



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 07:47 AM UTC

PDB ID : 6URM / pdb_00006urm
Title : Crystal structure of vaccine-elicited receptor-binding site targeting antibody LPAF-a.01 in complex with Hemagglutinin H1 A/California/04/2009
Authors : Zhou, T.; Cheung, S.F.; Kwong, P.D.
Deposited on : 2019-10-23
Resolution : 2.65 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 : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

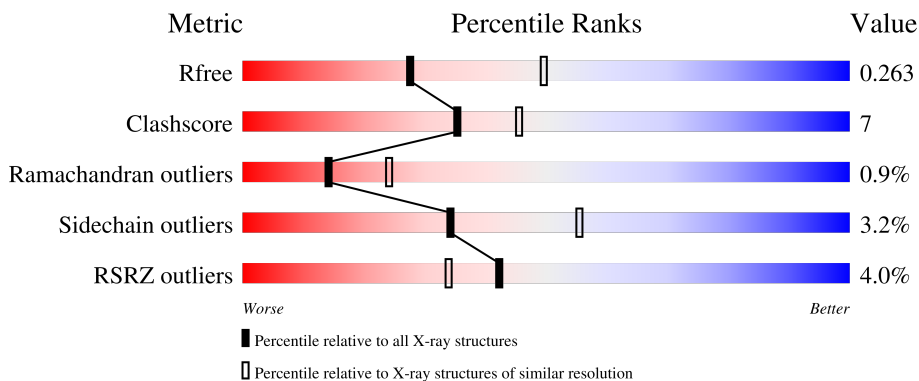
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.65 Å.

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



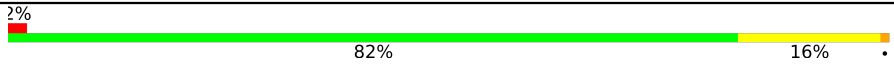
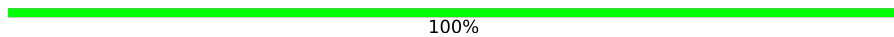

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1110 (2.66-2.66)
Clashscore	190562	1141 (2.66-2.66)
Ramachandran outliers	187476	1126 (2.66-2.66)
Sidechain outliers	187428	1126 (2.66-2.66)
RSRZ outliers	180081	1110 (2.66-2.66)

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	C	505	 4% 34% 9% 57%
1	F	505	 3% 32% 10% 57%
2	D	227	 3% 79% 19% ..
2	H	227	 2% 80% 18% ..
3	E	211	 % 82% 16% ..

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Mol	Chain	Length	Quality of chain
3	L	211	 2% 82% 16%
4	A	2	 100%
5	B	3	 33% 67%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 10193 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	F	219	Total 1733	C 1106	N 292	O 329	S 6	0	0	0
1	C	217	Total 1721	C 1098	N 290	O 327	S 6	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
F	506	SER	-	expression tag	UNP A0A3S7XTA4
F	507	GLY	-	expression tag	UNP A0A3S7XTA4
C	506	SER	-	expression tag	UNP A0A3S7XTA4
C	507	GLY	-	expression tag	UNP A0A3S7XTA4

- Molecule 2 is a protein called The heavy chain of antibody LPAF-a.01.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	H	224	Total 1689	C 1069	N 281	O 331	S 8	0	0	0
2	D	224	Total 1689	C 1069	N 281	O 331	S 8	0	0	0

- Molecule 3 is a protein called The light chain of antibody LPAF-a.01.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
3	L	210	Total 1579	C 992	N 266	O 317	S 4	0	0	0
3	E	209	Total 1570	C 987	N 265	O 314	S 4	0	0	0

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



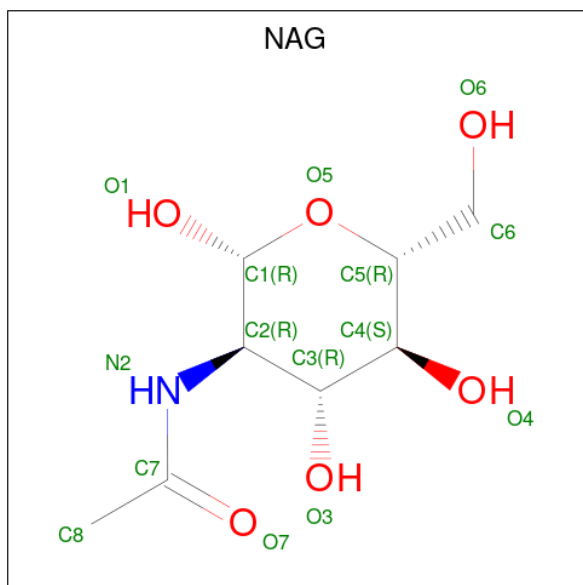
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	A	2	28	16	2	10	0	0	0

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

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



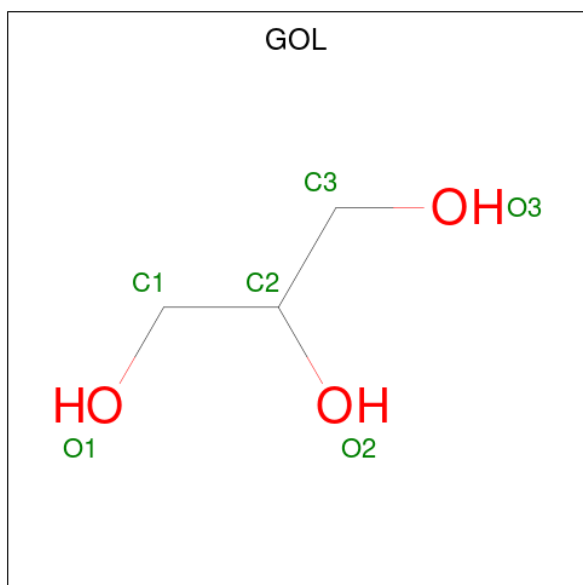
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
6	F	1	14	8	1	5	0	0

- Molecule 7 is SULFATE ION (CCD ID: SO4) (formula: O₄S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	F	1	Total	O	S	0	0
			5	4	1		
7	L	1	Total	O	S	0	0
			5	4	1		
7	D	1	Total	O	S	0	0
			5	4	1		
7	E	1	Total	O	S	0	0
			5	4	1		

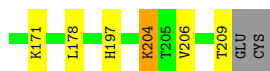
- Molecule 8 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	H	1	Total	C	O	0	0
			6	3	3		
8	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	F	14	Total	O	0	0
			14	14		
9	H	15	Total	O	0	0
			15	15		
9	L	18	Total	O	0	0
			18	18		
9	C	8	Total	O	0	0
			8	8		
9	D	27	Total	O	0	0
			27	27		
9	E	17	Total	O	0	0
			17	17		



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

Chain A:  100%



- 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:  33% 67%



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	42.41Å 260.84Å 66.45Å 90.00° 96.93° 90.00°	Depositor
Resolution (Å)	40.06 – 2.65 40.06 – 2.65	Depositor EDS
% Data completeness (in resolution range)	88.6 (40.06-2.65) 90.2 (40.06-2.65)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.54 (at 2.65Å)	Xtrriage
Refinement program	PHENIX 1.14_3260	Depositor
R, R_{free}	0.215 , 0.262 0.215 , 0.263	Depositor DCC
R_{free} test set	2000 reflections (4.74%)	wwPDB-VP
Wilson B-factor (Å ²)	45.7	Xtrriage
Anisotropy	0.753	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.35 , 60.2	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	0.93	EDS
Total number of atoms	10193	wwPDB-VP
Average B, all atoms (Å ²)	66.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.32% 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, GOL, SO4, NAG

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	C	0.10	0/1770	0.30	0/2401
1	F	0.12	0/1783	0.32	0/2420
2	D	0.12	0/1729	0.37	0/2361
2	H	0.12	0/1729	0.36	0/2361
3	E	0.11	0/1607	0.33	0/2197
3	L	0.11	0/1616	0.33	0/2209
All	All	0.11	0/10234	0.34	0/13949

There are no bond length outliers.

There are no bond angle outliers.

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	C	1721	0	1658	29	0
1	F	1733	0	1669	35	0
2	D	1689	0	1690	27	0
2	H	1689	0	1690	23	0
3	E	1570	0	1540	26	0
3	L	1579	0	1546	23	0
4	A	28	0	25	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
5	B	39	0	34	2	0
6	F	14	0	13	0	0
7	D	5	0	0	0	0
7	E	5	0	0	0	0
7	F	5	0	0	0	0
7	L	5	0	0	0	0
8	D	6	0	8	0	0
8	H	6	0	8	0	0
9	C	8	0	0	5	0
9	D	27	0	0	3	0
9	E	17	0	0	1	0
9	F	14	0	0	0	0
9	H	15	0	0	3	0
9	L	18	0	0	2	0
All	All	10193	0	9881	148	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 7.

All (148) 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:C:220:ARG:HG3	1:C:229:ARG:HG2	1.62	0.80
1:F:59:LEU:HD23	1:F:87:ILE:HG22	1.63	0.79
2:H:100(C):ARG:NH2	9:H:601:HOH:O	2.04	0.73
1:C:101:ASP:O	9:C:601:HOH:O	2.06	0.72
2:D:100(A):GLY:HA2	3:E:32:ASN:HD22	1.56	0.71
1:F:220:ARG:HG3	1:F:229:ARG:HG2	1.72	0.71
2:D:100(C):ARG:NH2	9:D:601:HOH:O	2.15	0.70
3:E:132:LEU:HD12	3:E:178:LEU:HD23	1.73	0.70
3:L:46:LEU:HD21	3:L:49:TYR:HB3	1.75	0.67
1:F:216:GLU:OE2	1:C:233:TYR:OH	2.10	0.64
2:D:81:LYS:NZ	9:D:603:HOH:O	2.29	0.64
1:F:87:ILE:HD13	1:F:113:SER:HA	1.80	0.64
2:D:87:THR:HG23	2:D:110:THR:HA	1.80	0.63
1:C:134:GLY:HA3	1:C:153:TRP:HB3	1.81	0.62
1:F:97:CYS:O	1:F:224:ARG:NH1	2.33	0.62
1:F:233:TYR:OH	1:C:216:GLU:OE2	2.14	0.60
3:L:180:LEU:O	9:L:401:HOH:O	2.16	0.59
2:D:100(A):GLY:O	3:E:91:TRP:HB3	2.02	0.59
1:F:202:VAL:HB	1:F:213:PHE:HB2	1.85	0.57

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:218:ALA:O	1:F:220:ARG:NH2	2.37	0.57
2:D:39:ARG:HG3	2:D:45:LEU:HD23	1.88	0.56
2:D:130:SER:OG	3:E:115:VAL:O	2.15	0.56
1:C:238:GLU:HG3	1:C:241:ASP:HB2	1.87	0.56
2:D:11:LEU:HD13	2:D:147:PRO:HG3	1.88	0.55
1:F:192:GLN:NE2	1:F:196:GLN:O	2.40	0.54
1:C:218:ALA:O	1:C:220:ARG:NH2	2.41	0.54
1:F:170:ASN:ND2	1:F:237:VAL:O	2.40	0.54
1:C:107:GLU:O	1:C:111:GLN:HG2	2.07	0.54
2:H:7:SER:O	9:H:602:HOH:O	2.18	0.52
3:E:117:LEU:HD21	3:E:206:VAL:HG22	1.91	0.52
1:C:137:ALA:HB1	3:E:30:ILE:HG22	1.91	0.52
3:L:13:VAL:HG11	3:L:19:ALA:HA	1.91	0.52
1:F:112:LEU:HD23	1:F:260:MET:HE1	1.92	0.52
1:C:101:ASP:N	1:C:101:ASP:OD1	2.44	0.51
2:D:15:THR:HA	2:D:82(B):ASP:HB2	1.93	0.51
3:E:20:ARG:HG2	3:E:74:ILE:HG13	1.93	0.51
1:C:227:GLU:H	2:D:99:ASP:CG	2.17	0.51
1:F:238:GLU:HG3	1:F:241:ASP:HB2	1.93	0.51
2:D:29:LEU:HD13	2:D:35(A):LEU:HD12	1.93	0.51
1:C:133:ASN:N	1:C:133:ASN:OD1	2.44	0.51
1:F:190:ASP:OD2	2:H:99:ASP:N	2.43	0.50
1:C:195:TYR:O	1:C:197:ASN:N	2.38	0.50
2:D:5:ARG:HE	2:D:23:THR:HB	1.75	0.50
2:H:29:LEU:HD22	2:H:35(A):LEU:HD12	1.94	0.50
1:C:71:LEU:O	9:C:602:HOH:O	2.20	0.50
1:C:72:GLY:HA3	9:C:602:HOH:O	2.12	0.50
2:D:18:LEU:HD22	2:D:109:VAL:HG11	1.93	0.50
1:F:87:ILE:HD11	1:F:267:ILE:HG13	1.93	0.50
2:D:51:ILE:HD11	2:D:71:LYS:HE2	1.94	0.49
3:L:115:VAL:HG22	3:L:136:ILE:HG23	1.93	0.49
1:F:152:ILE:HG13	1:F:255:ARG:HB2	1.94	0.49
2:H:66:ARG:NH1	2:H:86:ASP:OD2	2.43	0.49
2:D:131:THR:HG22	2:D:132:SER:H	1.78	0.48
3:L:132:LEU:HD12	3:L:178:LEU:HD23	1.94	0.48
2:D:119:PRO:HB3	2:D:145:TYR:HB3	1.94	0.48
3:E:204:LYS:NZ	9:E:407:HOH:O	2.44	0.48
1:F:195:TYR:O	1:F:197:ASN:N	2.42	0.48
2:H:100(A):GLY:N	9:H:601:HOH:O	2.45	0.48
3:L:113:PRO:HB3	3:L:139:PHE:HB3	1.96	0.48
1:C:180:TRP:CE2	1:C:204:VAL:HG21	2.49	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:E:113:PRO:HD3	3:E:197:HIS:CD2	2.48	0.48
2:D:95:MET:HE1	3:E:91:TRP:CE3	2.49	0.47
1:F:58:PRO:HB3	1:F:85:SER:H	1.79	0.47
2:H:68:THR:HB	2:H:81:LYS:HB2	1.97	0.47
3:L:108:GLN:HB2	3:L:140:TYR:CE1	2.50	0.47
1:F:175:GLU:OE1	1:F:262:ARG:NH1	2.46	0.47
1:F:73:ASN:HB3	1:F:76:CYS:SG	2.55	0.47
1:F:222:LYS:HD2	1:F:225:ASP:HA	1.96	0.47
1:C:150:ASN:N	9:C:602:HOH:O	2.24	0.47
2:D:6:GLU:N	2:D:6:GLU:OE1	2.48	0.47
3:E:49:TYR:CD2	3:E:50:THR:HG22	2.50	0.47
2:H:6:GLU:N	2:H:6:GLU:OE1	2.48	0.47
2:H:119:PRO:HB3	2:H:145:TYR:HB3	1.96	0.47
3:L:119:PRO:HA	3:L:132:LEU:HD23	1.96	0.47
3:E:61:ARG:HB2	3:E:76:SER:O	2.15	0.47
5:B:2:NAG:H62	5:B:3:MAN:O2	2.15	0.46
2:D:135:THR:HA	2:D:185:PRO:HA	1.96	0.46
2:H:5:ARG:HG3	2:H:23:THR:HB	1.96	0.46
1:C:102:PHE:CD2	1:C:232:TYR:HB2	2.50	0.46
1:C:108:LEU:HB2	1:C:234:TRP:CE2	2.51	0.46
3:E:46:LEU:HD21	3:E:49:TYR:HB3	1.97	0.46
3:L:132:LEU:HB2	3:L:178:LEU:HB3	1.97	0.46
1:F:136:THR:O	1:F:145:LYS:HB3	2.15	0.46
2:H:150:VAL:HG12	2:H:200:HIS:CD2	2.51	0.46
1:C:202:VAL:HB	1:C:213:PHE:HB2	1.98	0.45
3:L:52:ILE:HG22	3:L:64:GLY:O	2.17	0.45
2:H:209:LYS:HD2	2:H:209:LYS:HA	1.76	0.45
1:F:108:LEU:HB2	1:F:234:TRP:CE2	2.52	0.45
1:F:159:ASN:OD1	3:L:56:SER:HB3	2.17	0.45
2:H:100(C):ARG:HB3	3:L:34:HIS:CE1	2.52	0.45
3:L:40:PRO:HD2	3:L:166:LYS:HE2	1.99	0.45
1:F:177:LEU:HB3	1:F:258:PHE:HB2	1.98	0.45
3:L:77:LYS:NZ	9:L:407:HOH:O	2.50	0.45
2:H:35(B):THR:HG23	2:H:47:TRP:HE1	1.82	0.45
2:D:35(A):LEU:HD13	2:D:78:VAL:HG21	1.97	0.45
2:D:83:ASP:HB3	2:D:85:VAL:HG22	1.99	0.44
3:E:13:VAL:HG11	3:E:19:ALA:HA	1.98	0.44
3:L:51:ASP:OD1	3:L:66:ASN:ND2	2.45	0.44
1:F:123:LYS:NZ	1:F:133:ASN:OD1	2.37	0.44
2:H:117:LYS:HE2	2:H:118:GLY:O	2.17	0.44
1:C:159:ASN:OD1	3:E:56:SER:HB3	2.17	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:H:126:PRO:HD2	2:H:213:PRO:HA	1.99	0.43
1:C:145:LYS:NZ	3:E:32:ASN:OD1	2.26	0.43
3:L:185:TRP:CE2	3:L:208:PRO:HB3	2.54	0.43
1:C:65:ASN:HD21	1:C:67:ALA:HB3	1.83	0.43
2:D:100:LEU:HB3	2:D:100(C):ARG:NH2	2.33	0.43
2:D:123:PRO:HD3	2:D:209:LYS:HE3	1.99	0.43
3:E:122:SER:O	3:E:126:GLN:HG2	2.18	0.43
3:L:61:ARG:HB2	3:L:76:SER:O	2.18	0.43
1:F:145:LYS:NZ	3:L:29:GLY:O	2.48	0.43
2:H:73:THR:O	2:H:74:SER:HB3	2.18	0.43
2:H:100(B):GLY:HA3	3:L:91:TRP:CD1	2.54	0.43
3:L:144:VAL:HG12	3:L:197:HIS:HB2	2.01	0.43
3:E:11:VAL:O	3:E:104:LEU:HD12	2.19	0.43
1:F:133(A):LYS:HD2	3:L:52:ILE:HD12	2.01	0.43
2:H:123:PRO:HD3	2:H:209:LYS:HE2	2.01	0.43
1:C:231:ASN:N	1:C:231:ASN:OD1	2.51	0.43
3:E:167:GLN:HG2	3:E:171:LYS:O	2.18	0.43
2:H:29:LEU:HD23	2:H:71:LYS:HG3	2.01	0.42
3:E:36:TYR:HE2	3:E:89:GLN:HB3	1.83	0.42
9:D:622:HOH:O	5:B:2:NAG:H83	2.20	0.42
1:C:73:ASN:CG	1:C:74:PRO:HD2	2.44	0.42
1:C:202:VAL:HG11	1:C:251:LEU:HD13	2.01	0.42
2:D:12:VAL:O	2:D:111:VAL:HA	2.18	0.42
3:E:124:GLU:HG2	3:E:129:LYS:HB2	2.02	0.42
1:F:105:TYR:CE2	1:F:109:ARG:HD2	2.54	0.42
2:H:146:PHE:HA	2:H:147:PRO:HA	1.87	0.41
1:C:146:SER:OG	1:C:147:PHE:N	2.51	0.41
2:D:168:ALA:HA	2:D:178:LEU:HB3	2.01	0.41
1:F:88:VAL:HG12	1:F:268:ILE:HB	2.02	0.41
1:F:58:PRO:HB2	1:F:86:TYR:O	2.20	0.41
3:E:49:TYR:HD2	3:E:50:THR:HG22	1.85	0.41
3:E:59:PRO:HG2	3:E:62:PHE:CD1	2.55	0.41
3:E:115:VAL:O	3:E:204:LYS:HD2	2.19	0.41
1:C:184:HIS:HB3	1:C:220:ARG:HH12	1.84	0.41
1:F:180:TRP:CE2	1:F:204:VAL:HG21	2.55	0.41
2:D:29:LEU:HD23	2:D:71:LYS:HD3	2.01	0.41
1:C:103:ILE:HD12	9:C:601:HOH:O	2.19	0.41
1:F:89:GLU:OE2	1:F:109:ARG:NH1	2.54	0.41
2:H:12:VAL:O	2:H:111:VAL:HA	2.21	0.41
3:L:59:PRO:HG2	3:L:62:PHE:CD1	2.56	0.41
2:H:101:ASP:HA	2:H:102:PRO:HA	1.87	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:D:95:MET:HE1	3:E:91:TRP:CD2	2.56	0.40
3:E:13:VAL:HG21	3:E:19:ALA:HB2	2.03	0.40
1:F:175:GLU:OE2	1:F:262:ARG:HD3	2.21	0.40
3:L:13:VAL:HG21	3:L:19:ALA:HB2	2.03	0.40
1:F:66:ILE:HD12	1:F:109:ARG:HG2	2.02	0.40
1:F:154:LEU:HD23	1:F:154:LEU:HA	1.83	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	C	215/505 (43%)	204 (95%)	10 (5%)	1 (0%)	24	39
1	F	217/505 (43%)	204 (94%)	11 (5%)	2 (1%)	14	24
2	D	222/227 (98%)	204 (92%)	15 (7%)	3 (1%)	9	14
2	H	222/227 (98%)	211 (95%)	8 (4%)	3 (1%)	9	14
3	E	207/211 (98%)	197 (95%)	10 (5%)	0	100	100
3	L	208/211 (99%)	199 (96%)	7 (3%)	2 (1%)	12	20
All	All	1291/1886 (68%)	1219 (94%)	61 (5%)	11 (1%)	14	24

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
2	D	43	LYS
2	D	82(B)	ASP
1	F	58	PRO
2	H	8	GLY
2	H	135	THR
3	L	151	ASP

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Mol	Chain	Res	Type
2	H	74	SER
3	L	50	THR
2	D	8	GLY
1	C	91	SER
1	F	90(A)	PRO

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	C	188/440 (43%)	179 (95%)	9 (5%)	23	39
1	F	189/440 (43%)	184 (97%)	5 (3%)	40	63
2	D	196/199 (98%)	192 (98%)	4 (2%)	48	69
2	H	196/199 (98%)	189 (96%)	7 (4%)	31	51
3	E	176/178 (99%)	169 (96%)	7 (4%)	28	47
3	L	177/178 (99%)	173 (98%)	4 (2%)	44	66
All	All	1122/1634 (69%)	1086 (97%)	36 (3%)	34	55

All (36) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	F	59	LEU
1	F	76	CYS
1	F	87	ILE
1	F	89	GLU
1	F	135	VAL
2	H	32	SER
2	H	46	GLU
2	H	57	LYS
2	H	100	LEU
2	H	100(C)	ARG
2	H	100(D)	PHE
2	H	183	THR
3	L	50	THR

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Mol	Chain	Res	Type
3	L	52	ILE
3	L	136	ILE
3	L	194	GLN
1	C	60	HIS
1	C	61	LEU
1	C	87	ILE
1	C	103	ILE
1	C	129	ASN
1	C	133	ASN
1	C	133(A)	LYS
1	C	225	ASP
1	C	231	ASN
2	D	61	THR
2	D	72	ASP
2	D	116	THR
2	D	131	THR
3	E	30	ILE
3	E	52	ILE
3	E	54	ARG
3	E	117	LEU
3	E	155	VAL
3	E	204	LYS
3	E	209	THR

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	192	GLN
2	H	164	HIS
3	L	32	ASN
3	L	79	GLN
1	C	73	ASN
1	C	129	ASN
1	C	192	GLN
2	D	56	ASN
3	E	167	GLN

5.3.3 RNA

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](#)

5 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	4,2	14,14,15	0.26	0	17,19,21	0.52	0
4	NAG	A	2	4	14,14,15	0.21	0	17,19,21	0.46	0
5	NAG	B	1	5,2	14,14,15	0.20	0	17,19,21	0.51	0
5	NAG	B	2	5	14,14,15	1.36	2 (14%)	17,19,21	2.60	5 (29%)
5	MAN	B	3	5	11,11,12	1.63	3 (27%)	15,15,17	1.58	3 (20%)

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. '2' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	NAG	A	1	4,2	-	1/6/23/26	0/1/1/1
4	NAG	A	2	4	-	2/6/23/26	0/1/1/1
5	NAG	B	1	5,2	-	0/6/23/26	0/1/1/1
5	NAG	B	2	5	-	2/6/23/26	0/1/1/1
5	MAN	B	3	5	-	1/2/19/22	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	B	2	NAG	C1-C2	4.00	1.57	1.52
5	B	3	MAN	C4-C5	3.06	1.59	1.53
5	B	2	NAG	O5-C1	2.98	1.48	1.43
5	B	3	MAN	O2-C2	2.29	1.48	1.43
5	B	3	MAN	C4-C3	2.18	1.58	1.52

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	B	2	NAG	C1-O5-C5	6.95	121.50	112.19
5	B	2	NAG	O4-C4-C5	5.98	124.06	109.32
5	B	2	NAG	C3-C4-C5	-3.88	103.19	110.23
5	B	3	MAN	O5-C5-C6	-3.87	100.14	107.66
5	B	3	MAN	O2-C2-C1	2.84	115.72	109.22
5	B	3	MAN	C1-O5-C5	2.58	115.65	112.19
5	B	2	NAG	C2-N2-C7	2.12	125.74	122.90
5	B	2	NAG	O5-C5-C4	-2.06	105.81	110.83

There are no chirality outliers.

All (6) torsion outliers are listed below:

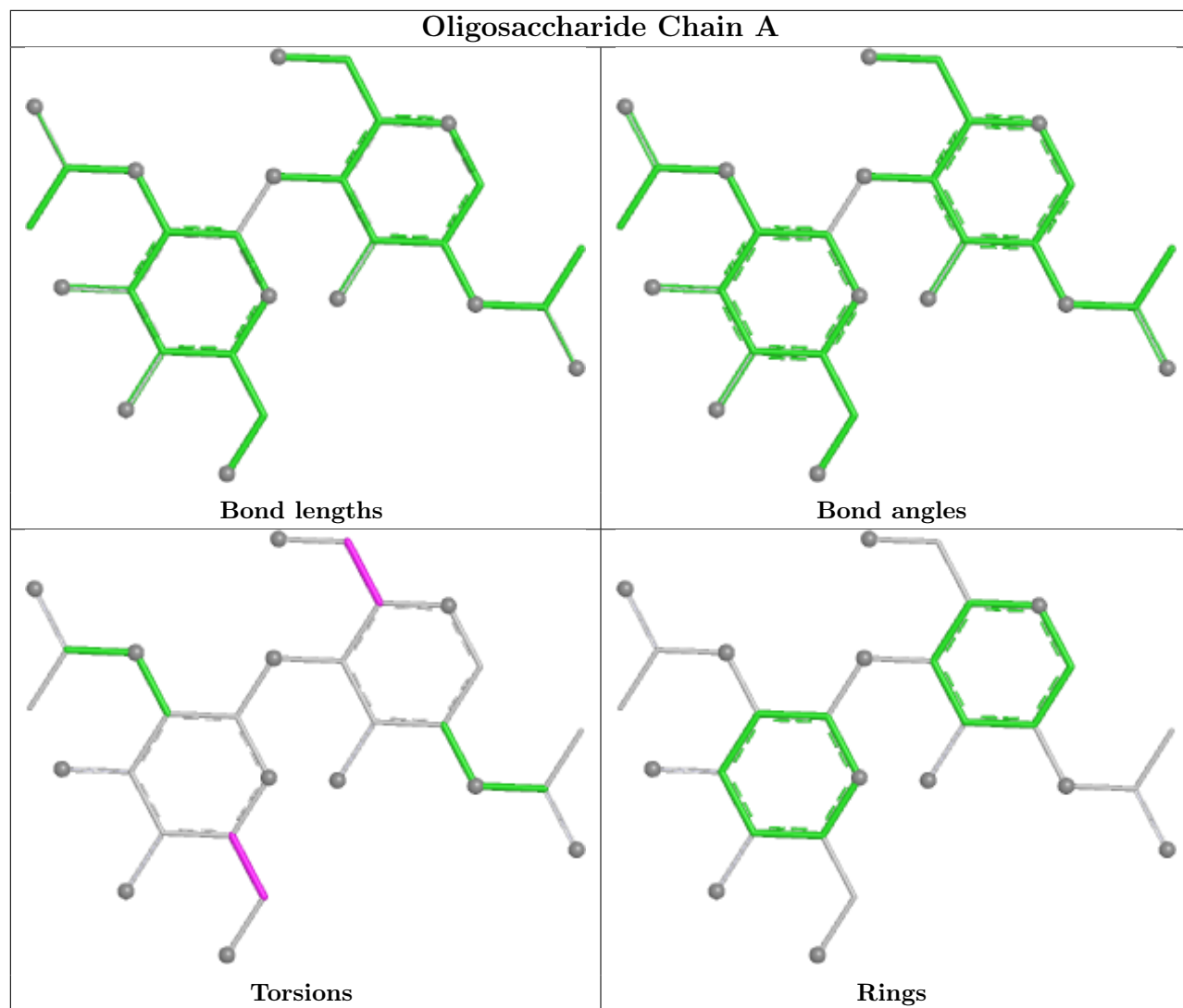
Mol	Chain	Res	Type	Atoms
5	B	2	NAG	C8-C7-N2-C2
5	B	2	NAG	O7-C7-N2-C2
4	A	2	NAG	C4-C5-C6-O6
4	A	2	NAG	O5-C5-C6-O6
5	B	3	MAN	O5-C5-C6-O6
4	A	1	NAG	C4-C5-C6-O6

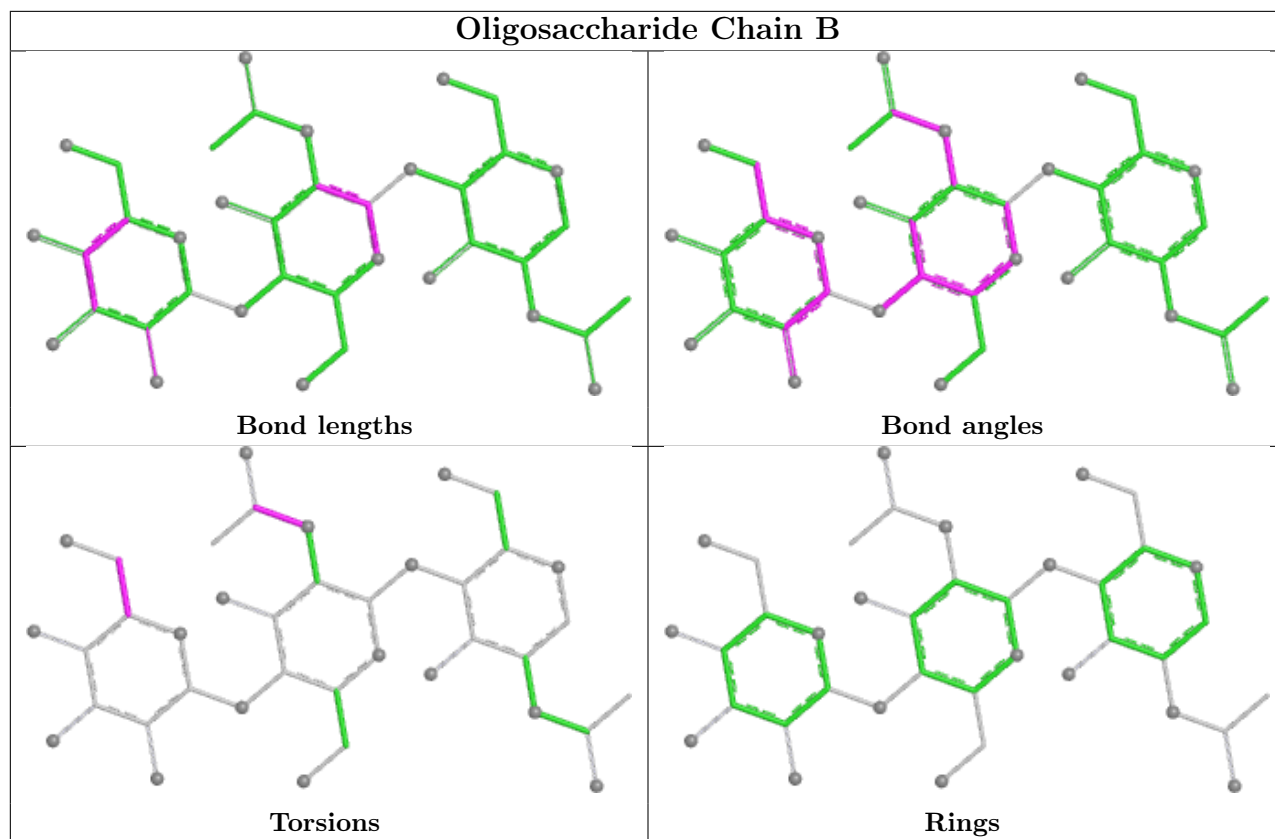
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	B	3	MAN	1	0
5	B	2	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](#)

7 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
7	SO4	F	602	-	4,4,4	0.23	0	6,6,6	0.10	0
7	SO4	L	301	-	4,4,4	0.23	0	6,6,6	0.10	0
6	NAG	F	601	1	14,14,15	0.38	0	17,19,21	0.47	0
7	SO4	D	505	-	4,4,4	0.23	0	6,6,6	0.10	0
7	SO4	E	301	-	4,4,4	0.23	0	6,6,6	0.09	0
8	GOL	H	503	-	5,5,5	0.95	0	5,5,5	1.11	0
8	GOL	D	504	-	5,5,5	0.94	0	5,5,5	1.08	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	GOL	H	503	-	-	2/4/4/4	-
8	GOL	D	504	-	-	2/4/4/4	-
6	NAG	F	601	1	-	0/6/23/26	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
8	H	503	GOL	O1-C1-C2-C3
8	D	504	GOL	O2-C2-C3-O3
8	D	504	GOL	C1-C2-C3-O3
8	H	503	GOL	O1-C1-C2-O2

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 [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	C	217/505 (42%)	0.71	22 (10%) 12 10	50, 80, 159, 194	6 (2%)
1	F	219/505 (43%)	0.54	14 (6%) 25 19	41, 71, 134, 180	6 (2%)
2	D	224/227 (98%)	0.26	6 (2%) 56 49	31, 54, 100, 166	0
2	H	224/227 (98%)	0.19	4 (1%) 67 63	29, 55, 98, 143	0
3	E	209/211 (99%)	0.07	2 (0%) 79 76	36, 54, 77, 117	0
3	L	210/211 (99%)	0.10	4 (1%) 66 61	33, 53, 84, 153	0
All	All	1303/1886 (69%)	0.31	52 (3%) 42 34	29, 60, 117, 194	12 (0%)

All (52) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	90(A)	PRO	4.8
1	C	59	LEU	3.8
1	F	59	LEU	3.6
2	D	130	SER	3.6
2	D	131	THR	3.5
1	F	80	SER	3.4
1	F	58	PRO	3.2
1	C	79	LEU	3.2
3	L	209	THR	3.1
1	F	57	ALA	3.0
1	F	79	LEU	2.9
1	C	263	ASN	2.9
1	C	158	GLY	2.9
1	C	205	GLY	2.9
2	D	191	THR	2.9
1	C	143	GLY	2.9
3	L	156	LYS	2.8
1	C	102	PHE	2.8
1	F	266	SER	2.8

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Mol	Chain	Res	Type	RSRZ
1	C	266(A)	GLY	2.7
1	C	90	THR	2.7
1	C	265	GLY	2.6
1	F	268	ILE	2.6
1	F	87	ILE	2.5
2	H	130	SER	2.5
3	L	91	TRP	2.5
2	D	186	SER	2.5
3	E	56	SER	2.5
1	C	94	ASN	2.4
3	L	42	GLN	2.4
2	D	215	SER	2.3
1	C	78	SER	2.3
1	F	82	ALA	2.3
2	H	134	GLY	2.3
1	C	264	ALA	2.2
1	F	143	GLY	2.2
2	H	132	SER	2.2
2	H	206	LYS	2.2
1	F	64	CYS	2.2
1	C	203	PHE	2.2
1	C	268	ILE	2.2
1	C	262	ARG	2.2
1	F	78	SER	2.2
3	E	115	VAL	2.2
1	F	94	ASN	2.1
1	F	203	PHE	2.1
1	C	132	SER	2.1
1	C	81	THR	2.1
2	D	116	THR	2.1
1	C	74	PRO	2.1
1	C	101	ASP	2.0
1	C	159	ASN	2.0

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

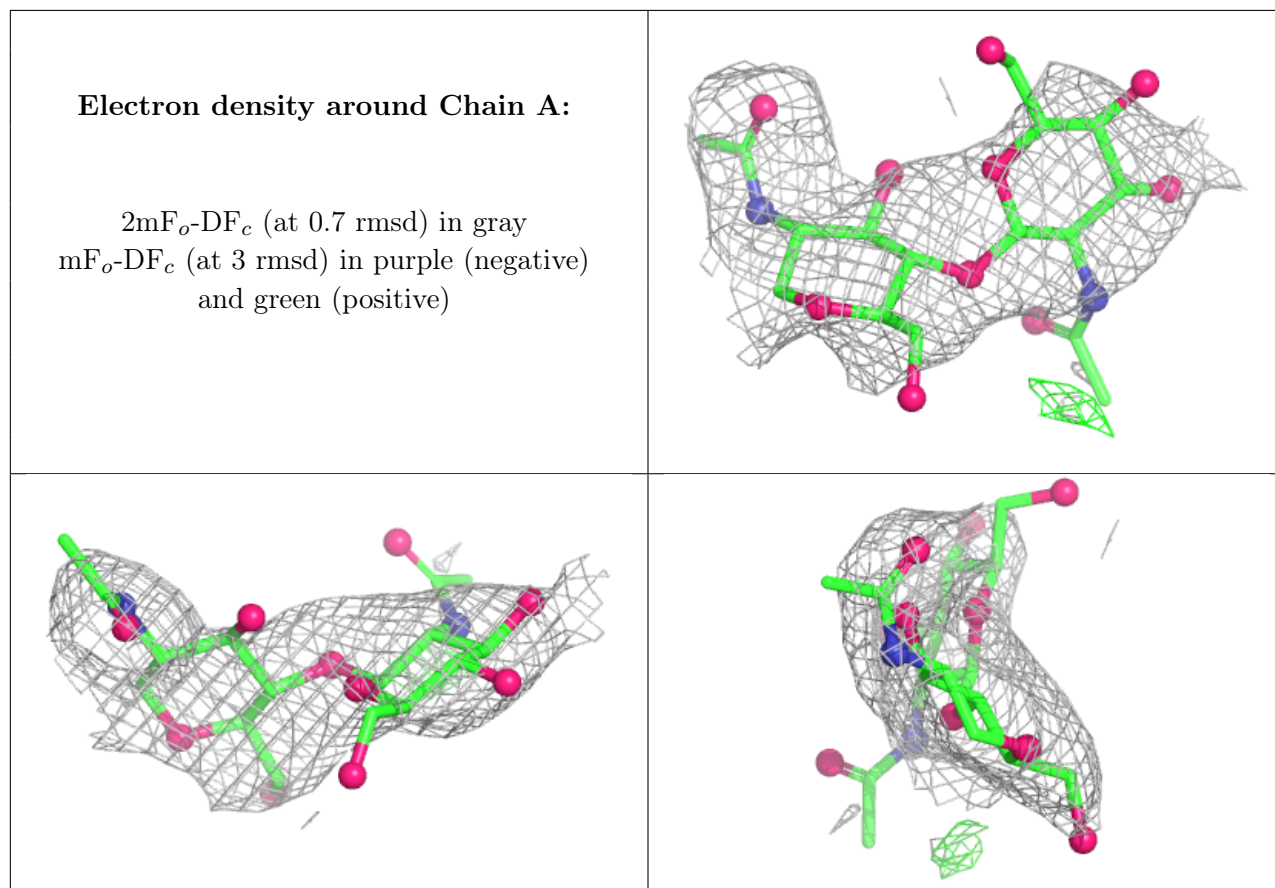
There are no non-standard protein/DNA/RNA residues in this entry.

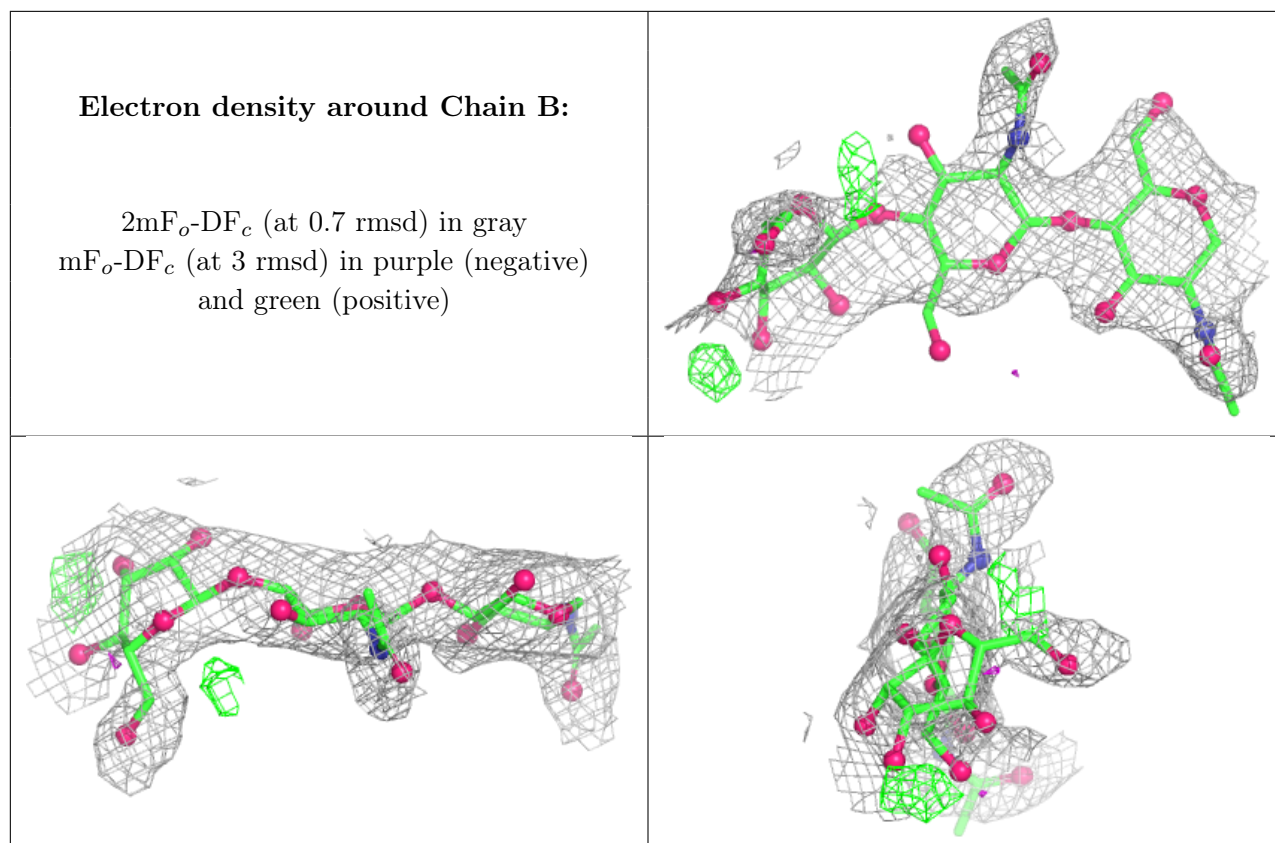
6.3 Carbohydrates [i](#)

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, 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	NAG	A	1	14/15	-	-	63,70,78,78	0
4	NAG	A	2	14/15	-	-	83,88,91,94	0
5	NAG	B	1	14/15	-	-	41,48,60,69	0
5	NAG	B	2	14/15	-	-	79,84,95,97	0
5	MAN	B	3	11/12	-	-	89,92,98,99	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.





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
7	SO4	D	505	5/5	0.70	0.15	122,124,125,128	0
6	NAG	F	601	14/15	0.77	0.14	57,68,76,78	0
7	SO4	L	301	5/5	0.80	0.09	105,106,106,108	0
7	SO4	F	602	5/5	0.82	0.13	90,92,92,93	0
8	GOL	D	504	6/6	0.83	0.15	65,70,71,72	0
7	SO4	E	301	5/5	0.88	0.12	92,92,93,94	0
8	GOL	H	503	6/6	0.90	0.10	55,60,61,63	0

6.5 Other polymers [i](#)

There are no such residues in this entry.