



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 25, 2026 – 06:02 am BST

PDB ID : 6SUV / pdb_00006suv
Title : Horse cytochrome c complexed by octa-anionic calixarene
Authors : Geremia, S.; Brancatelli, G.
Deposited on : 2019-09-16
Resolution : 2.50 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4-5-2 with Phenix2.0
Mogul : 1.8.4, CSD as541be (2020)
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 : 9.0.015 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.50

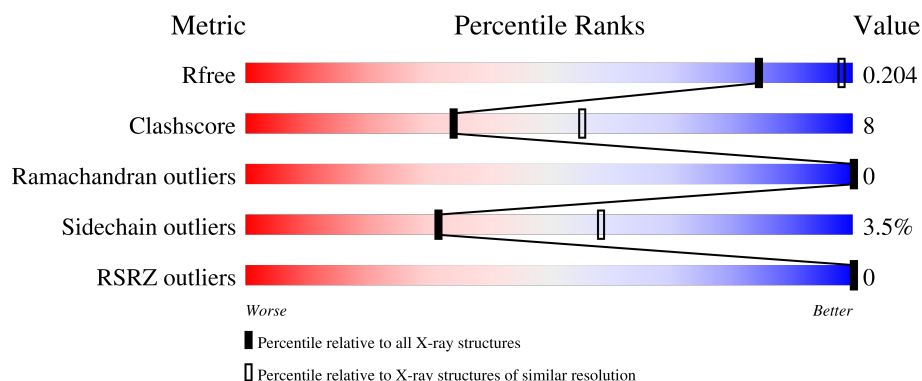
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

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	AaA	104	 84% 14% .
1	BaB	104	 85% 13% .
1	CaC	104	 80% 19% .
1	DaD	104	 81% 18% .
1	EaE	104	 90% 9% .

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	FaF	104	 84% 14% .
1	GaG	104	 88% 12% .
1	HaH	104	 87% 12% .

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
3	HEC	AaA	202	X	-	-	-
3	HEC	BaB	202	X	-	-	-
3	HEC	CaC	202	X	-	-	-
3	HEC	DaD	202	X	-	-	-
3	HEC	EaE	202	X	-	-	-
3	HEC	FaF	202	X	-	-	-
3	HEC	GaG	202	X	-	-	-
3	HEC	HaH	202	X	-	-	-

2 Entry composition

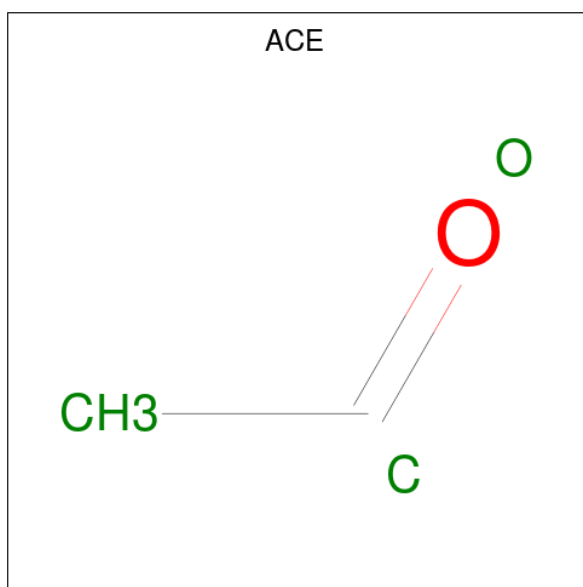
There are 6 unique types of molecules in this entry. The entry contains 7976 atoms, of which 0 are hydrogens and 0 are deuteriums.

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.

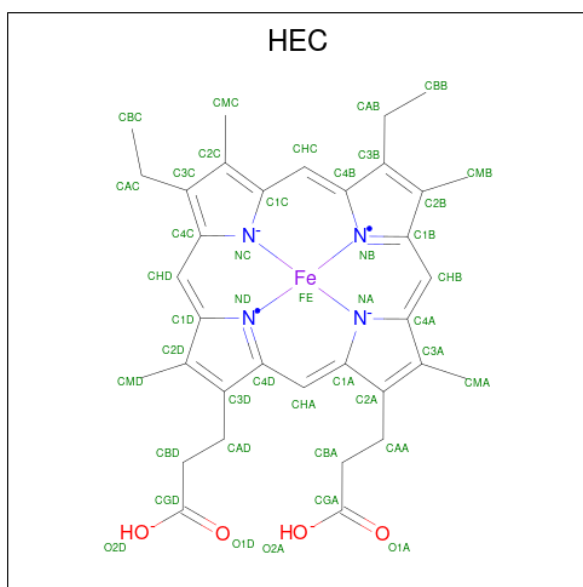
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	AaA	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	BaB	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	CaC	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	DaD	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	EaE	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	FaF	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	GaG	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			
1	HaH	104	Total	C	N	O	S	0	0	0
			823	524	144	151	4			

- Molecule 2 is ACETYL GROUP (CCD ID: ACE) (formula: C₂H₄O).



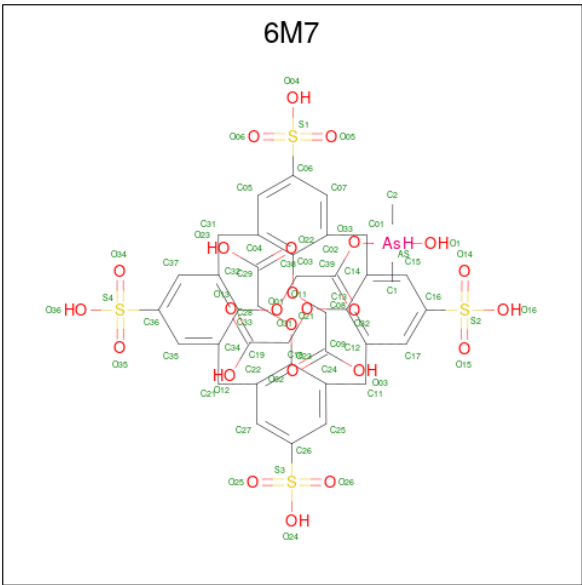
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	AaA	1	Total	C	O	0	0
			3	2	1		
2	BaB	1	Total	C	O	0	0
			3	2	1		
2	CaC	1	Total	C	O	0	0
			3	2	1		
2	DaD	1	Total	C	O	0	0
			3	2	1		
2	EaE	1	Total	C	O	0	0
			3	2	1		
2	FaF	1	Total	C	O	0	0
			3	2	1		
2	GaG	1	Total	C	O	0	0
			3	2	1		
2	HaH	1	Total	C	O	0	0
			3	2	1		

- Molecule 3 is HEME C (CCD ID: HEC) (formula: C₃₄H₃₆FeN₄O₄).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	
3	AaA	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	BaB	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	CaC	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	DaD	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	EaE	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	FaF	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	GaG	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
3	HaH	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 4 is octa-anionic calixarene (CCD ID: 6M7) (formula: $\text{C}_{38}\text{H}_{39}\text{AsO}_{25}\text{S}_4$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	AaA	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	BaB	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	CaC	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	DaD	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	EaE	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	FaF	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	GaG	1	Total 68	As 1	C 38	O 25	S 4	0	0
4	HaH	1	Total 68	As 1	C 38	O 25	S 4	0	0

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	AaA	1	Total	Na	0	0
			1	1		
5	BaB	1	Total	Na	0	0
			1	1		
5	CaC	1	Total	Na	0	0
			1	1		

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	DaD	1	Total 1	Na 1	0	0
5	EaE	1	Total 1	Na 1	0	0
5	FaF	1	Total 1	Na 1	0	0
5	GaG	1	Total 1	Na 1	0	0
5	HaH	1	Total 1	Na 1	0	0

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	AaA	52	Total 52	O 52	0	0
6	BaB	61	Total 61	O 61	0	0
6	CaC	61	Total 61	O 61	0	0
6	DaD	64	Total 64	O 64	0	0
6	EaE	54	Total 54	O 54	0	0
6	FaF	61	Total 61	O 61	0	0
6	GaG	63	Total 63	O 63	0	0
6	HaH	56	Total 56	O 56	0	0

3 Residue-property plots [i](#)

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

- Molecule 1: Cytochrome c

Chain AaA:  84% 14% .



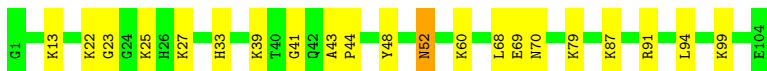
- Molecule 1: Cytochrome c

Chain BaB:  85% 13% .



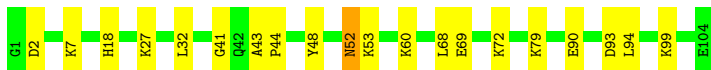
- Molecule 1: Cytochrome c

Chain CaC:  80% 19% .



- Molecule 1: Cytochrome c

Chain DaD:  81% 18% .



- Molecule 1: Cytochrome c

Chain EaE:  90% 9% .

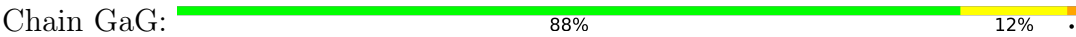


- Molecule 1: Cytochrome c

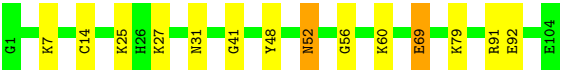
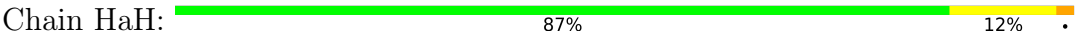
Chain FaF:  84% 14% .



● Molecule 1: Cytochrome c



● Molecule 1: Cytochrome c



4 Data and refinement statistics

Property	Value	Source
Space group	P 43	Depositor
Cell constants a, b, c, α , β , γ	65.59Å 65.59Å 250.70Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	46.38 – 2.50 46.38 – 2.50	Depositor EDS
% Data completeness (in resolution range)	96.1 (46.38-2.50) 98.0 (46.38-2.50)	Depositor EDS
R_{merge}	0.14	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.46 (at 2.51Å)	Xtriage
Refinement program	REFMAC 5.8.0257	Depositor
R, R_{free}	0.170 , 0.237 0.147 , 0.204	Depositor DCC
R_{free} test set	1828 reflections (5.03%)	wwPDB-VP
Wilson B-factor (Å ²)	25.8	Xtriage
Anisotropy	0.132	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.37 , 43.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.47$, $\langle L^2 \rangle = 0.29$	Xtriage
Estimated twinning fraction	0.069 for h,-k,-l	Xtriage
Reported twinning fraction	0.499 for H, K, L 0.501 for -K, -H, -L	Depositor
Outliers	0 of 35576 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	7976	wwPDB-VP
Average B, all atoms (Å ²)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.23% 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: ACE, HEC, 6M7, NA

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	AaA	0.51	0/839	1.01	0/1118
1	BaB	0.50	0/839	1.00	0/1118
1	CaC	0.54	0/839	1.00	0/1118
1	DaD	0.49	0/839	1.01	0/1118
1	EaE	0.51	0/839	1.03	0/1118
1	FaF	0.51	0/839	0.99	0/1118
1	GaG	0.52	0/839	1.01	0/1118
1	HaH	0.50	0/839	0.98	0/1118
All	All	0.51	0/6712	1.01	0/8944

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [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	AaA	823	0	845	14	0
1	BaB	823	0	845	12	0
1	CaC	823	0	845	19	0
1	DaD	823	0	845	16	1
1	EaE	823	0	845	8	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	FaF	823	0	845	14	0
1	GaG	823	0	845	10	0
1	HaH	823	0	844	12	0
2	AaA	3	0	3	0	0
2	BaB	3	0	3	0	0
2	CaC	3	0	3	0	0
2	DaD	3	0	3	0	0
2	EaE	3	0	3	0	0
2	FaF	3	0	3	0	0
2	GaG	3	0	3	0	0
2	HaH	3	0	3	1	0
3	AaA	43	0	30	1	0
3	BaB	43	0	30	0	0
3	CaC	43	0	30	0	0
3	DaD	43	0	30	1	0
3	EaE	43	0	30	0	0
3	FaF	43	0	30	0	0
3	GaG	43	0	30	2	0
3	HaH	43	0	30	2	0
4	AaA	68	0	0	2	0
4	BaB	68	0	0	3	0
4	CaC	68	0	0	1	0
4	DaD	68	0	0	3	0
4	EaE	68	0	0	1	0
4	FaF	68	0	0	2	0
4	GaG	68	0	0	4	1
4	HaH	68	0	0	3	0
5	AaA	1	0	0	0	0
5	BaB	1	0	0	0	0
5	CaC	1	0	0	0	0
5	DaD	1	0	0	0	0
5	EaE	1	0	0	0	0
5	FaF	1	0	0	0	0
5	GaG	1	0	0	0	0
5	HaH	1	0	0	0	0
6	AaA	52	0	0	7	0
6	BaB	61	0	0	6	0
6	CaC	61	0	0	13	0
6	DaD	64	0	0	10	0
6	EaE	54	0	0	3	0
6	FaF	61	0	0	7	0
6	GaG	63	0	0	3	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	HaH	56	0	0	5	0
All	All	7976	0	7023	110	1

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 8.

The worst 5 of 110 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)
4:AaA:203:6M7:O03	1:BaB:72:LYS:HD2	1.59	1.01
1:BaB:7:LYS:HD3	4:DaD:203:6M7:O22	1.62	0.98
1:CaC:13:LYS:HE2	6:CaC:318:HOH:O	1.69	0.92
1:CaC:22:LYS:HD3	6:CaC:335:HOH:O	1.69	0.92
1:CaC:99:LYS:HD3	6:CaC:338:HOH:O	1.72	0.89

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:DaD:72:LYS:NZ	4:GaG:203:6M7:O05[4_555]	2.01	0.19

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	AaA	102/104 (98%)	100 (98%)	2 (2%)	0	100	100
1	BaB	102/104 (98%)	100 (98%)	2 (2%)	0	100	100
1	CaC	102/104 (98%)	100 (98%)	2 (2%)	0	100	100
1	DaD	102/104 (98%)	99 (97%)	3 (3%)	0	100	100
1	EaE	102/104 (98%)	100 (98%)	2 (2%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	FaF	102/104 (98%)	99 (97%)	3 (3%)	0	100	100
1	GaG	102/104 (98%)	100 (98%)	2 (2%)	0	100	100
1	HaH	102/104 (98%)	100 (98%)	2 (2%)	0	100	100
All	All	816/832 (98%)	798 (98%)	18 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	AaA	86/86 (100%)	82 (95%)	4 (5%)	23	47
1	BaB	86/86 (100%)	82 (95%)	4 (5%)	23	47
1	CaC	86/86 (100%)	85 (99%)	1 (1%)	63	83
1	DaD	86/86 (100%)	83 (96%)	3 (4%)	32	58
1	EaE	86/86 (100%)	84 (98%)	2 (2%)	44	72
1	FaF	86/86 (100%)	83 (96%)	3 (4%)	32	58
1	GaG	86/86 (100%)	83 (96%)	3 (4%)	32	58
1	HaH	86/86 (100%)	82 (95%)	4 (5%)	23	47
All	All	688/688 (100%)	664 (96%)	24 (4%)	32	58

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	FaF	25	LYS
1	GaG	16	GLN
1	FaF	69	GLU
1	GaG	52	ASN
1	BaB	69	GLU

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

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

There are no oligosaccharides in this entry.

5.6 Ligand geometry ⓘ

Of 32 ligands modelled in this entry, 8 are monoatomic - leaving 24 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	ACE	HaH	201	1	1,2,2	0.40	0	1,1,1	0.55	0
4	6M7	FaF	203	5	69,72,72	2.02	19 (27%)	102,111,111	2.13	38 (37%)
4	6M7	DaD	203	5	69,72,72	1.93	12 (17%)	102,111,111	2.08	35 (34%)
3	HEC	BaB	202	1	50,50,50	1.37	9 (18%)	68,82,82	1.33	11 (16%)
4	6M7	GaG	203	5	69,72,72	1.68	11 (15%)	102,111,111	2.10	35 (34%)
3	HEC	CaC	202	1	50,50,50	1.39	8 (16%)	68,82,82	1.45	10 (14%)
2	ACE	BaB	201	1	1,2,2	0.27	0	1,1,1	0.53	0
3	HEC	AaA	202	1	50,50,50	1.27	5 (10%)	68,82,82	2.04	14 (20%)
2	ACE	FaF	201	1	1,2,2	0.02	0	1,1,1	0.69	0
3	HEC	GaG	202	1	50,50,50	1.38	6 (12%)	68,82,82	1.33	11 (16%)
2	ACE	AaA	201	1	1,2,2	0.07	0	1,1,1	0.69	0
2	ACE	CaC	201	1	1,2,2	0.22	0	1,1,1	0.38	0
3	HEC	EaE	202	1	50,50,50	1.34	8 (16%)	68,82,82	1.21	6 (8%)
2	ACE	DaD	201	1	1,2,2	0.20	0	1,1,1	0.51	0
4	6M7	BaB	203	5	69,72,72	1.83	13 (18%)	102,111,111	1.96	29 (28%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	HEC	HaH	202	1	50,50,50	1.23	4 (8%)	68,82,82	1.42	8 (11%)
2	ACE	GaG	201	1	1,2,2	0.17	0	1,1,1	0.43	0
3	HEC	DaD	202	1	50,50,50	1.20	4 (8%)	68,82,82	1.75	7 (10%)
3	HEC	FaF	202	1	50,50,50	1.38	5 (10%)	68,82,82	1.39	9 (13%)
4	6M7	AaA	203	5	69,72,72	1.71	12 (17%)	102,111,111	1.79	24 (23%)
4	6M7	EaE	203	5	69,72,72	1.68	8 (11%)	102,111,111	1.93	34 (33%)
4	6M7	CaC	203	5	69,72,72	1.61	13 (18%)	102,111,111	2.02	30 (29%)
2	ACE	EaE	201	1	1,2,2	0.15	0	1,1,1	0.54	0
4	6M7	HaH	203	5	69,72,72	1.73	11 (15%)	102,111,111	2.09	35 (34%)

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
3	HEC	CaC	202	1	1/1/3/7	4/14/54/54	-
4	6M7	FaF	203	5	-	4/60/65/65	0/5/5/5
3	HEC	DaD	202	1	1/1/3/7	6/14/54/54	-
3	HEC	FaF	202	1	1/1/3/7	5/14/54/54	-
3	HEC	EaE	202	1	1/1/3/7	5/14/54/54	-
4	6M7	DaD	203	5	-	5/60/65/65	0/5/5/5
4	6M7	AaA	203	5	-	3/60/65/65	0/5/5/5
4	6M7	EaE	203	5	-	4/60/65/65	0/5/5/5
4	6M7	HaH	203	5	-	1/60/65/65	0/5/5/5
3	HEC	AaA	202	1	1/1/3/7	4/14/54/54	-
4	6M7	CaC	203	5	-	3/60/65/65	0/5/5/5
4	6M7	BaB	203	5	-	2/60/65/65	0/5/5/5
3	HEC	HaH	202	1	1/1/3/7	5/14/54/54	-
3	HEC	BaB	202	1	1/1/3/7	5/14/54/54	-
3	HEC	GaG	202	1	1/1/3/7	4/14/54/54	-
4	6M7	GaG	203	5	-	2/60/65/65	0/5/5/5

The worst 5 of 148 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	BaB	203	6M7	AS-C2	7.55	1.98	1.90

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	FaF	203	6M7	AS-C2	7.11	1.98	1.90
4	DaD	203	6M7	AS-C2	7.09	1.98	1.90
4	BaB	203	6M7	AS-C1	6.74	1.98	1.90
4	EaE	203	6M7	AS-C2	6.72	1.97	1.90

The worst 5 of 336 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	DaD	202	HEC	CAB-C3B-C4B	8.91	136.37	124.81
3	AaA	202	HEC	CAB-C3B-C4B	8.48	135.81	124.81
4	FaF	203	6M7	O11-C13-C12	-7.33	107.49	119.08
3	AaA	202	HEC	CAB-C3B-C2B	-7.11	115.38	127.53
4	HaH	203	6M7	O15-S2-C16	-6.85	90.87	106.65

5 of 8 chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	AaA	202	HEC	NA
3	BaB	202	HEC	NA
3	CaC	202	HEC	NA
3	DaD	202	HEC	NA
3	EaE	202	HEC	NA

5 of 62 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	DaD	203	6M7	O31-C38-C39-O33
4	EaE	203	6M7	O31-C38-C39-O33
4	FaF	203	6M7	O31-C38-C39-O33
3	CaC	202	HEC	C4C-C3C-CAC-CBC
4	AaA	203	6M7	C09-C08-O01-C03

There are no ring outliers.

13 monomers are involved in 27 short contacts:

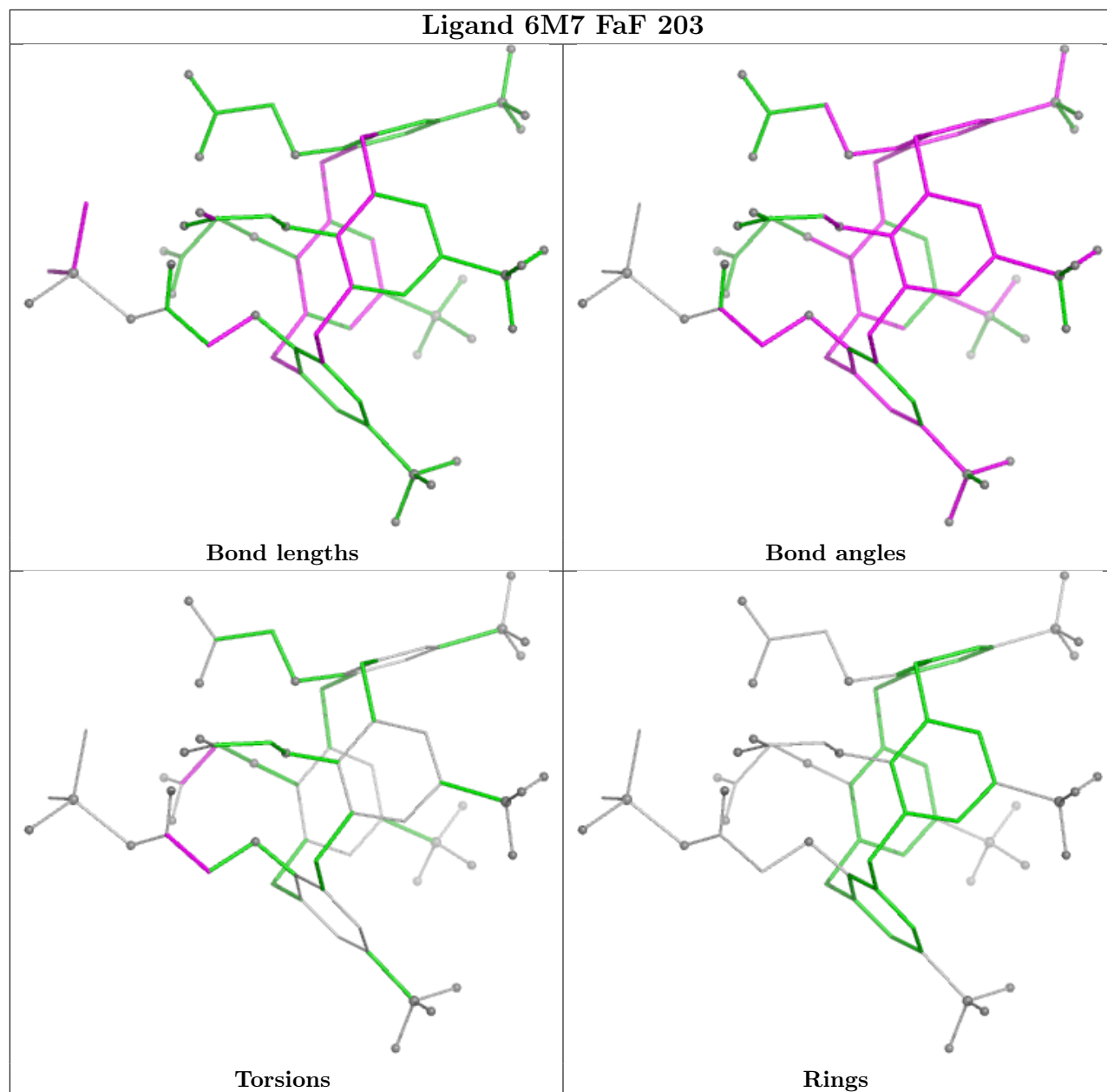
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	HaH	201	ACE	1	0
4	FaF	203	6M7	2	0
4	DaD	203	6M7	3	0
4	GaG	203	6M7	4	1
3	AaA	202	HEC	1	0

Continued on next page...

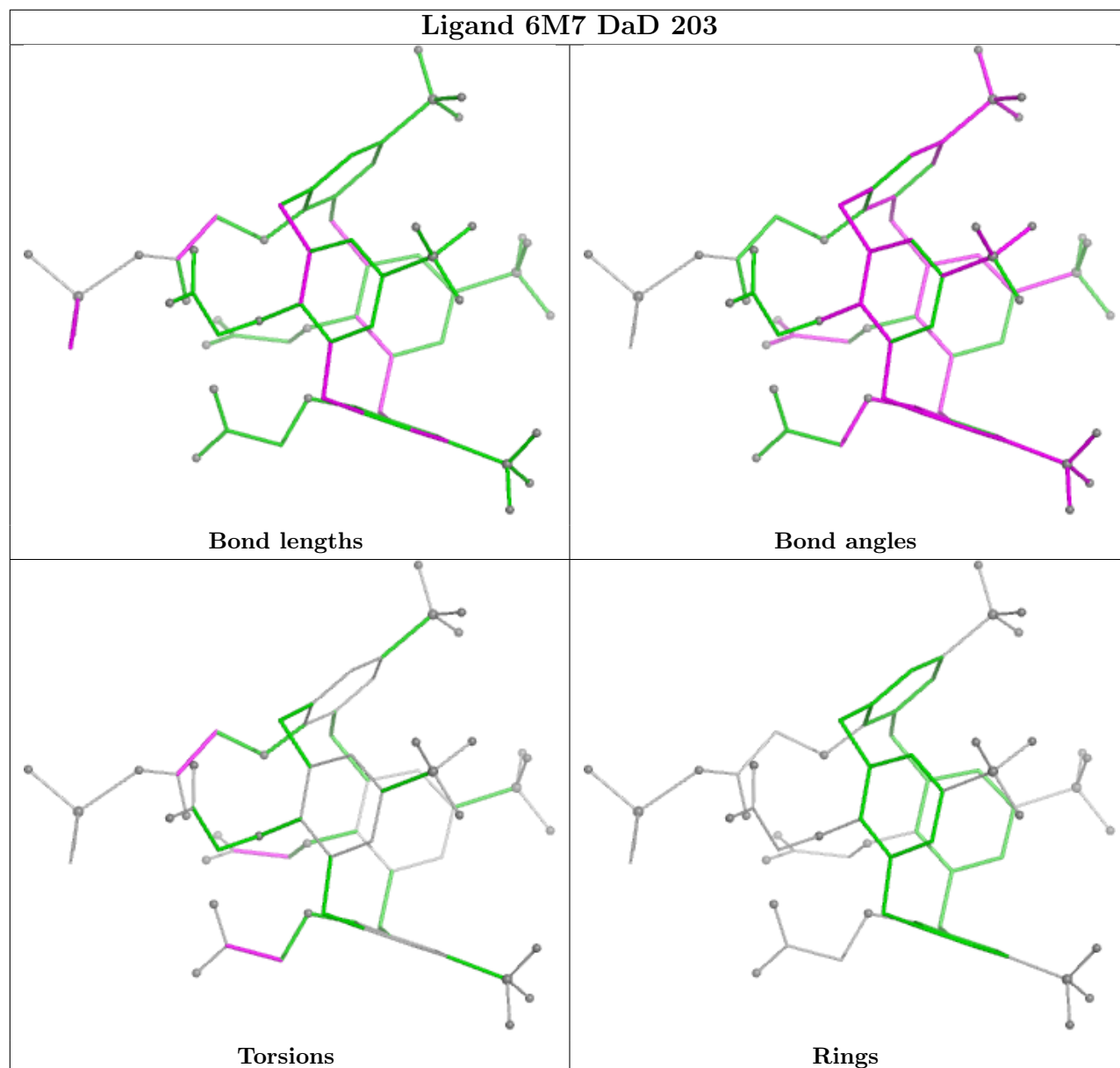
Continued from previous page...

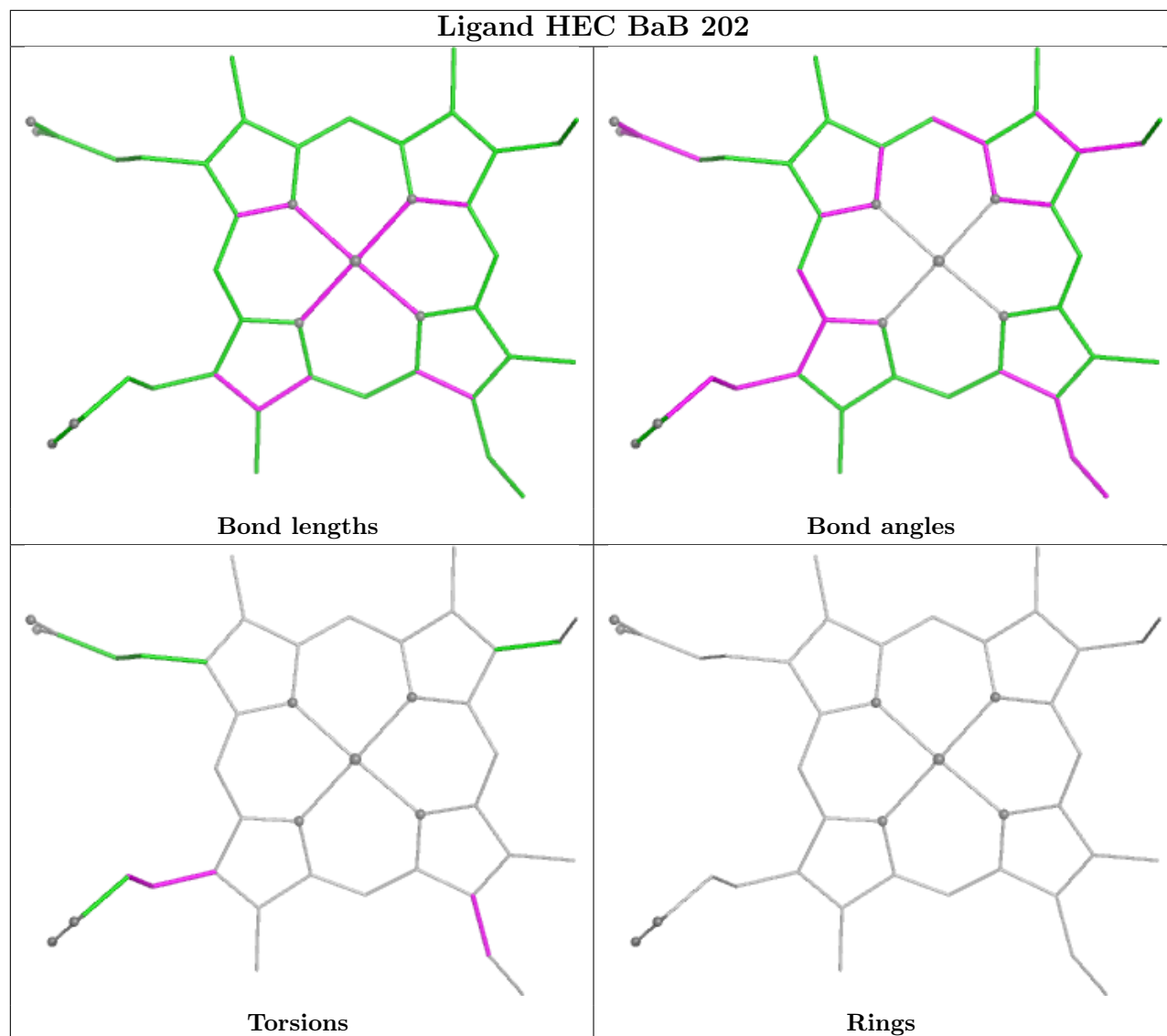
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	GaG	202	HEC	2	0
4	BaB	203	6M7	3	0
3	HaH	202	HEC	2	0
3	DaD	202	HEC	1	0
4	AaA	203	6M7	2	0
4	EaE	203	6M7	1	0
4	CaC	203	6M7	1	0
4	HaH	203	6M7	3	0

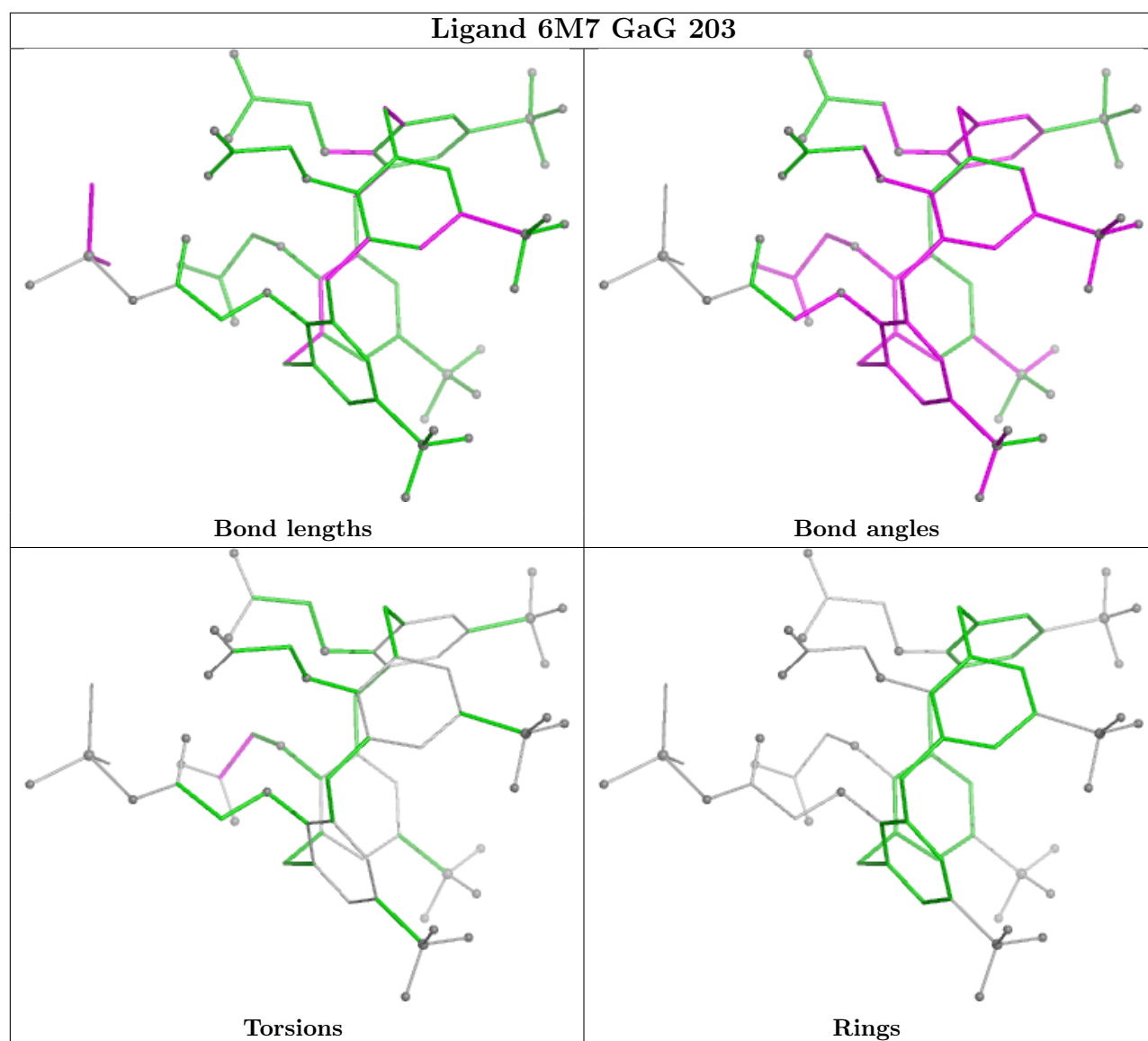
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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

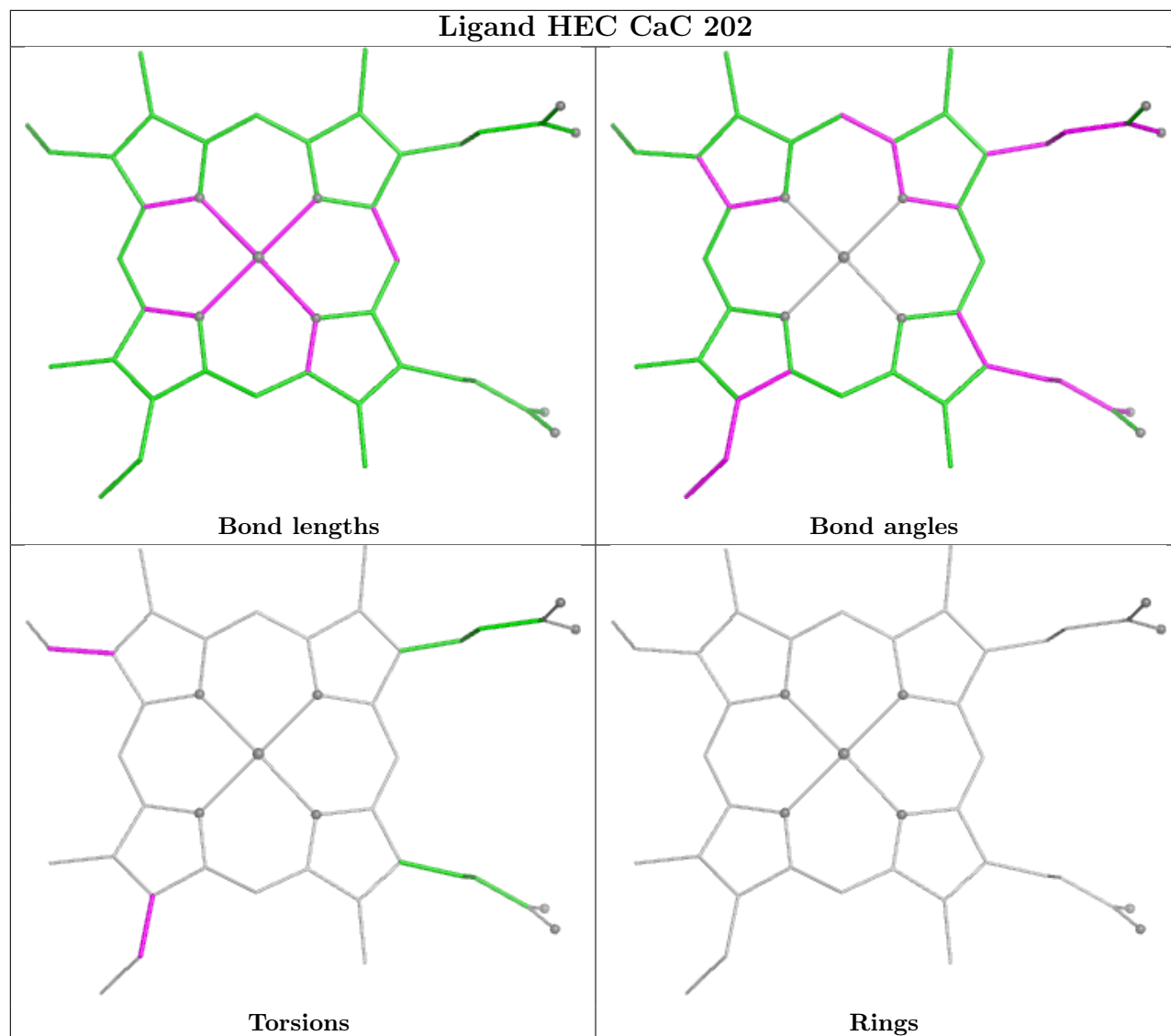


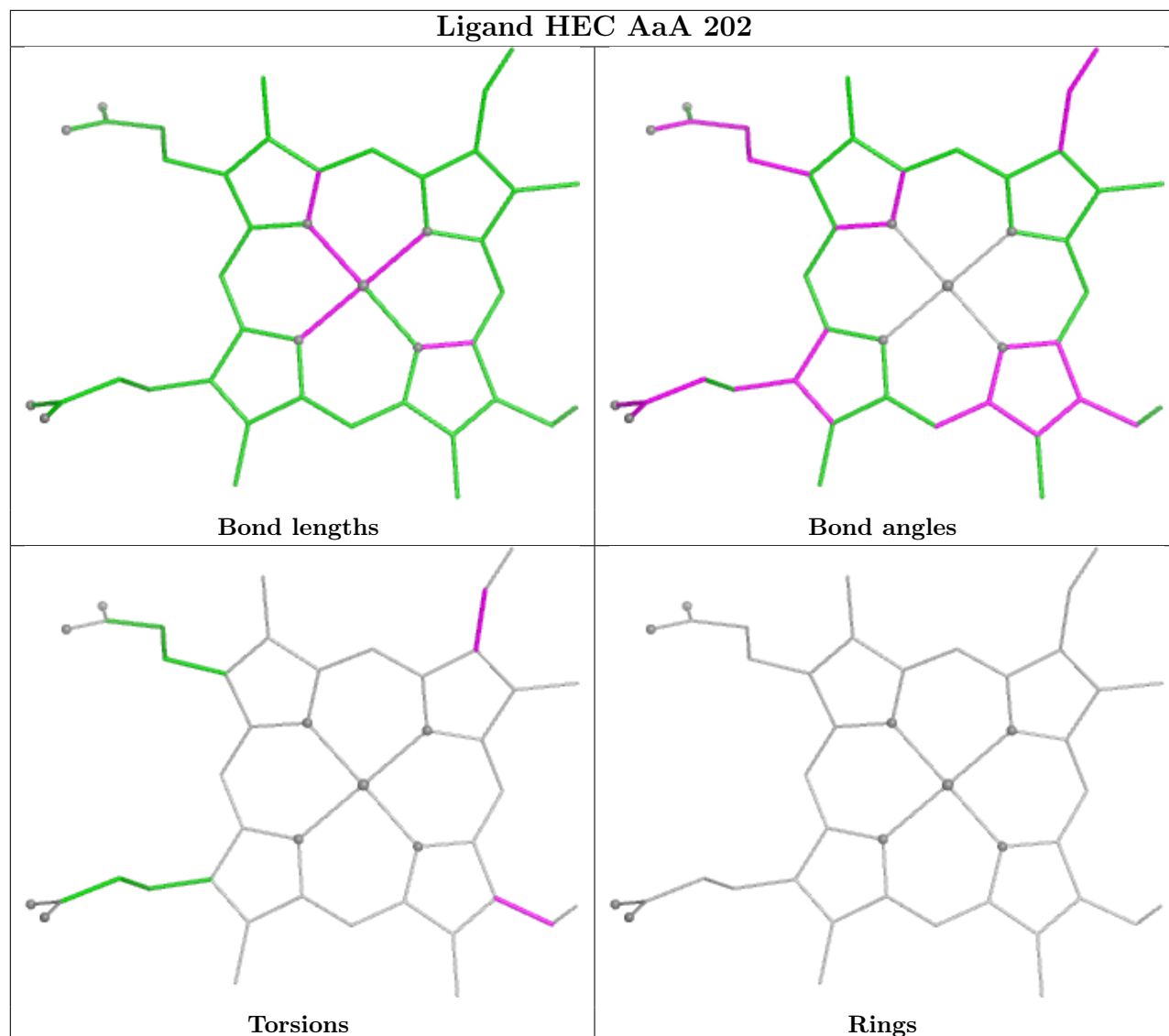
Ligand 6M7 DaD 203



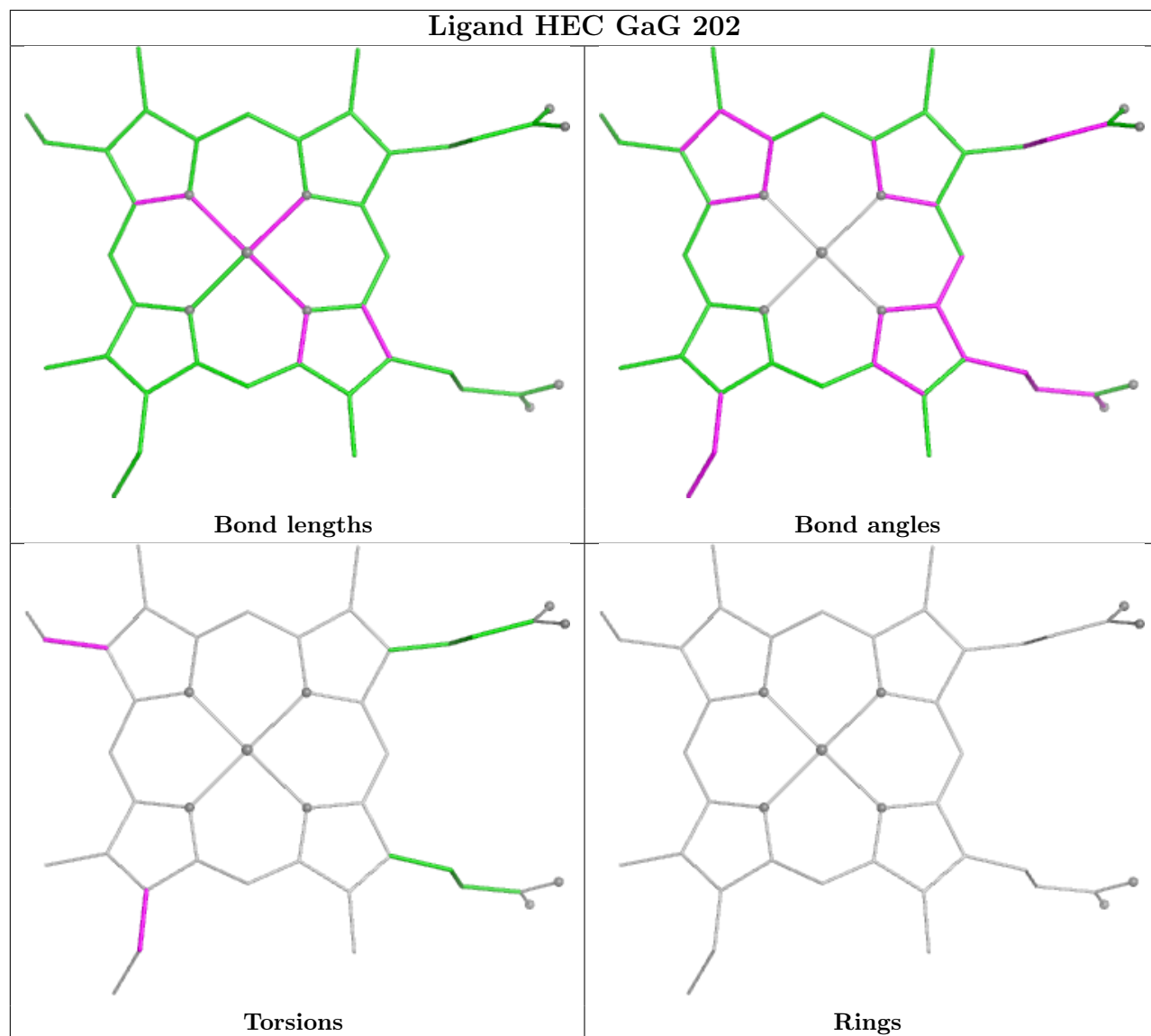




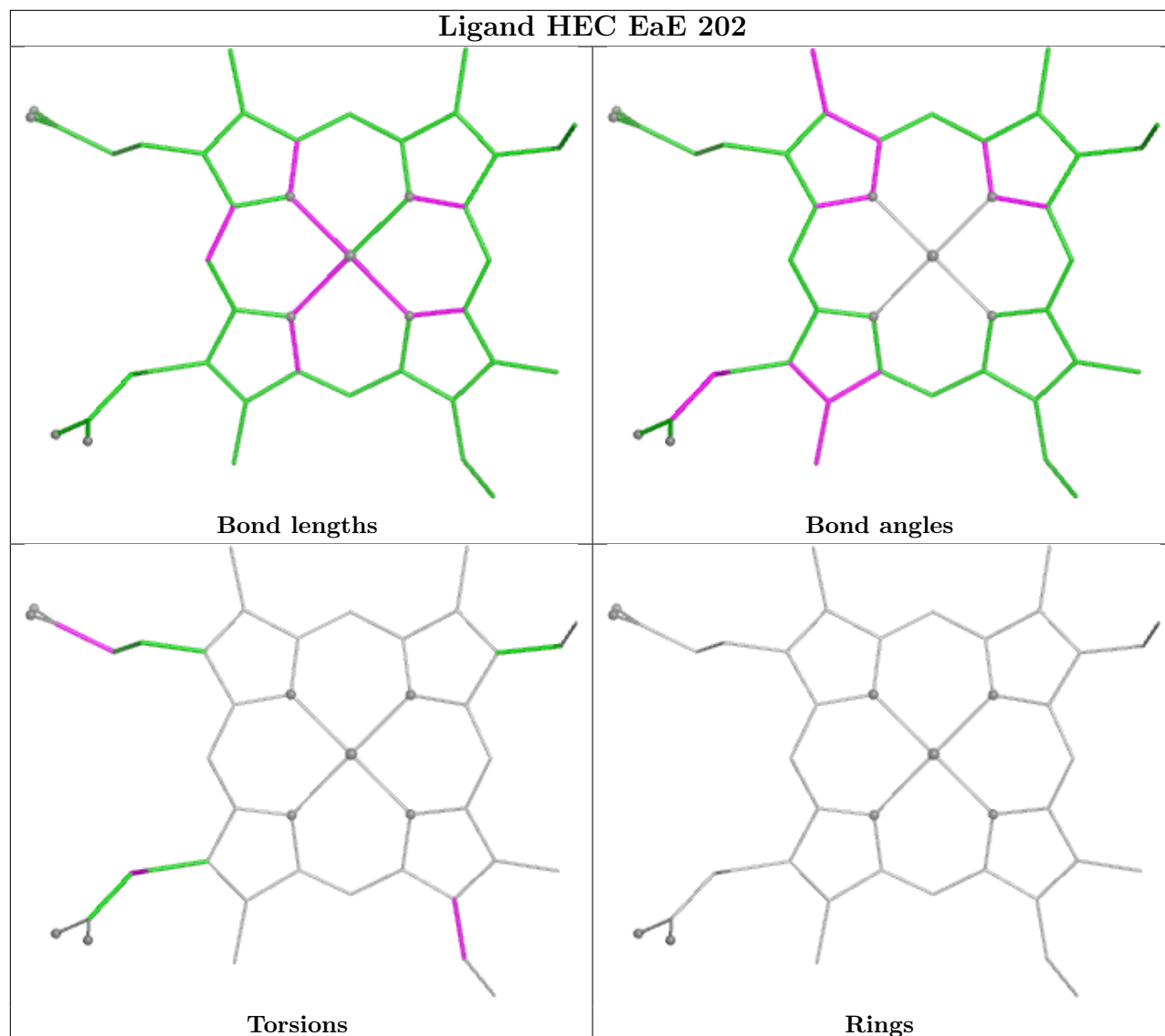




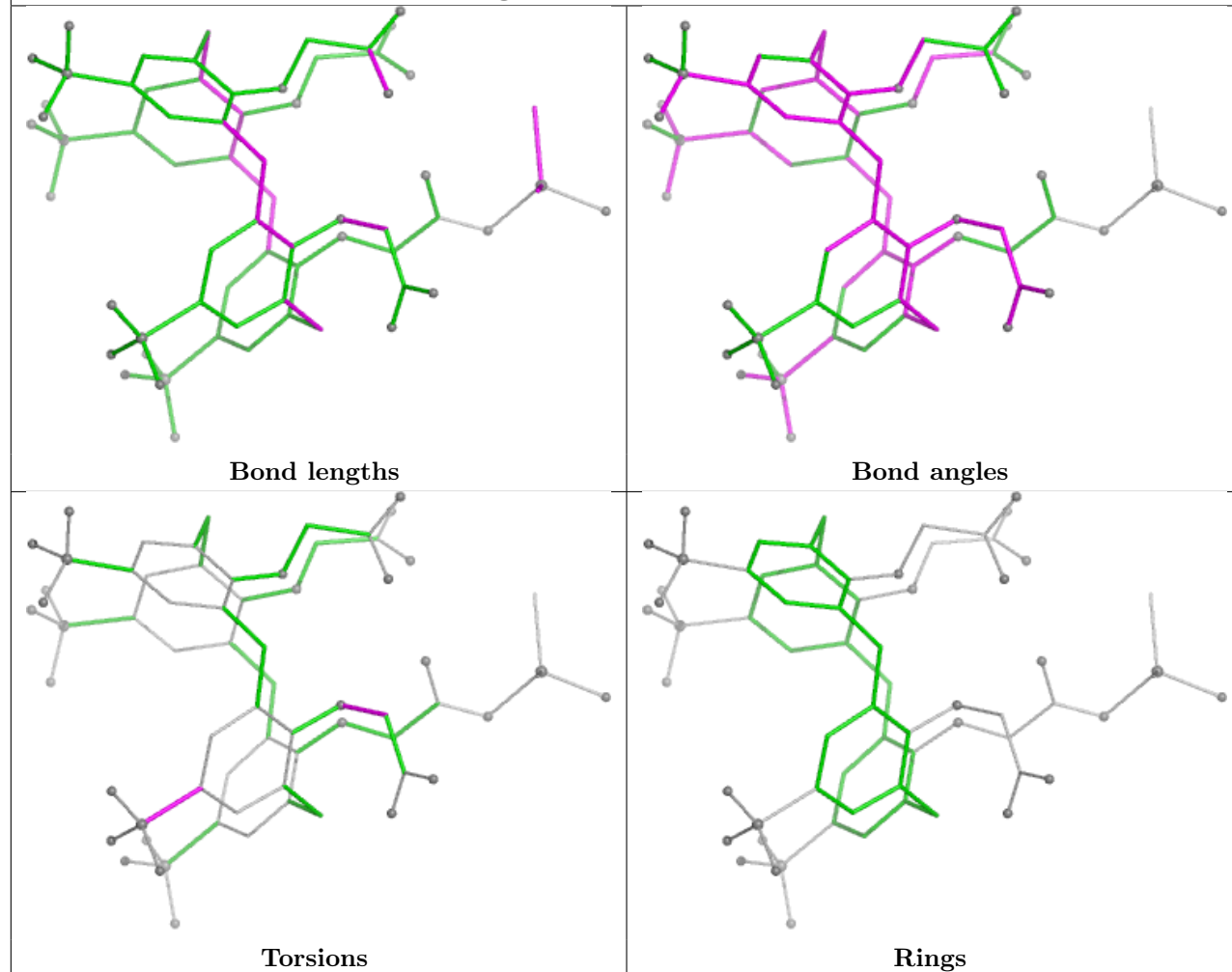
Ligand HEC GaG 202

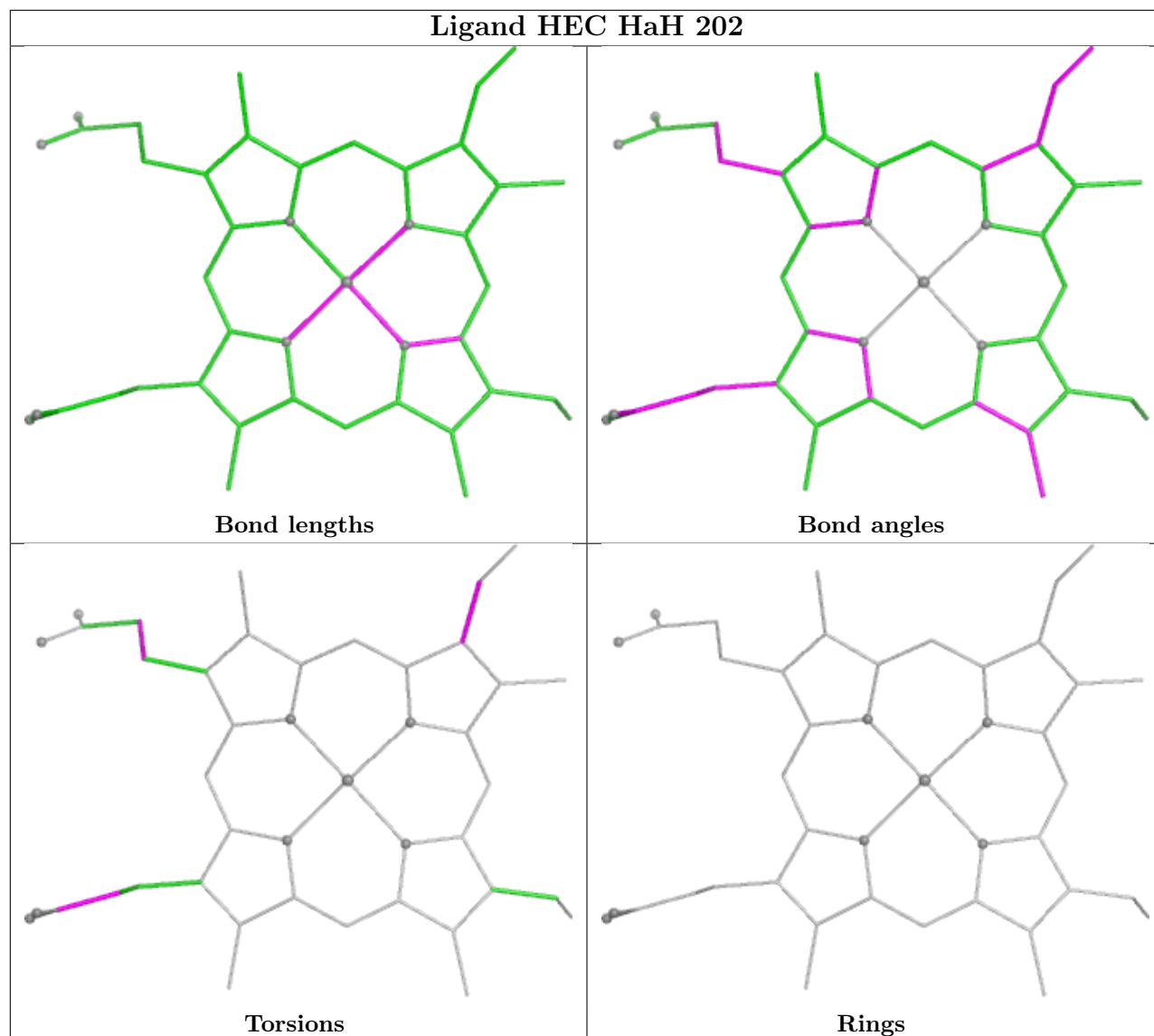


Ligand HEC EaE 202

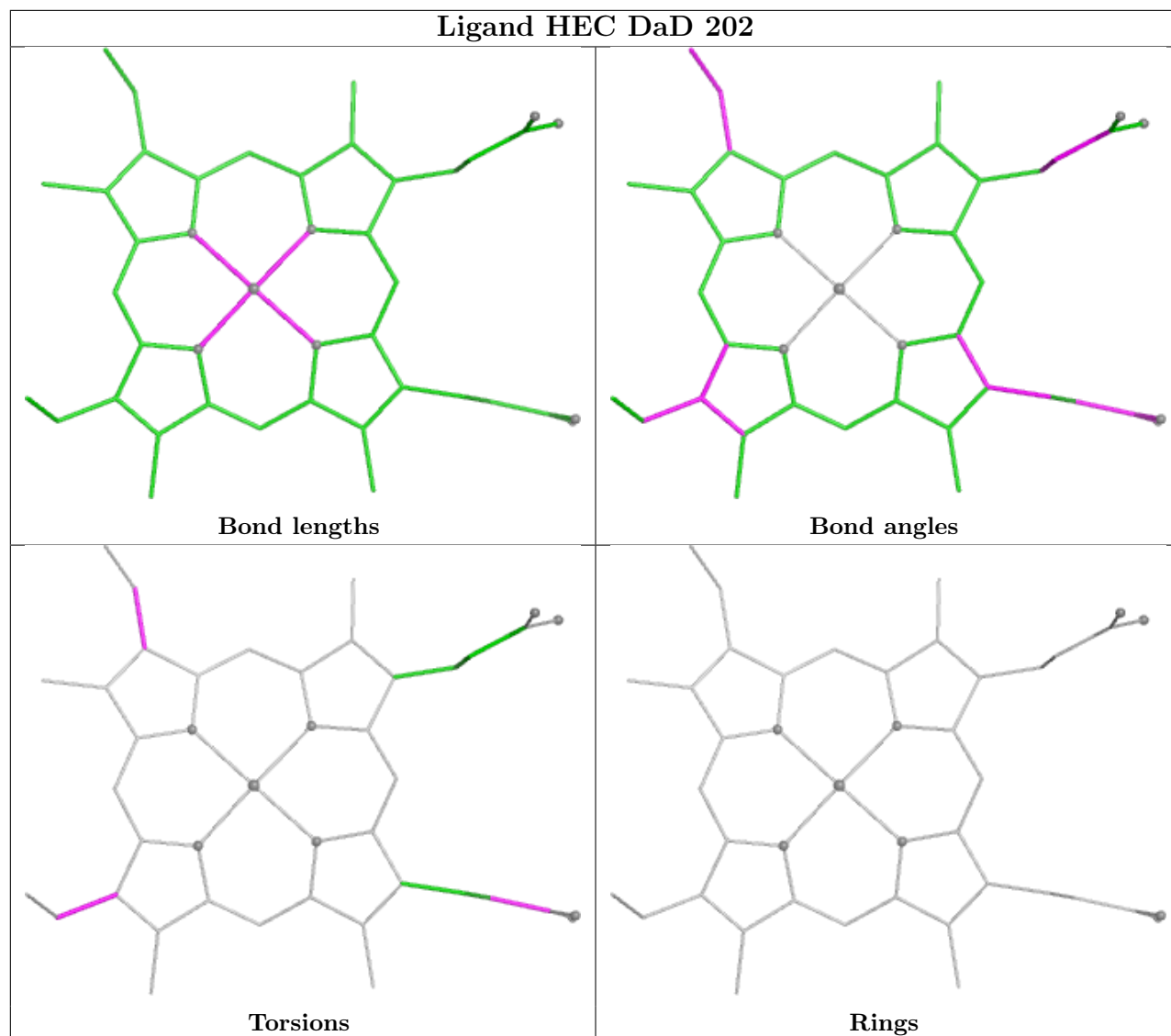


Ligand 6M7 BaB 203

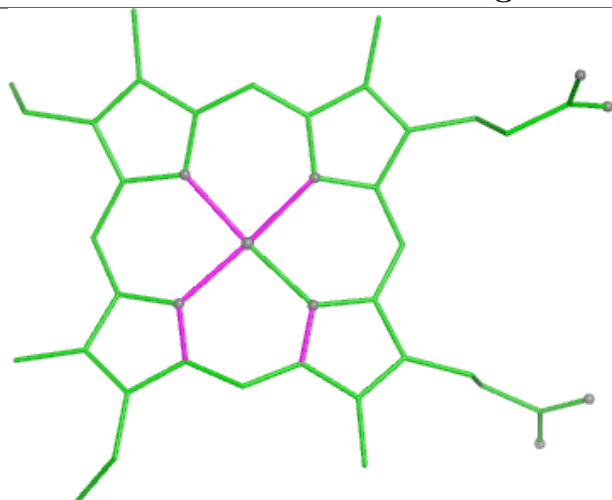




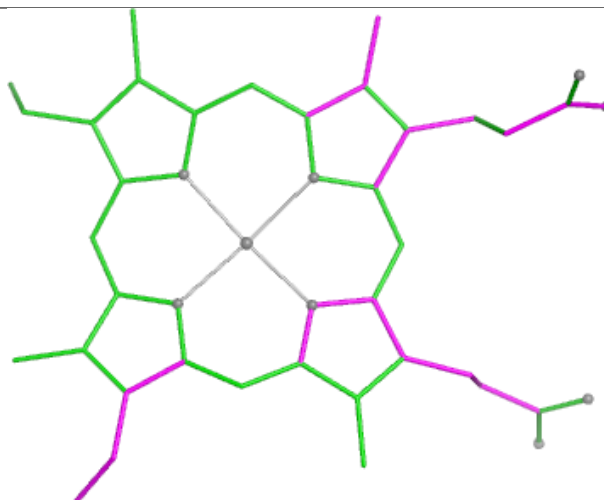
Ligand HEC DaD 202



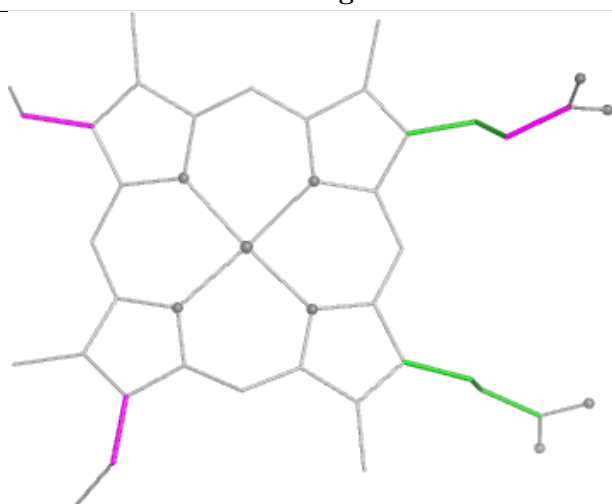
Ligand HEC FaF 202



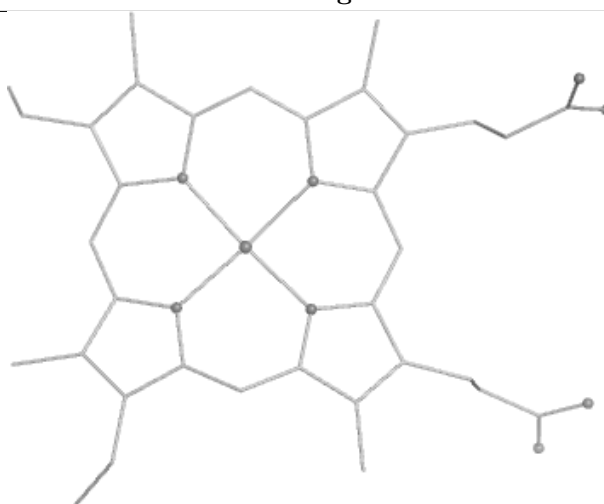
Bond lengths



Bond angles

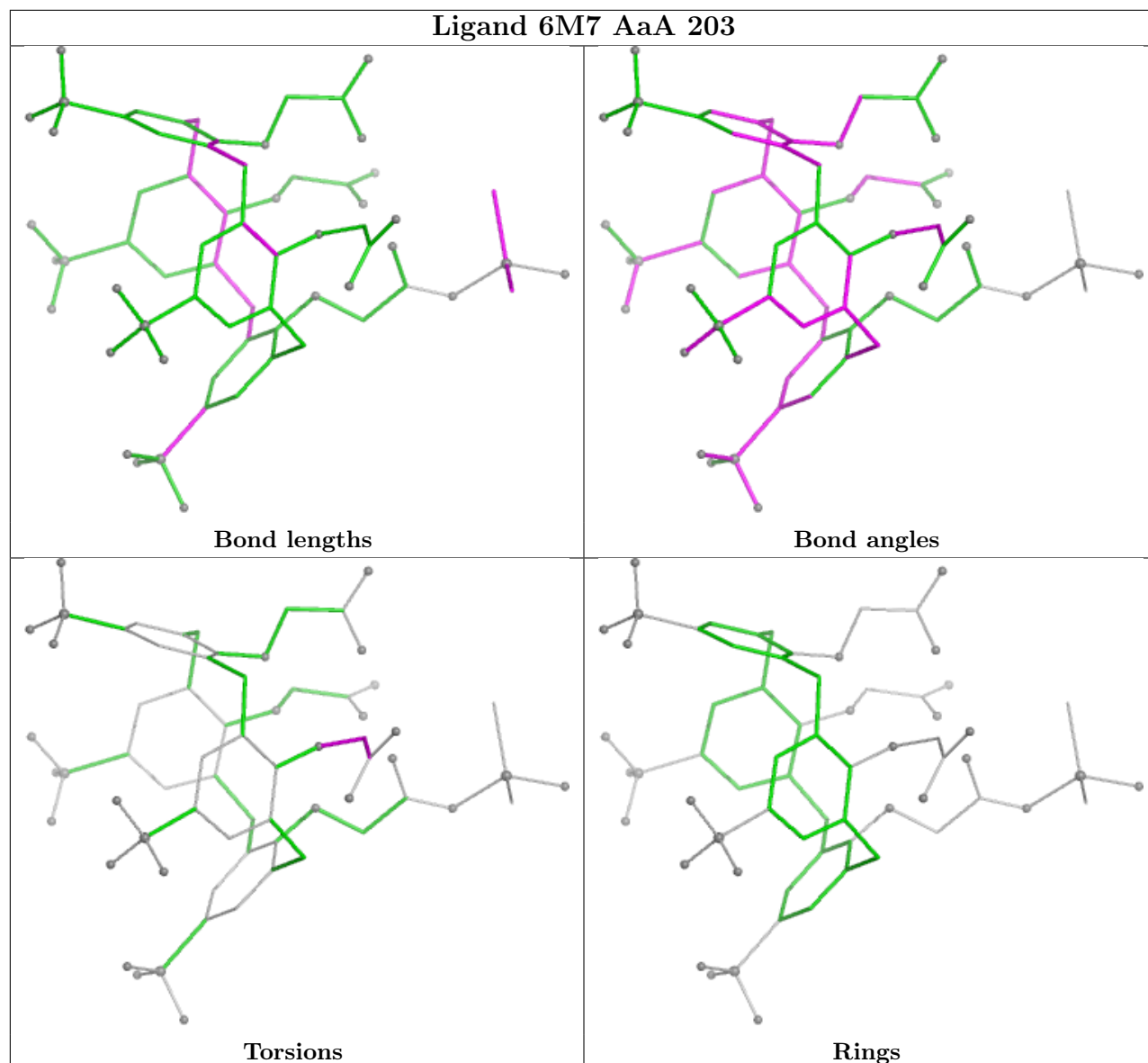


Torsions

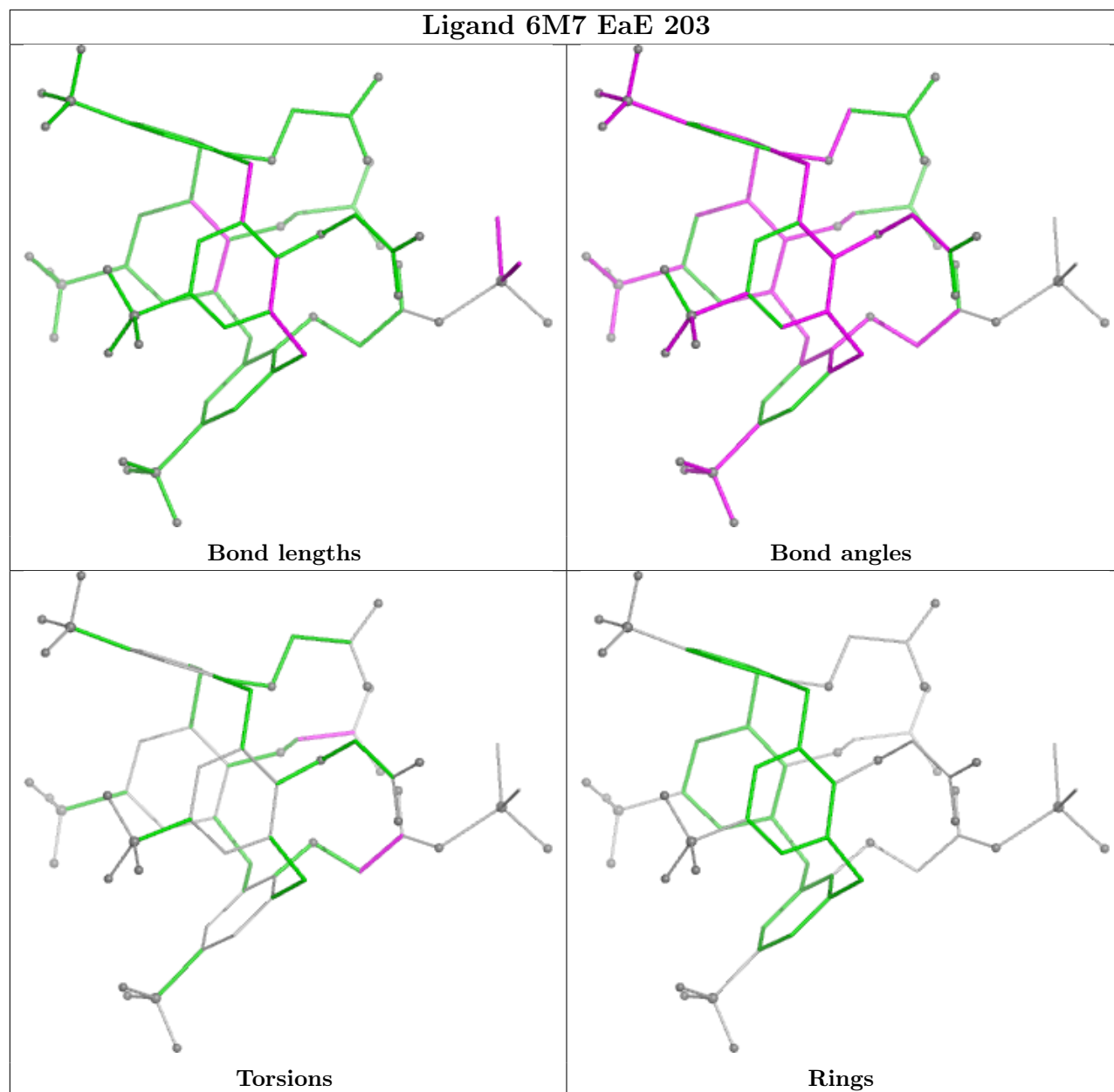


Rings

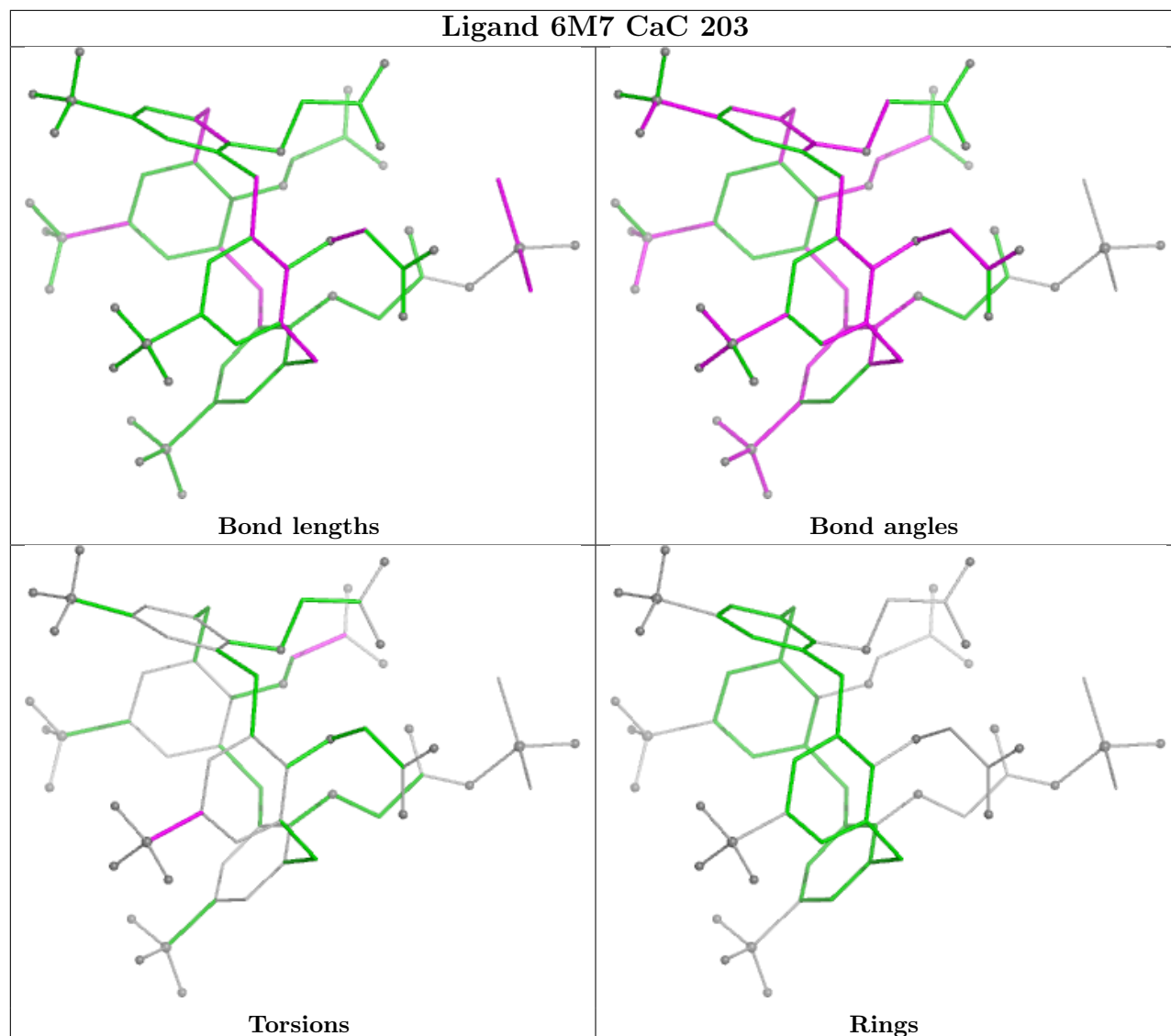
Ligand 6M7 AaA 203

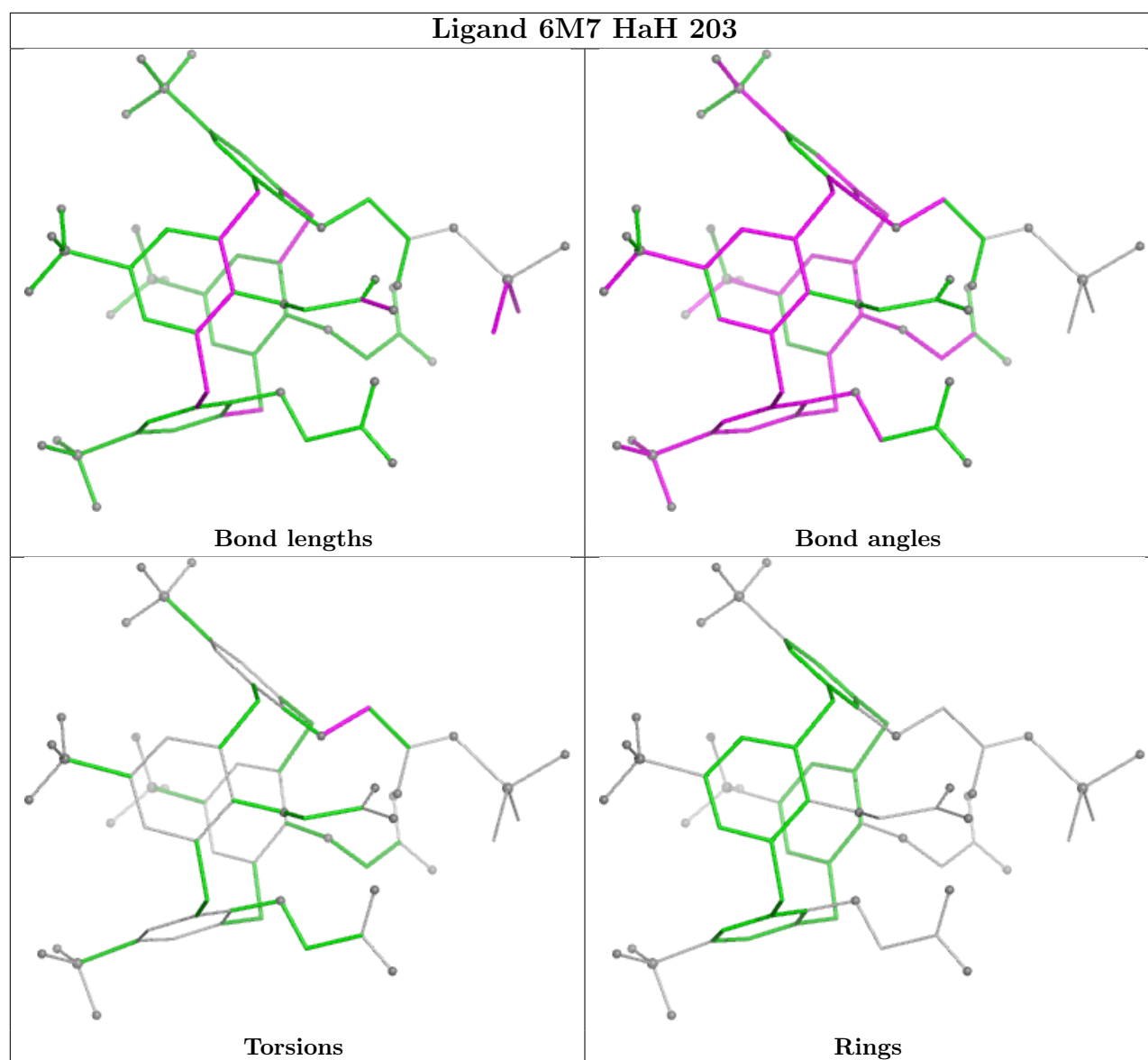


Ligand 6M7 EaE 203



Ligand 6M7 CaC 203





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	AaA	104/104 (100%)	-0.53	0 100 100	16, 23, 38, 62	0
1	BaB	104/104 (100%)	-0.47	0 100 100	15, 29, 42, 88	0
1	CaC	104/104 (100%)	-0.56	0 100 100	14, 23, 40, 51	0
1	DaD	104/104 (100%)	-0.60	0 100 100	13, 23, 37, 62	0
1	EaE	104/104 (100%)	-0.59	0 100 100	14, 24, 39, 64	0
1	FaF	104/104 (100%)	-0.53	0 100 100	14, 27, 42, 64	0
1	GaG	104/104 (100%)	-0.67	0 100 100	12, 21, 33, 71	0
1	HaH	104/104 (100%)	-0.55	0 100 100	17, 27, 38, 49	0
All	All	832/832 (100%)	-0.56	0 100 100	12, 24, 41, 88	0

There are no RSRZ outliers to report.

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 [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

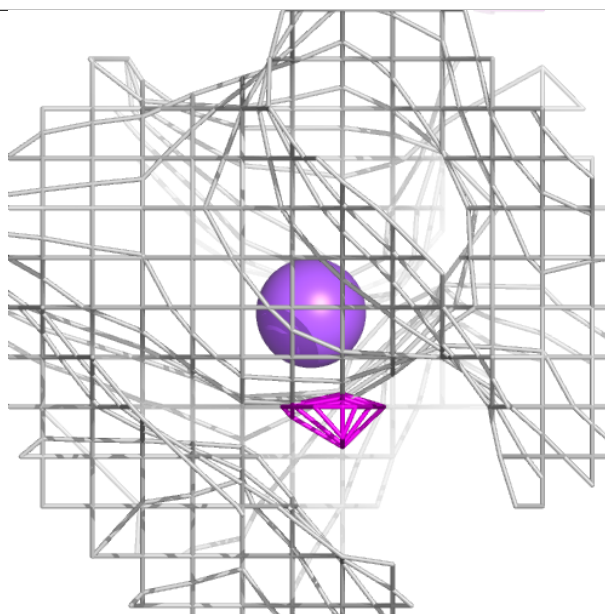
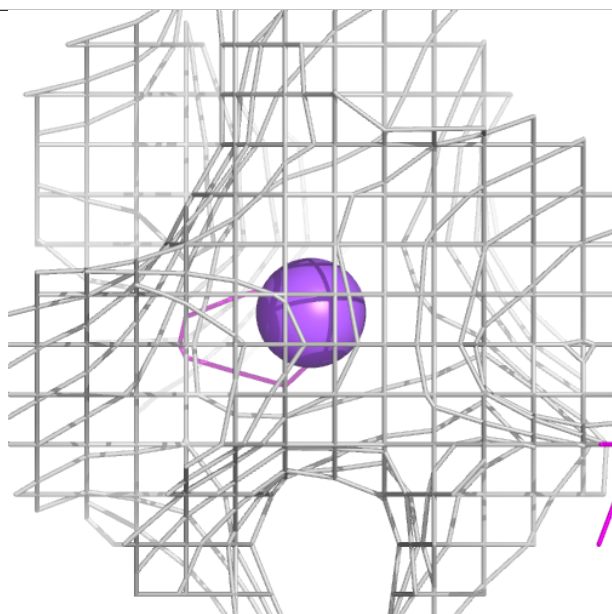
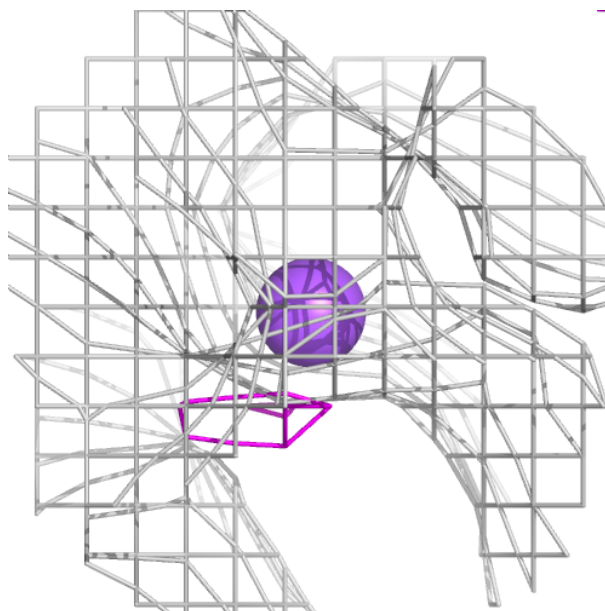
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists 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
5	NA	CaC	204	1/1	0.86	0.12	28,28,28,28	0
2	ACE	HaH	201	3/3	0.90	0.12	30,30,34,34	0
2	ACE	GaG	201	3/3	0.90	0.18	39,39,40,42	0
5	NA	GaG	204	1/1	0.91	0.07	22,22,22,22	0
2	ACE	FaF	201	3/3	0.92	0.11	33,33,35,37	0
5	NA	FaF	204	1/1	0.94	0.06	26,26,26,26	0
2	ACE	CaC	201	3/3	0.94	0.10	34,34,36,37	0
5	NA	HaH	204	1/1	0.94	0.08	28,28,28,28	0
5	NA	DaD	204	1/1	0.96	0.12	19,19,19,19	0
5	NA	EaE	204	1/1	0.97	0.04	28,28,28,28	0
5	NA	AaA	204	1/1	0.97	0.04	31,31,31,31	0
2	ACE	AaA	201	3/3	0.97	0.08	29,29,34,36	0
2	ACE	BaB	201	3/3	0.97	0.06	26,26,28,29	0
3	HEC	GaG	202	43/43	0.98	0.06	12,17,22,26	0
4	6M7	AaA	203	68/68	0.98	0.06	17,27,52,65	0
4	6M7	BaB	203	68/68	0.98	0.06	16,24,38,48	0
4	6M7	CaC	203	68/68	0.98	0.07	16,25,37,43	0
4	6M7	DaD	203	68/68	0.98	0.05	13,18,27,32	0
4	6M7	EaE	203	68/68	0.98	0.06	15,25,47,58	0
4	6M7	FaF	203	68/68	0.98	0.06	18,23,36,45	0
4	6M7	GaG	203	68/68	0.98	0.05	11,18,26,32	0
4	6M7	HaH	203	68/68	0.98	0.06	18,25,42,49	0
2	ACE	DaD	201	3/3	0.98	0.06	30,30,31,32	0
5	NA	BaB	204	1/1	0.98	0.05	26,26,26,26	0
3	HEC	AaA	202	43/43	0.98	0.05	12,16,18,20	0
3	HEC	BaB	202	43/43	0.98	0.06	15,17,21,27	0
3	HEC	CaC	202	43/43	0.98	0.06	14,16,19,21	0
3	HEC	DaD	202	43/43	0.98	0.05	13,19,21,23	0
3	HEC	EaE	202	43/43	0.98	0.06	15,17,22,29	0
3	HEC	FaF	202	43/43	0.98	0.06	14,17,22,24	0
2	ACE	EaE	201	3/3	0.99	0.04	17,17,18,18	0
3	HEC	HaH	202	43/43	0.99	0.05	15,19,26,34	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.

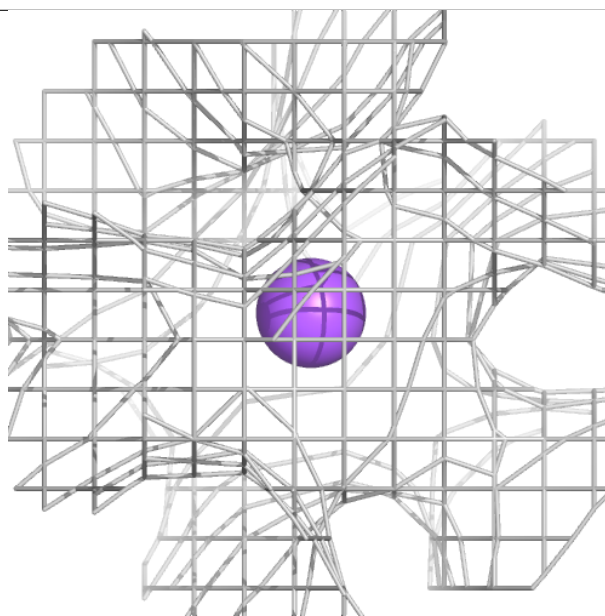
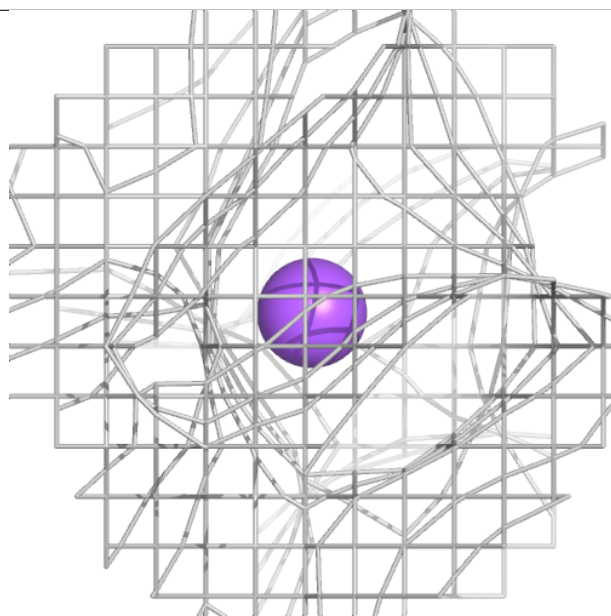
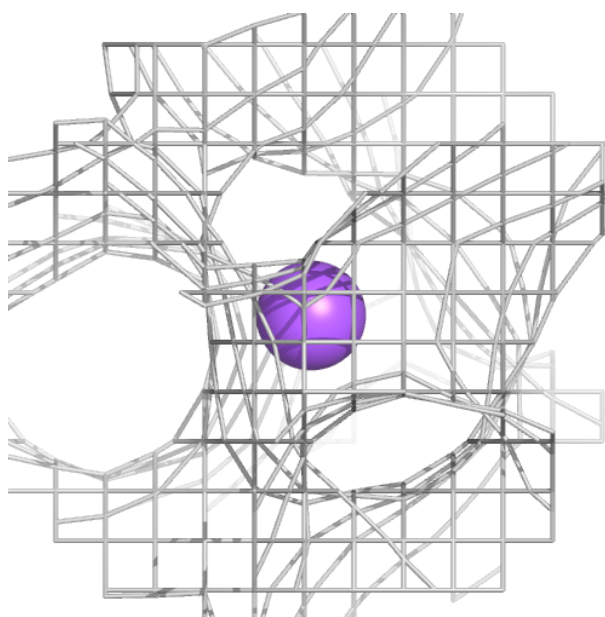
Electron density around NA CaC 204:

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



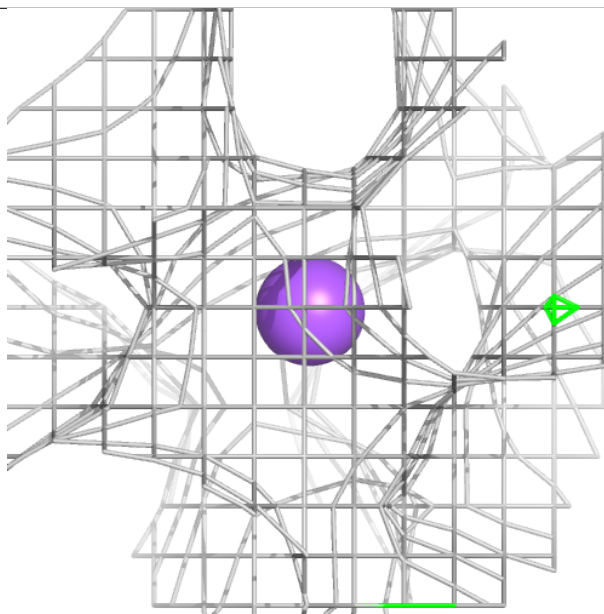
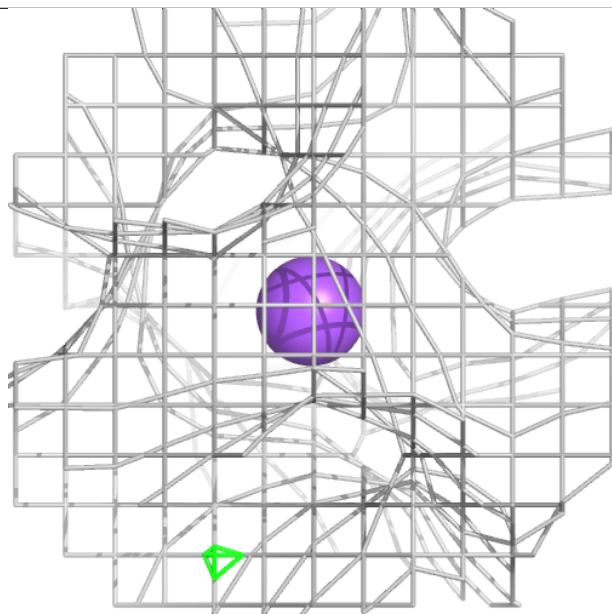
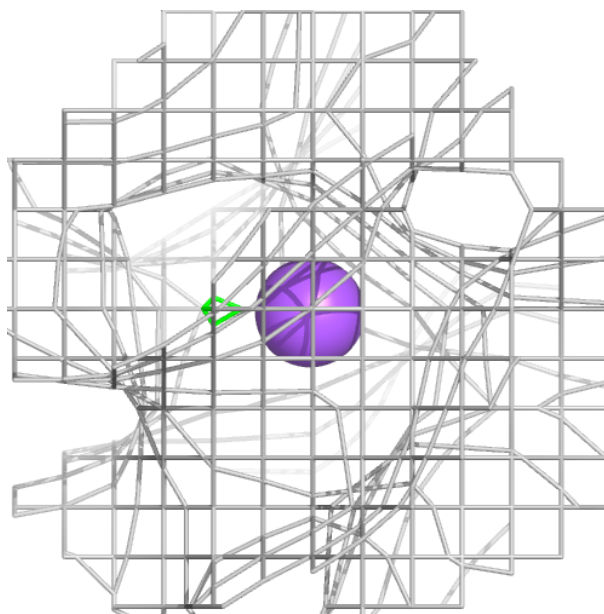
Electron density around NA GaG 204:

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



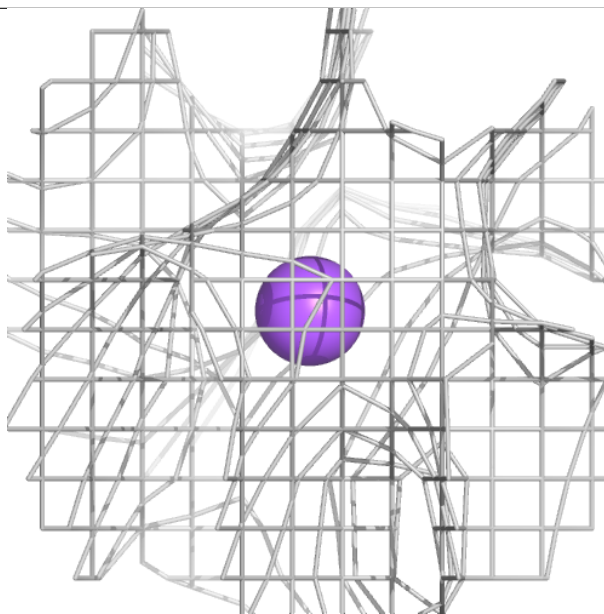
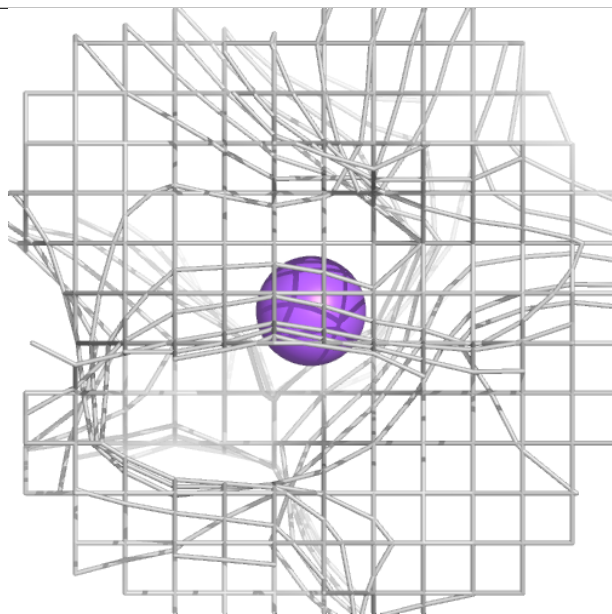
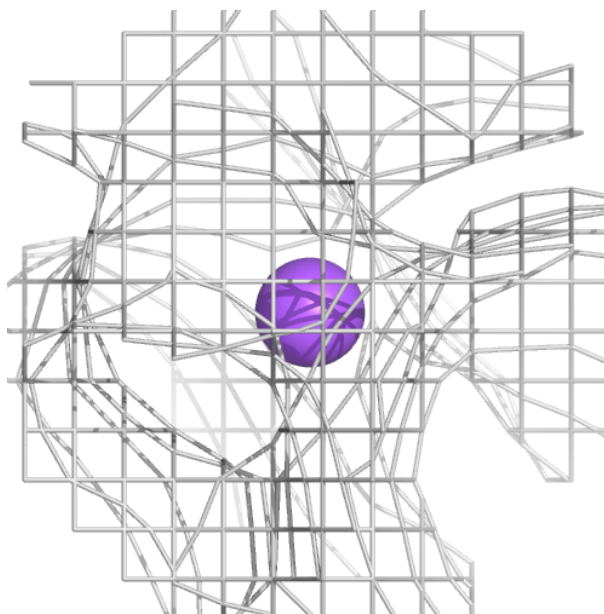
Electron density around NA FaF 204:

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



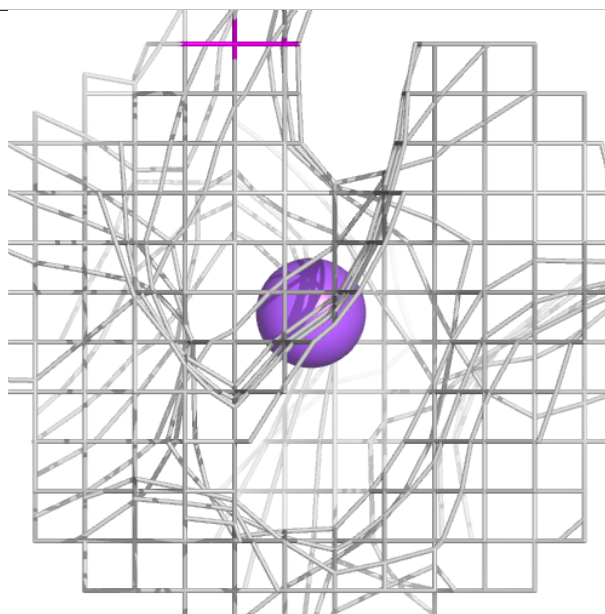
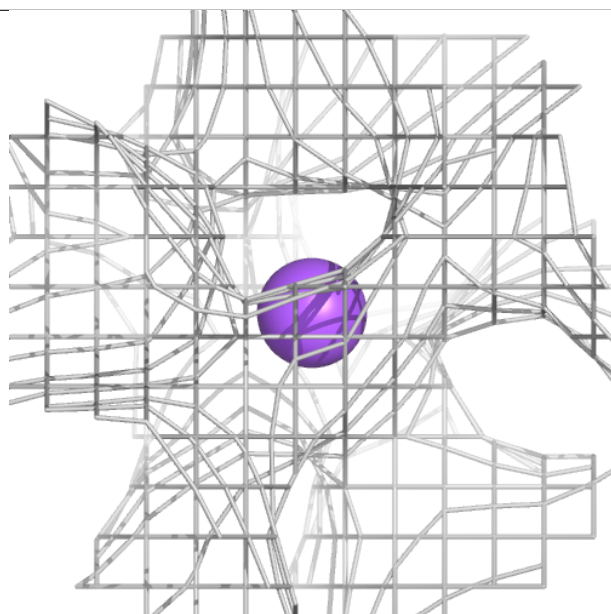
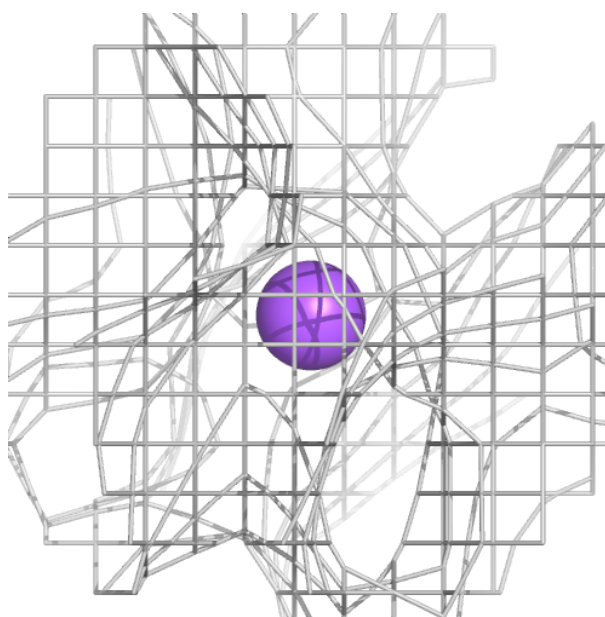
Electron density around NA HaH 204:

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



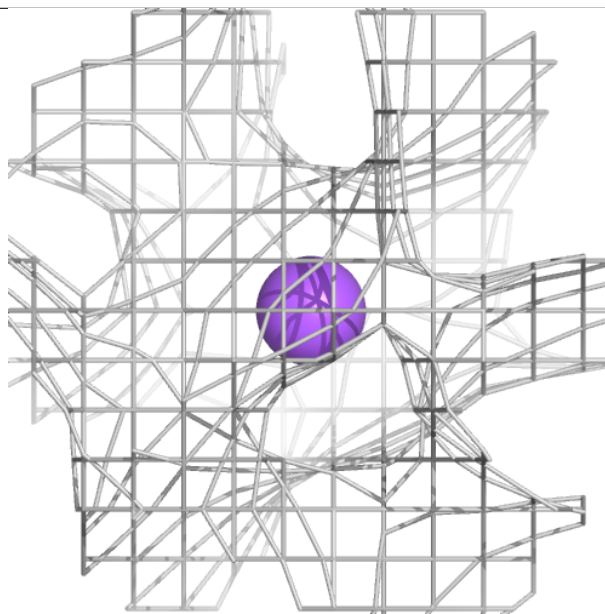
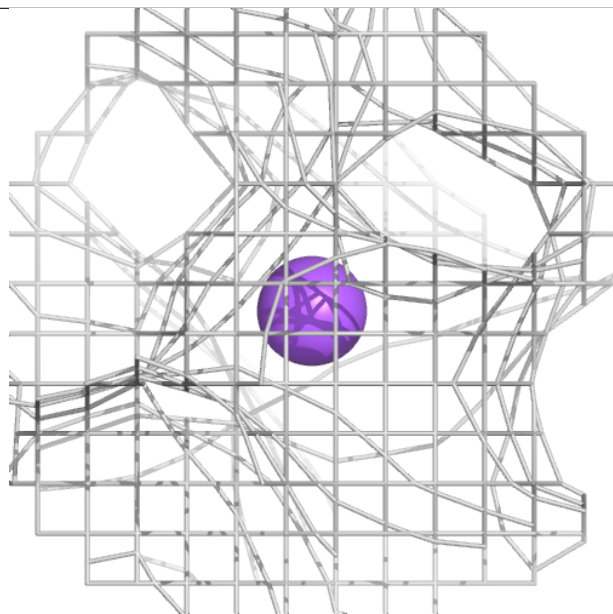
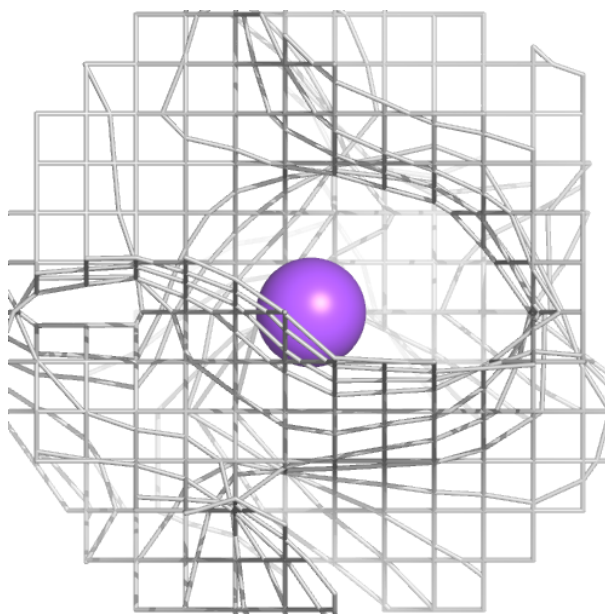
Electron density around NA DaD 204:

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



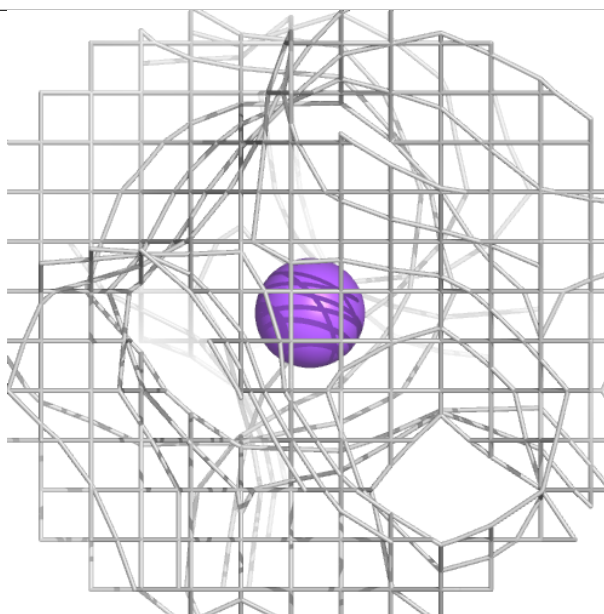
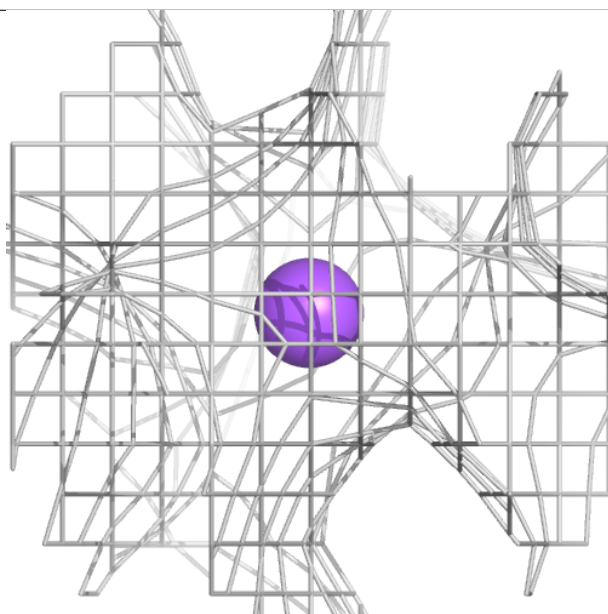
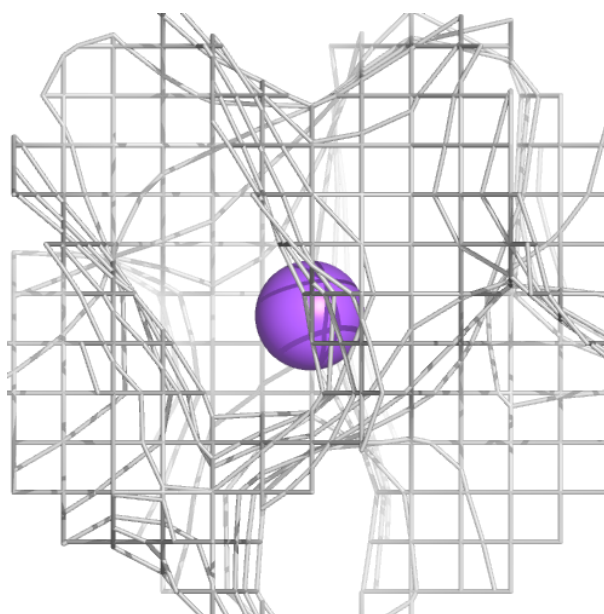
Electron density around NA EaE 204:

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



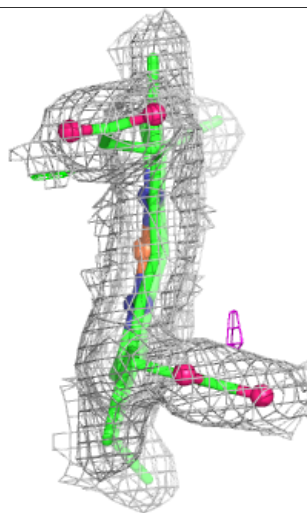
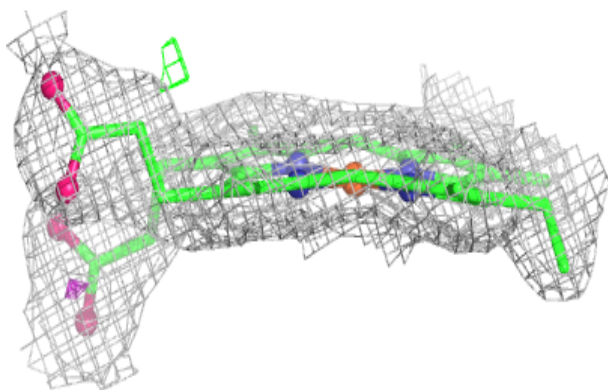
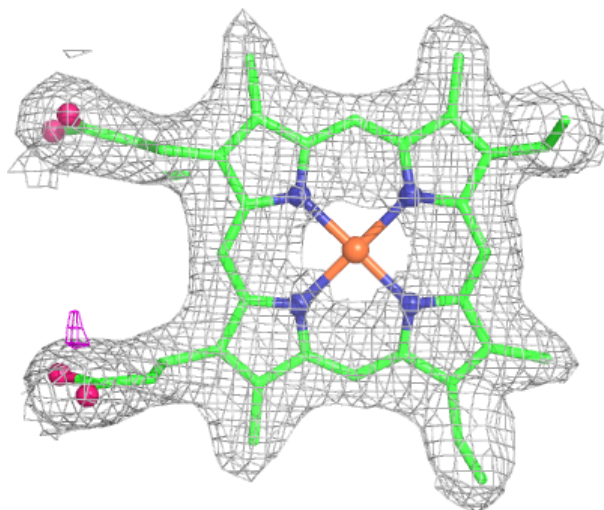
Electron density around NA AaA 204:

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



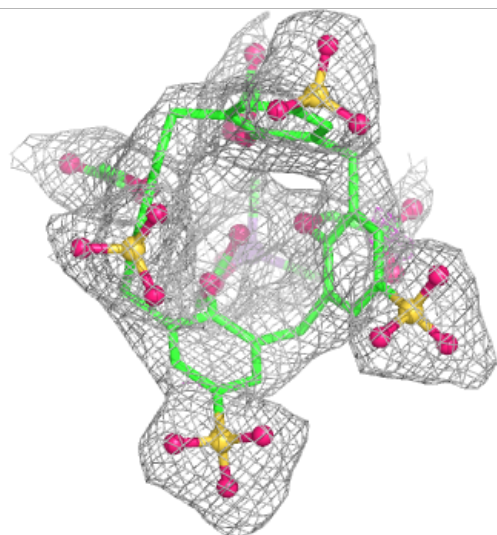
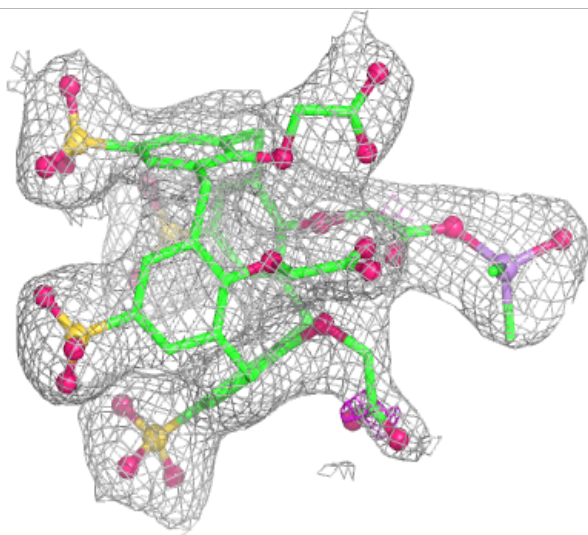
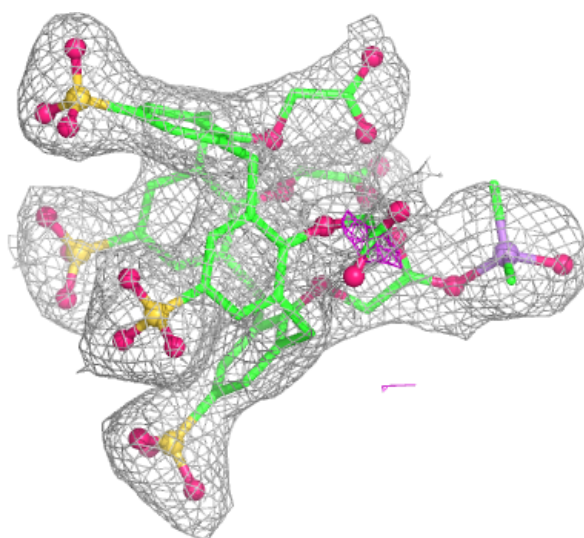
Electron density around HEC GaG 202:

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



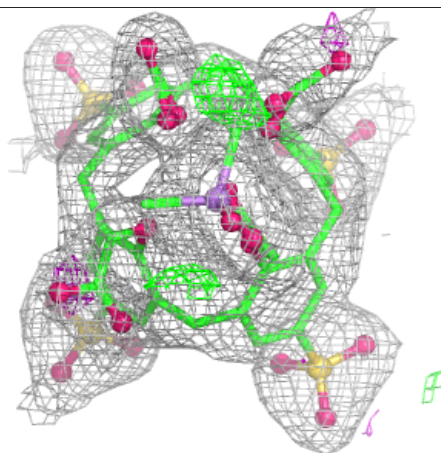
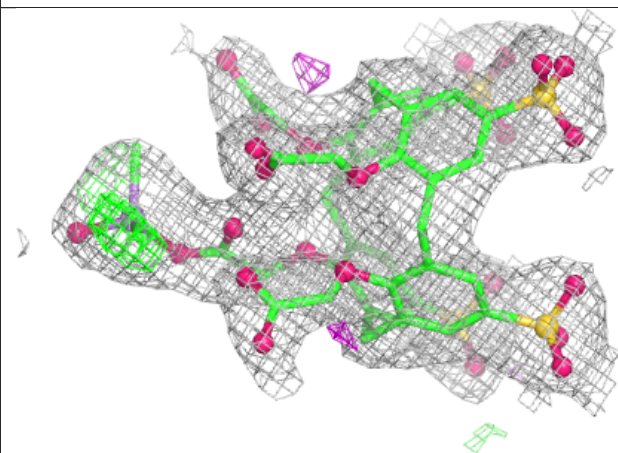
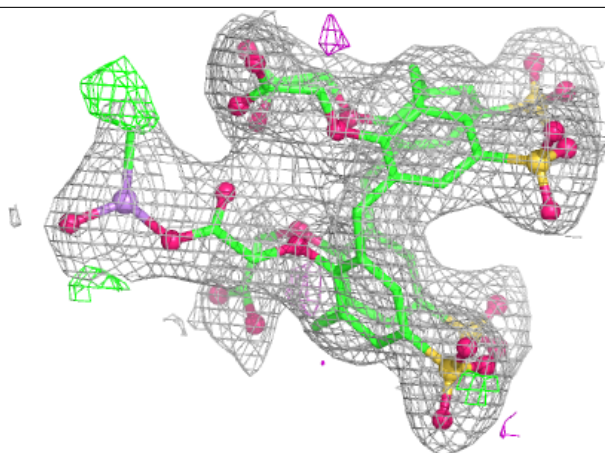
Electron density around 6M7 AaA 203:

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



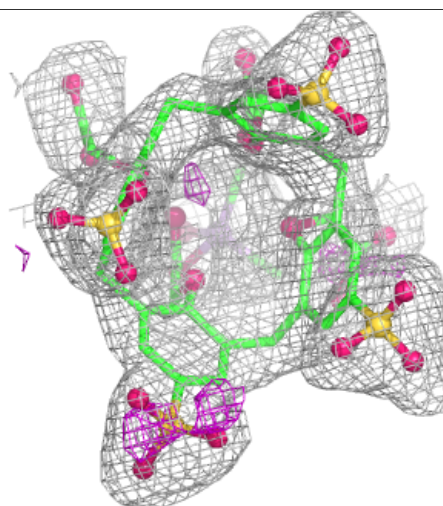
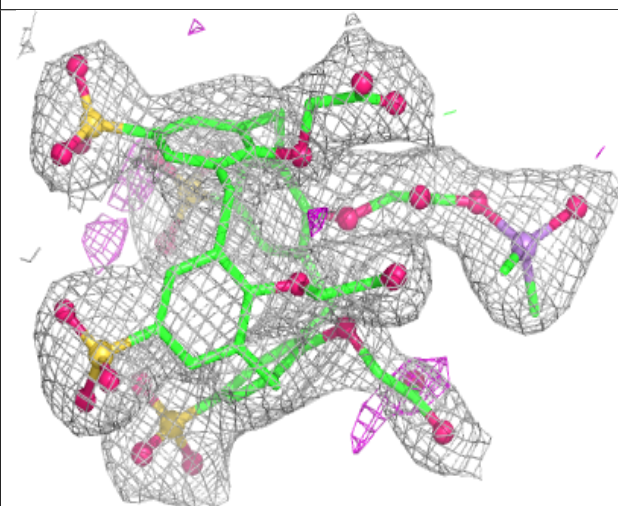
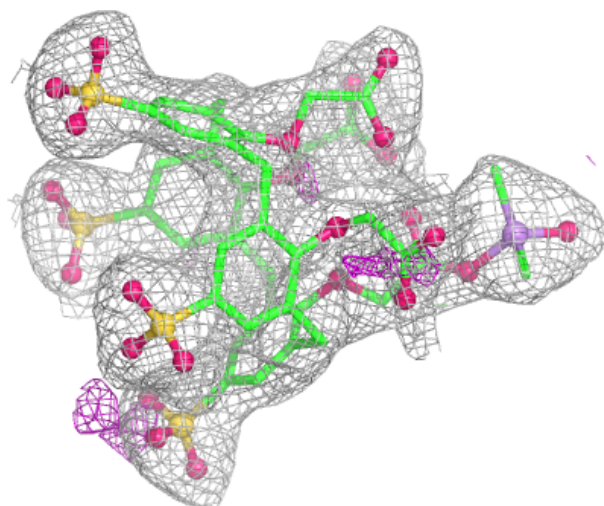
Electron density around 6M7 BaB 203:

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



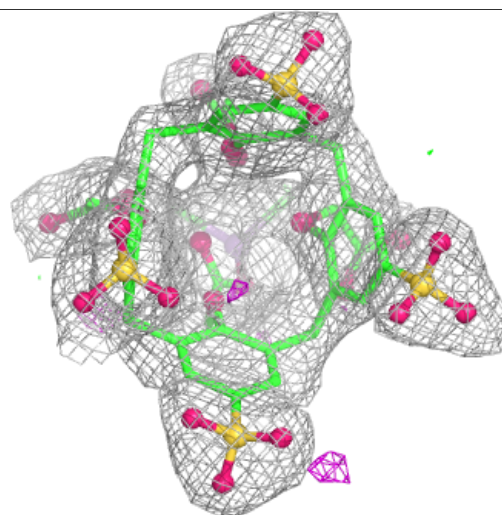
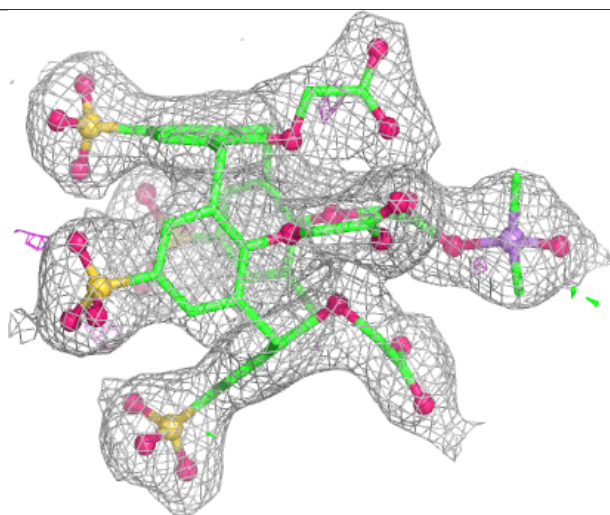
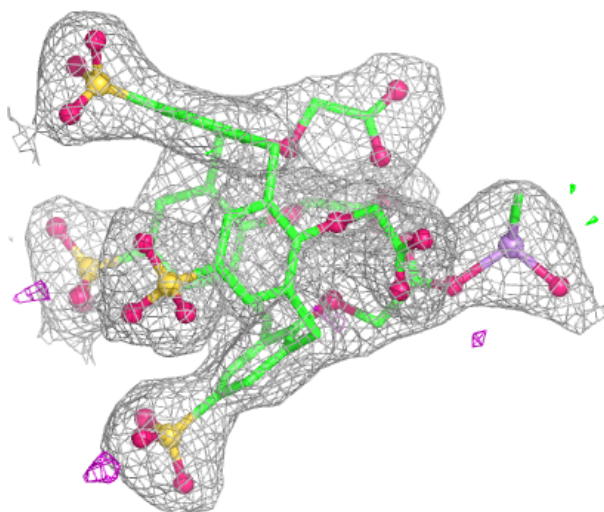
Electron density around 6M7 CaC 203:

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



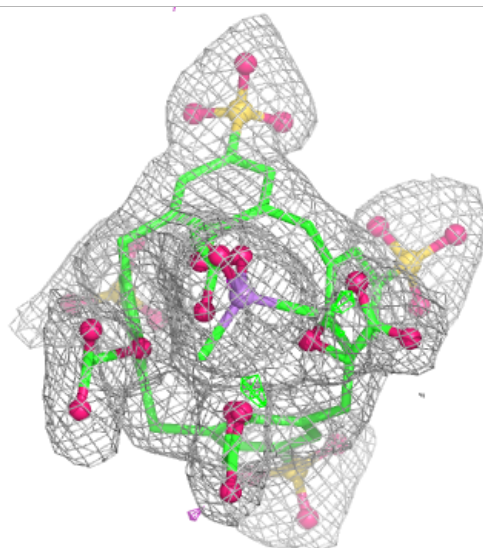
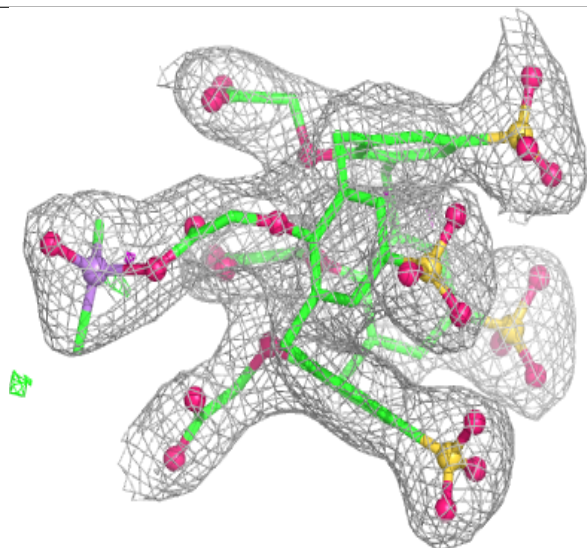
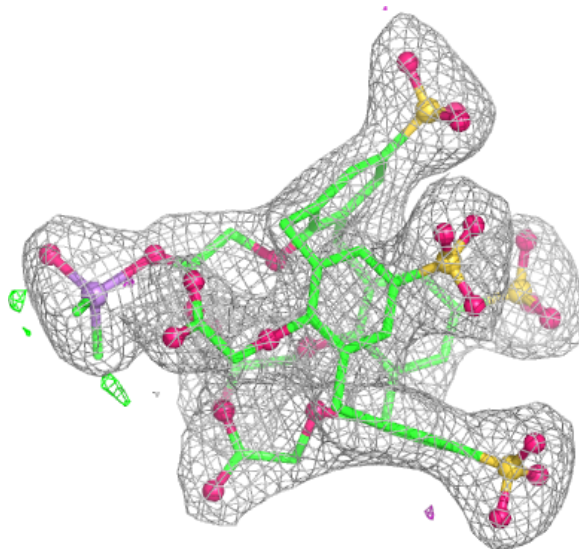
Electron density around 6M7 DaD 203:

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



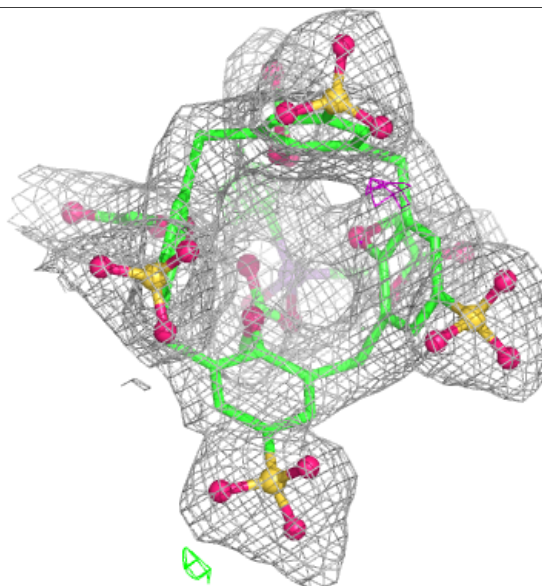
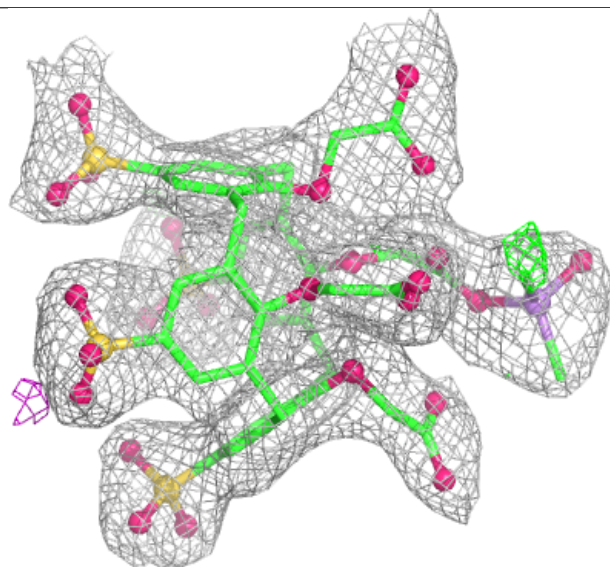
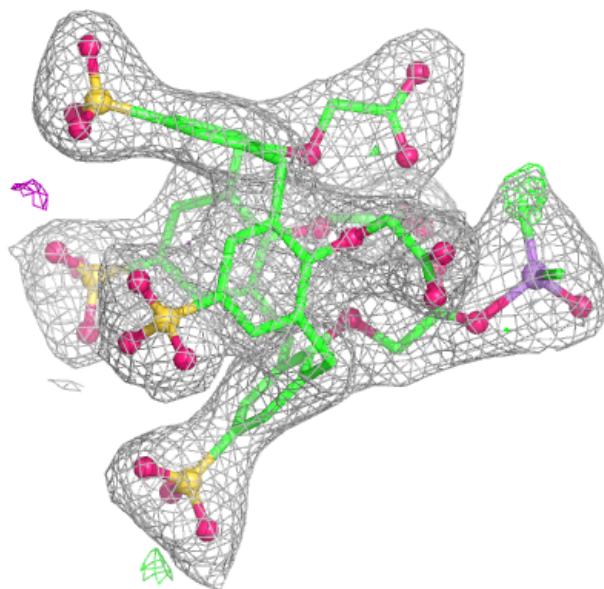
Electron density around 6M7 EaE 203:

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



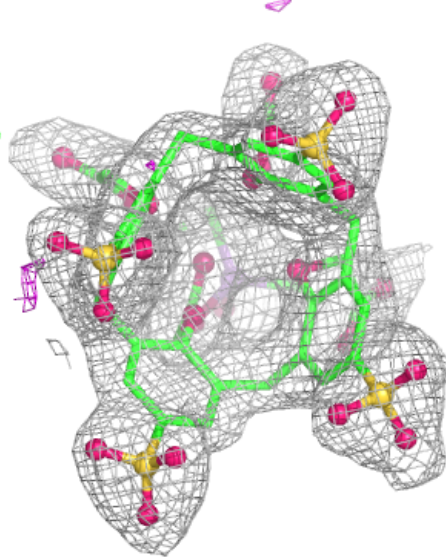
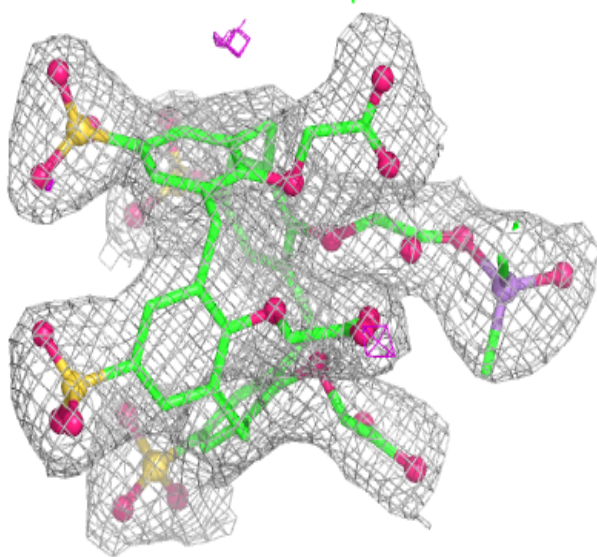
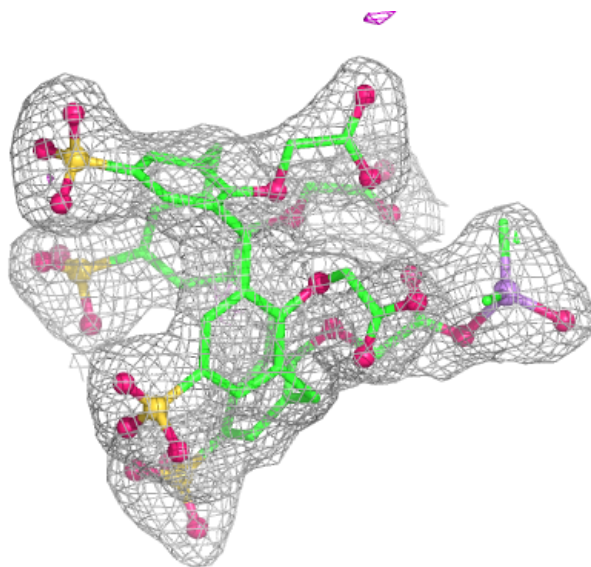
Electron density around 6M7 FaF 203:

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



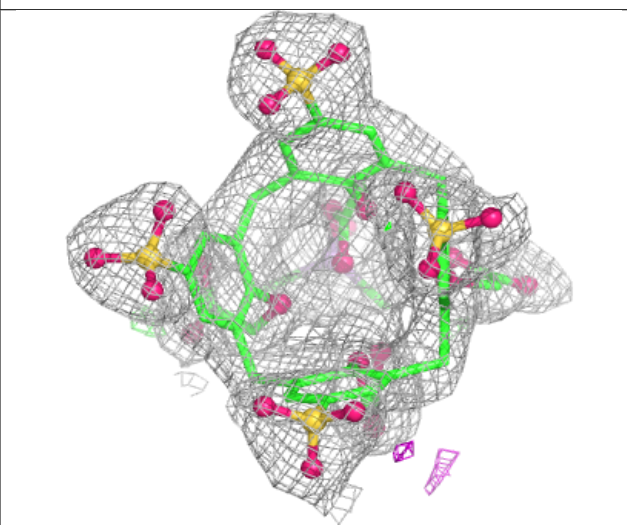
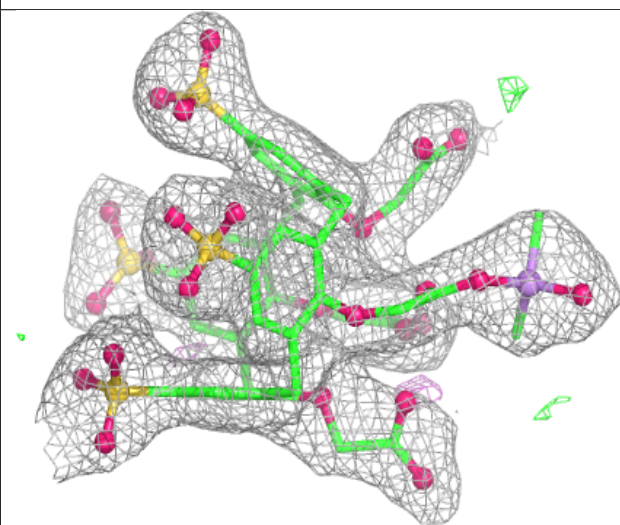
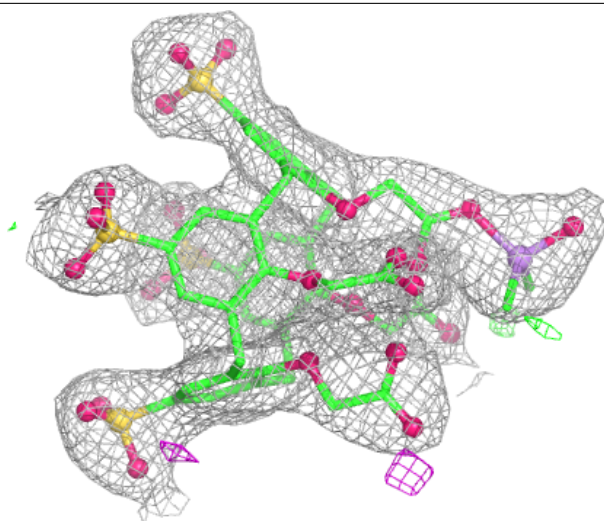
Electron density around 6M7 GaG 203:

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



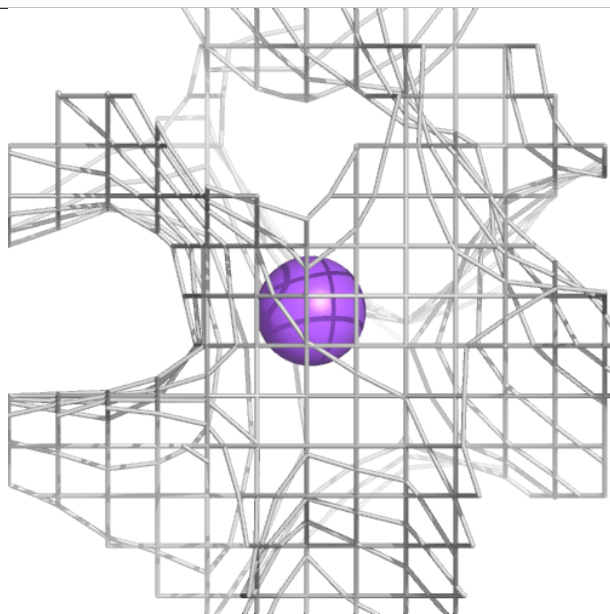
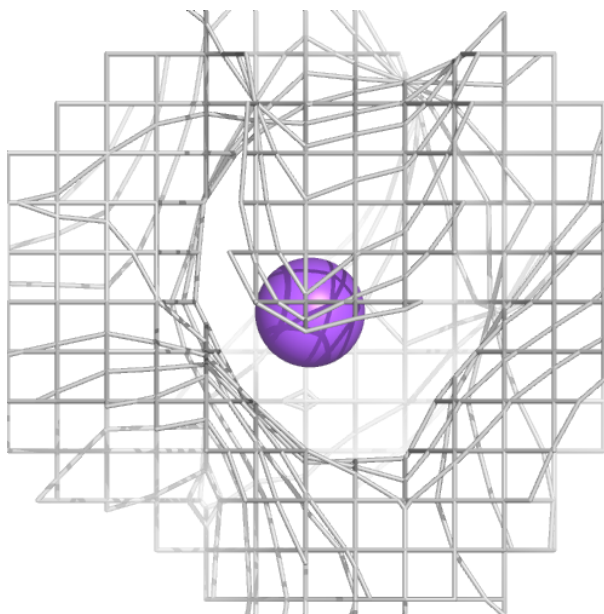
Electron density around 6M7 HaH 203:

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



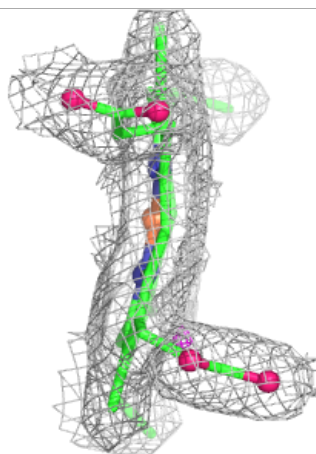
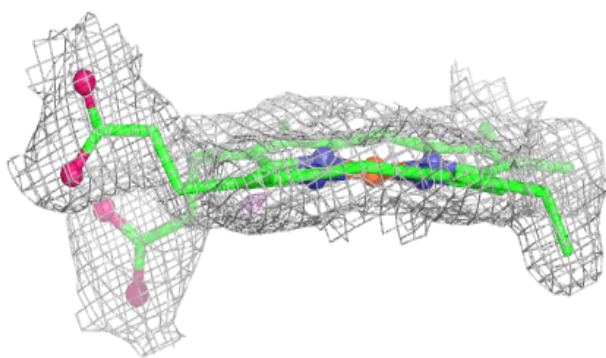
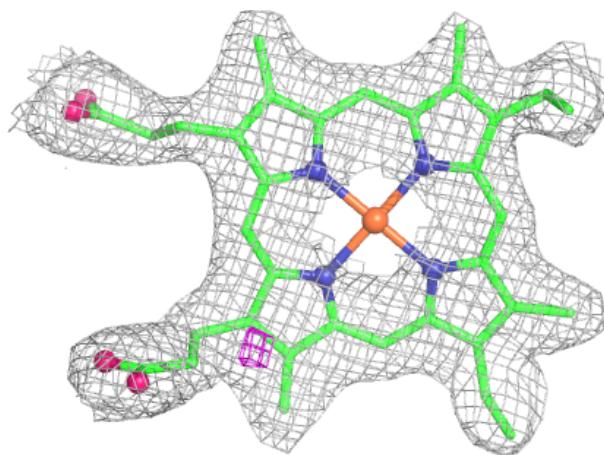
Electron density around NA BaB 204:

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



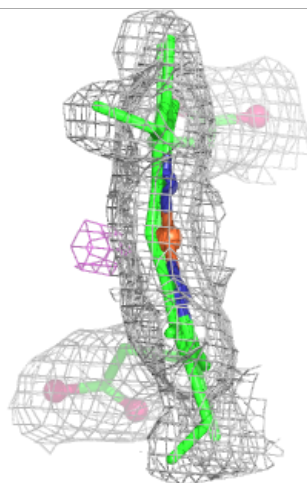
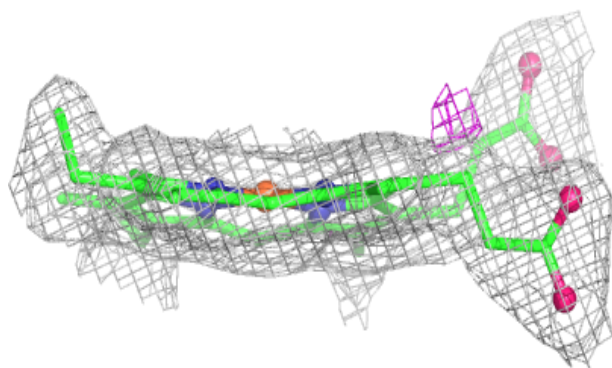
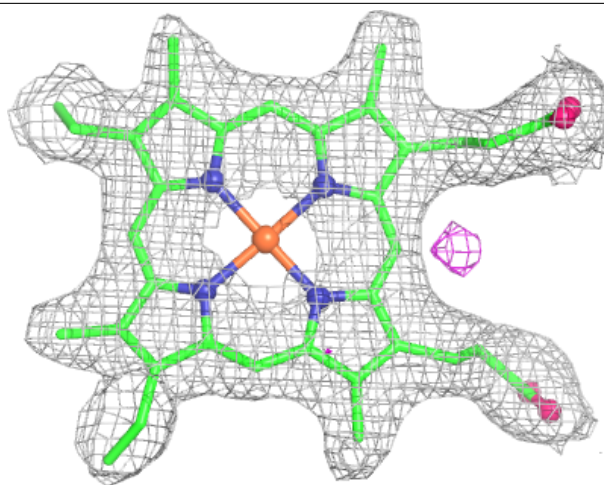
Electron density around HEC AaA 202:

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



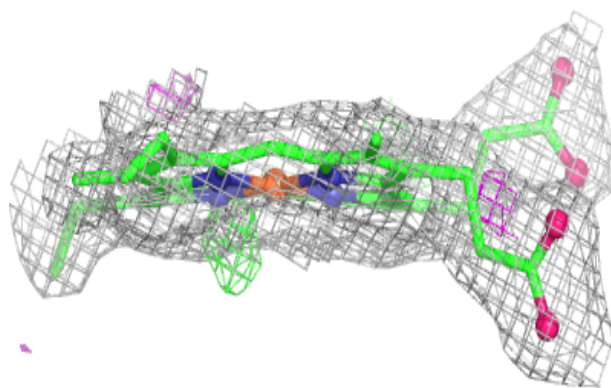
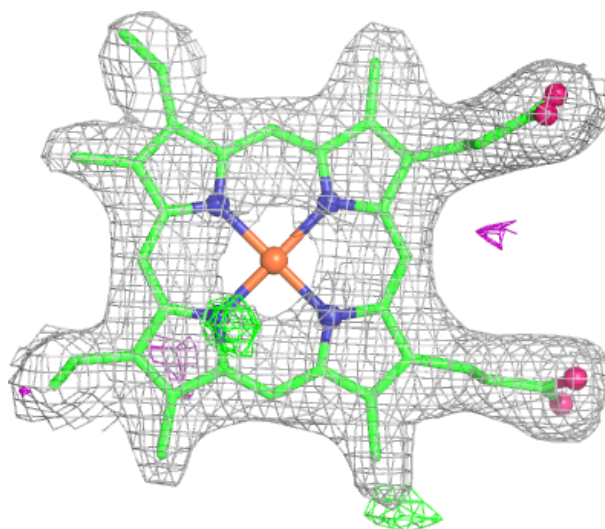
Electron density around HEC BaB 202:

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



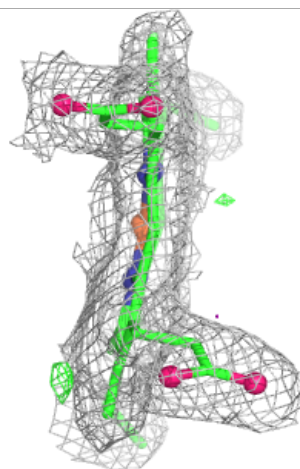
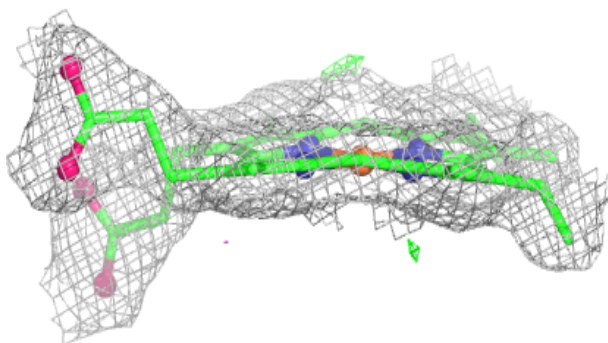
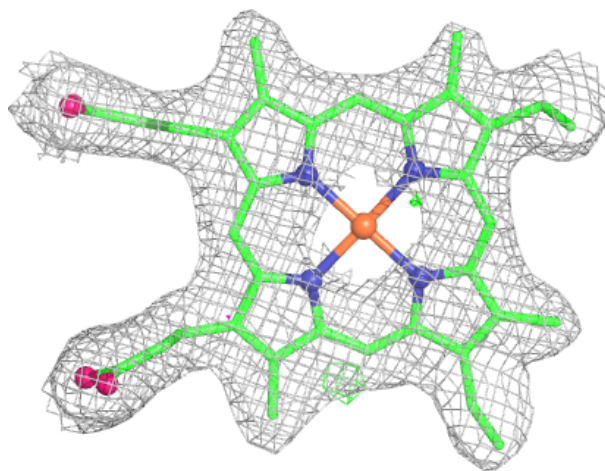
Electron density around HEC CaC 202:

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



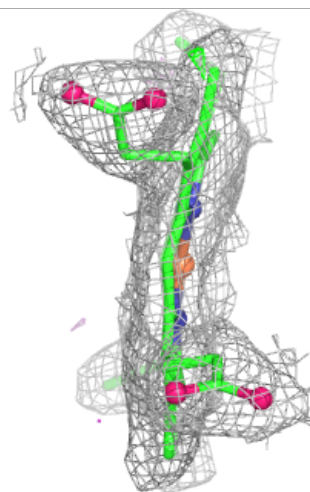
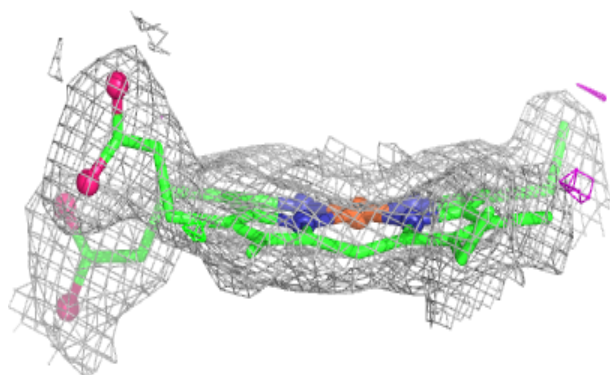
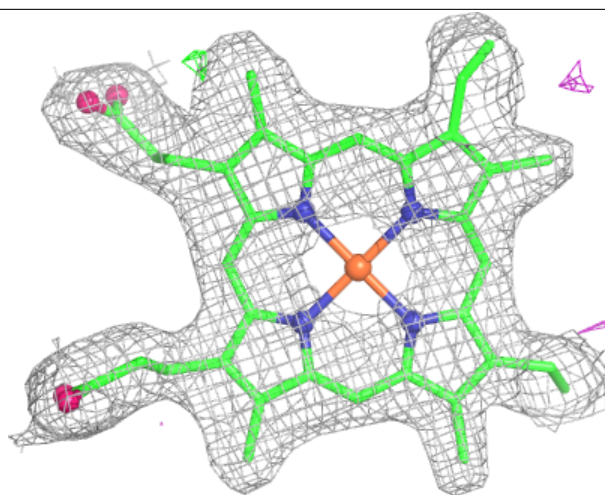
Electron density around HEC DaD 202:

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



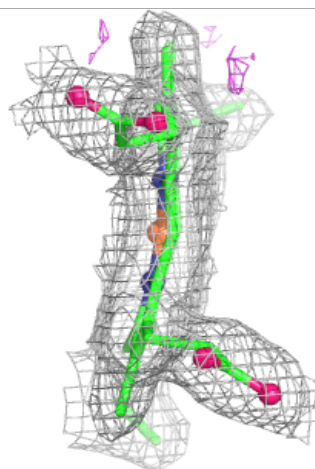
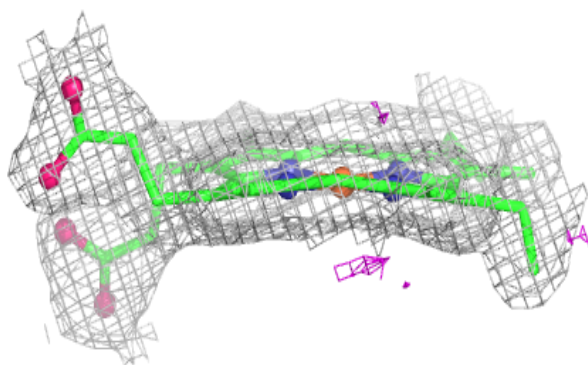
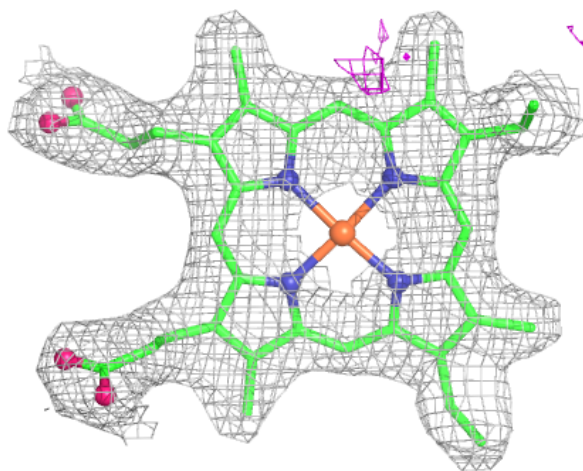
Electron density around HEC EaE 202:

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



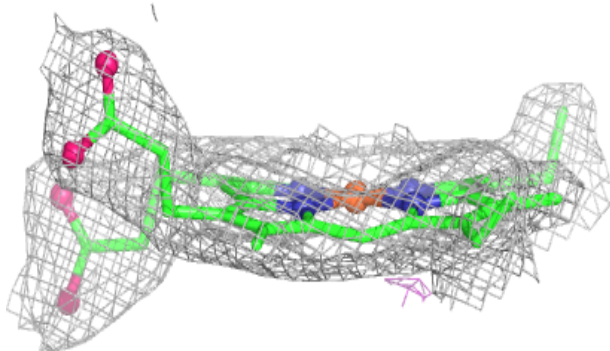
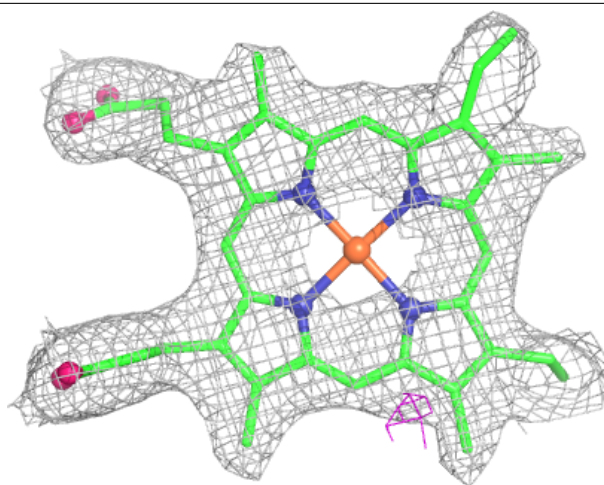
Electron density around HEC FaF 202:

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



Electron density around HEC HaH 202:

$2mF_o-DF_c$ (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.