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wwPDB X-ray Structure Validation Summary Report (i)

Dec 15, 2024 – 06:47 AM EST

PDB ID	:	3N8W
Title	:	Crystal Structure of R120Q/Native Cyclooxygenase-1 Heterodimer mutant in complex with Flurbiprofen
Authors	:	Sidhu, R.S.
Deposited on	:	2010-05-28
Resolution	:	2.75 Å(reported)

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

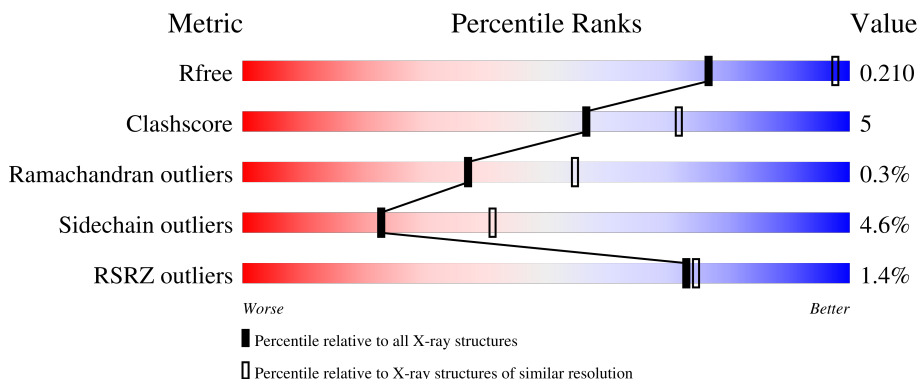|		
MolProbity	:	4.02b-467
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.40

1   Overall quality at a glance ⓘ

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.75 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
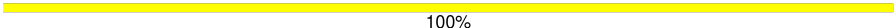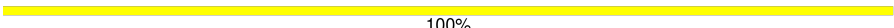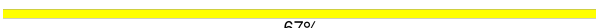
Metric	Percentile Ranks	Value
Rfree		0.210
Clashscore		5
Ramachandran outliers		0.3%
Sidechain outliers		4.6%
RSRZ outliers		1.4%

Worse ← → *Better*

▮ Percentile relative to all X-ray structures

▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	164625	1606 (2.78-2.74)
Clashscore	180529	1689 (2.78-2.74)
Ramachandran outliers	177936	1665 (2.78-2.74)
Sidechain outliers	177891	1665 (2.78-2.74)
RSRZ outliers	164620	1606 (2.78-2.74)

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

Mol	Chain	Length	Quality of chain
1	A	553	88% 11% •
2	B	553	89% 10% •
3	C	2	100%
3	F	2	50% 50%
4	D	3	100%

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Mol	Chain	Length	Quality of chain
5	E	5	100%
6	G	3	100%
7	H	3	67% 33%

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	NAG	C	1	X	-	-	-
9	FLP	A	802	X	-	-	-

2 Entry composition ⓘ

There are 11 unique types of molecules in this entry. The entry contains 9505 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 Prostaglandin G/H synthase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	553	Total 4437	C 2877	N 747	O 785	S 28	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	92	LEU	MET	conflict	UNP P05979

- Molecule 2 is a protein called Prostaglandin G/H synthase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	553	Total 4472	C 2901	N 744	O 800	S 27	0	8	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	92	LEU	MET	conflict	UNP P05979
B	120	GLN	ARG	conflict	UNP P05979

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.
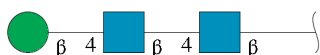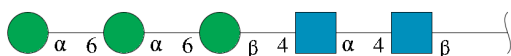

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	2	Total 28	C 16	N 2	O 10	0	0	0

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	F	2	28	16	2	10	0	0	0

- Molecule 4 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.
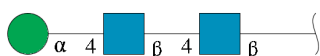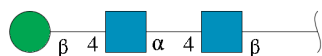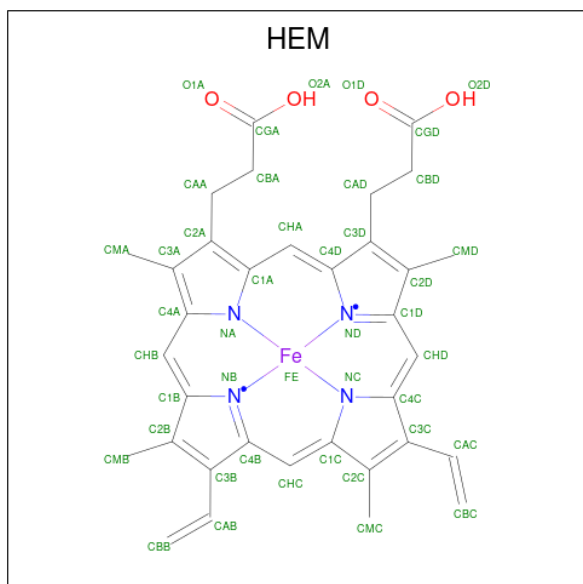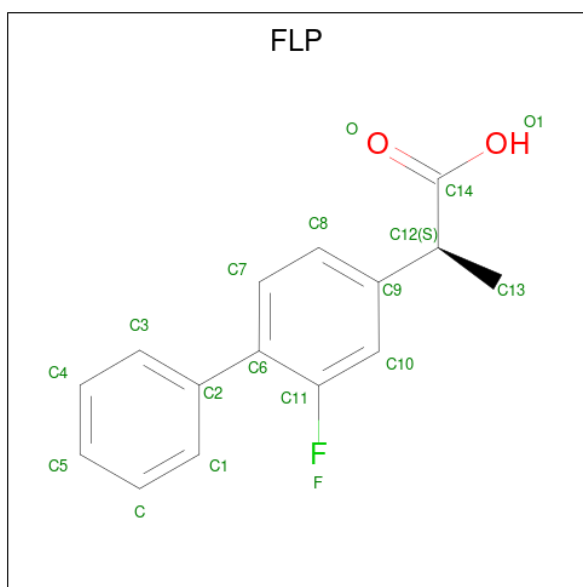
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	D	3	39	22	2	15	0	0	0

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	E	5	61	34	2	25	0	0	0

- Molecule 6 is an oligosaccharide called alpha-D-mannopyranose-(1-4)-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			
6	G	3	39	22	2	15	0	0	0

- Molecule 7 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
7	H	3	Total 39	C 22	N 2	O 15	0	0	0

- Molecule 8 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).
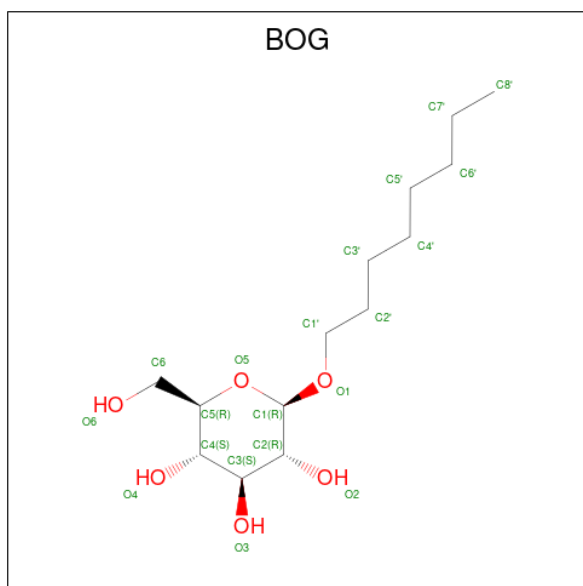

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	A	1	Total 43	C 34	Fe 1	N 4	O 4	0	0
8	B	1	Total 43	C 34	Fe 1	N 4	O 4	0	0

- Molecule 9 is FLURBIPROFEN (three-letter code: FLP) (formula: $C_{15}H_{13}FO_2$).

FLP

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
9	A	1	Total 18	C 15	F 1	O 2	0	0

- Molecule 10 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: $C_{14}H_{28}O_6$).

BOG

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total 20	C 14	O 6	0	0
10	B	1	Total 13	C 7	O 6	0	0
10	B	1	Total 12	C 6	O 6	0	0

• Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	103	Total O 103 103		0	0
11	B	110	Total O 110 110		0	0

# 3 Residue-property plots ⓘ

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

• Molecule 1: Prostaglandin G/H synthase 1
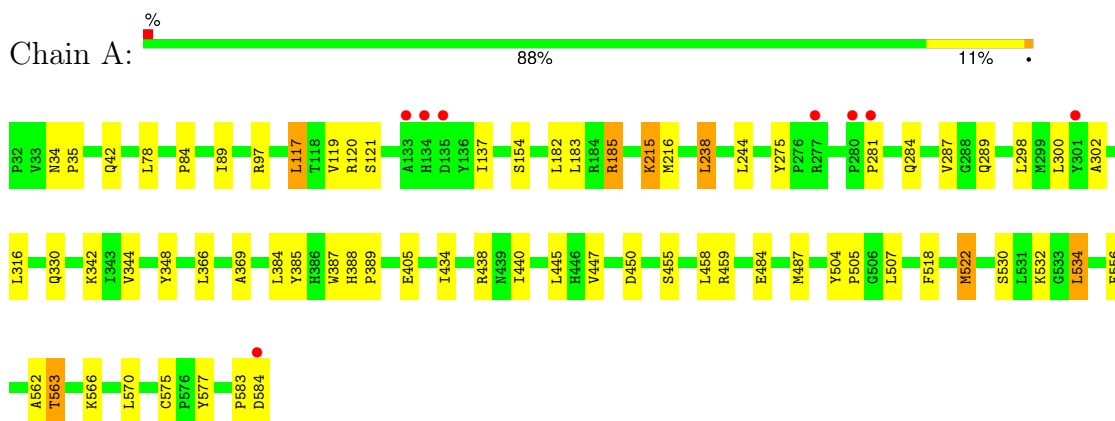
• Molecule 2: Prostaglandin G/H synthase 1
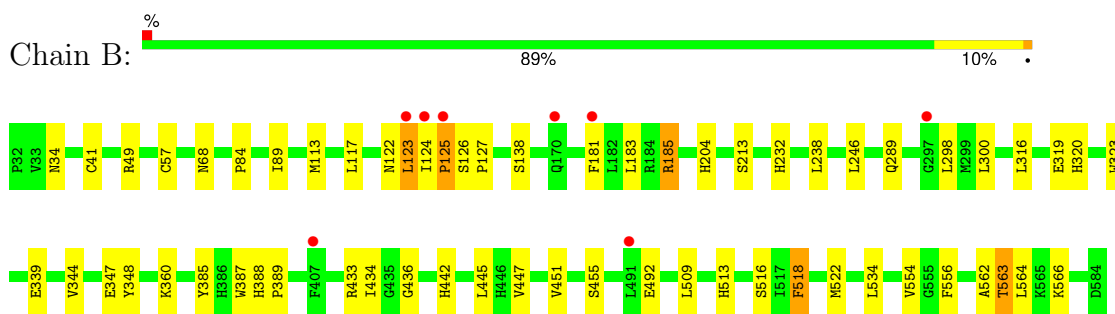
• Molecule 3: 2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

• Molecule 3: 2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

NAG1 NDG2

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

Chain D: 100%

NAG1 NAG2 BMA3

• Molecule 5: alpha-D-mannopyranose-(1-6)-alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E: 100%

NAG1 NDG2 BMA3 MAN4 MAN5

• Molecule 6: alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain G: 100%

NAG1 NAG2 MAN3

• Molecule 7: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain H: 67%   33%

NAG1 NDG2 BMA3

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α, β, γ	182.48Å 182.48Å 103.09Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	46.91 – 2.75 46.91 – 2.75	Depositor EDS
% Data completeness (in resolution range)	99.0 (46.91-2.75) 99.5 (46.91-2.75)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.44 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.5.0102	Depositor
R, R_{free}	0.178 , 0.201 0.191 , 0.210	Depositor DCC
R_{free} test set	1712 reflections (3.37%)	wwPDB-VP
Wilson B-factor (Å^2)	57.6	Xtriage
Anisotropy	0.048	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 42.2	EDS
L-test for twinning[2]	$< |L| > = 0.52, < L^2 > = 0.36$	Xtriage
Estimated twinning fraction	0.064 for h,-h-k,-l	Xtriage
Reported twinning fraction	0.532 for H, K, L 0.468 for -H-K, K, -L	Depositor
Outliers	0 of 50719 reflections	Xtriage
F_o,F_c correlation	0.94	EDS
Total number of atoms	9505	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.63% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1]Intensities estimated from amplitudes.
[2]Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality ⓘ

5.1 Standard geometry ⓘ

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, BOG, MAN, FLP, BMA, HEM, NDG

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	0.35	0/4576	0.51	0/6224
2	B	0.35	0/4612	0.51	0/6281
All	All	0.35	0/9188	0.51	0/12505

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 ⓘ

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	4437	0	4280	36	0
2	B	4472	0	4299	47	0
3	C	28	0	24	0	0
3	F	28	0	24	0	0
4	D	39	0	34	0	0
5	E	61	0	51	0	0
6	G	39	0	33	0	0
7	H	39	0	33	1	0
8	A	43	0	30	1	0
8	B	43	0	30	1	0
9	A	18	0	12	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
10	A	20	0	28	1	0
10	B	25	0	22	0	0
11	A	103	0	0	5	0
11	B	110	0	0	5	0
All	All	9505	0	8900	82	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

The worst 5 of 82 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)
2:B:124[B]:ILE:O	2:B:126[B]:SER:N	1.71	1.21
2:B:122[B]:ASN:O	2:B:124[B]:ILE:N	1.87	1.07
2:B:185:ARG:HG3	2:B:185:ARG:HH11	1.24	1.02
2:B:122[B]:ASN:C	2:B:124[B]:ILE:H	1.63	1.01
2:B:124[B]:ILE:C	2:B:126[B]:SER:H	1.65	0.99

There are no symmetry-related clashes.

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	551/553 (100%)	525 (95%)	26 (5%)	0	100	100
2	B	559/553 (101%)	528 (94%)	26 (5%)	5 (1%)	14	26
All	All	1110/1106 (100%)	1053 (95%)	52 (5%)	5 (0%)	37	41

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	B	123[A]	LEU
2	B	123[B]	LEU
2	B	125[A]	PRO
2	B	125[B]	PRO
2	B	204	HIS

5.3.2　Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	475/488 (97%)	449 (94%)	26 (6%)	18	33
2	B	480/488 (98%)	462 (96%)	18 (4%)	28	49
All	All	955/976 (98%)	911 (95%)	44 (5%)	23	41

5 of 44 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	232	HIS
2	B	347	GLU
2	B	238	LEU
2	B	298	LEU
2	B	385	TYR

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

Mol	Chain	Res	Type
1	A	400	GLN
2	B	581	HIS

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 ⓘ

18 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	#$|Z| > 2$
3	NAG	C	1	1,3	14,14,15	0.42	0	17,19,21	1.24	1 (5%)
3	NDG	C	2	3	14,14,15	0.55	0	17,19,21	1.61	4 (23%)
4	NAG	D	1	1,4	14,14,15	1.81	1 (7%)	17,19,21	2.19	3 (17%)
4	NAG	D	2	4	14,14,15	0.40	0	17,19,21	1.34	3 (17%)
4	BMA	D	3	4	11,11,12	0.56	0	15,15,17	1.44	2 (13%)
5	NAG	E	1	1,5	14,14,15	0.60	0	17,19,21	1.32	2 (11%)
5	NDG	E	2	5	14,14,15	0.65	1 (7%)	17,19,21	1.99	3 (17%)
5	BMA	E	3	5	11,11,12	0.59	0	15,15,17	0.89	1 (6%)
5	MAN	E	4	5	11,11,12	0.53	0	15,15,17	1.58	2 (13%)
5	MAN	E	5	5	11,11,12	0.60	0	15,15,17	1.45	2 (13%)
3	NAG	F	1	2,3	14,14,15	0.45	0	17,19,21	0.81	0
3	NDG	F	2	3	14,14,15	0.48	0	17,19,21	1.04	1 (5%)
6	NAG	G	1	2,6	14,14,15	0.72	0	17,19,21	1.72	4 (23%)
6	NAG	G	2	6	14,14,15	0.50	0	17,19,21	1.01	1 (5%)
6	MAN	G	3	6	11,11,12	0.54	0	15,15,17	1.04	1 (6%)
7	NAG	H	1	7,2	14,14,15	0.50	0	17,19,21	1.20	1 (5%)
7	NDG	H	2	7	14,14,15	0.66	0	17,19,21	1.91	5 (29%)
7	BMA	H	3	7	11,11,12	0.58	0	15,15,17	0.93	1 (6%)

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.

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	NAG	C	1	1,3	1/1/5/7	0/6/23/26	0/1/1/1
3	NDG	C	2	3	-	1/6/23/26	0/1/1/1
4	NAG	D	1	1,4	-	2/6/23/26	0/1/1/1
4	NAG	D	2	4	-	0/6/23/26	0/1/1/1
4	BMA	D	3	4	-	0/2/19/22	0/1/1/1
5	NAG	E	1	1,5	-	0/6/23/26	0/1/1/1
5	NDG	E	2	5	-	2/6/23/26	0/1/1/1
5	BMA	E	3	5	-	2/2/19/22	0/1/1/1
5	MAN	E	4	5	-	0/2/19/22	0/1/1/1
5	MAN	E	5	5	-	0/2/19/22	0/1/1/1
3	NAG	F	1	2,3	-	1/6/23/26	0/1/1/1
3	NDG	F	2	3	-	0/6/23/26	0/1/1/1
6	NAG	G	1	2,6	-	2/6/23/26	0/1/1/1
6	NAG	G	2	6	-	0/6/23/26	0/1/1/1
6	MAN	G	3	6	-	0/2/19/22	0/1/1/1
7	NAG	H	1	7,2	-	0/6/23/26	0/1/1/1
7	NDG	H	2	7	-	1/6/23/26	0/1/1/1
7	BMA	H	3	7	-	1/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1	NAG	O5-C1	-6.50	1.32	1.43
5	E	2	NDG	C1-C2	2.11	1.55	1.52

The worst 5 of 37 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	E	2	NDG	C1-O5-C5	6.52	120.92	112.19
4	D	1	NAG	C1-O5-C5	-5.90	104.28	112.19
4	D	1	NAG	O5-C1-C2	-5.02	103.53	111.29
5	E	4	MAN	C1-O5-C5	4.75	118.55	112.19
6	G	1	NAG	C4-C3-C2	4.69	117.89	111.02

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	C	1	NAG	C1

5 of 12 torsion outliers are listed below:

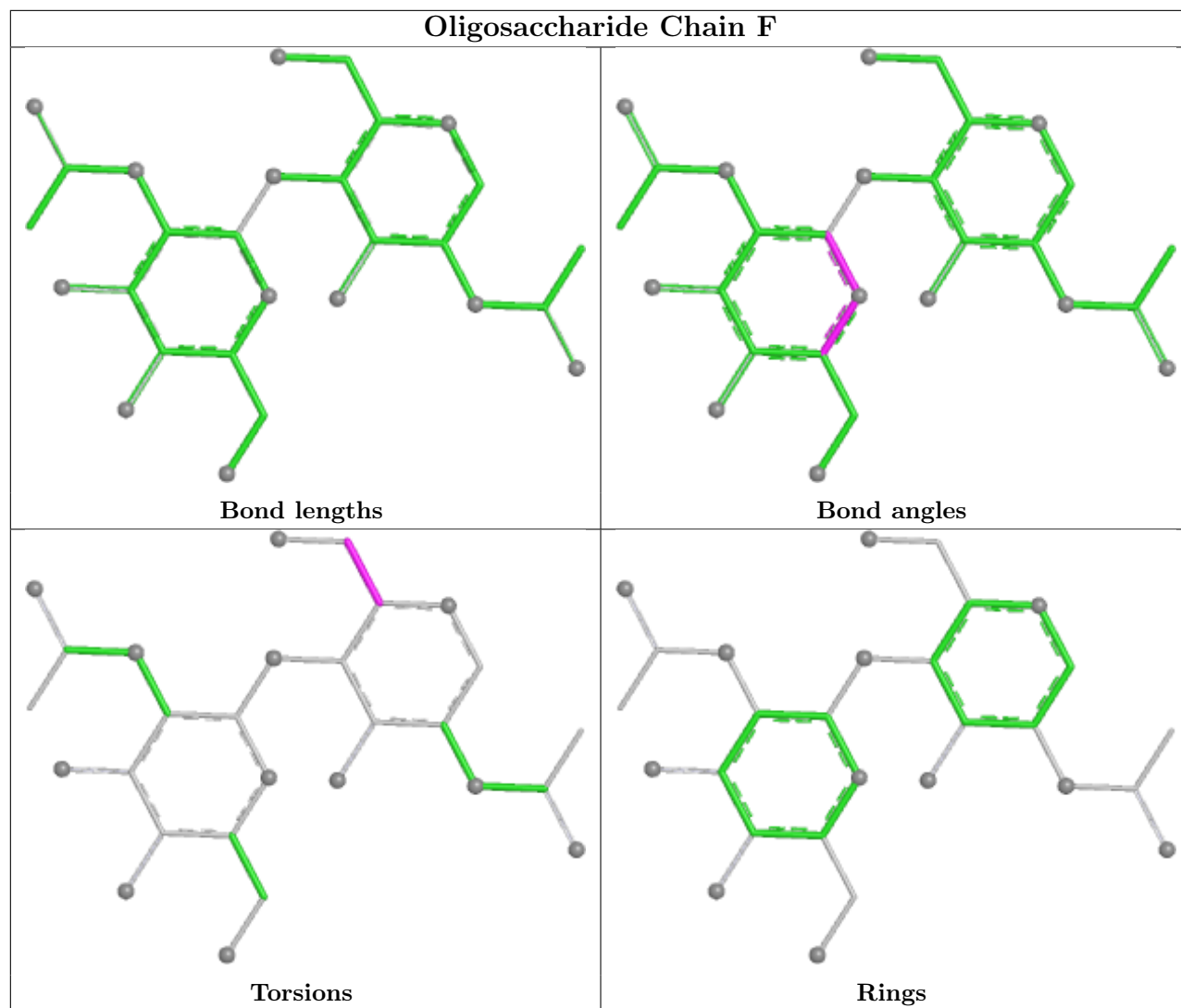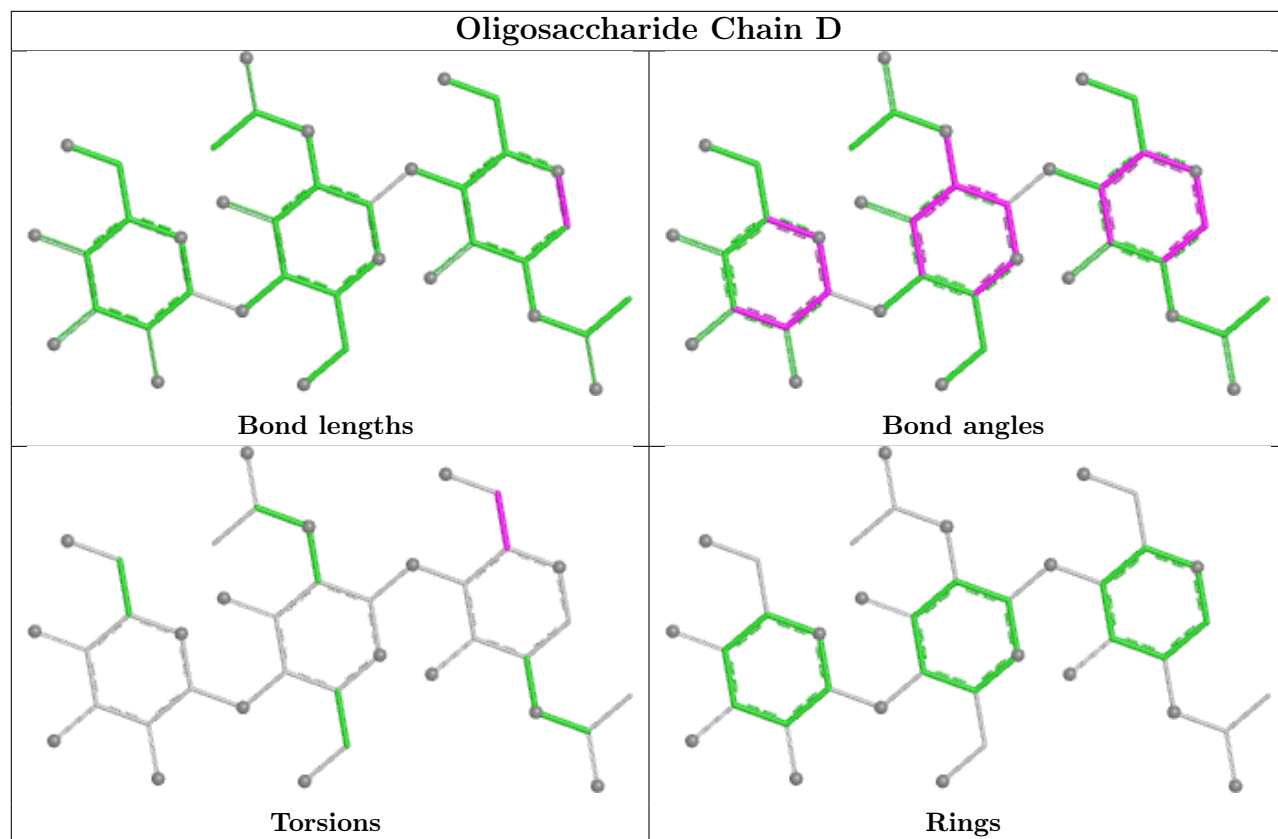| Mol	Chain	Res	Type	Atoms
5	E	2	NDG	C3-C2-N2-C7
4	D	1	NAG	O5-C5-C6-O6
5	E	3	BMA	O5-C5-C6-O6
7	H	3	BMA	O5-C5-C6-O6
4	D	1	NAG	C4-C5-C6-O6

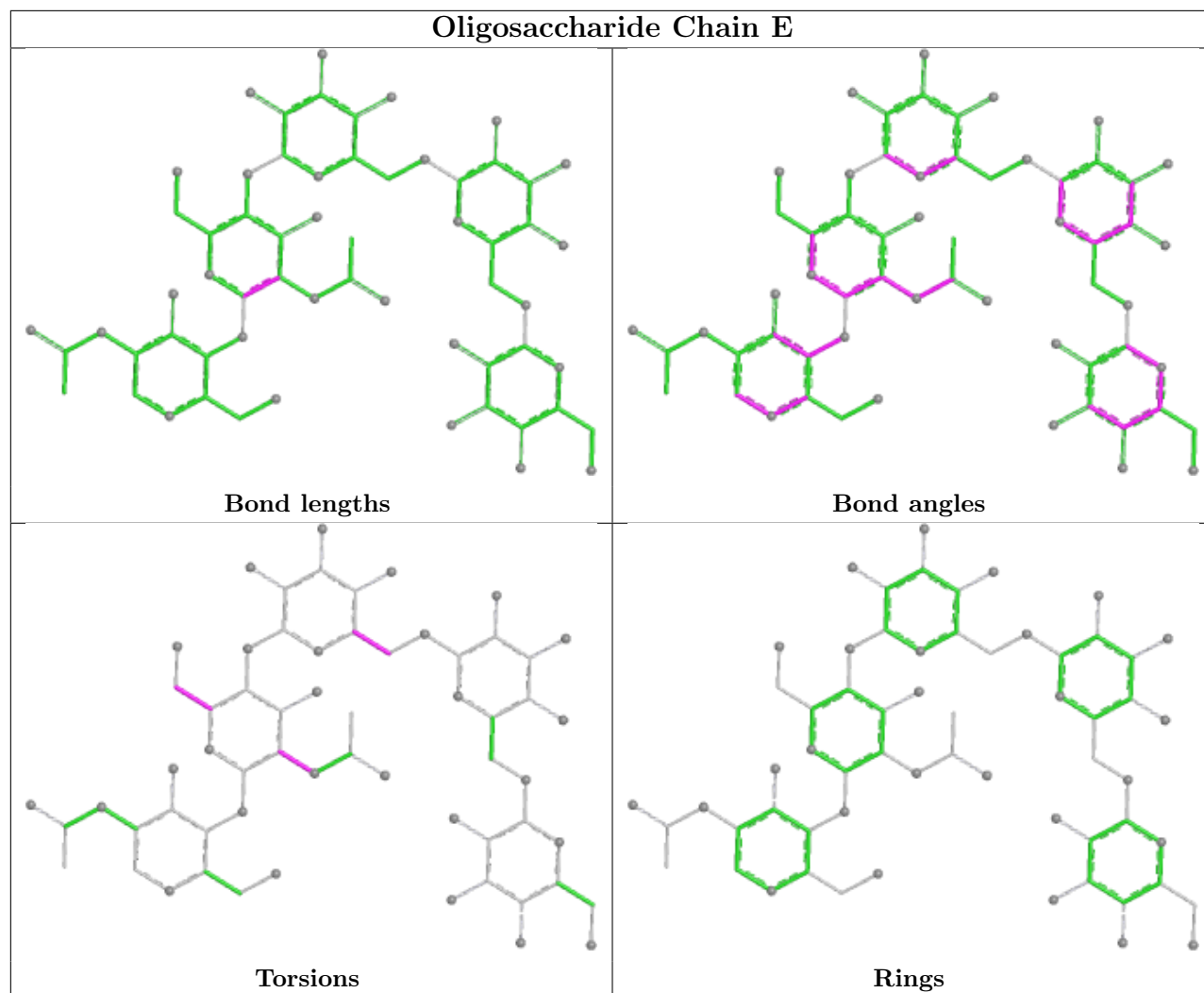There are no ring outliers.

1 monomer is involved in 1 short contact:

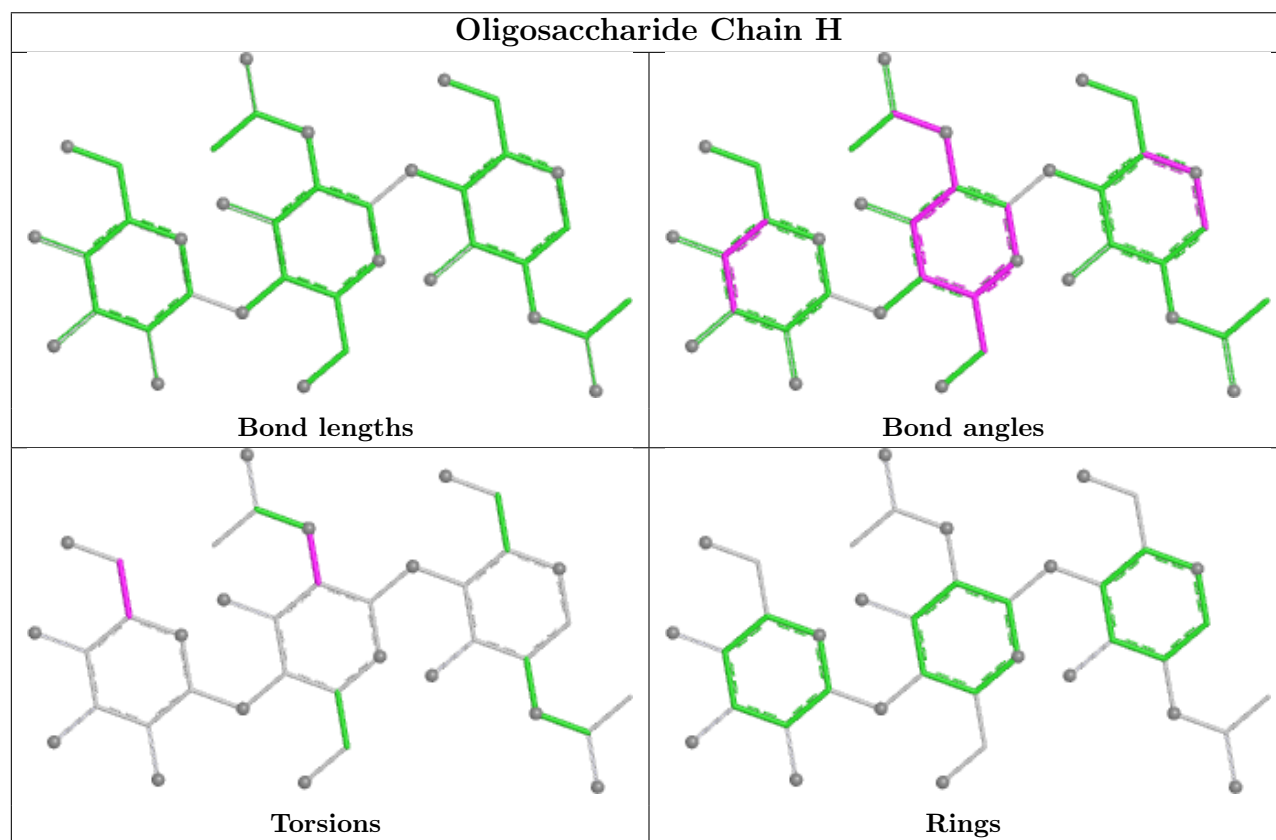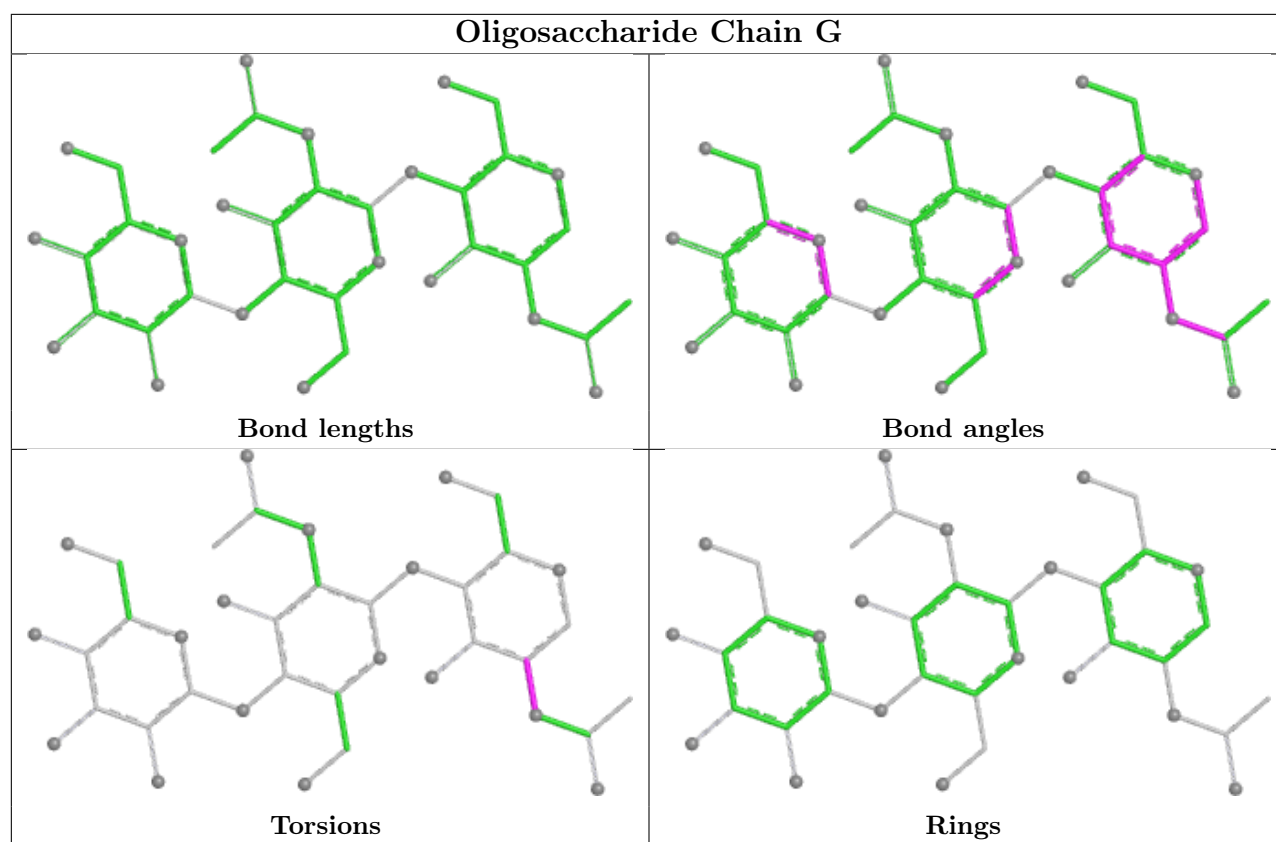| Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	H	2	NDG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain C

Bond lengths　　　　Bond angles

Torsions　　　　Rings

Oligosaccharide Chain F

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain D

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain E

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain G

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain H

Bond lengths

Bond angles

Torsions

Rings

5.6 Ligand geometry ⓘ

6 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
10	BOG	A	803	-	20,20,20	0.75	0	25,25,25	1.83	4 (16%)
9	FLP	A	802	-	18,19,19	1.09	1 (5%)	22,26,26	2.04	2 (9%)
8	HEM	A	801	1,11	42,50,50	2.00	7 (16%)	46,82,82	1.53	7 (15%)
10	BOG	B	602	-	13,13,20	0.86	0	18,18,25	1.71	3 (16%)
10	BOG	B	603	-	12,12,20	0.97	0	17,17,25	1.74	4 (23%)
8	HEM	B	601	2,11	42,50,50	1.98	7 (16%)	46,82,82	1.57	7 (15%)

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
10	BOG	A	803	-	-	7/11/31/31	0/1/1/1
9	FLP	A	802	-	1/1/2/2	0/8/12/12	0/2/2/2
8	HEM	A	801	1,11	-	5/12/54/54	-
10	BOG	B	602	-	-	3/4/24/31	0/1/1/1
10	BOG	B	603	-	-	2/2/22/31	0/1/1/1
8	HEM	B	601	2,11	-	4/12/54/54	-

The worst 5 of 15 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
8	A	801	HEM	C3D-C2D	8.11	1.54	1.36
8	B	601	HEM	C3D-C2D	8.01	1.54	1.36
8	A	801	HEM	C3C-C2C	-4.68	1.34	1.40
8	B	601	HEM	C3C-C2C	-4.34	1.34	1.40
8	A	801	HEM	C3C-CAC	3.39	1.55	1.47

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
9	A	802	FLP	C10-C11-C6	-7.58	120.11	124.15
10	A	803	BOG	C1'-O1-C1	-5.48	104.32	113.68
8	B	601	HEM	C4D-ND-C1D	5.34	111.54	105.21
8	A	801	HEM	C4D-ND-C1D	5.31	111.49	105.21
10	B	603	BOG	O5-C1-C2	-5.10	101.32	110.30

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
9	A	802	FLP	C12

5 of 21 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	A	801	HEM	C2A-CAA-CBA-CGA
10	B	602	BOG	O5-C1-O1-C1'
10	B	602	BOG	C2-C1-O1-C1'
10	B	603	BOG	O5-C5-C6-O6
10	A	803	BOG	O5-C1-O1-C1'

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	A	803	BOG	1	0
8	A	801	HEM	1	0
8	B	601	HEM	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 then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

Ligand BOG A 803

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 801

Bond lengths

Bond angles

Torsions

Rings

Ligand BOG B 602

Bond lengths

Bond angles

Torsions

Rings

Ligand BOG B 603

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM B 601

Bond lengths

Bond angles

Torsions

Rings
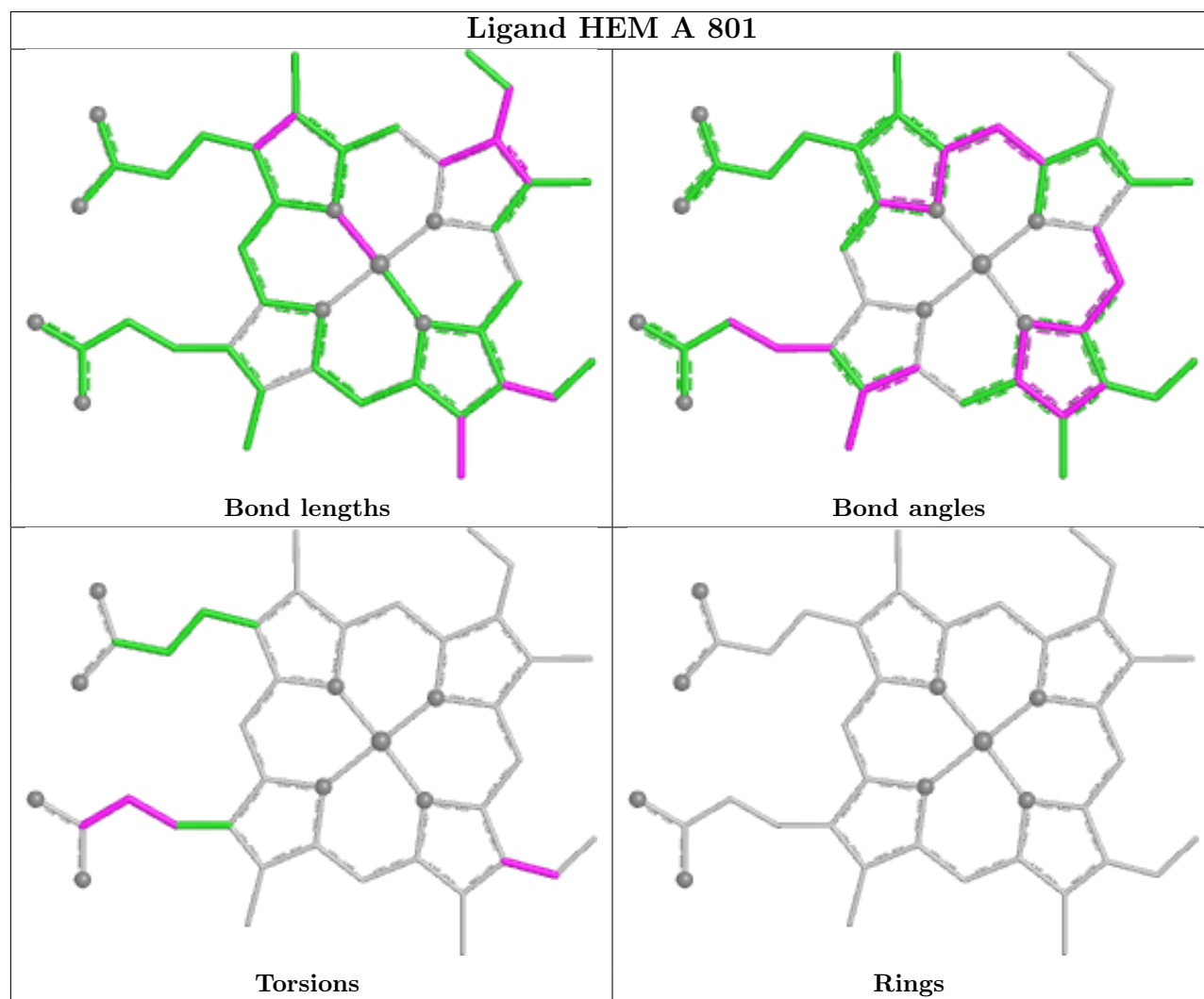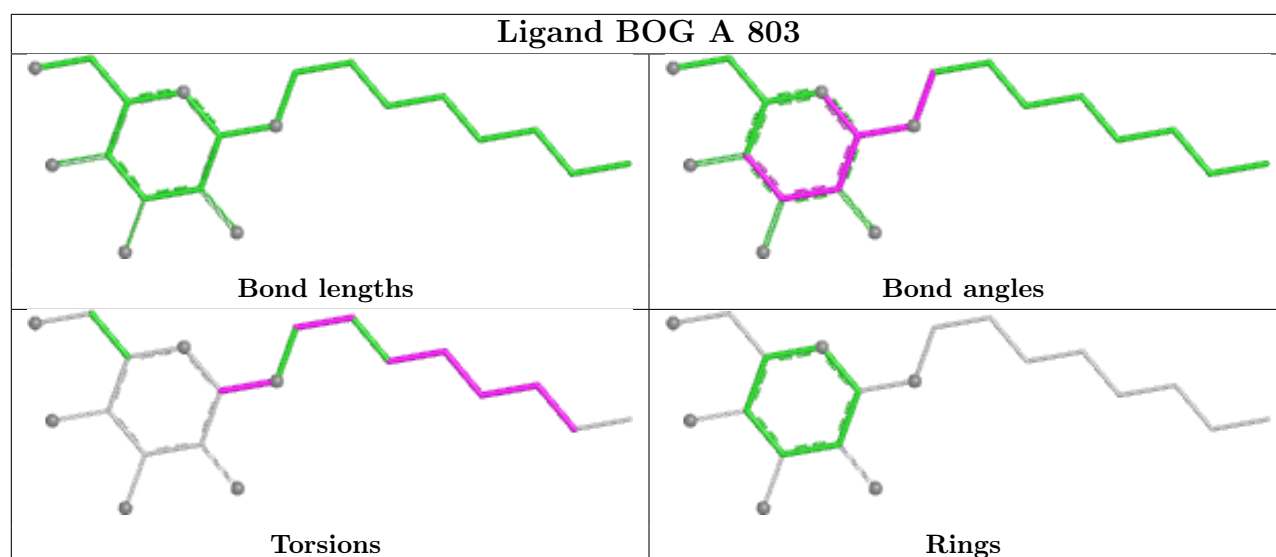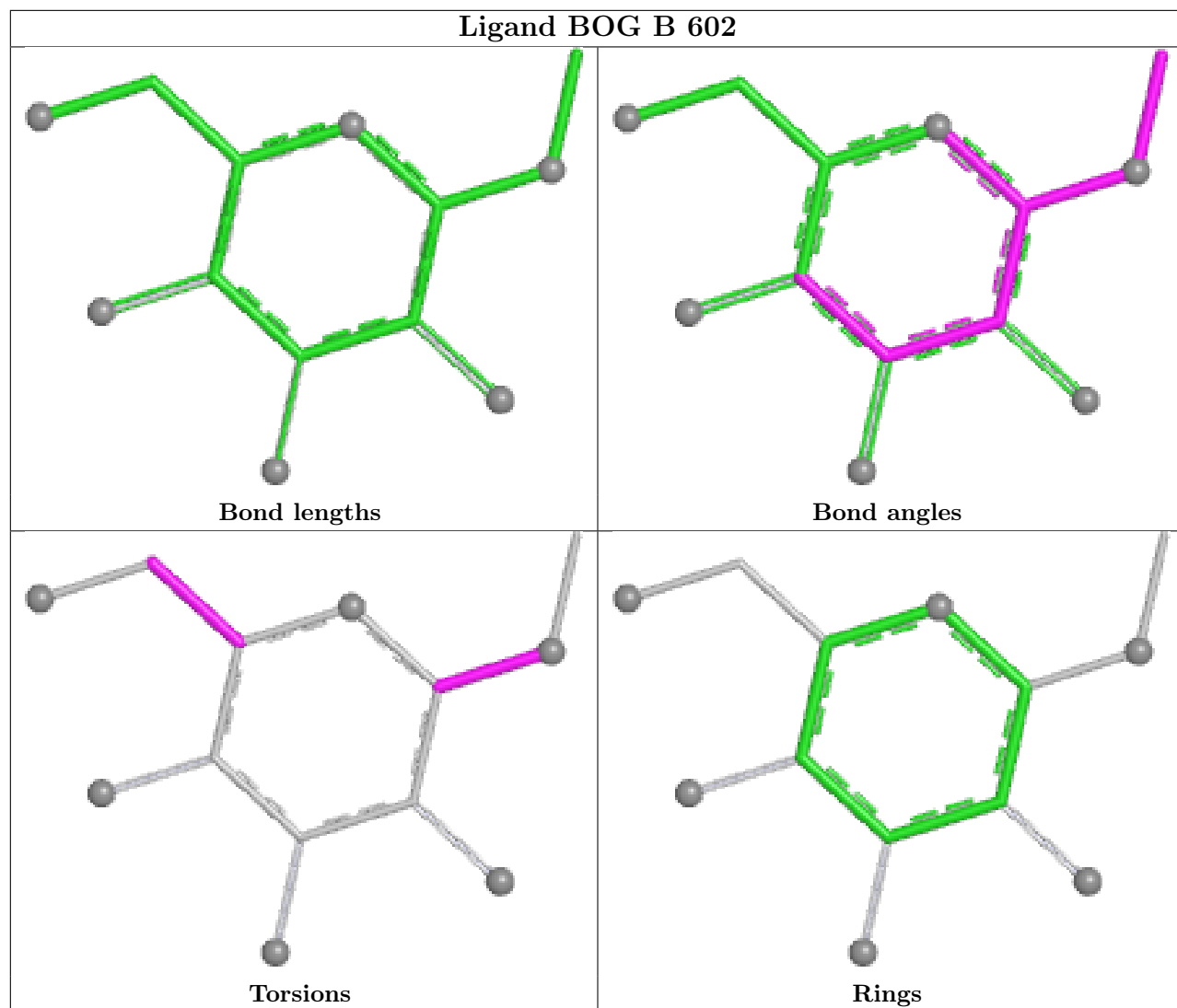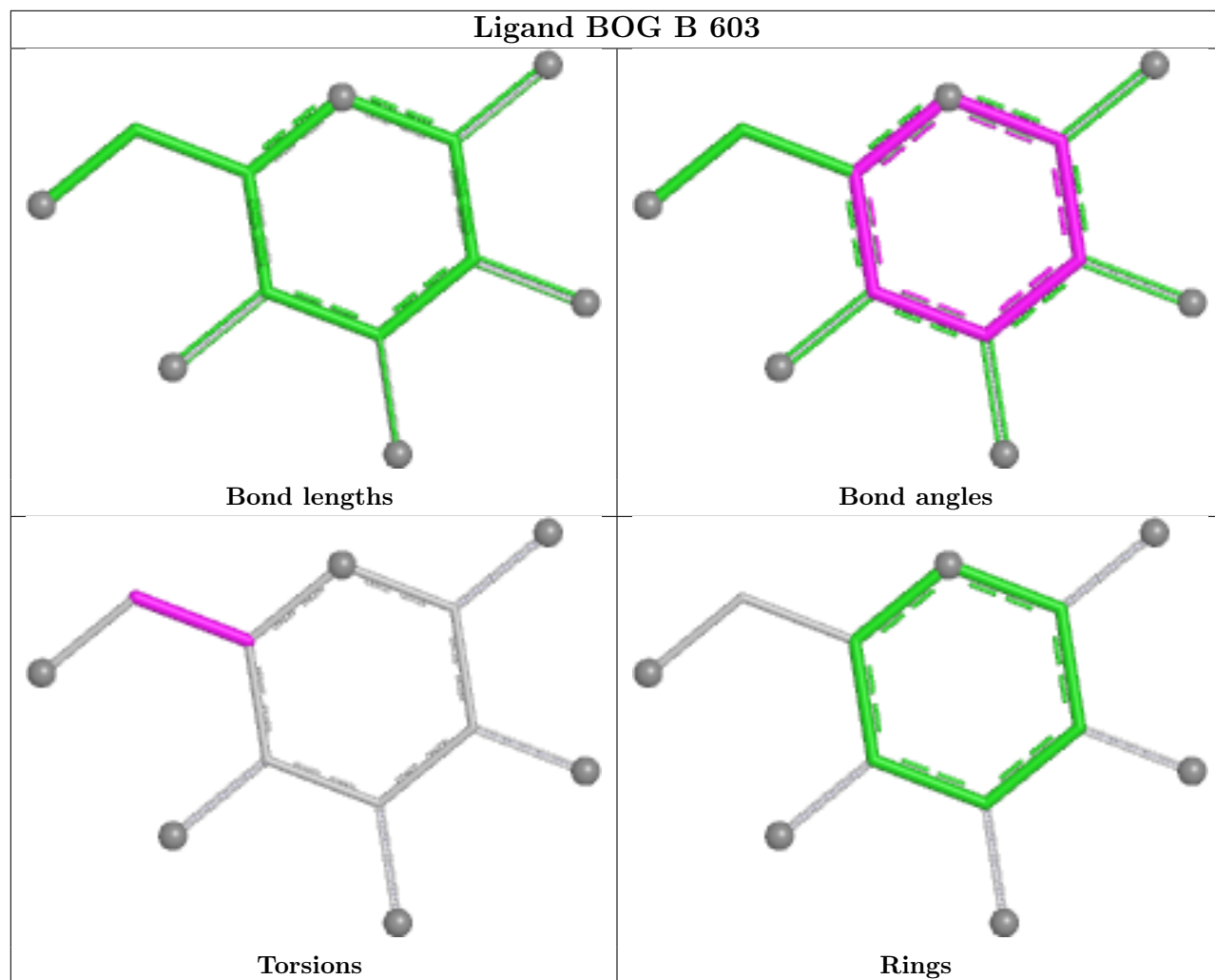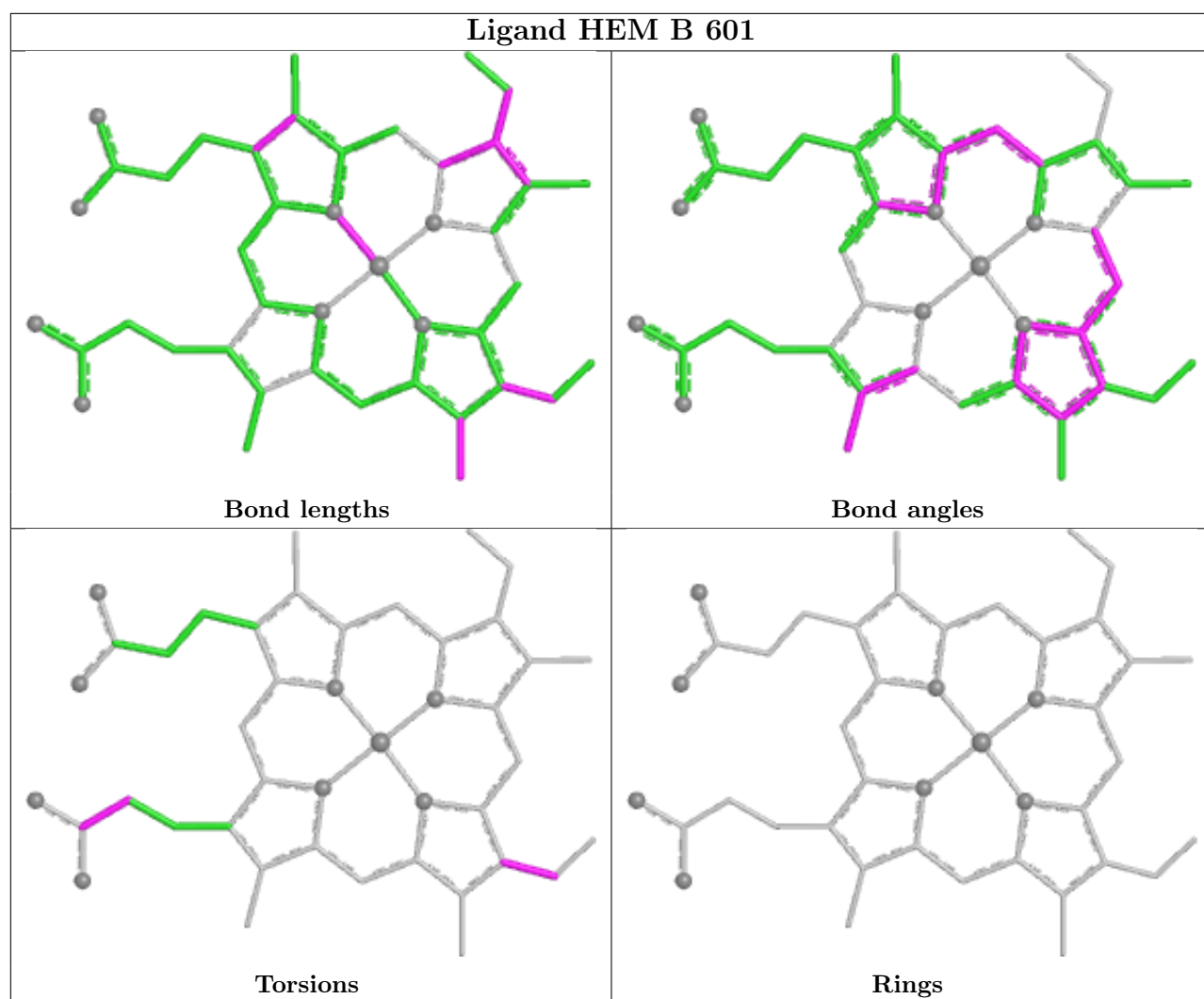
5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å²)	Q<0.9
1	A	553/553 (100%)	0.01	8 (1%)	73	75	43, 56, 71, 79	0
2	B	553/553 (100%)	0.06	8 (1%)	73	75	22, 58, 74, 81	8 (1%)
All	All	1106/1106 (100%)	0.03	16 (1%)	73	75	22, 56, 72, 81	8 (0%)

The worst 5 of 16 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	123[A]	LEU	7.1
2	B	124[A]	ILE	5.4
2	B	297	GLY	4.0
1	A	280	PRO	4.0
1	A	277	ARG	3.4

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

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

6.3 Carbohydrates ⓘ

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(Å²)	Q<0.9
5	MAN	E	4	11/12	0.43	0.17	89,91,92,94	0
6	MAN	G	3	11/12	0.48	0.14	79,80,80,80	0
7	BMA	H	3	11/12	0.68	0.12	69,70,70,70	0
5	MAN	E	5	11/12	0.72	0.14	95,95,96,96	0
3	NDG	F	2	14/15	0.74	0.17	74,76,77,77	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	NDG	C	2	14/15	0.78	0.14	75,77,79,79	0
4	BMA	D	3	11/12	0.80	0.12	77,78,79,79	0
5	BMA	E	3	11/12	0.80	0.11	77,80,84,87	0
6	NAG	G	1	14/15	0.81	0.13	56,59,63,67	0
3	NAG	C	1	14/15	0.82	0.12	60,66,68,72	0
6	NAG	G	2	14/15	0.84	0.12	71,73,75,77	0
7	NDG	H	2	14/15	0.85	0.12	61,64,65,68	0
4	NAG	D	2	14/15	0.86	0.11	69,71,73,75	0
3	NAG	F	1	14/15	0.88	0.12	59,65,67,71	0
5	NDG	E	2	14/15	0.89	0.13	64,67,69,73	0
4	NAG	D	1	14/15	0.90	0.10	56,60,62,66	0
5	NAG	E	1	14/15	0.92	0.09	46,49,53,58	0
7	NAG	H	1	14/15	0.94	0.09	45,48,51,56	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 C:

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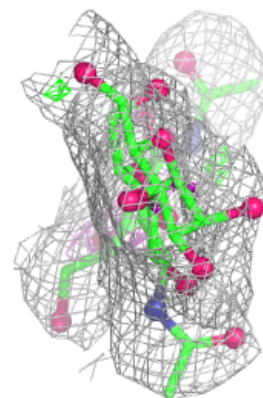mF_o-DF_c (at 3 rmsd) in purple (negative)
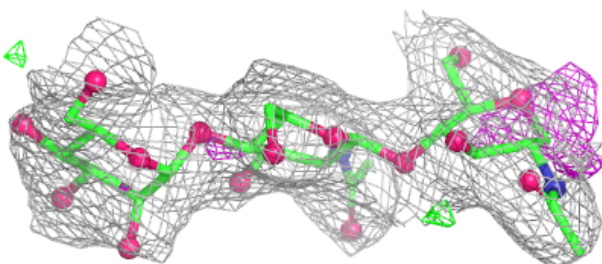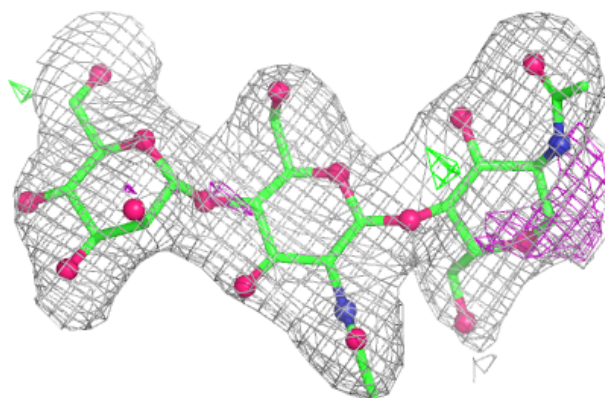and green (positive)
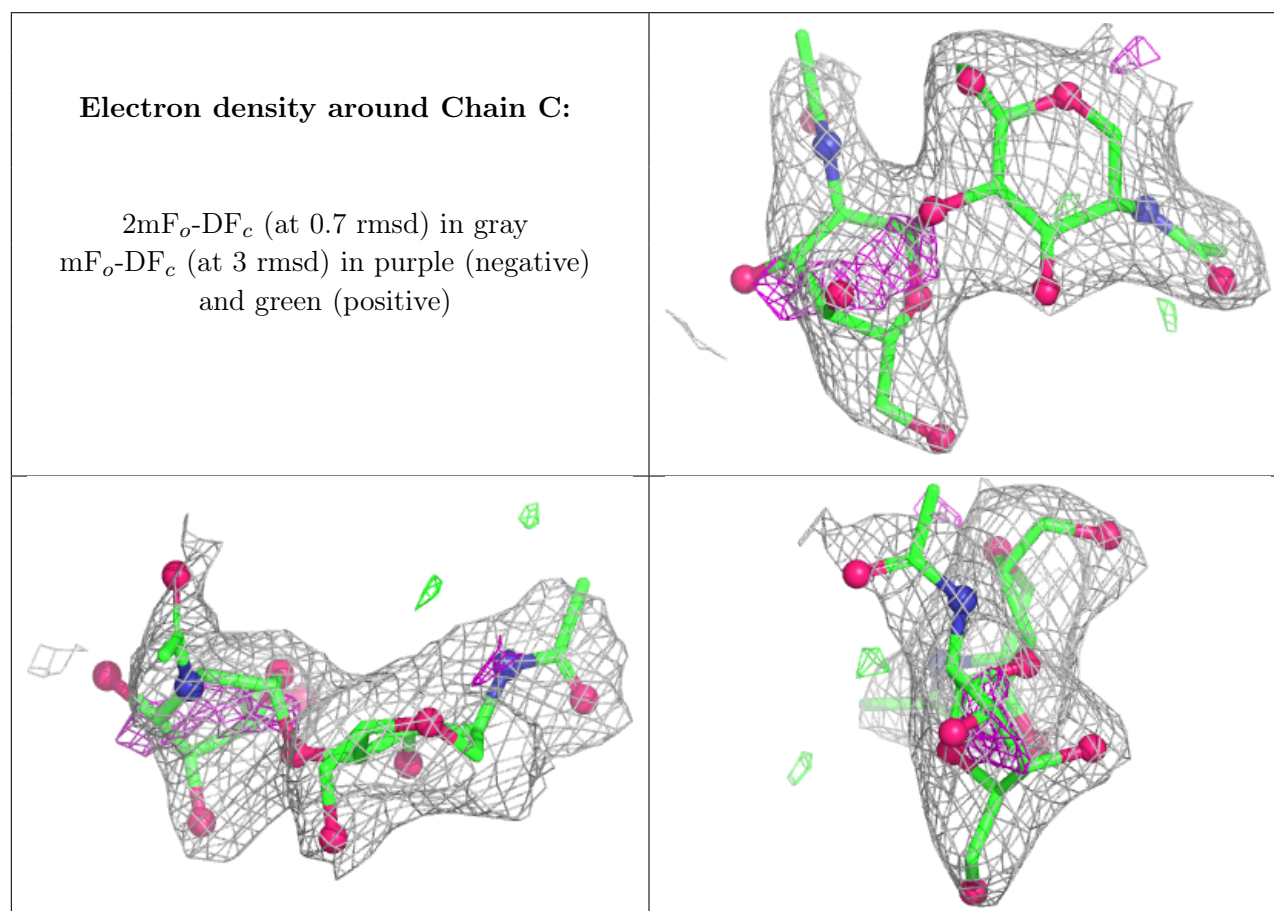
Electron density around Chain F:

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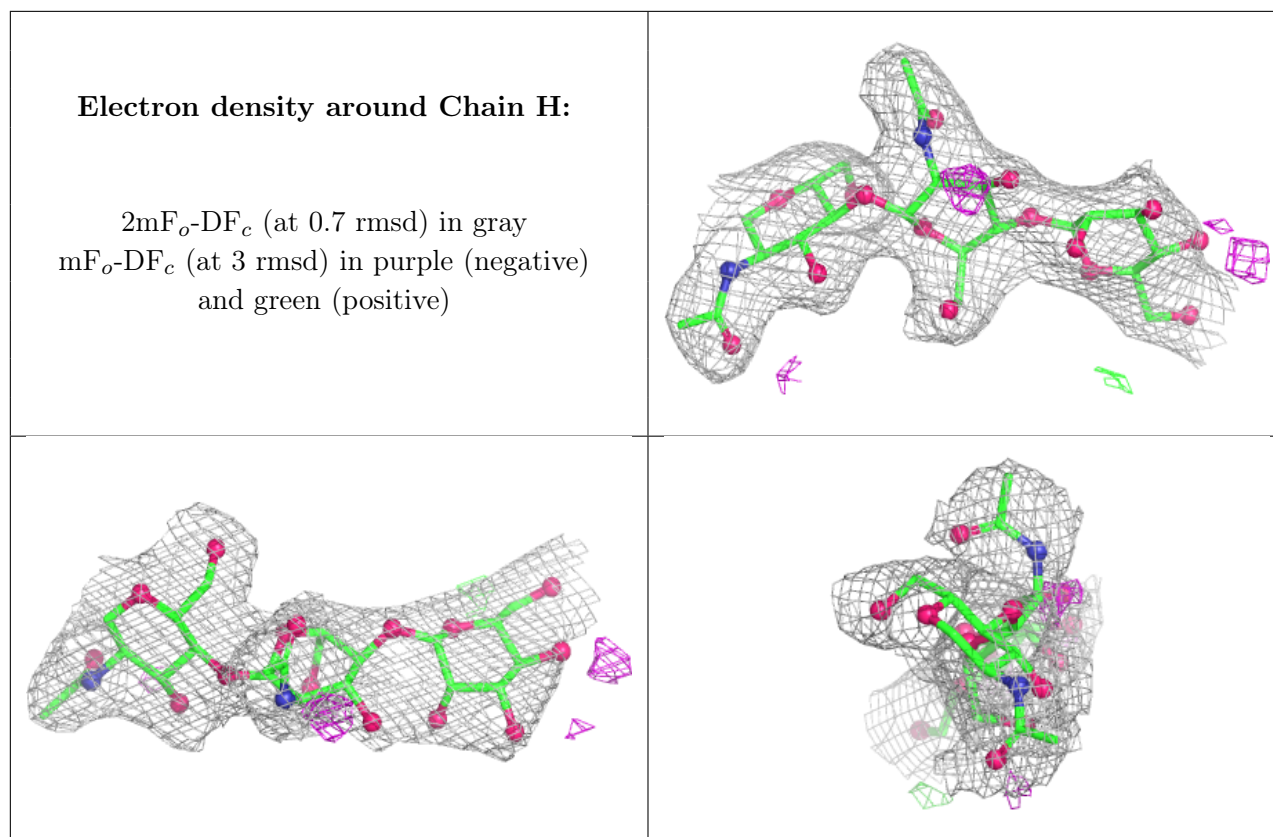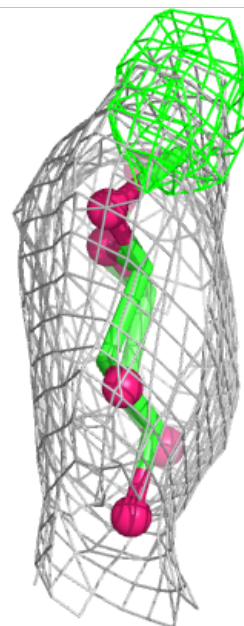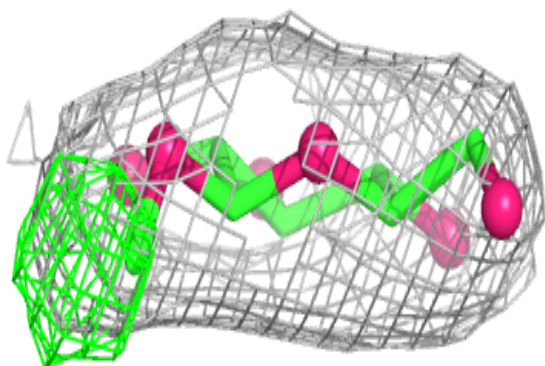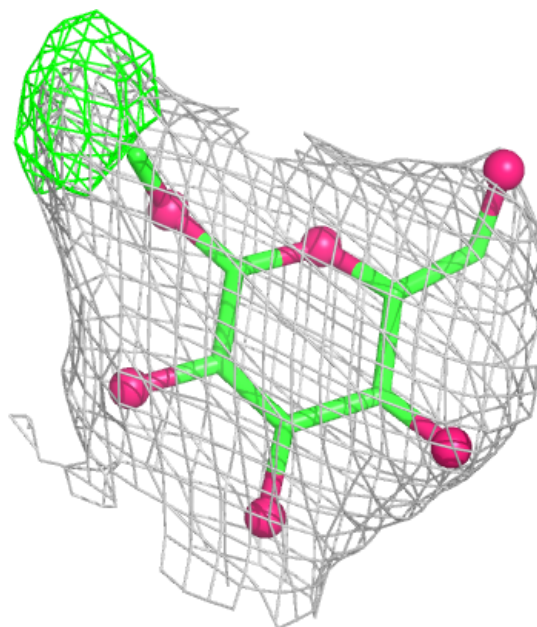mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
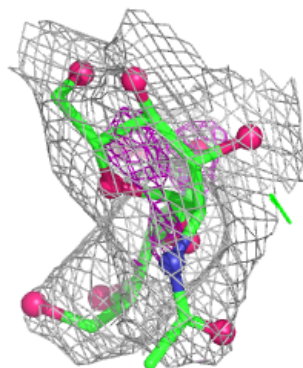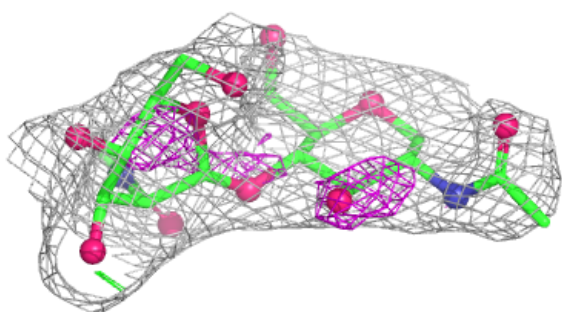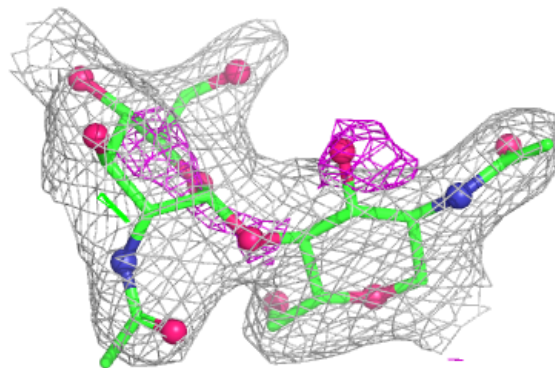
Electron density around Chain D:

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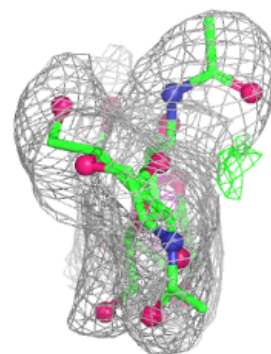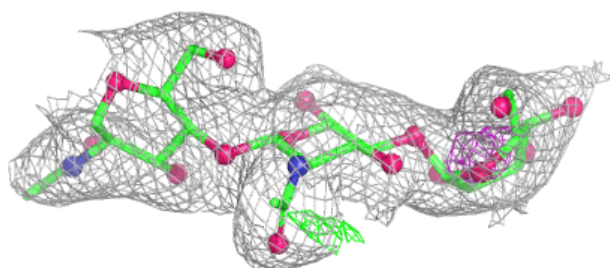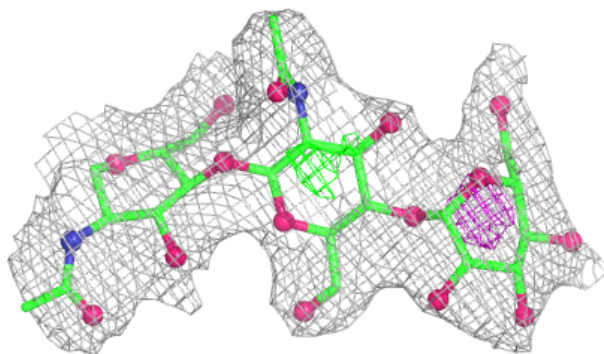
Electron density around Chain E:

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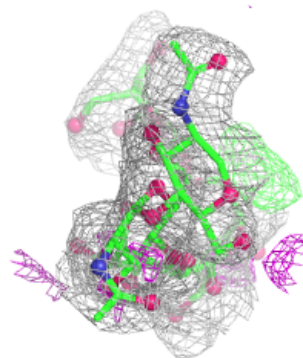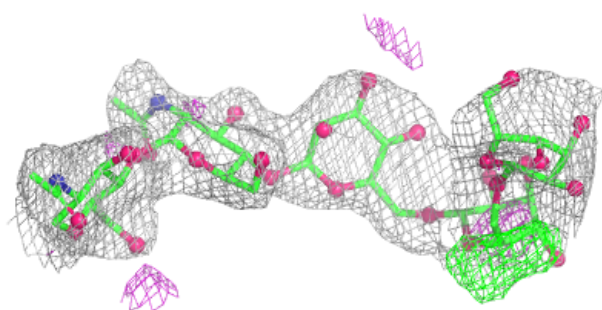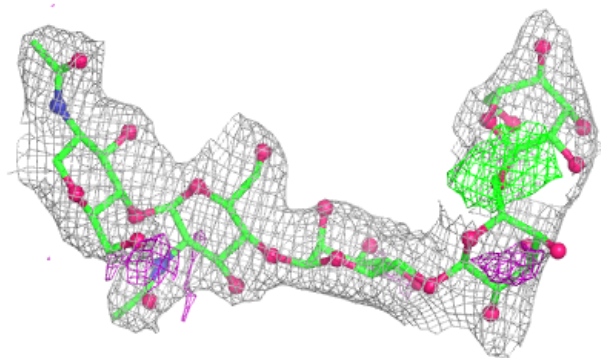
Electron density around Chain G:

$2mF_o$-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 H:

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

6.4 Ligands ⓘ

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
10	BOG	B	602	13/20	0.80	0.14	94,94,94,95	0
10	BOG	B	603	12/20	0.86	0.15	87,88,88,89	0
10	BOG	A	803	20/20	0.93	0.14	78,82,82,83	0
9	FLP	A	802	18/18	0.96	0.10	53,55,57,58	0
8	HEM	A	801	43/43	0.97	0.09	52,56,62,66	0
8	HEM	B	601	43/43	0.97	0.10	54,58,64,66	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.

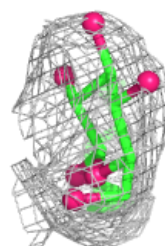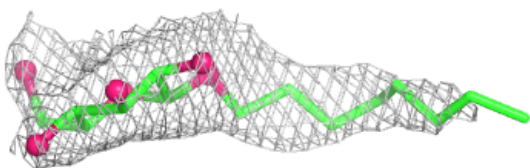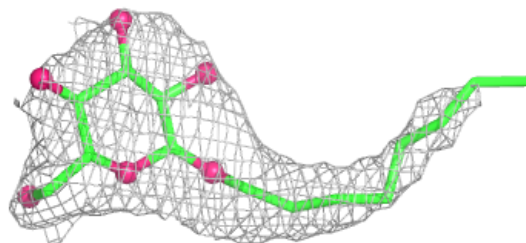**Electron density around BOG B 602:**

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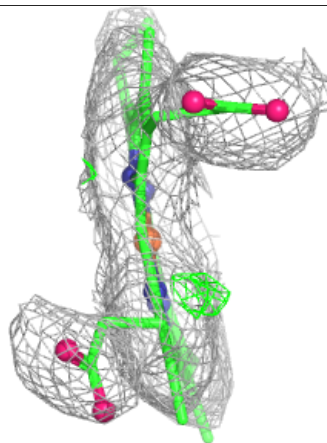mF_o-DF_c (at 3 rmsd) in purple (negative)
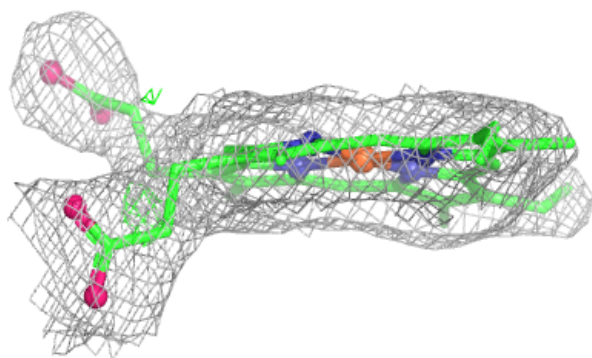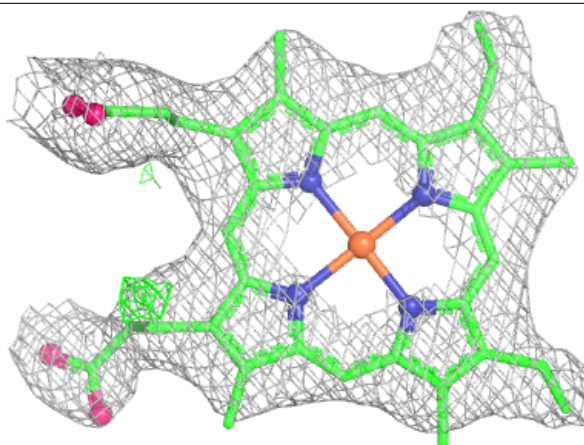and green (positive)

Electron density around BOG B 603:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
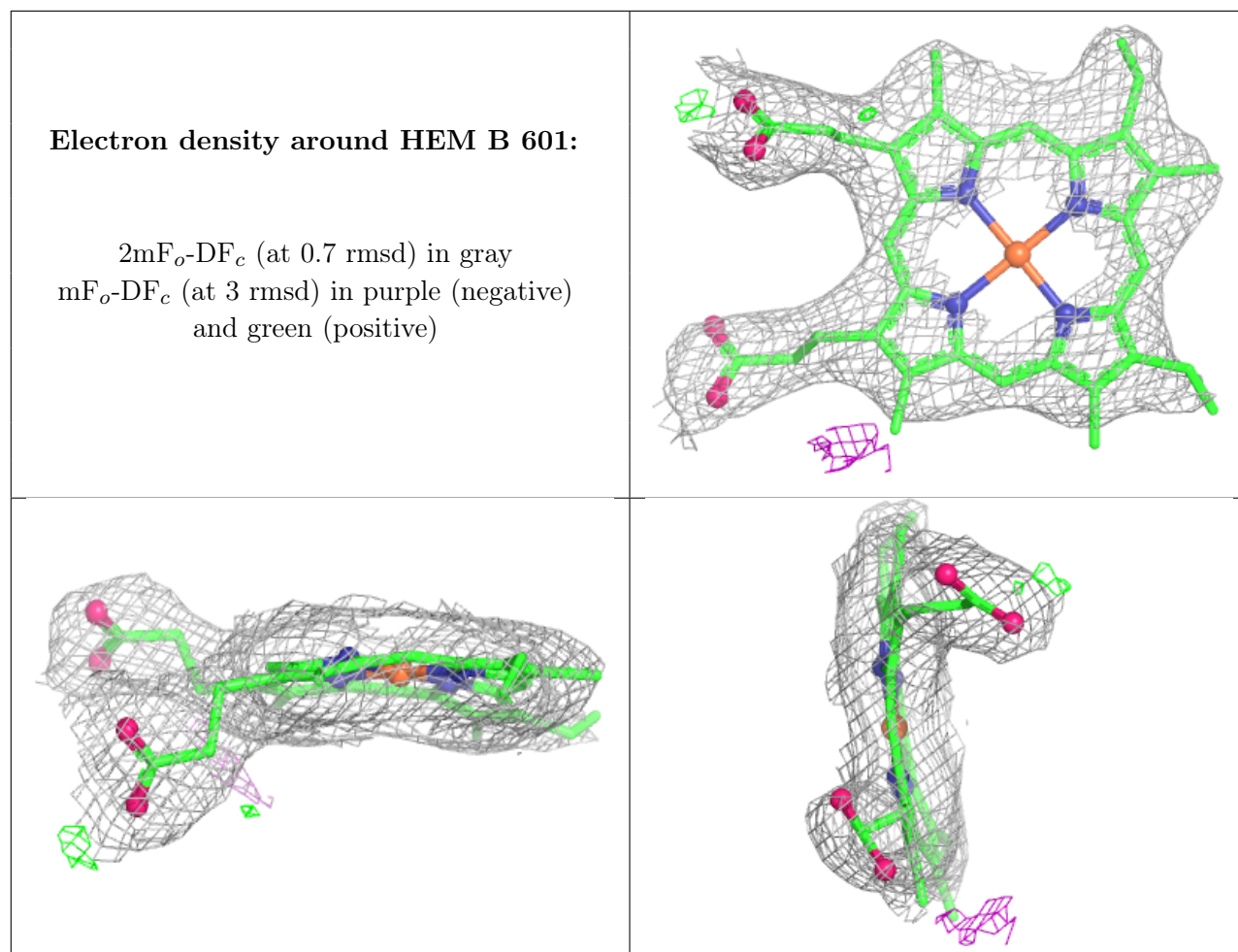and green (positive)
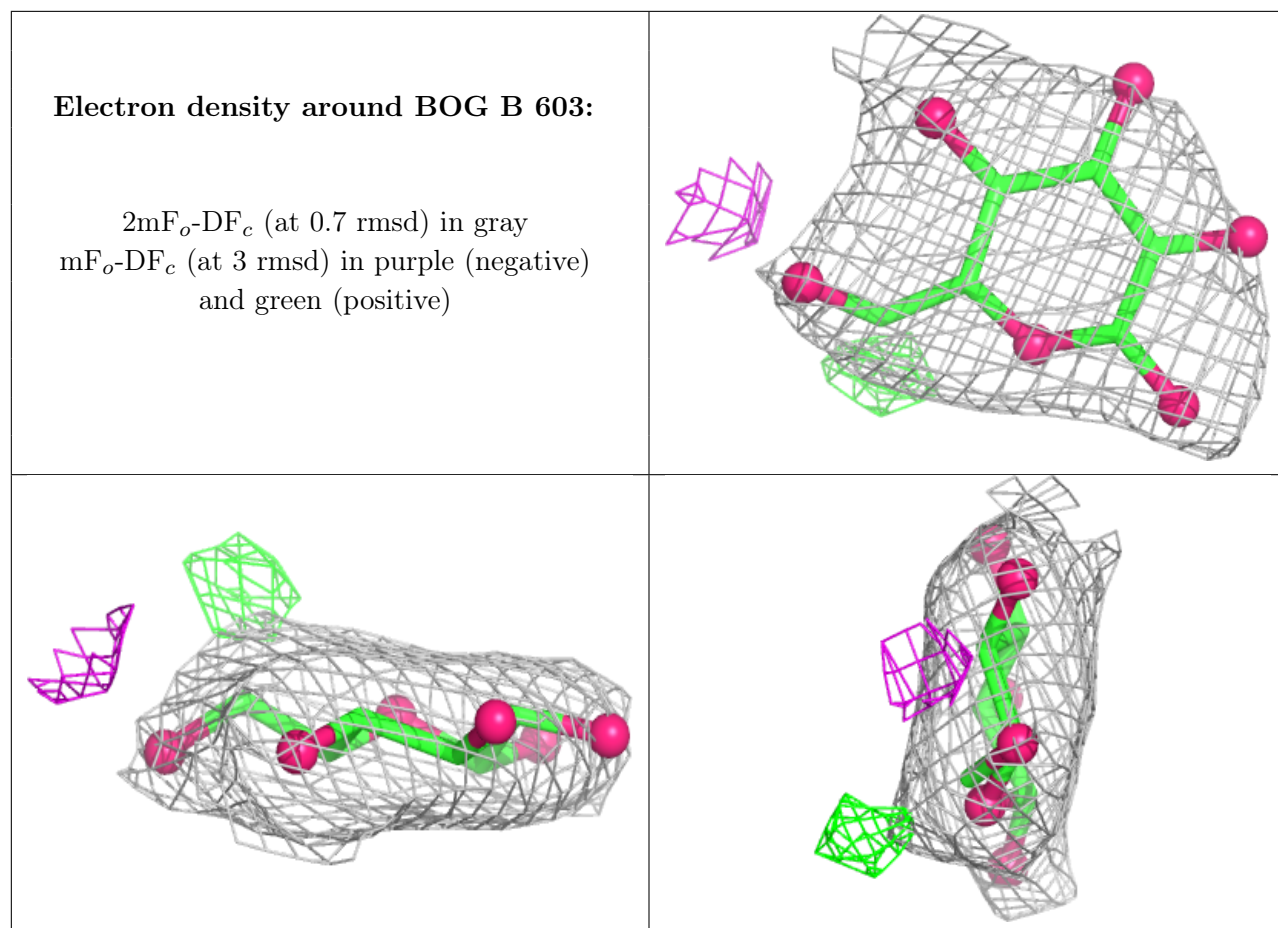
Electron density around BOG A 803:

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

Electron density around HEM A 801:

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

Electron density around HEM B 601:

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

6.5 Other polymers ⓘ

There are no such residues in this entry.