



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 5, 2026 – 07:36 PM UTC

PDB ID : 3U4E / pdb_00003u4e
Title : Crystal Structure of PG9 Fab in Complex with V1V2 Region from HIV-1 strain CAP45
Authors : Gorman, J.; McLellan, J.; Pancera, M.; Kwong, P.D.
Deposited on : 2011-10-07
Resolution : 2.19 Å(reported)

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

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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	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
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)	:	2.49

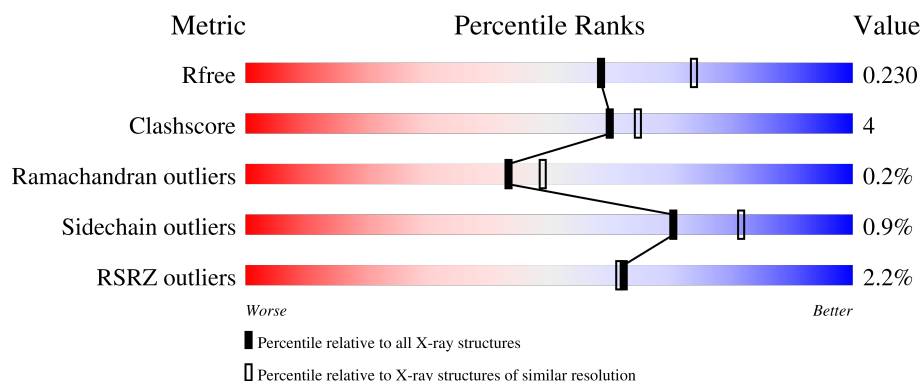
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.19 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.





Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	8975 (2.20-2.16)
Clashscore	190562	9786 (2.20-2.16)
Ramachandran outliers	187476	9664 (2.20-2.16)
Sidechain outliers	187428	9664 (2.20-2.16)
RSRZ outliers	180081	8979 (2.20-2.16)

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	G	124	<div> <div>5%</div> <div> <div></div> <div>73%</div> <div>13%</div> <div>•</div> <div>13%</div> </div> </div>
1	J	124	<div> <div>4%</div> <div> <div></div> <div>78%</div> <div>10%</div> <div>12%</div> </div> </div>
2	A	248	<div> <div>2%</div> <div> <div></div> <div>87%</div> <div>5%</div> <div>•</div> <div>7%</div> </div> </div>
2	H	248	<div> <div></div> <div> <div></div> <div>87%</div> <div>8%</div> <div>•</div> <div>•</div> </div> </div>
3	B	216	<div> <div>2%</div> <div> <div></div> <div>89%</div> <div>9%</div> <div>•</div> </div> </div>

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Mol	Chain	Length	Quality of chain
3	L	216	 % 92% 6% •
4	C	7	 86% 14%
4	E	7	 57% 43%
5	D	6	 50% 50%
6	F	2	 50% 50%
7	I	2	 50% 50%

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 17692 atoms, of which 8372 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 V1V2 region of HIV-1 on 1FD6 scaffold.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	G	108	Total	C	H	N	O	S	0	0	0
			1647	529	805	136	172	5			
1	J	109	Total	C	H	N	O	S	0	0	0
			1659	537	806	137	175	4			

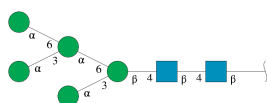
- Molecule 2 is a protein called PG9 Heavy Chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	H	239	Total	C	H	N	O	S	0	0	0
			3577	1155	1738	309	365	10			
2	A	230	Total	C	H	N	O	S	0	1	0
			3476	1127	1688	301	351	9			

- Molecule 3 is a protein called PG9 Light Chain.

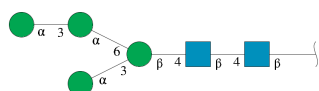
Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	L	214	Total	C	H	N	O	S	0	0	0
			3138	988	1547	271	328	4			
3	B	212	Total	C	H	N	O	S	0	0	0
			3114	978	1541	268	323	4			

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]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
4	C	7	Total	C	H	N	O	0	0	0
			154	46	71	2	35			
4	E	7	Total	C	H	N	O	0	0	0
			154	46	71	2	35			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]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
5	D	6	Total	C	H	N	O	0	0	0
			133	40	61	2	30			

- Molecule 6 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
6	F	2	Total	C	H	N	O	0	0	0
			54	16	26	2	10			

- Molecule 7 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
7	I	2	Total	C	H	O	0	0	0
			40	12	18	10			

- Molecule 8 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	G	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	L	1	Total	O	S	0	0
			5	4	1		
8	B	1	Total	O	S	0	0
			5	4	1		
8	B	1	Total	O	S	0	0
			5	4	1		
8	B	1	Total	O	S	0	0
			5	4	1		
8	B	1	Total	O	S	0	0
			5	4	1		

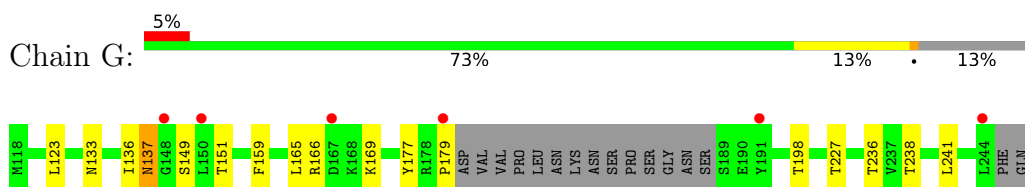
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	G	21	Total 21	O 21	0	0
9	J	19	Total 19	O 19	0	0
9	H	123	Total 123	O 123	0	0
9	L	135	Total 135	O 135	0	0
9	A	109	Total 109	O 109	0	0
9	B	79	Total 79	O 79	0	0

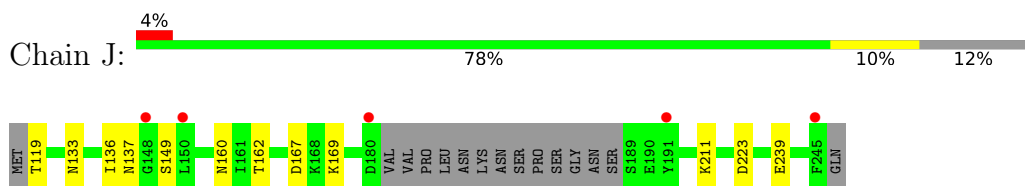
3 Residue-property plots [i](#)

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.

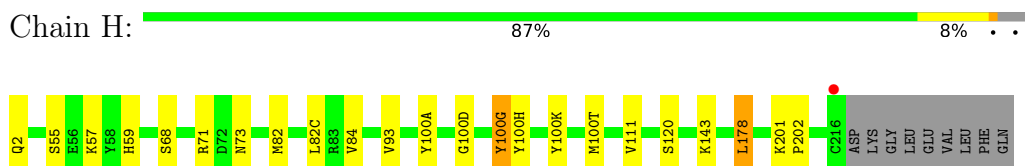
- Molecule 1: V1V2 region of HIV-1 on 1FD6 scaffold



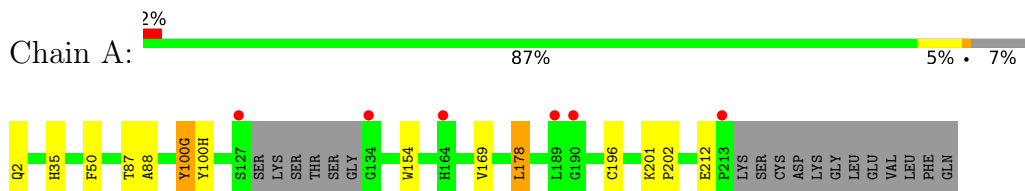
- Molecule 1: V1V2 region of HIV-1 on 1FD6 scaffold



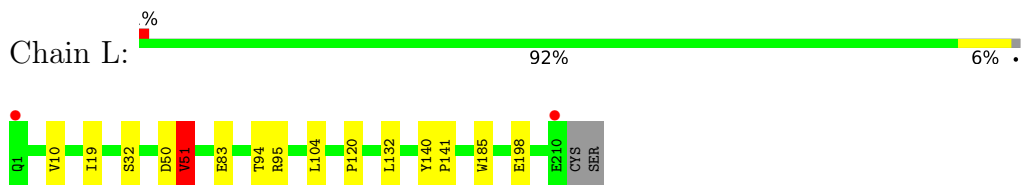
- Molecule 2: PG9 Heavy Chain



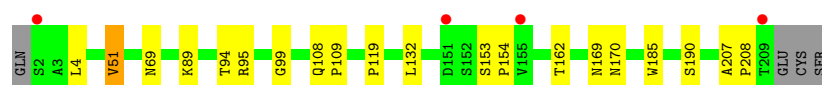
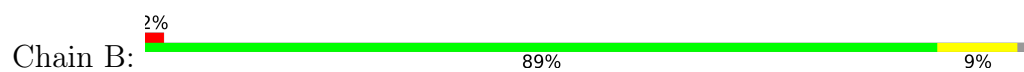
- Molecule 2: PG9 Heavy Chain



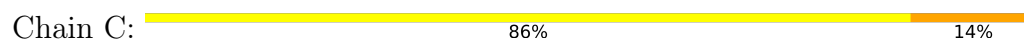
- Molecule 3: PG9 Light Chain



- Molecule 3: PG9 Light Chain



- Molecule 4: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 4: alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyranose-(1-6)]alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



- Molecule 5: alpha-D-mannopyranose-(1-3)-alpha-D-mannopyranose-(1-6)-[alpha-D-mannopyranose-(1-3)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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



- Molecule 7: alpha-D-mannopyranose-(1-3)-beta-D-mannopyranose



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	73.03Å 103.55Å 186.37Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	27.69 – 2.19 27.69 – 2.19	Depositor EDS
% Data completeness (in resolution range)	91.5 (27.69-2.19) 91.4 (27.69-2.19)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.68 (at 2.18Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.7.2_869)	Depositor
R, R_{free}	0.182 , 0.234 0.179 , 0.230	Depositor DCC
R_{free} test set	3455 reflections (4.65%)	wwPDB-VP
Wilson B-factor (Å ²)	34.9	Xtriage
Anisotropy	0.395	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 42.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	17692	wwPDB-VP
Average B, all atoms (Å ²)	50.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.92% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: PCA, BMA, TYS, SO4, NAG, MAN

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	G	0.36	0/853	0.67	1/1157 (0.1%)
1	J	0.32	0/865	0.62	1/1174 (0.1%)
2	A	0.33	0/1798	0.67	0/2446
2	H	0.35	0/1847	0.67	0/2512
3	B	0.37	0/1608	0.70	1/2190 (0.0%)
3	L	0.38	0/1626	0.73	2/2214 (0.1%)
All	All	0.35	0/8597	0.68	5/11693 (0.0%)

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	J	0	1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	L	32	SER	N-CA-C	5.57	119.07	112.72
3	L	51	VAL	CB-CA-C	-5.34	102.52	111.29
1	G	149	SER	N-CA-C	5.25	115.07	108.45
3	B	51	VAL	CB-CA-C	-5.14	102.86	111.29
1	J	137	ASN	N-CA-C	5.04	121.53	110.80

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	J	136	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	G	842	805	819	10	0
1	J	853	806	823	8	0
2	A	1788	1688	1690	12	0
2	H	1839	1738	1739	17	0
3	B	1573	1541	1540	17	0
3	L	1591	1547	1557	9	0
4	C	83	71	70	1	0
4	E	83	71	70	3	0
5	D	72	61	61	9	0
6	F	28	26	24	5	0
7	I	22	18	19	5	0
8	B	20	0	0	1	0
8	G	5	0	0	0	0
8	L	35	0	0	0	0
9	A	109	0	0	0	0
9	B	79	0	0	1	0
9	G	21	0	0	1	0
9	H	123	0	0	0	0
9	J	19	0	0	3	0
9	L	135	0	0	1	0
All	All	9320	8372	8412	74	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 4.

The worst 5 of 74 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)
6:F:2:NAG:O4	7:I:1:BMA:C1	1.68	1.39
6:F:2:NAG:O4	7:I:1:BMA:C2	1.91	1.18
5:D:3:BMA:H62	5:D:4:MAN:H5	1.42	1.00

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:F:2:NAG:C4	7:I:1:BMA:C1	2.44	0.94
6:F:2:NAG:O4	7:I:1:BMA:H2	1.71	0.91

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	G	104/124 (84%)	99 (95%)	5 (5%)	0	100	100
1	J	105/124 (85%)	103 (98%)	2 (2%)	0	100	100
2	A	225/248 (91%)	220 (98%)	5 (2%)	0	100	100
2	H	235/248 (95%)	229 (97%)	6 (3%)	0	100	100
3	B	210/216 (97%)	203 (97%)	6 (3%)	1 (0%)	24	25
3	L	212/216 (98%)	206 (97%)	5 (2%)	1 (0%)	24	25
All	All	1091/1176 (93%)	1060 (97%)	29 (3%)	2 (0%)	43	49

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
3	L	51	VAL
3	B	51	VAL

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	G	92/107 (86%)	90 (98%)	2 (2%)	45	58
1	J	93/107 (87%)	92 (99%)	1 (1%)	65	77
2	A	192/207 (93%)	190 (99%)	2 (1%)	68	79
2	H	199/207 (96%)	196 (98%)	3 (2%)	57	70
3	B	179/183 (98%)	179 (100%)	0	100	100
3	L	181/183 (99%)	181 (100%)	0	100	100
All	All	936/994 (94%)	928 (99%)	8 (1%)	70	81

5 of 8 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	A	212	GLU
2	A	178	LEU
2	H	143	LYS
2	H	120	SER
2	H	178	LEU

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

Mol	Chain	Res	Type
3	B	194	GLN
3	B	126	GLN
2	A	100(F)	ASN
2	A	82(A)	ASN
3	B	38	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

6 non-standard protein/DNA/RNA residues 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	TYS	H	100(G)	-	15,16,17	1.46	1 (6%)	15,22,24	1.09	1 (6%)
2	TYS	A	100(G)	-	15,16,17	1.47	1 (6%)	15,22,24	1.08	1 (6%)
2	PCA	H	2	2	7,8,9	2.18	2 (28%)	9,10,12	1.78	5 (55%)
2	TYS	A	100(H)	2	15,16,17	1.47	2 (13%)	15,22,24	1.06	1 (6%)
2	TYS	H	100(H)	2	15,16,17	1.45	2 (13%)	15,22,24	1.12	1 (6%)
2	PCA	A	2	2	7,8,9	2.19	2 (28%)	9,10,12	1.78	4 (44%)

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	TYS	H	100(G)	-	-	3/10/11/13	0/1/1/1
2	TYS	A	100(G)	-	-	0/10/11/13	0/1/1/1
2	PCA	H	2	2	-	0/0/11/13	0/1/1/1
2	TYS	A	100(H)	2	-	3/10/11/13	0/1/1/1
2	TYS	H	100(H)	2	-	3/10/11/13	0/1/1/1
2	PCA	A	2	2	-	0/0/11/13	0/1/1/1

The worst 5 of 10 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	100(G)	TYS	OH-S	-4.98	1.48	1.58
2	H	100(G)	TYS	OH-S	-4.97	1.48	1.58
2	A	2	PCA	CD-N	4.92	1.46	1.34
2	H	2	PCA	CD-N	4.91	1.46	1.34
2	A	100(H)	TYS	OH-S	-4.78	1.49	1.58

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

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	100(H)	TYS	O2-S-O1	-3.11	100.26	112.24
2	A	100(G)	TYS	O2-S-O1	-2.96	100.84	112.24
2	H	100(G)	TYS	O2-S-O1	-2.85	101.24	112.24
2	A	100(H)	TYS	O2-S-O1	-2.82	101.36	112.24
2	A	2	PCA	CA-N-CD	-2.64	104.55	113.58

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	H	100(G)	TYS	CZ-OH-S-O3
2	H	100(H)	TYS	CZ-OH-S-O2
2	A	100(H)	TYS	CZ-OH-S-O1
2	H	100(H)	TYS	CZ-OH-S-O3
2	A	100(H)	TYS	CZ-OH-S-O3

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	H	100(G)	TYS	1	0
2	A	100(G)	TYS	1	0

5.5 Carbohydrates [i](#)

24 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
4	NAG	C	1	4,1	14,14,15	1.78	5 (35%)	17,19,21	1.51	2 (11%)
4	NAG	C	2	4	14,14,15	1.76	4 (28%)	17,19,21	1.37	2 (11%)
4	BMA	C	3	4	11,11,12	2.11	4 (36%)	15,15,17	1.38	4 (26%)
4	MAN	C	4	4	11,11,12	2.16	5 (45%)	15,15,17	1.06	1 (6%)
4	MAN	C	5	4	11,11,12	1.99	4 (36%)	15,15,17	1.17	2 (13%)
4	MAN	C	6	4	11,11,12	2.26	5 (45%)	15,15,17	1.10	1 (6%)
4	MAN	C	7	4	11,11,12	2.10	4 (36%)	15,15,17	1.36	2 (13%)
5	NAG	D	1	5,1	14,14,15	1.83	5 (35%)	17,19,21	1.47	4 (23%)
5	NAG	D	2	5	14,14,15	1.85	5 (35%)	17,19,21	1.75	5 (29%)
5	BMA	D	3	5	11,11,12	0.71	0	15,15,17	1.15	1 (6%)
5	MAN	D	4	5	11,11,12	0.54	0	15,15,17	0.82	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	MAN	D	5	5	11,11,12	0.83	0	15,15,17	1.02	1 (6%)
5	MAN	D	6	5	11,11,12	0.66	0	15,15,17	1.19	1 (6%)
4	NAG	E	1	4,1	14,14,15	1.80	4 (28%)	17,19,21	1.52	3 (17%)
4	NAG	E	2	4	14,14,15	1.87	5 (35%)	17,19,21	1.73	3 (17%)
4	BMA	E	3	4	11,11,12	2.11	4 (36%)	15,15,17	1.40	2 (13%)
4	MAN	E	4	4	11,11,12	1.97	4 (36%)	15,15,17	1.06	0
4	MAN	E	5	4	11,11,12	2.01	4 (36%)	15,15,17	1.22	2 (13%)
4	MAN	E	6	4	11,11,12	2.10	4 (36%)	15,15,17	1.11	1 (6%)
4	MAN	E	7	4	11,11,12	2.10	4 (36%)	15,15,17	2.18	5 (33%)
6	NAG	F	1	6,1	14,14,15	1.86	4 (28%)	17,19,21	1.47	2 (11%)
6	NAG	F	2	6	14,14,15	1.97	5 (35%)	17,19,21	1.75	5 (29%)
7	BMA	I	1	7	11,11,12	0.70	0	15,15,17	1.14	1 (6%)
7	MAN	I	2	7	11,11,12	0.67	0	15,15,17	1.18	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.

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

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	MAN	E	7	4	-	1/2/19/22	0/1/1/1
6	NAG	F	1	6,1	-	0/6/23/26	0/1/1/1
6	NAG	F	2	6	-	0/6/23/26	0/1/1/1
7	BMA	I	1	7	-	0/2/19/22	0/1/1/1
7	MAN	I	2	7	-	0/2/19/22	0/1/1/1

The worst 5 of 79 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	C	6	MAN	C2-C3	-4.36	1.45	1.52
6	F	2	NAG	O5-C1	4.23	1.50	1.43
6	F	1	NAG	O5-C1	4.16	1.50	1.43
4	C	6	MAN	C4-C3	-3.93	1.42	1.52
4	E	2	NAG	O5-C1	3.92	1.50	1.43

The worst 5 of 51 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	7	MAN	C3-C4-C5	4.97	119.24	110.23
4	E	2	NAG	O5-C5-C6	3.97	115.39	107.66
6	F	2	NAG	C1-O5-C5	3.69	117.14	112.19
4	E	1	NAG	C1-O5-C5	3.45	116.81	112.19
6	F	1	NAG	O5-C5-C6	3.42	114.31	107.66

There are no chirality outliers.

5 of 9 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	C	7	MAN	O5-C5-C6-O6
4	C	7	MAN	C4-C5-C6-O6
4	E	2	NAG	O5-C5-C6-O6
4	E	2	NAG	C4-C5-C6-O6
4	E	1	NAG	C8-C7-N2-C2

There are no ring outliers.

10 monomers are involved in 18 short contacts:

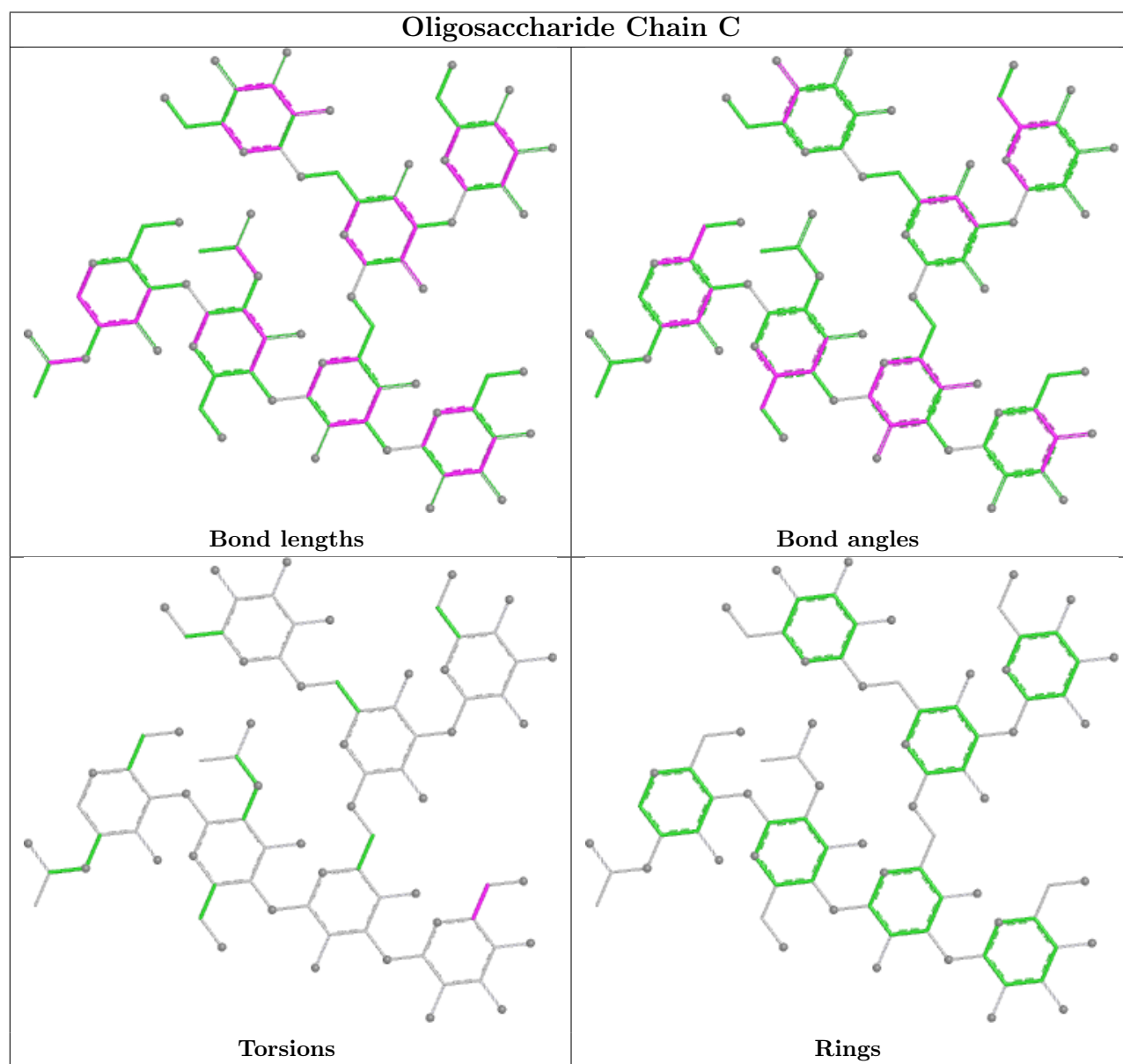
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	6	MAN	3	0
4	E	4	MAN	2	0
5	D	3	BMA	5	0

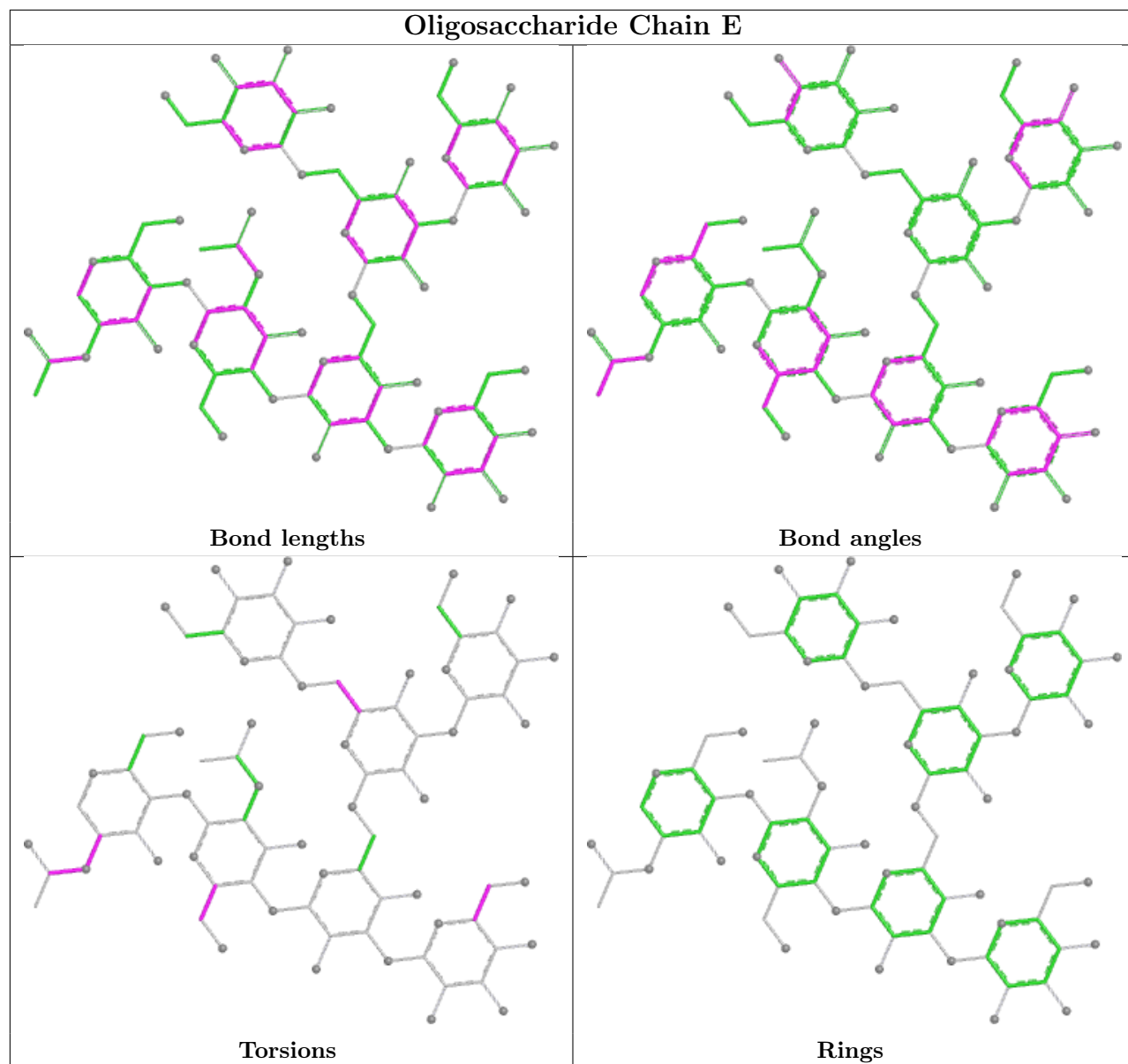
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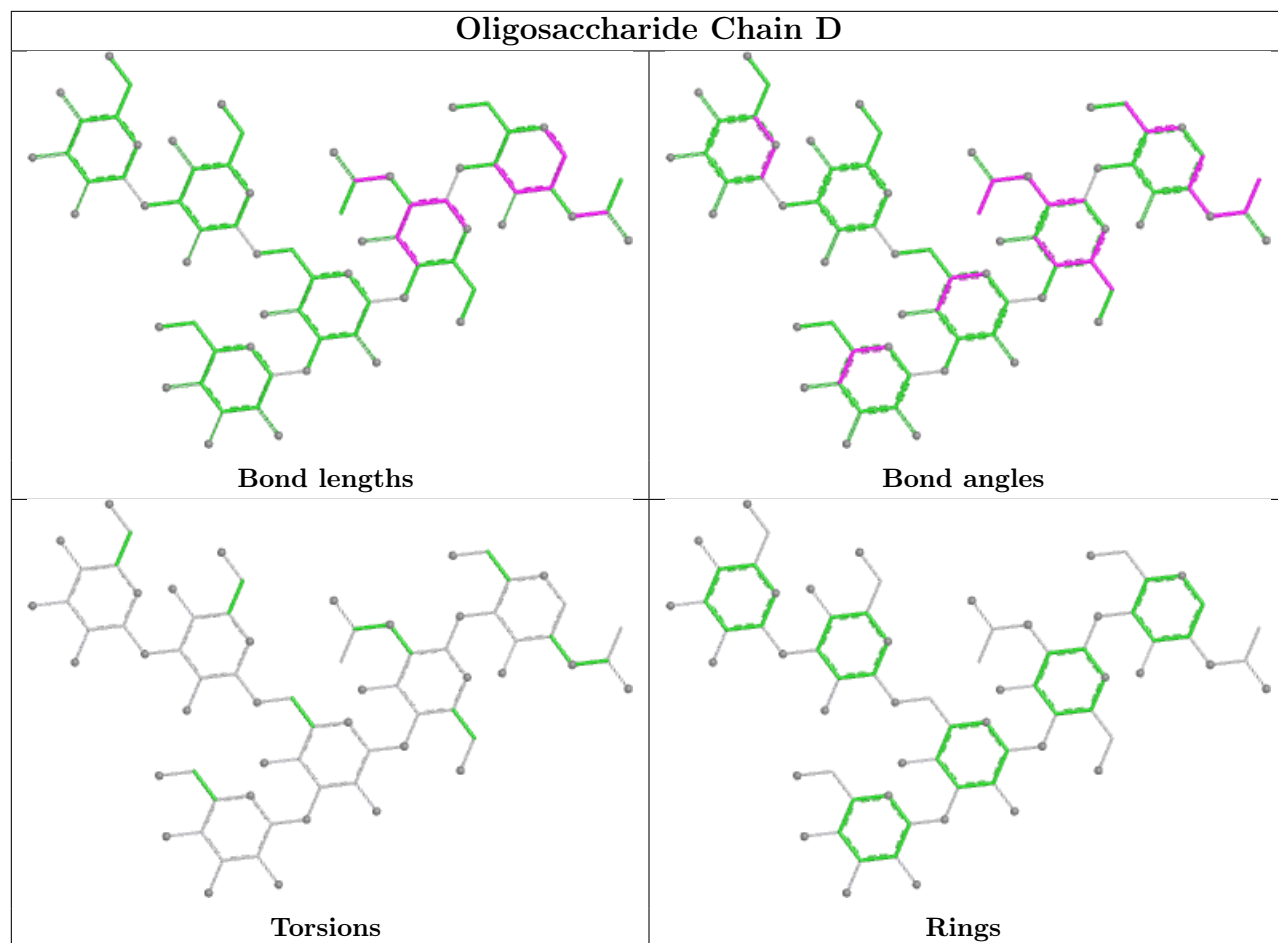
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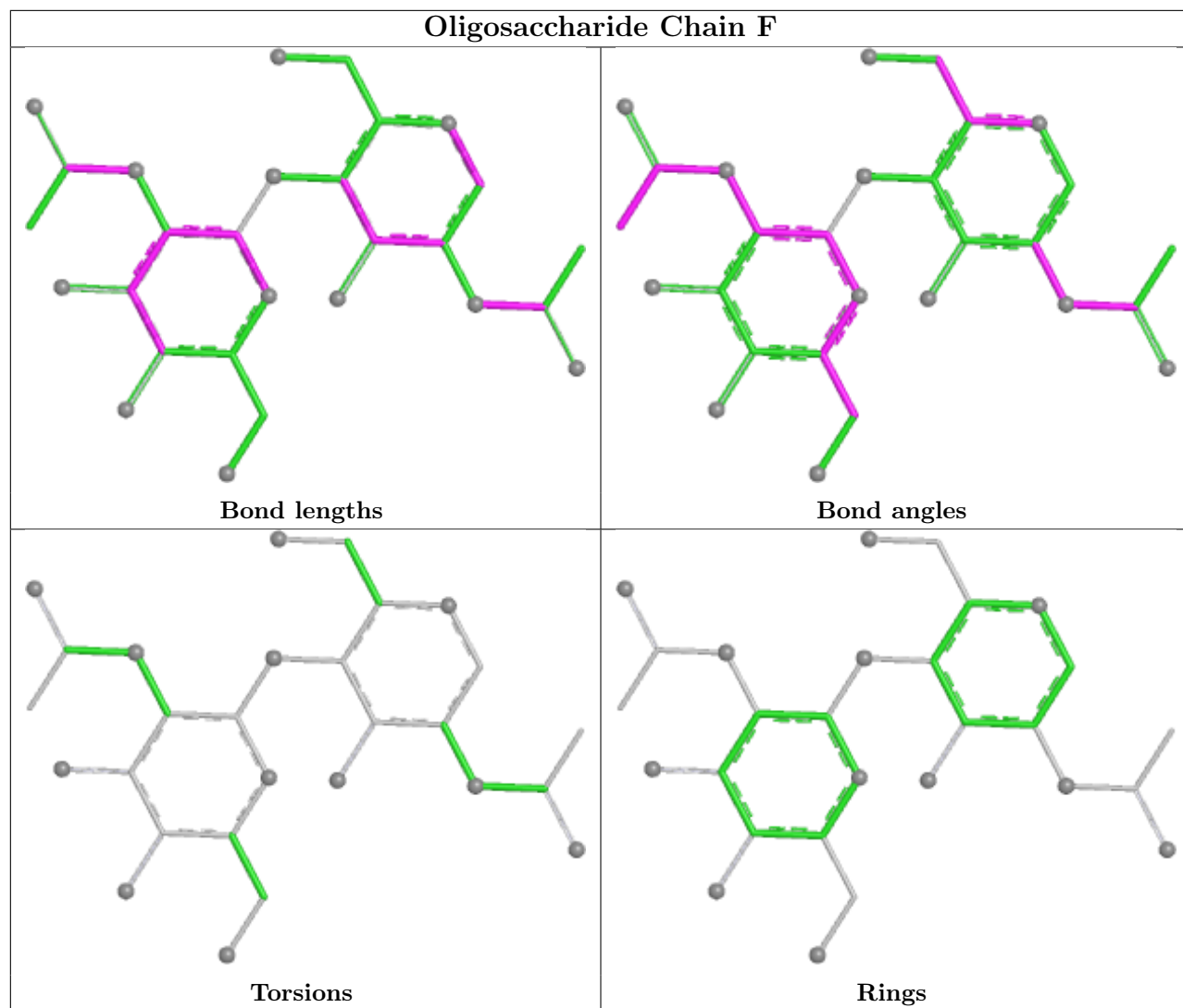
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	D	4	MAN	4	0
7	I	1	BMA	5	0
4	E	6	MAN	2	0
5	D	2	NAG	1	0
4	C	1	NAG	1	0
4	E	1	NAG	1	0
6	F	2	NAG	5	0

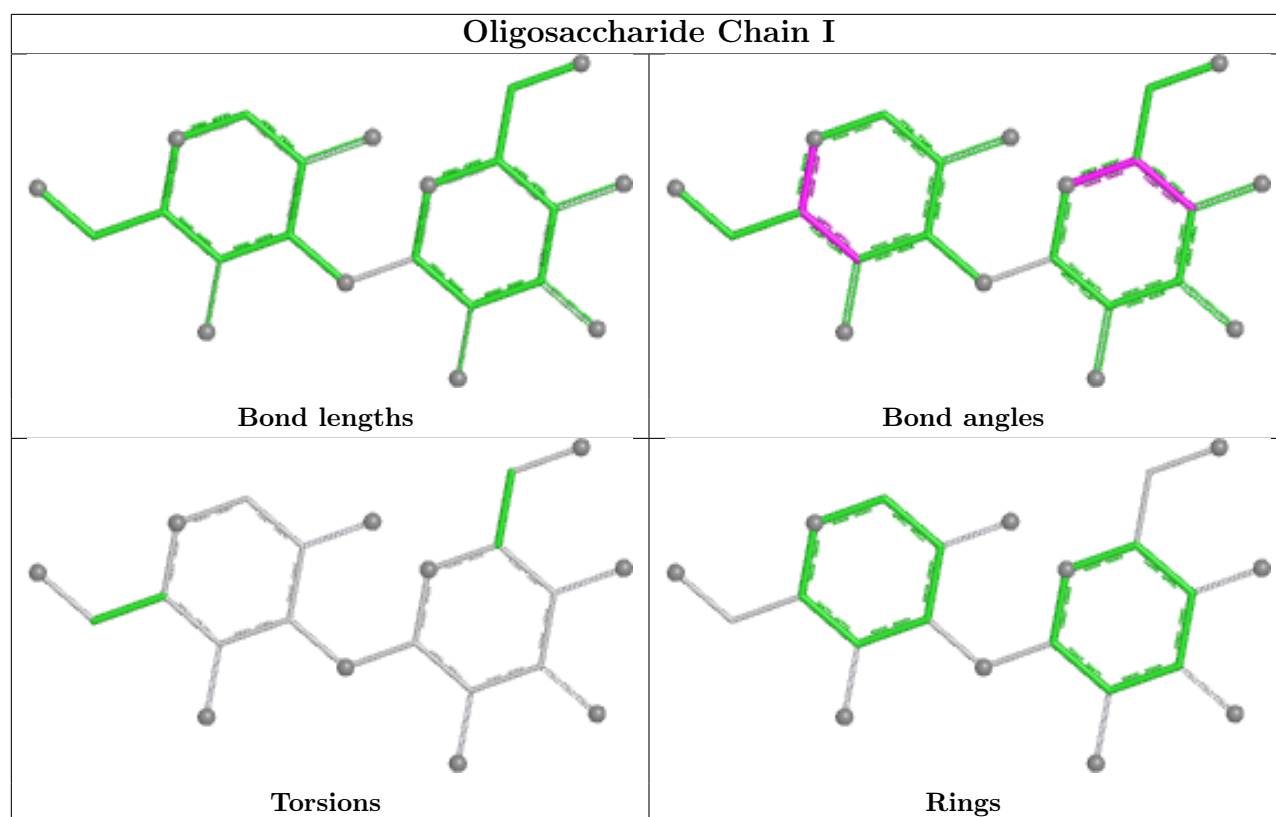
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.











5.6 Ligand geometry [i](#)

12 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	$\# Z > 2$
8	SO4	L	217	-	4,4,4	0.24	0	6,6,6	0.11	0
8	SO4	B	216	-	4,4,4	0.23	0	6,6,6	0.14	0
8	SO4	G	15	-	4,4,4	0.25	0	6,6,6	0.06	0
8	SO4	L	213	-	4,4,4	0.24	0	6,6,6	0.08	0
8	SO4	L	218	-	4,4,4	0.24	0	6,6,6	0.16	0
8	SO4	L	12	-	4,4,4	0.24	0	6,6,6	0.11	0
8	SO4	B	214	-	4,4,4	0.23	0	6,6,6	0.11	0
8	SO4	L	214	-	4,4,4	0.25	0	6,6,6	0.11	0
8	SO4	B	215	-	4,4,4	0.23	0	6,6,6	0.09	0
8	SO4	L	216	-	4,4,4	0.23	0	6,6,6	0.16	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
8	SO4	B	213	-	4,4,4	0.26	0	6,6,6	0.09	0
8	SO4	L	215	-	4,4,4	0.25	0	6,6,6	0.10	0

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
8	B	213	SO4	1	0

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	G	108/124 (87%)	0.31	6 (5%)	30 29	31, 52, 106, 135	0
1	J	109/124 (87%)	0.38	5 (4%)	37 36	34, 63, 107, 126	0
2	A	227/248 (91%)	-0.11	6 (2%)	57 56	22, 45, 90, 127	1 (0%)
2	H	236/248 (95%)	-0.23	1 (0%)	88 88	23, 37, 77, 119	0
3	B	212/216 (98%)	-0.00	4 (1%)	66 65	25, 49, 87, 124	0
3	L	214/216 (99%)	-0.24	2 (0%)	81 80	20, 37, 62, 109	0
All	All	1106/1176 (94%)	-0.05	24 (2%)	62 61	20, 44, 90, 135	1 (0%)

The worst 5 of 24 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	L	1	GLN	5.6
2	H	216	CYS	4.6
1	G	244	LEU	4.3
1	J	150	LEU	3.9
3	B	209	THR	3.2

6.2 Non-standard residues in protein, DNA, RNA chains [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	TYS	A	100(G)	16/17	0.89	0.10	28,38,92,103	0
2	TYS	H	100(H)	16/17	0.91	0.14	25,35,102,112	0
2	PCA	H	2	8/9	0.92	0.09	27,35,48,61	0
2	TYS	H	100(G)	16/17	0.92	0.11	27,35,105,119	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	TYS	A	100(H)	16/17	0.92	0.12	21,33,94,107	0
2	PCA	A	2	8/9	0.96	0.06	31,45,55,60	0

6.3 Carbohydrates

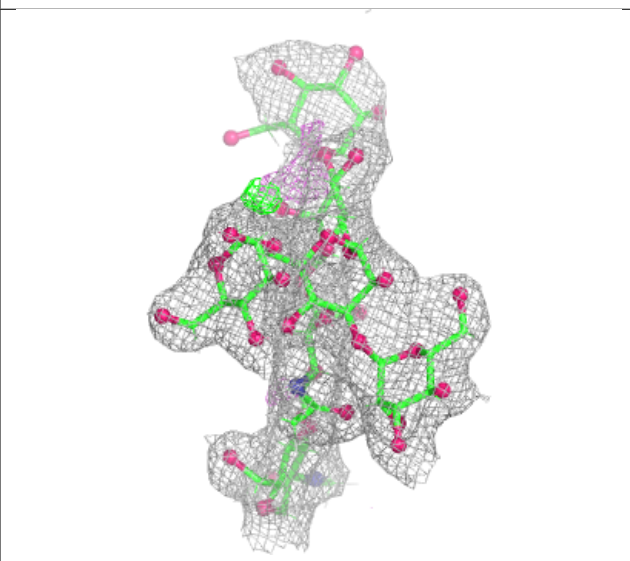
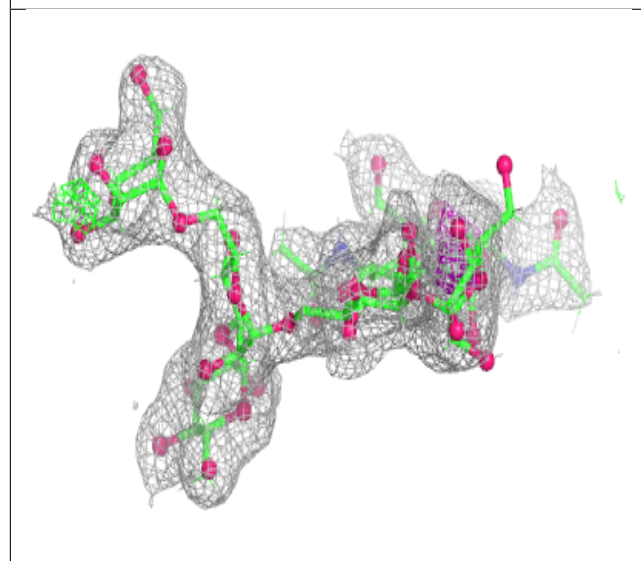
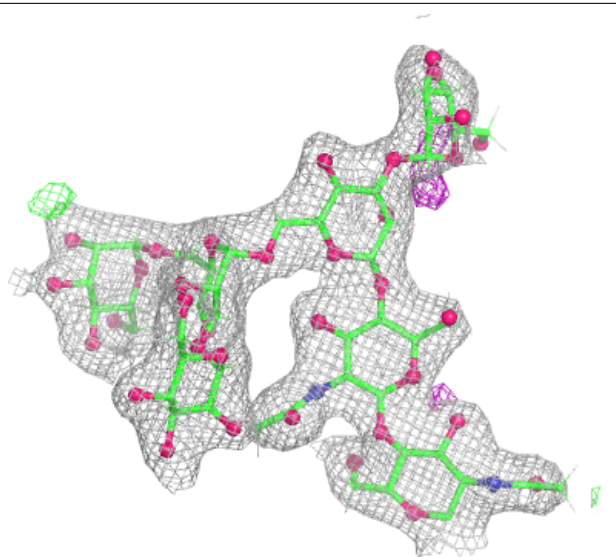
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
4	NAG	C	1	14/15	-	-	27,40,50,58	0
4	NAG	C	2	14/15	-	-	33,47,84,101	0
4	BMA	C	3	11/12	-	-	41,67,96,100	0
4	MAN	C	4	11/12	-	-	29,37,47,48	0
4	MAN	C	5	11/12	-	-	23,37,50,50	0
4	MAN	C	6	11/12	-	-	27,37,49,53	0
4	MAN	C	7	11/12	-	-	93,110,131,132	0
4	NAG	E	1	14/15	-	-	27,41,55,58	0
4	NAG	E	2	14/15	-	-	22,46,74,85	0
4	BMA	E	3	11/12	-	-	45,61,91,96	0
4	MAN	E	4	11/12	-	-	32,39,46,54	0
4	MAN	E	5	11/12	-	-	24,38,58,58	0
4	MAN	E	6	11/12	-	-	32,42,52,60	0
4	MAN	E	7	11/12	-	-	108,114,138,138	0
5	NAG	D	1	14/15	-	-	32,51,61,69	0
5	NAG	D	2	14/15	-	-	49,68,88,100	0
5	BMA	D	3	11/12	-	-	116,141,169,171	0
5	MAN	D	4	11/12	-	-	130,148,176,178	0
5	MAN	D	5	11/12	-	-	112,142,167,171	0
5	MAN	D	6	11/12	-	-	111,144,176,190	0
6	NAG	F	1	14/15	-	-	38,47,62,66	0
6	NAG	F	2	14/15	-	-	48,63,77,82	0
7	BMA	I	1	11/12	-	-	136,144,171,173	0
7	MAN	I	2	11/12	-	-	118,143,167,174	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.

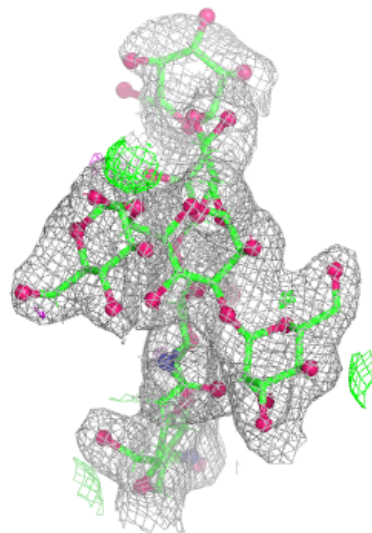
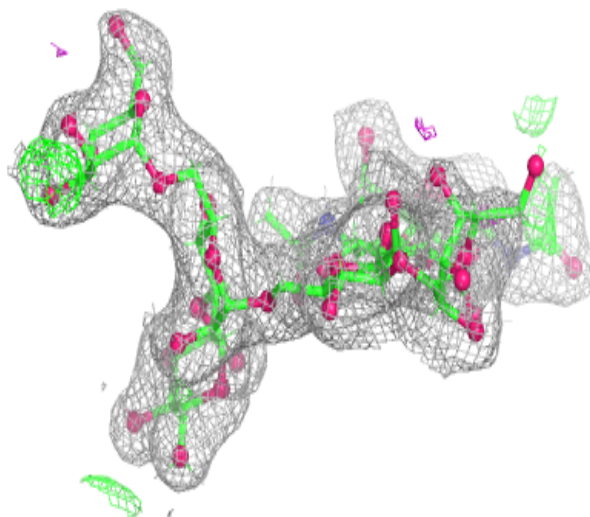
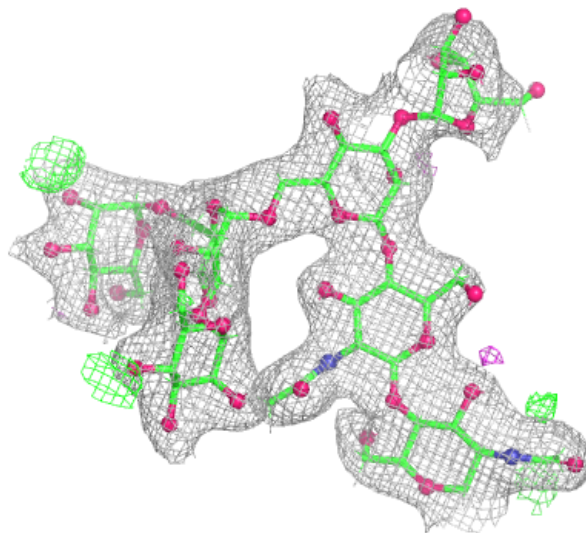
Electron density around Chain C:

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



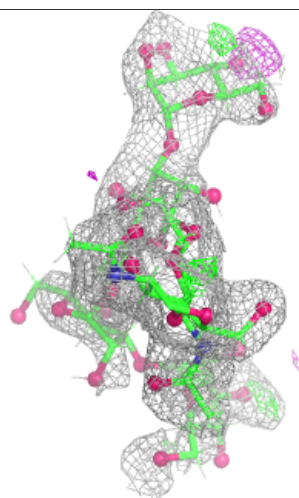
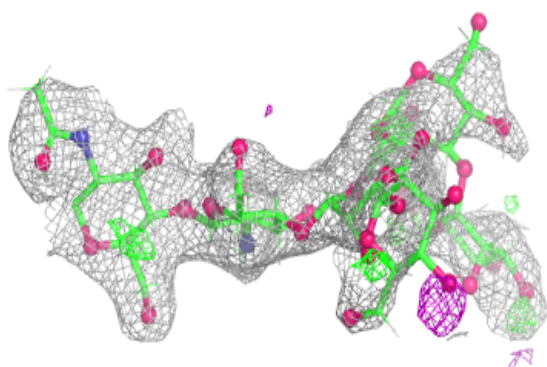
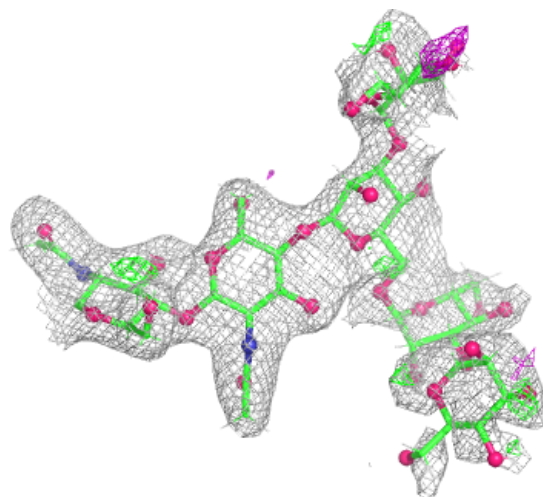
Electron density around Chain E:

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



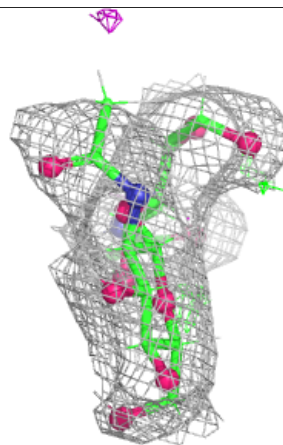
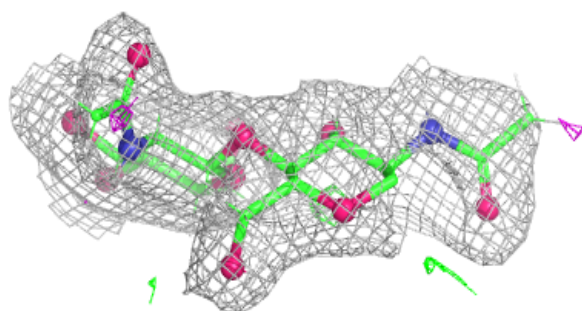
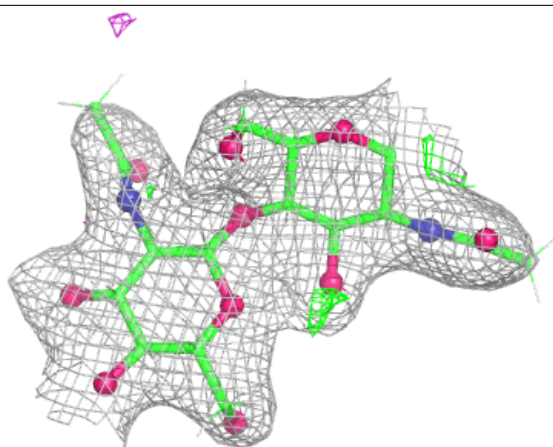
Electron density around Chain D:

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

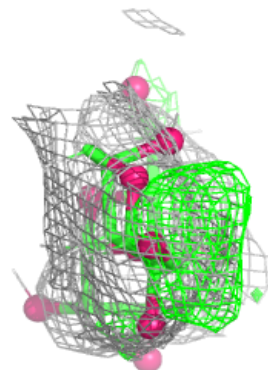
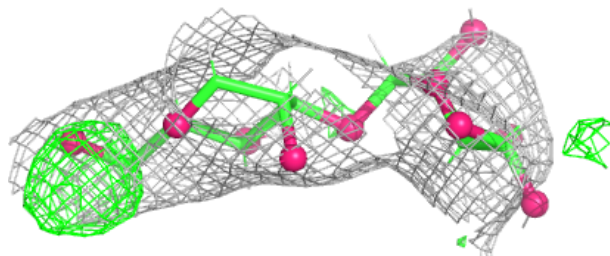
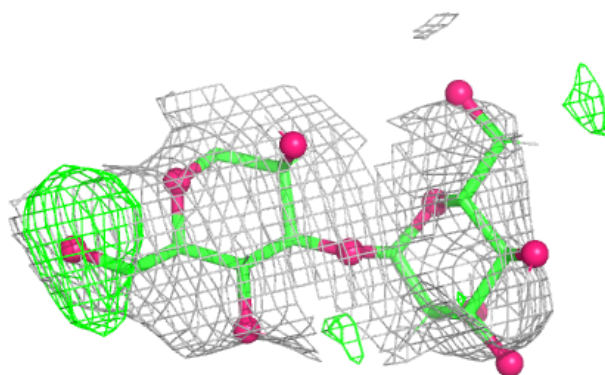


Electron density around Chain F:

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

**Electron density around Chain I:**

$2mF_o - DF_c$ (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
8	SO4	B	214	5/5	0.76	0.12	85,93,99,103	0
8	SO4	G	15	5/5	0.81	0.16	116,116,122,132	0
8	SO4	L	12	5/5	0.84	0.11	85,89,96,100	0
8	SO4	L	213	5/5	0.84	0.09	80,89,94,99	0
8	SO4	L	218	5/5	0.86	0.22	115,120,123,129	0
8	SO4	B	216	5/5	0.86	0.16	107,121,125,126	0
8	SO4	B	215	5/5	0.87	0.09	94,98,103,108	0
8	SO4	L	215	5/5	0.88	0.12	68,72,79,83	0
8	SO4	B	213	5/5	0.91	0.09	70,83,90,92	0
8	SO4	L	214	5/5	0.93	0.11	44,52,82,91	0
8	SO4	L	217	5/5	0.96	0.10	40,50,55,65	0
8	SO4	L	216	5/5	0.98	0.05	35,38,45,53	0

6.5 Other polymers [i](#)

There are no such residues in this entry.