



Full wwPDB X-ray Structure Validation Report ⓘ

May 27, 2024 – 08:48 PM EDT

PDB ID : 6MDS
Title : Crystal structure of Streptococcus pyogenes endo-beta-N-acetylglucosaminidase (EndoS2) with complex biantennary glycan
Authors : Klontz, E.H.; Trastoy, B.; Orwenyo, J.; Wang, L.X.; Guerin, M.E.; Sundberg, E.J.
Deposited on : 2018-09-05
Resolution : 2.50 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 : 2.36.2
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) : 2.36.2

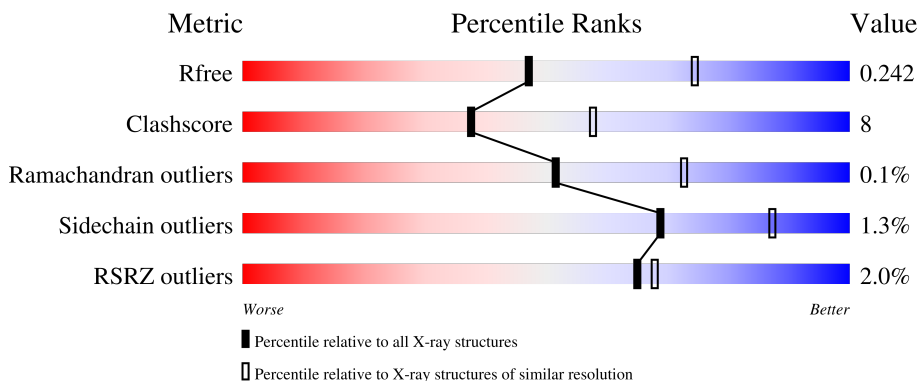
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 Å.

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



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	130704	4661 (2.50-2.50)
Clashscore	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)
RSRZ outliers	127900	4559 (2.50-2.50)

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

Mol	Chain	Length	Quality of chain
1	A	802	 83% 14% 3% 0% 0%
1	B	802	 79% 19% 0% 3% 0%
2	C	8	 25% 75% 0% 0% 0%
2	D	8	 25% 62% 12% 0% 0%

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 13077 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.

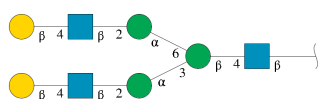
- Molecule 1 is a protein called Endo-beta-N-acetylglucosaminidase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	787	6238	3916	1065	1242	15	0	0	0
1	B	787	6221	3903	1065	1238	15	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	43	MET	-	initiating methionine	UNP T1WGN1
A	844	LEU	-	expression tag	UNP T1WGN1
B	43	MET	-	initiating methionine	UNP T1WGN1
B	844	LEU	-	expression tag	UNP T1WGN1

- Molecule 2 is an oligosaccharide called beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	C	8	98	54	3	41	0	0	0
2	D	8	98	54	3	41	0	0	0

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total 1	Ca 1	0	0
3	B	1	Total 1	Ca 1	0	0

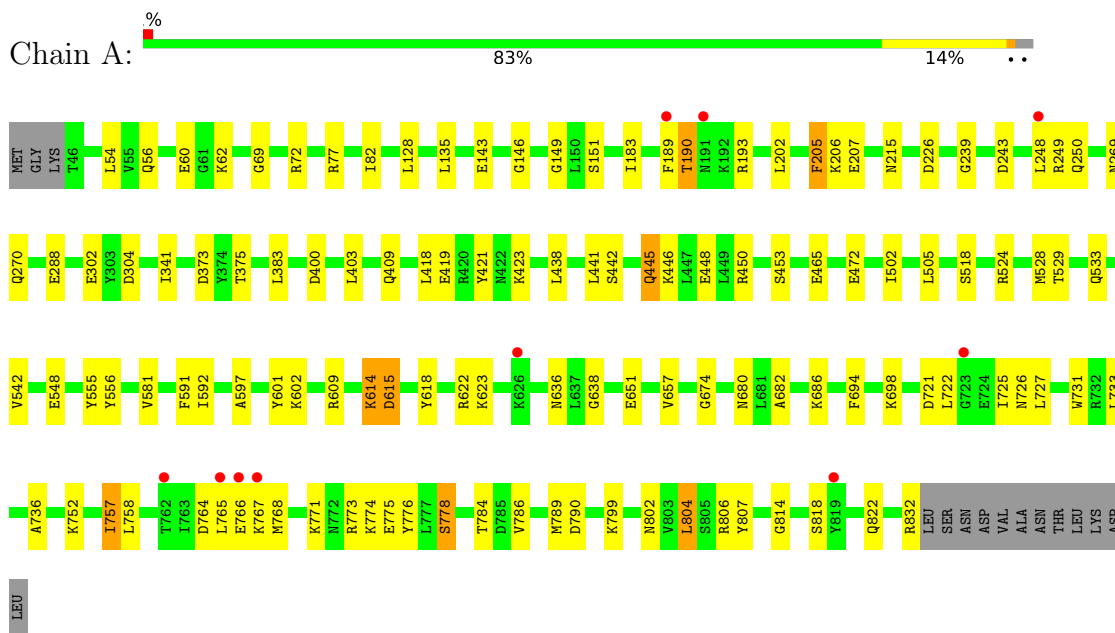
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	246	Total 246	O 246	0	0
4	B	174	Total 174	O 174	0	0

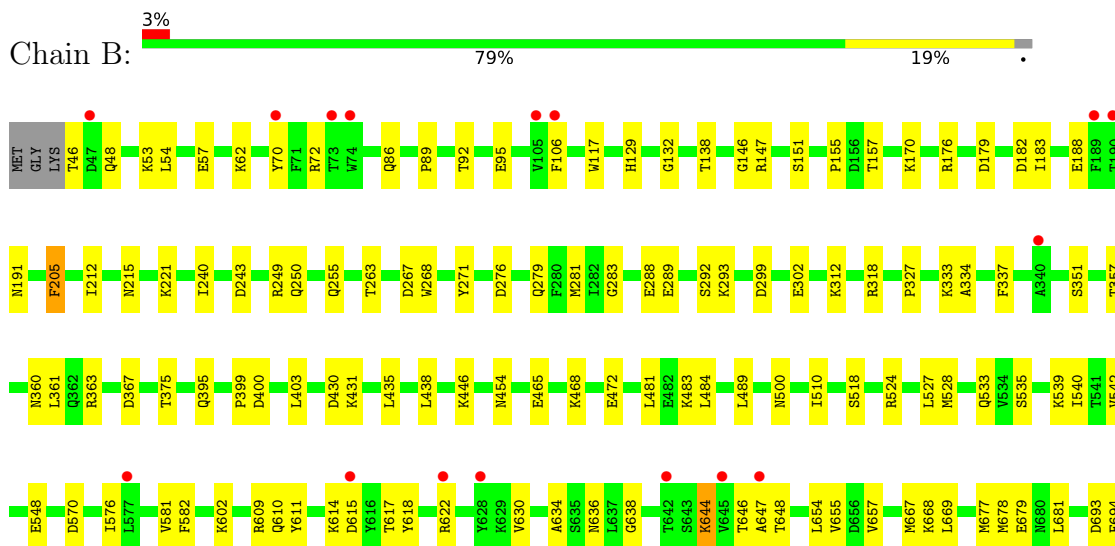
3 Residue-property plots i

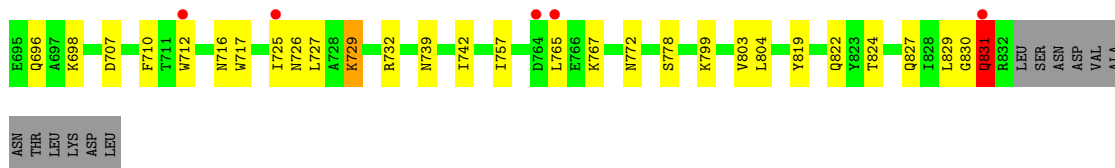
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. 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: Endo-beta-N-acetylglucosaminidase

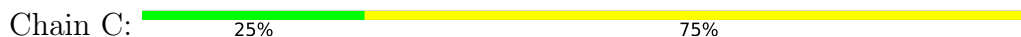


• Molecule 1: Endo-beta-N-acetylglucosaminidase

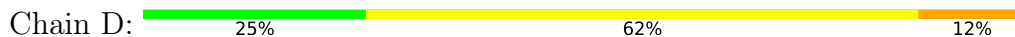




- Molecule 2: beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-3)-[beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-2)-alpha-D-mannopyranose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	89.38Å 105.51Å 259.77Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	39.71 – 2.50 39.71 – 2.50	Depositor EDS
% Data completeness (in resolution range)	88.5 (39.71-2.50) 88.5 (39.71-2.50)	Depositor EDS
R_{merge}	0.15	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.70 (at 2.51Å)	Xtrriage
Refinement program	PHENIX 1.10.1_2155	Depositor
R, R_{free}	0.193 , 0.242 0.193 , 0.242	Depositor DCC
R_{free} test set	3800 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	42.4	Xtrriage
Anisotropy	0.592	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 41.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	13077	wwPDB-VP
Average B, all atoms (Å ²)	48.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.51% 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: MAN, CA, NAG, GAL, BMA

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	0.48	0/6356	0.68	2/8595 (0.0%)
1	B	0.47	0/6338	0.70	7/8571 (0.1%)
All	All	0.47	0/12694	0.69	9/17166 (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

There are no bond length outliers.

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	831	GLN	CA-CB-CG	-9.60	92.27	113.40
1	A	757	ILE	CG1-CB-CG2	-7.96	93.89	111.40
1	B	767	LYS	CG-CD-CE	7.82	135.37	111.90
1	B	170	LYS	CB-CG-CD	-7.34	92.52	111.60
1	A	804	LEU	CB-CG-CD2	-6.20	100.46	111.00
1	B	170	LYS	CD-CE-NZ	-6.02	97.85	111.70
1	B	767	LYS	CD-CE-NZ	-5.62	98.78	111.70
1	B	644	LYS	CG-CD-CE	5.56	128.57	111.90
1	B	170	LYS	CA-CB-CG	5.36	125.19	113.40

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	831	GLN	Sidechain

5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	6238	0	6039	79	1
1	B	6221	0	6012	111	1
2	C	98	0	84	0	0
2	D	98	0	84	3	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	246	0	0	14	0
4	B	174	0	0	19	1
All	All	13077	0	12219	191	2

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 8.

All (191) 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:B:95:GLU:OE2	4:B:1001:HOH:O	1.82	0.96
1:B:819:TYR:OH	4:B:1002:HOH:O	1.85	0.92
1:A:445:GLN:NE2	4:A:1001:HOH:O	1.91	0.91
1:B:276:ASP:H	1:B:279:GLN:HE21	1.19	0.87
1:A:419:GLU:OE2	4:A:1002:HOH:O	1.93	0.84
1:B:830:GLY:C	1:B:831:GLN:HG2	2.01	0.81
1:A:207:GLU:OE1	4:A:1005:HOH:O	2.00	0.80
1:A:832:ARG:O	4:A:1003:HOH:O	1.99	0.79
1:A:421:TYR:O	4:A:1004:HOH:O	1.99	0.79
1:A:806:ARG:NH1	1:A:807:TYR:OH	2.16	0.79
1:B:677:MET:O	1:B:831:GLN:NE2	2.16	0.78
1:A:725:ILE:HG13	1:A:804:LEU:HD21	1.65	0.78
1:A:776:TYR:OH	4:A:1006:HOH:O	2.01	0.76
1:A:206:LYS:NZ	1:A:239:GLY:O	2.14	0.76
1:B:46:THR:N	4:B:1014:HOH:O	2.19	0.75

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:299:ASP:OD1	1:B:318:ARG:NH1	2.20	0.74
1:B:276:ASP:H	1:B:279:GLN:NE2	1.86	0.73
1:A:77:ARG:NH1	4:A:1013:HOH:O	2.22	0.72
1:B:360:ASN:OD1	4:B:1004:HOH:O	2.06	0.71
1:A:448:GLU:OE2	1:A:450:ARG:NH1	2.23	0.71
1:A:383:LEU:O	4:A:1008:HOH:O	2.08	0.71
1:A:56:GLN:O	1:A:60:GLU:HG3	1.91	0.70
1:B:610:GLN:O	4:B:1005:HOH:O	2.09	0.70
1:A:694:PHE:CE1	1:A:698:LYS:HE2	2.28	0.69
1:B:533:GLN:OE1	4:B:1007:HOH:O	2.11	0.68
1:B:729:LYS:O	1:B:799:LYS:HG3	1.93	0.68
1:B:710:PHE:HB3	1:B:822:GLN:HB3	1.76	0.68
1:B:716:ASN:OD1	4:B:1006:HOH:O	2.10	0.68
1:A:636:ASN:HB3	1:A:638:GLY:H	1.59	0.67
1:B:678:MET:HA	1:B:831:GLN:HE21	1.60	0.67
1:B:772:ASN:ND2	4:B:1012:HOH:O	2.17	0.67
1:B:481:LEU:O	4:B:1008:HOH:O	2.12	0.66
1:B:636:ASN:HB3	1:B:638:GLY:H	1.60	0.66
1:B:446:LYS:HG3	1:B:472:GLU:HB2	1.76	0.66
1:B:732:ARG:HD2	1:B:827:GLN:HE21	1.62	0.64
1:B:510:ILE:HD11	1:B:527:LEU:HD13	1.80	0.63
1:A:82:ILE:HD12	1:A:82:ILE:H	1.62	0.63
1:B:739:ASN:O	4:B:1009:HOH:O	2.16	0.63
1:B:732:ARG:HB3	1:B:827:GLN:HG3	1.82	0.61
1:B:727:LEU:HD13	1:B:804:LEU:HG	1.82	0.61
1:B:430:ASP:O	1:B:454:ASN:ND2	2.32	0.60
1:B:732:ARG:HD2	1:B:827:GLN:NE2	2.16	0.60
1:A:446:LYS:HG3	1:A:472:GLU:HB2	1.84	0.59
1:B:630:VAL:HG13	1:B:655:VAL:HG23	1.84	0.59
1:B:693:ASP:HB3	1:B:696:GLN:OE1	2.02	0.59
1:B:542:VAL:HG22	1:B:609:ARG:HD3	1.84	0.59
1:B:729:LYS:HB3	1:B:799:LYS:HE3	1.84	0.58
1:A:764:ASP:OD1	1:A:767:LYS:HG3	2.03	0.58
1:B:72:ARG:NH1	1:B:288:GLU:OE1	2.37	0.58
1:B:357:THR:O	1:B:361:LEU:HD23	2.04	0.58
1:A:556:TYR:CD2	1:A:623:LYS:HE3	2.39	0.58
1:B:57:GLU:HG2	1:B:62:LYS:CE	2.34	0.58
1:A:725:ILE:HG13	1:A:804:LEU:CD2	2.34	0.58
1:B:54:LEU:HD21	1:B:132:GLY:HA2	1.85	0.57
1:B:267:ASP:HB3	1:B:271:TYR:CE2	2.39	0.57
1:B:302:GLU:OE1	4:B:1010:HOH:O	2.17	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:576:ILE:HD11	1:B:669:LEU:HD22	1.84	0.57
1:B:634:ALA:N	4:B:1030:HOH:O	2.37	0.57
1:B:86:GLN:NE2	1:B:89:PRO:HB3	2.19	0.57
1:B:292:SER:HB3	1:B:357:THR:HA	1.87	0.57
1:B:281:MET:HG2	1:B:334:ALA:HB3	1.87	0.57
1:A:771:LYS:O	1:A:775:GLU:HG3	2.04	0.56
1:B:739:ASN:ND2	1:B:742:ILE:HB	2.20	0.56
1:A:597:ALA:O	4:A:1010:HOH:O	2.17	0.56
1:A:373:ASP:OD1	1:A:375:THR:HG23	2.06	0.56
1:A:502:ILE:HG22	1:A:505:LEU:HB2	1.88	0.56
1:B:155:PRO:HB2	1:B:157:THR:HG23	1.88	0.56
1:A:721:ASP:OD1	1:A:806:ARG:HG2	2.07	0.55
1:B:655:VAL:CG1	1:B:667:MET:HG3	2.36	0.55
1:A:555:TYR:HA	1:A:623:LYS:HE2	1.87	0.55
1:A:768:MET:CE	1:A:773:ARG:HA	2.38	0.54
1:B:725:ILE:HD11	1:B:804:LEU:HB3	1.90	0.54
1:A:731:TRP:HH2	1:A:789:MET:HE2	1.74	0.53
1:A:548:GLU:OE2	1:A:609:ARG:HD2	2.08	0.53
1:A:733:LEU:HD22	1:A:789:MET:HE1	1.90	0.53
1:A:250:GLN:NE2	4:A:1031:HOH:O	2.42	0.52
1:A:542:VAL:HG22	1:A:609:ARG:HD3	1.91	0.52
1:A:765:LEU:O	1:A:773:ARG:NH1	2.42	0.52
1:A:694:PHE:CE1	1:A:698:LYS:CE	2.91	0.52
1:B:548:GLU:OE2	1:B:609:ARG:HD2	2.08	0.52
1:B:57:GLU:HG2	1:B:62:LYS:HE2	1.92	0.52
1:A:727:LEU:HD11	1:A:802:ASN:HB3	1.91	0.51
1:B:582:PHE:O	4:B:1013:HOH:O	2.19	0.51
1:B:188:GLU:OE1	4:B:1015:HOH:O	2.19	0.51
1:B:618:TYR:CE2	1:B:622:ARG:HD3	2.45	0.51
1:B:106:PHE:HZ	2:D:1:NAG:HO3	1.55	0.51
1:B:654:LEU:CD2	1:B:668:LYS:HG3	2.40	0.51
1:B:86:GLN:HE22	1:B:89:PRO:HB3	1.74	0.51
1:A:524:ARG:O	1:A:528:MET:HG2	2.11	0.51
1:B:212:ILE:HB	1:B:221:LYS:HB2	1.91	0.51
1:B:830:GLY:O	1:B:831:GLN:HG2	2.11	0.51
1:A:766:GLU:HA	1:A:773:ARG:HH12	1.77	0.50
1:A:768:MET:HE2	1:A:773:ARG:HA	1.92	0.50
1:B:500:ASN:ND2	4:B:1034:HOH:O	2.40	0.50
1:B:147:ARG:NH1	1:B:188:GLU:OE2	2.45	0.50
1:B:694:PHE:CE2	1:B:698:LYS:HE3	2.46	0.50
1:A:682:ALA:HA	1:A:722:LEU:HD22	1.92	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:129:HIS:NE2	1:B:179:ASP:OD1	2.37	0.49
1:B:630:VAL:CG1	1:B:655:VAL:HG23	2.42	0.49
1:B:483:LYS:HG2	1:B:484:LEU:N	2.26	0.49
1:B:138:THR:HG22	1:B:182:ASP:HB3	1.95	0.49
1:B:727:LEU:CD1	1:B:804:LEU:HG	2.43	0.49
1:A:202:LEU:HD11	1:A:206:LYS:HE2	1.95	0.49
1:A:190:THR:N	4:A:1036:HOH:O	2.46	0.49
1:B:465:GLU:N	1:B:465:GLU:OE1	2.40	0.48
1:B:732:ARG:HH11	1:B:827:GLN:NE2	2.11	0.48
1:A:529:THR:O	1:A:533:GLN:HG2	2.13	0.48
1:B:630:VAL:HG13	1:B:655:VAL:CG2	2.42	0.48
1:B:717:TRP:CZ2	1:B:778:SER:HB3	2.48	0.48
1:A:680:ASN:HD21	1:A:682:ALA:HB3	1.77	0.48
1:B:535:SER:HB2	1:B:540:ILE:HD11	1.96	0.48
1:A:651:GLU:O	1:A:674:GLY:HA2	2.13	0.48
1:A:686:LYS:HG3	1:A:721:ASP:HB3	1.95	0.48
1:B:215:ASN:ND2	1:B:243:ASP:OD1	2.27	0.48
1:A:302:GLU:O	4:A:1011:HOH:O	2.20	0.48
1:B:602:LYS:NZ	1:B:614:LYS:O	2.37	0.47
1:A:72:ARG:NH1	1:A:288:GLU:OE1	2.46	0.47
1:B:92:THR:HG23	1:B:95:GLU:HG3	1.96	0.47
1:A:618:TYR:CE2	1:A:622:ARG:HD3	2.50	0.47
1:B:524:ARG:O	1:B:528:MET:HG2	2.14	0.47
1:B:188:GLU:HG2	1:B:191:ASN:O	2.14	0.47
1:A:69:GLY:HA3	1:A:341:ILE:HD12	1.97	0.47
1:A:146:GLY:N	1:A:151:SER:OG	2.47	0.47
1:B:255:GLN:O	1:B:263:THR:HG23	2.15	0.47
1:A:193:ARG:HD2	4:A:1059:HOH:O	2.14	0.47
1:A:226:ASP:HA	1:A:248:LEU:O	2.14	0.47
1:B:276:ASP:N	1:B:279:GLN:HE21	2.00	0.46
1:A:758:LEU:HD11	1:A:776:TYR:HE1	1.79	0.46
1:B:435:LEU:HD22	1:B:438:LEU:HD22	1.98	0.46
1:B:70:TYR:CE2	1:B:138:THR:HG21	2.50	0.46
1:B:757:ILE:HG21	1:B:803:VAL:HG11	1.97	0.45
2:D:1:NAG:O7	2:D:1:NAG:H1	2.15	0.45
1:A:215:ASN:ND2	1:A:243:ASP:OD1	2.42	0.45
1:B:333:LYS:NZ	4:B:1022:HOH:O	2.30	0.45
1:A:438:LEU:HD12	1:A:438:LEU:HA	1.76	0.45
1:B:117:TRP:CZ3	1:B:176:ARG:NH1	2.84	0.45
1:B:681:LEU:CD2	1:B:726:ASN:HB2	2.46	0.45
1:A:418:LEU:HD22	1:A:441:LEU:HD21	1.99	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:268:TRP:CD1	1:B:327:PRO:HB3	2.51	0.45
1:B:678:MET:HA	1:B:831:GLN:NE2	2.28	0.45
1:B:70:TYR:HE2	1:B:138:THR:HG21	1.82	0.45
1:B:283:GLY:HA3	1:B:337:PHE:CZ	2.52	0.44
1:A:757:ILE:HG12	1:A:786:VAL:HG13	1.99	0.44
1:B:146:GLY:N	1:B:151:SER:OG	2.49	0.44
1:A:202:LEU:O	1:A:206:LYS:HG3	2.17	0.44
1:A:442:SER:HB3	1:A:465:GLU:OE1	2.18	0.44
1:B:679:GLU:O	1:B:829:LEU:HA	2.17	0.44
1:B:468:LYS:HG2	1:B:489:LEU:HA	2.01	0.43
1:A:774:LYS:O	1:A:778:SER:OG	2.35	0.43
1:B:765:LEU:HD23	1:B:765:LEU:HA	1.70	0.43
1:A:143:GLU:OE1	1:A:149:GLY:HA3	2.19	0.43
1:B:46:THR:HG22	1:B:48:GLN:H	1.84	0.43
1:B:570:ASP:O	1:B:647:ALA:O	2.36	0.43
1:B:712:TRP:O	1:B:712:TRP:CE3	2.71	0.43
1:B:518:SER:HA	1:B:611:TYR:OH	2.18	0.42
1:A:423:LYS:O	1:A:445:GLN:HG3	2.19	0.42
1:A:799:LYS:H	1:A:799:LYS:HG2	1.64	0.42
1:B:400:ASP:HB3	1:B:403:LEU:HB3	2.01	0.42
1:A:269:ASN:HD22	1:A:270:GLN:NE2	2.17	0.42
1:B:581:VAL:HG21	1:B:657:VAL:HG21	2.01	0.42
1:B:646:THR:HG22	1:B:648:THR:HG23	2.00	0.42
1:B:732:ARG:HB3	1:B:827:GLN:HE21	1.83	0.42
1:B:289:GLU:HB2	1:B:367:ASP:O	2.18	0.42
1:B:539:LYS:HD2	1:B:539:LYS:HA	1.65	0.42
1:B:707:ASP:O	1:B:824:THR:HG22	2.20	0.42
1:A:128:LEU:CD1	1:A:135:LEU:HD21	2.50	0.42
1:A:736:ALA:HB2	1:A:822:GLN:O	2.20	0.42
1:B:240:ILE:HG13	1:B:240:ILE:O	2.20	0.42
1:A:556:TYR:CE2	1:A:623:LYS:HE3	2.55	0.42
1:B:399:PRO:HD2	4:B:1031:HOH:O	2.19	0.42
1:A:757:ILE:HG13	1:A:784:THR:HB	2.02	0.41
1:B:615:ASP:OD1	1:B:615:ASP:N	2.49	0.41
1:A:614:LYS:NZ	1:A:615:ASP:HB3	2.36	0.41
1:B:617:THR:HG23	4:B:1110:HOH:O	2.19	0.41
1:A:60:GLU:HB2	1:A:62:LYS:HE3	2.03	0.41
1:B:53:LYS:HE3	1:B:57:GLU:OE1	2.21	0.41
1:A:304:ASP:OD1	4:A:1012:HOH:O	2.22	0.41
1:B:176:ARG:HH11	1:B:176:ARG:HD3	1.70	0.41
1:B:312:LYS:HE2	1:B:375:THR:HB	2.03	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:183:ILE:HG13	1:A:205:PHE:CZ	2.56	0.41
1:B:431:LYS:HB3	1:B:431:LYS:HE2	1.77	0.41
1:A:581:VAL:HG21	1:A:657:VAL:HG21	2.03	0.41
1:A:752:LYS:NZ	1:A:814:GLY:HA3	2.36	0.41
1:A:726:ASN:OD1	1:A:832:ARG:HB2	2.21	0.40
1:B:293:LYS:NZ	4:B:1053:HOH:O	2.53	0.40
1:A:54:LEU:HA	1:A:54:LEU:HD23	1.89	0.40
1:A:400:ASP:HB3	1:A:403:LEU:HB3	2.02	0.40
1:A:518:SER:HB3	1:A:601:TYR:CE1	2.55	0.40
1:A:591:PHE:C	1:A:592:ILE:HD12	2.42	0.40
1:B:183:ILE:HG13	1:B:205:PHE:CZ	2.57	0.40
1:B:250:GLN:NE2	2:D:1:NAG:O1	2.49	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:B:1064:HOH:O	4:B:1149:HOH:O[1_565]	1.86	0.34
1:A:602:LYS:O	1:B:363:ARG:NH2[1_655]	2.11	0.09

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	785/802 (98%)	756 (96%)	28 (4%)	1 (0%)	51	73
1	B	785/802 (98%)	754 (96%)	31 (4%)	0	100	100
All	All	1570/1604 (98%)	1510 (96%)	59 (4%)	1 (0%)	51	73

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	190	THR

5.3.2 Protein sidechains [i](#)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	674/699 (96%)	663 (98%)	11 (2%)	62 84
1	B	669/699 (96%)	663 (99%)	6 (1%)	78 92
All	All	1343/1398 (96%)	1326 (99%)	17 (1%)	69 87

All (17) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	189	PHE
1	A	205	PHE
1	A	249	ARG
1	A	409	GLN
1	A	445	GLN
1	A	453	SER
1	A	614	LYS
1	A	615	ASP
1	A	778	SER
1	A	790	ASP
1	A	818	SER
1	B	205	PHE
1	B	249	ARG
1	B	351	SER
1	B	395	GLN
1	B	644	LYS
1	B	729	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	203	ASN

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Mol	Chain	Res	Type
1	A	270	GLN
1	A	409	GLN
1	A	680	ASN
1	B	86	GLN
1	B	203	ASN
1	B	250	GLN
1	B	279	GLN
1	B	739	ASN
1	B	779	ASN
1	B	827	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](#)

16 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	15,15,15	0.64	0	21,21,21	0.95	1 (4%)
2	BMA	C	2	2	11,11,12	1.04	1 (9%)	15,15,17	0.98	0
2	MAN	C	3	2	11,11,12	1.43	2 (18%)	15,15,17	1.34	3 (20%)
2	NAG	C	4	2	14,14,15	0.21	0	17,19,21	0.51	0
2	GAL	C	5	2	11,11,12	0.86	0	15,15,17	1.18	2 (13%)
2	MAN	C	6	2	11,11,12	1.71	3 (27%)	15,15,17	1.08	1 (6%)
2	NAG	C	7	2	14,14,15	0.55	0	17,19,21	0.66	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	GAL	C	8	2	11,11,12	1.30	2 (18%)	15,15,17	1.02	1 (6%)
2	NAG	D	1	2	15,15,15	0.63	1 (6%)	21,21,21	0.79	0
2	BMA	D	2	2	11,11,12	1.31	1 (9%)	15,15,17	0.89	0
2	MAN	D	3	2	11,11,12	1.09	1 (9%)	15,15,17	1.31	2 (13%)
2	NAG	D	4	2	14,14,15	0.29	0	17,19,21	0.53	0
2	GAL	D	5	2	11,11,12	0.90	0	15,15,17	1.05	1 (6%)
2	MAN	D	6	2	11,11,12	1.04	0	15,15,17	1.11	2 (13%)
2	NAG	D	7	2	14,14,15	0.55	0	17,19,21	0.61	0
2	GAL	D	8	2	11,11,12	0.94	1 (9%)	15,15,17	0.93	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
2	NAG	C	1	2	-	4/6/26/26	0/1/1/1
2	BMA	C	2	2	-	0/2/19/22	0/1/1/1
2	MAN	C	3	2	-	0/2/19/22	0/1/1/1
2	NAG	C	4	2	-	0/6/23/26	0/1/1/1
2	GAL	C	5	2	-	1/2/19/22	0/1/1/1
2	MAN	C	6	2	-	0/2/19/22	0/1/1/1
2	NAG	C	7	2	-	0/6/23/26	0/1/1/1
2	GAL	C	8	2	-	0/2/19/22	0/1/1/1
2	NAG	D	1	2	-	4/6/26/26	0/1/1/1
2	BMA	D	2	2	-	0/2/19/22	0/1/1/1
2	MAN	D	3	2	-	0/2/19/22	0/1/1/1
2	NAG	D	4	2	-	0/6/23/26	0/1/1/1
2	GAL	D	5	2	-	1/2/19/22	0/1/1/1
2	MAN	D	6	2	-	0/2/19/22	0/1/1/1
2	NAG	D	7	2	-	0/6/23/26	0/1/1/1
2	GAL	D	8	2	-	0/2/19/22	0/1/1/1

All (12) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	6	MAN	C2-C3	3.27	1.57	1.52
2	C	6	MAN	O5-C5	3.25	1.50	1.43
2	C	2	BMA	C2-C3	2.62	1.56	1.52
2	C	6	MAN	C4-C3	2.60	1.58	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	3	MAN	C2-C3	2.56	1.56	1.52
2	C	8	GAL	C4-C5	2.54	1.58	1.53
2	C	3	MAN	O3-C3	2.51	1.48	1.43
2	D	2	BMA	C2-C3	2.47	1.56	1.52
2	D	3	MAN	C4-C3	2.30	1.58	1.52
2	C	8	GAL	C1-C2	2.29	1.57	1.52
2	D	8	GAL	C1-C2	2.12	1.57	1.52
2	D	1	NAG	O5-C1	-2.11	1.37	1.42

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	3	MAN	C1-O5-C5	3.14	116.45	112.19
2	C	3	MAN	C1-O5-C5	2.88	116.09	112.19
2	D	6	MAN	O2-C2-C3	-2.58	104.97	110.14
2	C	6	MAN	O2-C2-C3	-2.52	105.10	110.14
2	D	3	MAN	O2-C2-C3	-2.50	105.13	110.14
2	C	8	GAL	O2-C2-C1	2.45	114.16	109.15
2	C	5	GAL	C1-C2-C3	2.42	112.64	109.67
2	C	3	MAN	O2-C2-C3	-2.39	105.35	110.14
2	C	3	MAN	O3-C3-C2	2.37	114.53	109.99
2	C	1	NAG	O1-C1-O5	-2.36	103.30	110.38
2	D	6	MAN	C1-O5-C5	2.09	115.02	112.19
2	D	5	GAL	C1-O5-C5	2.04	114.96	112.19
2	C	5	GAL	O2-C2-C3	-2.03	106.07	110.14

There are no chirality outliers.

All (10) torsion outliers are listed below:

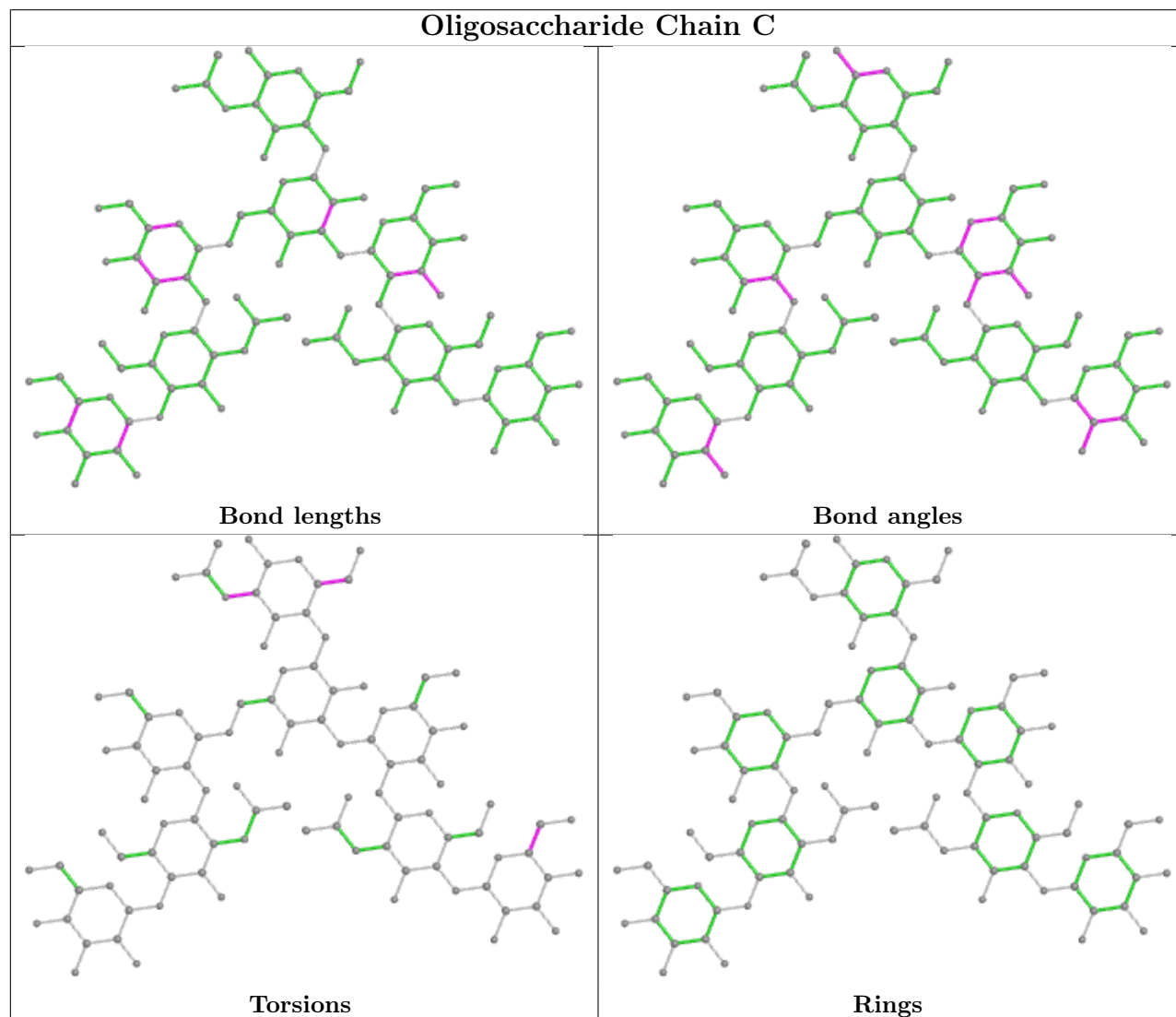
Mol	Chain	Res	Type	Atoms
2	D	1	NAG	C1-C2-N2-C7
2	D	1	NAG	O5-C5-C6-O6
2	C	1	NAG	C4-C5-C6-O6
2	C	1	NAG	O5-C5-C6-O6
2	D	1	NAG	C4-C5-C6-O6
2	D	5	GAL	O5-C5-C6-O6
2	C	5	GAL	O5-C5-C6-O6
2	C	1	NAG	C1-C2-N2-C7
2	C	1	NAG	C3-C2-N2-C7
2	D	1	NAG	C3-C2-N2-C7

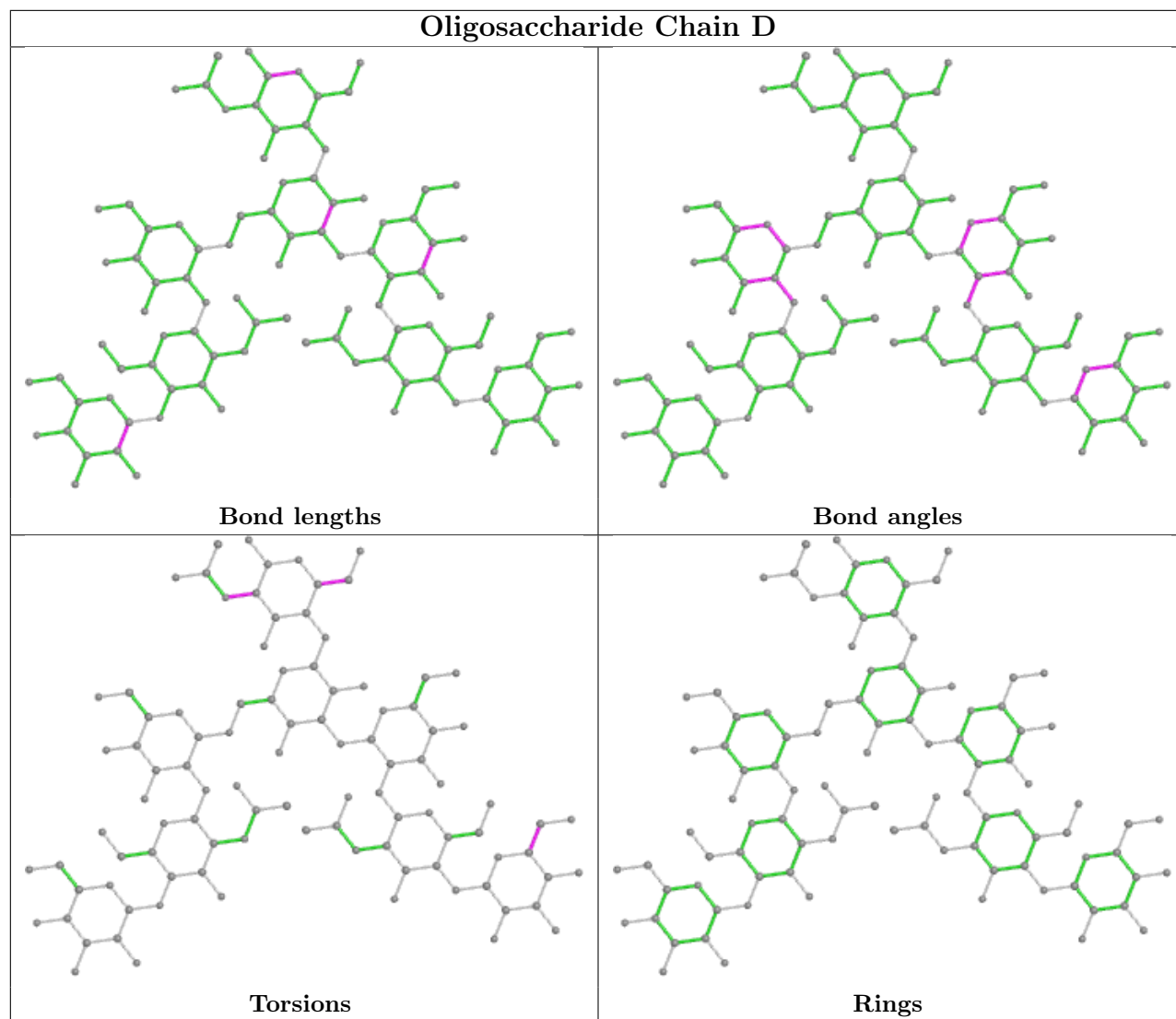
There are no ring outliers.

1 monomer is involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	D	1	NAG	3	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 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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.

No monomer is involved in short contacts.

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

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	787/802 (98%)	0.04	10 (1%) 77 79	28, 43, 62, 97	0
1	B	787/802 (98%)	0.20	21 (2%) 54 58	29, 51, 76, 98	0
All	All	1574/1604 (98%)	0.12	31 (1%) 65 68	28, 46, 72, 98	0

All (31) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	189	PHE	4.9
1	A	189	PHE	4.5
1	A	723	GLY	3.9
1	B	764	ASP	3.8
1	A	767	LYS	3.7
1	B	577	LEU	3.4
1	B	190	THR	3.3
1	A	765	LEU	3.2
1	A	766	GLU	3.1
1	B	106	PHE	2.8
1	B	647	ALA	2.8
1	B	615	ASP	2.6
1	A	762	THR	2.6
1	A	248	LEU	2.6
1	B	712	TRP	2.5
1	B	725	ILE	2.5
1	B	73	THR	2.5
1	B	105	VAL	2.5
1	A	626	LYS	2.4
1	B	628	TYR	2.4
1	B	47	ASP	2.4
1	A	191	ASN	2.3
1	B	340	ALA	2.3
1	B	74	TRP	2.3

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Mol	Chain	Res	Type	RSRZ
1	B	70	TYR	2.3
1	B	645	VAL	2.2
1	B	765	LEU	2.2
1	B	642	THR	2.2
1	A	819	TYR	2.1
1	B	622	ARG	2.1
1	B	831	GLN	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](#)

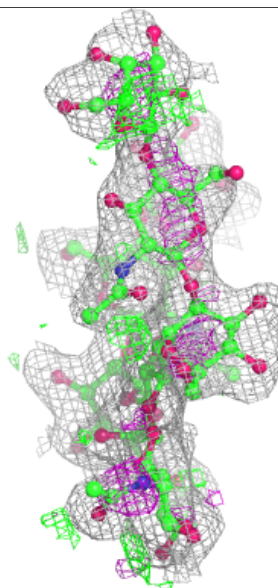
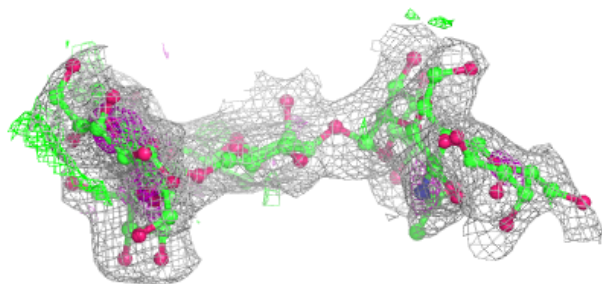
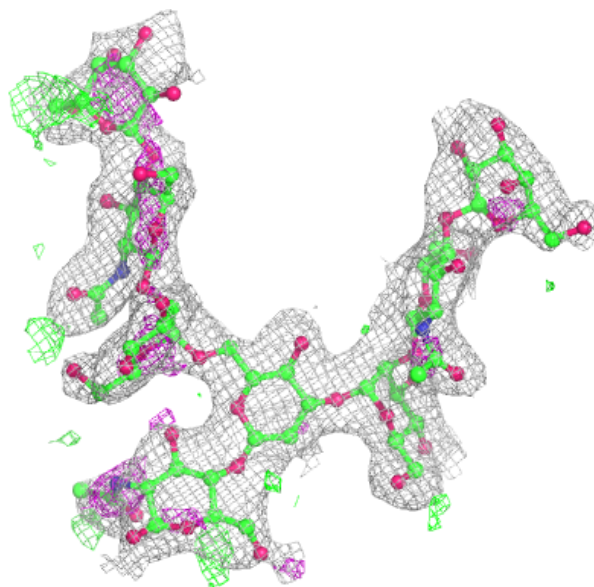
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

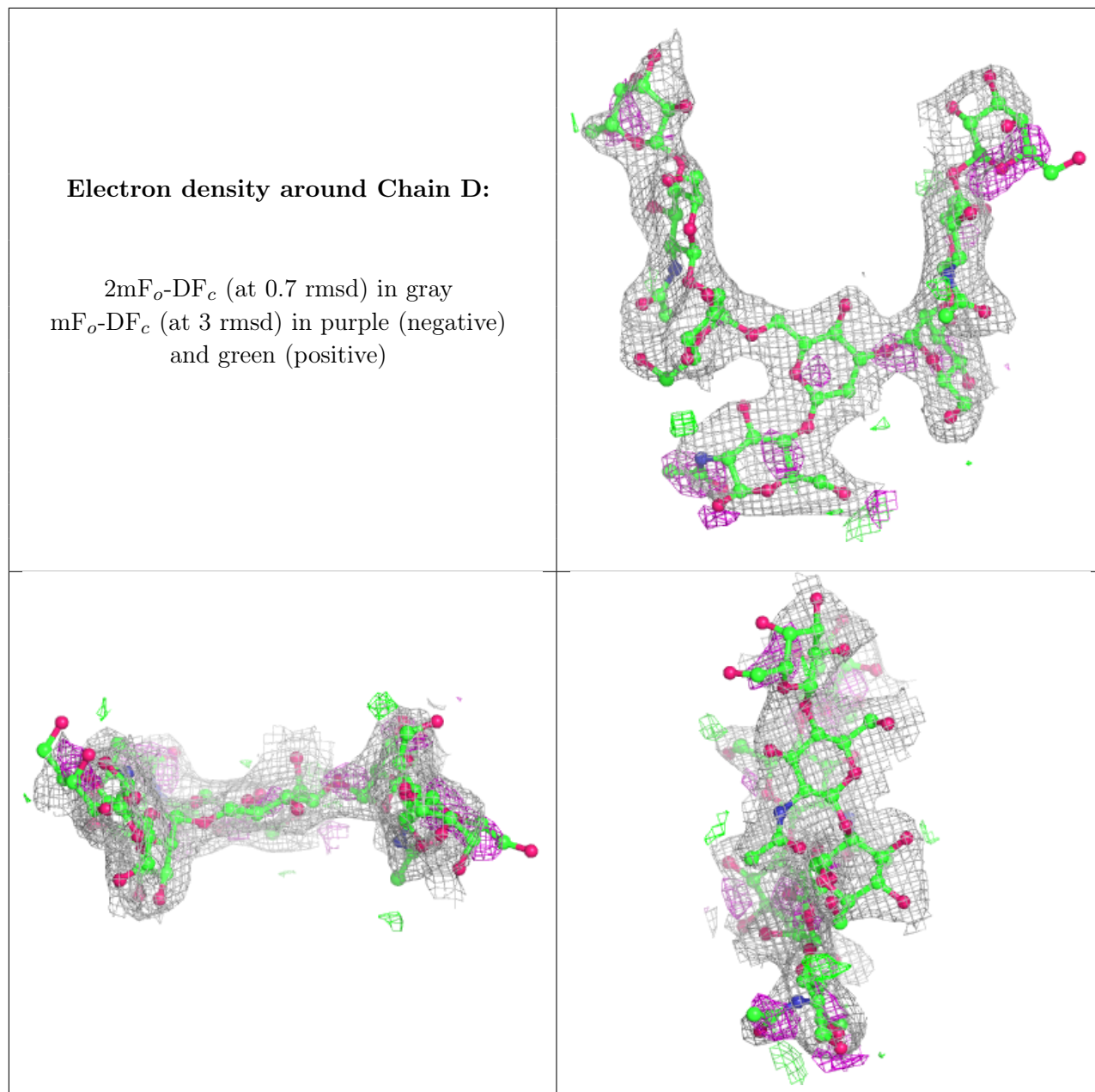
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	GAL	C	8	11/12	0.63	0.31	72,85,94,94	0
2	GAL	D	5	11/12	0.68	0.29	77,84,96,99	0
2	GAL	D	8	11/12	0.70	0.33	79,92,101,101	0
2	NAG	C	7	14/15	0.79	0.23	51,66,77,83	0
2	GAL	C	5	11/12	0.81	0.20	81,84,90,92	0
2	NAG	D	4	14/15	0.87	0.20	54,65,73,77	0
2	MAN	C	6	11/12	0.88	0.17	61,62,65,65	0
2	NAG	C	1	15/15	0.88	0.24	43,53,60,65	0
2	NAG	D	1	15/15	0.89	0.21	50,58,64,67	0
2	NAG	C	4	14/15	0.90	0.15	49,61,72,74	0
2	NAG	D	7	14/15	0.91	0.16	55,71,83,86	0
2	BMA	D	2	11/12	0.92	0.15	47,52,57,67	0
2	MAN	D	3	11/12	0.92	0.17	39,47,56,61	0
2	MAN	C	3	11/12	0.92	0.17	36,45,50,52	0
2	BMA	C	2	11/12	0.93	0.15	43,50,54,60	0
2	MAN	D	6	11/12	0.93	0.11	66,68,71,72	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)





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
3	CA	B	901	1/1	0.77	0.10	74,74,74,74	0
3	CA	A	909	1/1	0.98	0.06	65,65,65,65	0

6.5 Other polymers [i](#)

There are no such residues in this entry.