



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 31, 2023 – 02:17 PM EDT

PDB ID : 3KCG
Title : Crystal structure of the antithrombin-factor IXa-pentasaccharide complex
Authors : Huntington, J.A.; Johnson, D.J.D.
Deposited on : 2009-10-21
Resolution : 1.70 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.36
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) : 2.36

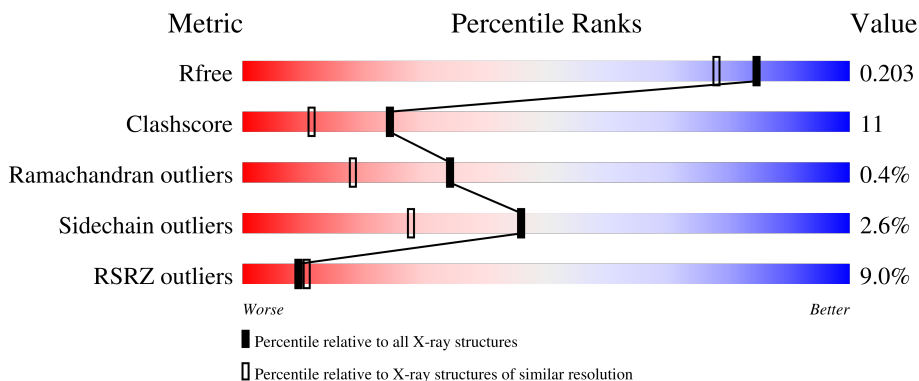
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.70 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	4298 (1.70-1.70)
Clashscore	141614	4695 (1.70-1.70)
Ramachandran outliers	138981	4610 (1.70-1.70)
Sidechain outliers	138945	4610 (1.70-1.70)
RSRZ outliers	127900	4222 (1.70-1.70)

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	L	59	
2	H	235	
3	I	432	
4	A	2	
4	C	2	

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Mol	Chain	Length	Quality of chain	
5	B	3		
6	D	5		

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	FUC	A	2	-	-	-	X
4	NAG	C	1	-	-	-	X
4	FUC	C	2	-	-	-	X
5	MAN	B	3	-	-	-	X

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 6669 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 Coagulation factor IXa light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	L	54	377	231	69	70	7	0	0	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
L	84	MET	-	initiating methionine	UNP P00740

- Molecule 2 is a protein called Coagulation factor IXa heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	235	1938	1227	341	360	10	0	12	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	195	ALA	SER	engineered mutation	UNP P00740

- Molecule 3 is a protein called Antithrombin-III.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	I	419	3483	2213	597	653	20	0	24	0

There is a discrepancy between the modelled and reference sequences:

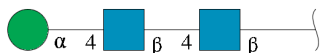
Chain	Residue	Modelled	Actual	Comment	Reference
I	137	ALA	SER	engineered mutation	UNP P01008

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



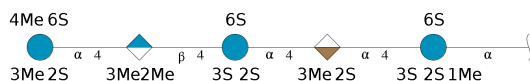
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	A	2	Total	C	N	O	0	0	0
			24	14	1	9			
4	C	2	Total	C	N	O	0	0	0
			24	14	1	9			

- Molecule 5 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
5	B	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 6 is an oligosaccharide called 3,4-di-O-methyl-2,6-di-O-sulfo-alpha-D-glucopyranos e-(1-4)-2,3-di-O-methyl-beta-D-glucopyranuronic acid-(1-4)-2,3,6-tri-O-sulfo-alpha-D-glucop yranose-(1-4)-3-O-methyl-2-O-sulfo-alpha-L-idopyranuronic acid-(1-4)-methyl 2,3,6-tri-O-su lfo-alpha-D-glucopyranoside.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
6	D	5	Total	C	O	S	0	0	0
			100	36	55	9			

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	H	1	Total	Ca	0	0
			1	1		

- Molecule 8 is (4S)-2-METHYL-2,4-PENTANEDIOL (three-letter code: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	I	1	Total C O 8 6 2	0	0
8	I	1	Total C O 8 6 2	0	0

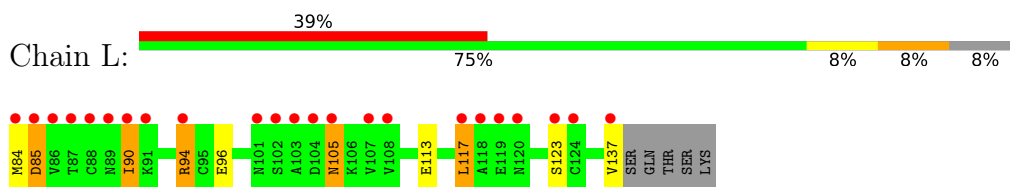
- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	L	28	Total O 28 28	0	0
9	H	292	Total O 292 292	0	0
9	I	347	Total O 347 347	0	0

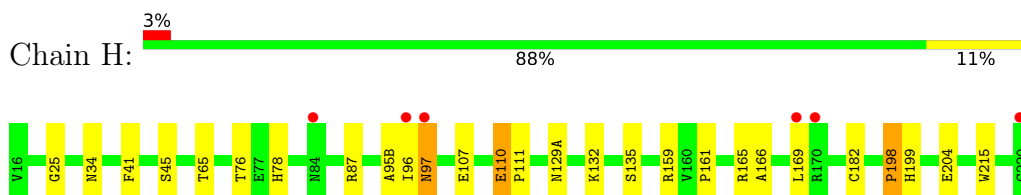
3 Residue-property plots [i](#)

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.

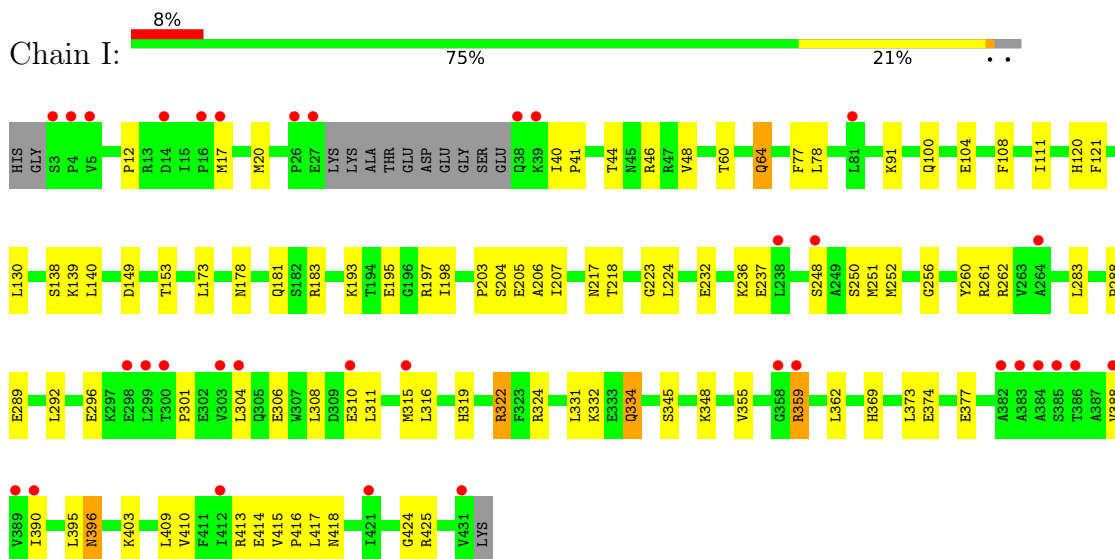
- Molecule 1: Coagulation factor IXa light chain



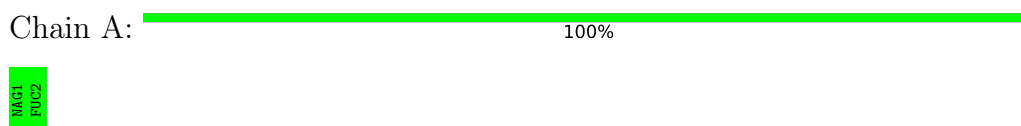
- Molecule 2: Coagulation factor IXa heavy chain



- Molecule 3: Antithrombin-III



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



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

Chain C:  50% 50%


MAG1
FUC2

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

Chain B:  67% 33%

MAG1
MAG2
MAN3

- Molecule 6: 3,4-di-O-methyl-2,6-di-O-sulfo-alpha-D-glucopyranose-(1-4)-2,3-di-O-methyl-beta-D-glucopyranuronic acid-(1-4)-2,3,6-tri-O-sulfo-alpha-D-glucopyranose-(1-4)-3-O-methyl-2-O-sulfo-alpha-L-idopyranuronic acid-(1-4)-methyl 2,3,6-tri-O-sulfo-alpha-D-glucopyranoside

Chain D:  60% 40%

Z9L1
Z9K2
G063
G014
Z9H5

4 Data and refinement statistics i

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	78.78Å 88.44Å 147.23Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.05 – 1.70 38.05 – 1.70	Depositor EDS
% Data completeness (in resolution range)	98.9 (38.05-1.70) 99.1 (38.05-1.70)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	0.07	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.00 (at 1.70Å)	Xtrriage
Refinement program	CNS 1.2	Depositor
R, R_{free}	0.208 , 0.230 0.206 , 0.203	Depositor DCC
R_{free} test set	5638 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å ²)	26.4	Xtrriage
Anisotropy	0.030	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 47.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	6669	wwPDB-VP
Average B, all atoms (Å ²)	33.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.47% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: FUC, Z9K, Z9L, GU1, MAN, GU6, Z9H, MPD, NAG, CA

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	L	0.31	0/382	0.57	0/518
2	H	0.34	0/1983	0.67	1/2687 (0.0%)
3	I	0.31	0/3551	0.60	0/4799
All	All	0.32	0/5916	0.62	1/8004 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	H	199	HIS	N-CA-C	-5.94	94.95	111.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	L	377	0	335	15	0
2	H	1938	0	1869	29	0
3	I	3483	0	3401	88	0
4	A	24	0	22	0	0
4	C	24	0	22	1	0
5	B	39	0	34	2	0
6	D	100	0	19	3	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	H	1	0	0	0	0
8	I	16	0	28	1	0
9	H	292	0	0	4	0
9	I	347	0	0	4	0
9	L	28	0	0	1	0
All	All	6669	0	5730	130	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 11.

All (130) 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)
3:I:359:ARG:HD3	3:I:359:ARG:H	1.13	1.07
3:I:359:ARG:HH21	3:I:359:ARG:HG2	1.15	1.07
3:I:60[A]:THR:HG21	3:I:301:PRO:HG3	1.41	1.02
3:I:359:ARG:HD3	3:I:359:ARG:N	1.84	0.92
3:I:424:GLY:C	3:I:425[A]:ARG:CA	2.44	0.86
3:I:64[A]:GLN:HE21	3:I:64[A]:GLN:HA	1.40	0.85
3:I:359:ARG:H	3:I:359:ARG:CD	1.86	0.83
3:I:20:MET:CE	5:B:1:NAG:H2	2.19	0.73
3:I:292:LEU:HD11	3:I:409:LEU:HG	1.70	0.72
2:H:34:ASN:HB2	2:H:65[B]:THR:HG23	1.73	0.71
3:I:261:ARG:NH1	3:I:310:GLU:HB3	2.06	0.69
3:I:193:LYS:HG3	4:C:2:FUC:O3	1.92	0.69
3:I:183[A]:ARG:HB2	3:I:207:ILE:HD11	1.74	0.69
3:I:359:ARG:HH21	3:I:359:ARG:CG	2.01	0.68
2:H:87[B]:ARG:HB3	2:H:107:GLU:HB3	1.76	0.68
3:I:359:ARG:HG2	3:I:359:ARG:NH2	1.94	0.67
3:I:183[B]:ARG:HB2	3:I:207:ILE:HD11	1.76	0.66
2:H:159[B]:ARG:HH22	2:H:161:PRO:HB3	1.61	0.66
3:I:198:ILE:HD13	3:I:218:THR:HB	1.78	0.64
3:I:324:ARG:HG2	3:I:374:GLU:HG3	1.79	0.63
2:H:34:ASN:HB2	2:H:65[B]:THR:CG2	2.29	0.63
6:D:4:GU1:H82	6:D:4:GU1:O2	1.99	0.63
3:I:319:HIS:HB2	3:I:403[A]:LYS:HA	1.80	0.63
3:I:319:HIS:HB2	3:I:403[B]:LYS:HA	1.80	0.62
2:H:76:THR:HG22	2:H:78[A]:HIS:HD2	1.65	0.61
2:H:41:PHE:HA	3:I:395:LEU:HB2	1.83	0.60
3:I:308:LEU:HD13	3:I:413:ARG:NH1	2.17	0.60
3:I:203:PRO:HG2	3:I:206:ALA:HB2	1.82	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:L:94:ARG:HH11	1:L:94:ARG:CG	2.15	0.59
2:H:45:SER:OG	2:H:198:PRO:HB3	2.03	0.58
1:L:113:GLU:HG3	9:H:587:HOH:O	2.03	0.58
1:L:85:ASP:HB3	1:L:105:ASN:OD1	2.04	0.58
6:D:3:GU6:O4	6:D:4:GU1:H73	2.04	0.57
1:L:84:MET:O	1:L:85:ASP:HB2	2.03	0.57
3:I:252:MET:SD	3:I:377:GLU:HG3	2.44	0.57
3:I:359:ARG:NH2	9:I:571:HOH:O	2.37	0.57
3:I:415:VAL:HB	3:I:416:PRO:HD3	1.87	0.57
2:H:165[A]:ARG:O	2:H:169:LEU:HD13	2.06	0.56
3:I:60[A]:THR:CG2	3:I:301:PRO:HG3	2.26	0.56
3:I:108:PHE:O	3:I:111:ILE:HG12	2.06	0.56
3:I:261:ARG:HD3	3:I:262:ARG:N	2.21	0.55
3:I:60[A]:THR:HG21	3:I:301:PRO:CG	2.28	0.55
3:I:20:MET:HE2	5:B:1:NAG:H2	1.88	0.54
3:I:283:LEU:CD2	3:I:410:VAL:HG12	2.37	0.54
1:L:94:ARG:NH1	1:L:94:ARG:HG2	2.22	0.54
3:I:417:LEU:O	3:I:418:ASN:HB2	2.08	0.54
2:H:97[B]:ASN:O	2:H:97[B]:ASN:OD1	2.26	0.53
2:H:110[A]:GLU:OE1	2:H:111:PRO:HD2	2.09	0.53
3:I:236:LYS:HD2	3:I:248:SER:OG	2.09	0.53
3:I:332[A]:LYS:HE2	9:I:616:HOH:O	2.09	0.52
3:I:183[B]:ARG:CB	3:I:207:ILE:HD11	2.39	0.52
3:I:44:THR:HG21	3:I:417:LEU:HD11	1.91	0.52
3:I:120:HIS:H	3:I:120:HIS:CD2	2.27	0.52
3:I:60[B]:THR:HG21	3:I:301:PRO:HD3	1.91	0.51
2:H:96:ILE:O	2:H:97[A]:ASN:CB	2.57	0.51
3:I:288:PRO:O	3:I:289:GLU:CB	2.58	0.51
3:I:304:LEU:HD23	3:I:304:LEU:C	2.31	0.51
2:H:96:ILE:O	2:H:97[A]:ASN:HB2	2.11	0.51
2:H:215:TRP:CE3	3:I:390:ILE:HG23	2.46	0.50
2:H:182[B]:CYS:SG	2:H:225:TYR:HB2	2.52	0.50
2:H:129(A):ASN:O	2:H:132[A]:LYS:HG2	2.12	0.50
1:L:137:VAL:HG21	2:H:25:GLY:HA3	1.93	0.49
2:H:95(B):ALA:C	2:H:96:ILE:HD13	2.32	0.49
1:L:94:ARG:CG	1:L:94:ARG:NH1	2.74	0.49
2:H:135:SER:OG	2:H:159[B]:ARG:NE	2.43	0.49
3:I:60[A]:THR:O	3:I:64[A]:GLN:HG2	2.13	0.49
1:L:90:ILE:O	1:L:90:ILE:HG13	2.12	0.49
1:L:94:ARG:HH11	1:L:94:ARG:CB	2.26	0.49
3:I:139:LYS:HE3	3:I:197:ARG:NH2	2.27	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:I:359:ARG:CG	3:I:359:ARG:NH2	2.67	0.48
3:I:355:VAL:HB	3:I:362:LEU:HD22	1.94	0.48
2:H:165[B]:ARG:HH11	2:H:165[B]:ARG:CG	2.26	0.48
9:H:659:HOH:O	3:I:388:VAL:HA	2.13	0.47
3:I:237:GLU:OE1	3:I:251[A]:MET:HG2	2.14	0.47
2:H:165[B]:ARG:NH1	2:H:165[B]:ARG:HG2	2.28	0.47
1:L:113:GLU:HG2	9:L:584:HOH:O	2.14	0.47
2:H:96:ILE:O	2:H:97[B]:ASN:ND2	2.48	0.47
3:I:130:LEU:HB2	8:I:5276:MPD:HM2	1.96	0.47
1:L:94:ARG:HH11	1:L:94:ARG:HG2	1.79	0.47
3:I:44:THR:HG21	3:I:417:LEU:CD1	2.45	0.47
3:I:261:ARG:HH12	3:I:310:GLU:HB3	1.77	0.47
2:H:165[B]:ARG:HG3	9:H:664:HOH:O	2.15	0.46
3:I:261:ARG:HD3	3:I:262:ARG:H	1.79	0.46
3:I:256:GLY:HA2	3:I:315:MET:HE1	1.97	0.46
3:I:138:SER:CB	3:I:223:GLY:HA2	2.46	0.46
3:I:232[A]:GLU:H	3:I:232[A]:GLU:CD	2.19	0.46
1:L:117:LEU:HD23	1:L:123:SER:O	2.15	0.46
3:I:91:LYS:HD3	3:I:91:LYS:C	2.37	0.46
2:H:76:THR:HG22	2:H:78[A]:HIS:CD2	2.49	0.46
3:I:181:GLN:HG3	9:I:756:HOH:O	2.16	0.46
3:I:64[A]:GLN:HE21	3:I:64[A]:GLN:CA	2.14	0.46
3:I:331[B]:LEU:HD11	3:I:369:HIS:HB2	1.98	0.45
1:L:90:ILE:O	1:L:90:ILE:CG1	2.64	0.45
3:I:100:GLN:O	3:I:104:GLU:HG3	2.17	0.45
3:I:261:ARG:HB3	3:I:311:LEU:HD23	1.98	0.45
3:I:334:GLN:HE21	3:I:334:GLN:N	2.02	0.45
1:L:96:GLU:HG3	2:H:204:GLU:HG2	1.98	0.45
2:H:96:ILE:O	2:H:97[B]:ASN:CB	2.63	0.45
3:I:40:ILE:HD12	3:I:46[B]:ARG:NH1	2.31	0.45
3:I:306:GLU:O	3:I:310:GLU:HG3	2.17	0.45
3:I:283:LEU:HD22	3:I:410:VAL:HG12	1.99	0.44
3:I:292:LEU:O	3:I:296:GLU:HG3	2.17	0.44
3:I:17:MET:HG3	3:I:120:HIS:HE1	1.82	0.44
2:H:132[B]:LYS:HE2	2:H:132[B]:LYS:HB2	1.75	0.43
3:I:153[B]:THR:HG23	9:I:450:HOH:O	2.18	0.43
3:I:395:LEU:O	3:I:396:ASN:HB3	2.18	0.43
3:I:195:GLU:HB2	3:I:197:ARG:NH1	2.34	0.43
3:I:260:TYR:CG	3:I:261:ARG:N	2.87	0.42
1:L:105:ASN:HD22	1:L:105:ASN:HA	1.57	0.42
3:I:140:LEU:C	3:I:140:LEU:HD23	2.40	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:165[B]:ARG:CG	2:H:165[B]:ARG:NH1	2.83	0.42
3:I:40:ILE:HA	3:I:41:PRO:HD3	1.92	0.42
3:I:149:ASP:HA	3:I:173:LEU:O	2.20	0.42
2:H:132[A]:LYS:HD2	9:H:624:HOH:O	2.19	0.41
3:I:40:ILE:HD12	3:I:46[B]:ARG:CZ	2.51	0.41
3:I:183[A]:ARG:NE	3:I:204:SER:HA	2.36	0.41
3:I:183[A]:ARG:CA	3:I:207:ILE:HD11	2.51	0.41
3:I:204:SER:O	3:I:205:GLU:HB2	2.21	0.41
3:I:395:LEU:HD23	3:I:395:LEU:HA	1.97	0.41
2:H:165[B]:ARG:O	2:H:166:ALA:C	2.59	0.41
3:I:12:PRO:HG3	3:I:121:PHE:CE2	2.56	0.40
3:I:345:SER:HB3	3:I:348:LYS:HB2	2.04	0.40
3:I:178:ASN:OD1	3:I:181:GLN:NE2	2.54	0.40
3:I:48:VAL:HG21	6:D:5:Z9H:O12	2.21	0.40
3:I:77:PHE:CE2	3:I:373:LEU:HB2	2.57	0.40
3:I:250:SER:HB2	3:I:322[A]:ARG:CG	2.51	0.40

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	L	52/59 (88%)	46 (88%)	5 (10%)	1 (2%)	8 1
2	H	245/235 (104%)	237 (97%)	6 (2%)	2 (1%)	19 6
3	I	439/432 (102%)	426 (97%)	12 (3%)	1 (0%)	47 30
All	All	736/726 (101%)	709 (96%)	23 (3%)	4 (0%)	34 13

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	H	97[A]	ASN

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Mol	Chain	Res	Type
2	H	97[B]	ASN
1	L	85	ASP
3	I	396	ASN

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	L	38/53 (72%)	34 (90%)	4 (10%)	7 1
2	H	206/197 (105%)	203 (98%)	3 (2%)	65 51
3	I	374/382 (98%)	363 (97%)	11 (3%)	42 23
All	All	618/632 (98%)	600 (97%)	18 (3%)	46 23

All (18) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	L	90	ILE
1	L	94	ARG
1	L	105	ASN
1	L	117	LEU
2	H	110[A]	GLU
2	H	110[B]	GLU
2	H	198	PRO
3	I	64[A]	GLN
3	I	64[B]	GLN
3	I	78	LEU
3	I	217	ASN
3	I	224	LEU
3	I	316	LEU
3	I	322[A]	ARG
3	I	322[B]	ARG
3	I	334	GLN
3	I	359	ARG
3	I	414	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	L	89	ASN
2	H	84	ASN
3	I	120	HIS
3	I	181	GLN
3	I	334	GLN

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

12 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	A	1	4,3	14,14,15	0.50	0	17,19,21	0.72	0
4	FUC	A	2	4	10,10,11	0.48	0	14,14,16	0.38	0
5	NAG	B	1	3,5	14,14,15	0.54	0	17,19,21	0.67	1 (5%)
5	NAG	B	2	5	14,14,15	0.65	0	17,19,21	1.01	1 (5%)
5	MAN	B	3	5	11,11,12	1.15	1 (9%)	15,15,17	1.40	2 (13%)
4	NAG	C	1	4,3	14,14,15	0.52	0	17,19,21	0.68	0
4	FUC	C	2	4	10,10,11	0.53	0	14,14,16	0.49	0
6	Z9L	D	1	6	25,25,25	1.86	4 (16%)	30,39,39	1.21	3 (10%)
6	Z9K	D	2	6	17,17,18	1.45	2 (11%)	17,25,27	1.12	1 (5%)
6	GU6	D	3	6	23,23,24	1.93	4 (17%)	25,36,38	1.44	3 (12%)
6	GU1	D	4	6	14,14,15	0.66	0	15,19,21	0.74	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
6	Z9H	D	5	6	21,21,22	1.70	3 (14%)	25,31,33	1.63	4 (16%)

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	A	1	4,3	-	2/6/23/26	0/1/1/1
4	FUC	A	2	4	-	-	0/1/1/1
5	NAG	B	1	3,5	-	4/6/23/26	0/1/1/1
5	NAG	B	2	5	-	4/6/23/26	0/1/1/1
5	MAN	B	3	5	-	2/2/19/22	0/1/1/1
4	NAG	C	1	4,3	-	6/6/23/26	0/1/1/1
4	FUC	C	2	4	-	-	0/1/1/1
6	Z9L	D	1	6	-	0/18/38/38	0/1/1/1
6	Z9K	D	2	6	-	0/11/28/31	0/1/1/1
6	GU6	D	3	6	-	0/16/33/36	0/1/1/1
6	GU1	D	4	6	-	0/8/25/28	0/1/1/1
6	Z9H	D	5	6	-	0/15/32/35	0/1/1/1

All (14) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	D	5	Z9H	O6-S1	-4.93	1.43	1.56
6	D	1	Z9L	O6-S1	-4.89	1.43	1.56
6	D	3	GU6	O6-S6	-4.87	1.43	1.56
6	D	3	GU6	O2-S2	-4.65	1.43	1.57
6	D	5	Z9H	O2-S2	-4.61	1.43	1.57
6	D	2	Z9K	O2-S1	-4.60	1.43	1.57
6	D	1	Z9L	O3-S2	-4.58	1.43	1.57
6	D	3	GU6	O3-S3	-4.57	1.43	1.57
6	D	1	Z9L	O2-S3	-4.56	1.43	1.57
5	B	3	MAN	C1-C2	3.07	1.59	1.52
6	D	5	Z9H	O2-C2	-2.52	1.43	1.47
6	D	3	GU6	O2-C2	-2.39	1.43	1.47
6	D	2	Z9K	O2-C2	-2.37	1.43	1.47
6	D	1	Z9L	O1-C1	2.25	1.44	1.40

All (15) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	D	5	Z9H	C2-O2-S2	-5.55	110.67	117.91
6	D	3	GU6	C2-O2-S2	-4.93	111.48	117.91
5	B	3	MAN	C1-C2-C3	4.10	114.70	109.67
6	D	1	Z9L	C2-O2-S3	-3.87	111.41	118.88
6	D	5	Z9H	O2-C2-C3	3.01	109.99	106.65
6	D	3	GU6	O2-C2-C3	2.96	109.93	106.65
6	D	1	Z9L	C3-O3-S2	-2.94	113.20	118.88
6	D	2	Z9K	C2-O2-S1	-2.89	114.15	117.91
6	D	3	GU6	C3-O3-S3	-2.81	113.44	118.88
6	D	5	Z9H	O6-C6-C5	2.74	112.73	107.62
6	D	5	Z9H	C6-C5-C4	-2.54	107.03	113.33
5	B	3	MAN	C3-C4-C5	-2.32	106.09	110.24
6	D	1	Z9L	C7-O1-C1	-2.30	109.72	113.27
5	B	2	NAG	C4-C3-C2	-2.08	107.98	111.02
5	B	1	NAG	C2-N2-C7	-2.07	119.96	122.90

There are no chirality outliers.

All (18) torsion outliers are listed below:

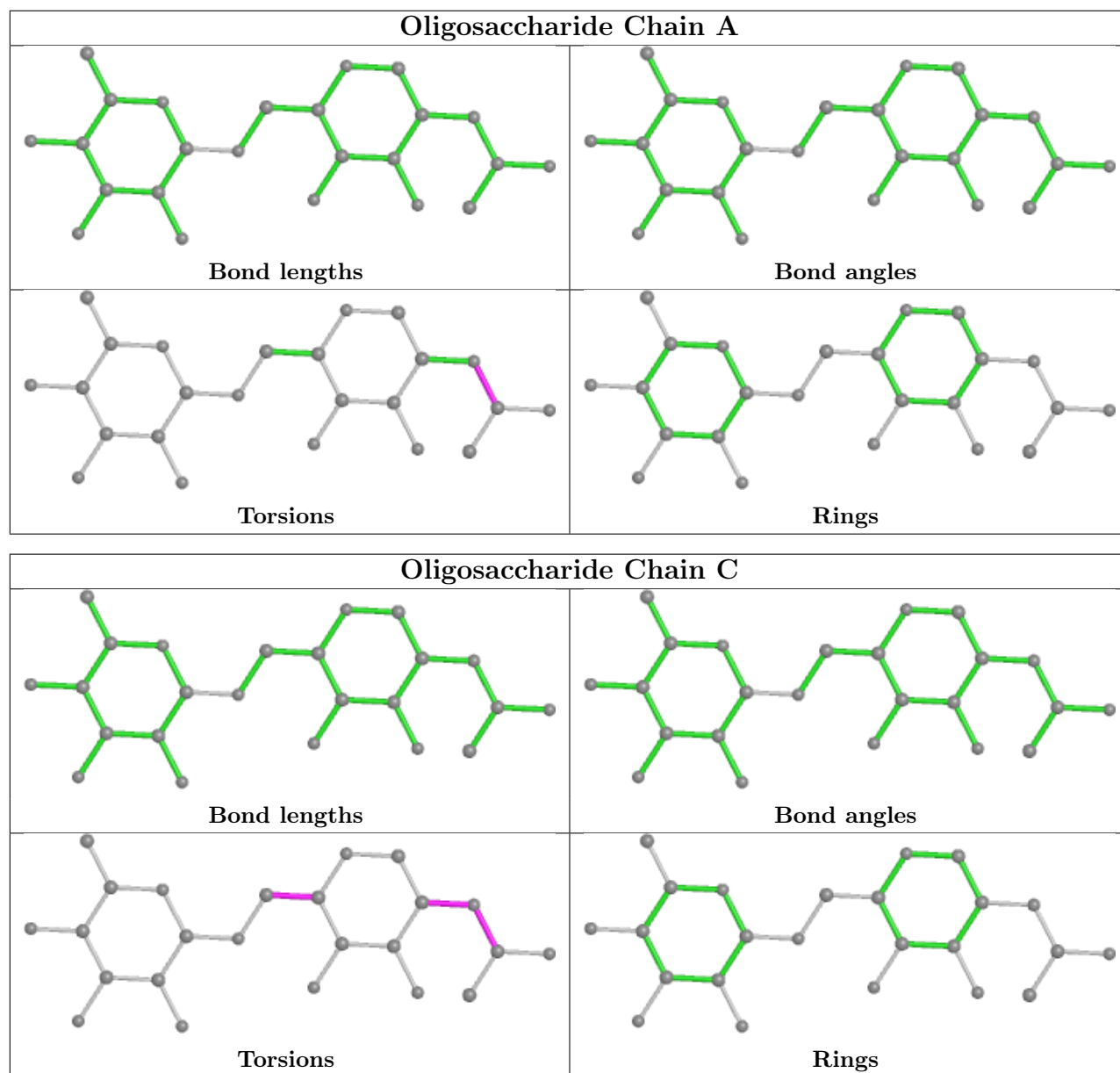
Mol	Chain	Res	Type	Atoms
4	A	1	NAG	C8-C7-N2-C2
4	A	1	NAG	O7-C7-N2-C2
4	C	1	NAG	C8-C7-N2-C2
4	C	1	NAG	O7-C7-N2-C2
5	B	1	NAG	C8-C7-N2-C2
5	B	1	NAG	O7-C7-N2-C2
5	B	2	NAG	C8-C7-N2-C2
5	B	2	NAG	O7-C7-N2-C2
5	B	3	MAN	O5-C5-C6-O6
5	B	2	NAG	O5-C5-C6-O6
5	B	2	NAG	C4-C5-C6-O6
5	B	3	MAN	C4-C5-C6-O6
4	C	1	NAG	O5-C5-C6-O6
4	C	1	NAG	C4-C5-C6-O6
4	C	1	NAG	C1-C2-N2-C7
5	B	1	NAG	C4-C5-C6-O6
4	C	1	NAG	C3-C2-N2-C7
5	B	1	NAG	O5-C5-C6-O6

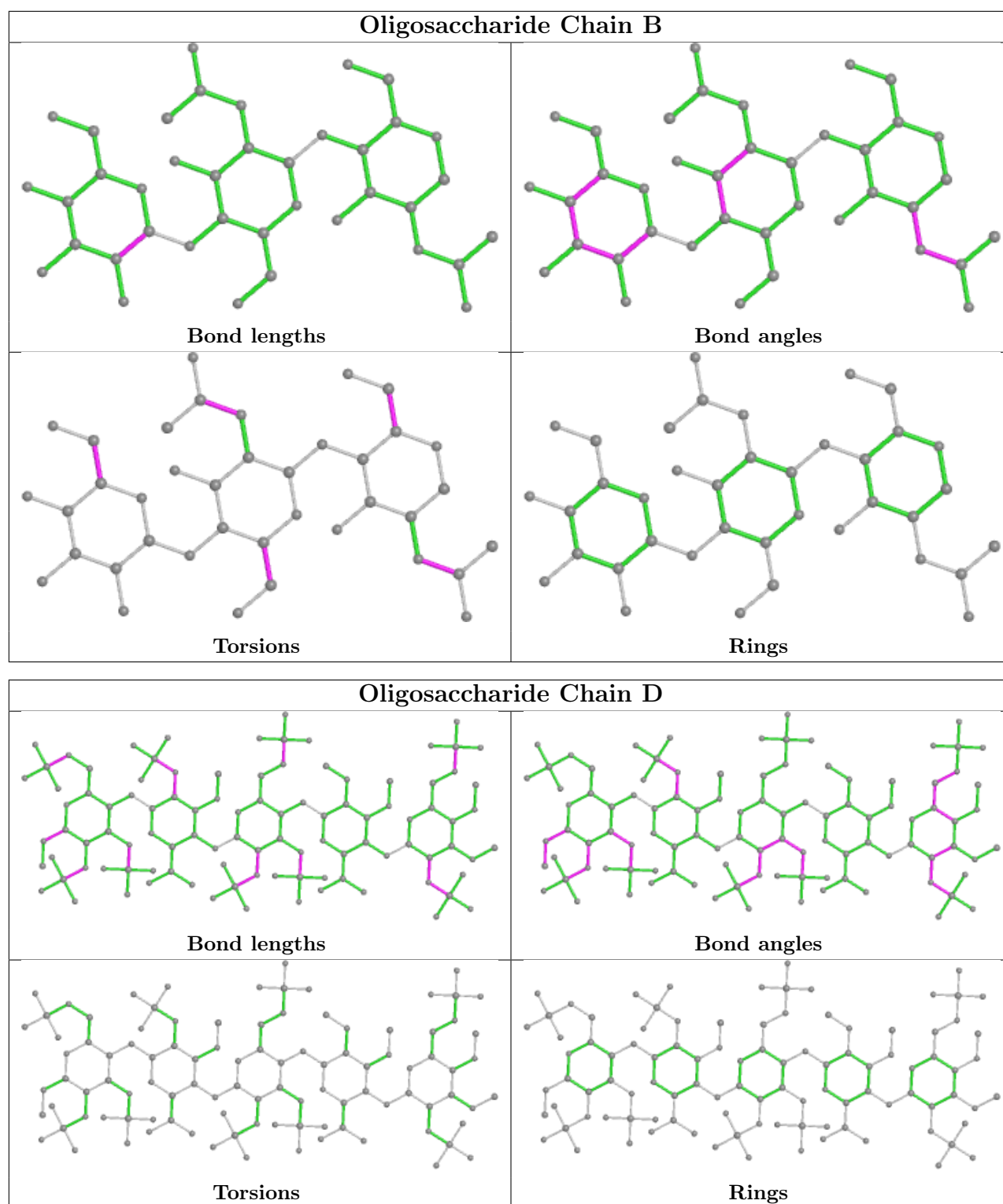
There are no ring outliers.

5 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	D	4	GU1	2	0
6	D	3	GU6	1	0
6	D	5	Z9H	1	0
4	C	2	FUC	1	0
5	B	1	NAG	2	0

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





5.6 Ligand geometry [\(i\)](#)

Of 3 ligands modelled in this entry, 1 is monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
8	MPD	I	5276	-	7,7,7	0.45	0	9,10,10	0.43	0
8	MPD	I	5277	-	7,7,7	0.44	0	9,10,10	0.36	0

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

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	MPD	I	5276	-	-	0/5/5/5	-
8	MPD	I	5277	-	-	0/5/5/5	-

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	I	5276	MPD	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	L	54/59 (91%)	1.66	23 (42%) 0 0	25, 45, 60, 62	0
2	H	235/235 (100%)	0.11	7 (2%) 50 54	13, 23, 39, 52	2 (0%)
3	I	419/432 (96%)	0.41	34 (8%) 12 14	18, 31, 58, 75	0
All	All	708/726 (97%)	0.41	64 (9%) 9 10	13, 29, 57, 75	2 (0%)

All (64) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	H	220	CYS	8.7
3	I	3	SER	8.7
3	I	4	PRO	8.6
3	I	386	THR	7.6
1	L	118	ALA	6.4
1	L	84	MET	6.1
3	I	388	VAL	6.0
3	I	38	GLN	5.5
3	I	26	PRO	5.5
2	H	84	ASN	5.2
1	L	89	ASN	4.6
2	H	245	THR	4.5
1	L	102	SER	4.4
1	L	103	ALA	4.3
3	I	384	ALA	4.2
3	I	299	LEU	4.2
1	L	90	ILE	3.9
3	I	431	VAL	3.9
3	I	264	ALA	3.5
1	L	104	ASP	3.4
1	L	88	CYS	3.4
1	L	123	SER	3.4
3	I	27	GLU	3.4

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Mol	Chain	Res	Type	RSRZ
1	L	108	VAL	3.3
3	I	359	ARG	3.2
1	L	119	GLU	3.0
1	L	86	VAL	3.0
3	I	412[A]	ILE	2.9
2	H	96	ILE	2.9
1	L	117	LEU	2.9
1	L	94	ARG	2.8
1	L	120	ASN	2.8
3	I	304	LEU	2.8
3	I	390	ILE	2.8
1	L	105	ASN	2.8
3	I	383	ALA	2.7
1	L	85	ASP	2.7
3	I	298	GLU	2.6
3	I	382	ALA	2.6
3	I	303	VAL	2.5
1	L	87	THR	2.5
3	I	14	ASP	2.5
1	L	91	LYS	2.5
3	I	389	VAL	2.5
3	I	385	SER	2.4
3	I	81	LEU	2.3
3	I	17	MET	2.3
2	H	97[A]	ASN	2.3
1	L	107	VAL	2.3
3	I	310	GLU	2.3
3	I	315	MET	2.2
2	H	170	ARG	2.1
3	I	421	ILE	2.1
1	L	124	CYS	2.1
3	I	5	VAL	2.1
3	I	16	PRO	2.1
1	L	101	ASN	2.1
3	I	39	LYS	2.0
3	I	300	THR	2.0
3	I	358	GLY	2.0
1	L	137	VAL	2.0
2	H	169	LEU	2.0
3	I	238	LEU	2.0
3	I	248	SER	2.0

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

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

6.3 Carbohydrates [i](#)

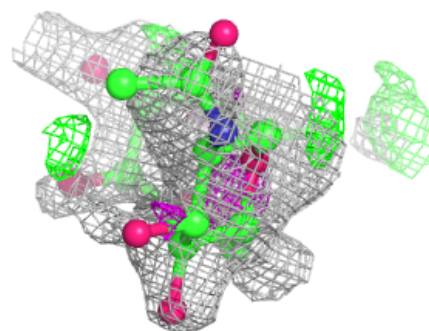
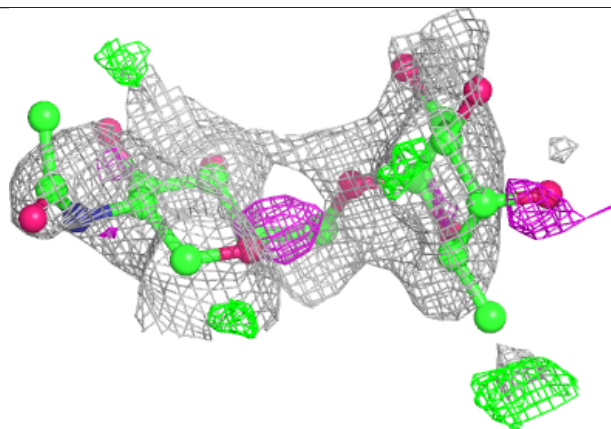
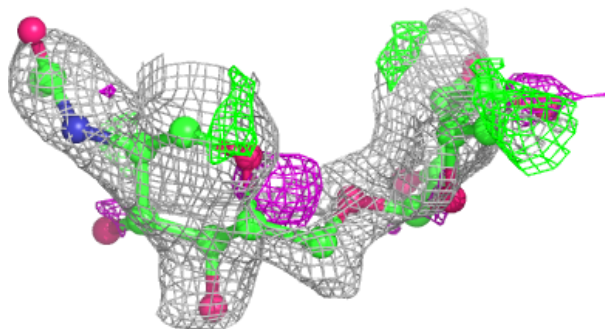
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	FUC	A	2	10/11	0.49	0.49	75,75,76,77	0
5	MAN	B	3	11/12	0.52	0.42	74,76,77,78	0
4	NAG	C	1	14/15	0.63	0.49	64,68,71,73	0
4	NAG	A	1	14/15	0.64	0.39	62,68,70,73	0
4	FUC	C	2	10/11	0.69	0.59	75,76,76,77	0
5	NAG	B	1	14/15	0.83	0.17	49,54,55,60	0
5	NAG	B	2	14/15	0.87	0.19	62,66,67,70	0
6	GU1	D	4	14/15	0.92	0.12	32,34,36,37	0
6	Z9K	D	2	17/18	0.94	0.09	28,29,32,32	0
6	Z9H	D	5	21/22	0.94	0.10	29,37,41,42	0
6	GU6	D	3	23/24	0.95	0.09	26,31,36,37	0
6	Z9L	D	1	25/25	0.97	0.08	28,31,35,36	0

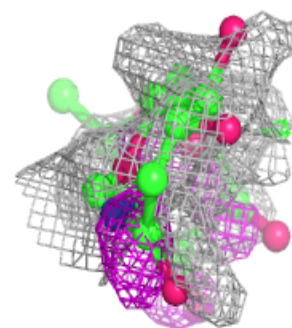
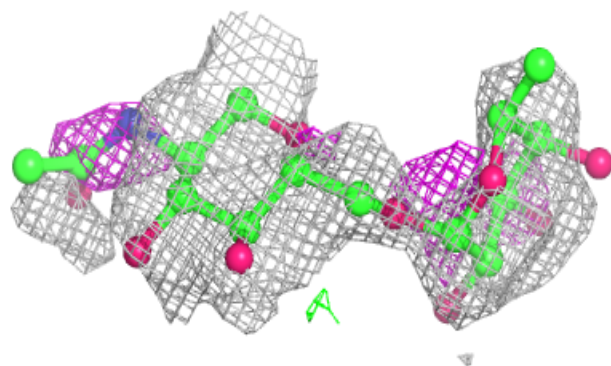
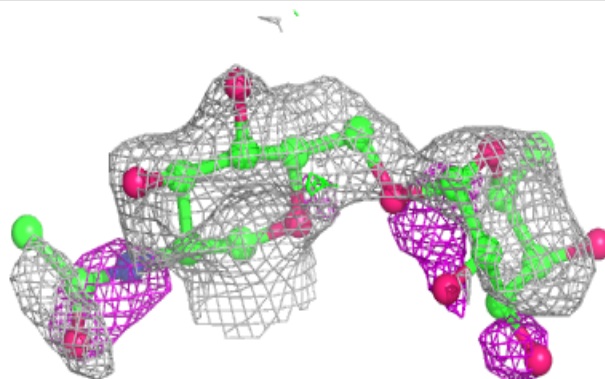
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain A:

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

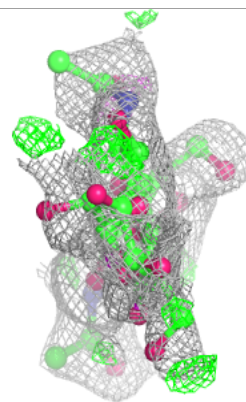
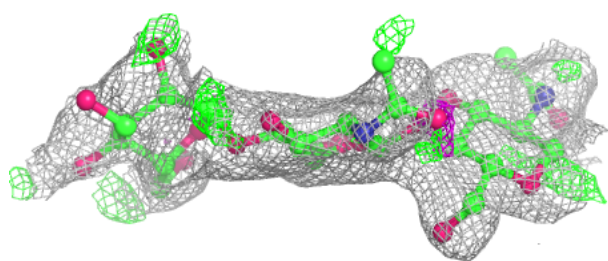
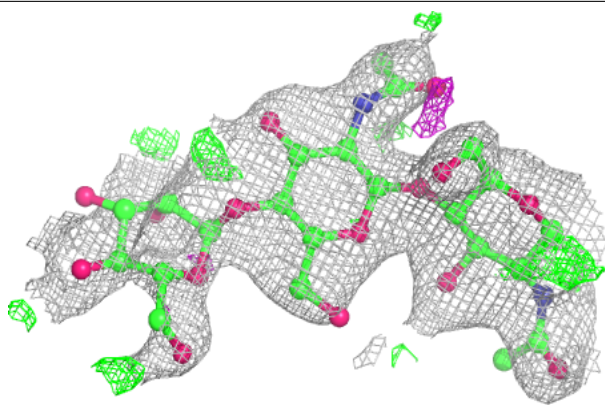
**Electron density around Chain C:**

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

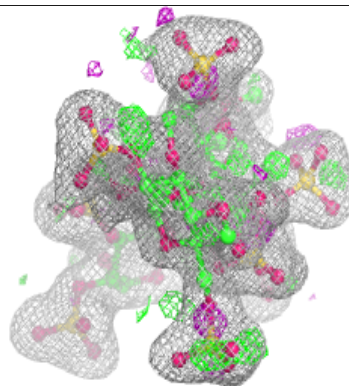
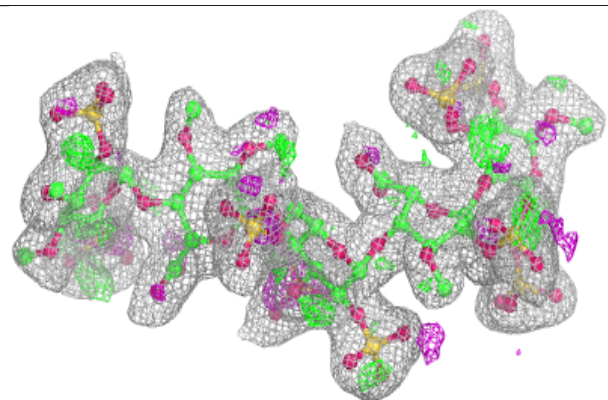
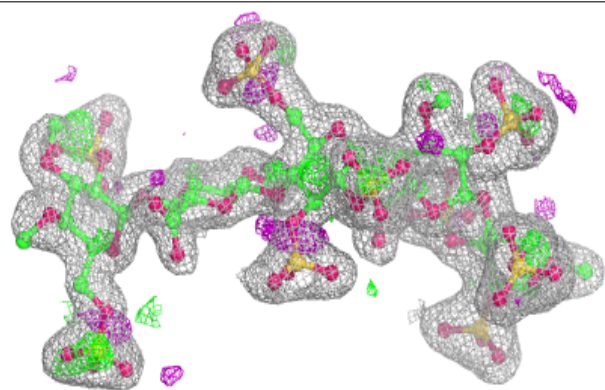


Electron density around Chain B:

$2mF_o-DF_c$ (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)



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	MPD	I	5276	8/8	0.83	0.45	61,62,63,63	0
8	MPD	I	5277	8/8	0.92	0.21	61,62,62,63	0
7	CA	H	500	1/1	0.98	0.06	23,23,23,23	0

6.5 Other polymers [i](#)

There are no such residues in this entry.