Full wwPDB X-ray Structure Validation Report ⓘ

Sep 30, 2025 – 06:06 PM EDT

PDB ID	:	9E55 / pdb_00009e55
Title	:	Crystal structure of the A/Viet Nam/1203/2004(H5N1) influenza virus hemagglutinin in complex with cyclic peptide iHA-100
Authors	:	Nguyen, T.K.Y.; Wilson, I.A.
Deposited on	:	2024-10-27
Resolution	:	2.89 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:

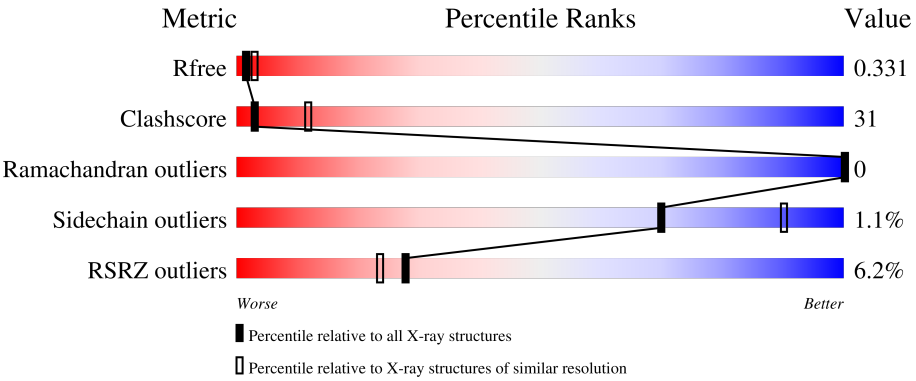
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.46

1 Overall quality at a glance (i)

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

The reported resolution of this entry is 2.89 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}	164625	2335 (2.90-2.90)
Clashscore	180529	2564 (2.90-2.90)
Ramachandran outliers	177936	2514 (2.90-2.90)
Sidechain outliers	177891	2516 (2.90-2.90)
RSRZ outliers	164620	2337 (2.90-2.90)

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

Mol	Chain	Length	Quality of chain
1	A	323	6% 59% 40%
2	B	176	4% 72% 27%
3	P	16	31% 56% 25% 12% 6%
4	S	2	100%

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard

residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	NAG	S	1	-	-	X	-

2 Entry composition

There are 5 unique types of molecules in this entry. The entry contains 4144 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 Hemagglutinin HA1 subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	323	Total	C	N	O	S	0	0	0
			2561	1617	443	486	15			

There are 5 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	8	ASP	-	expression tag	UNP A0A2P1MB68
A	9	PRO	-	expression tag	UNP A0A2P1MB68
A	10	GLY	-	expression tag	UNP A0A2P1MB68
A	46	LYS	THR	conflict	UNP A0A2P1MB68
A	96	ASN	ASP	conflict	UNP A0A2P1MB68

- Molecule 2 is a protein called Hemagglutinin HA2 subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	B	176	Total	C	N	O	S	0	0	0
			1422	883	247	284	8			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	174	SER	-	insertion	UNP A0A2P1MB68

- Molecule 3 is a protein called IHA-100 peptide.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	P	16	Total	C	N	O	S	0	0	0
			130	85	21	23	1			

- Molecule 4 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
4	S	2	Total C N O 28 16 2 10	0	0	0

- Molecule 5 is water.

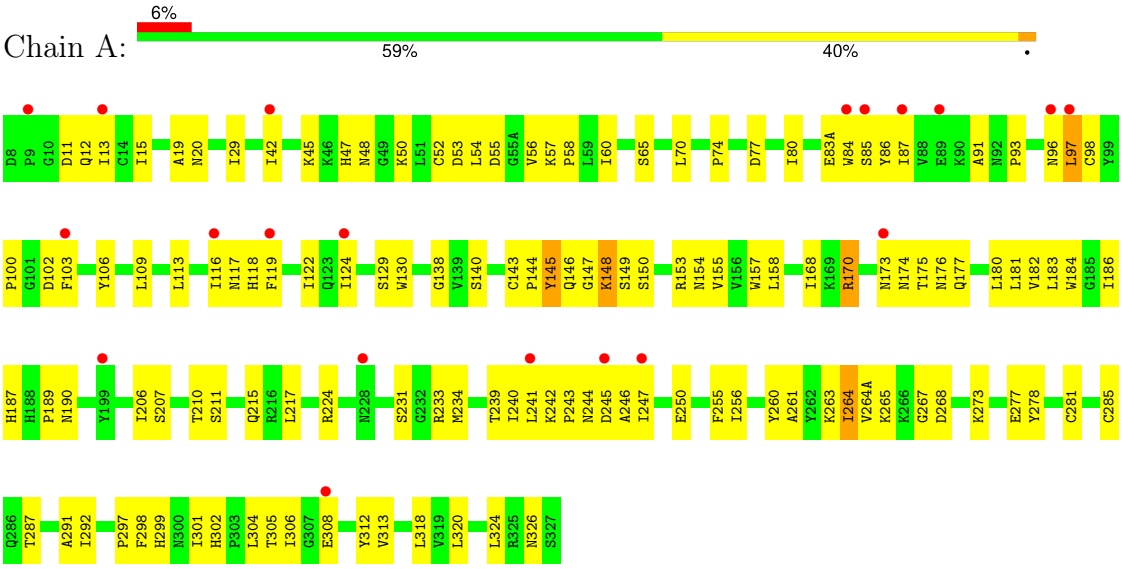
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total O 2 2	0	0
5	B	1	Total O 1 1	0	0

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.

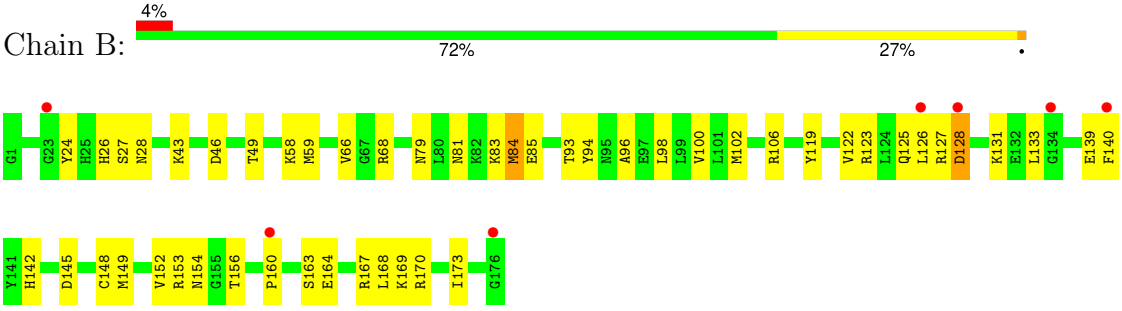
• Molecule 1: Hemagglutinin HA1 subunit

Chain A:



• Molecule 2: Hemagglutinin HA2 subunit

Chain B:

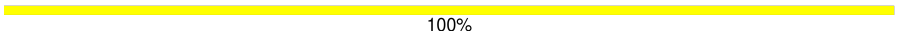


• Molecule 3: IHA-100 peptide

Chain P:

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

Chain S:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	H 3 2	Depositor
Cell constants a, b, c, α, β, γ	100.73Å 100.73Å 328.68Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	43.24 – 2.89 43.24 – 2.89	Depositor EDS
% Data completeness (in resolution range)	93.8 (43.24-2.89) 99.3 (43.24-2.89)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.07 (at 2.91Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.274 , 0.312 0.311 , 0.331	Depositor DCC
R_{free} test set	744 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å^2)	57.8	Xtriage
Anisotropy	0.692	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 62.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.40$, $< L^2 > = 0.23$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.86	EDS
Total number of atoms	4144	wwPDB-VP
Average B, all atoms (Å^2)	74.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.59% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

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

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, ACE

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	0.54	0/2623	0.93	11/3562 (0.3%)
2	B	0.50	0/1449	1.07	4/1947 (0.2%)
3	P	0.78	0/134	1.63	4/183 (2.2%)
All	All	0.54	0/4206	1.01	19/5692 (0.3%)

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	A	0	1
2	B	0	3
3	P	0	1
All	All	0	5

There are no bond length outliers.

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	B	127	ARG	N-CA-C	25.97	139.86	111.03
2	B	128	ASP	N-CA-C	-17.70	87.74	114.64
1	A	148	LYS	N-CA-C	-14.52	89.08	108.24
1	A	145	TYR	N-CA-C	-11.67	89.39	108.41
1	A	148	LYS	N-CA-CB	11.05	128.21	110.97
1	A	175	THR	N-CA-C	-10.77	100.15	113.18
1	A	98	CYS	N-CA-C	-7.60	102.12	111.40
2	B	127	ARG	CB-CA-C	-7.55	99.24	110.95
3	P	16	CYS	N-CA-C	-7.42	90.21	111.00
2	B	128	ASP	N-CA-CB	7.40	122.83	111.06

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	P	16	CYS	N-CA-CB	7.25	122.83	110.50
1	A	97	LEU	N-CA-C	-6.77	100.62	110.64
1	A	97	LEU	CB-CA-C	6.71	118.06	109.80
3	P	15	ARG	N-CA-C	6.11	125.51	113.29
1	A	174	ASN	N-CA-C	-5.64	99.60	108.63
1	A	264	ILE	CA-C-O	-5.60	117.76	122.63
3	P	8	SER	N-CA-C	5.57	118.31	110.23
1	A	144	PRO	N-CA-C	-5.38	101.38	112.47
1	A	145	TYR	N-CA-CB	5.13	118.65	110.65

There are no chirality outliers.

All (5) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	170	ARG	Sidechain
2	B	106	ARG	Sidechain
2	B	123	ARG	Sidechain
2	B	153	ARG	Sidechain
3	P	15	ARG	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	2561	0	2504	204	0
2	B	1422	0	1327	54	2
3	P	130	0	111	17	0
4	S	28	0	25	16	0
5	A	2	0	0	0	0
5	B	1	0	0	0	0
All	All	4144	0	3967	253	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 31.

All (253) 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:P:1:ACE:H3	3:P:16:CYS:SG	1.40	1.61
3:P:1:ACE:CH3	3:P:16:CYS:SG	2.03	1.46
1:A:244:ASN:ND2	4:S:1:NAG:H61	1.45	1.30
1:A:15:ILE:HD13	2:B:119:TYR:HA	1.24	1.17
1:A:13:ILE:HD12	2:B:140:PHE:HZ	1.00	1.16
1:A:292:ILE:CD1	1:A:301:ILE:HD12	1.77	1.14
1:A:190:ASN:HD21	1:A:231:SER:HB2	1.04	1.12
1:A:103:PHE:CE2	1:A:106:TYR:HA	1.83	1.12
1:A:13:ILE:HD12	2:B:140:PHE:CZ	1.84	1.11
3:P:1:ACE:H1	3:P:15:ARG:HG3	1.23	1.10
1:A:234:MET:HE1	1:A:256:ILE:HD11	1.37	1.06
1:A:15:ILE:CD1	2:B:119:TYR:HA	1.85	1.05
1:A:155:VAL:HG12	1:A:256:ILE:HG22	1.41	1.01
1:A:186:ILE:HG12	1:A:206:ILE:HD12	1.39	1.01
1:A:292:ILE:HD11	1:A:301:ILE:CD1	1.90	1.00
1:A:190:ASN:HD21	1:A:231:SER:CB	1.74	0.99
1:A:190:ASN:ND2	1:A:231:SER:HB2	1.78	0.98
1:A:234:MET:HE1	1:A:256:ILE:CD1	1.93	0.98
1:A:155:VAL:CG1	1:A:256:ILE:HG22	1.94	0.98
1:A:176:ASN:ND2	1:A:263:LYS:HD3	1.77	0.98
3:P:15:ARG:O	3:P:16:CYS:SG	2.21	0.97
1:A:244:ASN:HD21	4:S:1:NAG:C6	1.77	0.97
1:A:124:ILE:HD11	1:A:261:ALA:CB	1.95	0.96
1:A:292:ILE:HD11	1:A:301:ILE:HD12	0.96	0.95
2:B:122:VAL:HG22	2:B:125:GLN:HE21	1.31	0.94
1:A:103:PHE:HE2	1:A:106:TYR:HA	1.31	0.93
1:A:124:ILE:CD1	1:A:261:ALA:CB	2.47	0.92
1:A:103:PHE:HD2	1:A:106:TYR:HB2	1.33	0.92
1:A:244:ASN:ND2	4:S:1:NAG:C6	2.33	0.92
1:A:103:PHE:CD2	1:A:106:TYR:HA	2.05	0.91
1:A:138:GLY:HA3	1:A:157:TRP:HB3	1.53	0.91
3:P:1:ACE:C	3:P:16:CYS:SG	2.54	0.91
1:A:103:PHE:HD2	1:A:106:TYR:CB	1.82	0.90
1:A:124:ILE:HD12	1:A:261:ALA:HB2	1.54	0.90
1:A:246:ALA:H	4:S:1:NAG:H81	1.35	0.89
2:B:122:VAL:HG22	2:B:125:GLN:NE2	1.88	0.89
1:A:244:ASN:HD21	4:S:1:NAG:H61	0.80	0.88
1:A:176:ASN:HD22	1:A:263:LYS:HD3	1.36	0.88
1:A:246:ALA:N	4:S:1:NAG:C8	2.37	0.88
2:B:122:VAL:HA	2:B:125:GLN:HG2	1.54	0.87
1:A:124:ILE:HD11	1:A:261:ALA:HB3	1.57	0.85
1:A:186:ILE:HD11	1:A:217:LEU:CD1	2.07	0.84

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:42:ILE:HG22	1:A:298:PHE:HD2	1.42	0.84
1:A:186:ILE:HD11	1:A:217:LEU:HD13	1.58	0.83
1:A:103:PHE:CD2	1:A:106:TYR:CA	2.61	0.83
1:A:60:ILE:CD1	1:A:278:TYR:HB2	2.10	0.82
1:A:124:ILE:CD1	1:A:261:ALA:HB2	2.09	0.82
1:A:242:LYS:HG2	1:A:243:PRO:HD2	1.60	0.81
1:A:246:ALA:H	4:S:1:NAG:C8	1.94	0.81
1:A:246:ALA:N	4:S:1:NAG:H81	1.96	0.80
3:P:1:ACE:H1	3:P:16:CYS:SG	2.19	0.80
2:B:46:ASP:HA	3:P:14:PRO:HG3	1.64	0.80
1:A:15:ILE:HD13	2:B:119:TYR:CA	2.10	0.80
1:A:42:ILE:HG22	1:A:298:PHE:CD2	2.17	0.80
1:A:87:ILE:CD1	1:A:113:LEU:HD21	2.12	0.80
1:A:13:ILE:CD1	2:B:140:PHE:CZ	2.65	0.79
1:A:187:HIS:HA	1:A:234:MET:SD	2.23	0.79
1:A:42:ILE:HG23	1:A:297:PRO:CG	2.14	0.78
1:A:53:ASP:OD1	1:A:57:LYS:HA	1.84	0.78
1:A:103:PHE:HZ	1:A:109:LEU:HD22	1.49	0.78
1:A:186:ILE:HD11	1:A:217:LEU:CB	2.14	0.78
1:A:103:PHE:CD2	1:A:106:TYR:CB	2.67	0.78
1:A:245:ASP:HA	4:S:1:NAG:H81	1.67	0.77
1:A:42:ILE:HG23	1:A:297:PRO:HG2	1.66	0.76
1:A:207:SER:OG	1:A:250:GLU:HB3	1.85	0.76
1:A:242:LYS:O	1:A:245:ASP:HB3	1.87	0.74
1:A:113:LEU:CD1	1:A:119:PHE:CZ	2.72	0.73
1:A:116:ILE:HD13	1:A:119:PHE:CE1	2.23	0.72
3:P:15:ARG:HG3	3:P:15:ARG:O	1.88	0.72
1:A:124:ILE:CD1	1:A:261:ALA:HB3	2.15	0.72
1:A:148:LYS:HG2	1:A:149:SER:H	1.55	0.71
1:A:173:ASN:OD1	4:S:2:NAG:O6	2.09	0.71
1:A:190:ASN:ND2	1:A:231:SER:CB	2.45	0.71
1:A:103:PHE:HZ	1:A:109:LEU:CD2	2.02	0.71
1:A:113:LEU:CD1	1:A:119:PHE:CE2	2.74	0.71
1:A:13:ILE:CD1	2:B:140:PHE:HZ	1.90	0.70
2:B:79:ASN:ND2	2:B:83:LYS:HE3	2.05	0.70
1:A:186:ILE:CD1	1:A:217:LEU:HD13	2.21	0.70
3:P:1:ACE:H1	3:P:15:ARG:CG	2.13	0.70
1:A:60:ILE:HD12	1:A:278:TYR:HB2	1.74	0.70
1:A:103:PHE:HD2	1:A:106:TYR:CA	1.99	0.70
1:A:29:ILE:HD11	2:B:102:MET:HG2	1.73	0.69
1:A:103:PHE:CD2	1:A:106:TYR:HB2	2.22	0.69

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:117:ASN:HD21	1:A:268:ASP:H	1.40	0.69
2:B:128:ASP:OD2	2:B:170:ARG:NH2	2.25	0.69
3:P:1:ACE:O	3:P:16:CYS:SG	2.51	0.69
1:A:42:ILE:CG2	1:A:297:PRO:HG2	2.23	0.69
1:A:318:LEU:HD22	2:B:100:VAL:HG21	1.76	0.68
1:A:47:HIS:HB3	1:A:301:ILE:HD13	1.76	0.67
3:P:1:ACE:H1	3:P:15:ARG:O	1.95	0.66
1:A:124:ILE:HD11	1:A:180:LEU:HD21	1.77	0.66
1:A:215:GLN:HE21	1:A:217:LEU:HD11	1.60	0.66
1:A:143:CYS:HB2	1:A:150:SER:O	1.95	0.66
1:A:168:ILE:O	1:A:250:GLU:HA	1.95	0.66
1:A:186:ILE:CD1	1:A:217:LEU:HB3	2.26	0.66
1:A:246:ALA:N	4:S:1:NAG:H83	2.11	0.66
1:A:182:VAL:C	1:A:183:LEU:HD12	2.21	0.65
1:A:245:ASP:HA	4:S:1:NAG:C8	2.25	0.65
1:A:20:ASN:O	1:A:326:ASN:ND2	2.27	0.65
1:A:184:TRP:HE1	1:A:215:GLN:NE2	1.94	0.65
1:A:77:ASP:O	1:A:80:ILE:HG13	1.96	0.65
1:A:234:MET:CE	1:A:256:ILE:CD1	2.71	0.65
1:A:186:ILE:HD11	1:A:217:LEU:HB3	1.80	0.64
1:A:45:LYS:O	1:A:45:LYS:HG2	1.98	0.64
1:A:74:PRO:HB3	1:A:145:TYR:HB2	1.79	0.63
1:A:117:ASN:ND2	1:A:267:GLY:HA3	2.13	0.63
1:A:118:HIS:ND1	1:A:264(A):VAL:CG1	2.61	0.63
3:P:15:ARG:O	3:P:15:ARG:CG	2.46	0.63
1:A:117:ASN:HB2	1:A:265:LYS:HG3	1.81	0.62
1:A:287:THR:HG22	1:A:305:THR:HG22	1.81	0.62
2:B:122:VAL:HA	2:B:125:GLN:CG	2.29	0.62
1:A:173:ASN:ND2	4:S:1:NAG:C1	2.62	0.62
1:A:117:ASN:HD21	1:A:268:ASP:N	1.96	0.62
2:B:122:VAL:CG2	2:B:125:GLN:HE21	2.09	0.62
1:A:11:ASP:OD1	2:B:28:ASN:HA	2.00	0.62
1:A:234:MET:HE1	1:A:256:ILE:CG1	2.30	0.62
2:B:84:MET:HG3	2:B:85:GLU:N	2.14	0.61
1:A:234:MET:CE	1:A:256:ILE:HG13	2.31	0.60
2:B:145:ASP:OD1	2:B:145:ASP:C	2.44	0.60
1:A:182:VAL:HG21	1:A:247:ILE:HD12	1.84	0.60
2:B:96:ALA:O	2:B:100:VAL:HG23	2.02	0.60
1:A:118:HIS:ND1	1:A:264(A):VAL:HG11	2.17	0.59
2:B:128:ASP:OD1	2:B:128:ASP:C	2.44	0.59
1:A:102:ASP:OD1	1:A:103:PHE:N	2.36	0.59

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:140:SER:HB2	1:A:157:TRP:HZ3	1.67	0.59
1:A:103:PHE:CZ	1:A:109:LEU:CD2	2.85	0.59
1:A:113:LEU:HD13	1:A:119:PHE:CZ	2.38	0.58
1:A:210:THR:HG22	1:A:211:SER:H	1.68	0.58
2:B:26:HIS:HB2	2:B:149:MET:HE3	1.85	0.57
1:A:122:ILE:HG13	1:A:263:LYS:NZ	2.20	0.57
1:A:117:ASN:HD22	1:A:267:GLY:HA3	1.68	0.57
1:A:298:PHE:HZ	2:B:59:MET:HG3	1.71	0.56
1:A:302:HIS:HE1	1:A:304:LEU:HD12	1.69	0.56
1:A:113:LEU:HD12	1:A:119:PHE:CZ	2.41	0.56
1:A:138:GLY:CA	1:A:157:TRP:HB3	2.32	0.56
1:A:187:HIS:CA	1:A:234:MET:SD	2.93	0.56
1:A:42:ILE:CG2	1:A:298:PHE:CD2	2.89	0.55
1:A:11:ASP:CG	2:B:28:ASN:HA	2.32	0.55
1:A:173:ASN:HD21	4:S:1:NAG:C1	2.19	0.55
1:A:84:TRP:HZ3	1:A:118:HIS:HA	1.71	0.55
1:A:113:LEU:CD1	1:A:119:PHE:HZ	2.18	0.55
1:A:239:THR:HG22	1:A:240:ILE:N	2.21	0.55
1:A:285:CYS:HB2	1:A:308:GLU:O	2.05	0.55
1:A:83(A):GLU:HG2	1:A:118:HIS:CD2	2.43	0.54
1:A:113:LEU:HD11	1:A:119:PHE:HE2	1.73	0.54
1:A:55:ASP:O	1:A:56:VAL:HG23	2.07	0.54
1:A:130:TRP:CD1	1:A:158:LEU:HD21	2.43	0.54
1:A:103:PHE:CE2	1:A:106:TYR:CA	2.73	0.53
1:A:42:ILE:HG22	1:A:42:ILE:O	2.08	0.53
1:A:60:ILE:HD11	1:A:278:TYR:HB2	1.87	0.53
1:A:103:PHE:CZ	1:A:109:LEU:HD23	2.44	0.52
1:A:155:VAL:CG1	1:A:256:ILE:CG2	2.79	0.52
1:A:96:ASN:CG	1:A:97:LEU:H	2.17	0.52
1:A:117:ASN:ND2	1:A:268:ASP:N	2.58	0.52
1:A:113:LEU:CD1	1:A:119:PHE:HE2	2.22	0.52
2:B:164:GLU:OE2	2:B:167:ARG:NH2	2.42	0.52
2:B:122:VAL:HG13	2:B:152:VAL:HG13	1.91	0.52
1:A:124:ILE:CD1	1:A:180:LEU:HD21	2.40	0.51
1:A:215:GLN:NE2	1:A:217:LEU:HD11	2.24	0.51
2:B:49:THR:HB	3:P:14:PRO:HG2	1.91	0.51
1:A:189:PRO:O	1:A:224:ARG:NH2	2.43	0.51
1:A:91:ALA:CB	1:A:273:LYS:HE3	2.41	0.51
2:B:79:ASN:HD21	2:B:83:LYS:HE3	1.72	0.51
1:A:96:ASN:O	1:A:97:LEU:C	2.53	0.50
1:A:182:VAL:O	1:A:183:LEU:HD12	2.11	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:50:LYS:HE3	1:A:281:CYS:SG	2.50	0.50
1:A:122:ILE:HG13	1:A:263:LYS:HZ2	1.76	0.50
2:B:68:ARG:NH2	2:B:81:ASN:OD1	2.45	0.50
1:A:84:TRP:CZ3	1:A:118:HIS:HA	2.46	0.50
1:A:83(A):GLU:HG2	1:A:118:HIS:HD2	1.75	0.50
2:B:133:LEU:HD11	2:B:139:GLU:HB2	1.94	0.50
1:A:241:LEU:HD13	1:A:247:ILE:HG13	1.93	0.50
1:A:155:VAL:HG12	1:A:256:ILE:CG2	2.29	0.49
1:A:42:ILE:HD11	1:A:320:LEU:HD12	1.93	0.49
1:A:13:ILE:HG13	2:B:140:PHE:CE1	2.47	0.49
1:A:113:LEU:HD12	1:A:119:PHE:HZ	1.76	0.49
2:B:164:GLU:O	2:B:168:LEU:HG	2.12	0.49
1:A:116:ILE:CD1	1:A:119:PHE:CE1	2.95	0.49
1:A:313:VAL:HB	2:B:93:THR:HG23	1.95	0.49
1:A:245:ASP:CA	4:S:1:NAG:H81	2.41	0.48
3:P:1:ACE:CH3	3:P:15:ARG:O	2.60	0.48
1:A:48:ASN:OD1	1:A:291:ALA:N	2.45	0.48
1:A:117:ASN:ND2	1:A:268:ASP:H	2.08	0.48
1:A:181:LEU:HG	1:A:183:LEU:CD1	2.43	0.48
2:B:160:PRO:HA	2:B:163:SER:HB3	1.95	0.48
1:A:118:HIS:N	1:A:265:LYS:HB3	2.29	0.48
1:A:56:VAL:HB	1:A:85:SER:OG	2.13	0.47
1:A:187:HIS:CB	1:A:234:MET:SD	3.02	0.47
1:A:65:SER:OG	1:A:93:PRO:HB2	2.14	0.47
1:A:70:LEU:O	1:A:154:ASN:ND2	2.42	0.47
1:A:13:ILE:HG13	2:B:140:PHE:HE1	1.78	0.47
1:A:54:LEU:HD11	1:A:306:ILE:HG23	1.97	0.47
1:A:292:ILE:CG1	1:A:301:ILE:HD12	2.42	0.47
3:P:15:ARG:C	3:P:16:CYS:SG	2.97	0.47
1:A:29:ILE:HD11	2:B:102:MET:CG	2.43	0.47
1:A:177:GLN:O	1:A:243:PRO:HG3	2.14	0.47
1:A:15:ILE:HD12	2:B:119:TYR:HA	1.90	0.47
1:A:264:ILE:HG22	1:A:264:ILE:O	2.14	0.47
1:A:299:HIS:CE1	1:A:312:TYR:HD1	2.33	0.47
2:B:28:ASN:HB3	2:B:149:MET:HE2	1.96	0.47
1:A:91:ALA:HA	1:A:273:LYS:HE3	1.97	0.46
1:A:181:LEU:HG	1:A:183:LEU:HD11	1.97	0.46
2:B:154:ASN:OD1	2:B:156:THR:OG1	2.29	0.46
3:P:8:SER:O	3:P:9:SER:OG	2.27	0.46
2:B:145:ASP:OD1	2:B:148:CYS:N	2.25	0.46
2:B:46:ASP:HA	3:P:14:PRO:CG	2.40	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:239:THR:CG2	1:A:240:ILE:N	2.79	0.45
1:A:234:MET:CE	1:A:256:ILE:CG1	2.92	0.45
2:B:94:TYR:CZ	2:B:98:LEU:HD22	2.52	0.45
1:A:52:CYS:O	1:A:86:TYR:OH	2.25	0.45
1:A:87:ILE:HD11	1:A:113:LEU:HD21	1.94	0.45
1:A:186:ILE:HD11	1:A:217:LEU:HB2	1.96	0.45
2:B:164:GLU:CD	2:B:167:ARG:HH21	2.25	0.45
1:A:42:ILE:CG2	1:A:42:ILE:O	2.66	0.44
1:A:277:GLU:HG2	1:A:278:TYR:N	2.33	0.43
2:B:128:ASP:CG	2:B:170:ARG:NH2	2.76	0.43
2:B:58:LYS:HA	2:B:58:LYS:HD3	1.85	0.43
1:A:19:ALA:HB1	1:A:326:ASN:OD1	2.18	0.43
1:A:186:ILE:CD1	1:A:217:LEU:CB	2.86	0.43
1:A:77:ASP:OD2	1:A:153:ARG:NE	2.52	0.43
1:A:87:ILE:HD12	1:A:113:LEU:HD21	1.98	0.43
2:B:94:TYR:CE1	2:B:98:LEU:HD22	2.53	0.43
1:A:58:PRO:HB3	1:A:86:TYR:CZ	2.53	0.43
1:A:103:PHE:CD2	1:A:106:TYR:CD1	3.06	0.43
1:A:245:ASP:CA	4:S:1:NAG:C8	2.96	0.43
2:B:122:VAL:HG12	2:B:126:LEU:HD12	2.00	0.43
2:B:126:LEU:CD2	2:B:140:PHE:CE2	3.02	0.43
1:A:12:GLN:HB2	2:B:27:SER:OG	2.19	0.42
1:A:116:ILE:O	1:A:117:ASN:OD1	2.36	0.42
1:A:54:LEU:HD12	1:A:86:TYR:CD1	2.54	0.42
1:A:100:PRO:HB2	1:A:233:ARG:HE	1.85	0.42
1:A:129:SER:HB2	1:A:170:ARG:HH22	1.84	0.42
1:A:155:VAL:HG11	1:A:256:ILE:HG22	1.95	0.42
1:A:190:ASN:ND2	1:A:231:SER:HB3	2.31	0.41
1:A:206:ILE:HD11	1:A:255:PHE:HA	2.02	0.41
1:A:154:ASN:HA	1:A:260:TYR:HD2	1.85	0.41
2:B:131:LYS:HB2	2:B:131:LYS:HE3	1.79	0.41
1:A:184:TRP:HE1	1:A:215:GLN:HE21	1.68	0.41
1:A:187:HIS:HB2	1:A:234:MET:SD	2.60	0.41
1:A:207:SER:HG	1:A:250:GLU:HB3	1.85	0.41
2:B:140:PHE:HB3	2:B:142:HIS:O	2.20	0.41
1:A:47:HIS:HB3	1:A:301:ILE:CD1	2.46	0.41
1:A:13:ILE:HD13	2:B:152:VAL:HG11	2.02	0.41
1:A:117:ASN:ND2	1:A:267:GLY:CA	2.82	0.41
1:A:302:HIS:CE1	1:A:304:LEU:HD12	2.52	0.41
1:A:320:LEU:HD23	1:A:320:LEU:HA	1.88	0.41
1:A:45:LYS:O	1:A:45:LYS:CG	2.67	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:113:LEU:HD11	1:A:119:PHE:CE2	2.49	0.40
1:A:116:ILE:HD13	1:A:119:PHE:HE1	1.82	0.40
1:A:241:LEU:HD12	1:A:241:LEU:HA	1.90	0.40
1:A:318:LEU:HD23	1:A:318:LEU:HA	1.89	0.40
1:A:146:GLN:O	1:A:147:GLY:C	2.64	0.40
2:B:169:LYS:O	2:B:173:ILE:HG12	2.22	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)
2:B:66:VAL:CG1	2:B:83:LYS:NZ[3_545]	1.10	1.10
2:B:66:VAL:CB	2:B:83:LYS:NZ[3_545]	1.97	0.23

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	321/323 (99%)	293 (91%)	28 (9%)	0	100	100
2	B	174/176 (99%)	169 (97%)	5 (3%)	0	100	100
3	P	14/16 (88%)	11 (79%)	3 (21%)	0	100	100
All	All	509/515 (99%)	473 (93%)	36 (7%)	0	100	100

There are no Ramachandran outliers to report.

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	290/290 (100%)	289 (100%)	1 (0%)	91 97
2	B	150/150 (100%)	147 (98%)	3 (2%)	50 79
3	P	14/14 (100%)	13 (93%)	1 (7%)	12 36
All	All	454/454 (100%)	449 (99%)	5 (1%)	70 90

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	324	LEU
2	B	24	TYR
2	B	43	LYS
2	B	84	MET
3	P	6	PHE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (10) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	40	GLN
1	A	117	ASN
1	A	123	GLN
1	A	215	GLN
1	A	230	GLN
1	A	244	ASN
1	A	248	ASN
1	A	302	HIS
2	B	79	ASN
2	B	125	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)

2 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	S	1	4	14,14,15	0.40	0	17,19,21	0.63	0
4	NAG	S	2	4	14,14,15	0.39	0	17,19,21	0.49	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
4	NAG	S	1	4	-	5/6/23/26	0/1/1/1
4	NAG	S	2	4	-	5/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (10) torsion outliers are listed below:

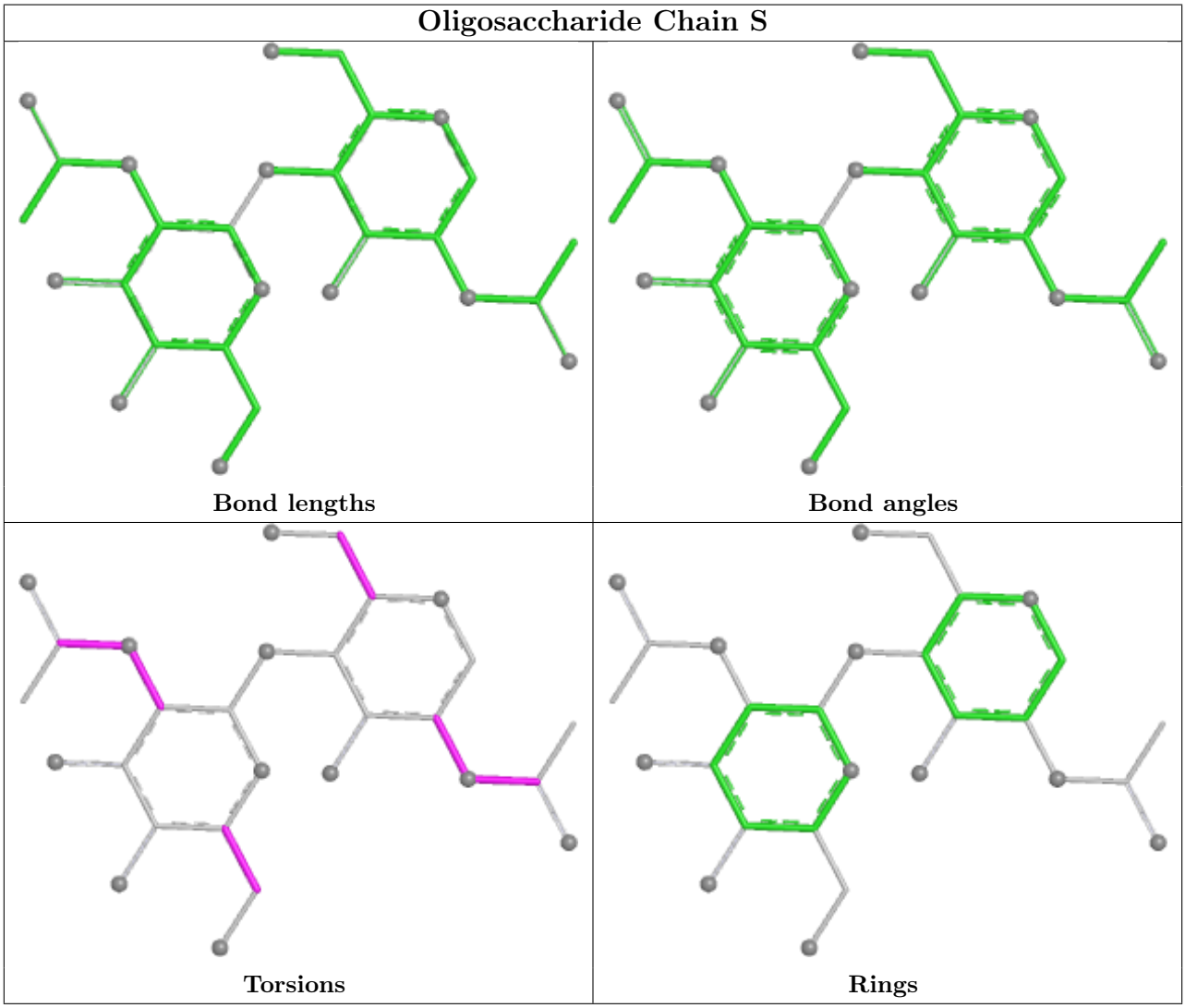
Mol	Chain	Res	Type	Atoms
4	S	1	NAG	C1-C2-N2-C7
4	S	1	NAG	C8-C7-N2-C2
4	S	1	NAG	O7-C7-N2-C2
4	S	2	NAG	C1-C2-N2-C7
4	S	2	NAG	C8-C7-N2-C2
4	S	2	NAG	O7-C7-N2-C2
4	S	1	NAG	O5-C5-C6-O6
4	S	2	NAG	C4-C5-C6-O6
4	S	2	NAG	O5-C5-C6-O6
4	S	1	NAG	C4-C5-C6-O6

There are no ring outliers.

2 monomers are involved in 16 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	S	1	NAG	15	0
4	S	2	NAG	1	0

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



5.6 Ligand geometry (i)

There are no ligands in this entry.

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, 95^{th} 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	323/323 (100%)	0.59	20 (6%) 28 23	30, 73, 100, 129	0
2	B	176/176 (100%)	0.45	7 (3%) 43 36	30, 67, 126, 163	0
3	P	15/16 (93%)	1.48	5 (33%) 1 1	30, 95, 126, 128	0
All	All	514/515 (99%)	0.57	32 (6%) 28 23	30, 72, 113, 163	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	119	PHE	6.1
3	P	9	SER	4.5
1	A	96	ASN	3.9
2	B	140	PHE	3.8
1	A	87	ILE	3.4
1	A	247	ILE	3.2
1	A	228	ASN	3.1
1	A	97	LEU	3.1
2	B	128	ASP	2.8
3	P	16	CYS	2.8
1	A	103	PHE	2.8
2	B	126	LEU	2.7
3	P	10	HIS	2.6
1	A	84	TRP	2.6
1	A	308	GLU	2.6
1	A	245	ASP	2.4
1	A	116	ILE	2.4
1	A	9	PRO	2.4
2	B	23	GLY	2.4
2	B	134	GLY	2.3
1	A	89	GLU	2.2
1	A	13	ILE	2.2
2	B	160	PRO	2.2

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Mol	Chain	Res	Type	RSRZ
1	A	42	ILE	2.2
1	A	85	SER	2.2
2	B	176	GLY	2.1
1	A	199	TYR	2.1
1	A	241	LEU	2.1
3	P	2	TRP	2.1
1	A	124	ILE	2.1
3	P	6	PHE	2.1
1	A	173	ASN	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)

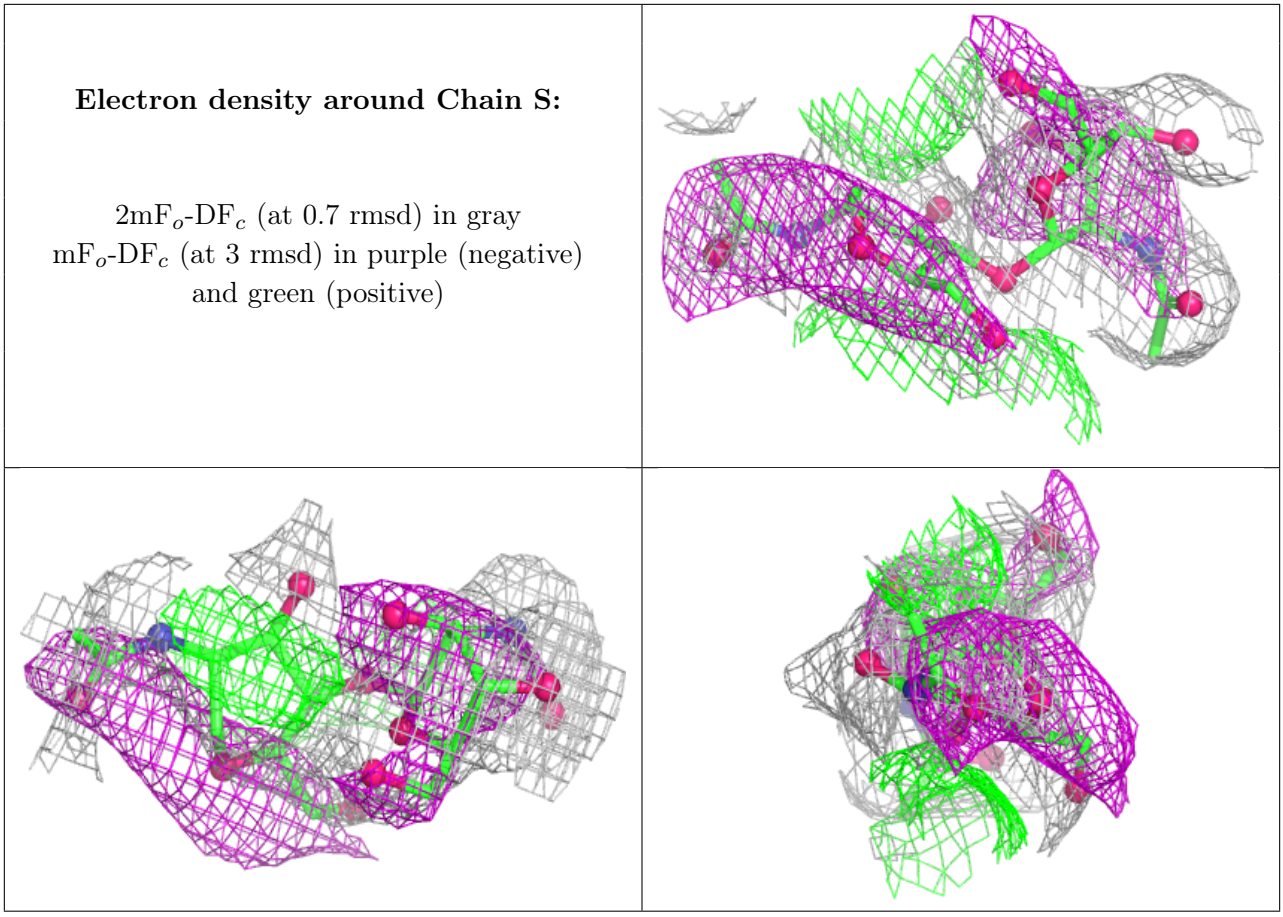
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' 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	NAG	S	1	14/15	-	-	30,30,30,30	0
4	NAG	S	2	14/15	-	-	30,30,30,30	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 S:

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



6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.