wwPDB X-ray Structure Validation Summary Report (i)

Aug 28, 2023 – 06:09 AM EDT

PDB ID	:	3KK6
Title	:	Crystal Structure of Cyclooxygenase-1 in complex with celecoxib
Authors	:	Sidhu, R.S.
Deposited on	:	2009-11-04
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	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.35
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.35

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 2.75 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.
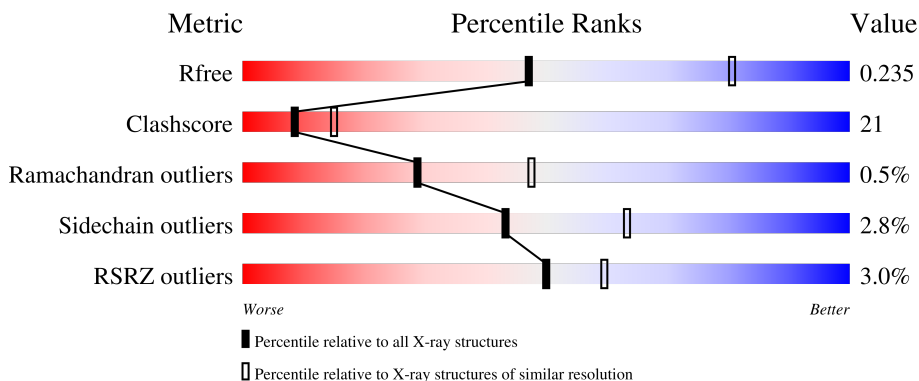
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	1235 (2.78-2.74)
Clashscore	141614	1277 (2.78-2.74)
Ramachandran outliers	138981	1257 (2.78-2.74)
Sidechain outliers	138945	1257 (2.78-2.74)
RSRZ outliers	127900	1207 (2.78-2.74)

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	2% 71% 27% ·
1	B	553	4% 68% 29% ·
2	C	5	100%
3	D	2	100%
3	E	2	100%

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Mol	Chain	Length	Quality of chain
3	G	2	100%
4	F	4	100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	NAG	C	1	-	-	X	-
2	MAN	C	3	-	-	X	-
2	BMA	C	4	-	-	X	-
2	MAN	C	5	-	-	X	-
3	NAG	G	1	-	-	X	-
6	CEL	A	701	-	-	X	-
7	BOG	B	1751	-	-	X	-
7	BOG	B	1752	X	-	-	-
8	FLC	A	900	-	X	-	-

2 Entry composition ⓘ

There are 9 unique types of molecules in this entry. The entry contains 18050 atoms, of which 8678 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 8497	C 2840	H 4120	N 731	O 778	S 28	4120	1	0
1	B	553	Total 8670	C 2899	H 4206	N 742	O 795	S 28	4219	12	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	92	LEU	MET	SEE REMARK 999	UNP P05979
B	92	LEU	MET	SEE REMARK 999	UNP P05979

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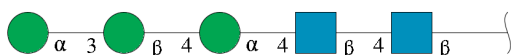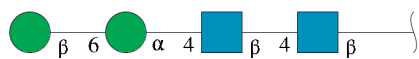

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	5	Total 94	C 34	H 33	N 2	O 25	33	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-alpha-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.
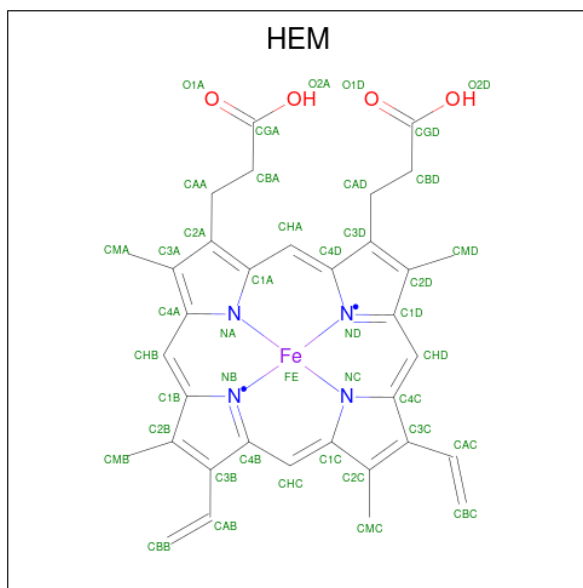
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	D	2	Total 53	C 16	H 25	N 2	O 10	25	0	0
3	E	2	Total 53	C 16	H 25	N 2	O 10	25	0	0
3	G	2	Total 53	C 16	H 25	N 2	O 10	25	0	0

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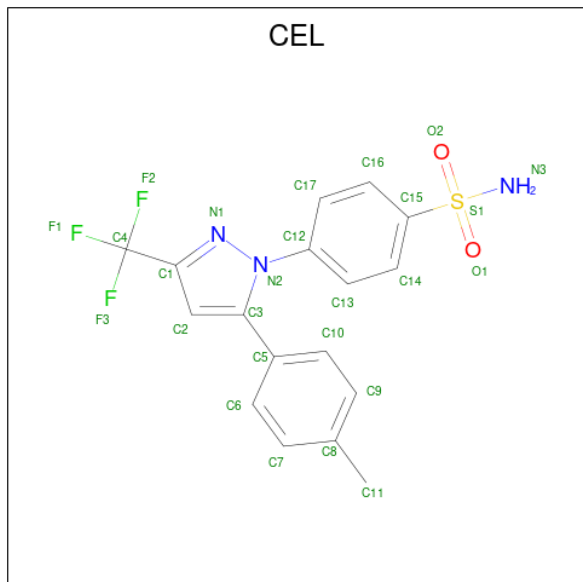

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
4	F	4	Total 90	C 28	H 40	N 2	O 20	40	0	0

- Molecule 5 is PROTOPORPHYRIN IX CONTAINING FE (three-letter code: HEM) (formula: $C_{34}H_{32}FeN_4O_4$).

HEM

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
5	A	1	Total 73	C 34	Fe 1	H 30	N 4	O 4	30	0
5	B	1	Total 73	C 34	Fe 1	H 30	N 4	O 4	30	0

- Molecule 6 is 4-[5-(4-METHYLPHENYL)-3-(TRIFLUOROMETHYL)-1H-PYRAZOL-1-Y L]BENZENESULFONAMIDE (three-letter code: CEL) (formula: $C_{17}H_{14}F_3N_3O_2S$).
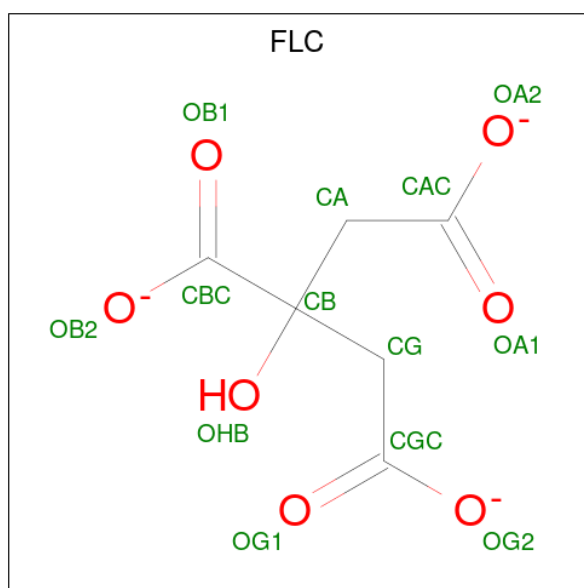
CEL

Mol	Chain	Residues	Atoms							ZeroOcc	AltConf
6	A	1	Total	C	F	H	N	O	S	14	0
			40	17	3	14	3	2	1		
6	B	1	Total	C	F	H	N	O	S	14	0
			40	17	3	14	3	2	1		

- Molecule 7 is octyl beta-D-glucopyranoside (three-letter code: BOG) (formula: $C_{14}H_{28}O_6$).

BOG
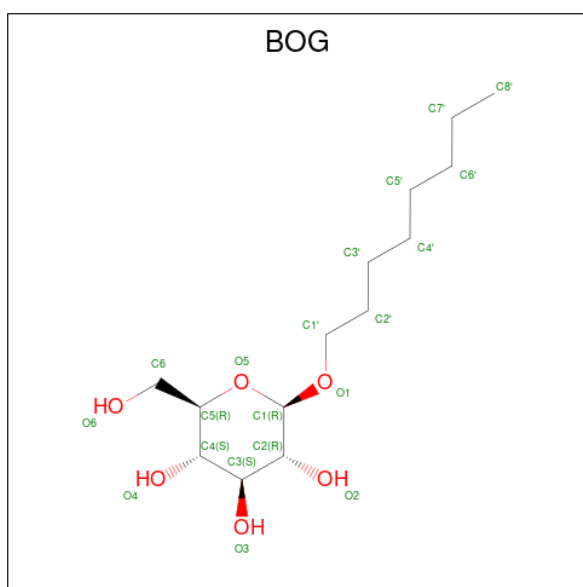
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
7	A	1	Total 47	C 14	H 27	O 6	30	0
7	A	1	Total 48	C 14	H 28	O 6	28	0
7	B	1	Total 48	C 14	H 28	O 6	28	0
7	B	1	Total 48	C 14	H 28	O 6	28	0

- Molecule 8 is CITRATE ANION (three-letter code: FLC) (formula: $C_6H_5O_7$).

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
8	A	1	Total 18	C 6	H 5	O 7	5	0

- Molecule 9 is water.

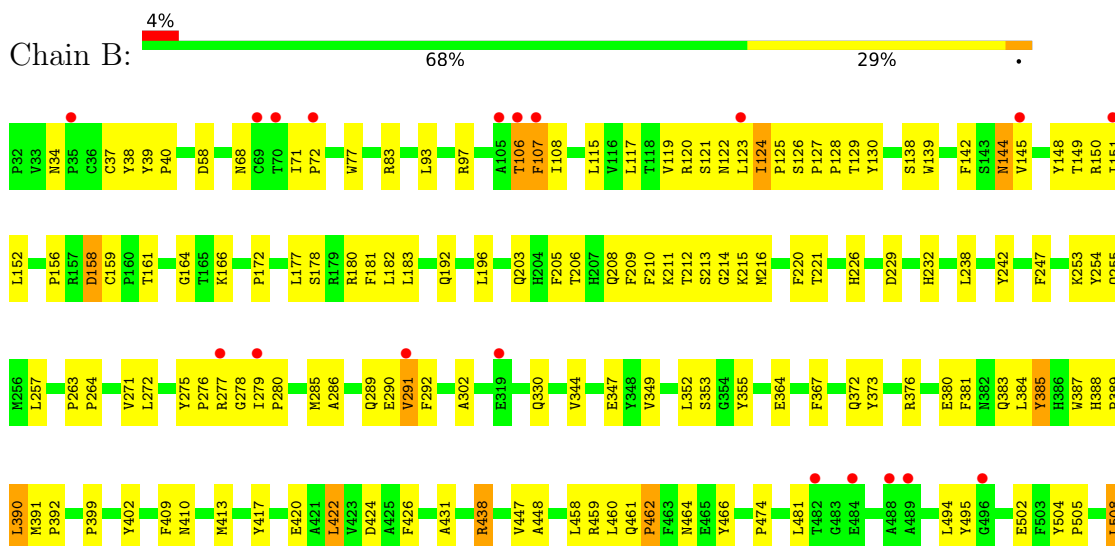| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	55	Total 55	O 55	0	0
9	B	50	Total 50	O 50	0	0

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.
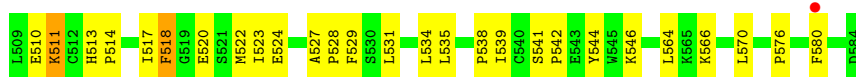
- Molecule 1: Prostaglandin G/H synthase 1

Chain A:

- Molecule 1: Prostaglandin G/H synthase 1

Chain B:

L509 E510 K511 C512 H513 P514 I517 F518 G519 E520 S521 M522 I523 E524 A527 P528 F529 S530 L531 L534 L535 P538 I539 C540 S541 P542 E543 Y544 W545 K546 L564 K565 K566 L570 P576 F580 D584
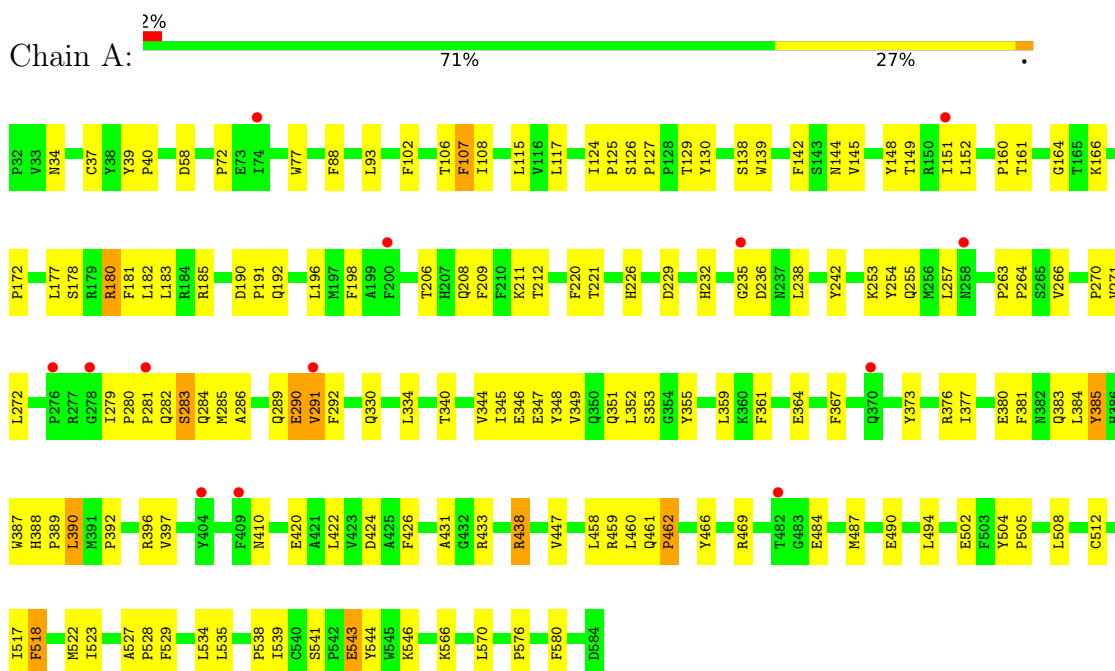
• Molecule 2: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose-(1-4)-alpha-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C: 100%

NAG1 NAG2 MAN3 BMA4 MAN5

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

Chain D: 100%

NAG1 NDG2

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

Chain E: 100%

NAG1 NDG2

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

Chain G: 100%

NAG1 NDG2

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

Chain F: 100%

NAG1 NAG2 MAN3 BMA4

4   Data and refinement statistics   ⓘ

Property	Value	Source
Space group	P 65	Depositor
Cell constants a, b, c, α, β, γ	181.03Å 181.03Å 102.70Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	41.41 – 2.75 46.58 – 2.75	Depositor EDS
% Data completeness (in resolution range)	97.4 (41.41-2.75) 97.4 (46.58-2.75)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.47 (at 2.77Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.207 , 0.242 0.203 , 0.235	Depositor DCC
R_{free} test set	2000 reflections (4.03%)	wwPDB-VP
Wilson B-factor (Å^2)	52.1	Xtriage
Anisotropy	0.102	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 52.9	EDS
L-test for twinning[2]	$< |L| > = 0.42, < L^2 > = 0.25$	Xtriage
Estimated twinning fraction	0.489 for h,-h-k,-l	Xtriage
Reported twinning fraction	0.501 for h,-h-k,-l	Depositor
Outliers	0 of 49651 reflections	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	18050	wwPDB-VP
Average B, all atoms (Å^2)	77.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.51% 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: HEM, BMA, NDG, FLC, MAN, NAG, BOG, CEL

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	0.45	2/4517 (0.0%)	0.55	6/6155 (0.1%)
1	B	0.44	0/4610	0.56	7/6287 (0.1%)
All	All	0.44	2/9127 (0.0%)	0.55	13/12442 (0.1%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	B	0	1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	543[A]	GLU	N-CA	5.09	1.56	1.46
1	A	543[B]	GLU	N-CA	5.09	1.56	1.46

The worst 5 of 13 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	459	ARG	NE-CZ-NH2	-12.75	113.92	120.30
1	A	459	ARG	NE-CZ-NH1	-12.53	114.03	120.30
1	B	459	ARG	NE-CZ-NH1	12.42	126.51	120.30
1	A	459	ARG	NE-CZ-NH2	12.25	126.43	120.30
1	B	180	ARG	NE-CZ-NH2	-12.16	114.22	120.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	124[B]	ILE	Peptide

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	4377	4120	4173	144	0
1	B	4464	4206	4244	200	1
2	C	61	33	52	28	0
3	D	28	25	24	2	1
3	E	28	25	24	8	0
3	G	28	25	24	10	0
4	F	50	40	43	13	0
5	A	43	30	30	7	0
5	B	43	30	30	10	0
6	A	26	14	14	9	0
6	B	26	14	14	8	0
7	A	40	55	56	4	0
7	B	40	56	55	13	0
8	A	13	5	4	0	0
9	A	55	0	0	3	0
9	B	50	0	0	3	0
All	All	9372	8678	8787	372	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 21.

The worst 5 of 372 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:144:ASN:HD21	2:C:1:NAG:C1	0.96	1.55
1:A:144:ASN:ND2	2:C:1:NAG:C1	1.80	1.36
2:C:4:BMA:O4	2:C:5:MAN:C2	1.81	1.28
2:C:4:BMA:O4	2:C:5:MAN:H2	1.22	1.26
1:B:349:VAL:O	1:B:353:SER:OG	1.53	1.26

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the sym-

metry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:279:ILE:O	3:D:1:NAG:H83[4_565]	1.56	0.04

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	552/553 (100%)	508 (92%)	41 (7%)	3 (0%)	29	47
1	B	563/553 (102%)	507 (90%)	54 (10%)	2 (0%)	34	53
All	All	1115/1106 (101%)	1015 (91%)	95 (8%)	5 (0%)	29	53

All (5) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	283	SER
1	A	462	PRO
1	B	462	PRO
1	B	399	PRO
1	A	160	PRO

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	462/488 (95%)	451 (98%)	11 (2%)	49	68
1	B	472/488 (97%)	457 (97%)	15 (3%)	39	59

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	934/976 (96%)	908 (97%)	26 (3%)	43 63

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	158	ASP
1	B	380	GLU
1	B	511	LYS
1	B	291	VAL
1	B	383	GLN

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	370	GLN
1	B	320	HIS
1	B	68	ASN
1	A	400	GLN
1	B	192	GLN

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 ⓘ

15 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	C	1	2	14,14,15	1.00	1 (7%)	17,19,21	1.92	5 (29%)
2	NAG	C	2	2	14,14,15	1.20	1 (7%)	17,19,21	2.85	7 (41%)
2	MAN	C	3	2	11,11,12	0.86	0	15,15,17	2.51	6 (40%)
2	BMA	C	4	2	11,11,12	0.88	0	15,15,17	2.17	6 (40%)
2	MAN	C	5	2	11,11,12	0.64	0	15,15,17	0.90	1 (6%)
3	NAG	D	1	3	14,14,15	1.15	1 (7%)	17,19,21	1.65	3 (17%)
3	NDG	D	2	3	14,14,15	1.72	4 (28%)	17,19,21	2.31	6 (35%)
3	NAG	E	1	3	14,14,15	1.17	2 (14%)	17,19,21	2.41	4 (23%)
3	NDG	E	2	3	14,14,15	0.86	0	17,19,21	2.38	8 (47%)
4	NAG	F	1	4	14,14,15	1.24	1 (7%)	17,19,21	2.18	5 (29%)
4	NAG	F	2	4	14,14,15	0.82	1 (7%)	17,19,21	2.49	5 (29%)
4	MAN	F	3	4	11,11,12	0.72	0	15,15,17	1.75	4 (26%)
4	BMA	F	4	4	11,11,12	1.08	1 (9%)	15,15,17	1.73	4 (26%)
3	NAG	G	1	3	14,14,15	0.87	0	17,19,21	2.07	5 (29%)
3	NDG	G	2	3	14,14,15	1.55	2 (14%)	17,19,21	2.63	5 (29%)

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	C	1	2	-	2/6/23/26	0/1/1/1
2	NAG	C	2	2	-	3/6/23/26	0/1/1/1
2	MAN	C	3	2	-	1/2/19/22	1/1/1/1
2	BMA	C	4	2	-	0/2/19/22	1/1/1/1
2	MAN	C	5	2	-	0/2/19/22	1/1/1/1
3	NAG	D	1	3	-	2/6/23/26	0/1/1/1
3	NDG	D	2	3	-	2/6/23/26	0/1/1/1
3	NAG	E	1	3	-	2/6/23/26	0/1/1/1
3	NDG	E	2	3	-	3/6/23/26	0/1/1/1
4	NAG	F	1	4	-	2/6/23/26	0/1/1/1
4	NAG	F	2	4	-	3/6/23/26	0/1/1/1
4	MAN	F	3	4	-	2/2/19/22	1/1/1/1
4	BMA	F	4	4	-	1/2/19/22	1/1/1/1
3	NAG	G	1	3	-	2/6/23/26	0/1/1/1
3	NDG	G	2	3	-	4/6/23/26	0/1/1/1

The worst 5 of 14 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	NAG	O5-C1	-3.17	1.38	1.43
3	D	2	NDG	O5-C1	-2.98	1.39	1.43
3	G	2	NDG	O5-C1	-2.73	1.39	1.43
4	F	1	NAG	O5-C1	-2.70	1.39	1.43
4	F	4	BMA	O5-C1	-2.58	1.39	1.43

The worst 5 of 74 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	E	1	NAG	C4-C3-C2	-6.43	101.60	111.02
3	G	2	NDG	O5-C1-C2	6.33	121.28	111.29
2	C	2	NAG	O5-C1-C2	-6.26	101.40	111.29
3	G	2	NDG	C4-C3-C2	-6.07	102.12	111.02
4	F	2	NAG	O5-C1-C2	-5.82	102.10	111.29

There are no chirality outliers.

5 of 29 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	E	2	NDG	C3-C2-N2-C7
4	F	2	NAG	C3-C2-N2-C7
3	E	2	NDG	C4-C5-C6-O6
4	F	3	MAN	O5-C5-C6-O6
4	F	1	NAG	C4-C5-C6-O6

All (5) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	5	MAN	C1-C2-C3-C4-C5-O5
4	F	3	MAN	C1-C2-C3-C4-C5-O5
4	F	4	BMA	C1-C2-C3-C4-C5-O5
2	C	4	BMA	C1-C2-C3-C4-C5-O5
2	C	3	MAN	C1-C2-C3-C4-C5-O5

15 monomers are involved in 62 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	5	MAN	12	0
4	F	2	NAG	6	0
3	G	1	NAG	9	0
4	F	3	MAN	2	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	F	4	BMA	2	0
3	D	2	NDG	1	0
2	C	1	NAG	7	0
3	E	1	NAG	5	0
3	D	1	NAG	2	1
3	G	2	NDG	3	0
2	C	2	NAG	3	0
4	F	1	NAG	5	0
2	C	4	BMA	20	0
3	E	2	NDG	5	0
2	C	3	MAN	8	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 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 F

Bond lengths

Bond angles

Torsions

Rings
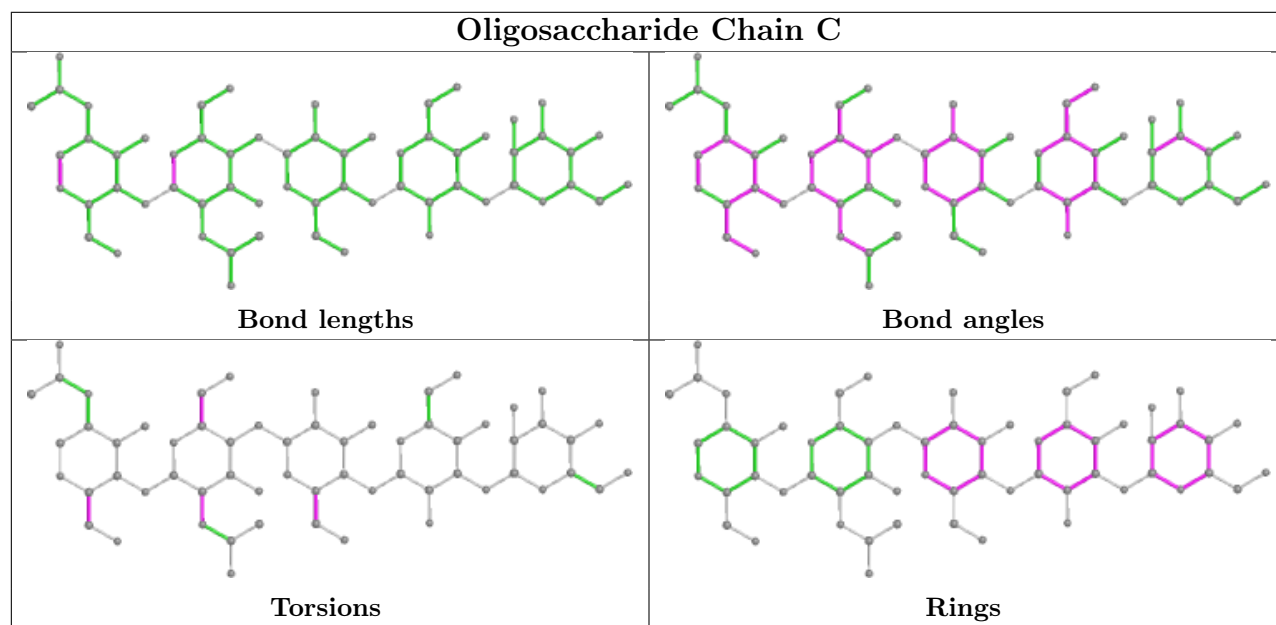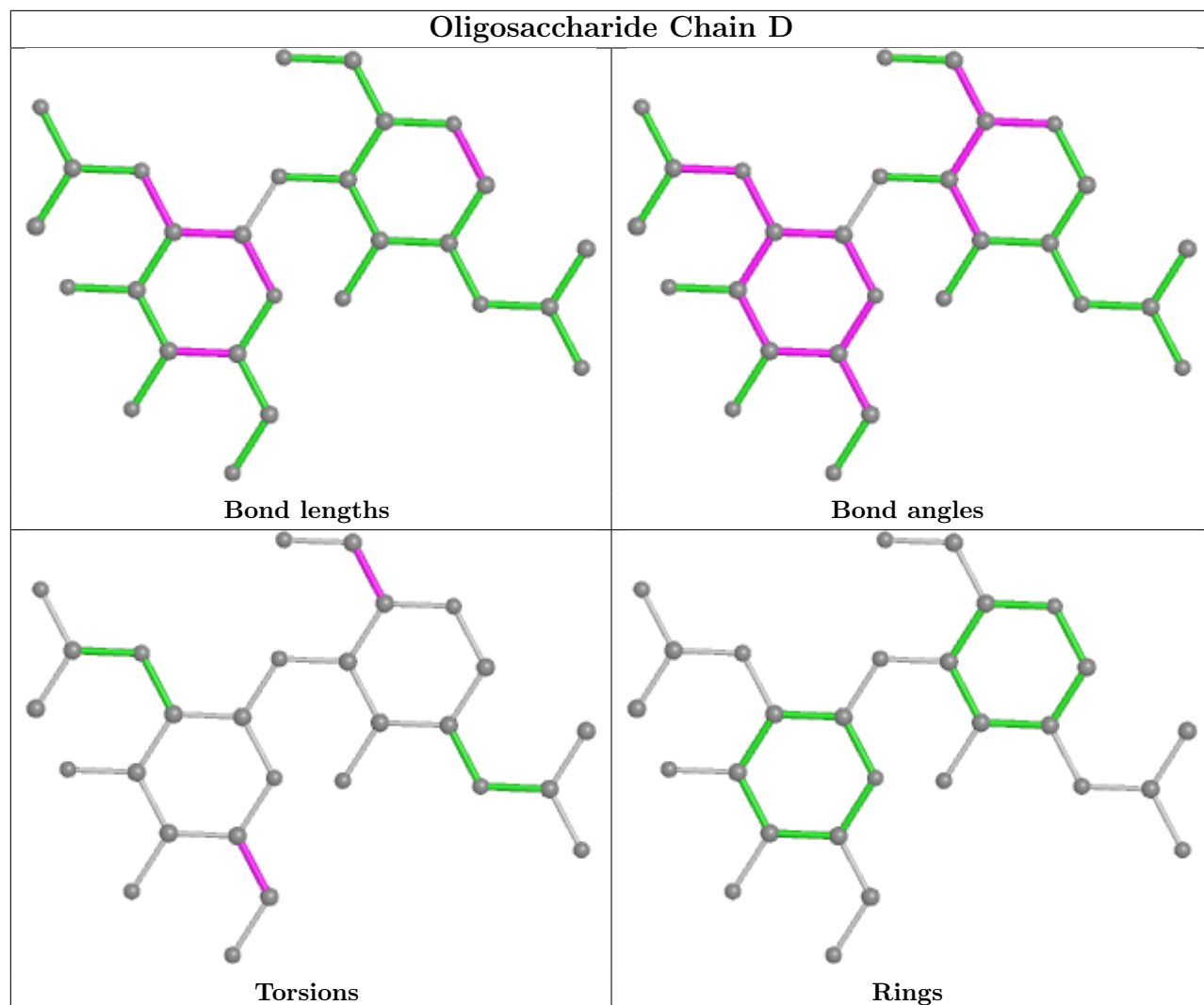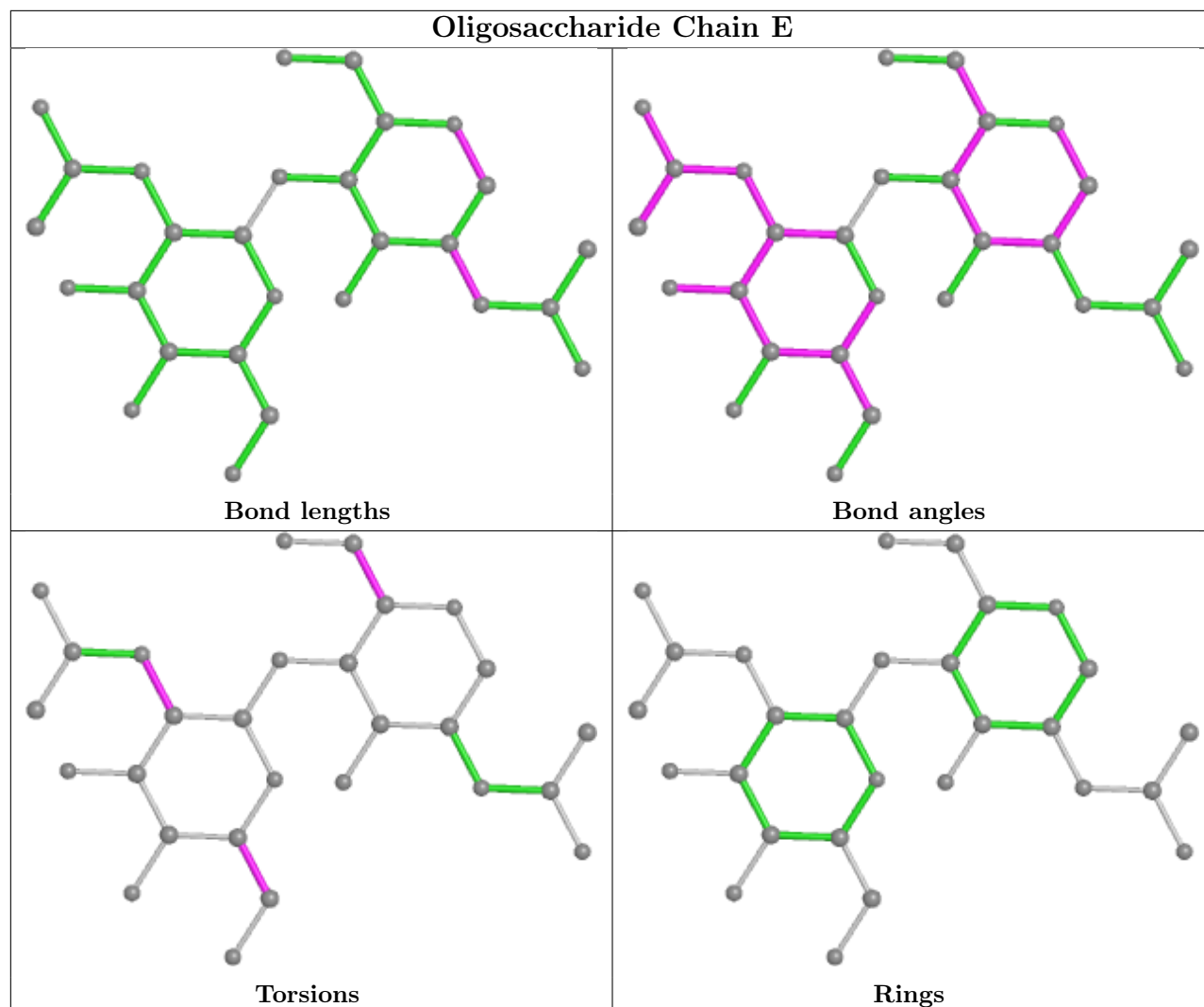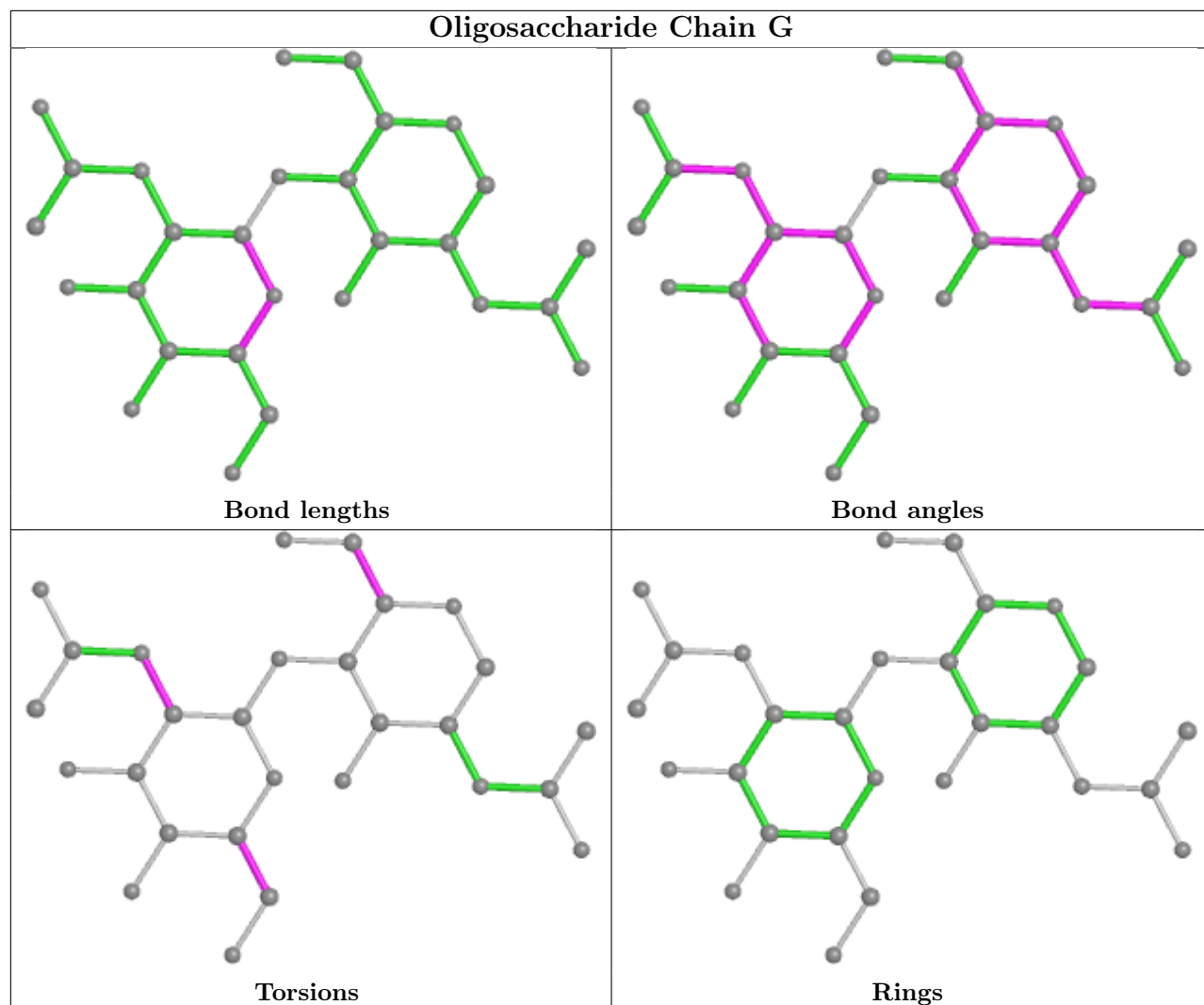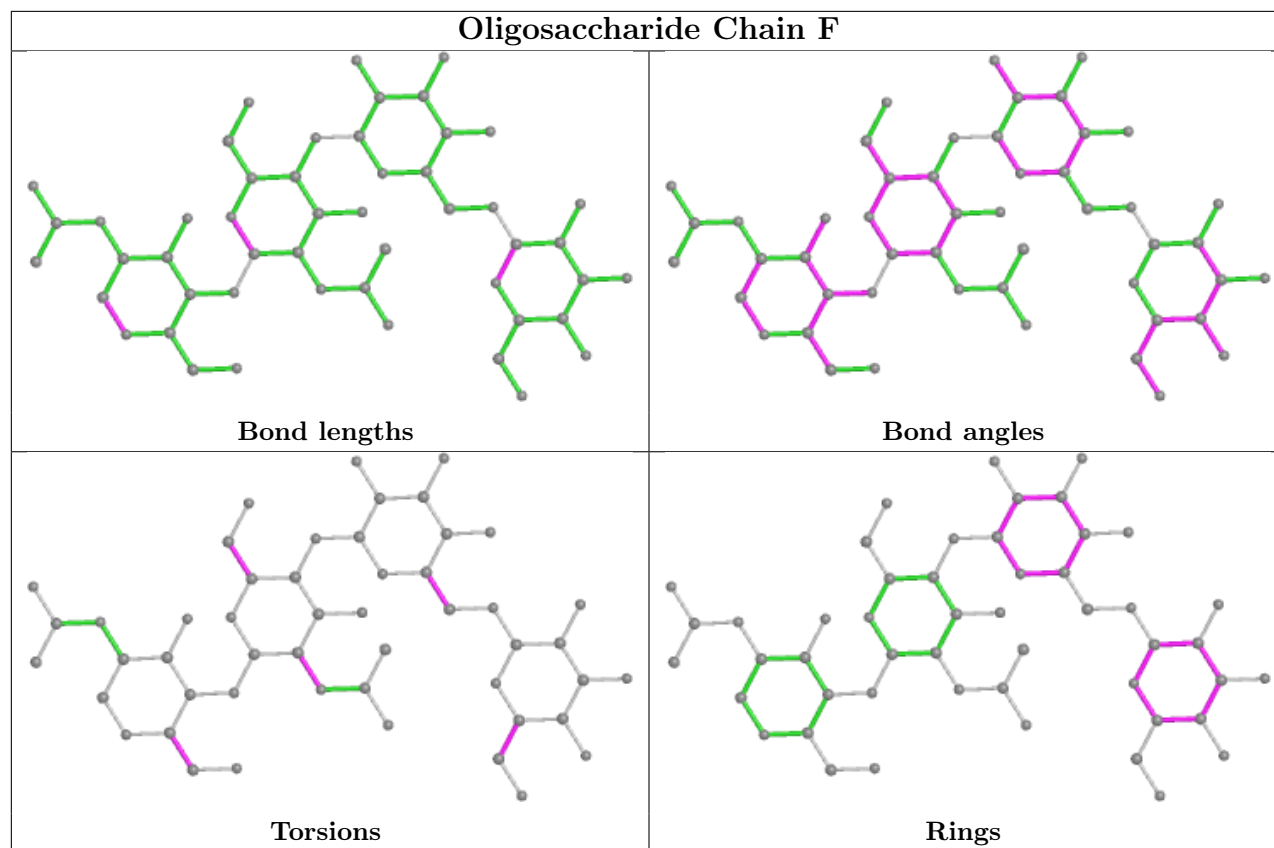
5.6 Ligand geometry ⓘ

9 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
7	BOG	B	1751	-	20,20,20	1.35	4 (20%)	25,25,25	1.99	6 (24%)
5	HEM	B	601	-	41,50,50	1.98	7 (17%)	45,82,82	1.65	7 (15%)
7	BOG	A	754	-	20,20,20	0.93	1 (5%)	25,25,25	1.76	5 (20%)
5	HEM	A	601	-	41,50,50	1.94	6 (14%)	45,82,82	1.67	4 (8%)
7	BOG	A	751	-	20,20,20	0.89	1 (5%)	25,25,25	1.86	5 (20%)
7	BOG	B	1752	-	20,20,20	0.85	1 (5%)	25,25,25	2.51	4 (16%)
6	CEL	A	701	-	25,28,28	3.98	9 (36%)	31,43,43	2.04	8 (25%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#|Z| > 2	Counts	RMSZ	#|Z| > 2
8	FLC	A	900	-	12,12,12	2.73	6 (50%)	17,17,17	2.05	5 (29%)
6	CEL	B	1701	-	25,28,28	4.28	10 (40%)	31,43,43	2.53	11 (35%)

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
7	BOG	B	1751	-	-	6/11/31/31	0/1/1/1
5	HEM	B	601	-	-	5/12/54/54	-
7	BOG	A	754	-	-	8/11/31/31	0/1/1/1
5	HEM	A	601	-	-	5/12/54/54	-
7	BOG	A	751	-	-	8/11/31/31	0/1/1/1
7	BOG	B	1752	-	1/1/5/5	3/11/31/31	0/1/1/1
6	CEL	A	701	-	-	10/12/20/20	0/3/3/3
8	FLC	A	900	-	-	8/16/16/16	-
6	CEL	B	1701	-	-	7/12/20/20	0/3/3/3

The worst 5 of 45 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	701	CEL	O1-S1	9.99	1.62	1.43
6	B	1701	CEL	O1-S1	9.88	1.62	1.43
6	A	701	CEL	O2-S1	9.67	1.61	1.43
6	B	1701	CEL	C3-N2	-9.05	1.29	1.40
6	B	1701	CEL	O2-S1	9.05	1.60	1.43

The worst 5 of 55 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	B	1701	CEL	O2-S1-C15	8.54	116.88	107.35
7	B	1752	BOG	O1-C1-C2	7.94	120.70	108.30
5	A	601	HEM	C4D-ND-C1D	6.44	111.72	105.07
7	B	1752	BOG	O5-C1-O1	6.27	124.82	109.97
5	B	601	HEM	C4D-ND-C1D	6.24	111.52	105.07

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
7	B	1752	BOG	C1

5 of 60 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	601	HEM	C1A-C2A-CAA-CBA
5	A	601	HEM	C3A-C2A-CAA-CBA
5	B	601	HEM	C1A-C2A-CAA-CBA
5	B	601	HEM	C3A-C2A-CAA-CBA
7	A	751	BOG	C2-C1-O1-C1'

There are no ring outliers.

8 monomers are involved in 51 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	1751	BOG	12	0
5	B	601	HEM	10	0
7	A	754	BOG	3	0
5	A	601	HEM	7	0
7	A	751	BOG	1	0
7	B	1752	BOG	1	0
6	A	701	CEL	9	0
6	B	1701	CEL	8	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 B 1751

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM B 601

Bond lengths

Bond angles

Torsions

Rings

Ligand BOG A 754

Bond lengths

Bond angles

Torsions

Rings

Ligand HEM A 601

Bond lengths

Bond angles

Torsions

Rings

Ligand BOG A 751

Bond lengths

Bond angles

Torsions

Rings

Ligand BOG B 1752

Bond lengths

Bond angles

Torsions

Rings

Ligand CEL A 701

Bond lengths

Bond angles

Torsions

Rings

Ligand CEL B 1701

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(Å^2)	Q<0.9
1	A	553/553 (100%)	0.31	13 (2%)	59	68	52, 87, 130, 213	0
1	B	553/553 (100%)	0.31	20 (3%)	42	51	54, 86, 129, 195	3 (0%)
All	All	1106/1106 (100%)	0.31	33 (2%)	50	59	52, 86, 130, 213	3 (0%)

The worst 5 of 33 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	278	GLY	3.6
1	B	69	CYS	3.1
1	B	277	ARG	3.1
1	A	409	PHE	3.0
1	B	291	VAL	3.0

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(Å^2)	Q<0.9
2	BMA	C	4	11/12	0.83	0.12	74,88,182,186	9
4	MAN	F	3	11/12	0.88	0.10	78,164,171,176	6
3	NDG	G	2	14/15	0.89	0.24	70,70,181,190	13
2	MAN	C	3	11/12	0.90	0.14	168,175,190,195	0
2	MAN	C	5	11/12	0.91	0.13	100,141,159,165	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\mathring{A}^2$)	Q<0.9
3	NAG	D	1	14/15	0.92	0.15	74,77,135,153	12
3	NDG	E	2	14/15	0.92	0.17	97,97,134,141	13
4	BMA	F	4	11/12	0.92	0.15	72,72,163,167	10
3	NAG	G	1	14/15	0.93	0.16	57,106,129,135	12
4	NAG	F	2	14/15	0.93	0.14	75,101,137,158	12
2	NAG	C	2	14/15	0.94	0.15	59,83,131,146	12
3	NDG	D	2	14/15	0.95	0.15	79,79,140,146	13
3	NAG	E	1	14/15	0.96	0.18	75,78,108,120	12
4	NAG	F	1	14/15	0.97	0.15	46,77,96,110	12
2	NAG	C	1	14/15	0.97	0.15	34,53,80,93	12

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.
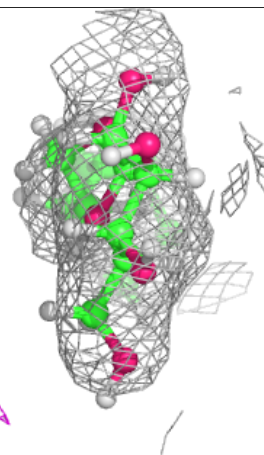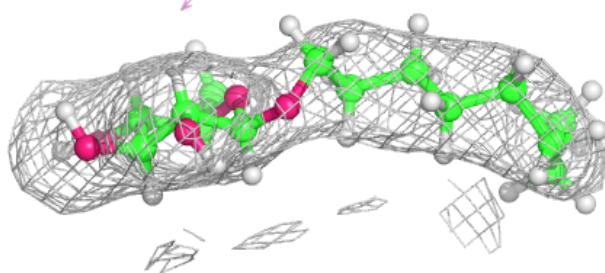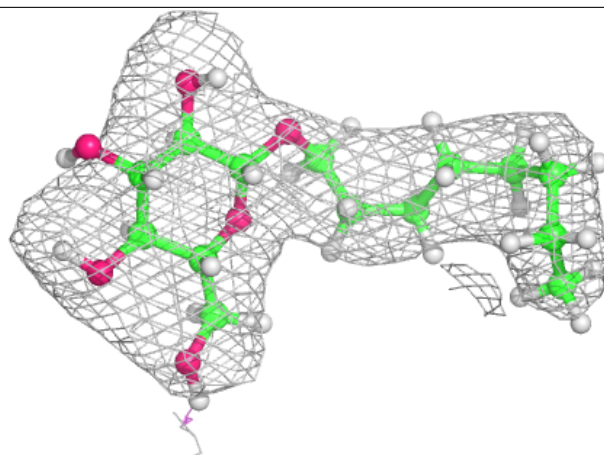
Electron density around Chain C:

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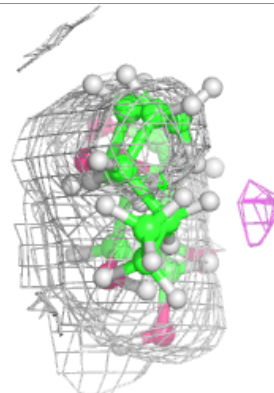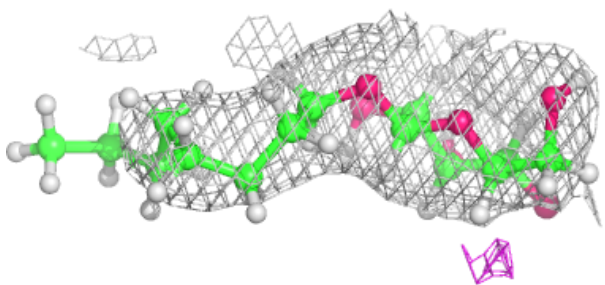$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
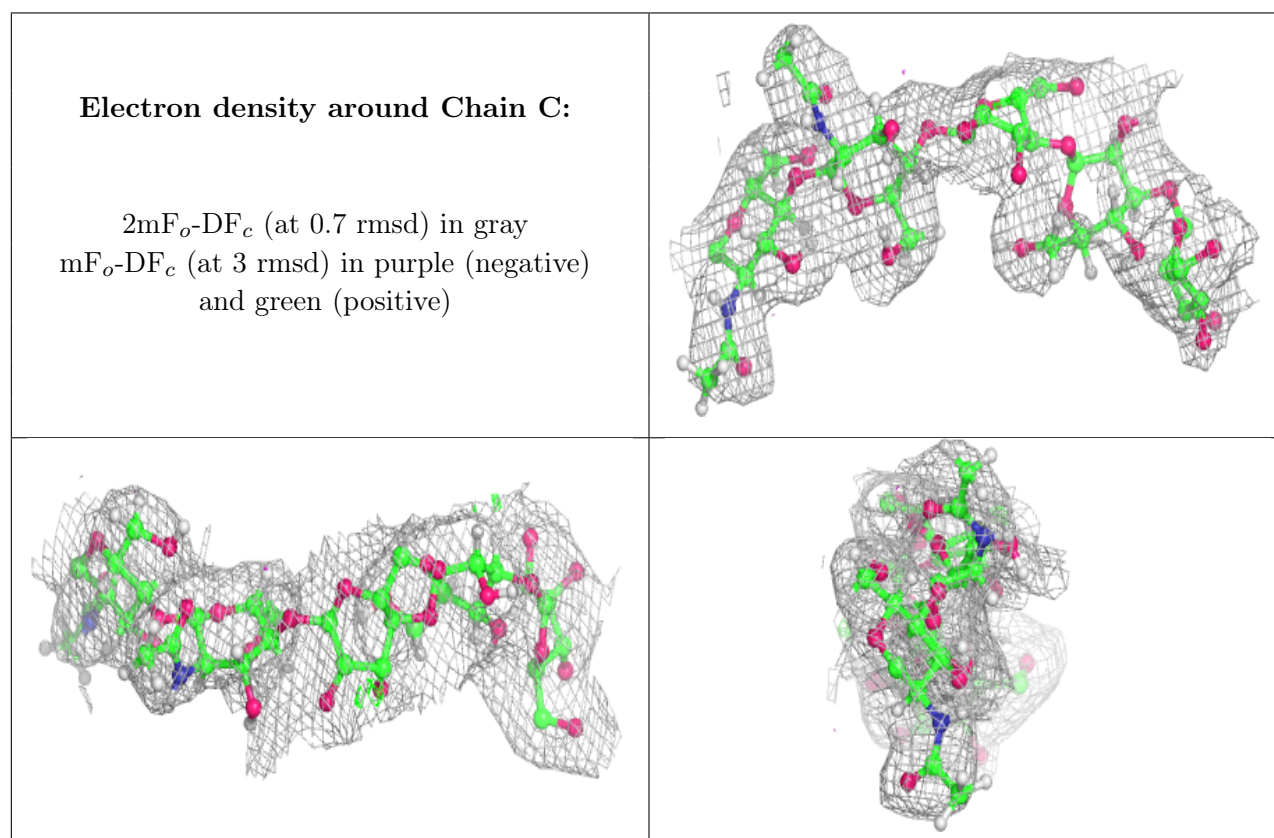
Electron density around Chain D:

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$mF_o\text{-}DF_c$ (at 3 rmsd) in purple (negative)
and green (positive)
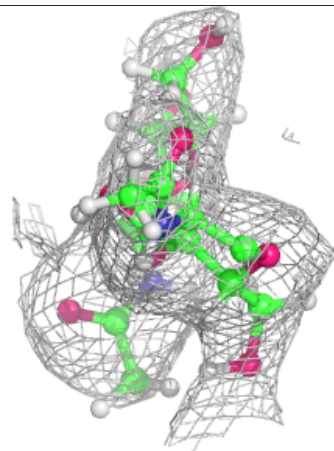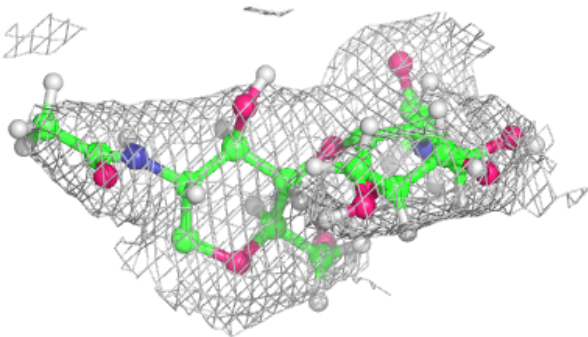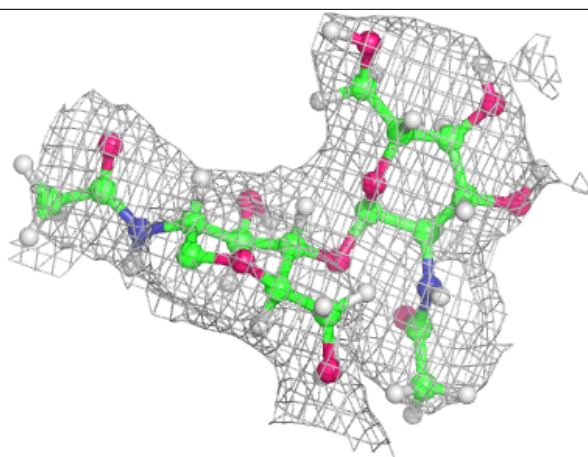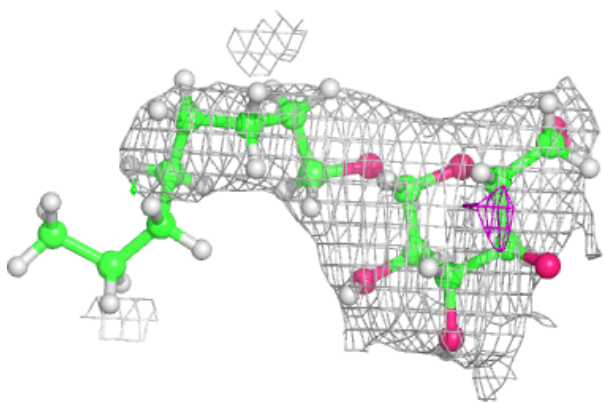
Electron density around Chain E:

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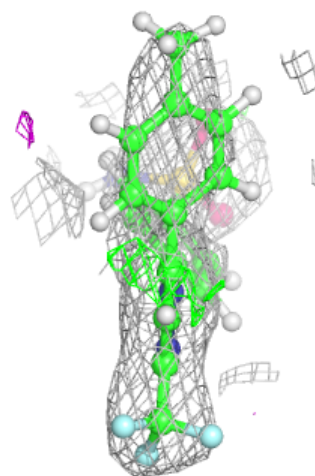and green (positive)
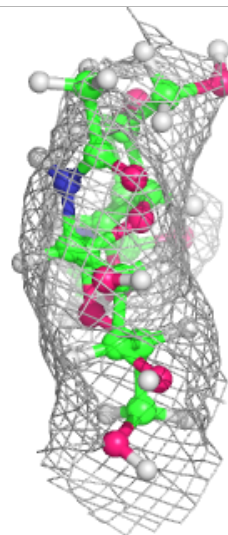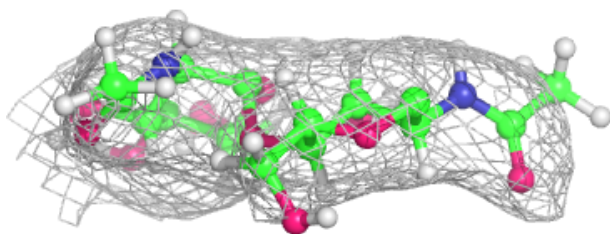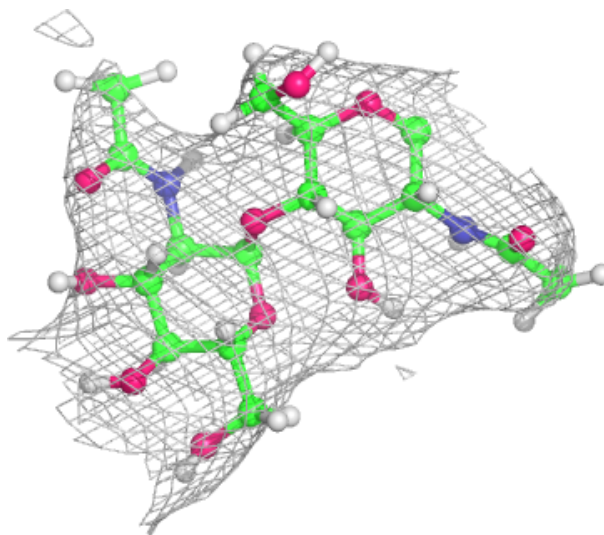
Electron density around Chain G:

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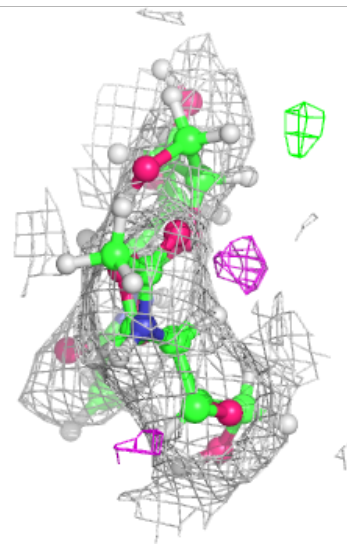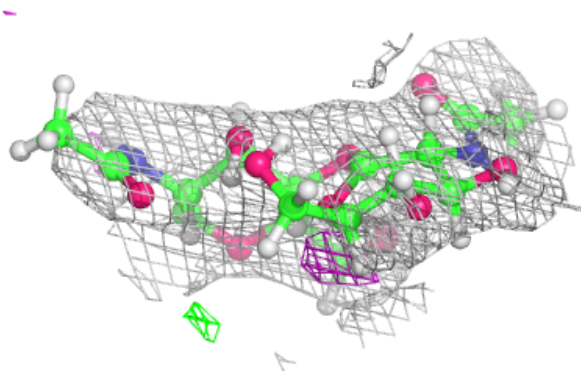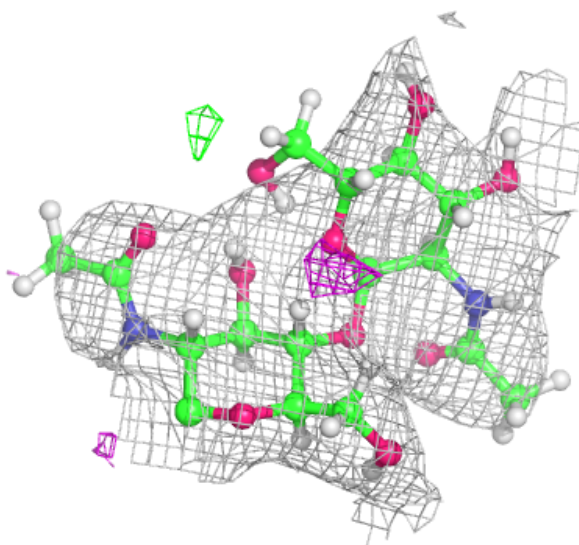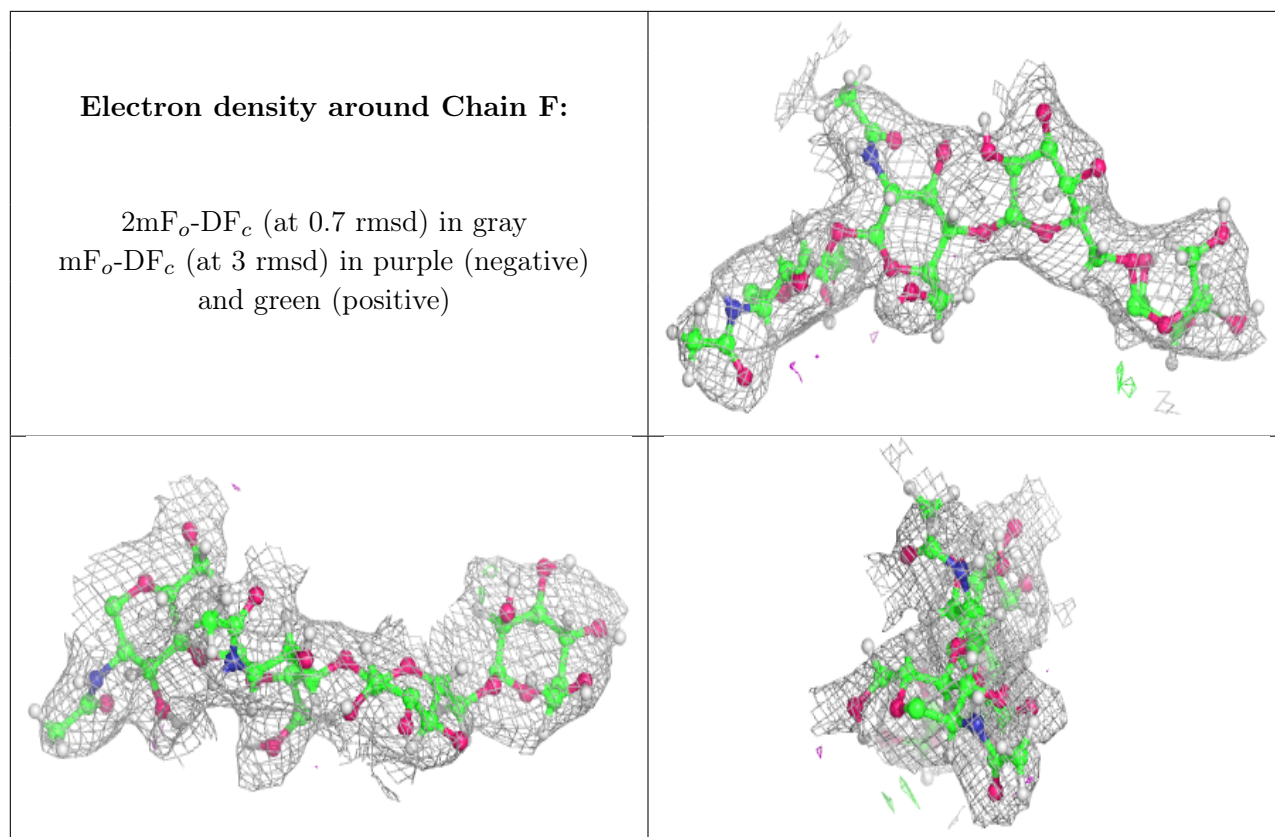
Electron density around Chain F:

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

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
8	FLC	A	900	13/13	0.87	0.18	61,143,174,180	6
7	BOG	B	1752	20/20	0.90	0.17	70,70,156,159	28
7	BOG	A	754	20/20	0.90	0.15	68,80,130,136	28
7	BOG	A	751	20/20	0.92	0.20	67,78,129,150	30
6	CEL	B	1701	26/26	0.95	0.36	22,52,65,66	40
7	BOG	B	1751	20/20	0.96	0.21	37,68,111,134	28
5	HEM	B	601	43/43	0.96	0.19	45,78,116,157	30
5	HEM	A	601	43/43	0.96	0.18	28,51,126,149	32
6	CEL	A	701	26/26	0.97	0.16	49,77,95,121	14

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 1752:

$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)
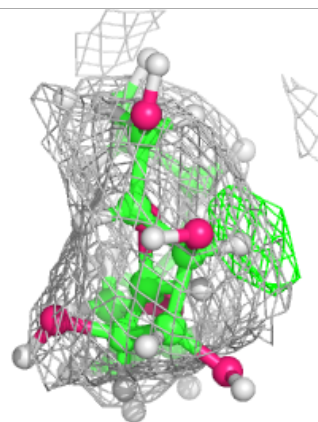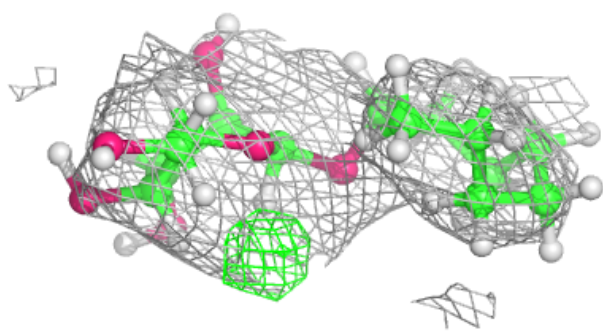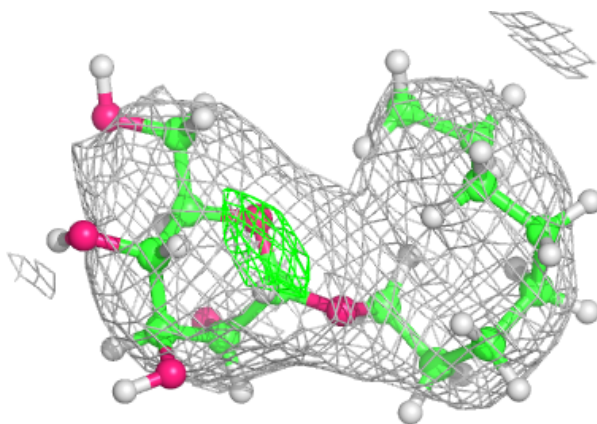
Electron density around BOG A 754:

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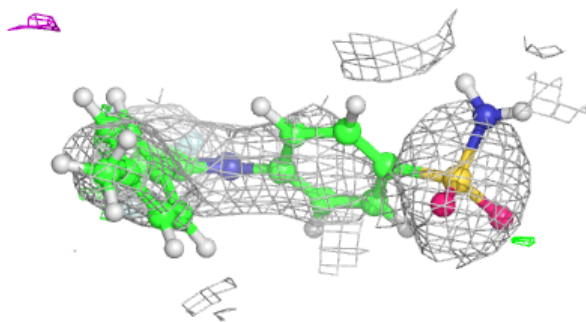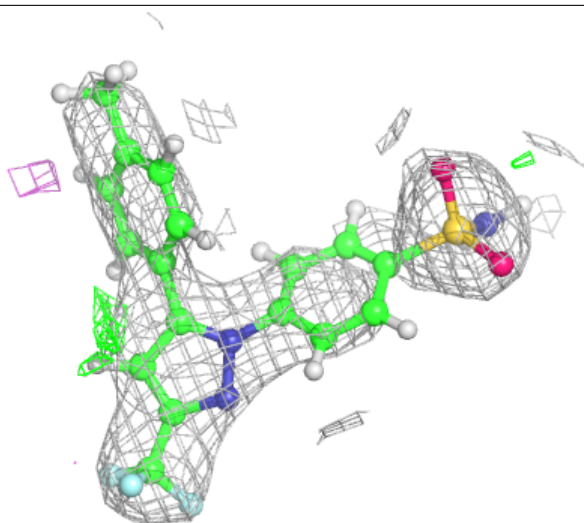mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
and green (positive)

Electron density around BOG A 751:

2mF$_o$-DF$_c$ (at 0.7 rmsd) in gray
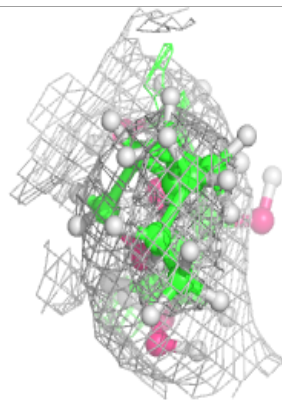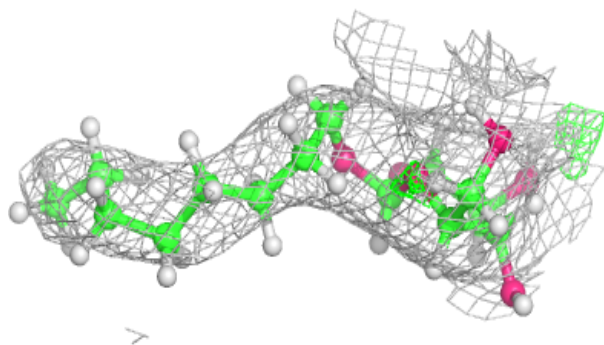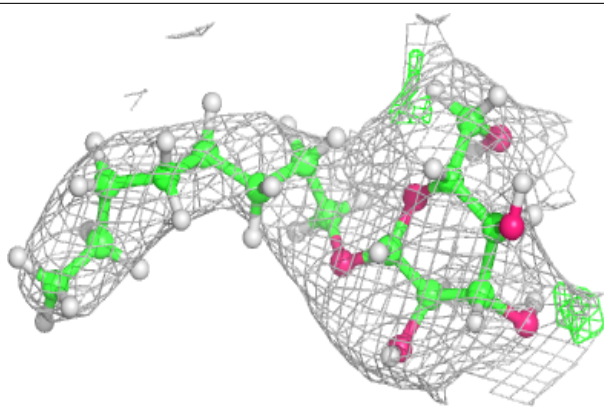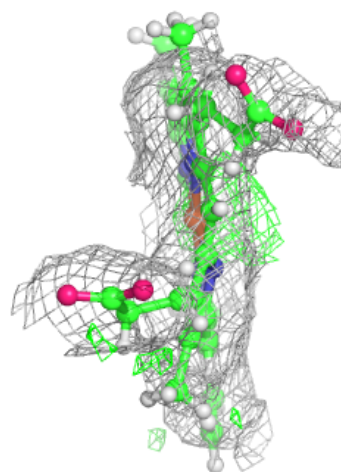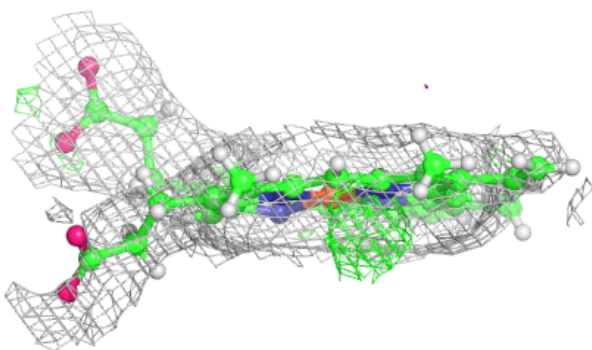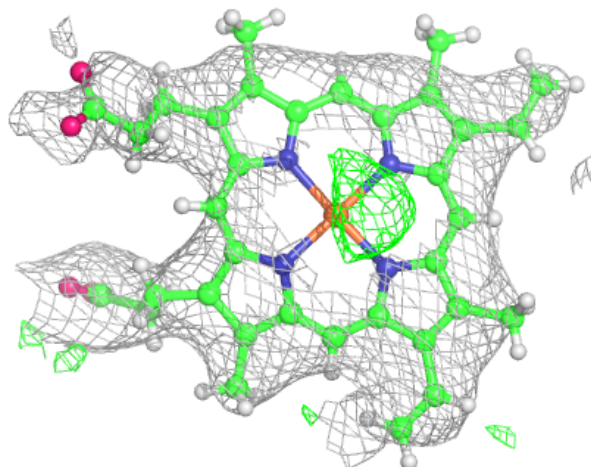mF$_o$-DF$_c$ (at 3 rmsd) in purple (negative)
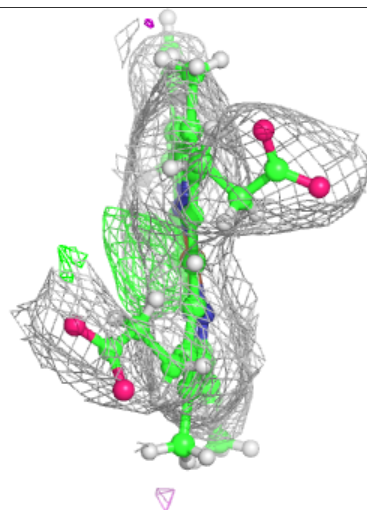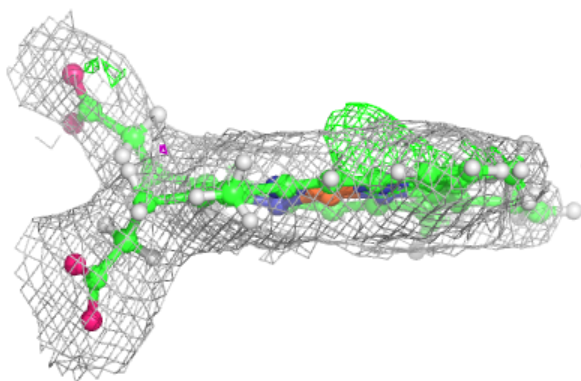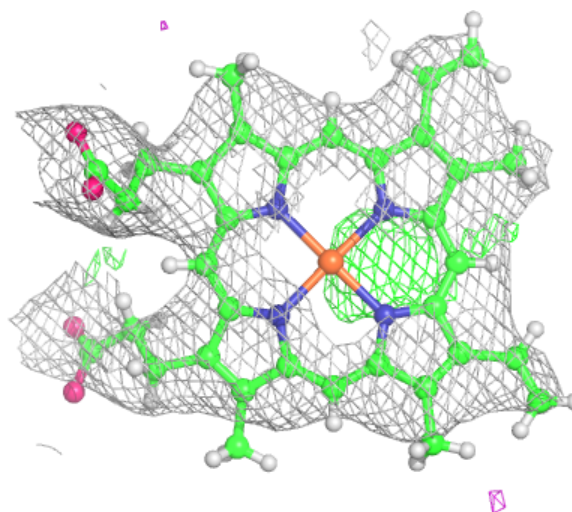and green (positive)

Electron density around CEL B 1701:

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

Electron density around BOG B 1751:

$2mF_o-DF_c$ (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)

Electron density around HEM A 601:

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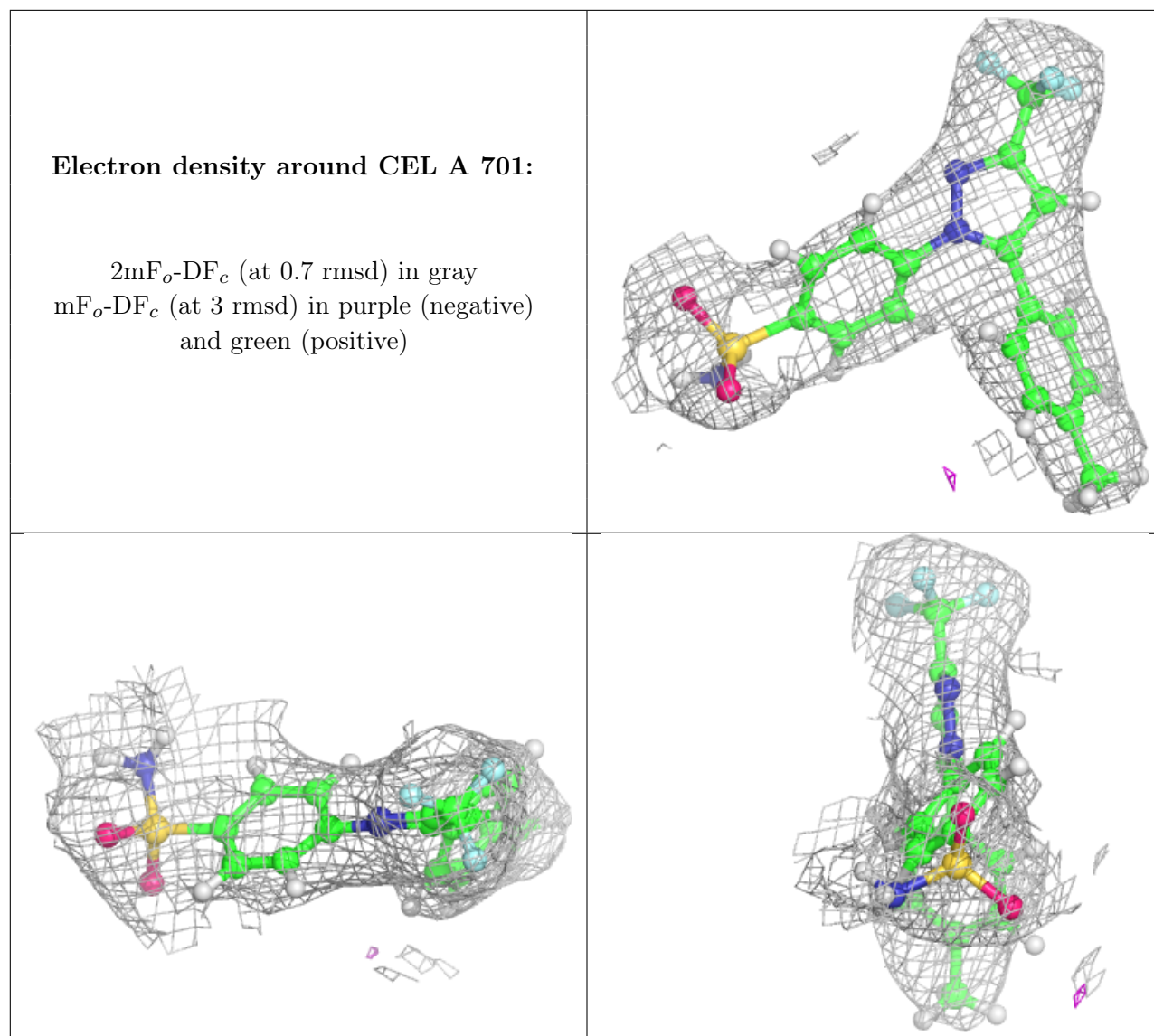and green (positive)

Electron density around CEL A 701:

$2mF_o$-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.