



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 26, 2026 – 03:42 pm GMT

PDB ID : 9RG3 / pdb_00009rg3
Title : Unspecific peroxygenase from *Psathyrella aberdarensis*, Grogu variant, in complex with anisole
Authors : Fernandez-Garcia, A.; Sanz-Aparicio, J.
Deposited on : 2025-06-05
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 : 1.1.7 (2018)
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.48.1

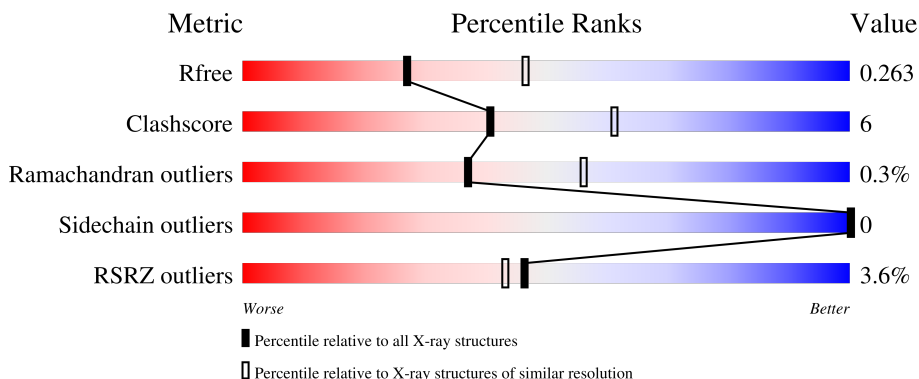
1 Overall quality at a glance

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}	164625	5504 (2.50-2.50)
Clashscore	180529	6282 (2.50-2.50)
Ramachandran outliers	177936	6191 (2.50-2.50)
Sidechain outliers	177891	6193 (2.50-2.50)
RSRZ outliers	164620	5504 (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	A	334	 3% 92% 8%
1	B	334	 4% 91% 9%
2	J	2	 50% 50%
2	M	2	 50% 50%
2	X	2	 50% 50%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
2	a	2	

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
4	ACT	A	403	-	-	X	-

2 Entry composition [i](#)

There are 14 unique types of molecules in this entry. The entry contains 5686 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.

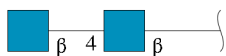
- Molecule 1 is a protein called Heme-thiolate peroxidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	334	2598	1659	437	495	7	0	2	0
1	B	334	2593	1656	436	494	7	0	1	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	61	ALA	SER	engineered mutation	UNP A0A4Q2DF39
A	79	ILE	LEU	engineered mutation	UNP A0A4Q2DF39
A	252	LEU	ALA	engineered mutation	UNP A0A4Q2DF39
B	61	ALA	SER	engineered mutation	UNP A0A4Q2DF39
B	79	ILE	LEU	engineered mutation	UNP A0A4Q2DF39
B	252	LEU	ALA	engineered mutation	UNP A0A4Q2DF39

- Molecule 2 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



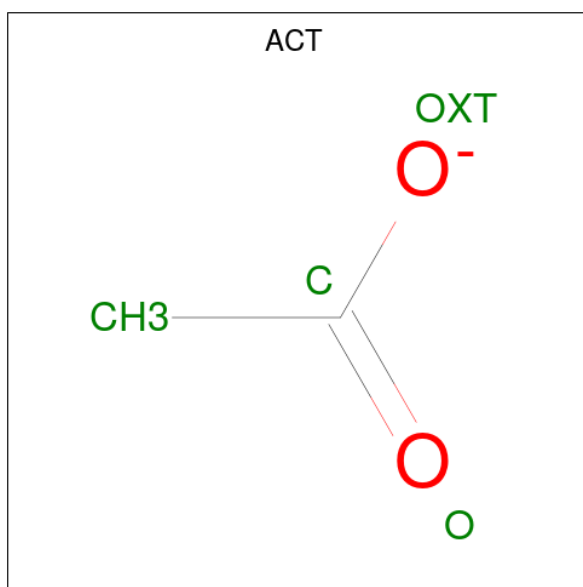
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	J	2	28	16	2	10	0	0	0
2	M	2	28	16	2	10	0	0	0
2	X	2	28	16	2	10	0	0	0
2	a	2	28	16	2	10	0	0	0

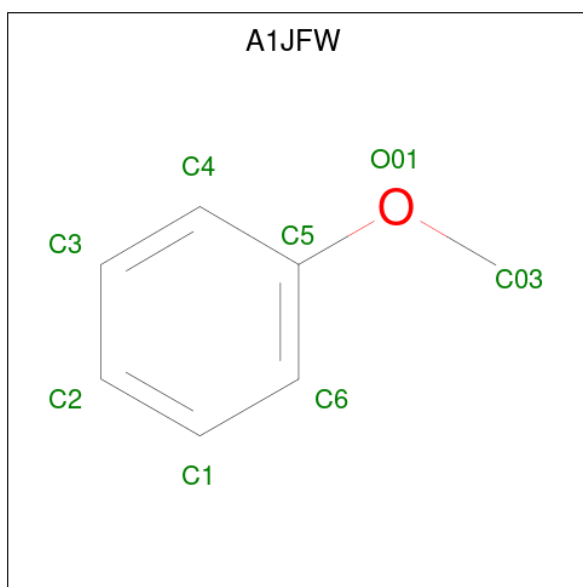
- Molecule 3 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



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

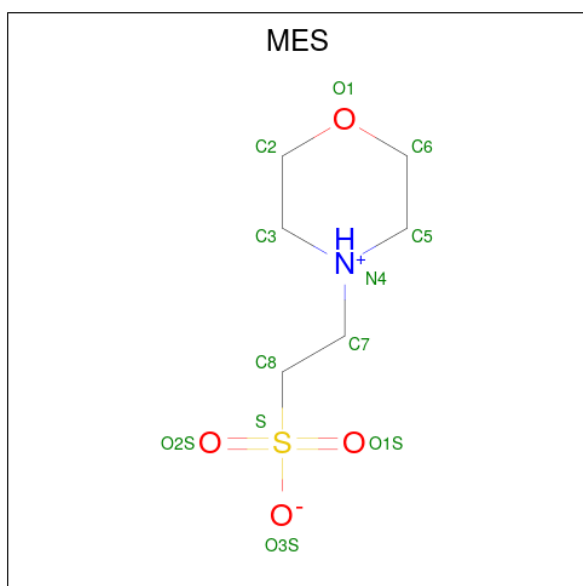
- Molecule 4 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2$).





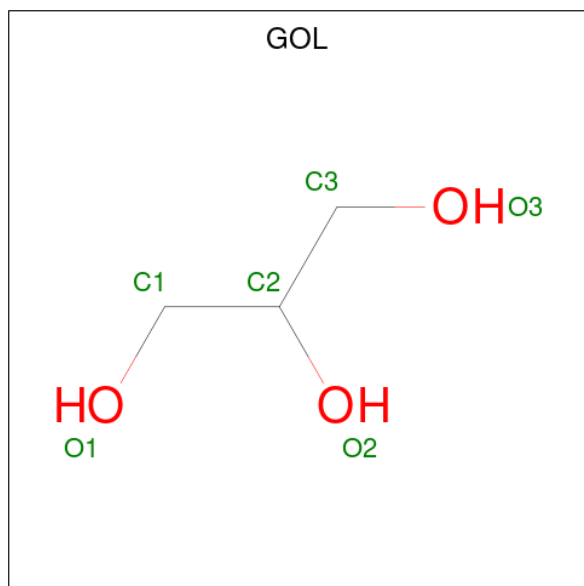
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			8	7	1		
6	B	1	Total	C	O	0	0
			8	7	1		
6	B	1	Total	C	O	0	0
			8	7	1		

- Molecule 7 is 2-(N-MORPHOLINO)-ETHANESULFONIC ACID (CCD ID: MES) (formula: $C_6H_{13}NO_4S$).



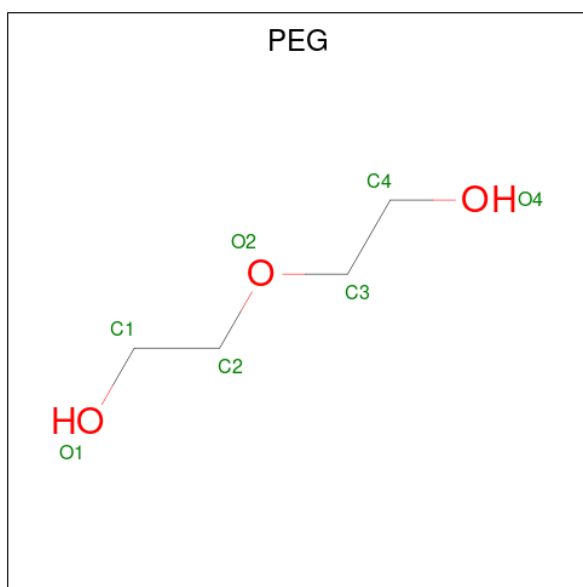
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
7	A	1	Total 12	C 6	N 1	O 4	S 1	0	0
7	A	1	Total 12	C 6	N 1	O 4	S 1	0	0
7	B	1	Total 12	C 6	N 1	O 4	S 1	0	0

- Molecule 8 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



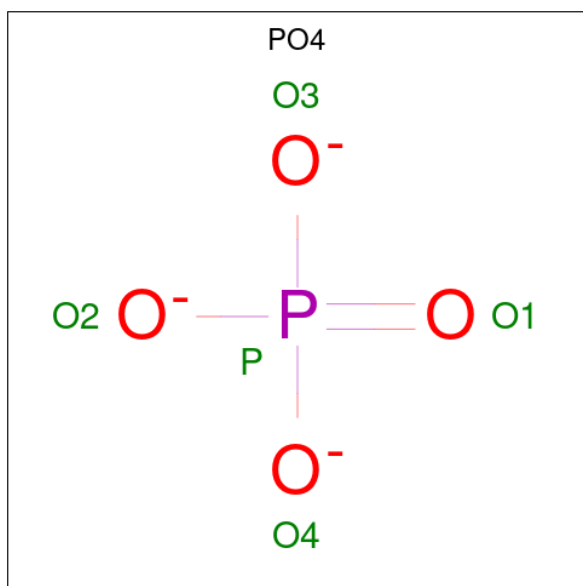
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
8	A	1	Total 6	C 3	O 3	0	0
8	A	1	Total 6	C 3	O 3	0	0
8	B	1	Total 6	C 3	O 3	0	0
8	B	1	Total 6	C 3	O 3	0	0

- Molecule 9 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: C₄H₁₀O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
9	A	1	Total	C	O	0	0
			7	4	3		

- Molecule 10 is PHOSPHATE ION (CCD ID: PO4) (formula: O₄P).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	O	P	0	0
			5	4	1		

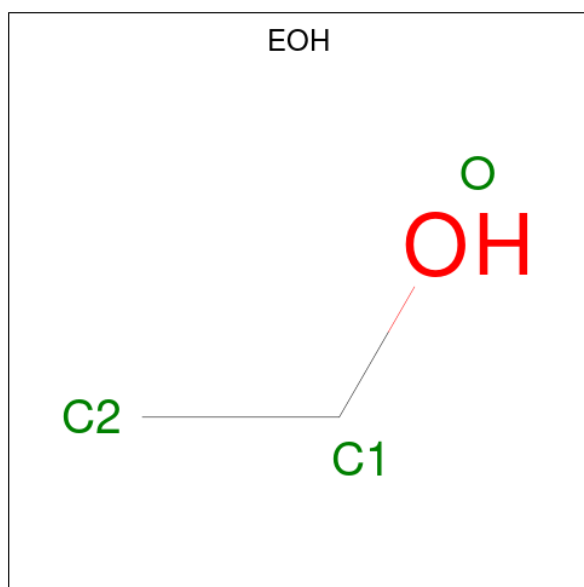
- Molecule 11 is ZINC ION (CCD ID: ZN) (formula: Zn) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
11	A	9	Total Zn 9 9	0	0
11	B	7	Total Zn 7 7	0	0

- Molecule 12 is MAGNESIUM ION (CCD ID: MG) (formula: Mg) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
12	A	1	Total Mg 1 1	0	0
12	B	1	Total Mg 1 1	0	0

- Molecule 13 is ETHANOL (CCD ID: EOH) (formula: C₂H₆O).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
13	B	1	Total C O 3 2 1	0	0

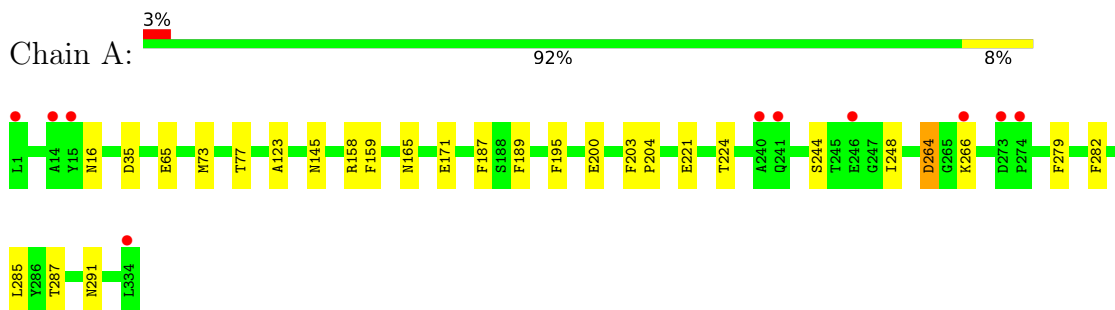
- Molecule 14 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
14	A	56	Total O 56 56	0	0
14	B	74	Total O 74 74	0	0

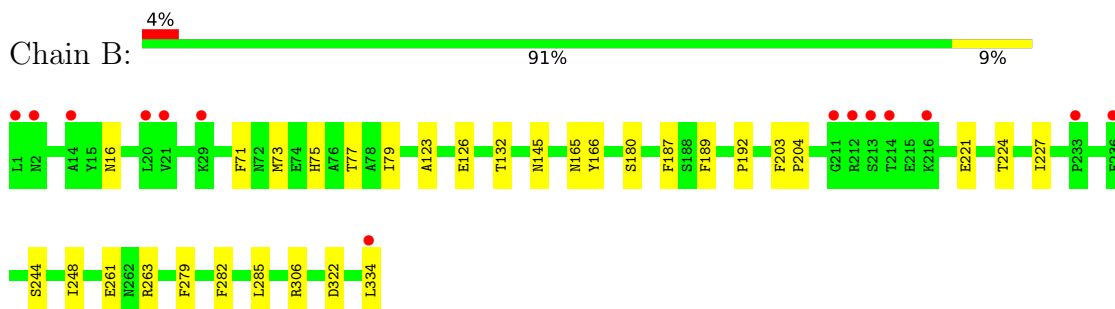
3 Residue-property plots [i](#)

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: Heme-thiolate peroxidase



- Molecule 1: Heme-thiolate peroxidase



- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose




- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucofuranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain X:  50% 50%

MAG1
MAG2

- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucofuranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain a:  50% 50%

MAG1
MAG2

4 Data and refinement statistics i

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α , β , γ	75.78Å 75.78Å 273.42Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	47.39 – 2.50 47.39 – 2.50	Depositor EDS
% Data completeness (in resolution range)	99.9 (47.39-2.50) 99.9 (47.39-2.50)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.24 (at 2.48Å)	Xtrriage
Refinement program	REFMAC 5.8.0419	Depositor
R, R_{free}	0.214 , 0.262 0.217 , 0.263	Depositor DCC
R_{free} test set	1570 reflections (5.10%)	wwPDB-VP
Wilson B-factor (Å ²)	49.8	Xtrriage
Anisotropy	0.240	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 33.0	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	0.077 for h,-h-k,-l	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	5686	wwPDB-VP
Average B, all atoms (Å ²)	56.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% 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: MG, ACT, MES, GOL, HEM, PEG, EOH, ZN, NAG, PO4, A1JFW

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	0.55	0/2680	1.00	2/3655 (0.1%)
1	B	0.54	0/2672	0.97	0/3644
All	All	0.54	0/5352	0.99	2/7299 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	264	ASP	CA-CB-CG	5.36	117.96	112.60
1	A	65	GLU	CB-CA-C	-5.09	102.66	110.81

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts i

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2598	0	2461	28	0
1	B	2593	0	2455	33	0
2	J	28	0	25	2	0
2	M	28	0	25	3	0
2	X	28	0	25	4	0
2	a	28	0	25	4	0
3	A	28	0	26	8	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	14	0	13	5	0
4	A	4	0	3	2	0
4	B	4	0	3	1	0
5	A	43	0	30	3	0
5	B	43	0	30	5	0
6	A	8	0	0	1	0
6	B	16	0	0	0	0
7	A	24	0	26	0	0
7	B	12	0	13	0	0
8	A	12	0	16	0	0
8	B	12	0	16	1	0
9	A	7	0	10	0	0
10	A	5	0	0	0	0
11	A	9	0	0	0	0
11	B	7	0	0	0	0
12	A	1	0	0	0	0
12	B	1	0	0	0	0
13	B	3	0	6	0	0
14	A	56	0	0	5	1
14	B	74	0	0	6	1
All	All	5686	0	5208	67	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 6.

The worst 5 of 67 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:A:145:ASN:HD21	2:M:1:NAG:C1	1.14	1.60
1:B:145:ASN:HD21	2:a:1:NAG:C1	1.40	1.35
1:A:165:ASN:ND2	2:J:1:NAG:C1	1.97	1.28
1:A:291:ASN:HD21	3:A:402:NAG:C1	1.51	1.24
1:A:145:ASN:ND2	2:M:1:NAG:C1	1.99	1.22

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)
14:A:541:HOH:O	14:B:517:HOH:O[6_564]	2.10	0.10

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	334/334 (100%)	323 (97%)	10 (3%)	1 (0%)	37	56
1	B	333/334 (100%)	319 (96%)	13 (4%)	1 (0%)	37	56
All	All	667/668 (100%)	642 (96%)	23 (3%)	2 (0%)	37	56

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	123	ALA
1	A	123	ALA

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	276/274 (101%)	276 (100%)	0	100	100
1	B	275/274 (100%)	275 (100%)	0	100	100
All	All	551/548 (100%)	551 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

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

Mol	Chain	Res	Type
1	B	312	ASN
1	B	16	ASN

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type
1	A	186	GLN
1	A	165	ASN
1	A	312	ASN

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](#)

8 monosaccharides 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	NAG	J	1	2	14,14,15	0.36	0	17,19,21	2.21	4 (23%)
2	NAG	J	2	2	14,14,15	0.31	0	17,19,21	0.94	0
2	NAG	M	1	2	14,14,15	0.46	0	17,19,21	0.98	0
2	NAG	M	2	2	14,14,15	0.27	0	17,19,21	1.10	2 (11%)
2	NAG	X	1	2	14,14,15	0.39	0	17,19,21	2.43	3 (17%)
2	NAG	X	2	2	14,14,15	0.34	0	17,19,21	0.56	0
2	NAG	a	1	2	14,14,15	0.40	0	17,19,21	0.96	1 (5%)
2	NAG	a	2	2	14,14,15	0.29	0	17,19,21	0.89	2 (11%)

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	NAG	J	1	2	-	4/6/23/26	0/1/1/1
2	NAG	J	2	2	-	2/6/23/26	0/1/1/1
2	NAG	M	1	2	-	2/6/23/26	0/1/1/1
2	NAG	M	2	2	-	0/6/23/26	0/1/1/1
2	NAG	X	1	2	-	2/6/23/26	0/1/1/1
2	NAG	X	2	2	-	2/6/23/26	0/1/1/1
2	NAG	a	1	2	-	1/6/23/26	0/1/1/1
2	NAG	a	2	2	-	3/6/23/26	0/1/1/1

There are no bond length outliers.

The worst 5 of 12 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	X	1	NAG	O5-C1-C2	8.53	124.75	111.29
2	J	1	NAG	O5-C1-C2	6.81	122.03	111.29
2	J	1	NAG	C1-O5-C5	4.26	117.96	112.19
2	X	1	NAG	C1-O5-C5	3.52	116.97	112.19
2	J	1	NAG	C4-C3-C2	-3.00	106.63	111.02

There are no chirality outliers.

5 of 16 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	J	1	NAG	C8-C7-N2-C2
2	J	1	NAG	O7-C7-N2-C2
2	M	1	NAG	C8-C7-N2-C2
2	M	1	NAG	O7-C7-N2-C2
2	a	2	NAG	O5-C5-C6-O6

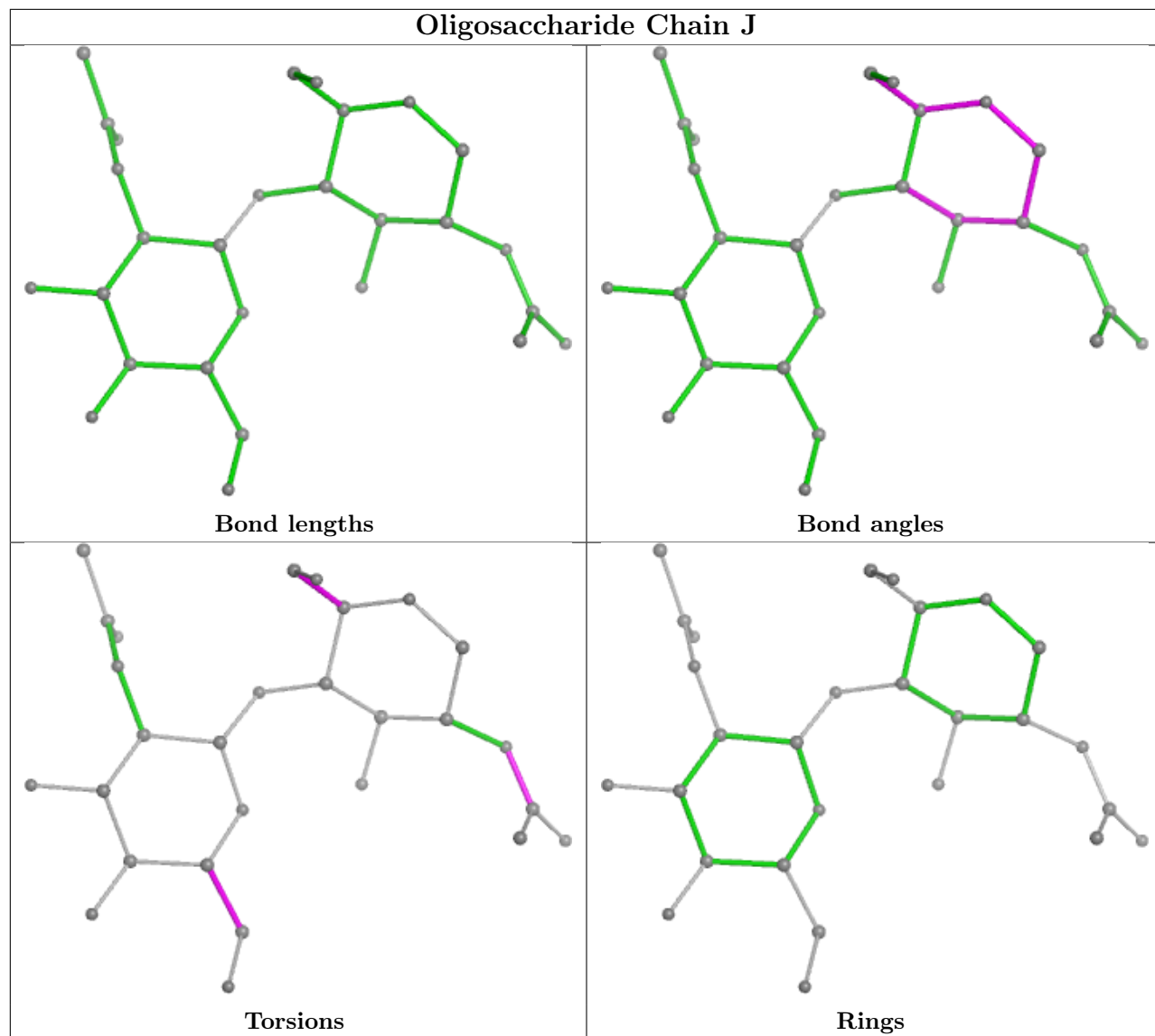
There are no ring outliers.

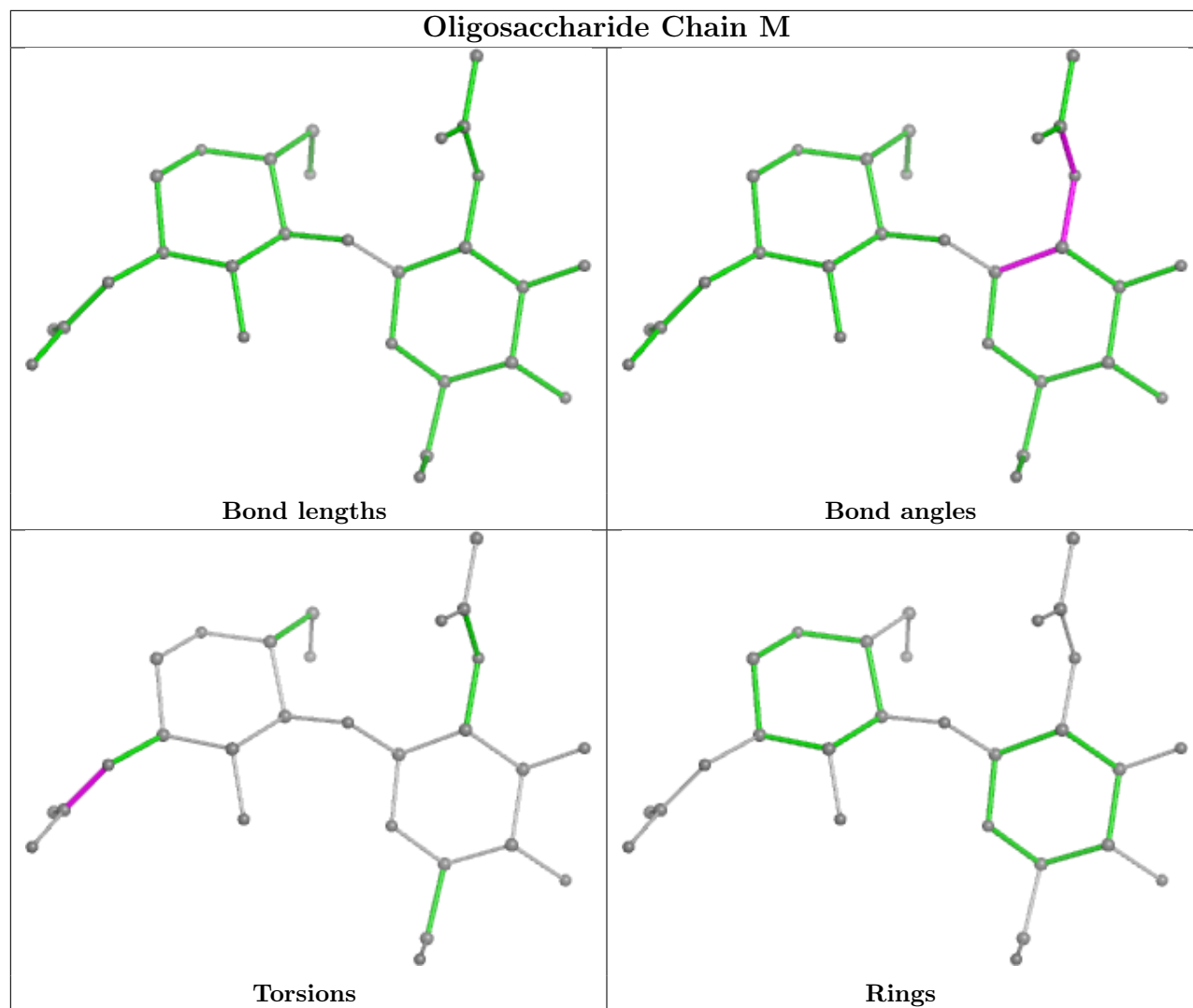
5 monomers are involved in 13 short contacts:

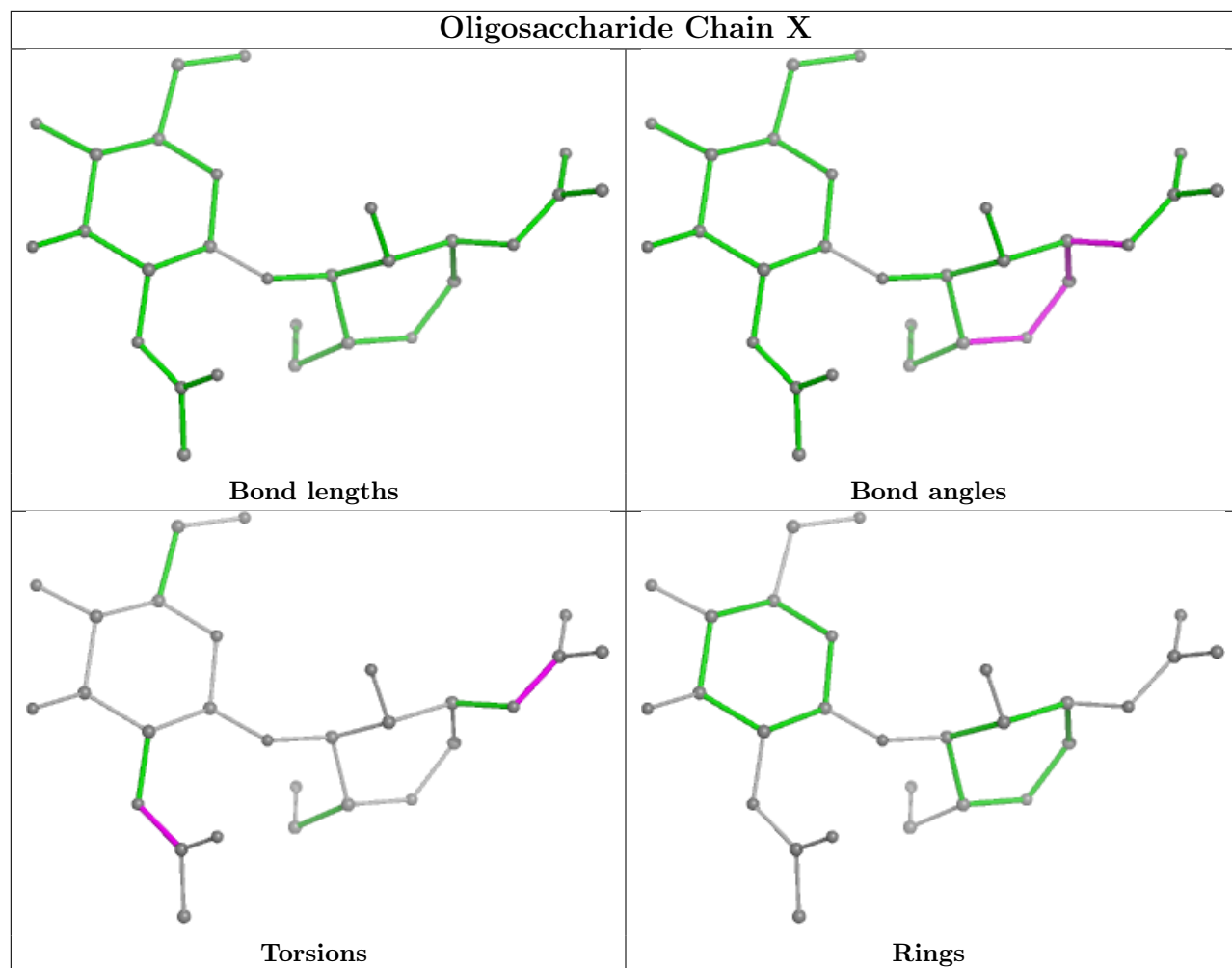
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	1	NAG	2	0
2	M	2	NAG	1	0
2	X	1	NAG	4	0
2	M	1	NAG	2	0
2	a	1	NAG	4	0

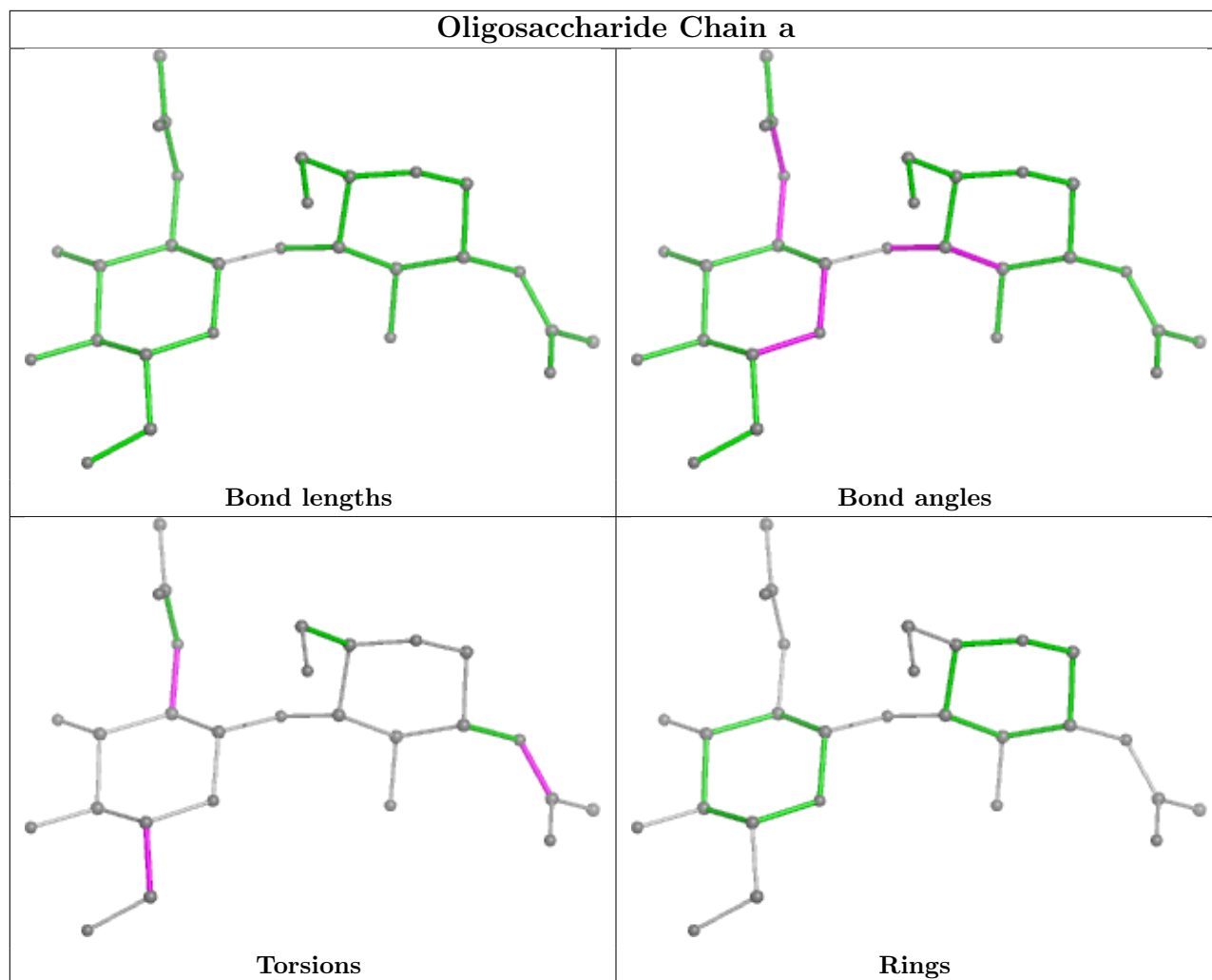
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths,

bond angles, torsion angles, and ring geometry for oligosaccharide.









5.6 Ligand geometry [i](#)

Of 38 ligands modelled in this entry, 18 are monoatomic - leaving 20 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	$\# Z > 2$
8	GOL	A	408	-	5,5,5	0.13	0	5,5,5	0.33	0
3	NAG	B	401	-	14,14,15	0.40	0	17,19,21	0.99	1 (5%)
5	HEM	A	404	12,1	41,50,50	1.39	6 (14%)	45,82,82	1.79	14 (31%)
13	EOH	B	409	-	2,2,2	0.09	0	1,1,1	0.09	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	NAG	A	401	-	14,14,15	0.36	0	17,19,21	0.81	0
5	HEM	B	402	12,1	41,50,50	1.28	5 (12%)	45,82,82	2.13	13 (28%)
9	PEG	A	410	-	6,6,6	0.18	0	5,5,5	0.09	0
6	A1JFW	A	405	-	8,8,8	0.60	0	9,9,9	0.65	0
7	MES	A	406	-	12,12,12	0.78	0	14,16,16	0.92	1 (7%)
7	MES	A	409	-	12,12,12	0.87	0	14,16,16	0.71	0
6	A1JFW	B	404	-	8,8,8	0.82	1 (12%)	9,9,9	0.97	0
4	ACT	A	403	-	3,3,3	0.96	0	3,3,3	0.85	0
10	PO4	A	411	-	4,4,4	0.83	0	6,6,6	0.52	0
7	MES	B	403	-	12,12,12	0.83	0	14,16,16	0.66	0
8	GOL	B	405	-	5,5,5	0.17	0	5,5,5	0.42	0
8	GOL	A	407	-	5,5,5	0.19	0	5,5,5	0.43	0
6	A1JFW	B	407	-	8,8,8	0.66	0	9,9,9	0.60	0
8	GOL	B	408	-	5,5,5	0.15	0	5,5,5	0.41	0
3	NAG	A	402	-	14,14,15	0.32	0	17,19,21	0.88	1 (5%)
4	ACT	B	406	-	3,3,3	0.88	0	3,3,3	0.96	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	A	401	-	-	2/6/23/26	0/1/1/1
7	MES	B	403	-	-	0/6/14/14	0/1/1/1
5	HEM	B	402	12,1	-	5/12/54/54	-
8	GOL	B	408	-	-	0/4/4/4	-
3	NAG	A	402	-	-	1/6/23/26	0/1/1/1
8	GOL	B	405	-	-	0/4/4/4	-
9	PEG	A	410	-	-	0/4/4/4	-
8	GOL	A	408	-	-	0/4/4/4	-
5	HEM	A	404	12,1	-	4/12/54/54	-
3	NAG	B	401	-	-	2/6/23/26	0/1/1/1
8	GOL	A	407	-	-	1/4/4/4	-
6	A1JFW	A	405	-	-	2/2/2/2	0/1/1/1
7	MES	A	406	-	-	0/6/14/14	0/1/1/1
7	MES	A	409	-	-	3/6/14/14	0/1/1/1
6	A1JFW	B	404	-	-	2/2/2/2	0/1/1/1
6	A1JFW	B	407	-	-	2/2/2/2	0/1/1/1

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	404	HEM	C1B-NB	-3.93	1.33	1.40
5	A	404	HEM	FE-NB	3.24	2.12	1.96
5	B	402	HEM	C4B-NB	-3.12	1.32	1.38
5	A	404	HEM	C4B-NB	-2.92	1.32	1.38
5	A	404	HEM	C4D-ND	-2.91	1.35	1.40

The worst 5 of 30 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	402	HEM	CHC-C4B-NB	5.83	130.76	124.43
5	B	402	HEM	C1B-NB-C4B	5.31	110.55	105.07
5	B	402	HEM	CHB-C1B-NB	4.29	129.69	124.38
5	B	402	HEM	CHA-C4D-ND	3.93	129.24	124.38
5	A	404	HEM	C1B-NB-C4B	3.84	109.04	105.07

There are no chirality outliers.

5 of 24 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	B	407	A1JFW	C6-C5-O01-C03
6	A	405	A1JFW	C6-C5-O01-C03
6	A	405	A1JFW	C4-C5-O01-C03
6	B	407	A1JFW	C4-C5-O01-C03
6	B	404	A1JFW	C4-C5-O01-C03

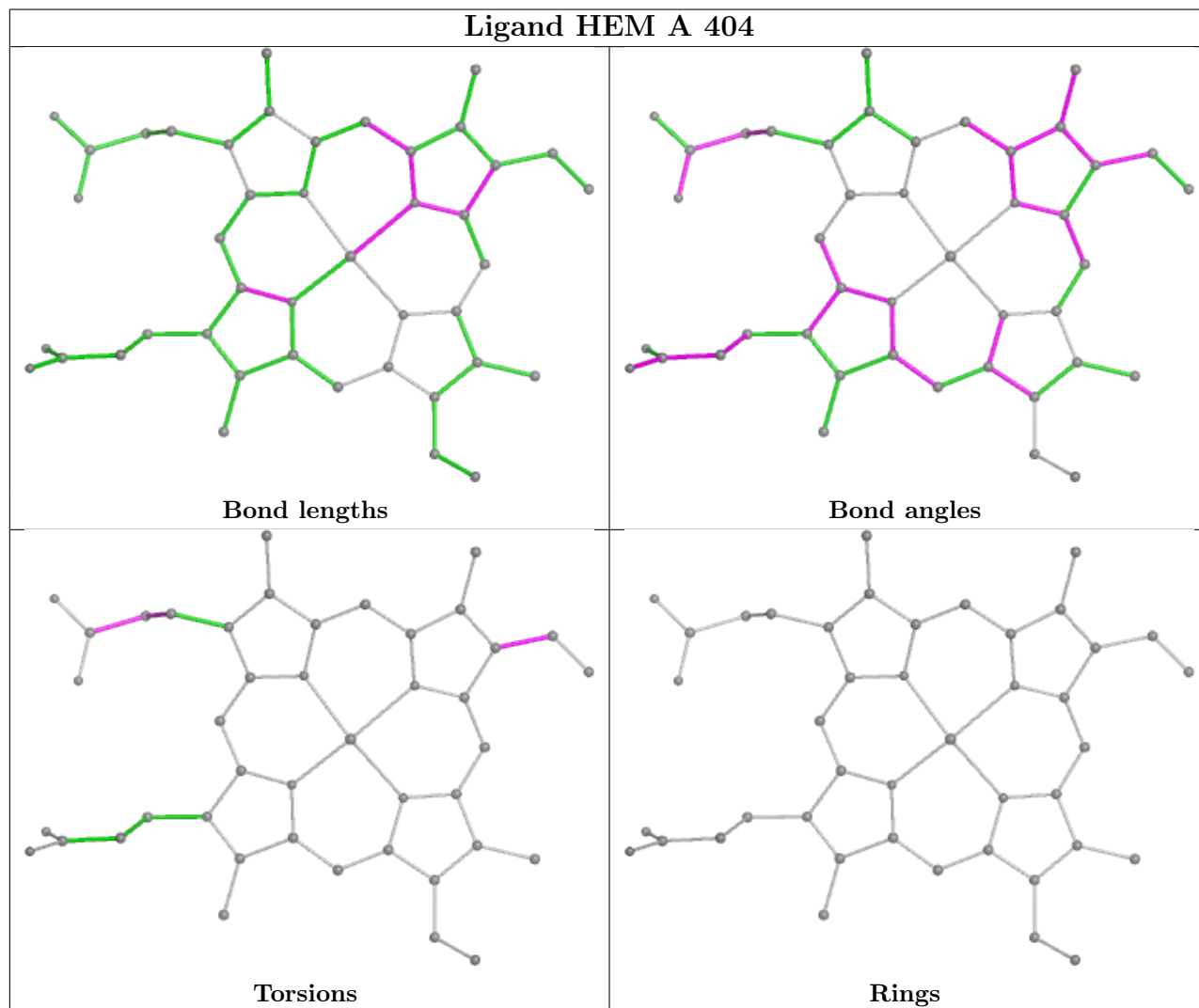
There are no ring outliers.

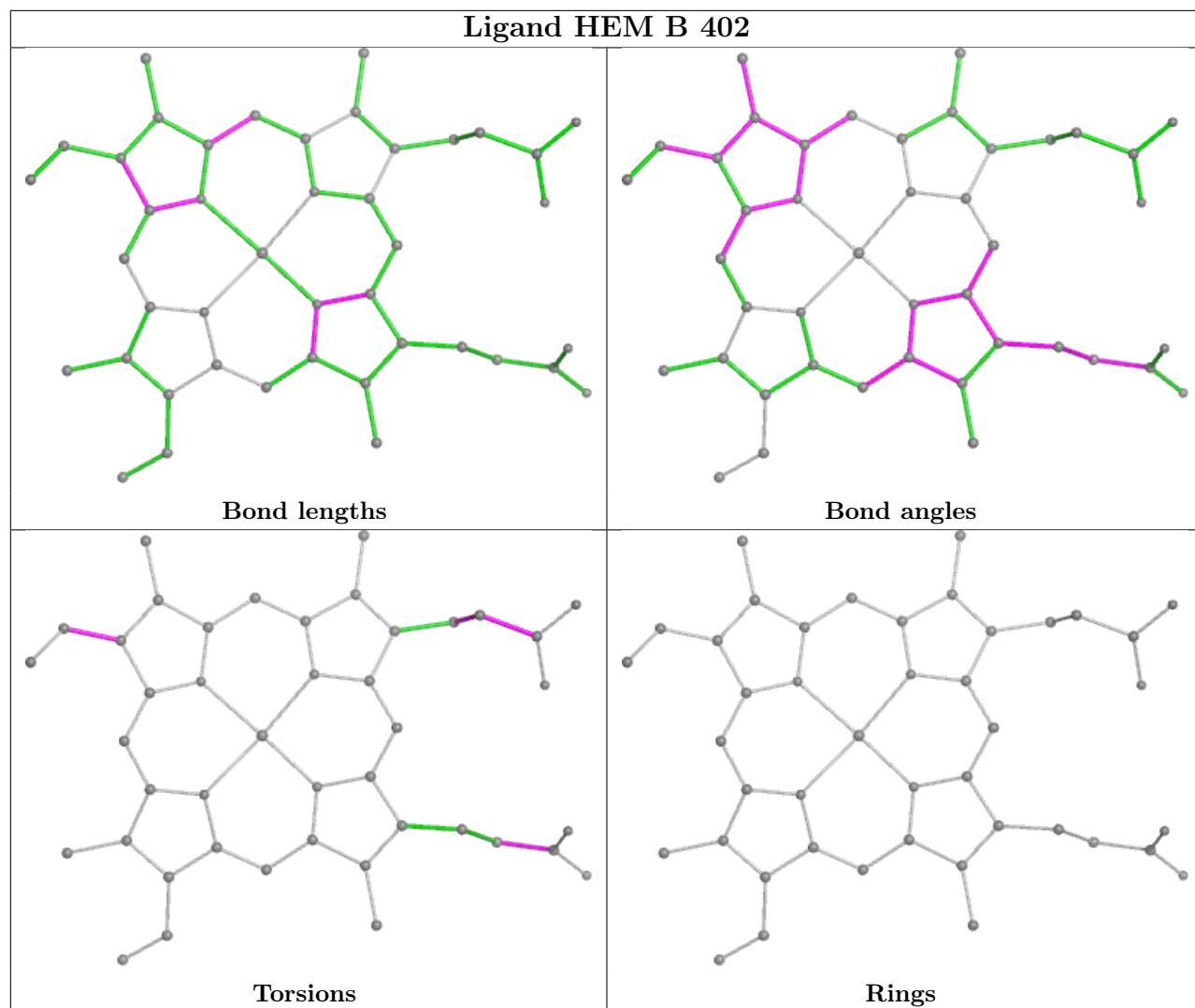
9 monomers are involved in 25 short contacts:

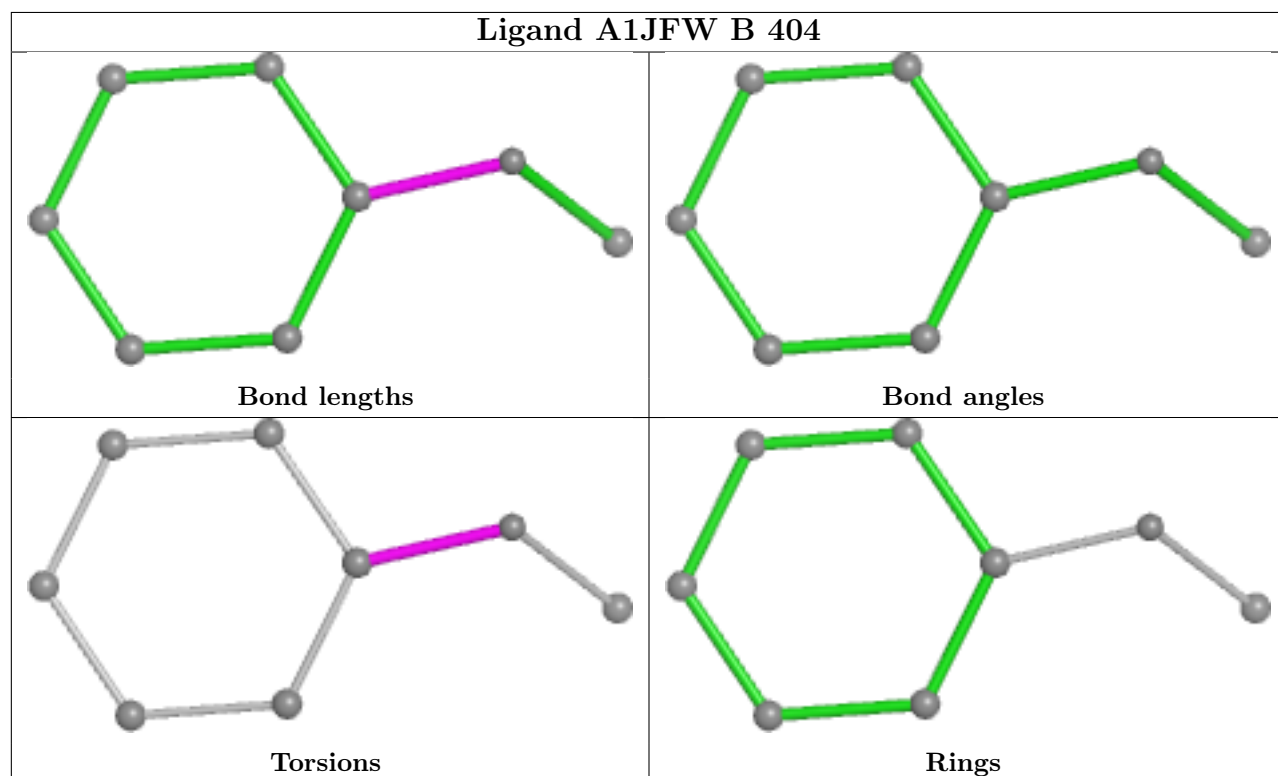
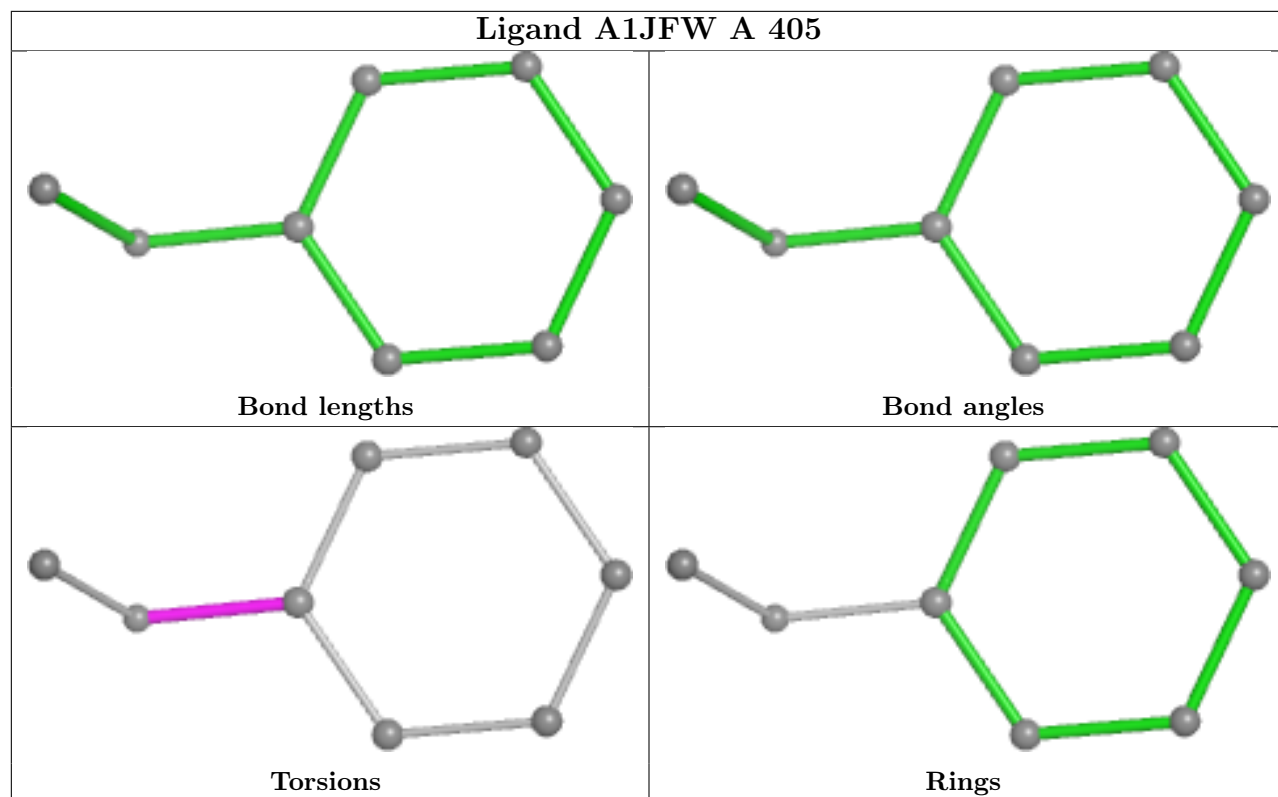
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	401	NAG	5	0
5	A	404	HEM	3	0
3	A	401	NAG	3	0
5	B	402	HEM	5	0
6	A	405	A1JFW	1	0
4	A	403	ACT	2	0
8	B	408	GOL	1	0
3	A	402	NAG	5	0
4	B	406	ACT	1	0

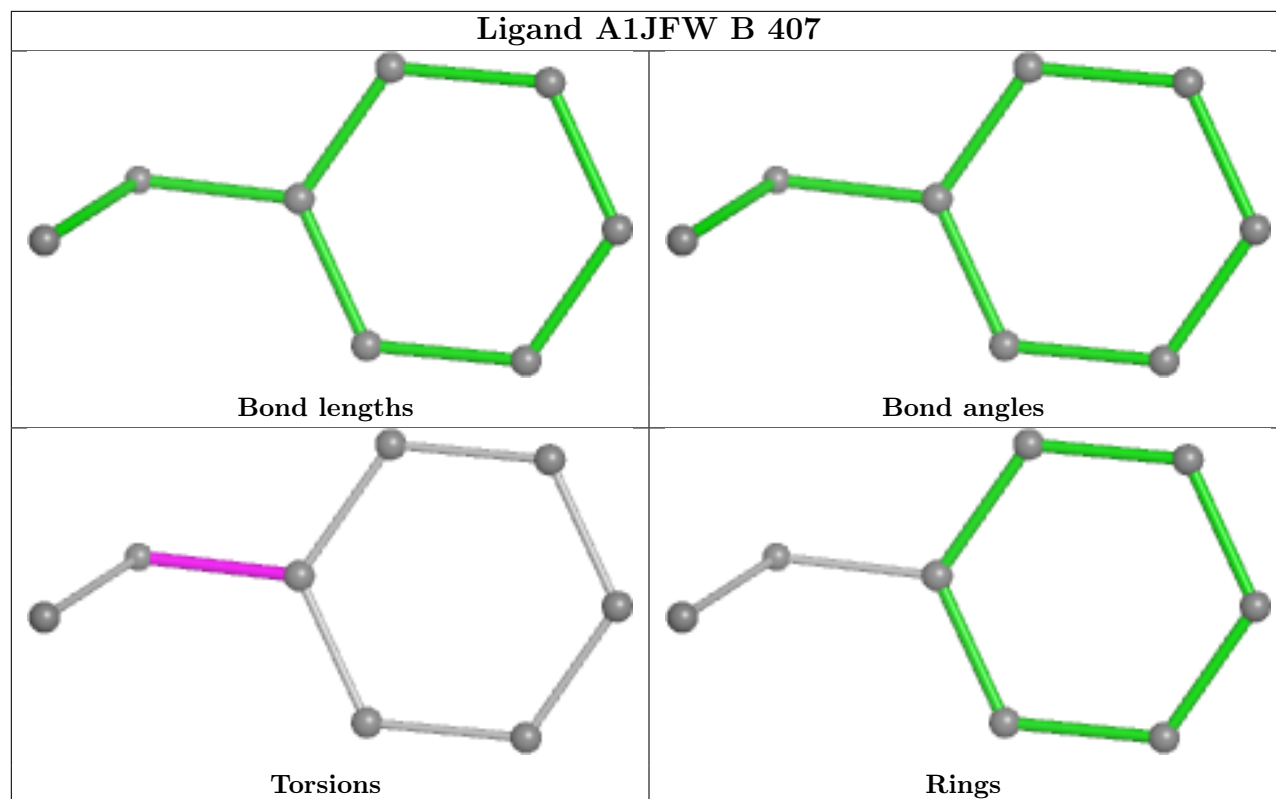
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In

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.









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	334/334 (100%)	0.19	10 (2%) 52 49	29, 50, 81, 119	2 (0%)
1	B	334/334 (100%)	0.41	14 (4%) 41 38	32, 56, 89, 123	1 (0%)
All	All	668/668 (100%)	0.30	24 (3%) 46 43	29, 53, 87, 123	3 (0%)

The worst 5 of 24 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1	LEU	3.5
1	A	274	PRO	3.4
1	B	334	LEU	3.3
1	A	1	LEU	3.2
1	A	266	LYS	3.2

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

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

6.3 Carbohydrates [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.

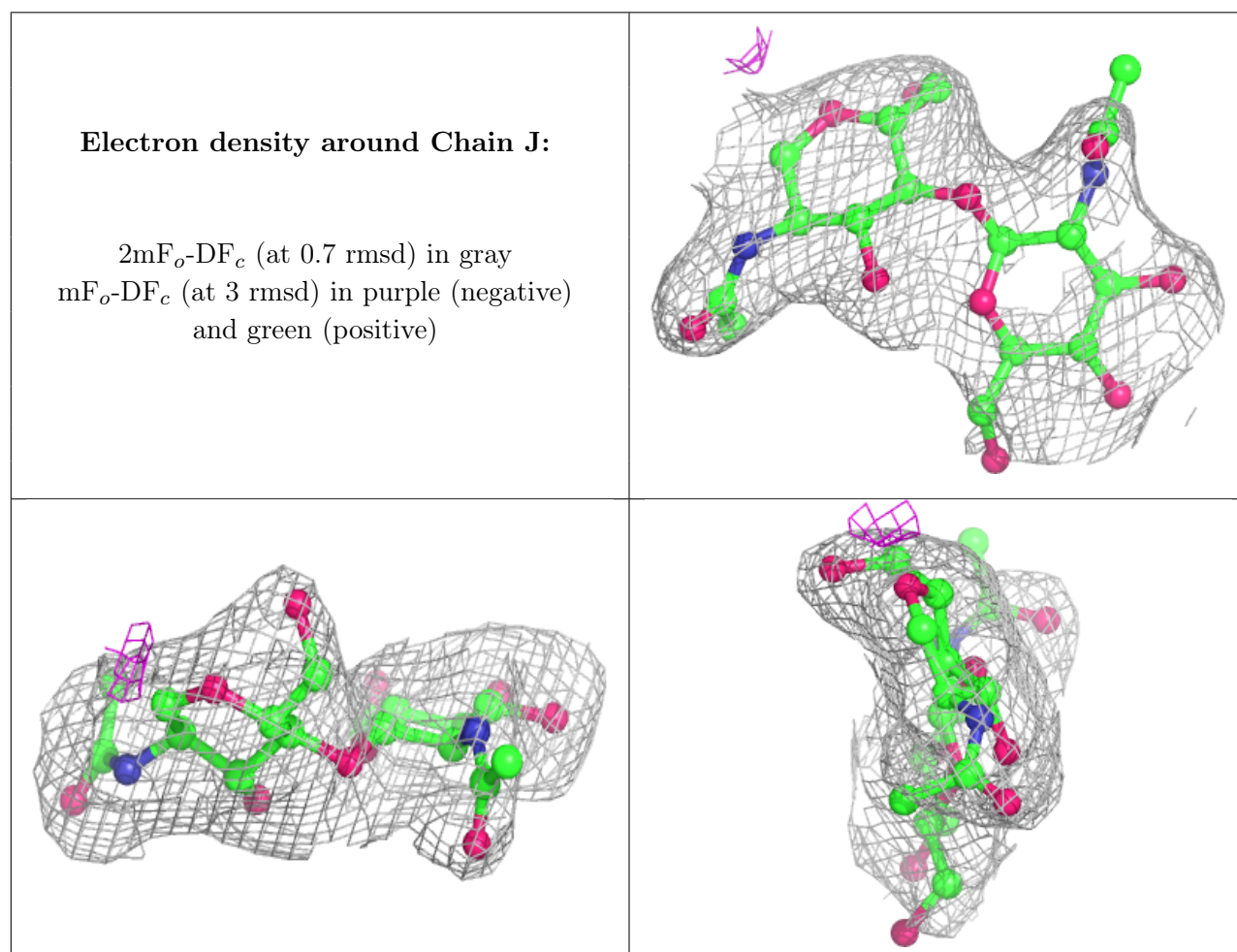
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	NAG	J	1	14/15	-	-	61,75,80,84	0
2	NAG	J	2	14/15	-	-	82,95,109,109	0
2	NAG	M	1	14/15	-	-	53,65,78,92	0
2	NAG	M	2	14/15	-	-	64,89,98,102	0
2	NAG	X	1	14/15	-	-	59,69,81,93	0

Continued on next page...

Continued from previous page...

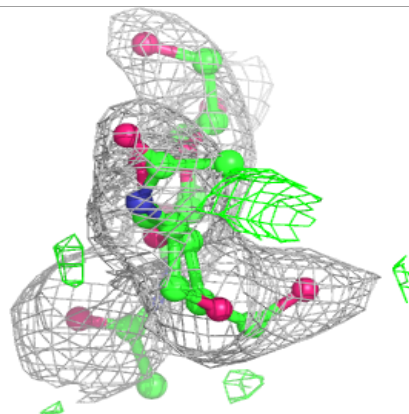
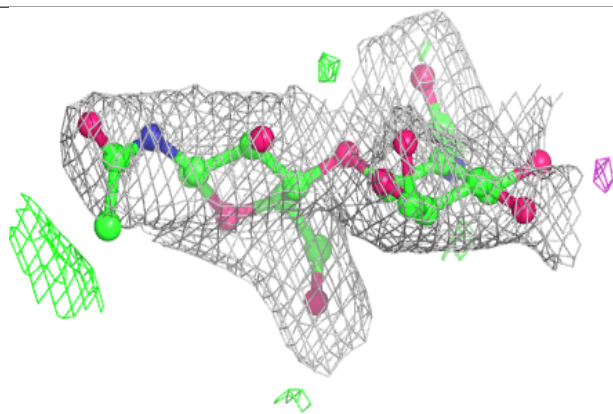
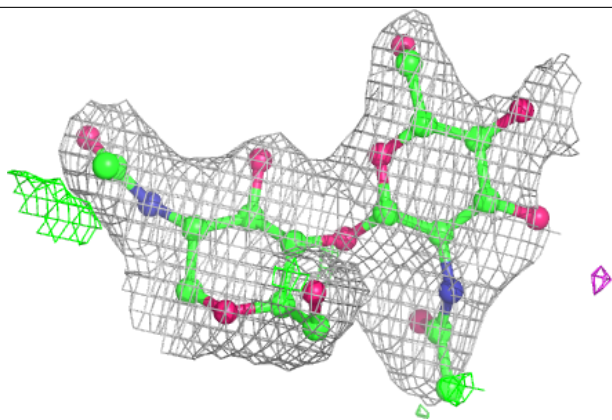
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	X	2	14/15	-	-	89,105,112,113	0
2	NAG	a	1	14/15	-	-	69,76,85,89	0
2	NAG	a	2	14/15	-	-	79,92,104,107	0

The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

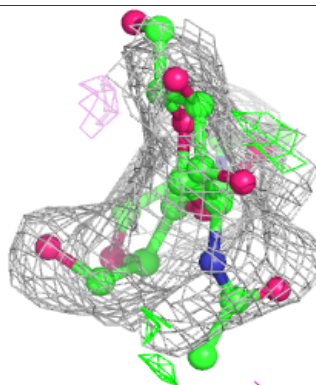
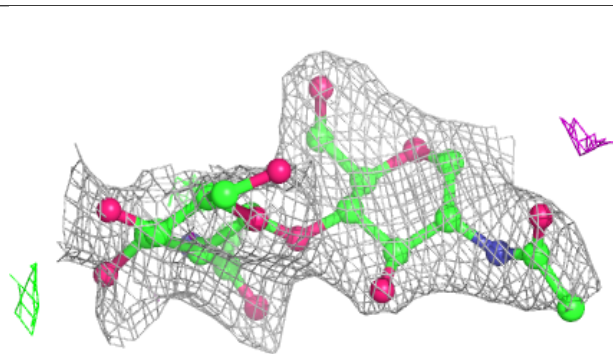
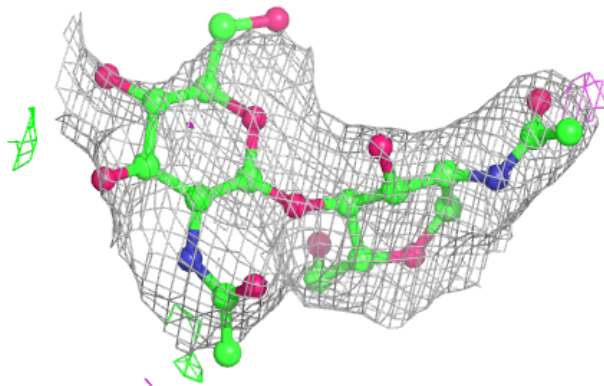


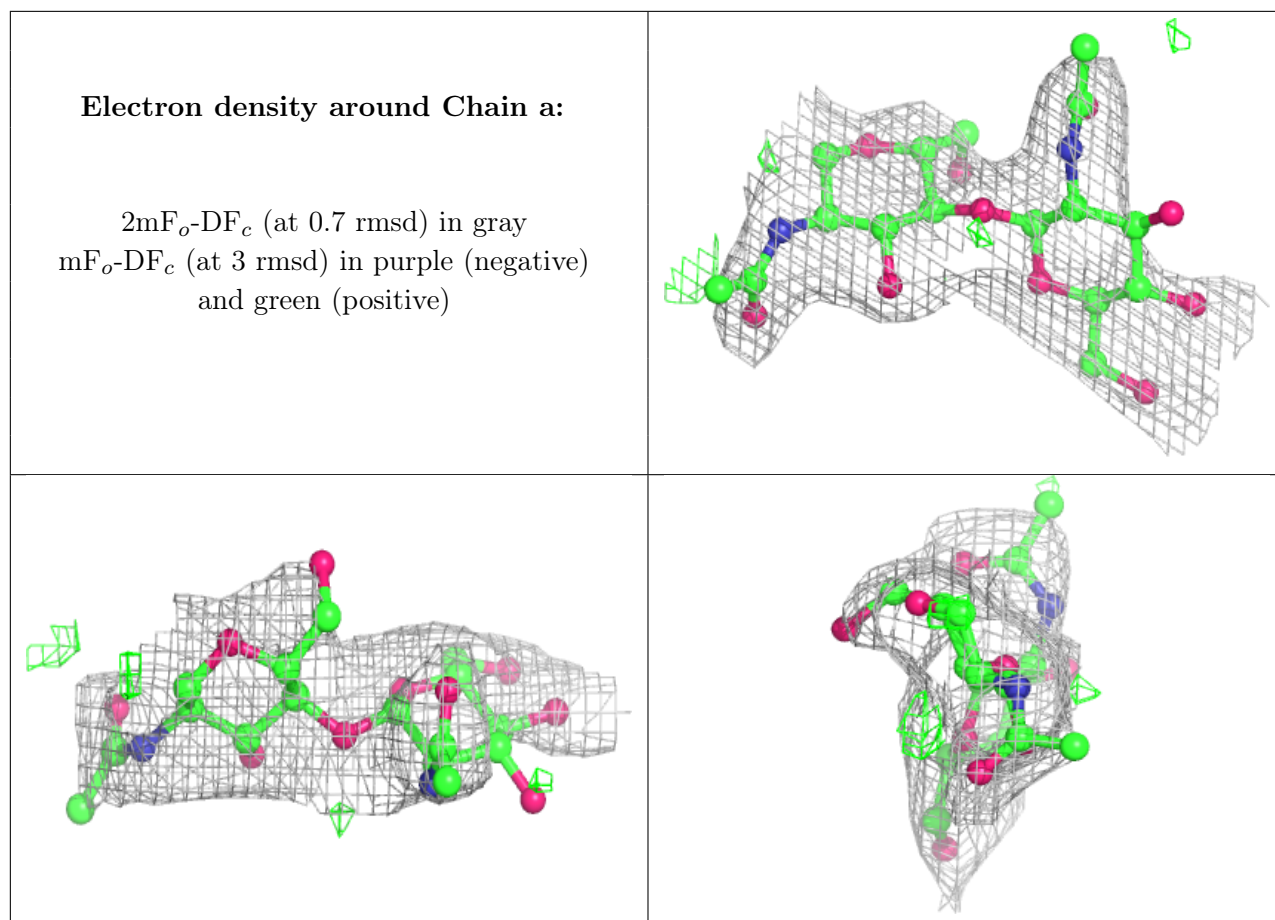
Electron density around Chain M:

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

**Electron density around Chain X:**

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





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(Å ²)	Q<0.9
13	EOH	B	409	3/3	0.42	0.30	76,76,77,78	0
3	NAG	A	402	14/15	0.60	0.16	82,112,116,116	0
8	GOL	A	407	6/6	0.66	0.16	64,73,74,75	0
8	GOL	B	405	6/6	0.67	0.22	65,75,78,81	0
3	NAG	A	401	14/15	0.72	0.17	93,105,110,112	0
7	MES	A	409	12/12	0.73	0.20	86,97,102,105	0
9	PEG	A	410	7/7	0.74	0.14	77,85,87,89	0
6	A1JFW	B	404	8/8	0.77	0.27	63,73,79,81	0
8	GOL	B	408	6/6	0.77	0.16	76,87,89,89	0
6	A1JFW	A	405	8/8	0.79	0.27	61,81,91,93	0
10	PO4	A	411	5/5	0.79	0.15	77,79,82,95	0
8	GOL	A	408	6/6	0.79	0.13	68,72,75,76	0

Continued on next page...

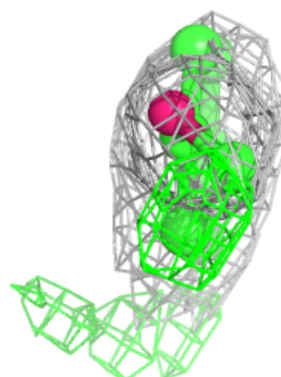
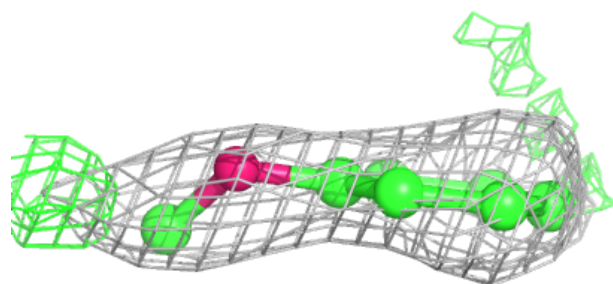
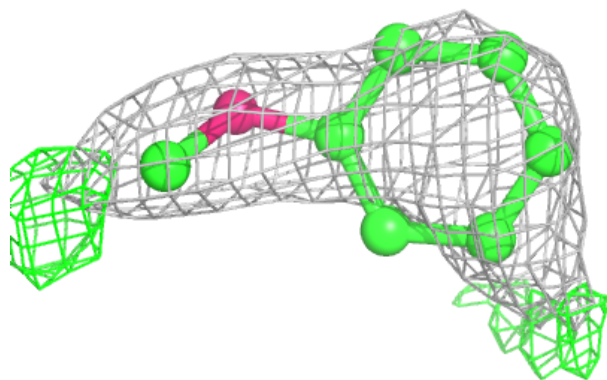
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	ACT	A	403	4/4	0.83	0.20	54,57,58,66	0
3	NAG	B	401	14/15	0.84	0.12	70,84,89,90	0
4	ACT	B	406	4/4	0.85	0.15	66,69,70,72	0
6	A1JFW	B	407	8/8	0.87	0.27	90,96,103,106	0
7	MES	B	403	12/12	0.90	0.16	49,74,87,90	0
7	MES	A	406	12/12	0.90	0.18	45,62,87,89	0
11	ZN	A	412	1/1	0.93	0.07	95,95,95,95	0
11	ZN	B	411	1/1	0.94	0.10	95,95,95,95	0
11	ZN	A	420	1/1	0.96	0.05	87,87,87,87	0
5	HEM	B	402	43/43	0.96	0.09	32,39,50,56	0
11	ZN	B	416	1/1	0.96	0.05	90,90,90,90	0
11	ZN	A	417	1/1	0.96	0.05	57,57,57,57	0
5	HEM	A	404	43/43	0.98	0.07	31,40,45,46	0
11	ZN	A	416	1/1	0.98	0.07	53,53,53,53	0
11	ZN	B	410	1/1	0.98	0.04	66,66,66,66	0
11	ZN	A	419	1/1	0.99	0.03	66,66,66,66	0
11	ZN	B	412	1/1	0.99	0.03	62,62,62,62	0
11	ZN	B	413	1/1	0.99	0.04	81,81,81,81	0
11	ZN	B	414	1/1	0.99	0.05	45,45,45,45	0
11	ZN	B	415	1/1	0.99	0.03	74,74,74,74	0
11	ZN	A	413	1/1	0.99	0.02	66,66,66,66	0
11	ZN	A	418	1/1	0.99	0.02	67,67,67,67	0
11	ZN	A	415	1/1	1.00	0.02	54,54,54,54	0
12	MG	A	421	1/1	1.00	0.02	24,24,24,24	0
12	MG	B	417	1/1	1.00	0.06	30,30,30,30	0
11	ZN	A	414	1/1	1.00	0.02	53,53,53,53	0

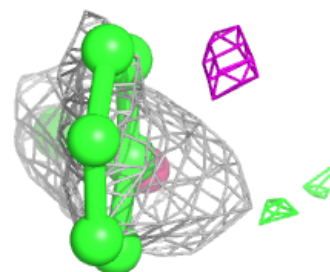
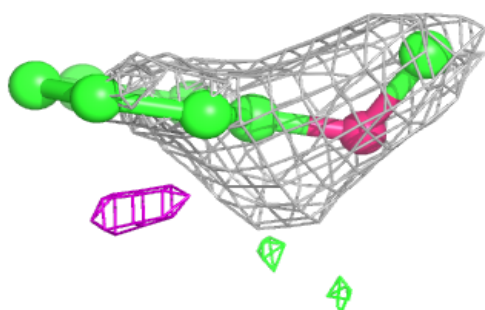
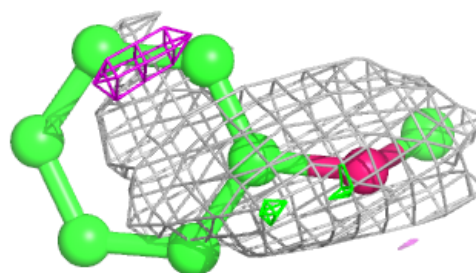
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around A1JFW B 404:

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

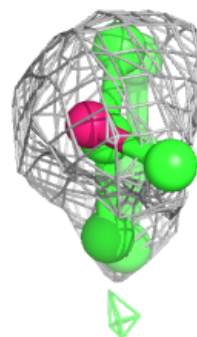
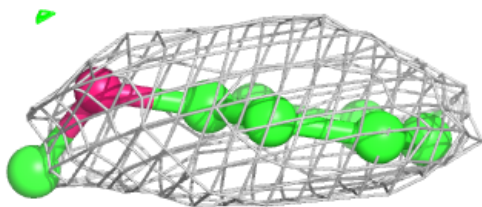
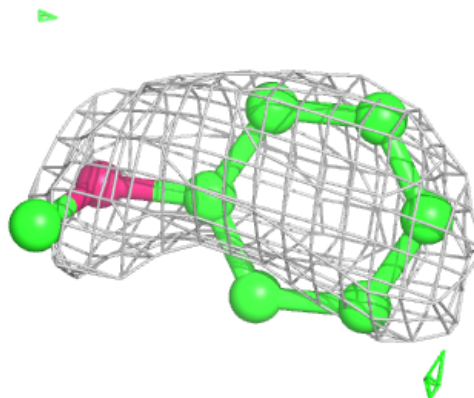
**Electron density around A1JFW A 405:**

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



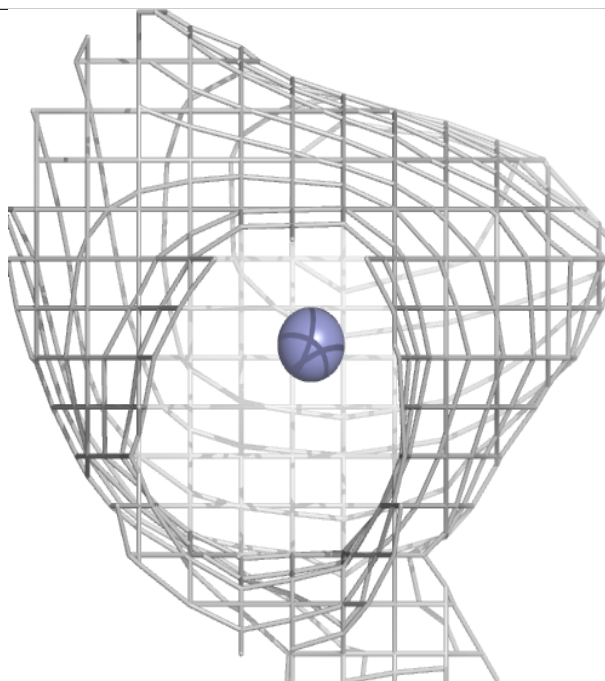
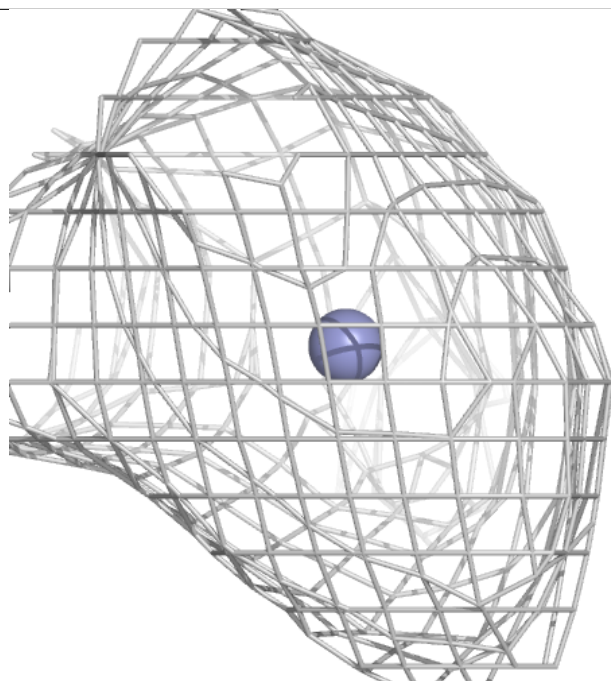
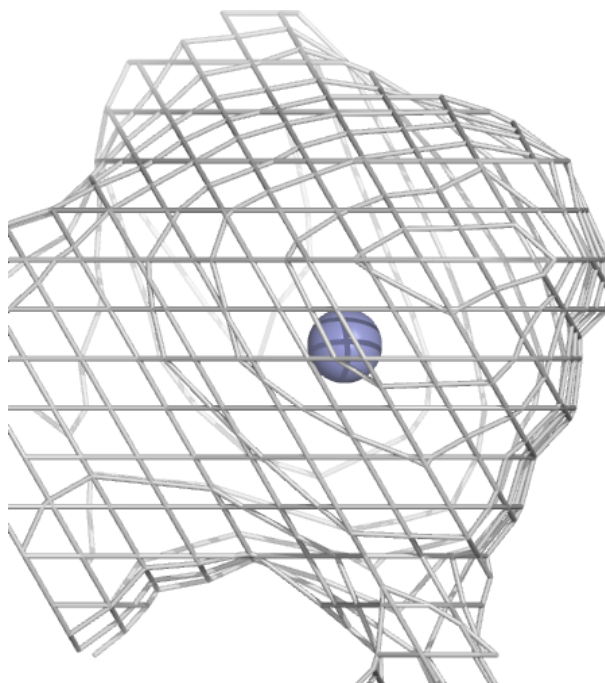
Electron density around A1JFW B 407:

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



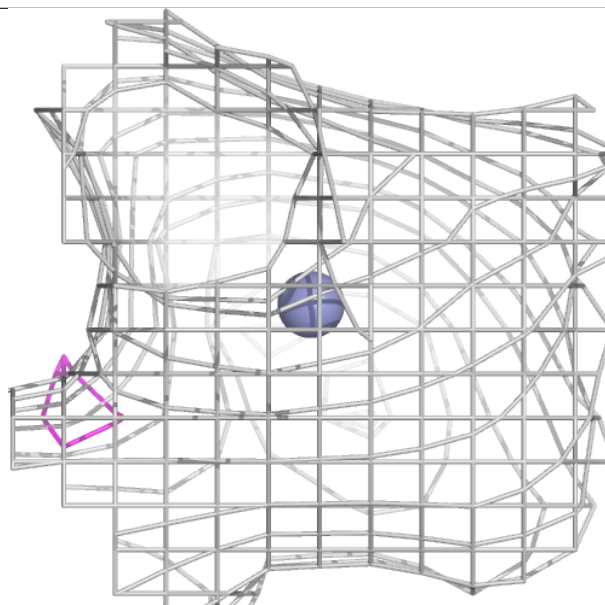
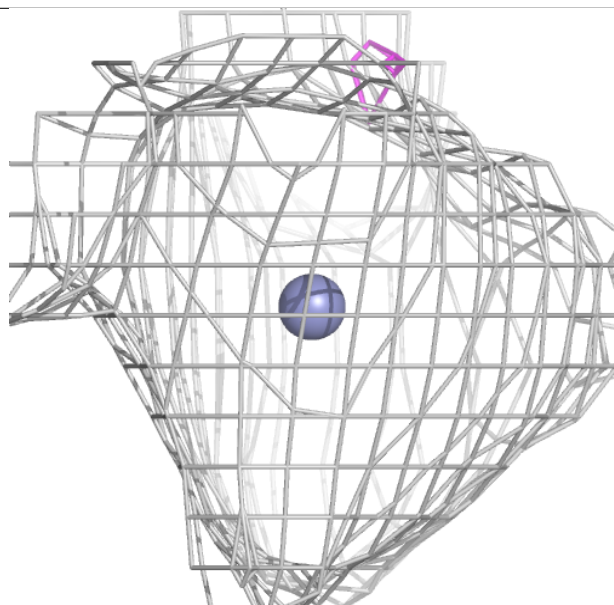
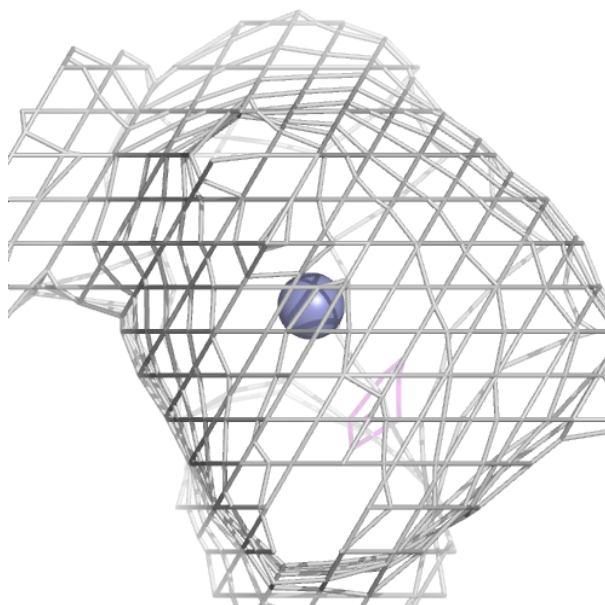
Electron density around ZN A 412:

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



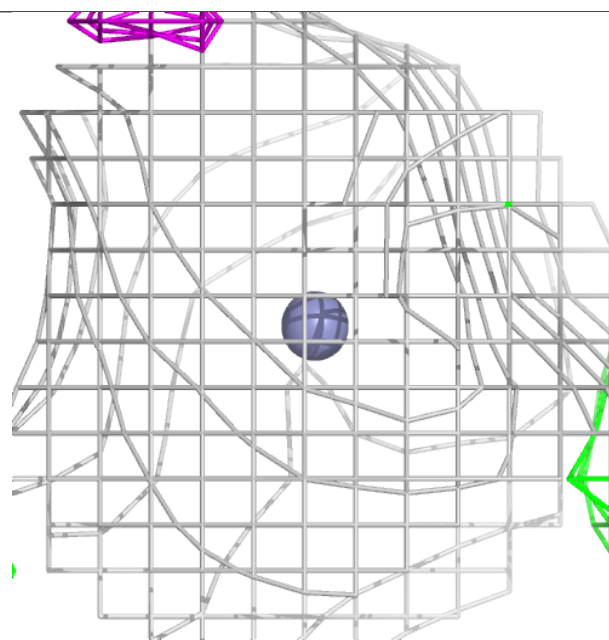
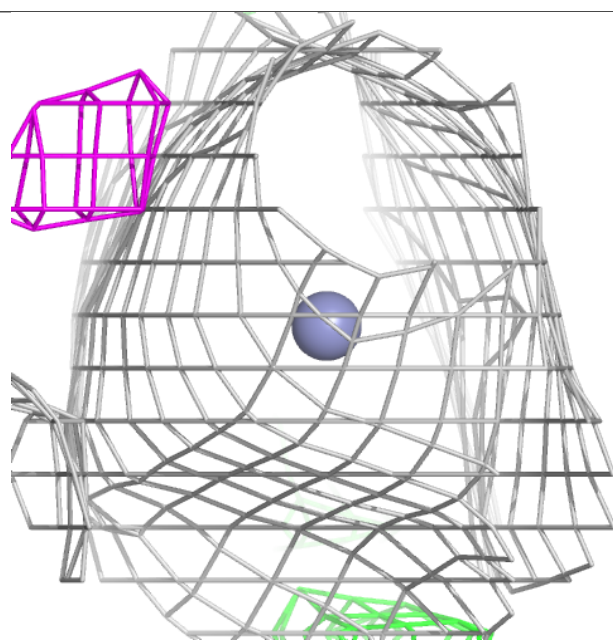
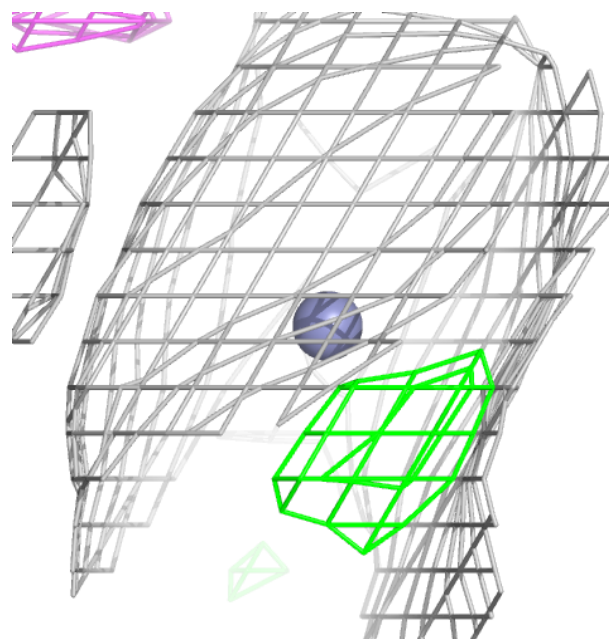
Electron density around ZN B 411:

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



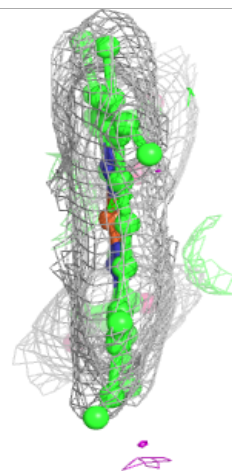
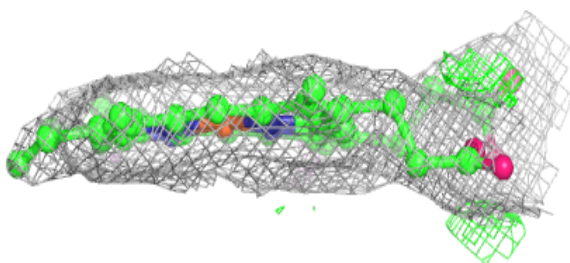
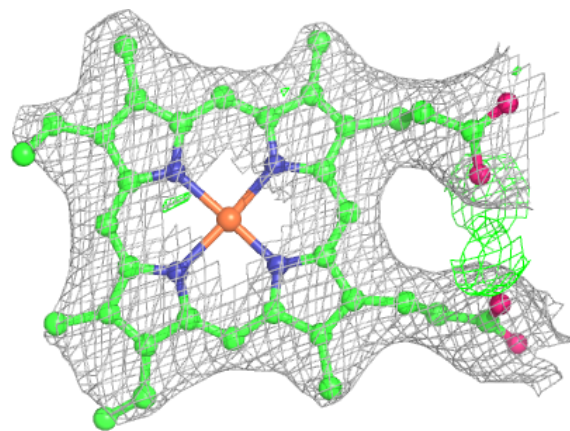
Electron density around ZN A 420:

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



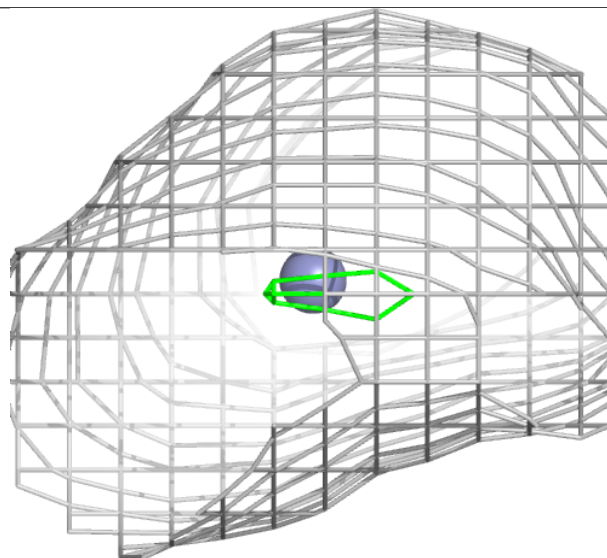
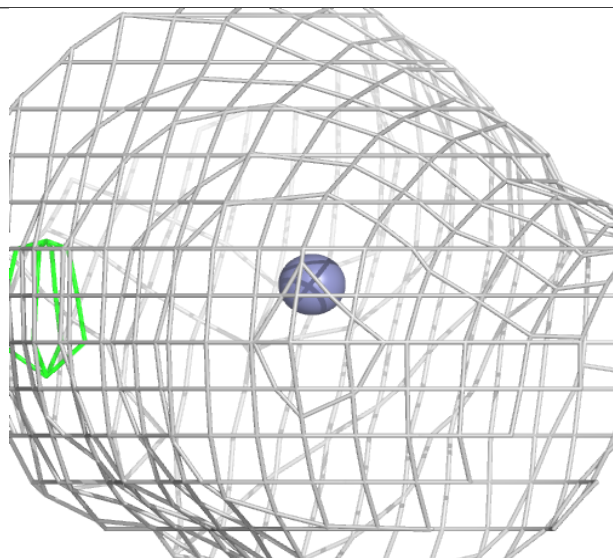
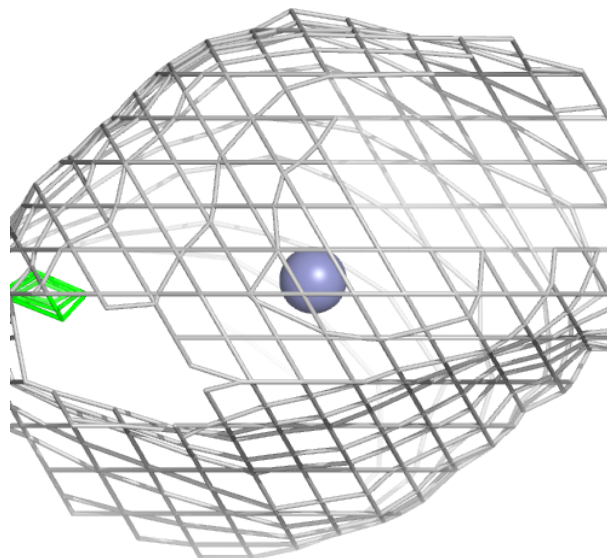
Electron density around HEM B 402:

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



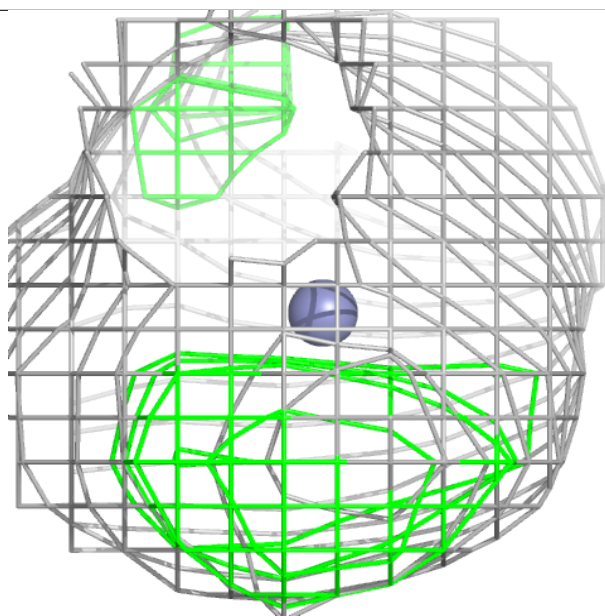
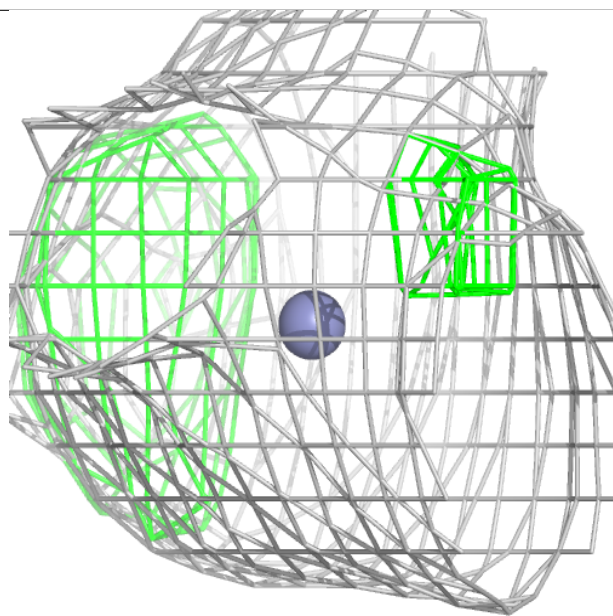
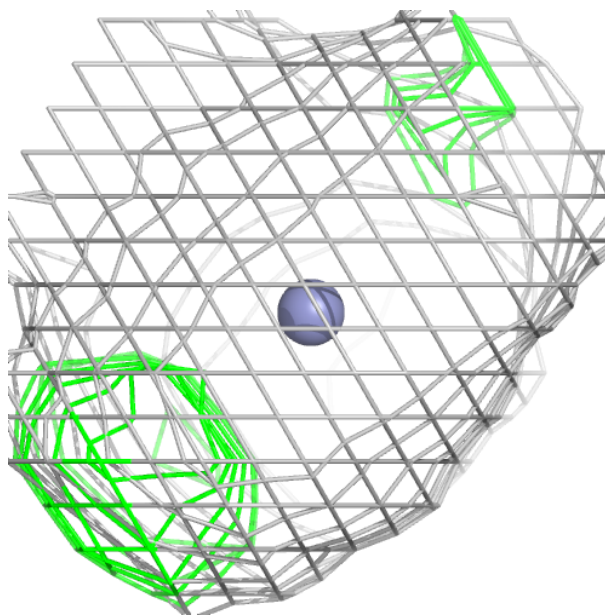
Electron density around ZN B 416:

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



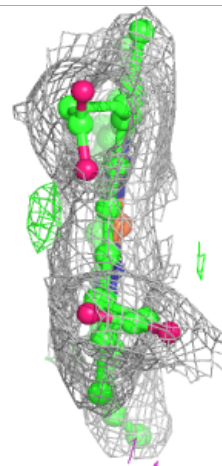
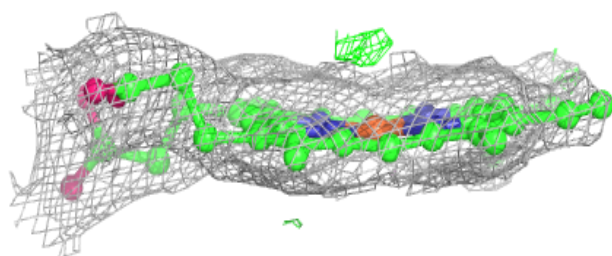
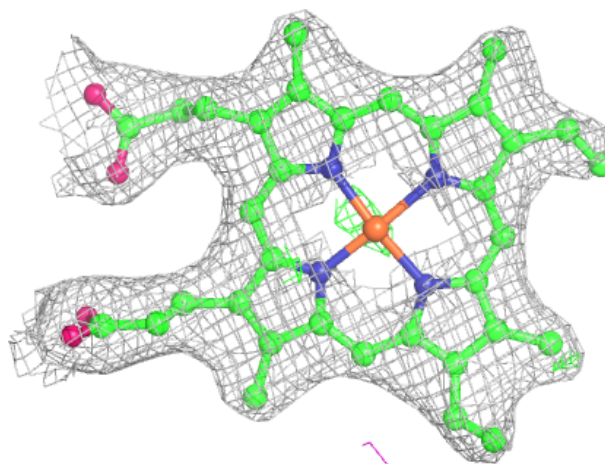
Electron density around ZN A 417:

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



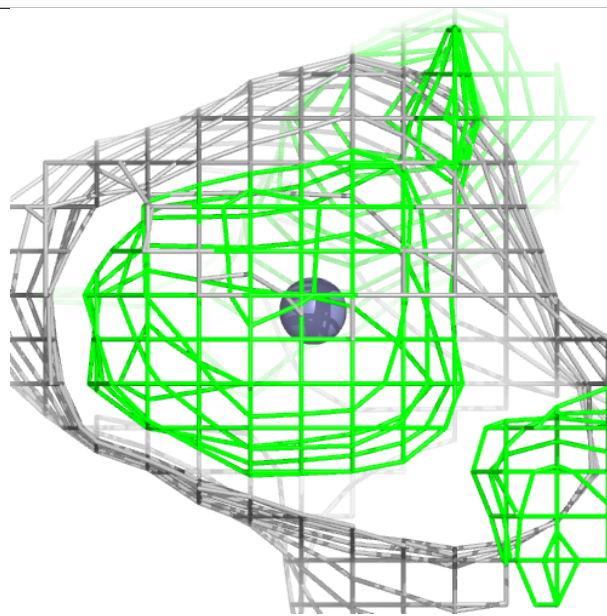
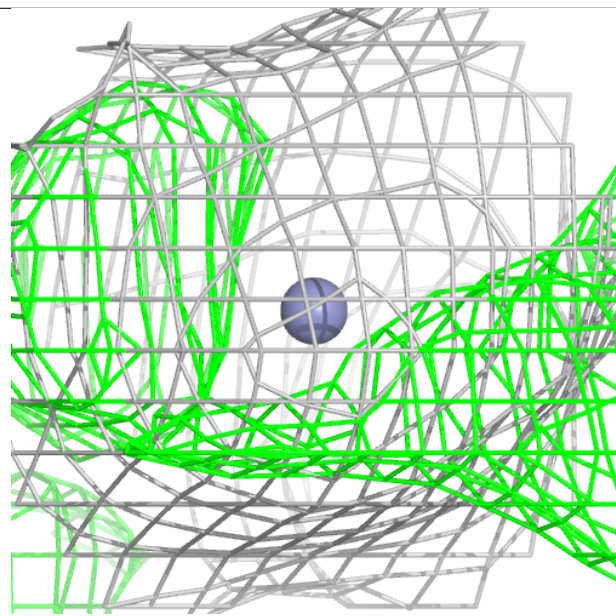
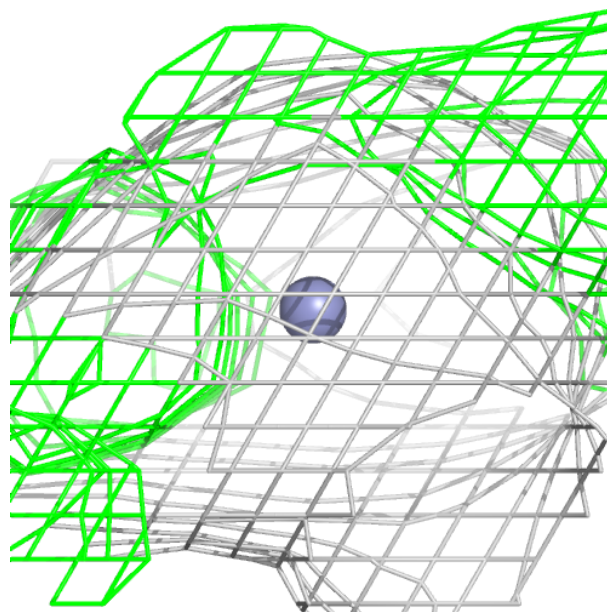
Electron density around HEM A 404:

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



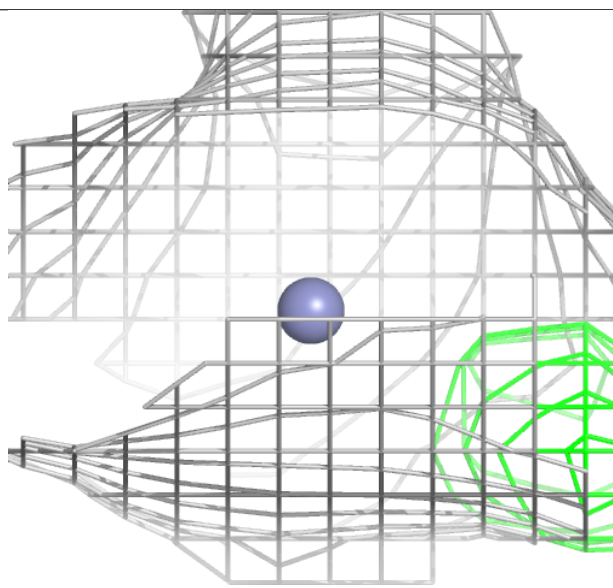
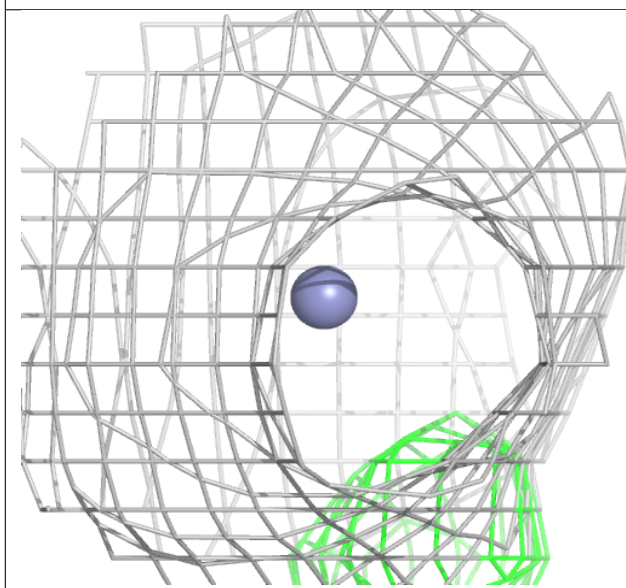
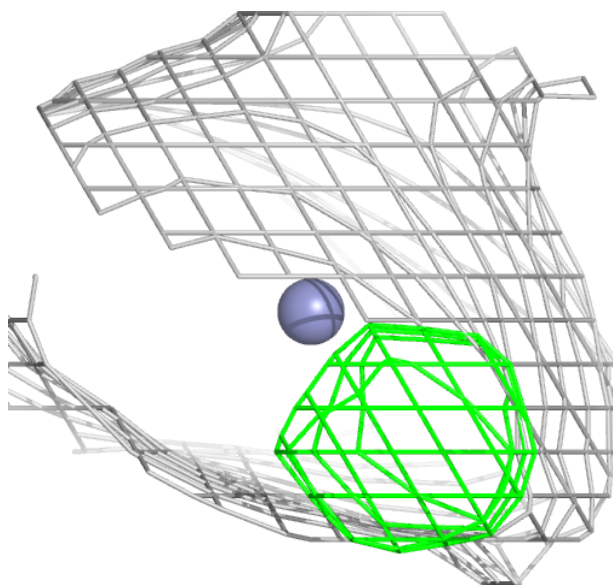
Electron density around ZN A 416:

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



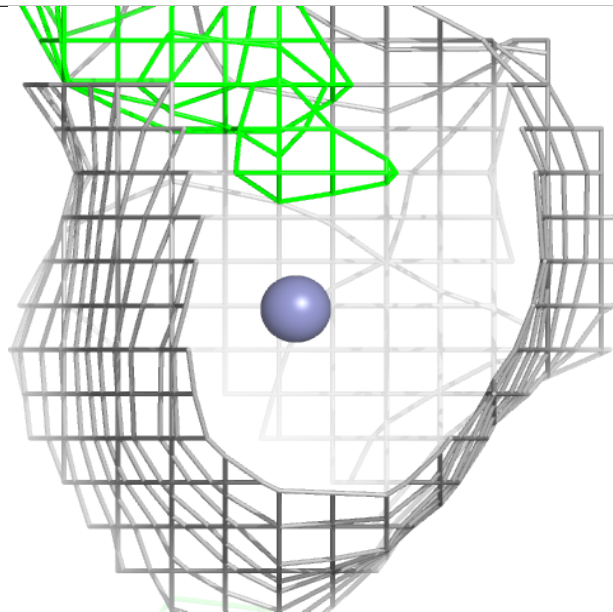
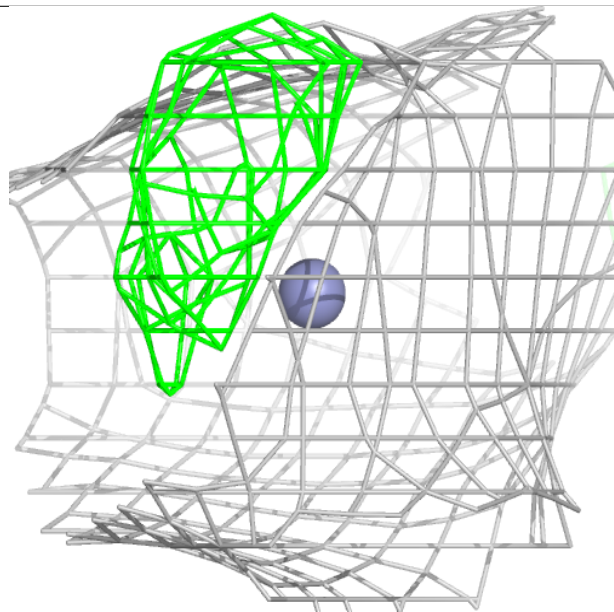
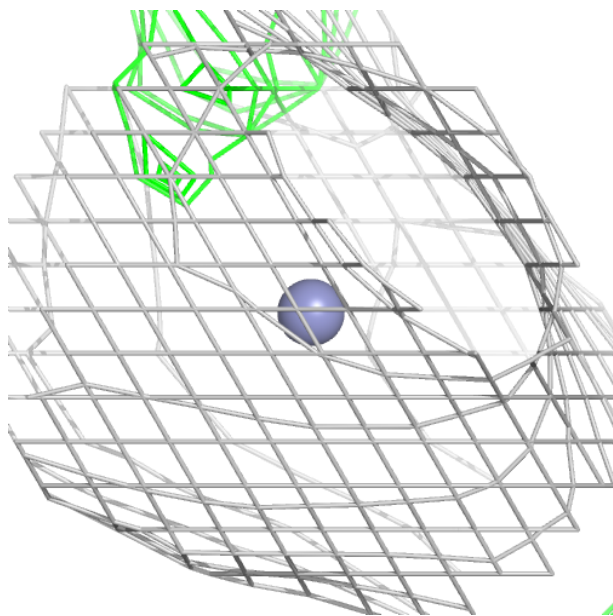
Electron density around ZN B 410:

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



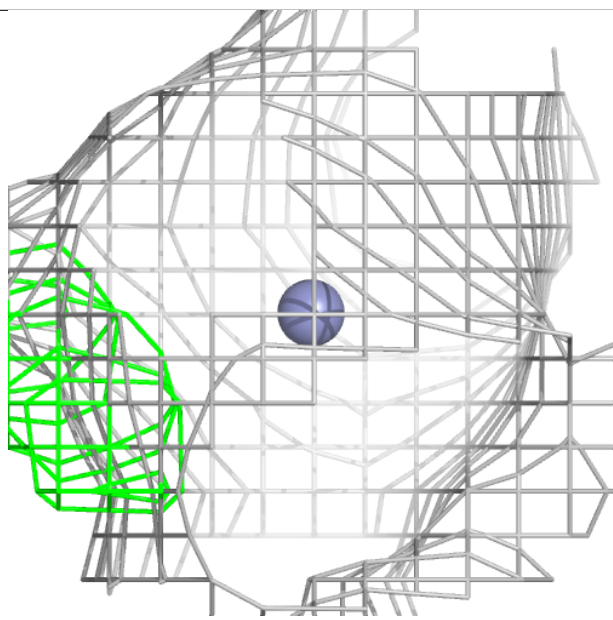
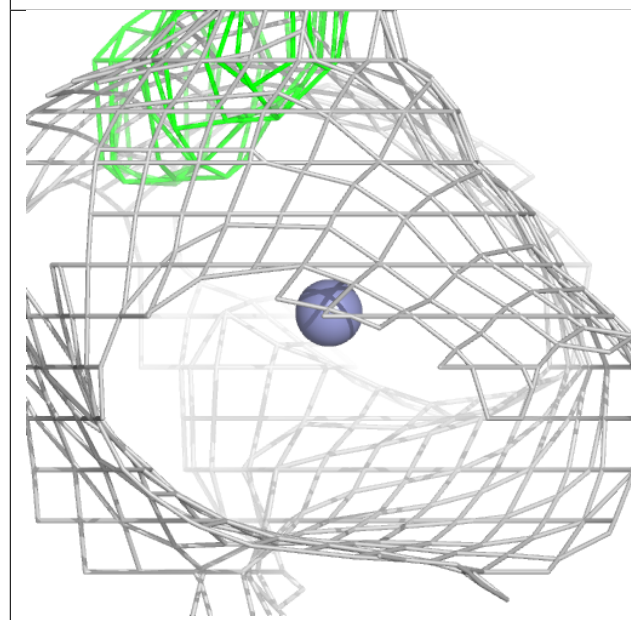
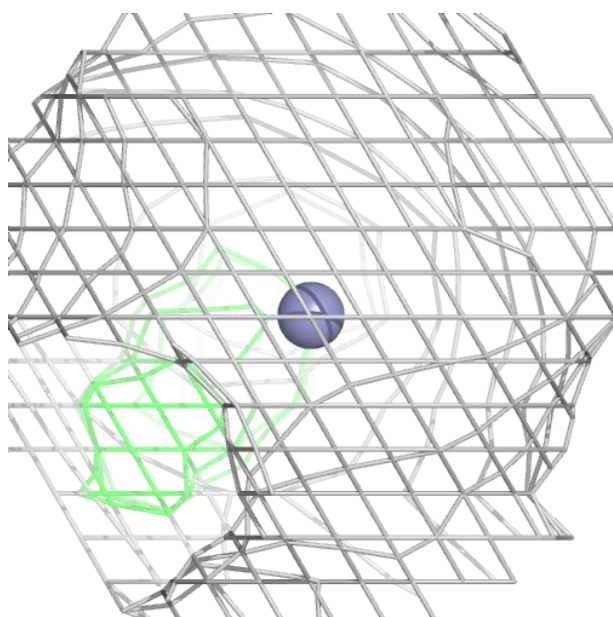
Electron density around ZN A 419:

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



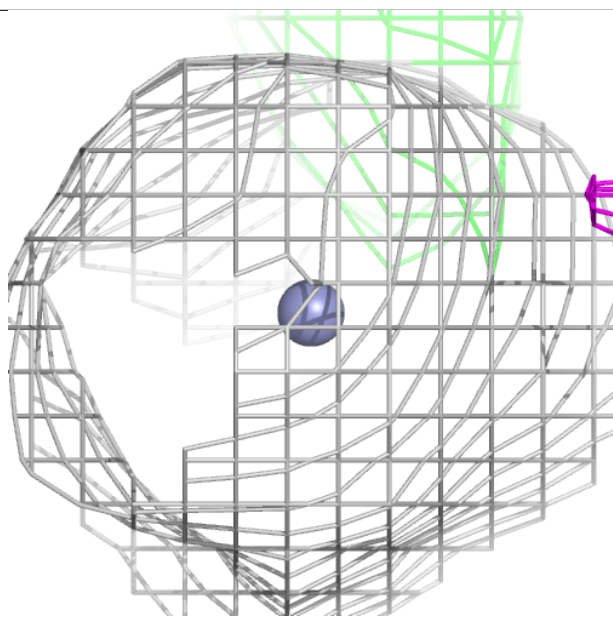
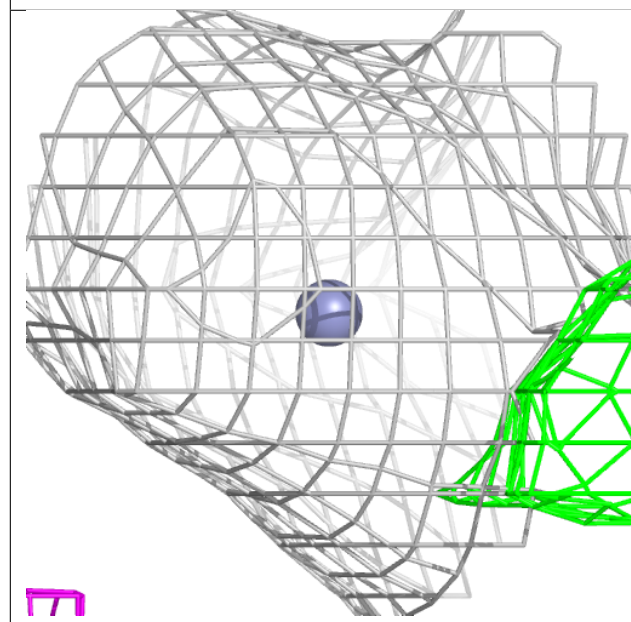
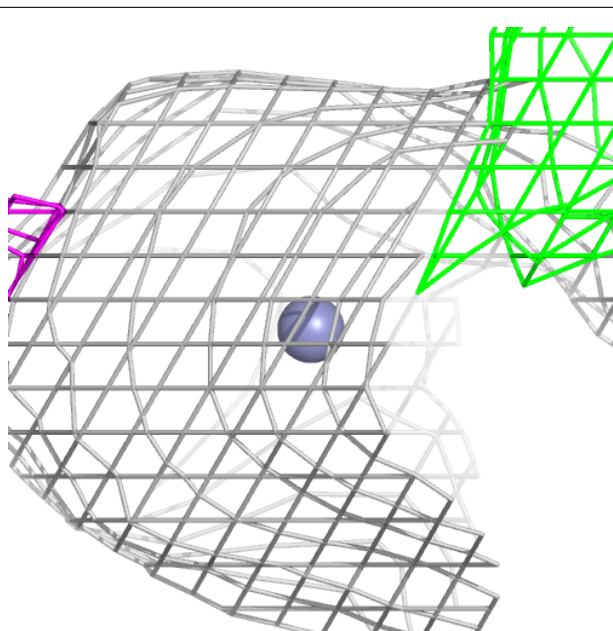
Electron density around ZN B 412:

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



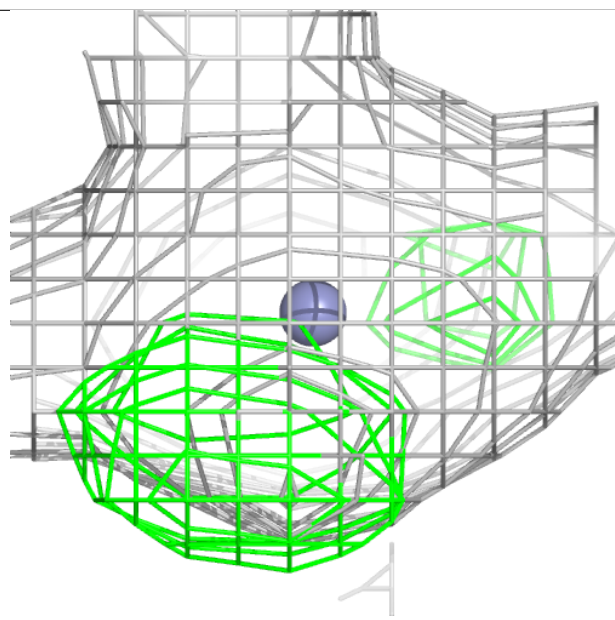
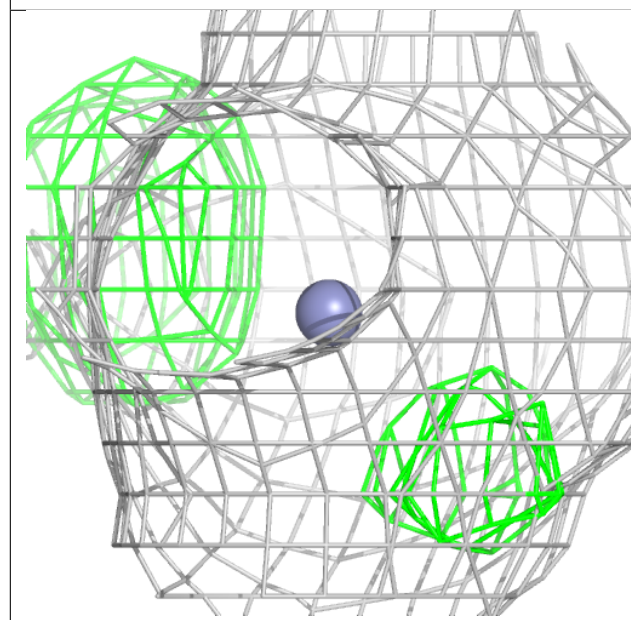
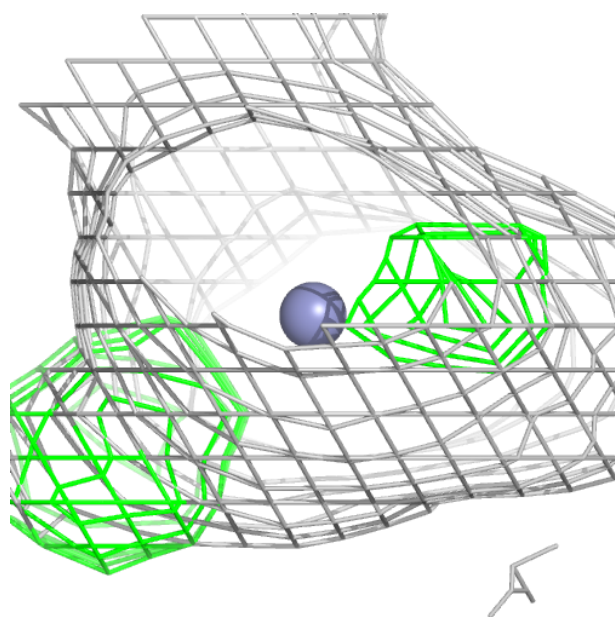
Electron density around ZN B 413:

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



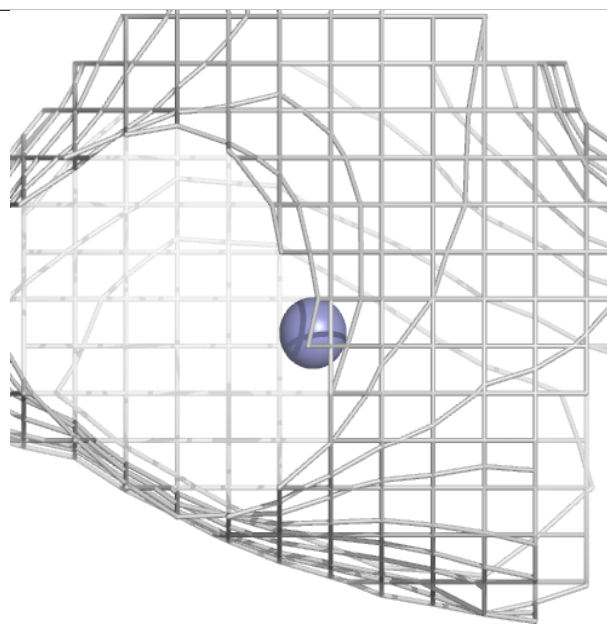
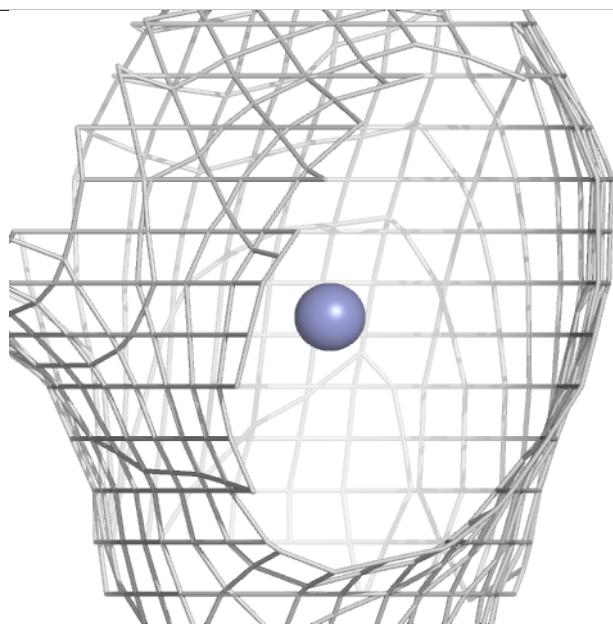
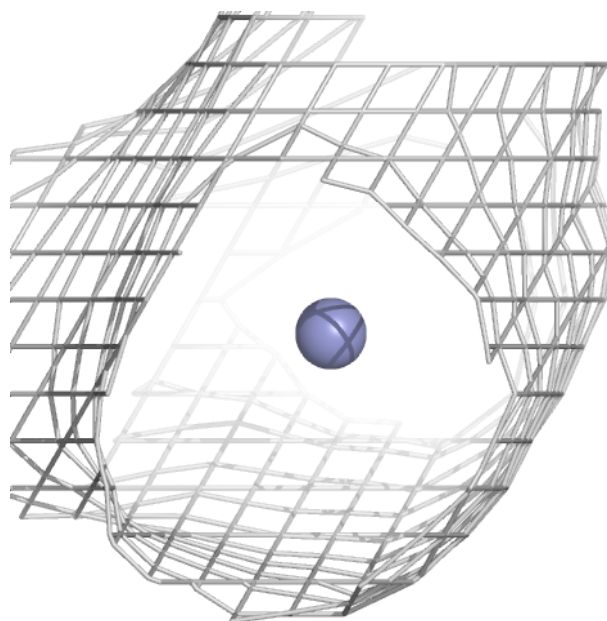
Electron density around ZN B 414:

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



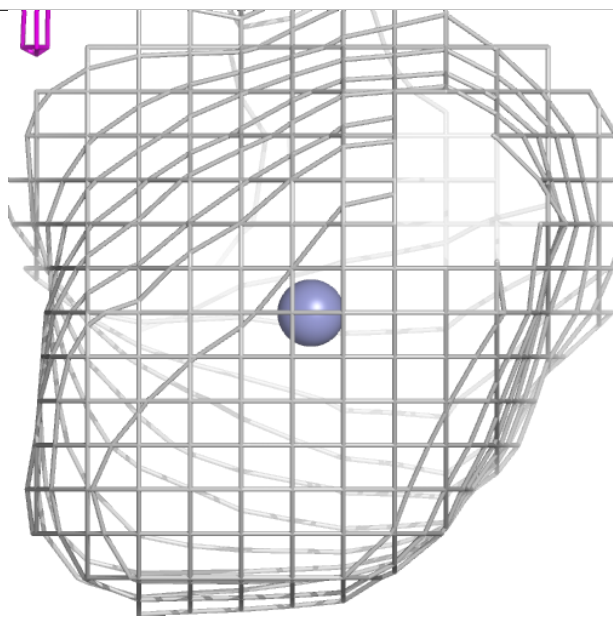
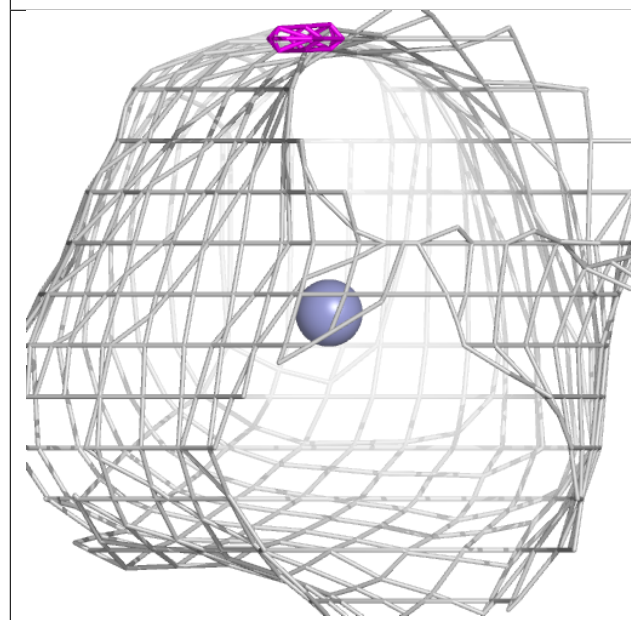
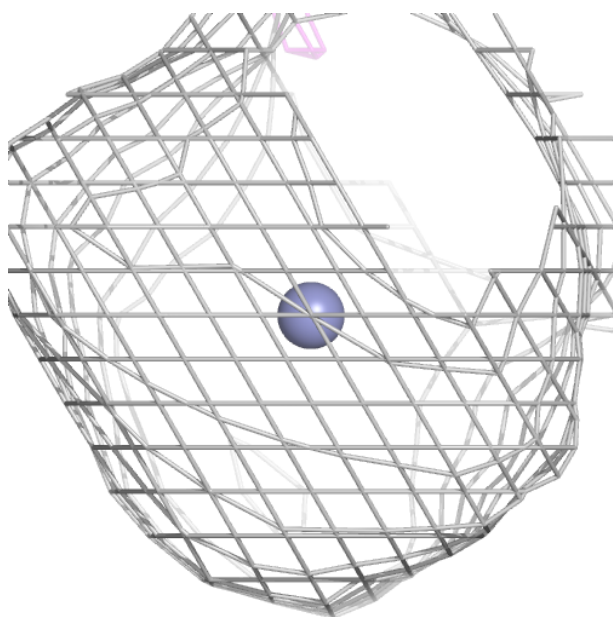
Electron density around ZN B 415:

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



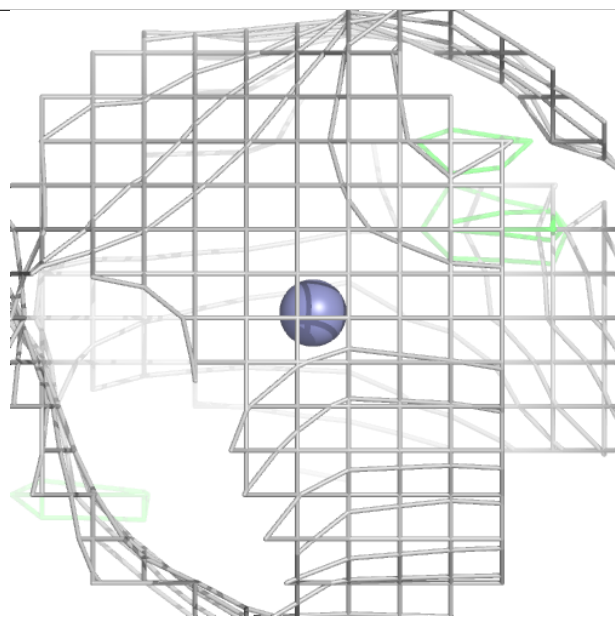
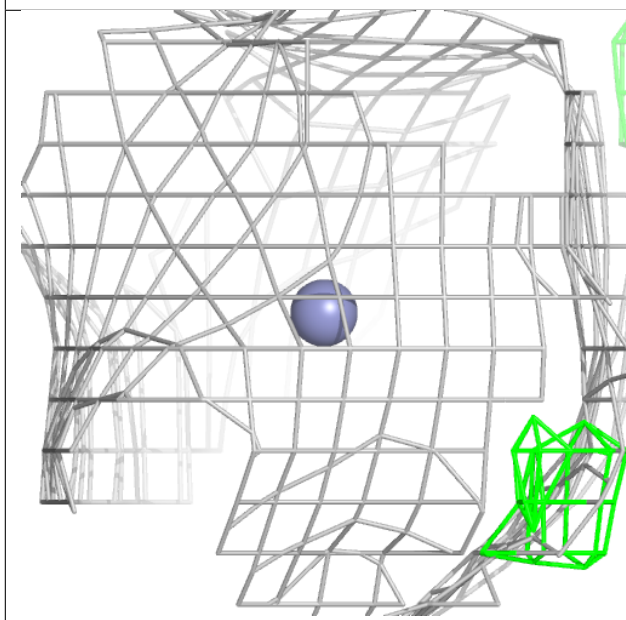
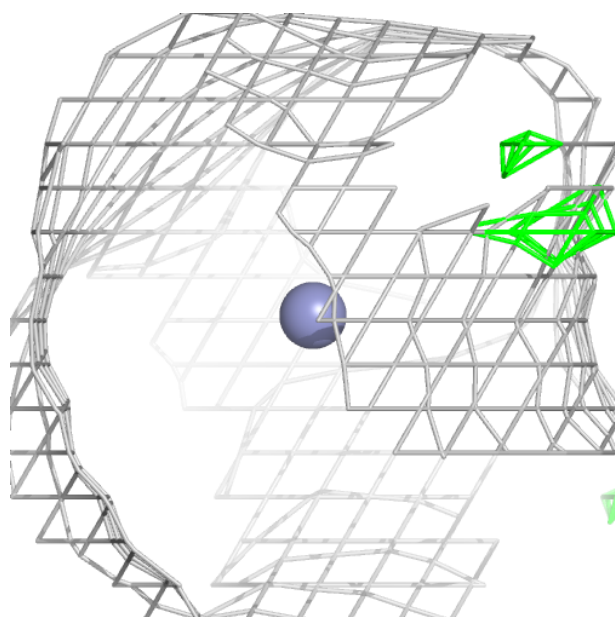
Electron density around ZN A 413:

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



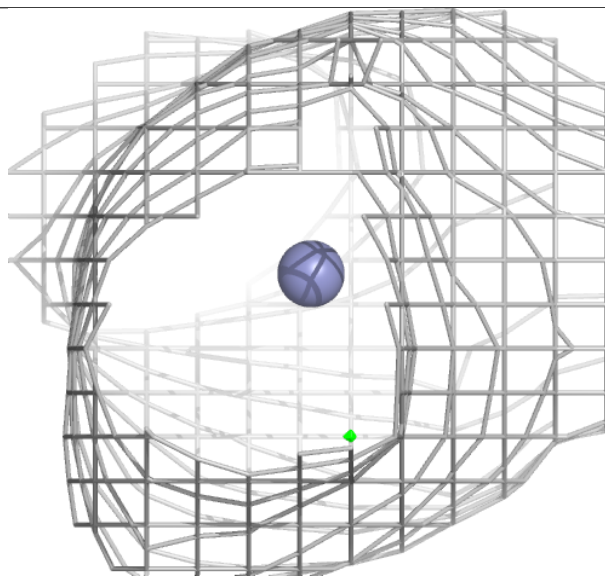
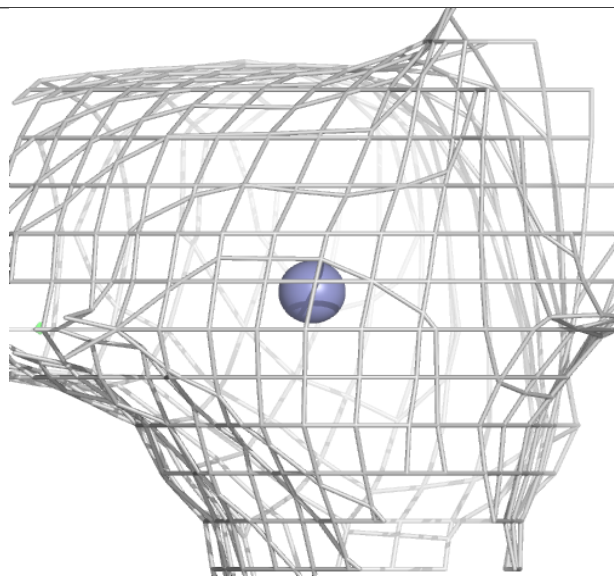
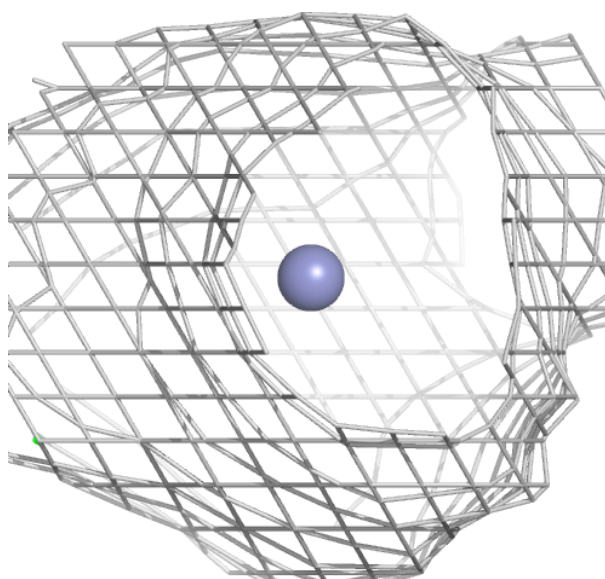
Electron density around ZN A 418:

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



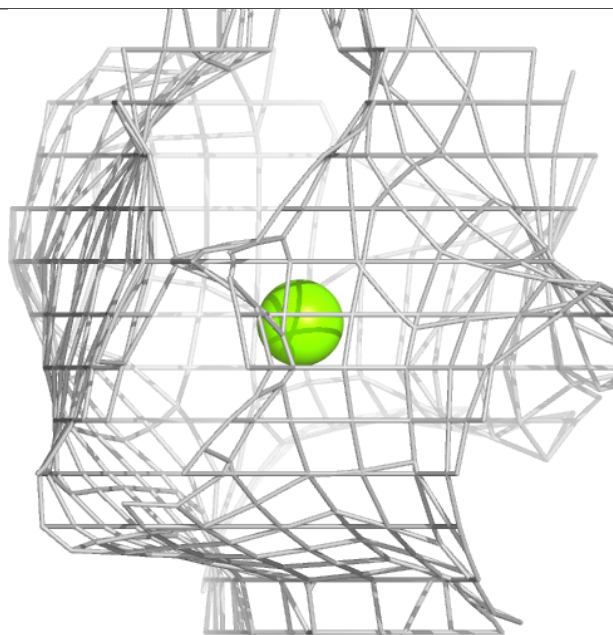
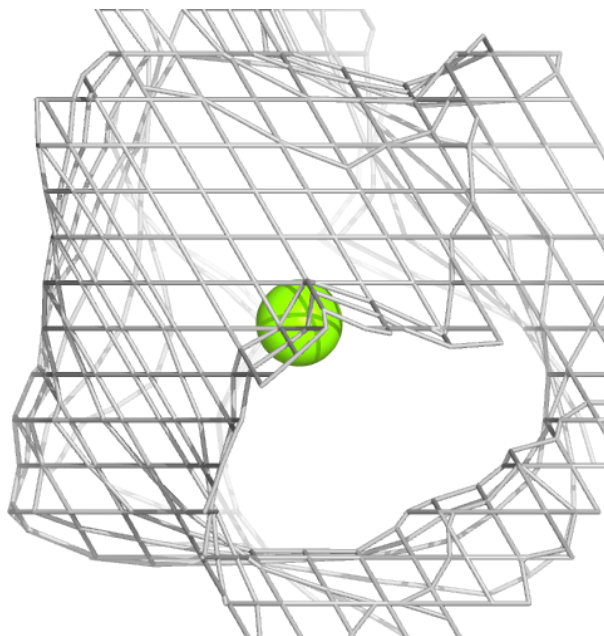
Electron density around ZN A 415:

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



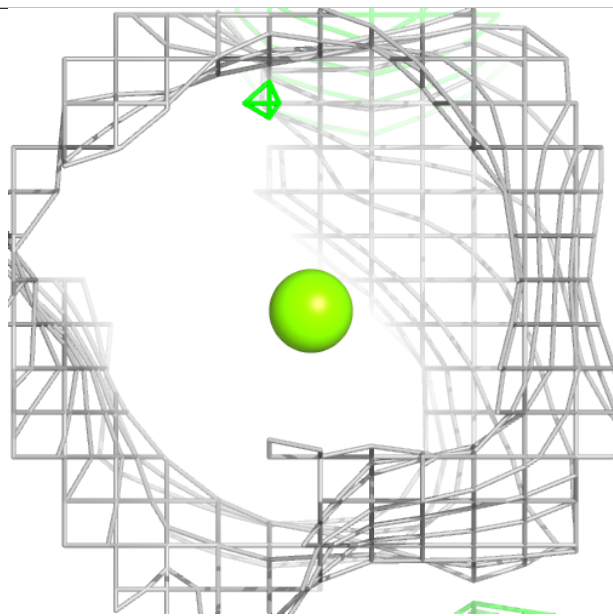
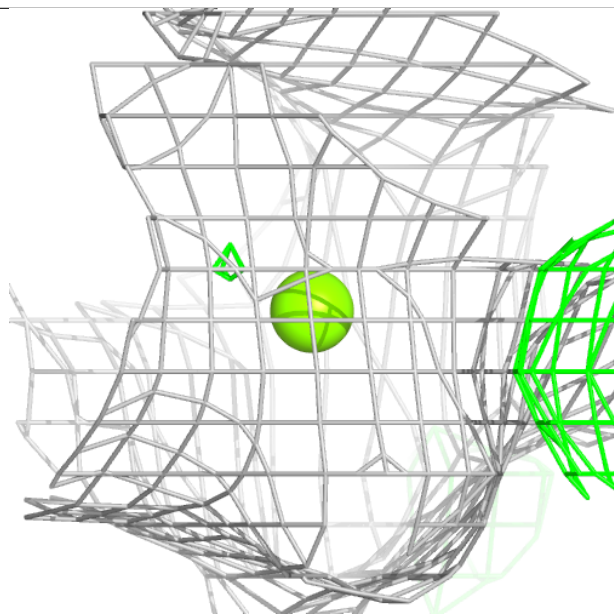
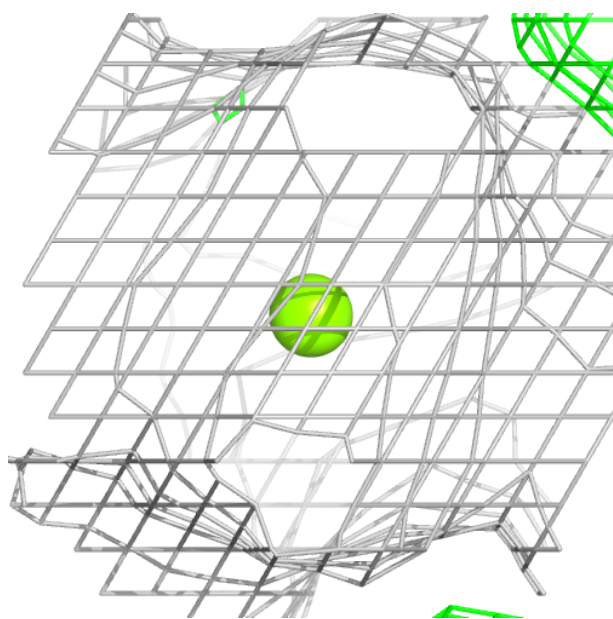
Electron density around MG A 421:

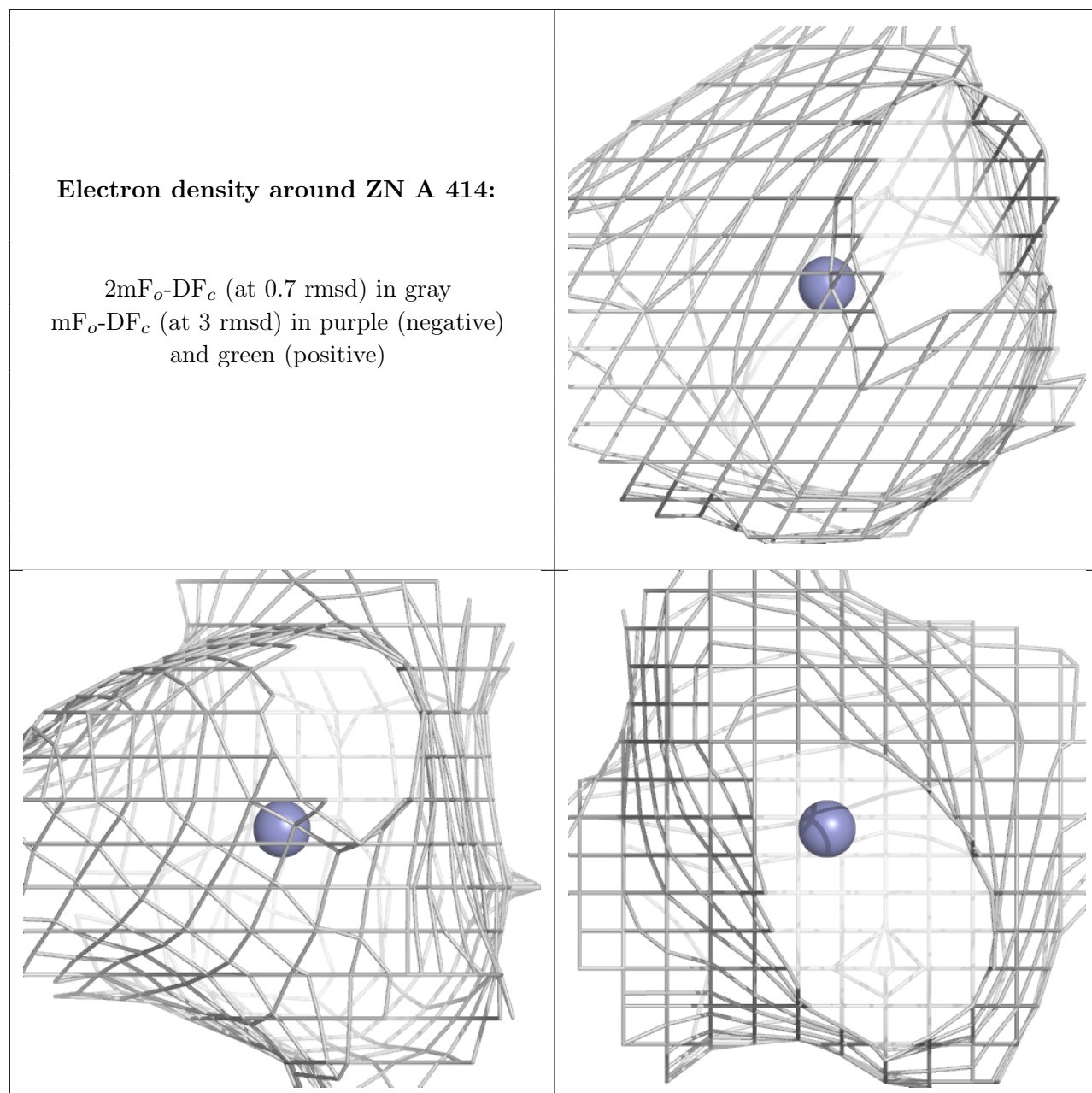
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around MG B 417:

$2mF_o-DF_c$ (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.