	127.87
2	J	407	HEC	CAB-C3B-C4B	2.86	128.51	124.79
2	A	405	HEC	C3B-C4B-NB	-2.82	107.08	110.17
2	A	405	HEC	CMC-C2C-C1C	-2.80	121.15	125.42
2	J	402	HEC	CAB-C3B-C4B	2.79	128.42	124.79
2	J	405	HEC	C3B-C4B-NB	-2.78	107.12	110.17
2	A	406	HEC	CAC-C3C-C4C	2.76	128.70	124.91
2	S	403	HEC	CHB-C1B-NB	2.74	127.38	124.42
2	J	406	HEC	CAD-CBD-CGD	-2.74	106.39	113.67
2	J	401	HEC	CMC-C2C-C1C	-2.70	121.31	125.42
2	A	406	HEC	C2A-C1A-NA	-2.67	107.75	110.32
2	J	402	HEC	C3C-C4C-NC	-2.64	107.22	110.15
2	A	408	HEC	CAD-C3D-C4D	2.64	129.31	124.70

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	A	403	HEC	C2A-C1A-NA	-2.64	107.77	110.32
2	S	403	HEC	CHD-C1D-ND	2.63	127.61	124.37
2	A	405	HEC	CHB-C1B-NB	2.61	127.24	124.42
2	J	401	HEC	CMC-C2C-C3C	2.61	131.16	125.62
2	A	408	HEC	CAA-CBA-CGA	-2.60	106.78	113.67
2	J	405	HEC	CAB-C3B-C4B	2.59	128.16	124.79
2	J	404	HEC	CAC-C3C-C4C	2.59	128.47	124.91
2	S	403	HEC	CHC-C4B-NB	-2.58	121.17	124.37
2	A	408	HEC	C2A-C1A-NA	-2.56	107.85	110.32
2	S	408	HEC	C2A-C1A-NA	-2.56	107.86	110.32
2	J	405	HEC	CHB-C1B-NB	2.55	127.17	124.42
2	J	401	HEC	CAD-C3D-C4D	2.54	129.13	124.70
2	J	407	HEC	CMD-C2D-C1D	2.54	129.01	125.03
2	A	402	HEC	C3C-C4C-NC	-2.54	107.33	110.15
2	S	403	HEC	CHA-C1A-C2A	2.54	128.87	124.86
2	S	408	HEC	C3B-C4B-NB	-2.54	107.39	110.17
2	J	405	HEC	C4B-NB-C1B	2.53	108.20	105.21
2	S	408	HEC	C4B-NB-C1B	2.53	108.20	105.21
2	S	407	HEC	CBD-CAD-C3D	-2.51	105.59	112.53
2	J	404	HEC	CBC-CAC-C3C	2.50	119.21	112.42
2	A	405	HEC	CMC-C2C-C3C	2.50	130.92	125.62
2	A	401	HEC	CAD-C3D-C4D	2.49	129.04	124.70
2	J	403	HEC	C2A-C1A-NA	-2.46	107.95	110.32
2	S	404	HEC	C4B-NB-C1B	2.44	108.09	105.21
2	S	401	HEC	CAD-C3D-C4D	2.42	128.91	124.70
2	S	406	HEC	CAD-CBD-CGD	-2.41	107.28	113.67
2	A	402	HEC	CHB-C4A-NA	2.41	127.08	124.45
2	A	408	HEC	CAB-C3B-C4B	2.41	127.92	124.79
2	S	404	HEC	CAC-C3C-C4C	2.39	128.20	124.91
2	J	404	HEC	C4B-NB-C1B	2.38	108.03	105.21
2	A	407	HEC	C3C-C4C-NC	-2.38	107.51	110.15
2	A	406	HEC	C4B-NB-C1B	2.37	108.02	105.21
2	A	408	HEC	CAA-C2A-C1A	2.37	129.67	124.85
2	S	407	HEC	C4B-NB-C1B	2.36	108.00	105.21
2	J	402	HEC	CBC-CAC-C3C	-2.34	106.07	112.42
2	S	403	HEC	C3C-C4C-NC	-2.33	107.57	110.15
2	S	403	HEC	C1A-CHA-C4D	-2.33	121.08	126.02
2	S	403	HEC	CAD-C3D-C4D	2.32	128.74	124.70
2	S	401	HEC	C4B-NB-C1B	2.30	107.93	105.21
2	J	408	HEC	CAB-C3B-C2B	-2.29	123.35	127.56
2	J	407	HEC	CAD-CBD-CGD	-2.28	107.61	113.67
2	A	408	HEC	C4B-NB-C1B	2.28	107.91	105.21

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	S	403	HEC	CAB-C3B-C2B	-2.28	123.37	127.56
2	S	408	HEC	CAB-C3B-C2B	-2.28	123.38	127.56
2	A	405	HEC	CHC-C4B-C3B	2.27	129.42	125.23
2	S	403	HEC	C2A-C1A-NA	-2.27	108.13	110.32
2	J	404	HEC	C2A-C1A-NA	-2.27	108.14	110.32
2	J	408	HEC	C2A-C1A-NA	-2.26	108.14	110.32
2	S	403	HEC	C2B-C1B-NB	-2.26	107.30	109.90
2	S	401	HEC	CMC-C2C-C3C	2.25	130.40	125.62
2	J	407	HEC	C3C-C4C-NC	-2.25	107.66	110.15
2	S	407	HEC	CMA-C3A-C4A	-2.24	120.79	124.73
2	S	401	HEC	C4C-CHD-C1D	-2.23	121.00	126.25
2	S	401	HEC	C3B-C4B-NB	-2.22	107.73	110.17
2	J	407	HEC	C3B-C4B-NB	-2.22	107.74	110.17
2	J	401	HEC	C4B-NB-C1B	2.22	107.83	105.21
2	J	407	HEC	CAC-C3C-C4C	2.21	127.96	124.91
2	J	408	HEC	C4B-NB-C1B	2.21	107.83	105.21
2	J	407	HEC	C4B-NB-C1B	2.21	107.82	105.21
2	S	401	HEC	CMC-C2C-C1C	-2.21	122.06	125.42
2	J	407	HEC	CAB-C3B-C2B	-2.21	123.50	127.56
2	J	408	HEC	C3B-C4B-NB	-2.20	107.75	110.17
2	J	405	HEC	C2A-C1A-NA	-2.20	108.20	110.32
2	S	403	HEC	C4B-NB-C1B	2.20	107.81	105.21
2	S	408	HEC	C3C-C4C-NC	-2.20	107.71	110.15
2	A	406	HEC	CAB-C3B-C4B	2.20	127.65	124.79
2	S	408	HEC	CAD-C3D-C4D	2.20	128.52	124.70
2	S	403	HEC	C1C-CHC-C4B	-2.19	121.10	126.25
2	S	402	HEC	CHC-C4B-C3B	2.19	129.26	125.23
2	J	401	HEC	C2A-C1A-NA	-2.19	108.21	110.32
2	J	405	HEC	C3C-C4C-NC	-2.19	107.73	110.15
2	A	405	HEC	C4B-NB-C1B	2.18	107.79	105.21
2	S	404	HEC	C3C-C4C-NC	-2.17	107.74	110.15
2	J	405	HEC	CAB-C3B-C2B	-2.17	123.58	127.56
2	S	408	HEC	CAA-CBA-CGA	-2.16	107.94	113.67
2	A	407	HEC	CAB-C3B-C4B	2.15	127.59	124.79
2	A	408	HEC	C3B-C4B-NB	-2.15	107.81	110.17
2	A	403	HEC	CAC-C3C-C4C	2.15	127.87	124.91
2	J	406	HEC	C4B-NB-C1B	2.15	107.75	105.21
2	S	405	HEC	C2A-C1A-NA	-2.14	108.25	110.32
2	A	401	HEC	CHC-C4B-C3B	2.14	129.17	125.23
2	A	402	HEC	CAC-C3C-C4C	2.14	127.85	124.91
2	J	407	HEC	CAD-C3D-C4D	2.13	128.41	124.70
2	S	407	HEC	C3D-C4D-ND	-2.13	108.29	110.35

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	S	401	HEC	CBB-CAB-C3B	-2.13	106.66	112.42
2	A	401	HEC	C4B-NB-C1B	2.12	107.72	105.21
2	A	401	HEC	CAA-CBA-CGA	-2.12	108.04	113.67
2	S	404	HEC	C2A-C1A-NA	-2.11	108.28	110.32
2	J	408	HEC	CAD-C3D-C4D	2.11	128.38	124.70
2	A	404	HEC	CAC-C3C-C4C	2.11	127.81	124.91
2	S	406	HEC	C4B-NB-C1B	2.10	107.69	105.21
2	A	401	HEC	C3B-C4B-NB	-2.10	107.87	110.17
2	A	407	HEC	C4B-NB-C1B	2.10	107.69	105.21
2	A	401	HEC	CAC-C3C-C4C	2.09	127.79	124.91
2	J	406	HEC	C2A-C1A-NA	-2.09	108.31	110.32
2	S	405	HEC	CAB-C3B-C4B	2.09	127.51	124.79
2	A	404	HEC	C4B-NB-C1B	2.09	107.68	105.21
2	S	404	HEC	CHA-C1A-C2A	2.08	128.15	124.86
2	J	407	HEC	C2A-C1A-NA	-2.07	108.32	110.32
2	A	407	HEC	C3B-C4B-NB	-2.07	107.90	110.17
2	A	408	HEC	CHB-C1B-NB	2.07	126.66	124.42
2	A	406	HEC	CAC-C3C-C2C	-2.07	123.62	126.89
2	S	403	HEC	CAA-CBA-CGA	-2.06	108.19	113.67
2	S	406	HEC	CAC-C3C-C4C	2.06	127.75	124.91
2	S	405	HEC	C4B-NB-C1B	2.06	107.65	105.21
2	J	407	HEC	CHA-C4D-ND	2.06	126.64	124.42
2	J	401	HEC	C3B-C4B-NB	-2.06	107.91	110.17
2	S	405	HEC	CHB-C1B-NB	2.06	126.64	124.42
2	J	403	HEC	CAB-C3B-C4B	2.05	127.46	124.79
2	A	404	HEC	C2A-C1A-NA	-2.05	108.35	110.32
2	S	401	HEC	CAA-CBA-CGA	-2.05	108.23	113.67
2	S	402	HEC	C2A-C1A-NA	-2.05	108.35	110.32
2	S	405	HEC	C3B-C4B-NB	-2.05	107.93	110.17
2	A	406	HEC	C2B-C1B-NB	-2.04	107.54	109.90
2	J	406	HEC	C3C-C4C-NC	-2.03	107.89	110.15
2	J	406	HEC	C3B-C4B-NB	-2.03	107.94	110.17
2	J	406	HEC	CHB-C1B-NB	2.03	126.61	124.42
2	S	402	HEC	C4B-NB-C1B	2.03	107.61	105.21
2	S	404	HEC	C3B-C4B-NB	-2.03	107.95	110.17
2	J	406	HEC	C3D-C4D-ND	-2.01	108.41	110.35
2	J	402	HEC	CAB-C3B-C2B	-2.01	123.87	127.56

All (14) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	403	HEC	NA

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Mol	Chain	Res	Type	Atom
2	A	404	HEC	NA
2	A	406	HEC	NA
2	A	407	HEC	NA
2	A	408	HEC	NA
2	J	403	HEC	NA
2	J	404	HEC	NA
2	J	405	HEC	NA
2	J	406	HEC	NA
2	J	407	HEC	NA
2	S	404	HEC	NA
2	S	405	HEC	NA
2	S	406	HEC	NA
2	S	408	HEC	NA

All (73) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	J	408	HEC	C3D-CAD-CBD-CGD
2	A	405	HEC	C2C-C3C-CAC-CBC
2	A	405	HEC	C4C-C3C-CAC-CBC
2	J	401	HEC	C2C-C3C-CAC-CBC
2	S	402	HEC	C4C-C3C-CAC-CBC
2	J	401	HEC	C4C-C3C-CAC-CBC
2	S	402	HEC	C2C-C3C-CAC-CBC
2	S	407	HEC	C3A-C2A-CAA-CBA
2	A	401	HEC	C2B-C3B-CAB-CBB
2	S	407	HEC	C1A-C2A-CAA-CBA
2	A	405	HEC	C2B-C3B-CAB-CBB
2	S	401	HEC	C2C-C3C-CAC-CBC
2	S	407	HEC	C3D-CAD-CBD-CGD
2	S	408	HEC	C3D-CAD-CBD-CGD
2	S	401	HEC	C4C-C3C-CAC-CBC
2	S	405	HEC	C2C-C3C-CAC-CBC
2	A	407	HEC	C3D-CAD-CBD-CGD
2	A	408	HEC	C3D-CAD-CBD-CGD
2	S	404	HEC	C3D-CAD-CBD-CGD
2	A	401	HEC	C4B-C3B-CAB-CBB
2	A	405	HEC	C4B-C3B-CAB-CBB
2	S	405	HEC	C4C-C3C-CAC-CBC
2	J	405	HEC	C2A-CAA-CBA-CGA
2	S	405	HEC	C2A-CAA-CBA-CGA
2	S	403	HEC	C2B-C3B-CAB-CBB

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Mol	Chain	Res	Type	Atoms
2	A	404	HEC	C3D-CAD-CBD-CGD
2	J	408	HEC	C2B-C3B-CAB-CBB
2	S	408	HEC	C2B-C3B-CAB-CBB
2	J	404	HEC	C2C-C3C-CAC-CBC
2	A	405	HEC	C2A-CAA-CBA-CGA
2	J	404	HEC	C3D-CAD-CBD-CGD
2	J	407	HEC	C3D-CAD-CBD-CGD
2	S	402	HEC	C2B-C3B-CAB-CBB
2	S	404	HEC	C2C-C3C-CAC-CBC
2	A	408	HEC	C1A-C2A-CAA-CBA
2	A	408	HEC	C3A-C2A-CAA-CBA
2	J	404	HEC	C1A-C2A-CAA-CBA
2	S	403	HEC	C4B-C3B-CAB-CBB
2	S	404	HEC	C1A-C2A-CAA-CBA
2	A	408	HEC	CAA-CBA-CGA-O1A
2	S	403	HEC	C3D-CAD-CBD-CGD
2	J	407	HEC	C2B-C3B-CAB-CBB
2	S	404	HEC	CAD-CBD-CGD-O2D
2	S	404	HEC	CAD-CBD-CGD-O1D
2	A	408	HEC	CAA-CBA-CGA-O2A
2	J	404	HEC	C3A-C2A-CAA-CBA
2	S	404	HEC	C3A-C2A-CAA-CBA
2	A	404	HEC	CAD-CBD-CGD-O2D
2	A	408	HEC	CAD-CBD-CGD-O2D
2	S	407	HEC	CAD-CBD-CGD-O2D
2	A	404	HEC	C1A-C2A-CAA-CBA
2	J	404	HEC	CAD-CBD-CGD-O2D
2	A	404	HEC	CAD-CBD-CGD-O1D
2	J	408	HEC	CAD-CBD-CGD-O2D
2	J	408	HEC	CAD-CBD-CGD-O1D
2	S	407	HEC	CAD-CBD-CGD-O1D
2	J	404	HEC	CAD-CBD-CGD-O1D
2	S	408	HEC	CAD-CBD-CGD-O1D
2	S	408	HEC	CAD-CBD-CGD-O2D
2	A	408	HEC	CAD-CBD-CGD-O1D
2	J	408	HEC	C4B-C3B-CAB-CBB
2	A	407	HEC	CAA-CBA-CGA-O2A
2	A	404	HEC	C3A-C2A-CAA-CBA
2	A	406	HEC	CAD-CBD-CGD-O2D
2	J	407	HEC	CAA-CBA-CGA-O2A
2	A	408	HEC	C4D-C3D-CAD-CBD
2	J	401	HEC	CAD-CBD-CGD-O2D

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Mol	Chain	Res	Type	Atoms
2	A	401	HEC	CAD-CBD-CGD-O2D
2	A	404	HEC	CAA-CBA-CGA-O2A
2	A	407	HEC	CAA-CBA-CGA-O1A
2	S	401	HEC	CAD-CBD-CGD-O2D
2	A	404	HEC	CAA-CBA-CGA-O1A
2	J	401	HEC	CAD-CBD-CGD-O1D

There are no ring outliers.

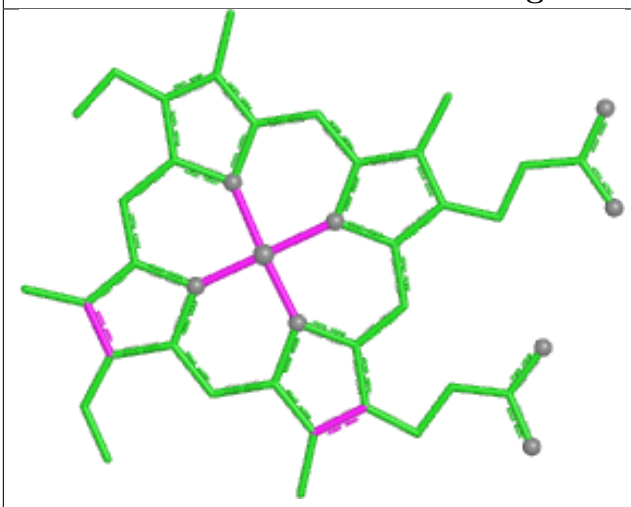
19 monomers are involved in 39 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	403	HEC	2	0
2	S	407	HEC	1	0
2	J	406	HEC	2	0
2	A	408	HEC	1	0
2	J	404	HEC	4	0
2	A	402	HEC	5	0
2	S	403	HEC	4	0
2	A	401	HEC	4	0
2	S	401	HEC	2	0
2	J	408	HEC	2	0
2	J	402	HEC	3	0
2	A	404	HEC	4	0
2	S	404	HEC	2	0
2	S	406	HEC	2	0
2	A	407	HEC	1	0
2	S	405	HEC	1	0
2	A	406	HEC	1	0
2	J	407	HEC	1	0
2	J	401	HEC	2	0

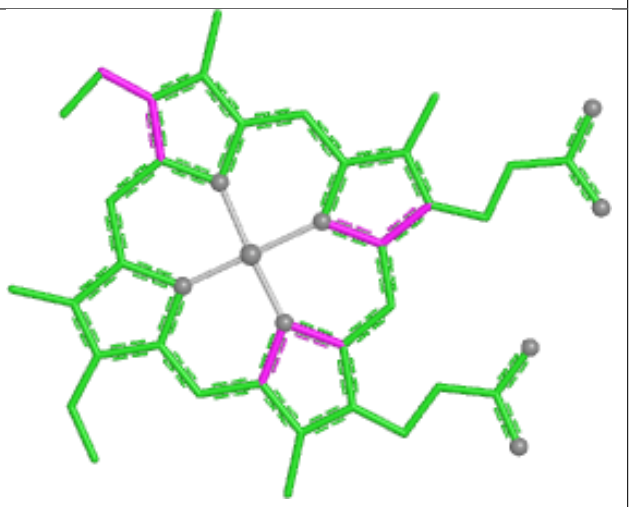
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

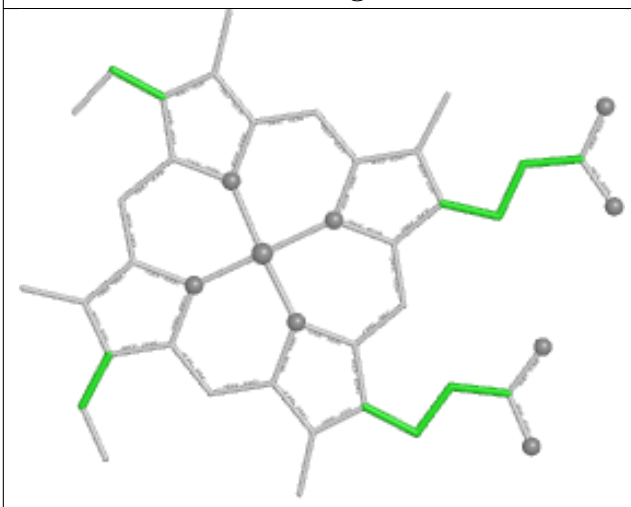
Ligand HEC J 403



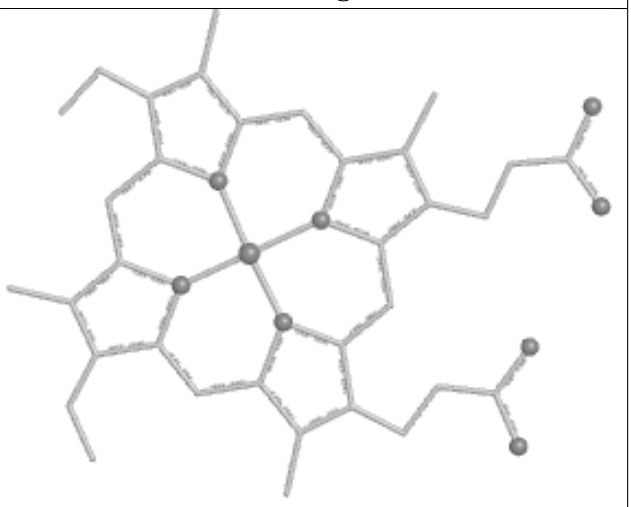
Bond lengths



Bond angles

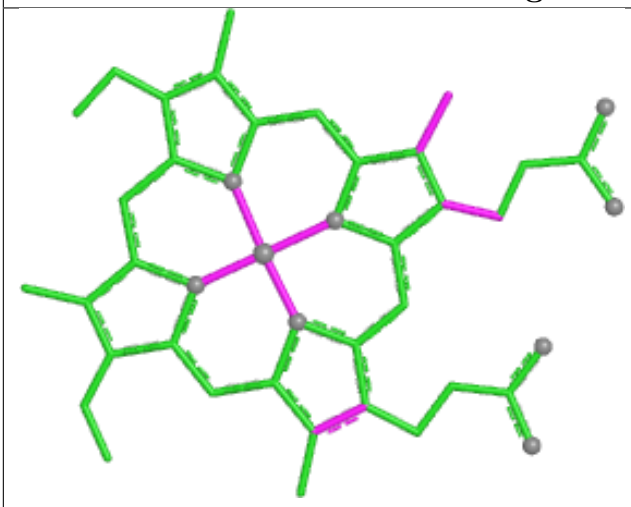


Torsions



Rings

Ligand HEC S 407



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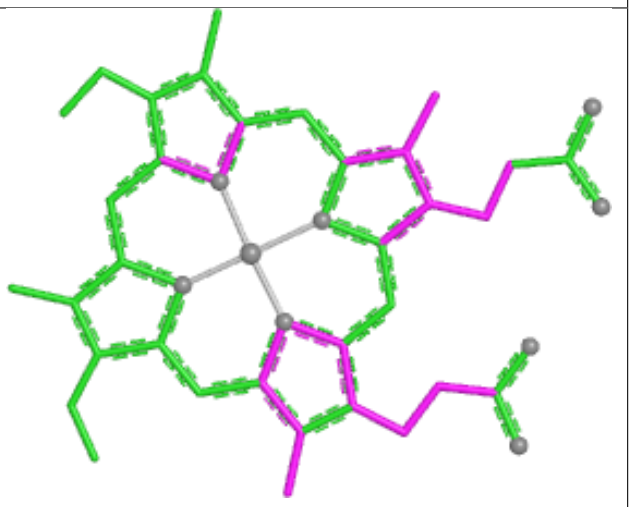

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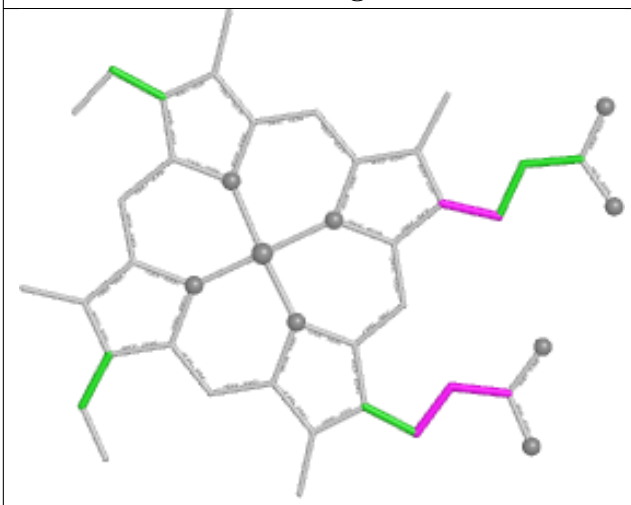

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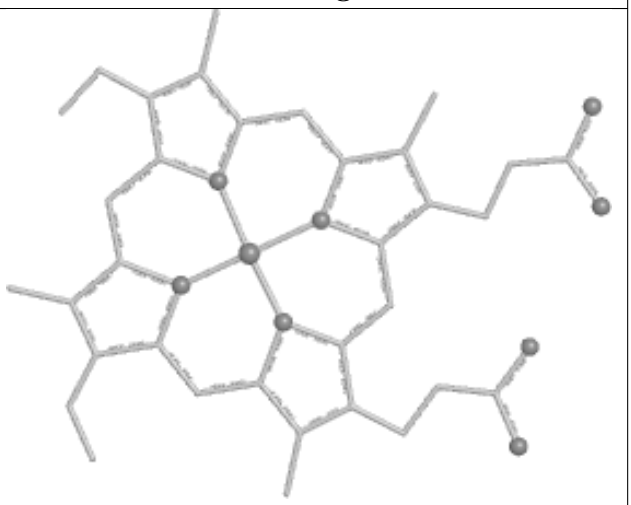
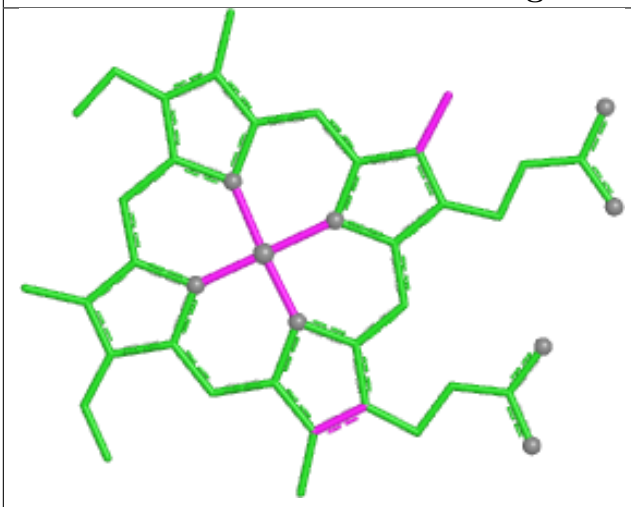


Rings

Ligand HEC J 406



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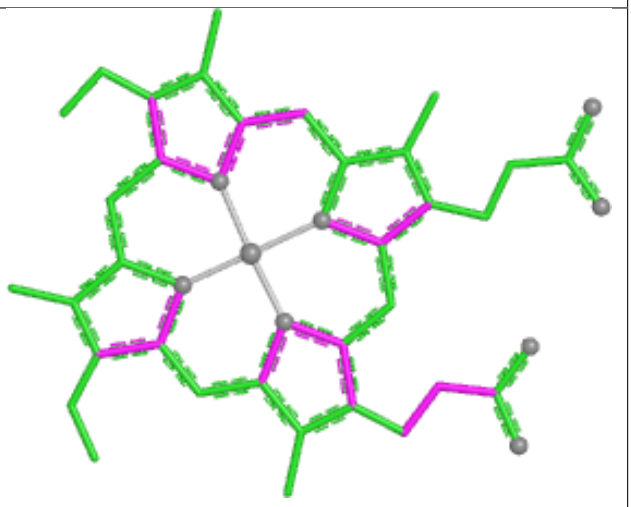

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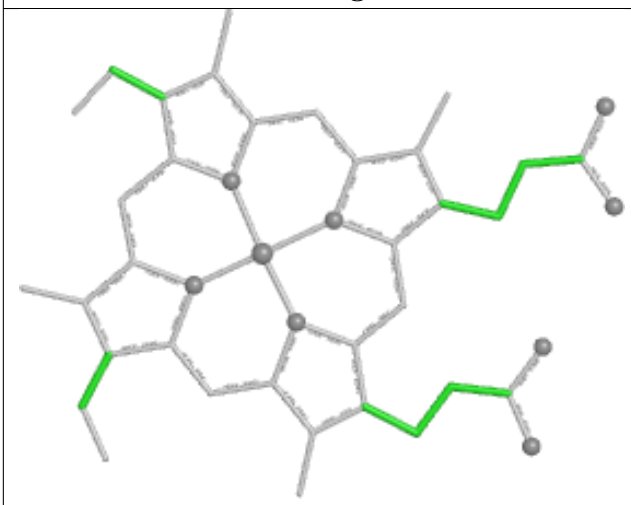

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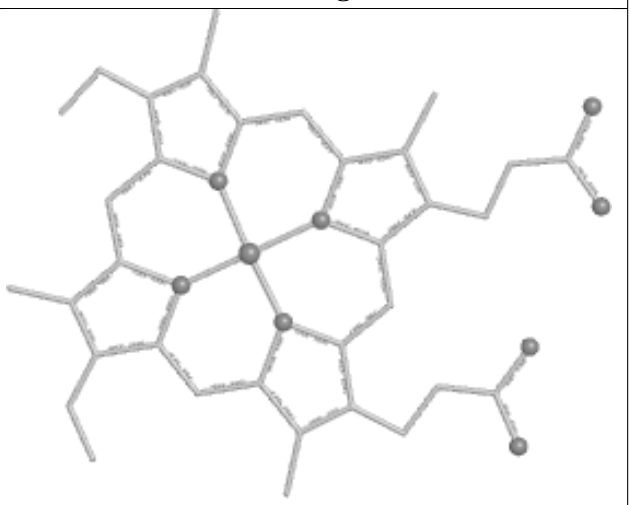
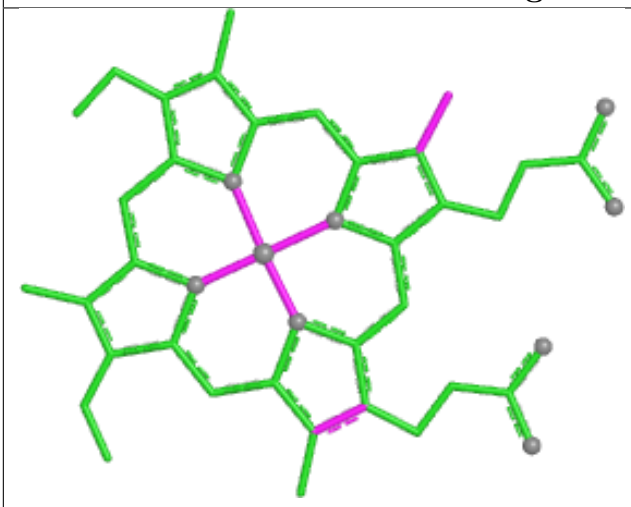


Rings

Ligand HEC S 408



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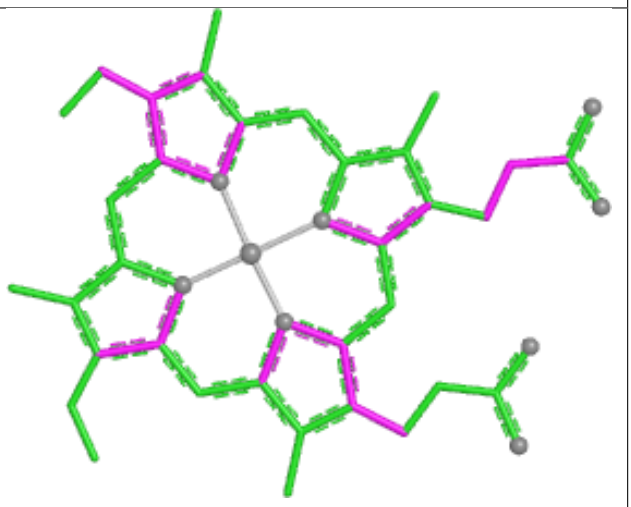

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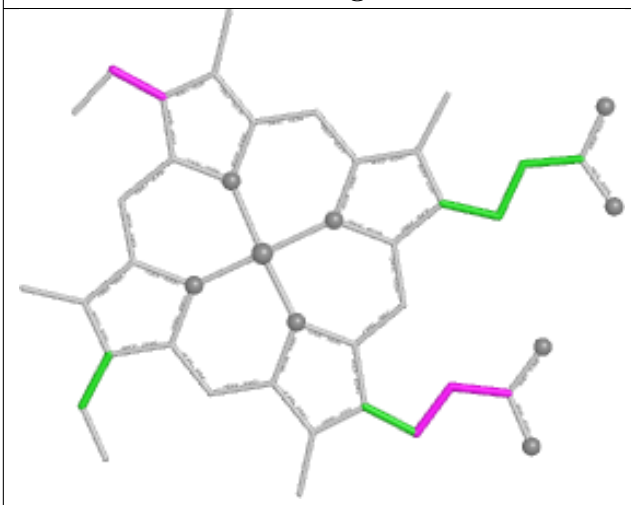

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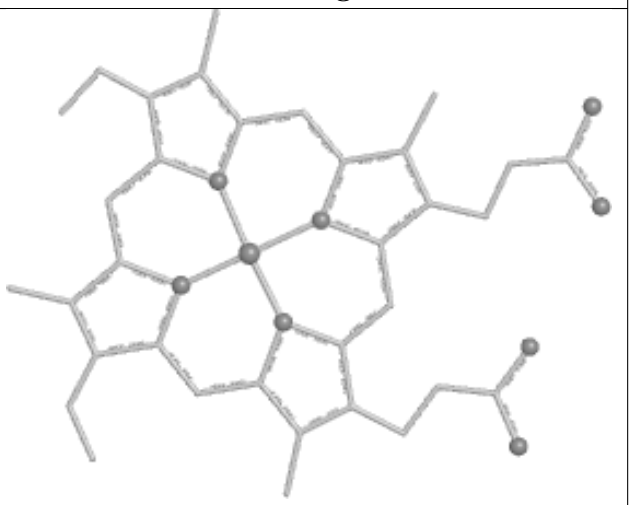
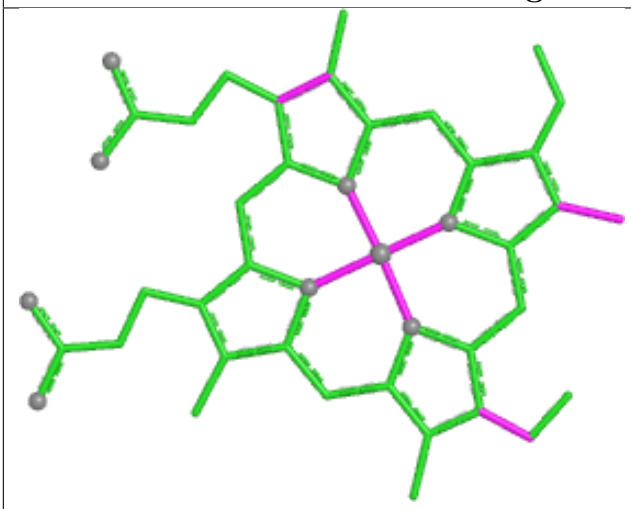


Rings

Ligand HEC S 402



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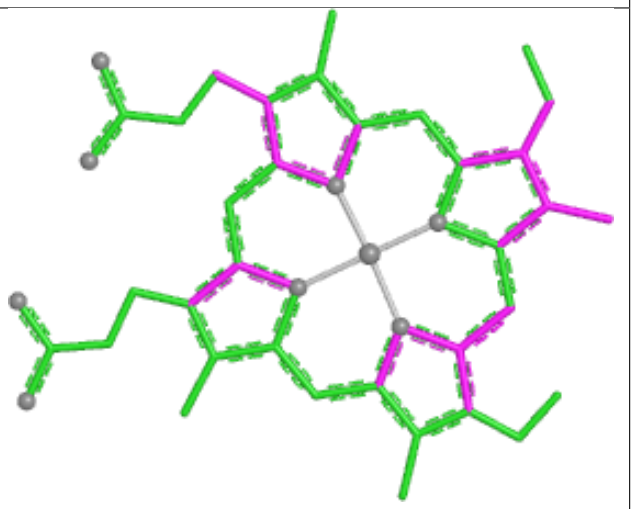

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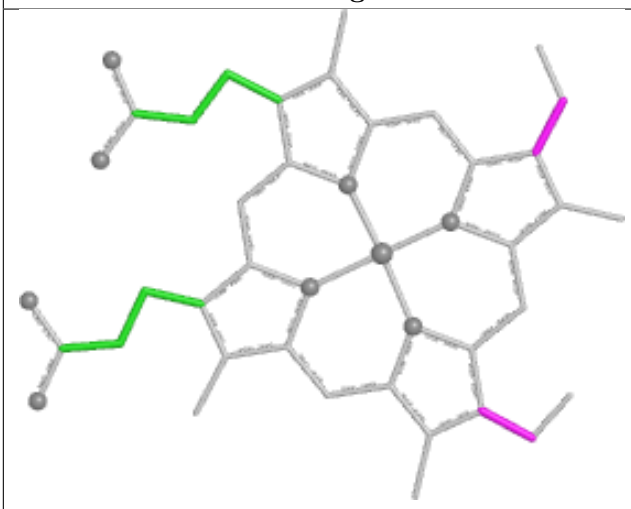

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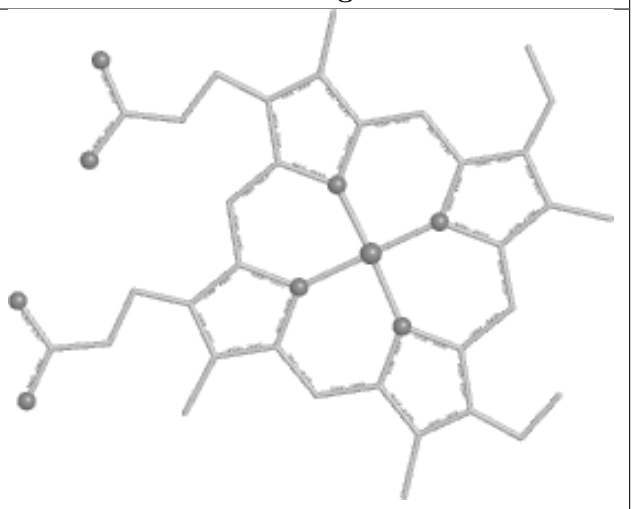
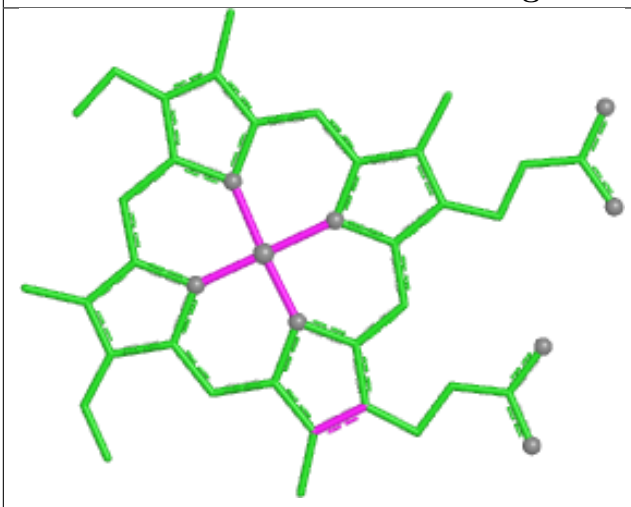


Rings

Ligand HEC A 408



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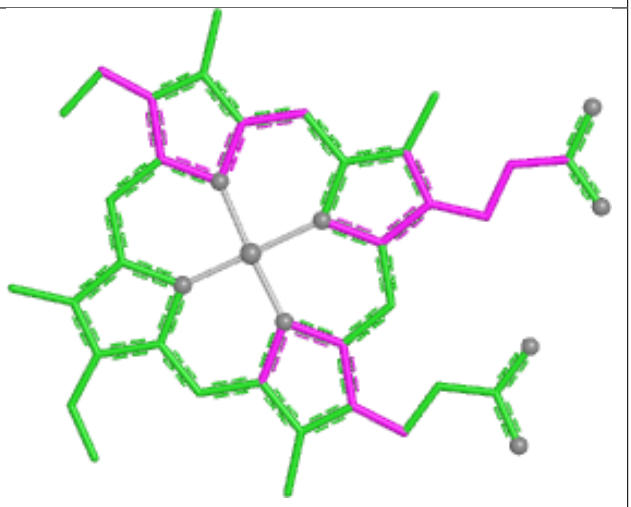

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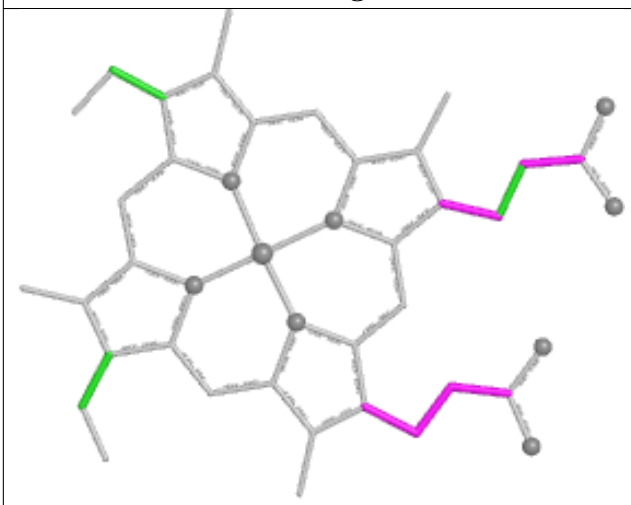

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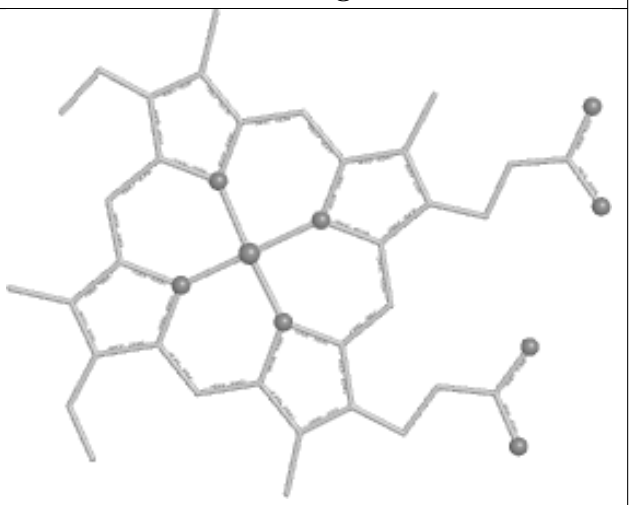
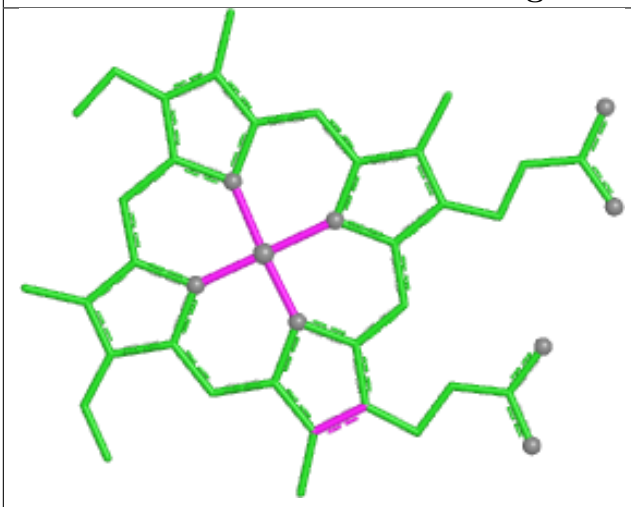


Rings

Ligand HEC J 404



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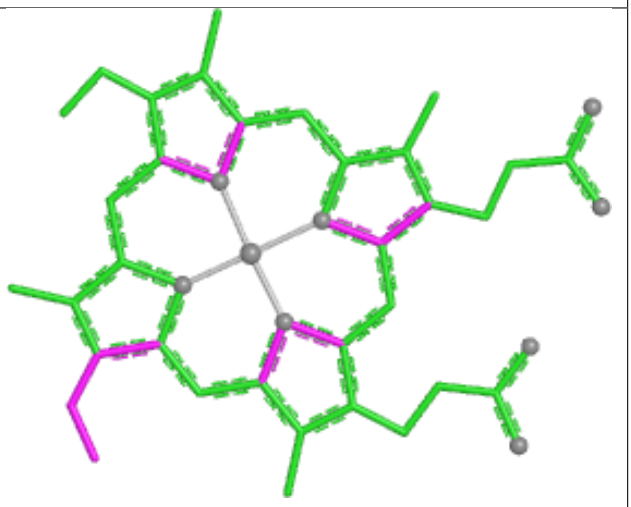
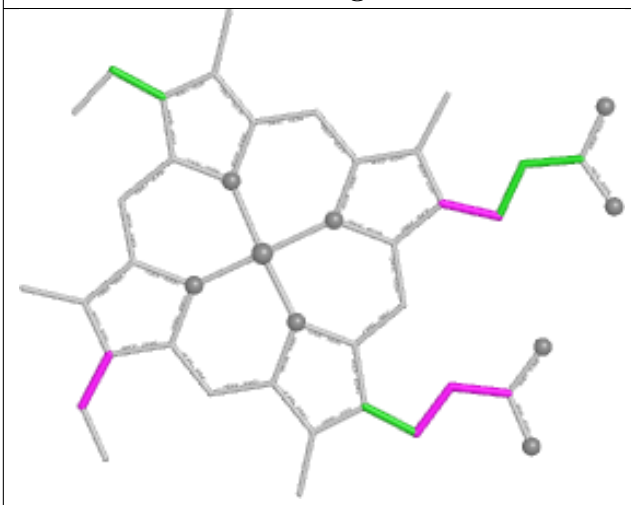


Bond angles



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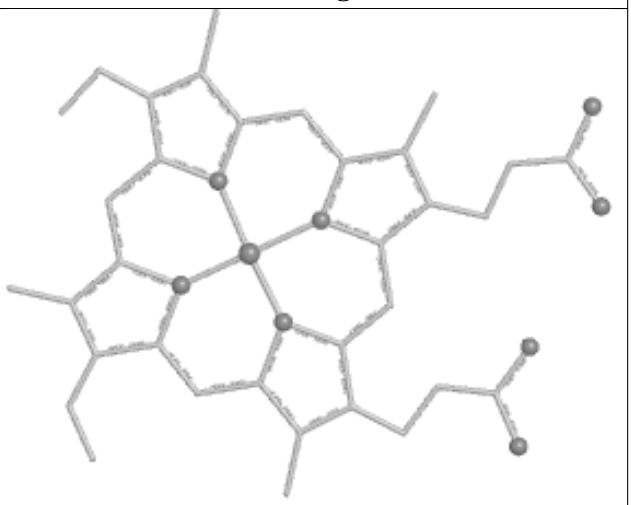
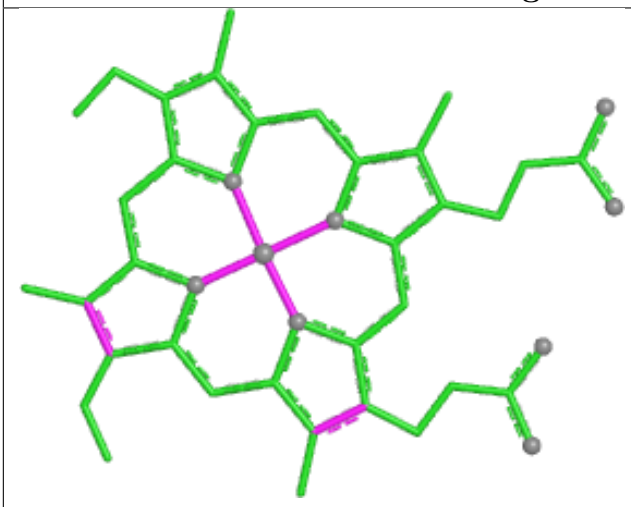


Rings

Ligand HEC A 402



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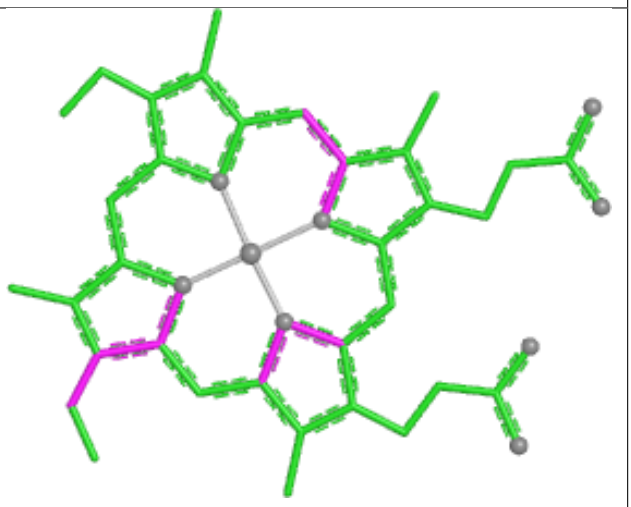

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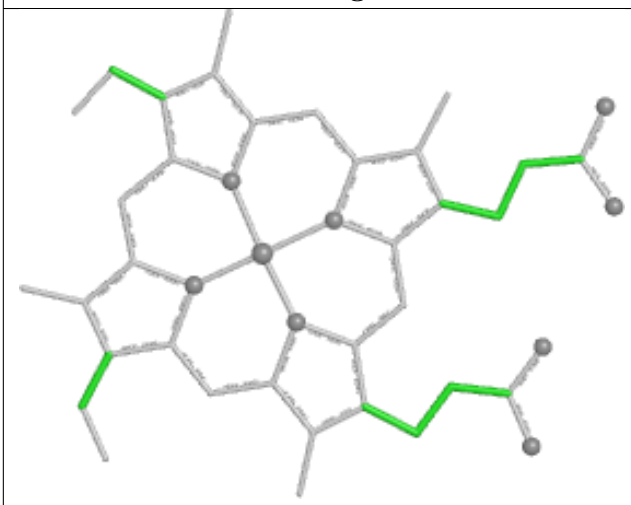

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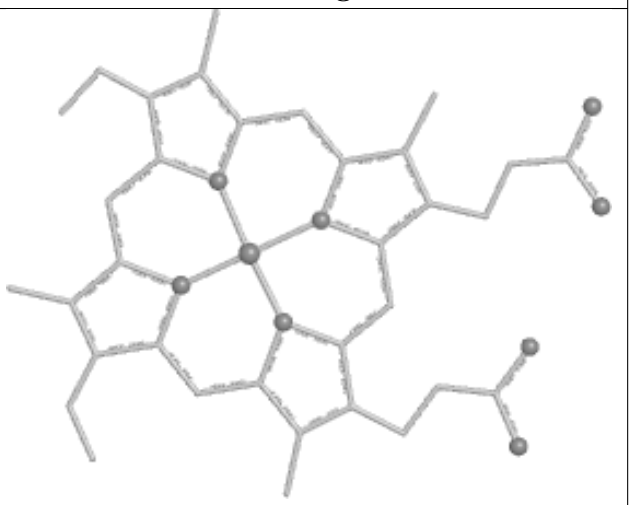
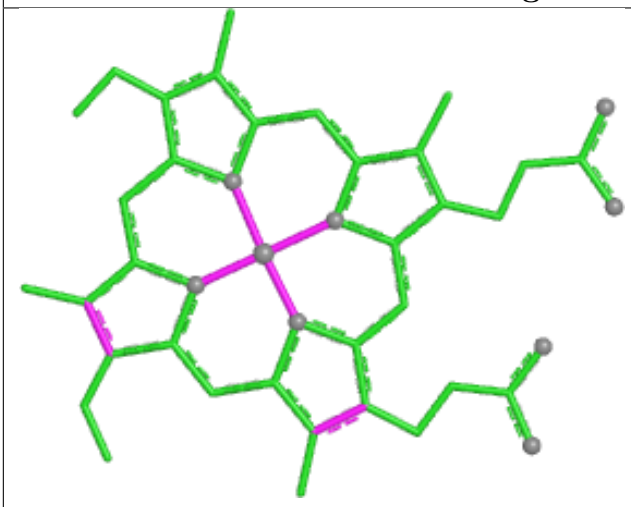


Rings

Ligand HEC A 403



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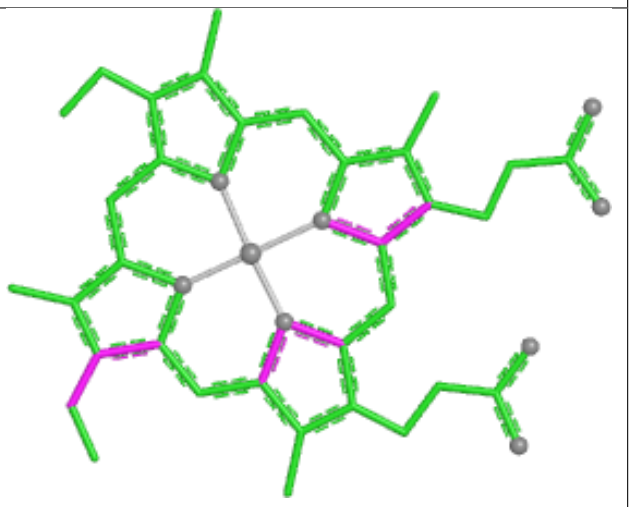

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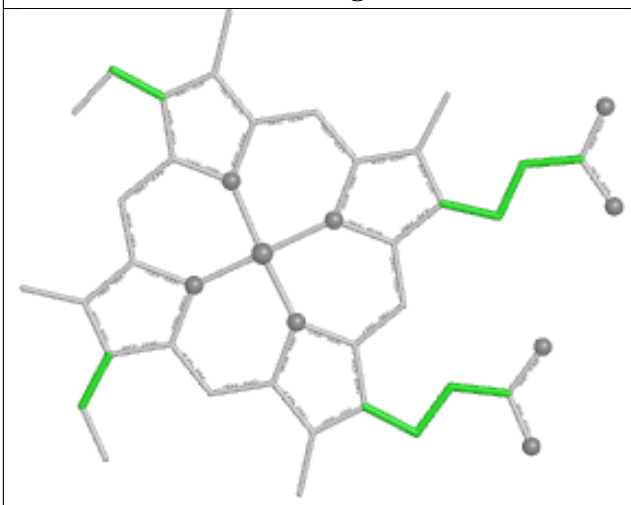

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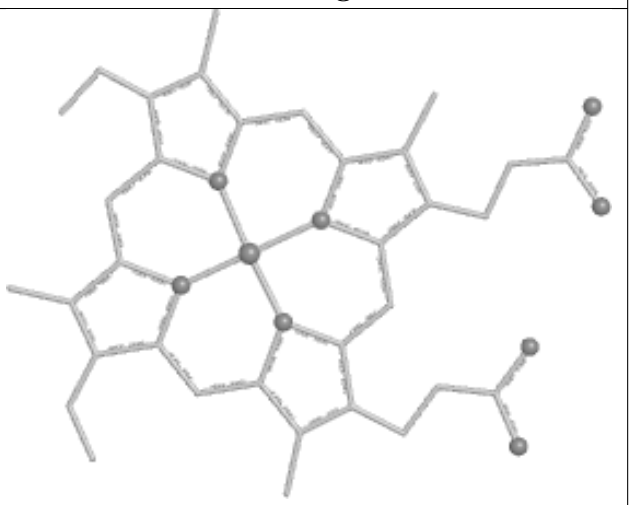
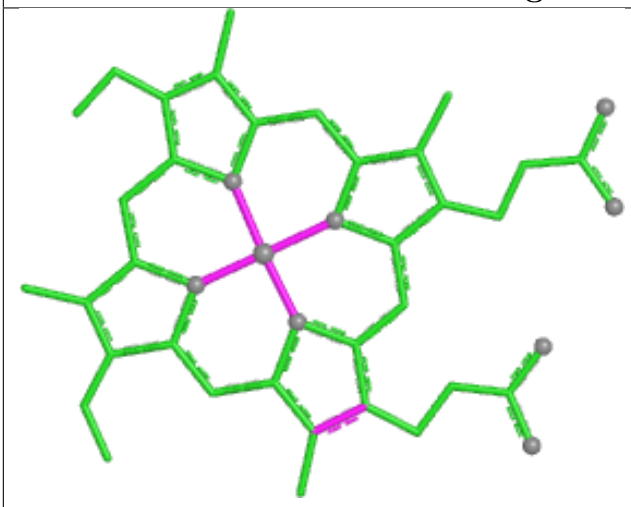


Rings

Ligand HEC S 403



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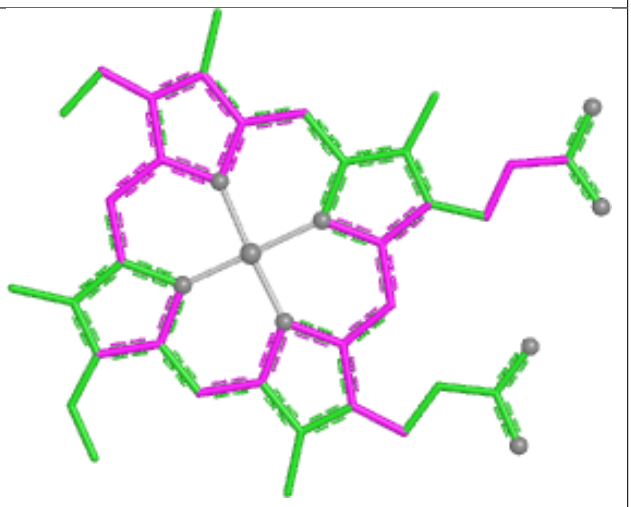

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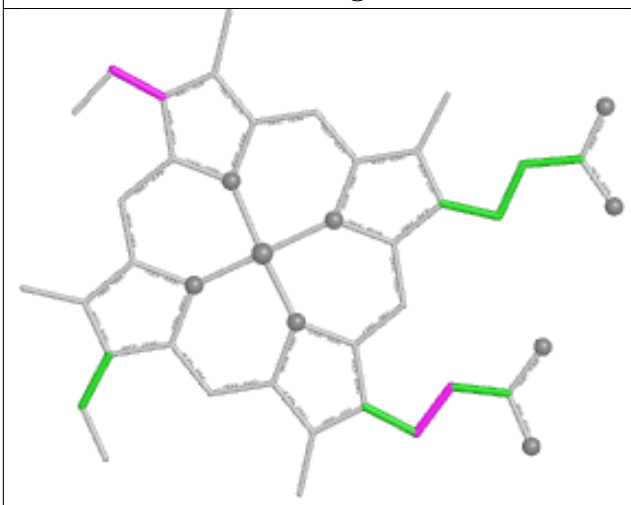

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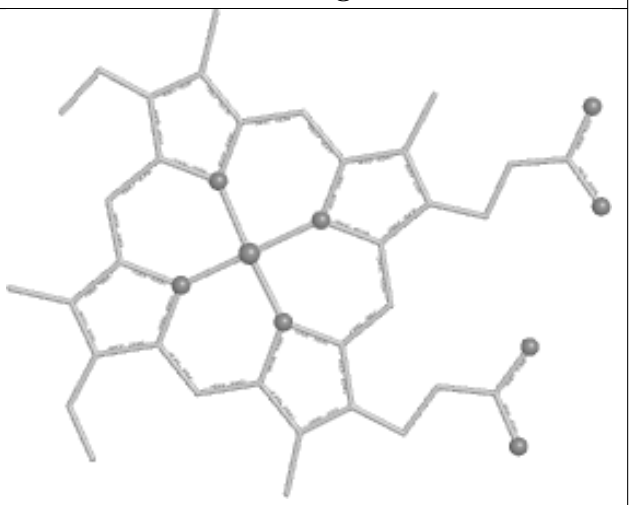
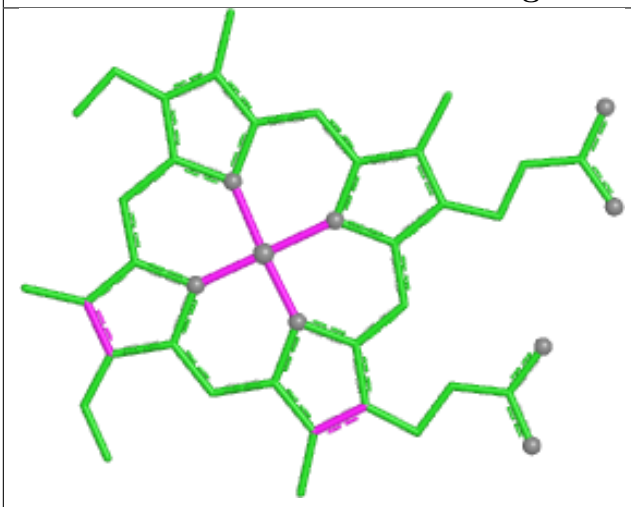


Rings

Ligand HEC A 401



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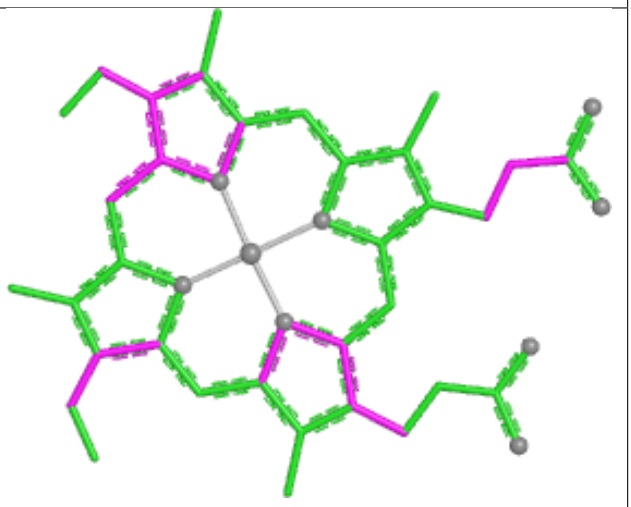
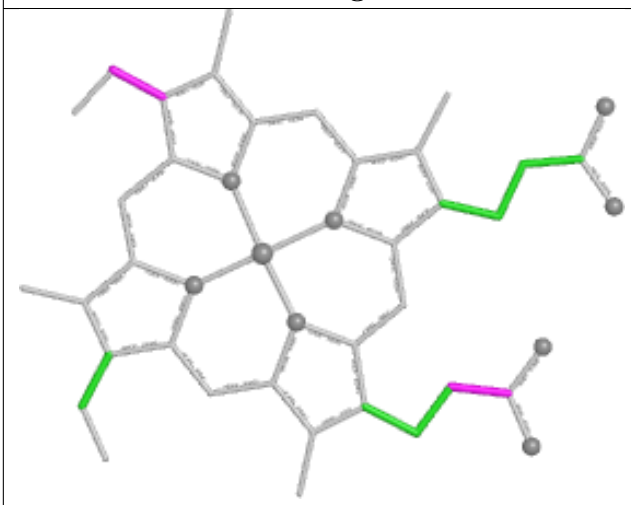


Bond angles



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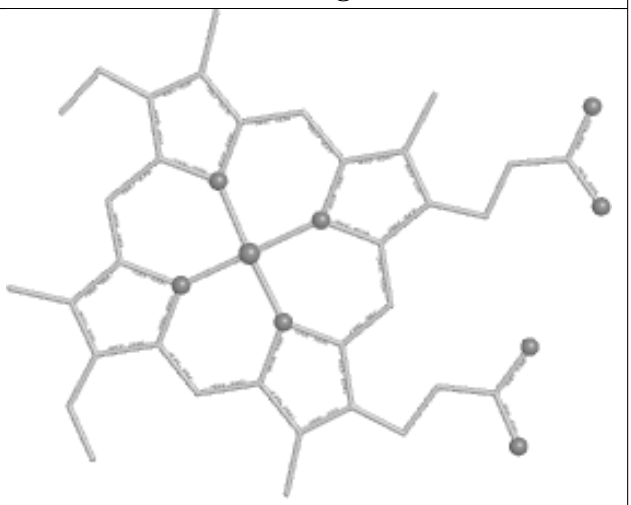
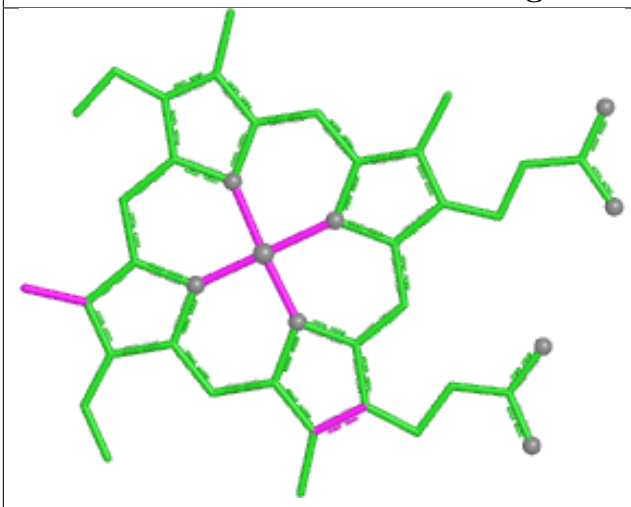


Rings

Ligand HEC S 401



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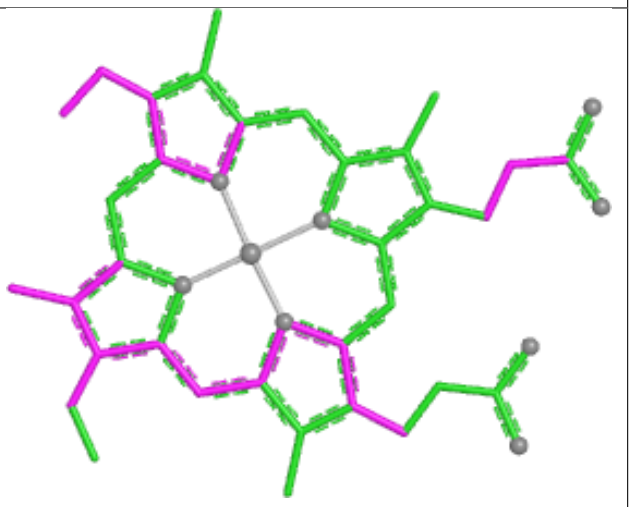

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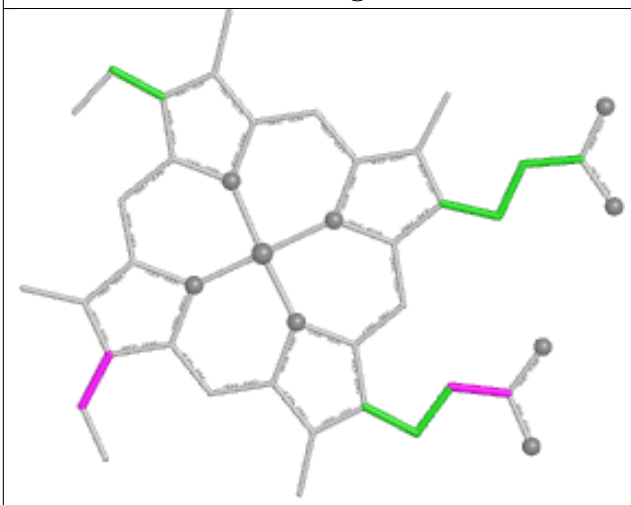

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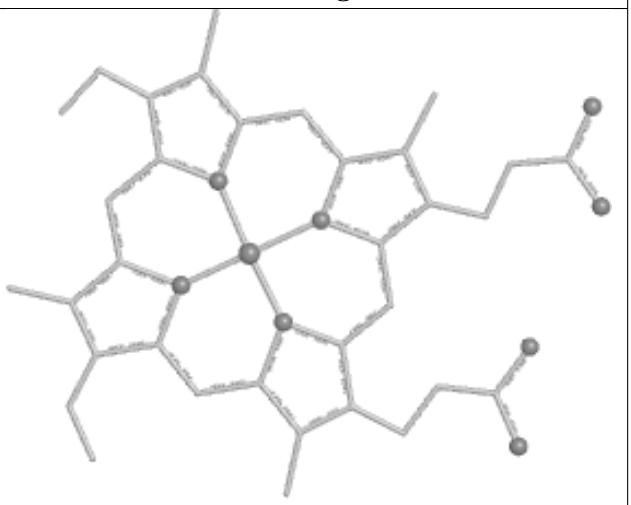
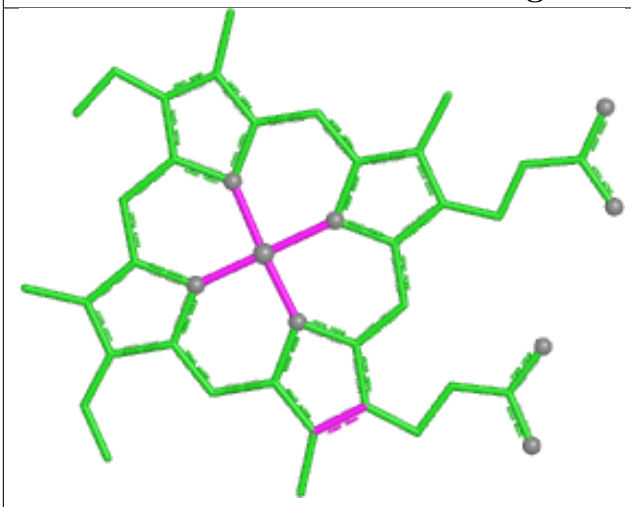


Rings

Ligand HEC J 408



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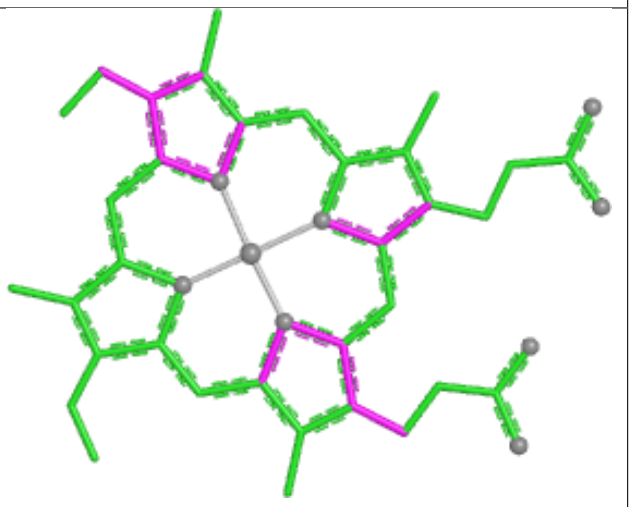
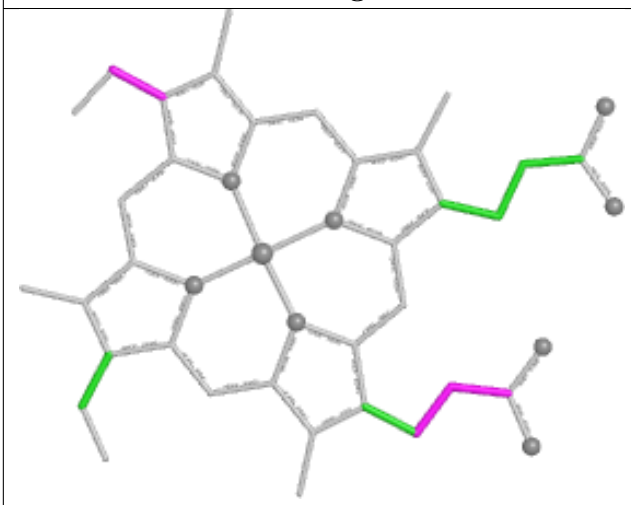


Bond angles



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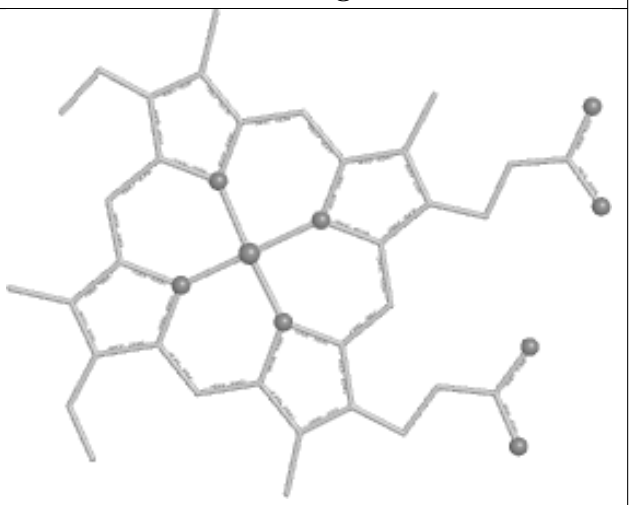
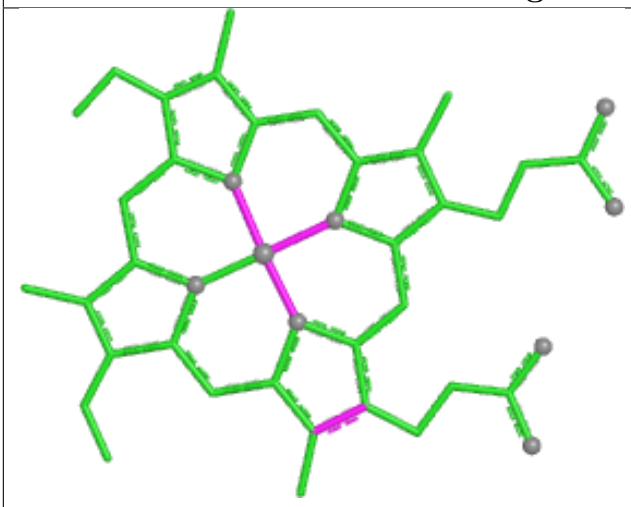


Rings

Ligand HEC J 402



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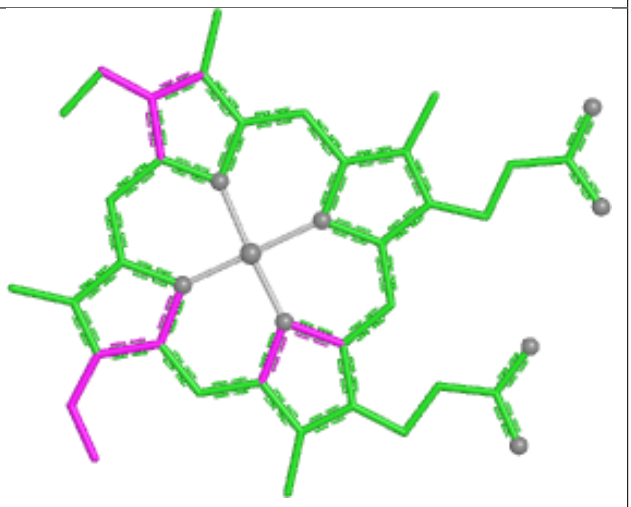
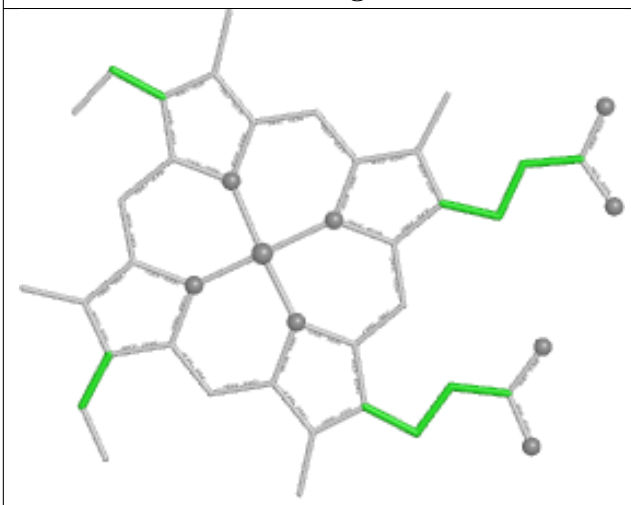


Bond angles



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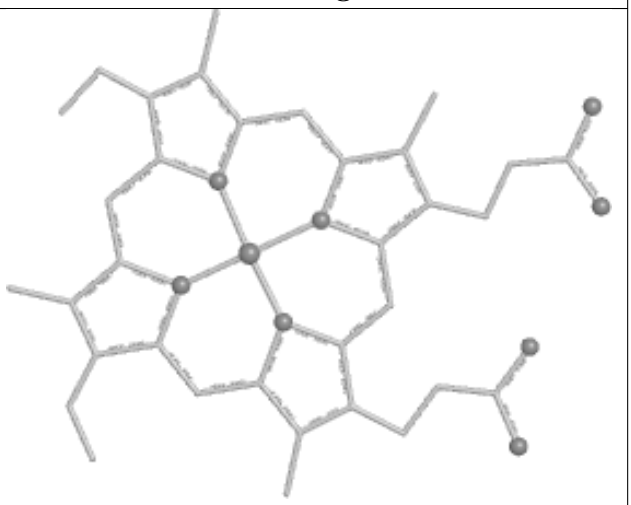
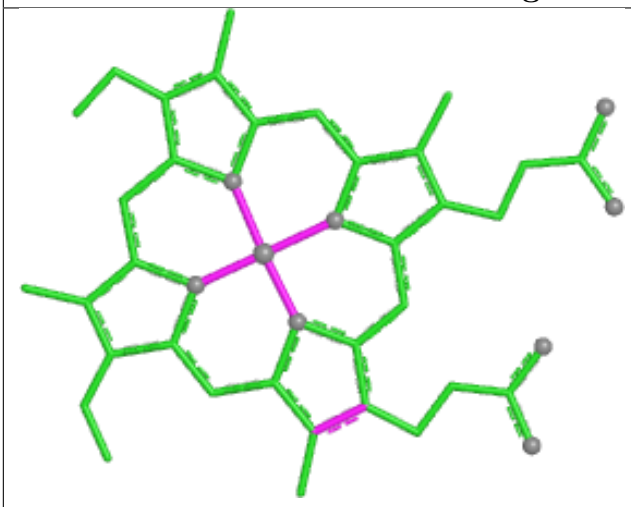
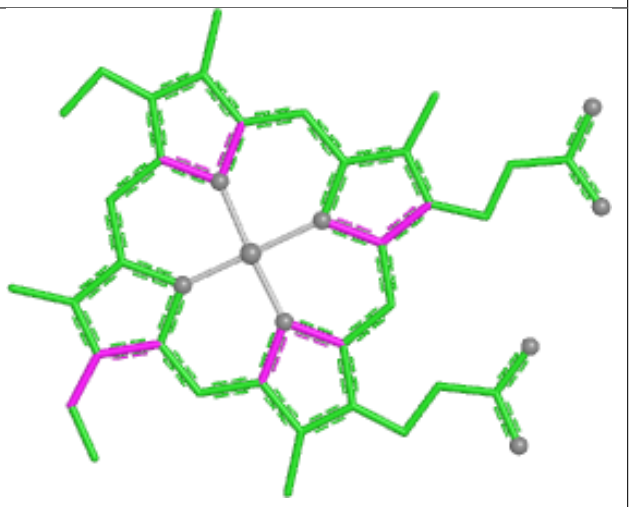


Rings

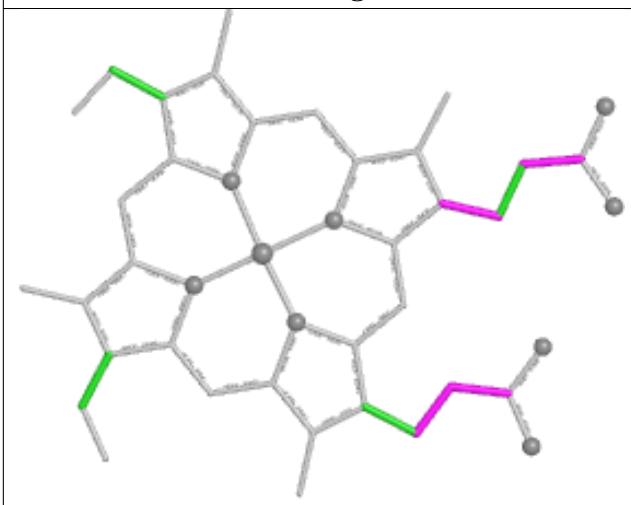
Ligand HEC A 404



Bond lengths



Bond angles



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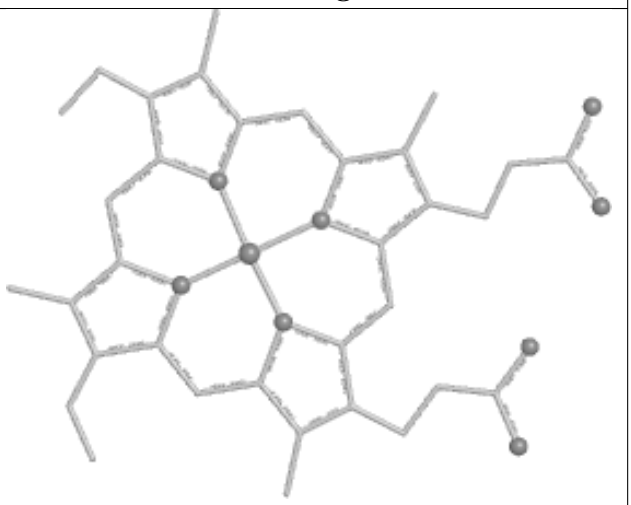
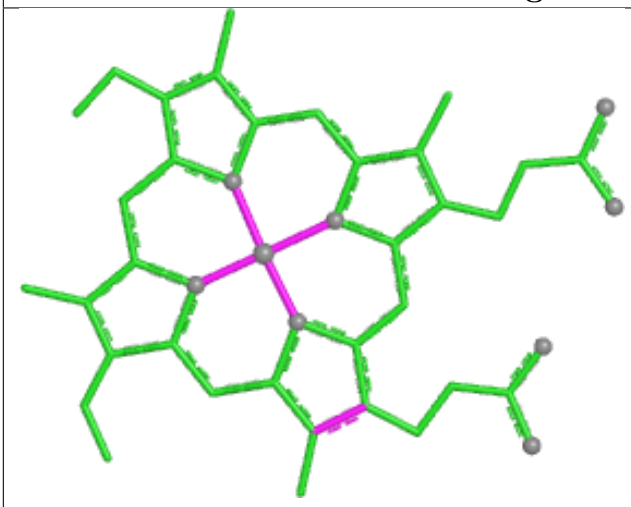
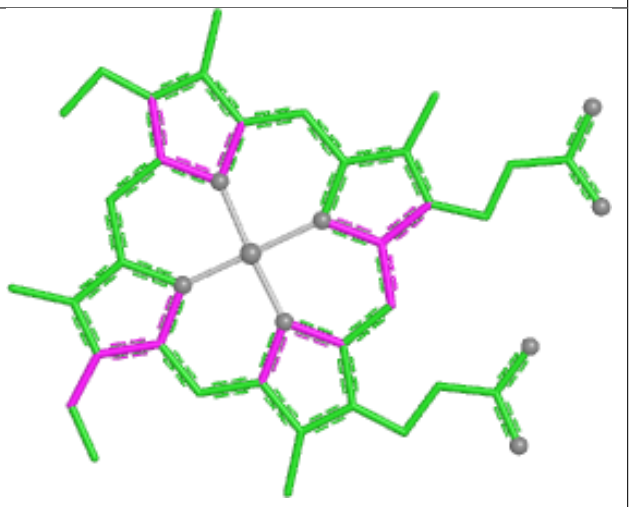


Rings

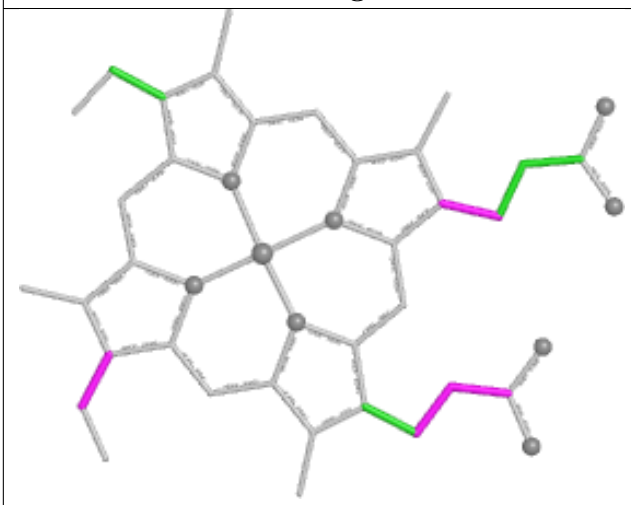
Ligand HEC S 404



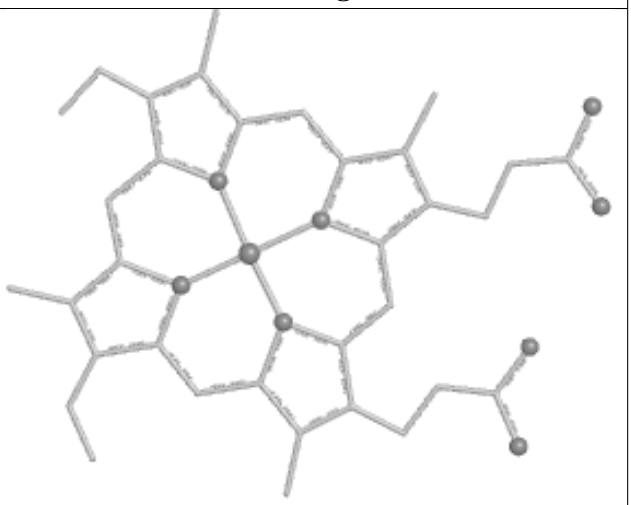
Bond lengths



Bond angles

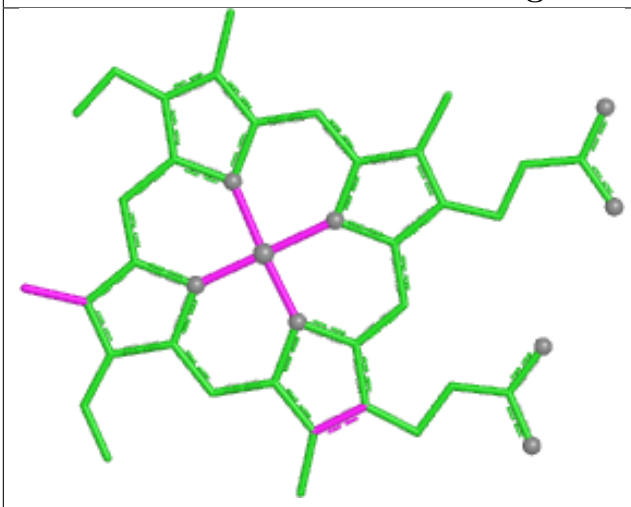


Torsions



Rings

Ligand HEC J 405



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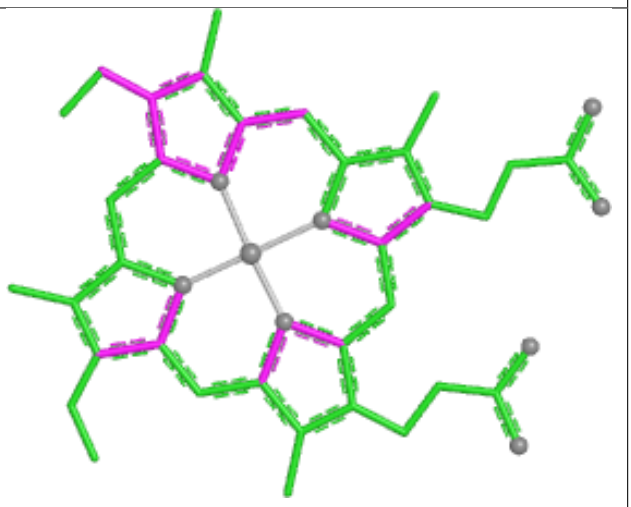
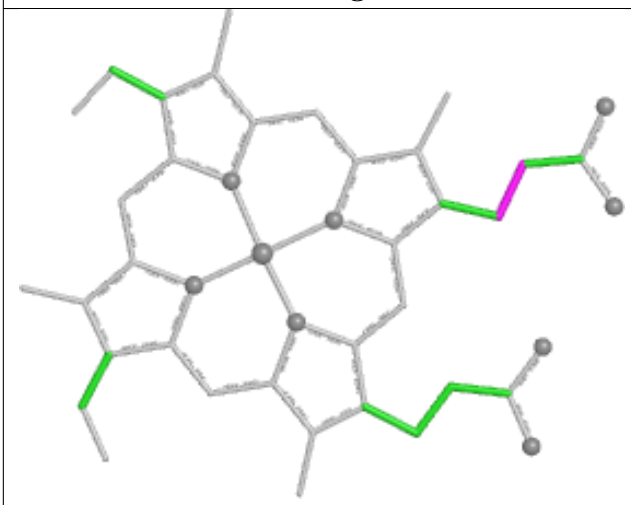


Bond angles



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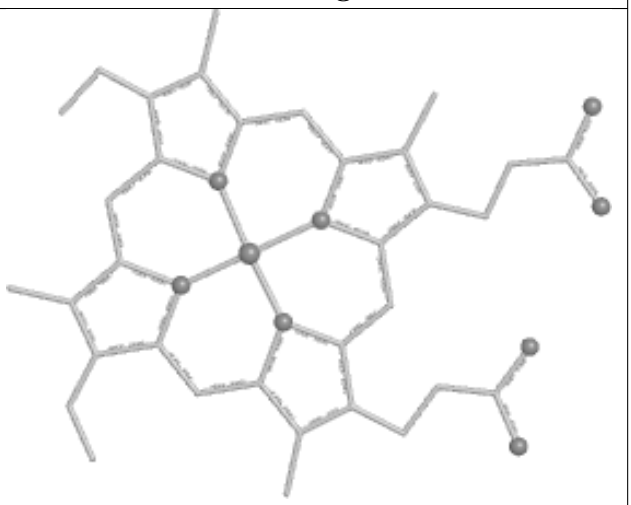
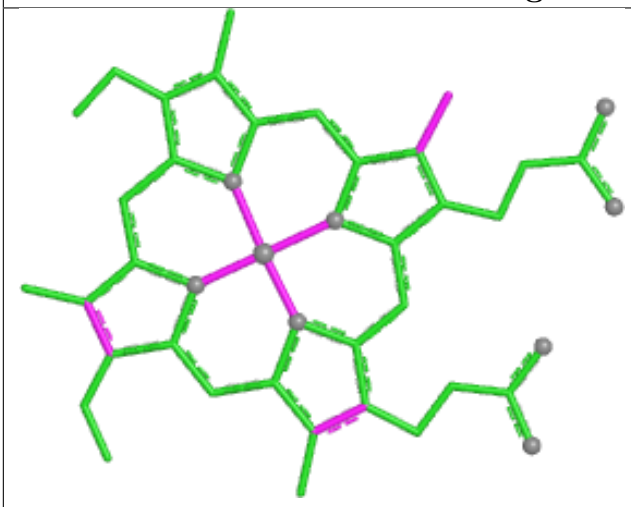


Rings

Ligand HEC S 406



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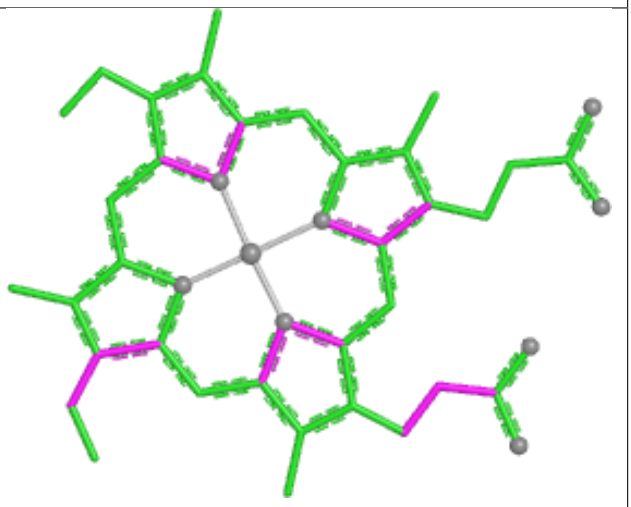
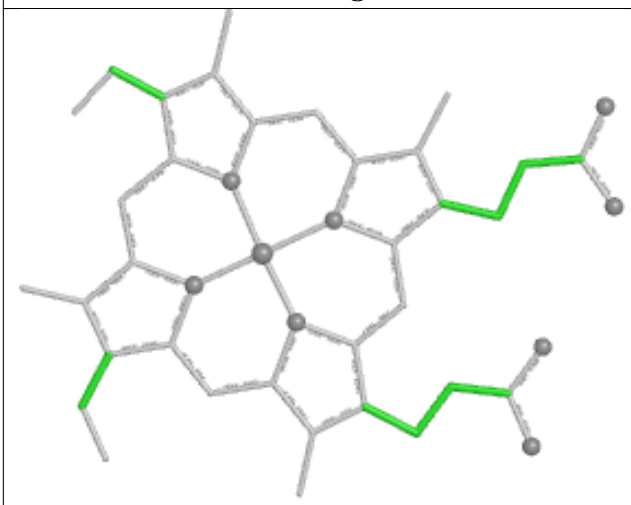


Bond angles



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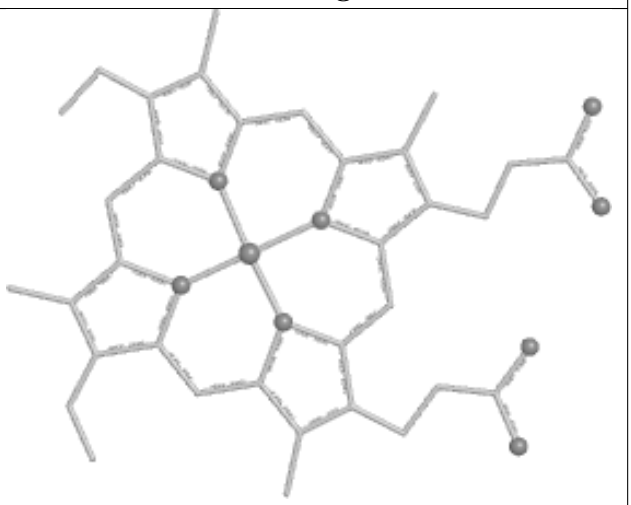
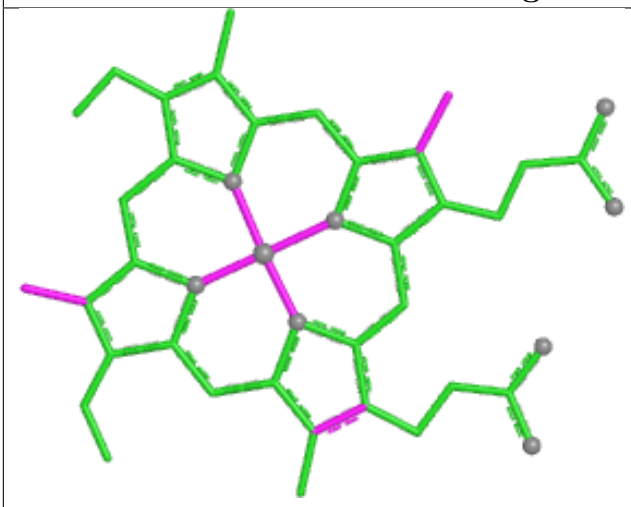


Rings

Ligand HEC A 405



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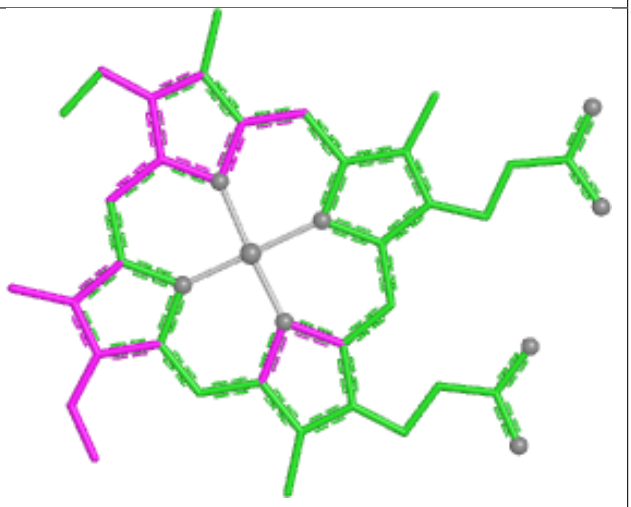
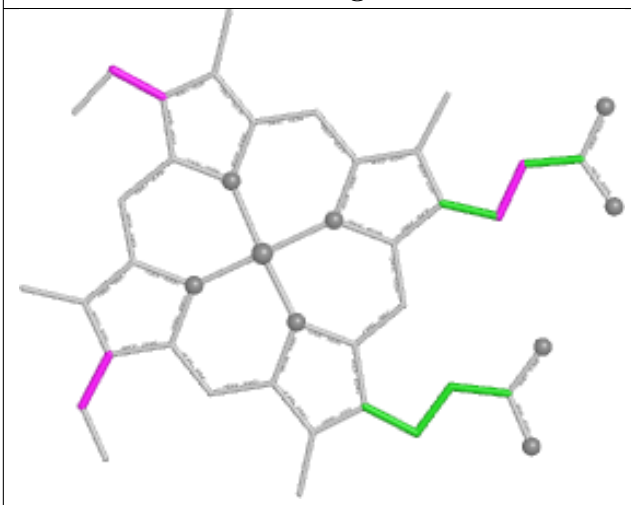


Bond angles



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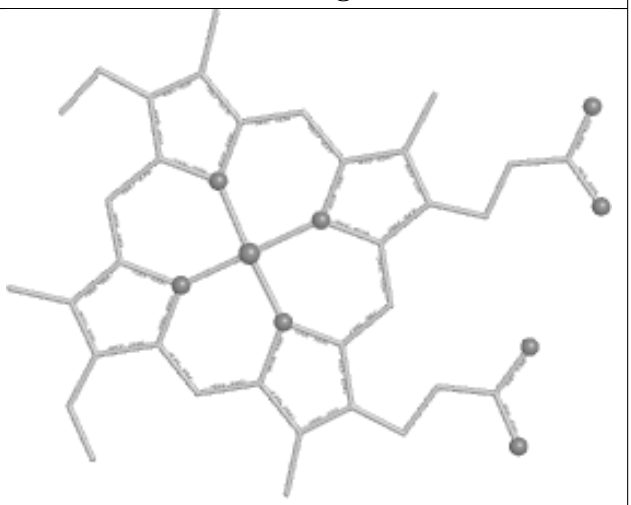
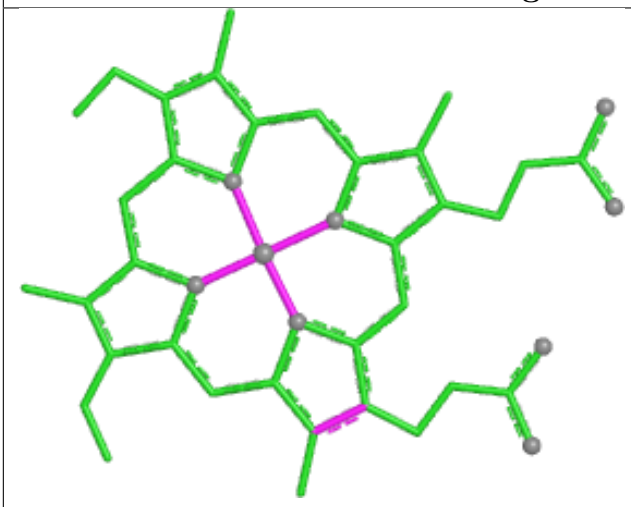
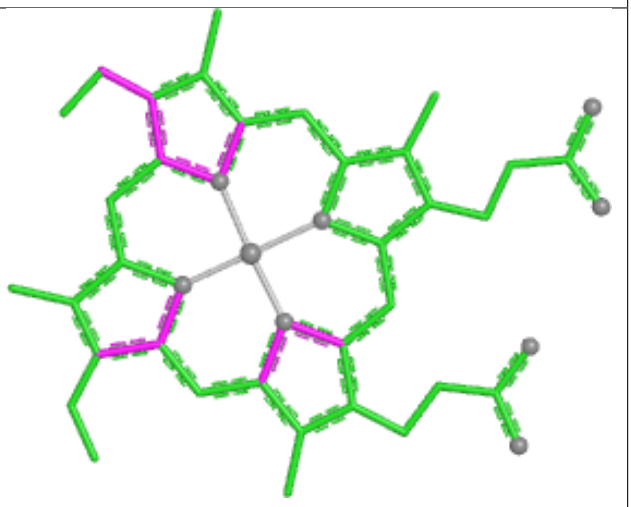


Rings

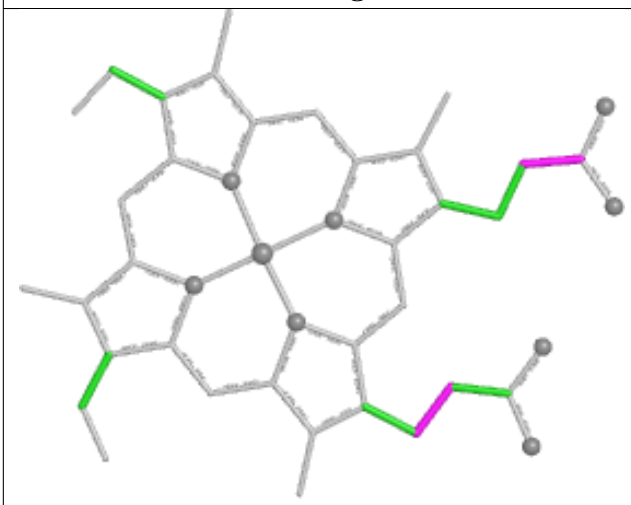
Ligand HEC A 407



Bond lengths



Bond angles



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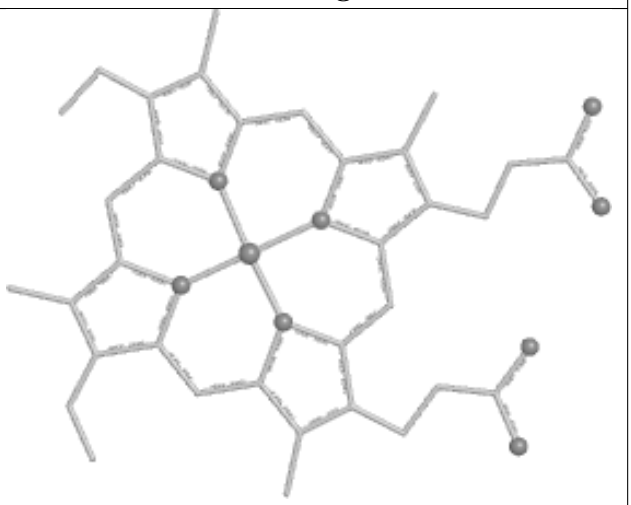
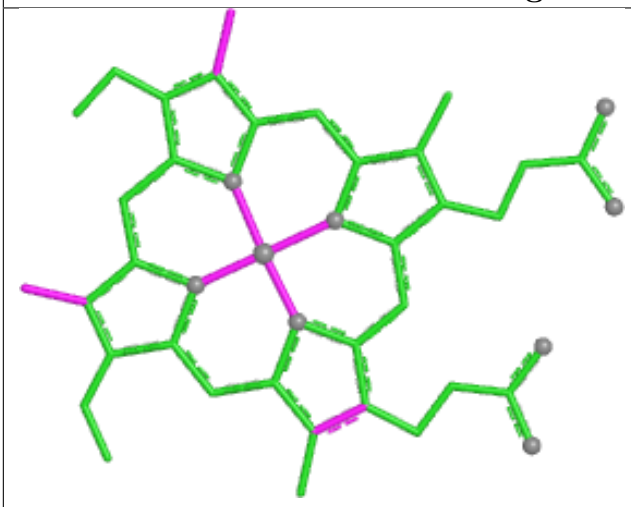


Rings

Ligand HEC S 405



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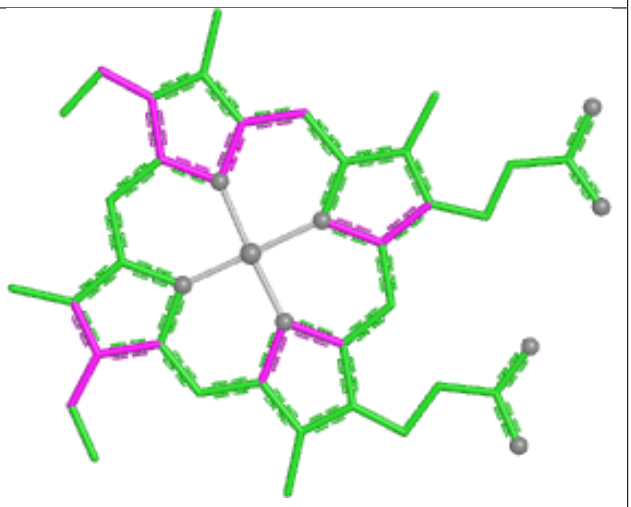
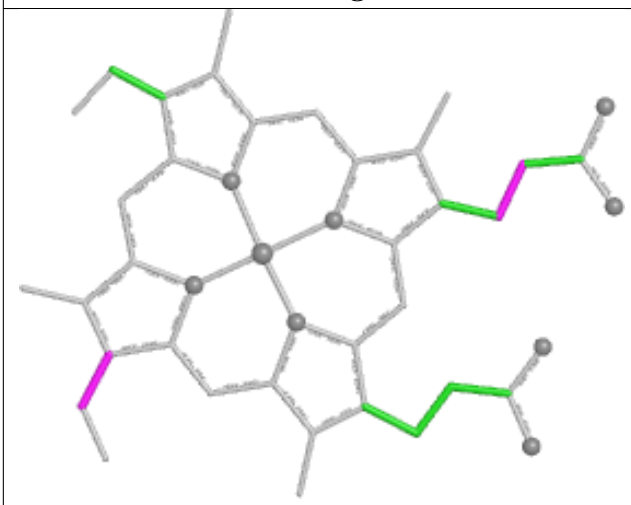
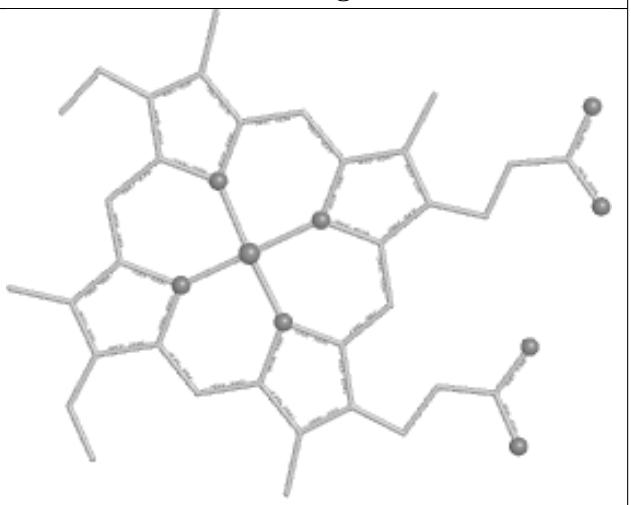


Bond angles

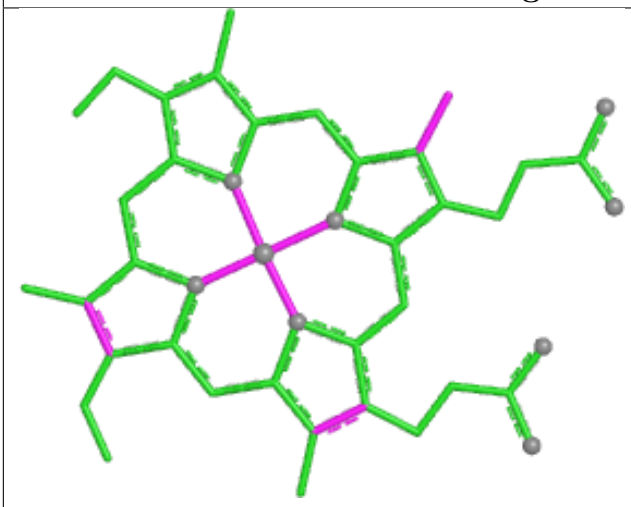


Torsions

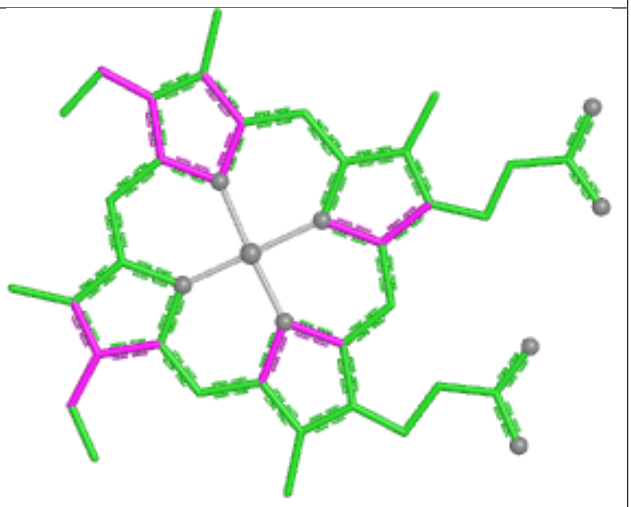


Rings

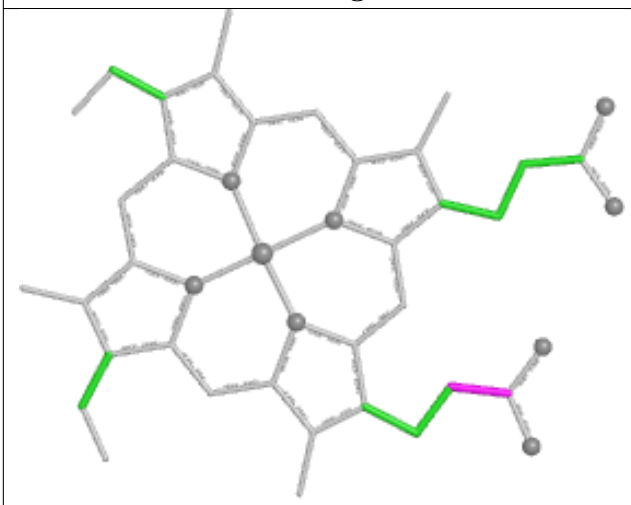
Ligand HEC A 406



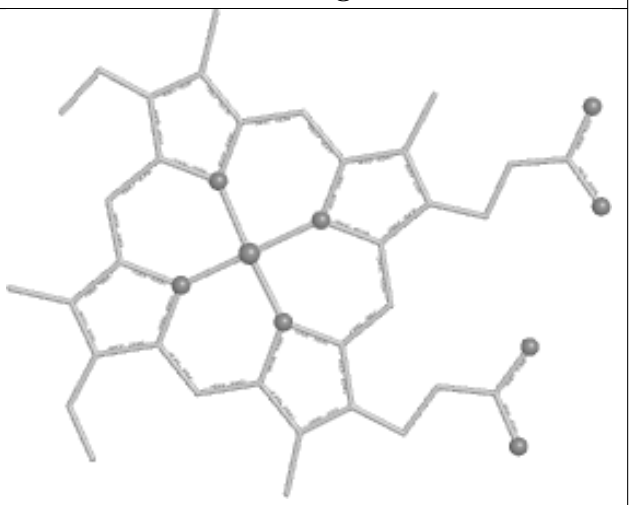
Bond lengths



Bond angles

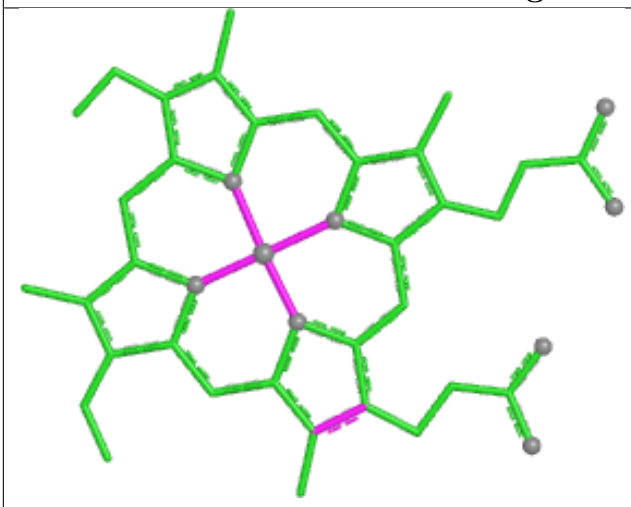


Torsions

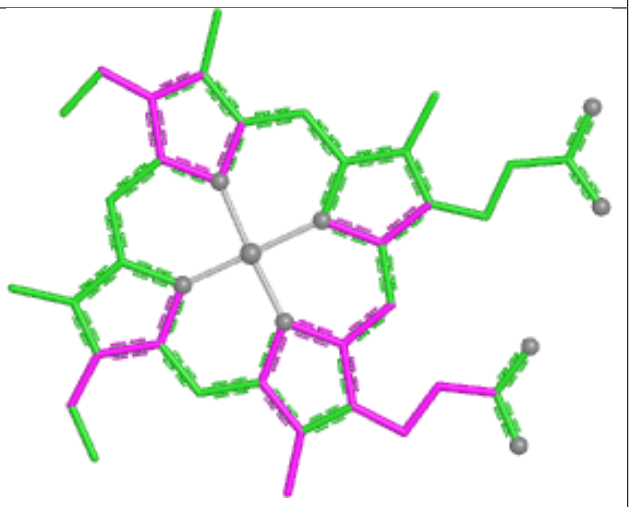


Rings

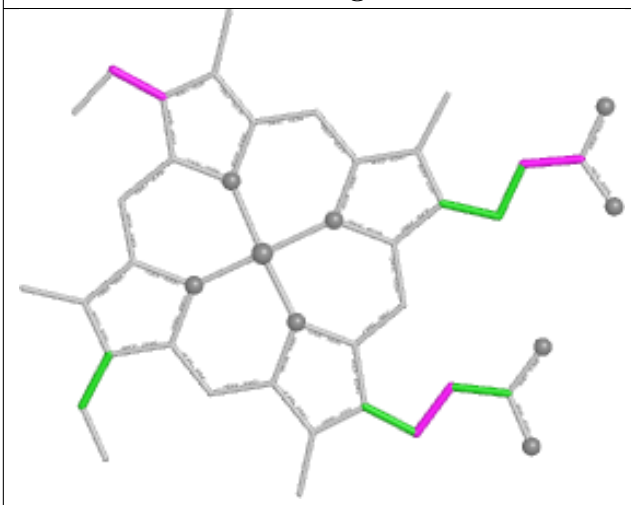
Ligand HEC J 407



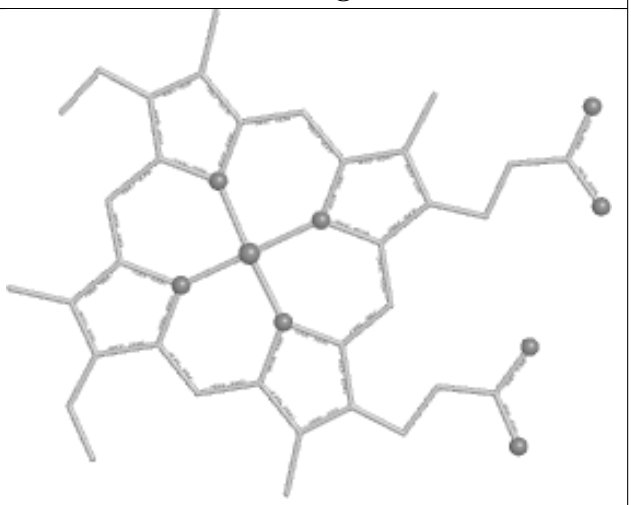
Bond lengths



Bond angles

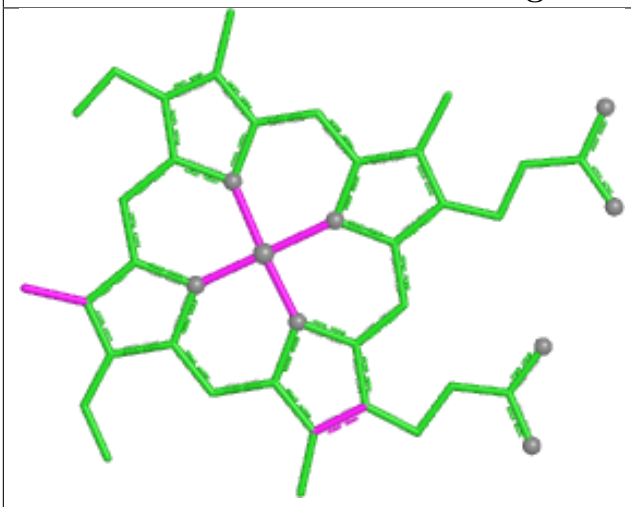


Torsions

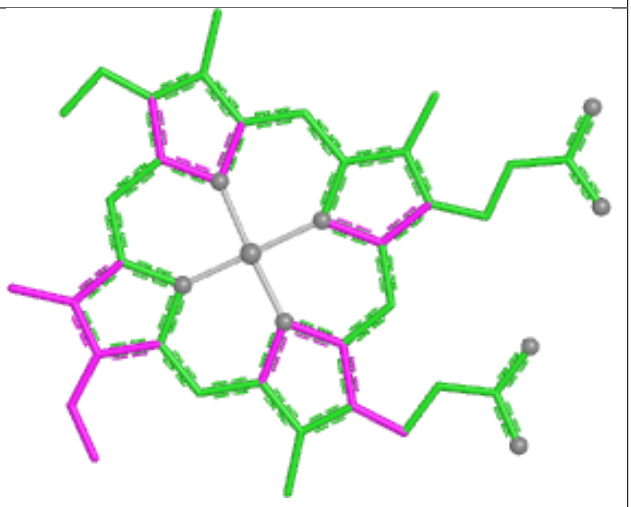


Rings

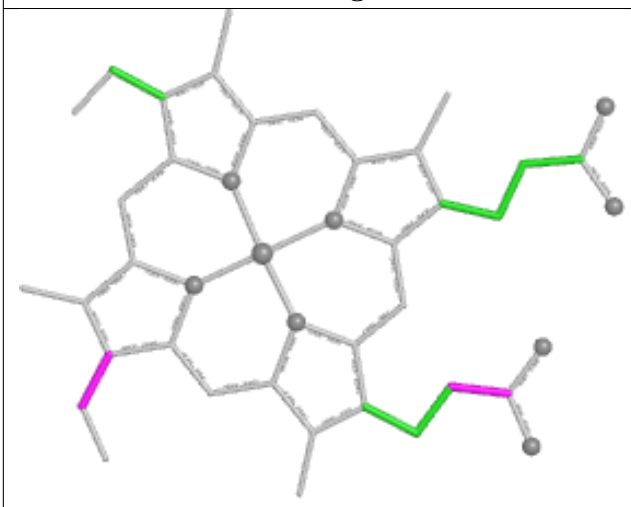
Ligand HEC J 401



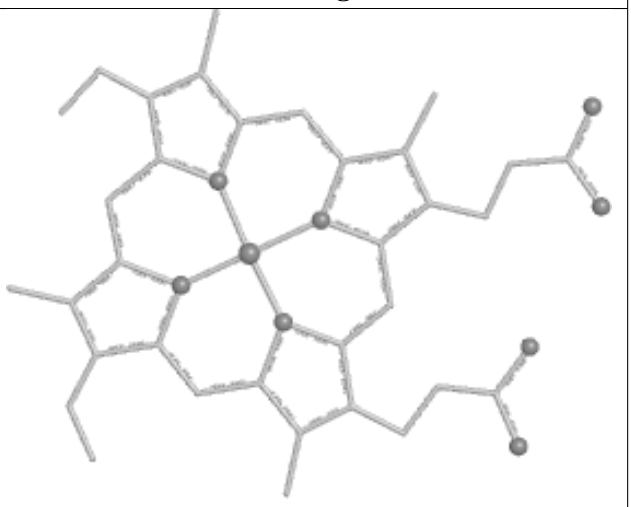
Bond lengths



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.

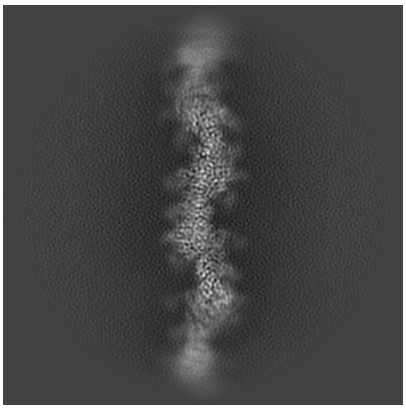
6 Map visualisation

This section contains visualisations of the EMDB entry EMD-75413. These allow visual inspection of the internal detail of the map and identification of artifacts.

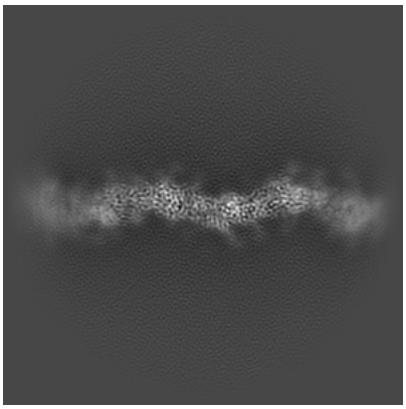
Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

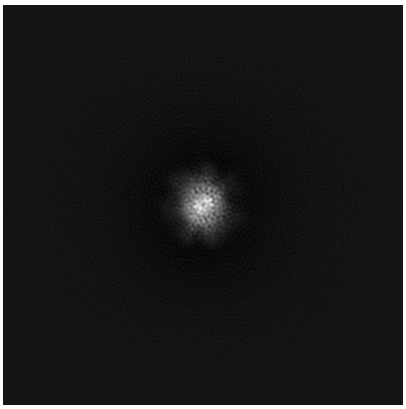
6.1.1 Primary map



X

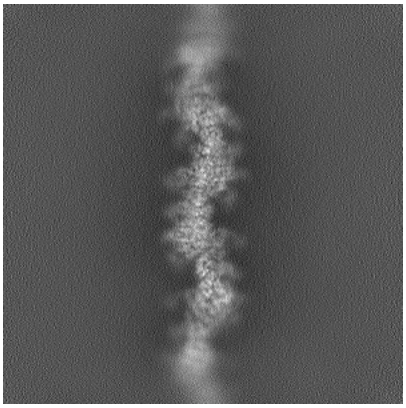


Y

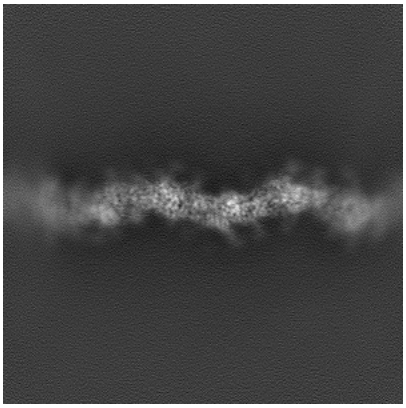


Z

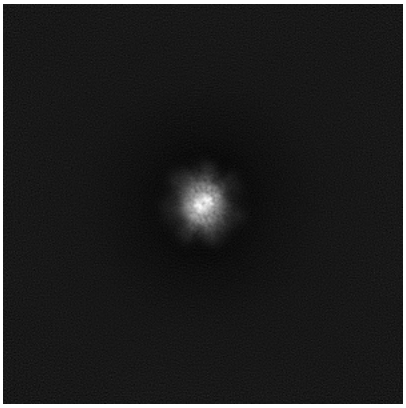
6.1.2 Raw map



X



Y

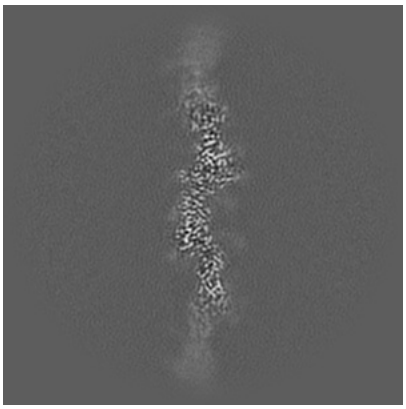


Z

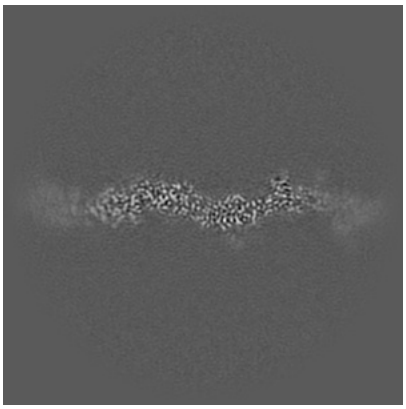
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

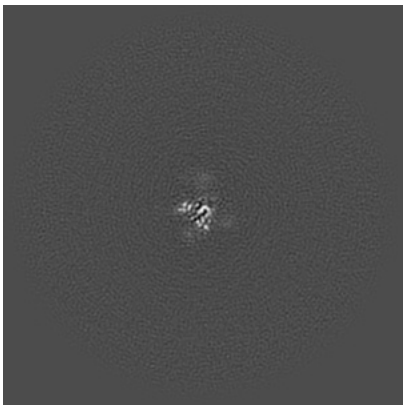
6.2.1 Primary map



X Index: 220

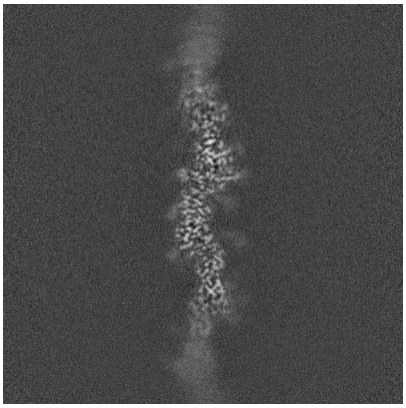


Y Index: 220

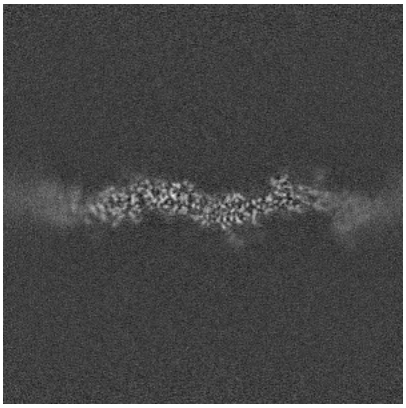


Z Index: 220

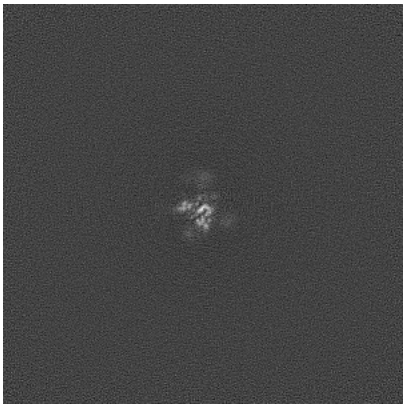
6.2.2 Raw map



X Index: 220



Y Index: 220

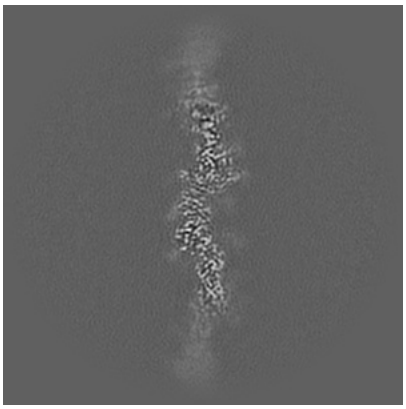


Z Index: 220

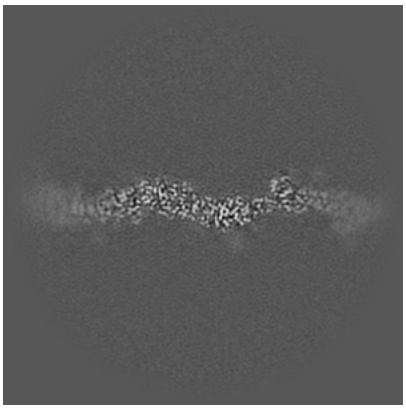
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

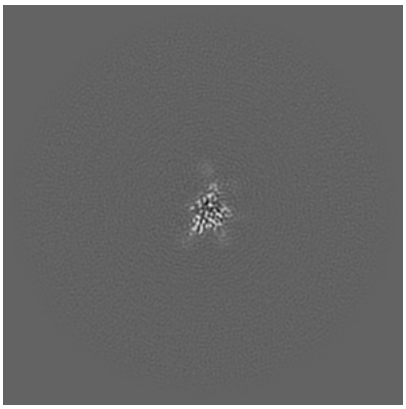
6.3.1 Primary map



X Index: 221

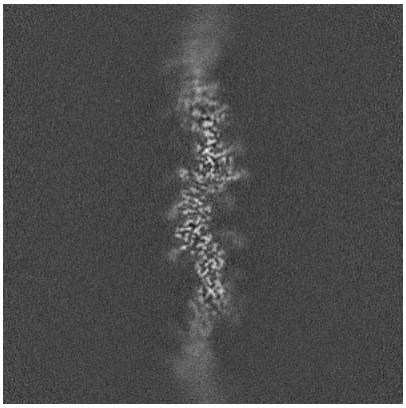


Y Index: 218

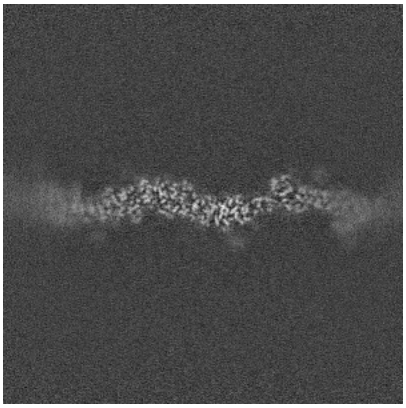


Z Index: 180

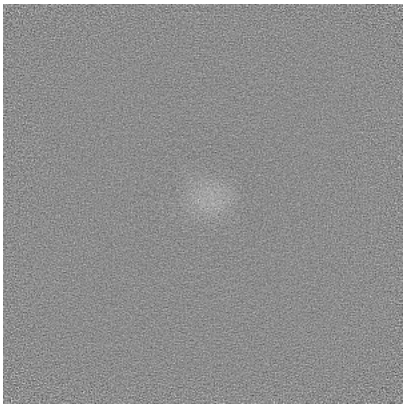
6.3.2 Raw map



X Index: 221



Y Index: 218

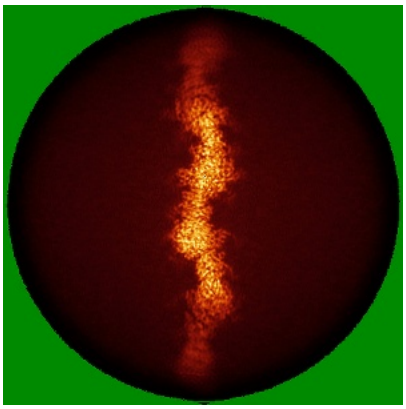


Z Index: 0

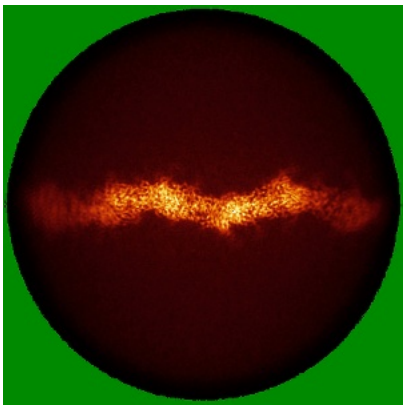
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) (i)

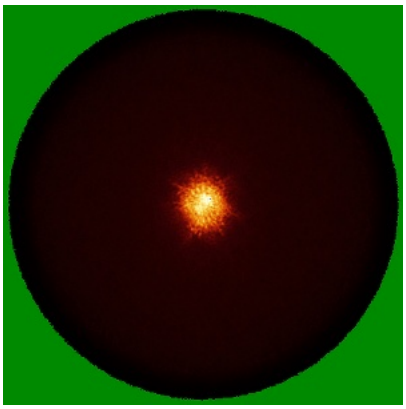
6.4.1 Primary map



X

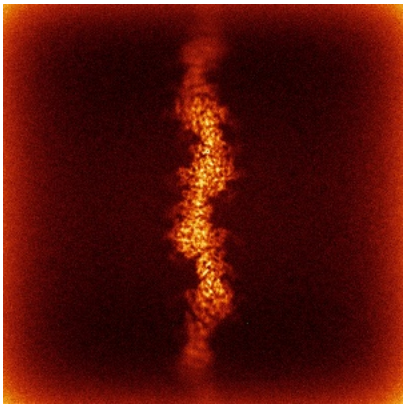


Y

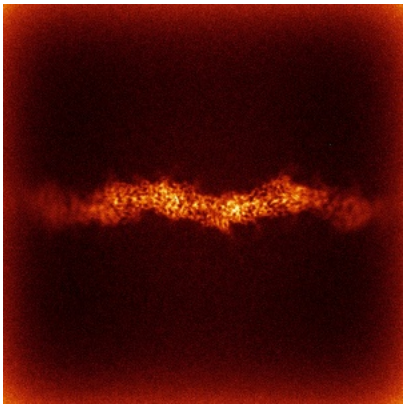


Z

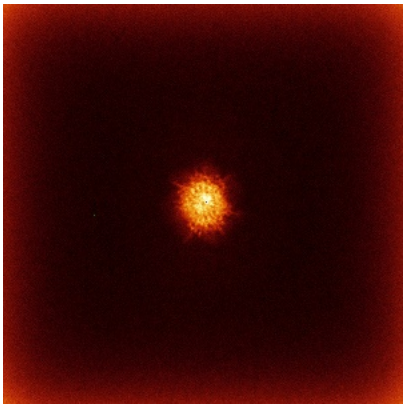
6.4.2 Raw map



X



Y

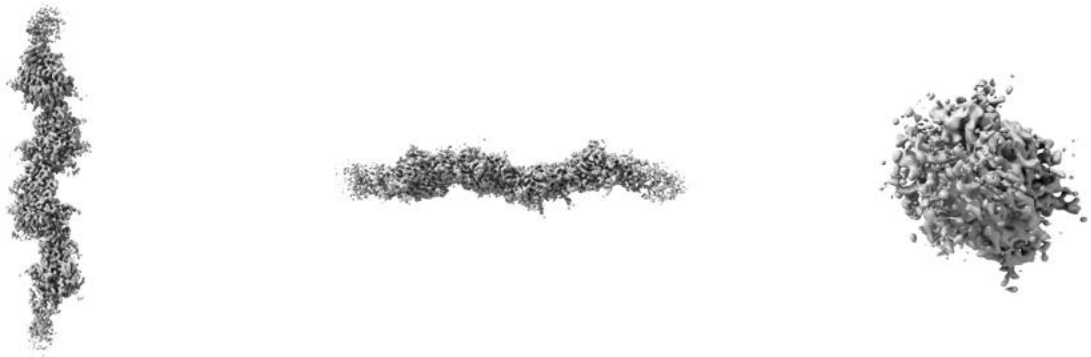


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views (i)

6.5.1 Primary map



X Y Z

The images above show the 3D surface view of the map at the recommended contour level 0.15. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

6.5.2 Raw map



X Y Z

These images show the 3D surface of the raw map. The raw map's contour level was selected so that its surface encloses the same volume as the primary map does at its recommended contour level.

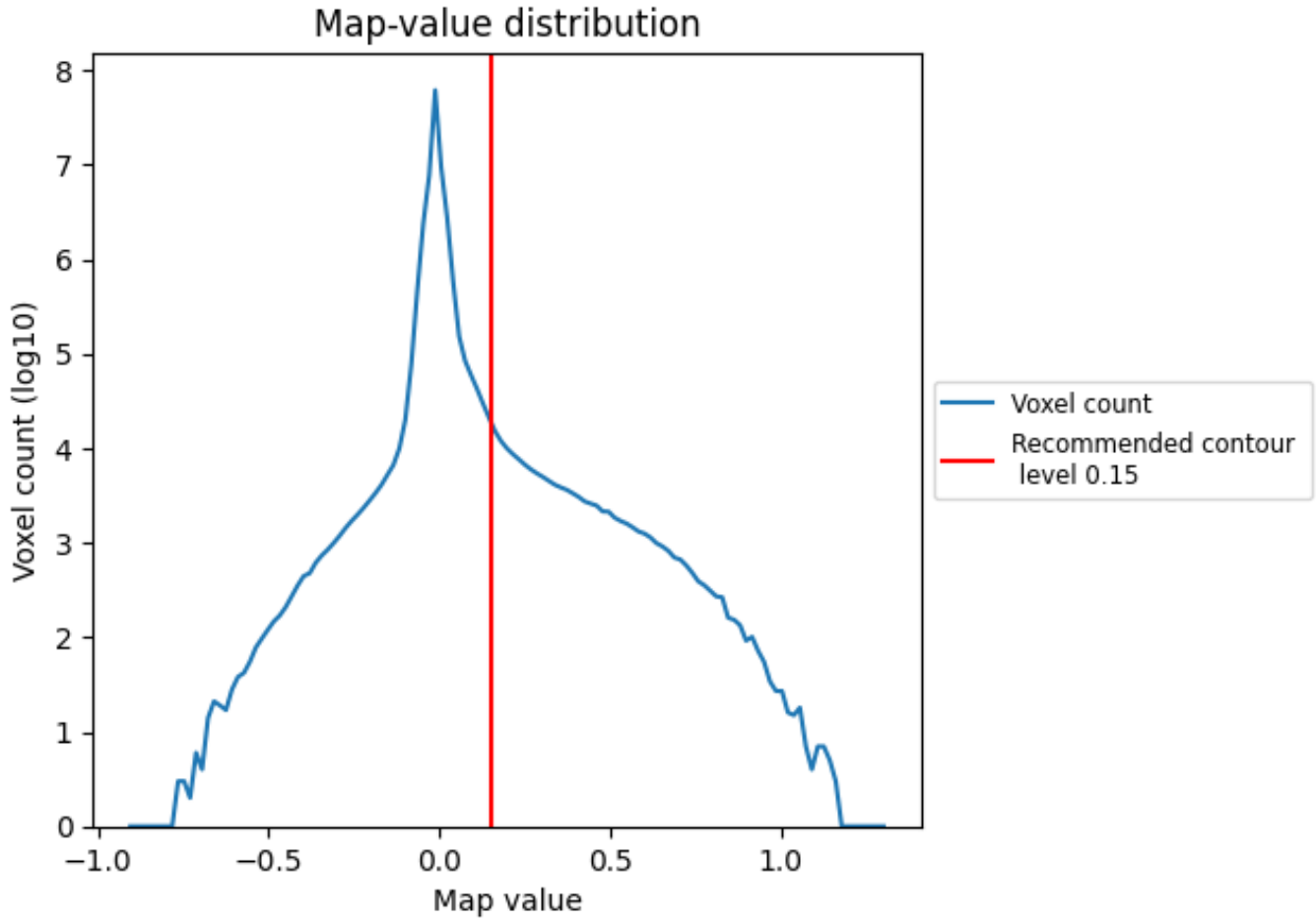
6.6 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis

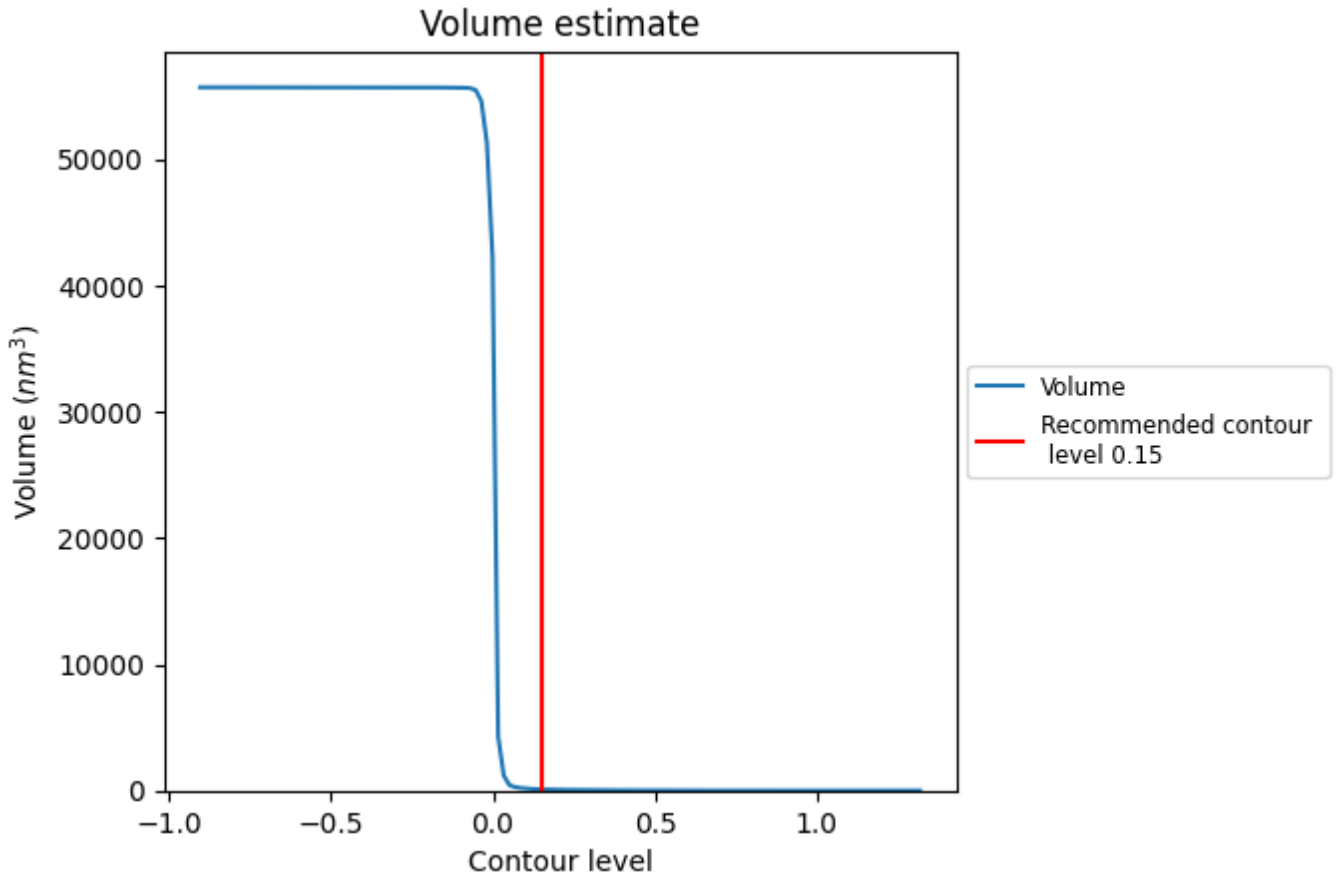
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

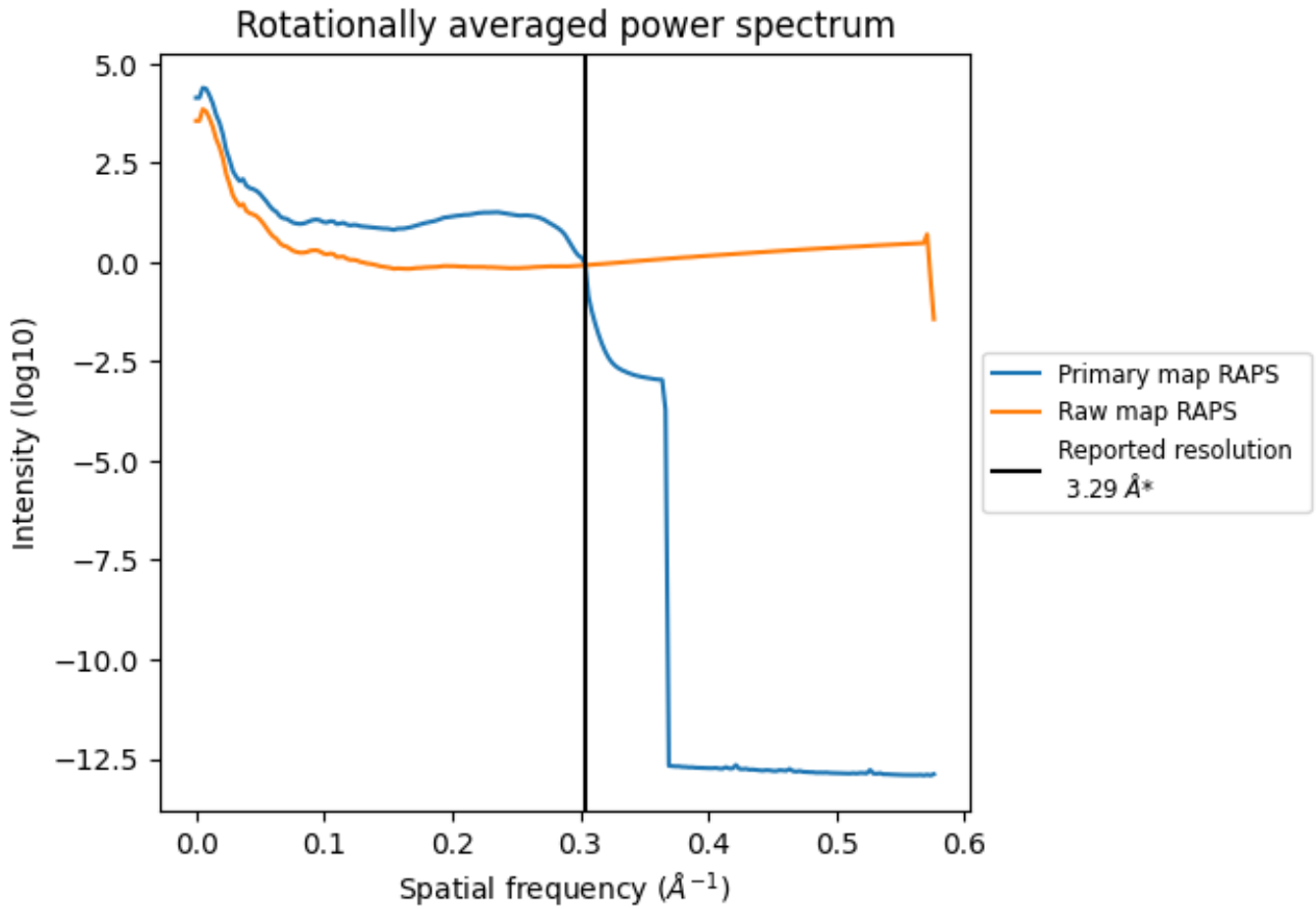
7.2 Volume estimate



The volume at the recommended contour level is 95 nm^3; this corresponds to an approximate mass of 86 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)

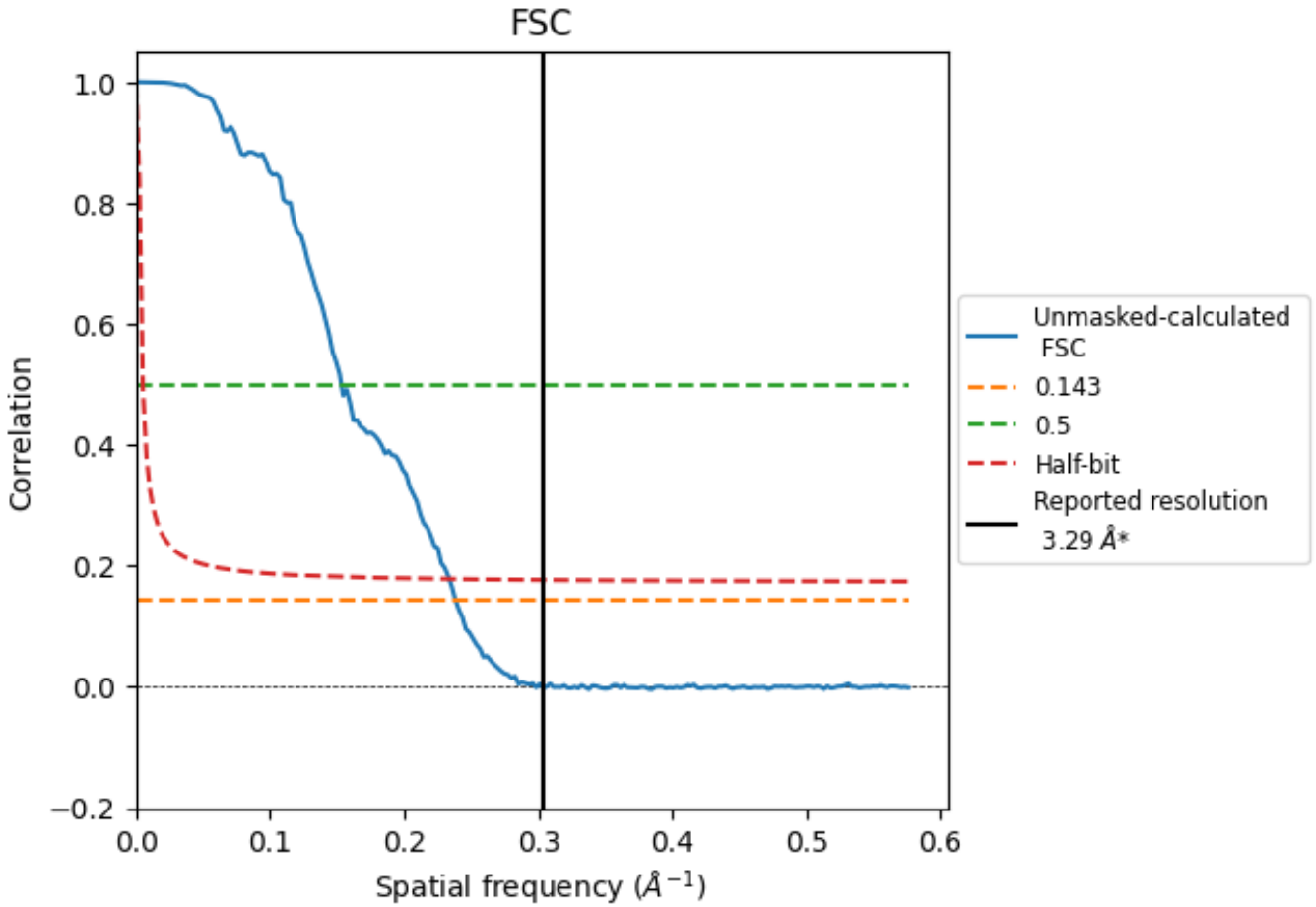


*Reported resolution corresponds to spatial frequency of 0.304 $Å^{-1}$

8 Fourier-Shell correlation

Fourier-Shell Correlation (FSC) is the most commonly used method to estimate the resolution of single-particle and subtomogram-averaged maps. The shape of the curve depends on the imposed symmetry, mask and whether or not the two 3D reconstructions used were processed from a common reference. The reported resolution is shown as a black line. A curve is displayed for the half-bit criterion in addition to lines showing the 0.143 gold standard cut-off and 0.5 cut-off.

8.1 FSC



*Reported resolution corresponds to spatial frequency of 0.304 Å^{-1}

8.2 Resolution estimates (i)

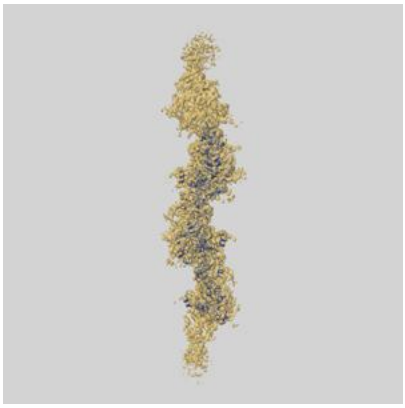
Resolution estimate (Å)	Estimation criterion (FSC cut-off)		
	0.143	0.5	Half-bit
Reported by author	3.29	-	-
Author-provided FSC curve	-	-	-
Unmasked-calculated*	4.19	6.53	4.28

*Resolution estimate based on FSC curve calculated by comparison of deposited half-maps. The value from deposited half-maps intersecting FSC 0.143 CUT-OFF 4.19 differs from the reported value 3.29 by more than 10 %

9 Map-model fit

This section contains information regarding the fit between EMDB map EMD-75413 and PDB model 10RP. Per-residue inclusion information can be found in section 3 on page 6.

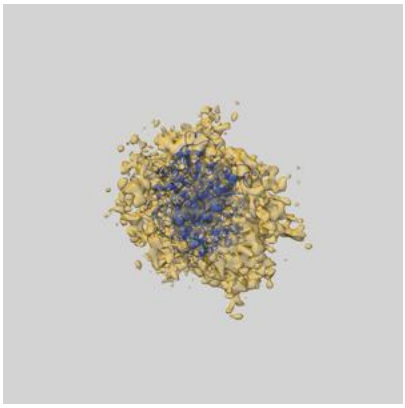
9.1 Map-model overlay



X



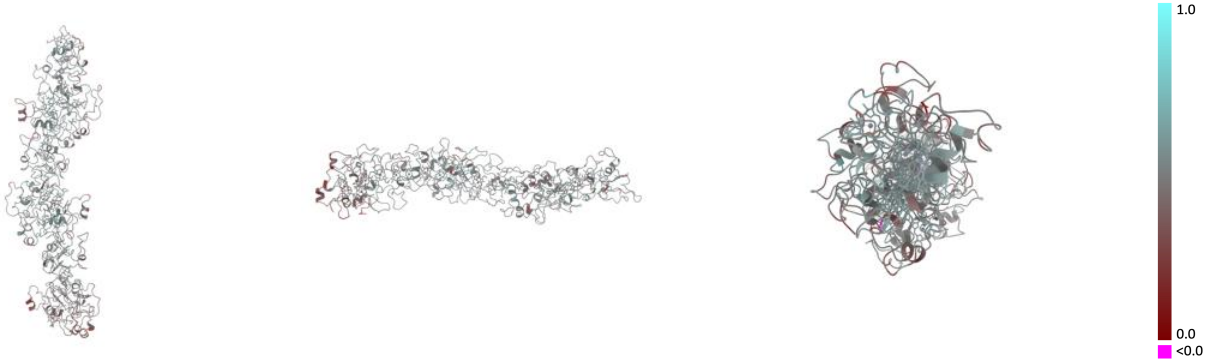
Y



Z

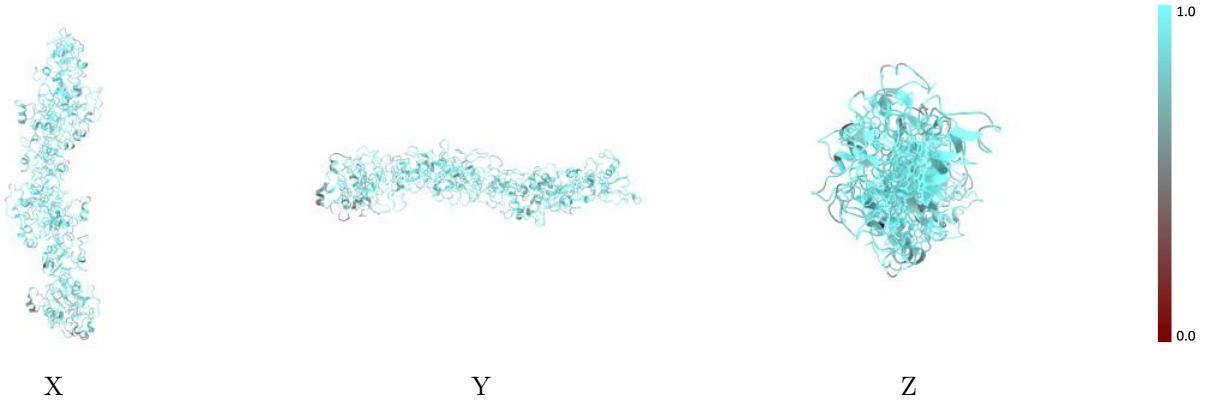
The images above show the 3D surface view of the map at the recommended contour level 0.15 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model



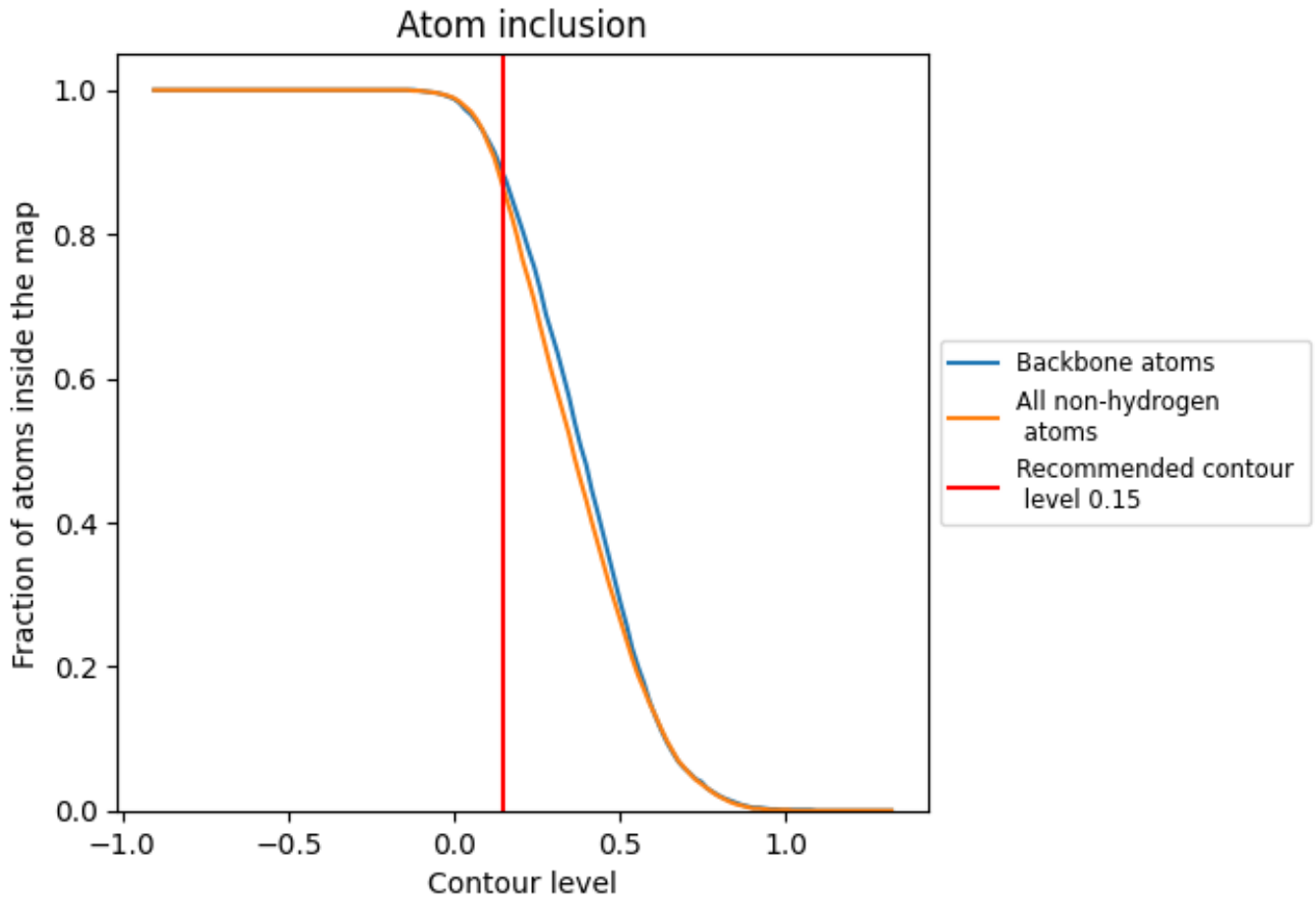
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

9.3 Atom inclusion mapped to coordinate model



The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.15).

9.4 Atom inclusion (i)



At the recommended contour level, 88% of all backbone atoms, 86% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary

The table lists the average atom inclusion at the recommended contour level (0.15) and Q-score for the entire model and for each chain.



Chain	Atom inclusion	Q-score
All	0.8610	0.4750
A	0.8810	0.4880
J	0.8840	0.4940
S	0.8190	0.4440