



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 27, 2026 – 11:46 pm BST

PDB ID : 30AF / pdb_000030af
Title : Complex between IgE-Fc and anti-IgE Fab aeFab98
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Deposited on : 2026-04-16
Resolution : 2.40 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	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

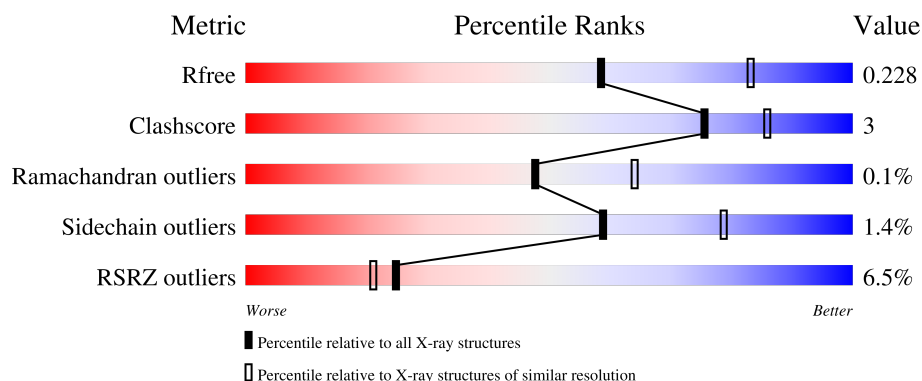
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.40 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	4912 (2.40-2.40)
Clashscore	190562	5391 (2.40-2.40)
Ramachandran outliers	187476	5320 (2.40-2.40)
Sidechain outliers	187428	5321 (2.40-2.40)
RSRZ outliers	180081	4916 (2.40-2.40)

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	327	10% 87% 9% ..
1	B	327	9% 84% 11% 5%
2	H	216	3% 91% 7% .
3	L	214	% 96% .
4	C	5	60% 40%

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Mol	Chain	Length	Quality of chain
4	D	5	60% 40%

2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 8321 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 Isoform 1 of Immunoglobulin heavy constant epsilon.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	B	312	Total	C	N	O	S	0	0	0
			2363	1486	411	455	11			
1	A	317	Total	C	N	O	S	0	0	0
			2428	1522	423	472	11			

There are 10 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	222	ASP	-	expression tag	UNP P01854
B	223	ILE	-	expression tag	UNP P01854
B	225	ALA	CYS	engineered mutation	UNP P01854
B	265	GLN	ASN	engineered mutation	UNP P01854
B	371	GLN	ASN	engineered mutation	UNP P01854
A	222	ASP	-	expression tag	UNP P01854
A	223	ILE	-	expression tag	UNP P01854
A	225	ALA	CYS	engineered mutation	UNP P01854
A	265	GLN	ASN	engineered mutation	UNP P01854
A	371	GLN	ASN	engineered mutation	UNP P01854

- Molecule 2 is a protein called aeFab98 heavy chain.

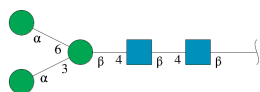
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	H	212	Total	C	N	O	S	0	0	0
			1557	986	250	312	9			

- Molecule 3 is a protein called aeFab98 light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	L	214	Total	C	N	O	S	0	0	0
			1598	991	265	333	9			

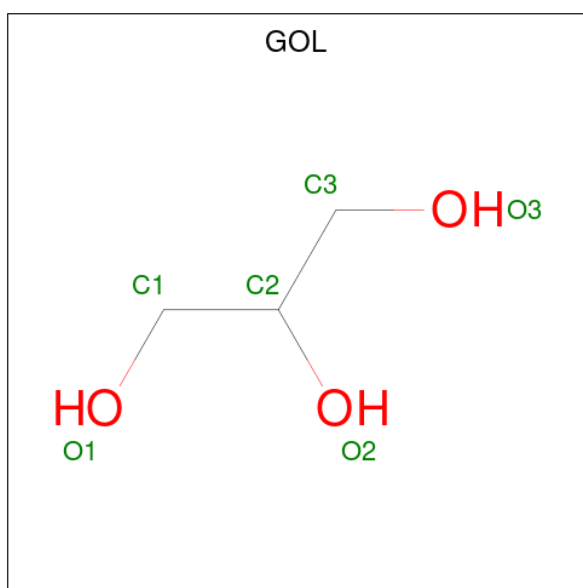
- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-[alpha-D-mannopyran

ose-(1-6)]beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-a
cetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	C	5	Total	C	N	O	0	0	0
			61	34	2	25			
4	D	5	Total	C	N	O	0	0	0
			61	34	2	25			

- Molecule 5 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$).



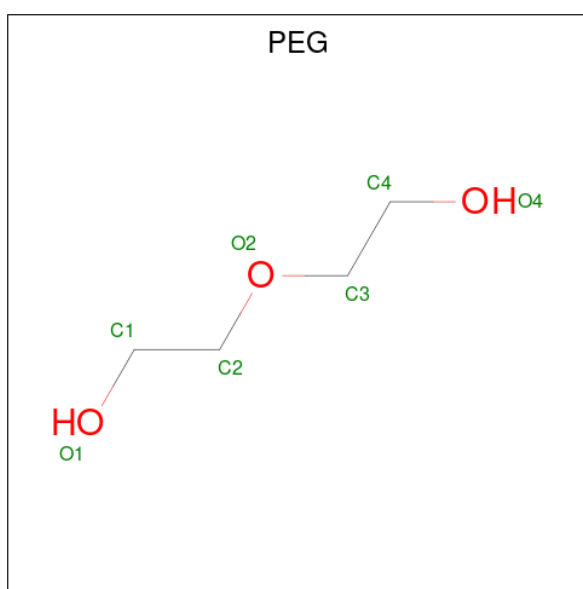
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	B	1	Total	C	O	0	0
			6	3	3		
5	H	1	Total	C	O	0	0
			6	3	3		
5	H	1	Total	C	O	0	0
			6	3	3		
5	H	1	Total	C	O	0	0
			6	3	3		

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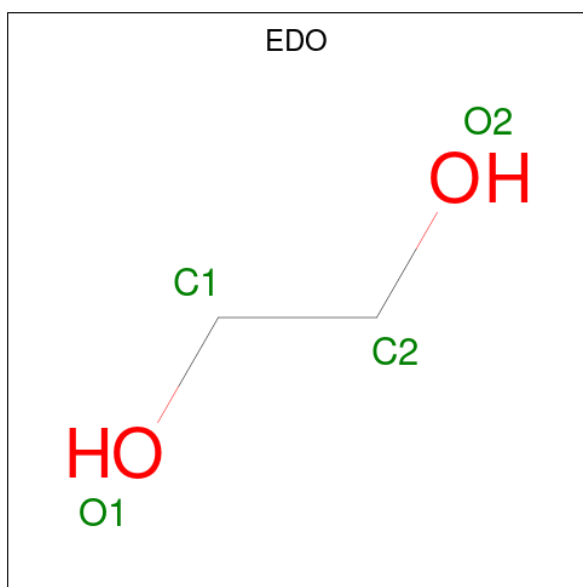
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	H	1	Total	C	O	0	0
			6	3	3		
5	H	1	Total	C	O	0	0
			6	3	3		
5	L	1	Total	C	O	0	0
			6	3	3		
5	L	1	Total	C	O	0	0
			6	3	3		

- Molecule 6 is DI(HYDROXYETHYL)ETHER (CCD ID: PEG) (formula: $C_4H_{10}O_3$).



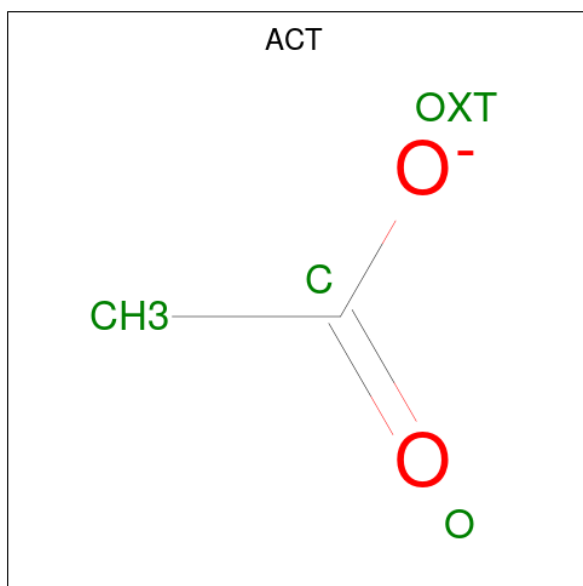
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	B	1	Total	C	O	0	0
			7	4	3		
6	H	1	Total	C	O	0	0
			7	4	3		

- Molecule 7 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
7	B	1	Total	C	O	0	0
			4	2	2		

- Molecule 8 is ACETATE ION (CCD ID: ACT) (formula: $C_2H_3O_2^-$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	H	1	Total	C	O	0	0
			4	2	2		
8	H	1	Total	C	O	0	0
			4	2	2		

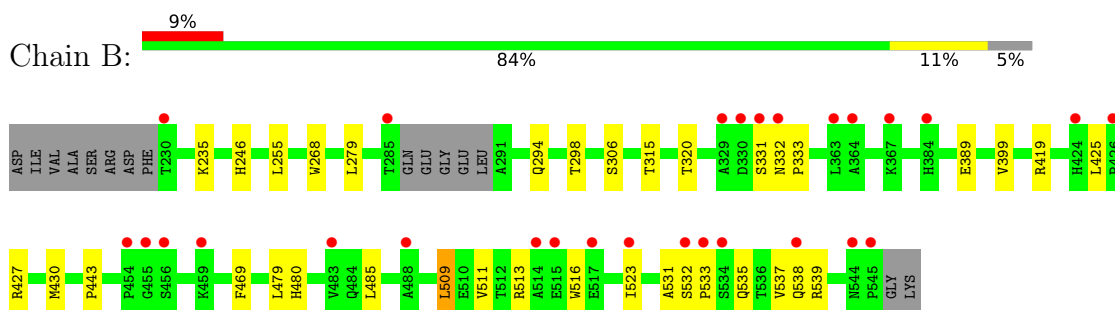
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	B	26	Total 26	O 26	0	0
9	A	18	Total 18	O 18	0	0
9	H	72	Total 72	O 72	0	0
9	L	51	Total 51	O 51	0	0

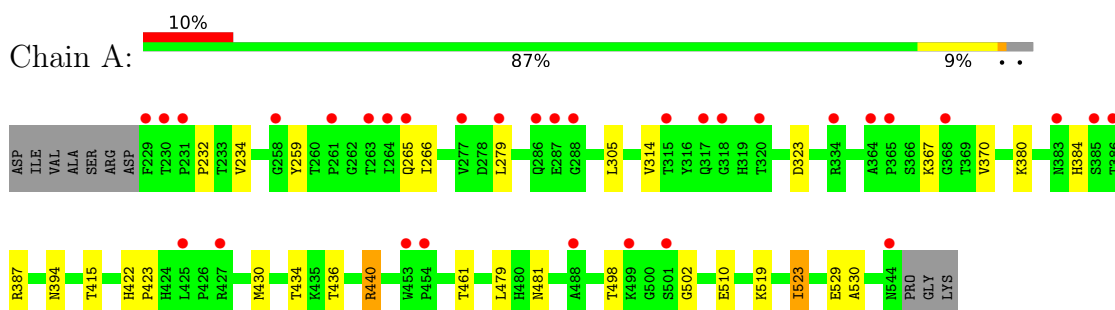
3 Residue-property plots [i](#)

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.

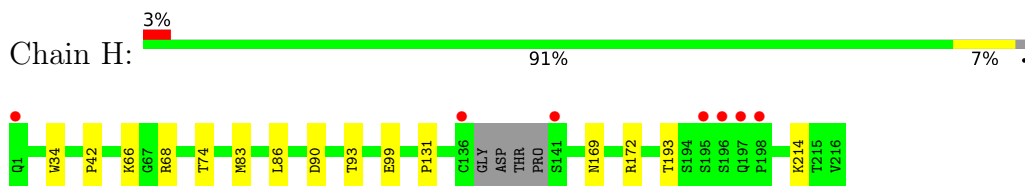
- Molecule 1: Isoform 1 of Immunoglobulin heavy constant epsilon



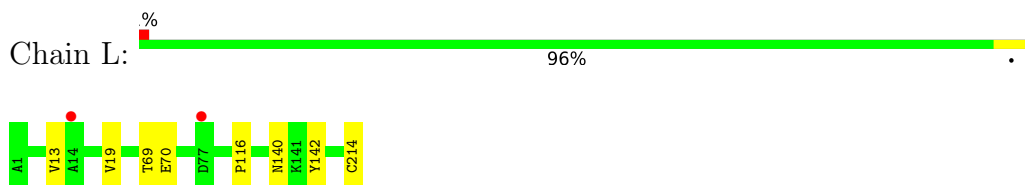
- Molecule 1: Isoform 1 of Immunoglobulin heavy constant epsilon



- Molecule 2: aeFab98 heavy chain



- Molecule 3: aeFab98 light chain



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

nose

Chain C:  60% 40%



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

Chain D:  60% 40%



4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	163.36Å 92.99Å 105.08Å 90.00° 108.87° 90.00°	Depositor
Resolution (Å)	79.68 – 2.40 79.68 – 2.40	Depositor EDS
% Data completeness (in resolution range)	98.6 (79.68-2.40) 98.6 (79.68-2.40)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.68 (at 2.40Å)	Xtriage
Refinement program	PHENIX (1.10_2155: ???)	Depositor
R, R_{free}	0.194 , 0.221 0.206 , 0.228	Depositor DCC
R_{free} test set	2797 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	48.5	Xtriage
Anisotropy	0.556	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.31 , 45.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8321	wwPDB-VP
Average B, all atoms (Å ²)	72.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.44% 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: EDO, BMA, GOL, ACT, PEG, NAG, MAN

The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 5$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Chain	Bond lengths		Bond angles	
		RMSZ	$\# Z > 5$	RMSZ	$\# Z > 5$
1	A	0.13	0/2487	0.33	0/3396
1	B	0.13	0/2423	0.33	0/3314
2	H	0.20	0/1595	0.42	0/2186
3	L	0.19	0/1628	0.42	0/2221
All	All	0.16	0/8133	0.37	0/11117

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	A	2428	0	2336	17	0
1	B	2363	0	2245	21	0
2	H	1557	0	1508	10	0
3	L	1598	0	1549	4	0
4	C	61	0	52	0	0
4	D	61	0	52	0	0
5	B	18	0	24	2	0
5	H	30	0	40	0	0
5	L	12	0	16	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	B	7	0	10	0	0
6	H	7	0	10	2	0
7	B	4	0	6	1	0
8	H	8	0	6	0	0
9	A	18	0	0	1	0
9	B	26	0	0	1	0
9	H	72	0	0	0	0
9	L	51	0	0	0	0
All	All	8321	0	7854	48	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 3.

All (48) 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:315:THR:HG22	1:B:320:THR:HG22	1.68	0.76
3:L:69:THR:HG23	3:L:70:GLU:HG3	1.69	0.75
1:A:436:THR:O	1:A:440:ARG:NH2	2.16	0.74
1:B:246:HIS:ND1	9:B:701:HOH:O	2.25	0.68
1:A:461:THR:HG22	1:A:510:GLU:HG2	1.76	0.66
1:A:370:VAL:O	1:A:387:ARG:NH2	2.29	0.64
2:H:172:ARG:NH2	3:L:140:ASN:OD1	2.29	0.64
1:A:266:ILE:HG12	1:A:314:VAL:HG22	1.81	0.62
2:H:34:TRP:HB2	2:H:99:GLU:HB2	1.83	0.61
1:B:427:ARG:HG3	2:H:66:LYS:O	2.03	0.58
1:A:479:LEU:HD13	1:A:523:ILE:HD11	1.86	0.58
1:B:480:HIS:HB3	1:B:485:LEU:HD21	1.86	0.57
1:B:331:SER:HB3	1:A:305:LEU:HD22	1.87	0.57
2:H:83:MET:HB3	2:H:86:LEU:HD21	1.89	0.55
2:H:68:ARG:NH2	2:H:90:ASP:OD2	2.41	0.54
1:A:440:ARG:NH1	1:A:529:GLU:OE2	2.41	0.53
2:H:42:PRO:HA	6:H:306:PEG:H11	1.89	0.53
2:H:68:ARG:HH22	2:H:90:ASP:CG	2.17	0.52
1:B:268:TRP:HD1	1:B:279:LEU:HD13	1.75	0.52
1:A:440:ARG:HB3	1:A:530:ALA:HB2	1.92	0.52
1:B:298:THR:H	5:B:602:GOL:H11	1.75	0.51
2:H:131:PRO:HD3	2:H:214:LYS:HE2	1.92	0.51
3:L:116:PRO:HB3	3:L:142:TYR:HB3	1.92	0.50
2:H:93:THR:OG1	6:H:306:PEG:H21	2.12	0.49
1:B:443:PRO:HG2	1:B:537:VAL:HG21	1.95	0.49

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:422:HIS:CG	1:A:423:PRO:HD2	2.48	0.48
1:B:389:GLU:HG2	1:B:399:VAL:HG22	1.94	0.48
1:B:294:GLN:HG3	7:B:605:EDO:H22	1.97	0.47
1:A:232:PRO:HB3	1:A:259:TYR:HB3	1.96	0.47
1:B:538:GLN:O	1:B:539:ARG:NH1	2.48	0.46
1:B:443:PRO:HB3	1:B:469:PHE:HB3	1.98	0.46
3:L:13:VAL:HG21	3:L:19:VAL:HG22	1.97	0.46
1:B:419:ARG:HH11	1:B:430:MET:HE1	1.81	0.46
1:A:481:ASN:OD1	1:A:519:LYS:HD2	2.16	0.45
1:A:323:ASP:OD2	9:A:601:HOH:O	2.21	0.45
1:A:415:THR:HG23	1:A:434:THR:HB	1.98	0.45
1:B:509:LEU:HD13	1:B:511:VAL:HG13	2.00	0.44
1:B:306:SER:OG	5:B:601:GOL:H12	2.18	0.43
1:B:235:LYS:HE3	1:B:255:LEU:HD12	2.01	0.43
1:A:498:THR:HG22	1:A:502:GLY:O	2.18	0.43
1:A:265:GLN:O	1:A:314:VAL:HA	2.19	0.43
1:A:394:ASN:HA	2:H:74:THR:O	2.20	0.42
1:B:531:ALA:HB3	1:B:535:GLN:HA	2.02	0.41
1:B:479:LEU:HB2	1:B:523:ILE:CG2	2.51	0.41
1:B:532:SER:HA	1:B:533:PRO:HA	1.75	0.41
1:A:422:HIS:CD2	1:A:423:PRO:HD2	2.56	0.41
1:B:332:ASN:HA	1:B:333:PRO:HA	1.81	0.40
1:B:513:ARG:HA	1:B:516:TRP:CZ3	2.55	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	A	315/327 (96%)	308 (98%)	6 (2%)	1 (0%)	36 50
1	B	308/327 (94%)	303 (98%)	5 (2%)	0	100 100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
2	H	208/216 (96%)	201 (97%)	7 (3%)	0	100	100
3	L	212/214 (99%)	204 (96%)	8 (4%)	0	100	100
All	All	1043/1084 (96%)	1016 (97%)	26 (2%)	1 (0%)	48	64

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	367	LYS

5.3.2 Protein sidechains ⓘ

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	266/289 (92%)	259 (97%)	7 (3%)	40	63
1	B	254/289 (88%)	252 (99%)	2 (1%)	73	86
2	H	177/184 (96%)	175 (99%)	2 (1%)	65	82
3	L	182/182 (100%)	181 (100%)	1 (0%)	81	91
All	All	879/944 (93%)	867 (99%)	12 (1%)	59	79

All (12) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	425	LEU
1	B	509	LEU
1	A	234	VAL
1	A	279	LEU
1	A	380	LYS
1	A	384	HIS
1	A	430	MET
1	A	440	ARG
1	A	523	ILE
2	H	169	ASN
2	H	193	THR

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Mol	Chain	Res	Type
3	L	214	CYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	238	GLN
1	B	303	HIS
1	B	317	GLN
1	B	480	HIS
1	B	535	GLN
2	H	123	GLN
3	L	157	GLN
3	L	210	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates ⓘ

10 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
4	NAG	C	1	4,1	14,14,15	0.23	0	17,19,21	0.40	0
4	NAG	C	2	4	14,14,15	0.26	0	17,19,21	0.52	0
4	BMA	C	3	4	11,11,12	0.83	0	15,15,17	0.98	0
4	MAN	C	4	4	11,11,12	0.88	0	15,15,17	0.89	1 (6%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
4	MAN	C	5	4	11,11,12	0.77	0	15,15,17	0.90	1 (6%)
4	NAG	D	1	4,1	14,14,15	0.28	0	17,19,21	0.46	0
4	NAG	D	2	4	14,14,15	0.22	0	17,19,21	0.40	0
4	BMA	D	3	4	11,11,12	0.77	0	15,15,17	0.92	0
4	MAN	D	4	4	11,11,12	1.07	1 (9%)	15,15,17	0.80	1 (6%)
4	MAN	D	5	4	11,11,12	0.89	1 (9%)	15,15,17	1.06	1 (6%)

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

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

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	4	MAN	O5-C1	-2.40	1.39	1.43
4	D	5	MAN	C1-C2	2.19	1.57	1.52

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	5	MAN	C1-O5-C5	2.44	115.50	112.19
4	C	5	MAN	O2-C2-C3	-2.18	105.78	110.14
4	C	4	MAN	O2-C2-C3	-2.15	105.82	110.14
4	D	4	MAN	O2-C2-C3	-2.10	105.93	110.14

There are no chirality outliers.

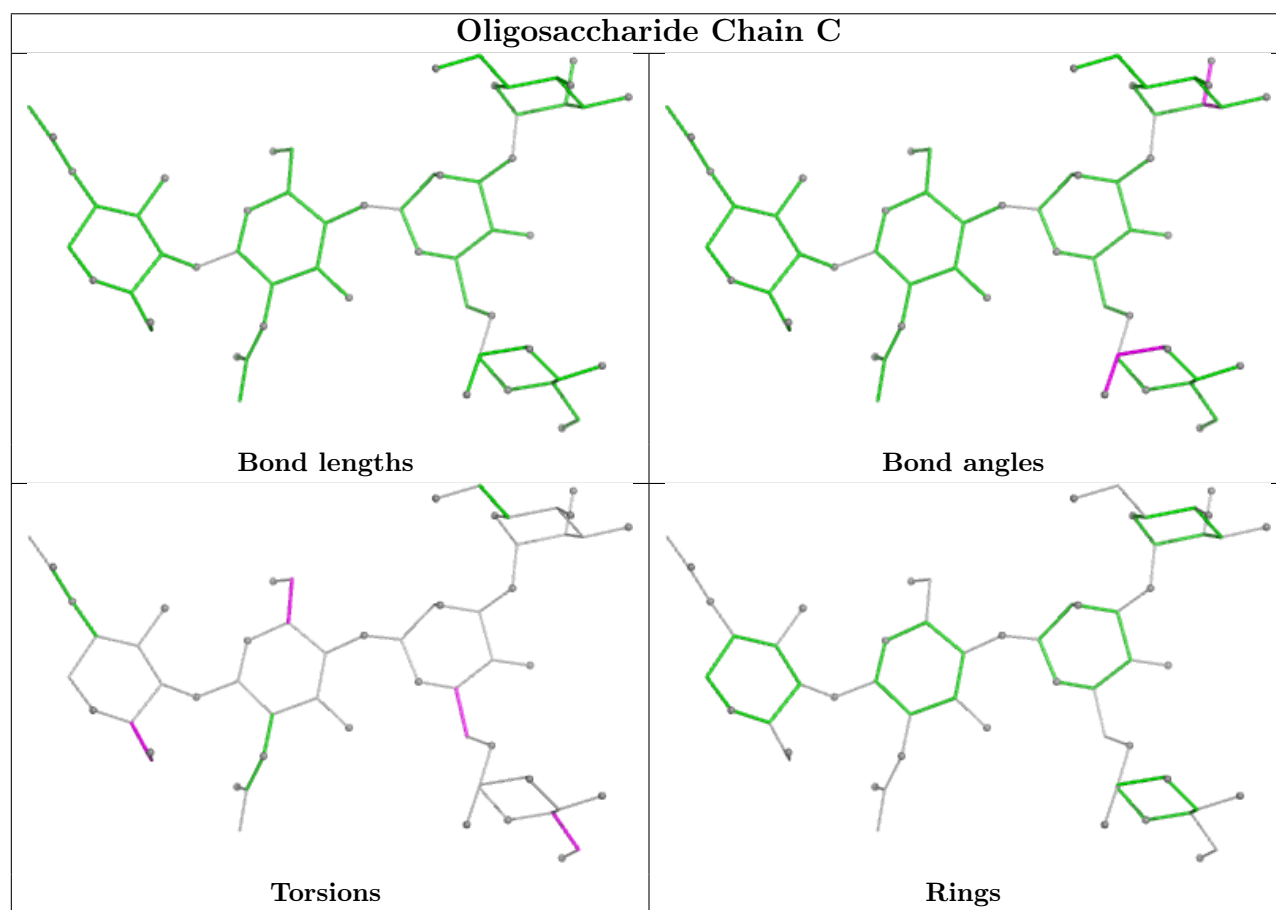
All (10) torsion outliers are listed below:

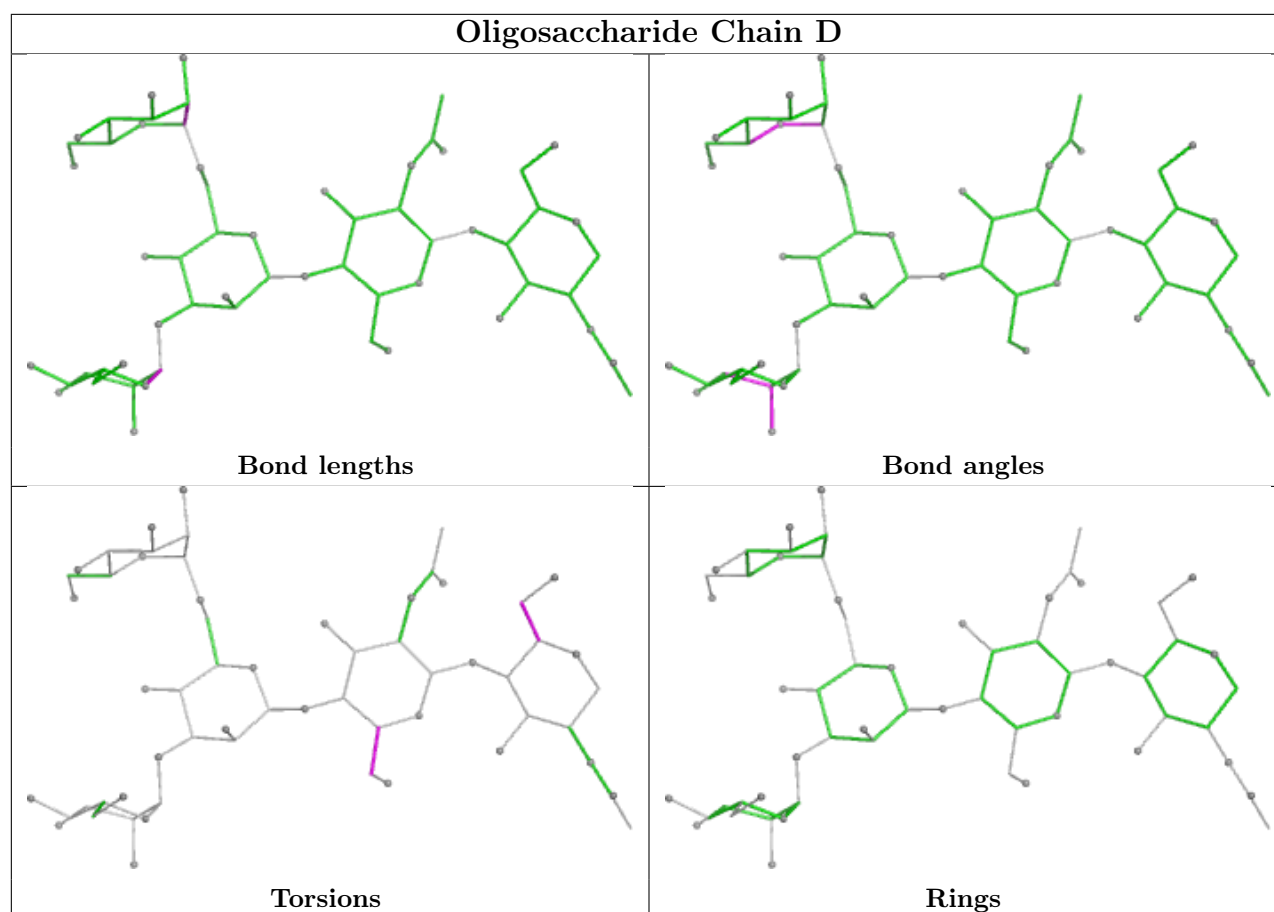
Mol	Chain	Res	Type	Atoms
4	C	2	NAG	O5-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
4	D	1	NAG	O5-C5-C6-O6
4	C	2	NAG	C4-C5-C6-O6
4	D	2	NAG	C4-C5-C6-O6
4	C	1	NAG	C4-C5-C6-O6
4	C	1	NAG	O5-C5-C6-O6
4	C	5	MAN	O5-C5-C6-O6
4	C	3	BMA	C4-C5-C6-O6
4	D	1	NAG	C4-C5-C6-O6

There are no ring outliers.

No monomer is involved in short contacts.

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](#)

15 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	$\# Z > 2$
5	GOL	H	302	-	5,5,5	0.35	0	5,5,5	0.50	0
7	EDO	B	605	-	3,3,3	0.45	0	2,2,2	0.33	0
5	GOL	B	601	-	5,5,5	0.38	0	5,5,5	0.36	0
5	GOL	H	303	-	5,5,5	0.36	0	5,5,5	0.23	0
5	GOL	H	305	-	5,5,5	0.34	0	5,5,5	0.29	0
6	PEG	B	604	-	6,6,6	0.83	0	5,5,5	0.25	0
6	PEG	H	306	-	6,6,6	0.89	0	5,5,5	0.31	0
5	GOL	B	602	-	5,5,5	0.35	0	5,5,5	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	GOL	H	304	-	5,5,5	0.35	0	5,5,5	0.27	0
5	GOL	B	603	-	5,5,5	0.39	0	5,5,5	0.19	0
5	GOL	L	302	-	5,5,5	0.36	0	5,5,5	0.26	0
5	GOL	H	301	-	5,5,5	0.36	0	5,5,5	0.22	0
8	ACT	H	307	-	3,3,3	0.75	0	3,3,3	1.41	0
5	GOL	L	301	-	5,5,5	0.35	0	5,5,5	0.27	0
8	ACT	H	308	-	3,3,3	0.77	0	3,3,3	1.35	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
5	GOL	H	302	-	-	2/4/4/4	-
7	EDO	B	605	-	-	0/1/1/1	-
5	GOL	B	601	-	-	2/4/4/4	-
5	GOL	H	303	-	-	2/4/4/4	-
5	GOL	H	305	-	-	4/4/4/4	-
6	PEG	B	604	-	-	2/4/4/4	-
6	PEG	H	306	-	-	2/4/4/4	-
5	GOL	B	602	-	-	0/4/4/4	-
5	GOL	H	304	-	-	2/4/4/4	-
5	GOL	B	603	-	-	2/4/4/4	-
5	GOL	L	302	-	-	2/4/4/4	-
5	GOL	H	301	-	-	0/4/4/4	-
5	GOL	L	301	-	-	2/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (22) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	B	601	GOL	O1-C1-C2-C3
5	H	302	GOL	O1-C1-C2-C3
5	H	303	GOL	C1-C2-C3-O3
5	H	304	GOL	O1-C1-C2-C3

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Mol	Chain	Res	Type	Atoms
5	L	301	GOL	O1-C1-C2-C3
5	L	302	GOL	O1-C1-C2-C3
5	B	601	GOL	O1-C1-C2-O2
5	H	303	GOL	O2-C2-C3-O3
5	H	305	GOL	O1-C1-C2-C3
5	H	305	GOL	C1-C2-C3-O3
5	H	302	GOL	O1-C1-C2-O2
5	H	305	GOL	O2-C2-C3-O3
5	L	301	GOL	O1-C1-C2-O2
5	L	302	GOL	O1-C1-C2-O2
5	H	304	GOL	O1-C1-C2-O2
5	B	603	GOL	O1-C1-C2-O2
6	B	604	PEG	C1-C2-O2-C3
6	H	306	PEG	C1-C2-O2-C3
6	H	306	PEG	O2-C3-C4-O4
5	B	603	GOL	O1-C1-C2-C3
5	H	305	GOL	O1-C1-C2-O2
6	B	604	PEG	O1-C1-C2-O2

There are no ring outliers.

4 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	B	605	EDO	1	0
5	B	601	GOL	1	0
6	H	306	PEG	2	0
5	B	602	GOL	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 ⓘ

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	317/327 (96%)	0.82	32 (10%) 12 9	47, 87, 135, 157	0
1	B	312/327 (95%)	0.68	28 (8%) 15 12	37, 82, 145, 163	0
2	H	212/216 (98%)	-0.34	7 (3%) 49 45	29, 41, 78, 136	0
3	L	214/214 (100%)	-0.16	2 (0%) 81 78	34, 56, 78, 101	0
All	All	1055/1084 (97%)	0.34	69 (6%) 25 21	29, 68, 132, 163	0

All (69) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	229	PHE	5.5
1	B	285	THR	4.9
1	B	330	ASP	4.4
1	A	265	GLN	4.3
1	A	264	ILE	4.1
1	A	263	THR	3.8
1	B	544	ASN	3.8
1	B	332	ASN	3.7
1	B	545	PRO	3.6
1	B	454	PRO	3.4
1	A	231	PRO	3.2
2	H	141	SER	3.1
1	B	230	THR	3.1
1	B	364	ALA	3.0
1	A	318	GLY	2.9
1	A	383	ASN	2.9
1	A	427	ARG	2.9
1	A	453	TRP	2.9
1	A	230	THR	2.9
1	B	329	ALA	2.8
1	A	279	LEU	2.8

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Mol	Chain	Res	Type	RSRZ
1	A	488	ALA	2.8
1	B	523	ILE	2.8
1	B	534	SER	2.8
1	B	483	VAL	2.8
1	A	368	GLY	2.7
1	B	514	ALA	2.7
1	B	538	GLN	2.7
1	B	363	LEU	2.7
1	A	364	ALA	2.7
1	A	286	GLN	2.6
1	A	499	LYS	2.6
3	L	77	ASP	2.6
1	B	426	PRO	2.5
1	B	424	HIS	2.5
1	A	277	VAL	2.5
1	A	544	ASN	2.5
1	A	334	ARG	2.5
1	B	517	GLU	2.5
1	B	532	SER	2.5
1	A	425	LEU	2.4
3	L	14	ALA	2.4
2	H	136	CYS	2.4
1	B	488	ALA	2.4
1	A	501	SER	2.4
2	H	195	SER	2.3
2	H	196	SER	2.3
2	H	197	GLN	2.3
1	B	515	GLU	2.3
1	A	261	PRO	2.3
1	A	454	PRO	2.3
2	H	1	GLN	2.3
2	H	198	PRO	2.3
1	B	367	LYS	2.2
1	A	315	THR	2.2
1	A	287	GLU	2.2
1	A	317	GLN	2.2
1	A	258	GLY	2.2
1	B	459	LYS	2.2
1	B	455	GLY	2.1
1	B	456	SER	2.1
1	B	331	SER	2.1
1	A	385	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	288	GLY	2.1
1	A	320	THR	2.1
1	A	365	PRO	2.1
1	A	386	THR	2.0
1	B	533	PRO	2.0
1	B	384	HIS	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](#)

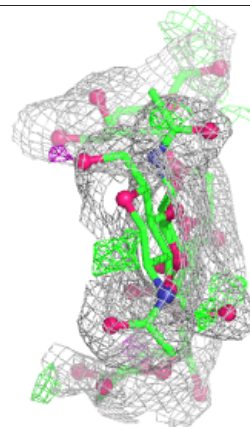
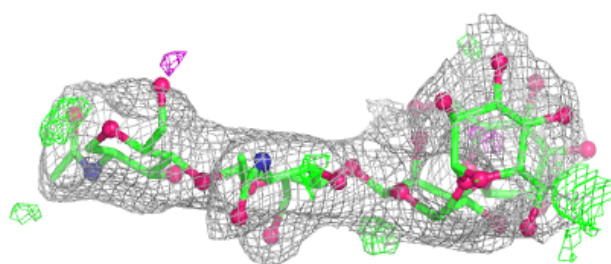
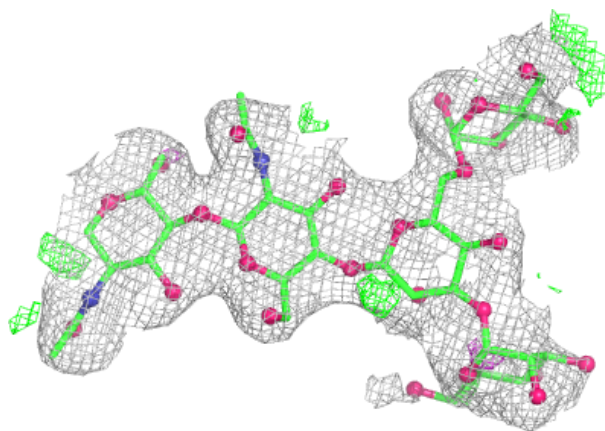
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q < 0.9' lists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

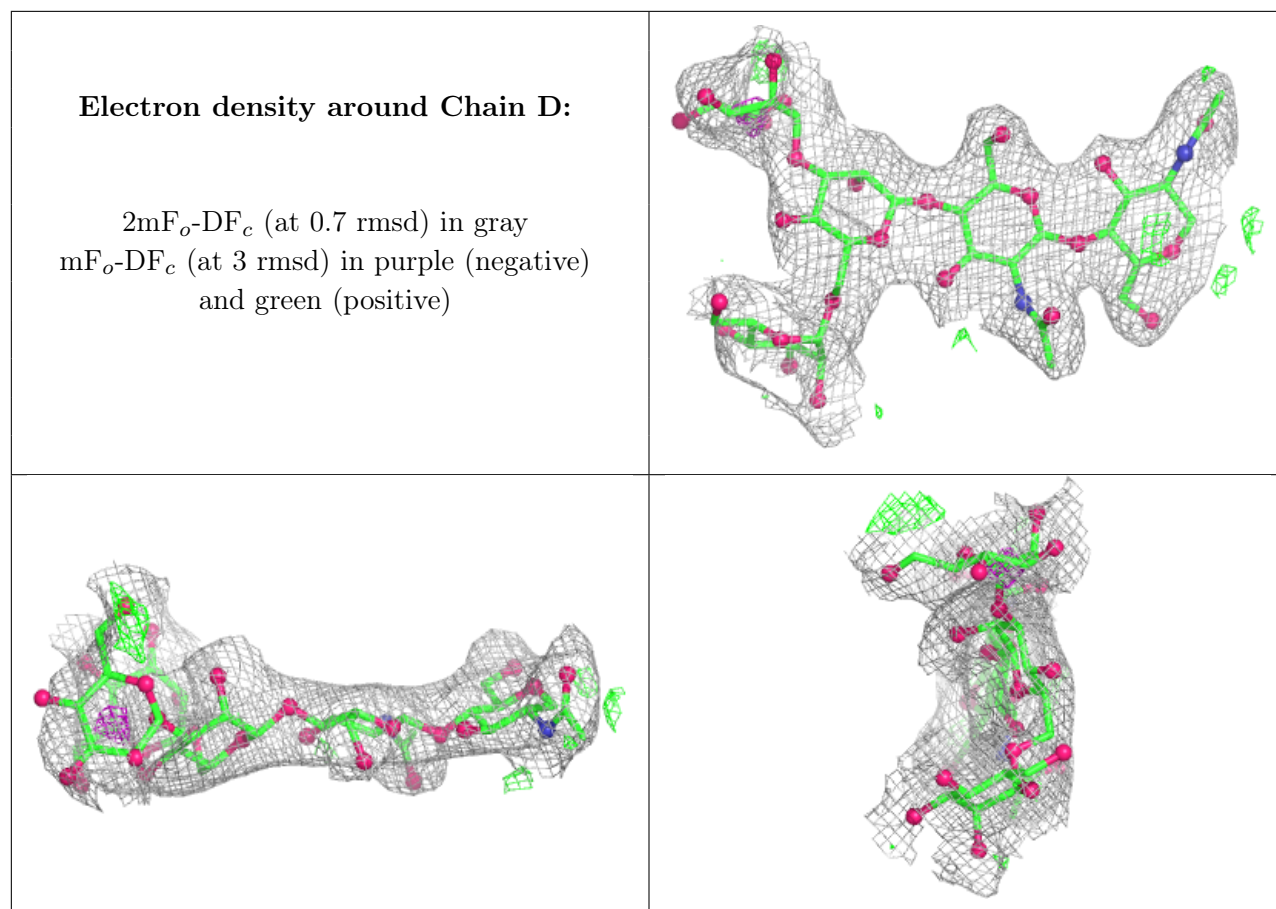
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
4	NAG	C	1	14/15	-	-	70,75,78,81	0
4	NAG	C	2	14/15	-	-	86,90,92,95	0
4	BMA	C	3	11/12	-	-	99,102,104,108	0
4	MAN	C	4	11/12	-	-	110,111,112,112	0
4	MAN	C	5	11/12	-	-	103,103,104,105	0
4	NAG	D	1	14/15	-	-	68,72,75,79	0
4	NAG	D	2	14/15	-	-	83,86,91,95	0
4	BMA	D	3	11/12	-	-	100,105,106,110	0
4	MAN	D	4	11/12	-	-	114,117,117,118	0
4	MAN	D	5	11/12	-	-	108,109,110,110	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 ⓘ

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
5	GOL	H	305	6/6	0.69	0.21	85,86,87,87	0
5	GOL	H	304	6/6	0.76	0.22	78,79,81,82	0
5	GOL	L	302	6/6	0.79	0.21	80,80,81,81	0
8	ACT	H	307	4/4	0.80	0.23	89,89,90,90	0
5	GOL	H	303	6/6	0.81	0.21	88,89,90,91	0
6	PEG	H	306	7/7	0.84	0.20	67,69,70,70	0
5	GOL	L	301	6/6	0.86	0.15	69,73,74,75	0
6	PEG	B	604	7/7	0.86	0.21	82,84,85,86	0
8	ACT	H	308	4/4	0.87	0.20	88,89,89,89	0
5	GOL	B	601	6/6	0.89	0.15	67,68,69,70	0
5	GOL	B	602	6/6	0.90	0.14	72,73,73,74	0
5	GOL	H	302	6/6	0.91	0.16	74,77,79,81	0
5	GOL	B	603	6/6	0.92	0.14	70,75,76,77	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
7	EDO	B	605	4/4	0.92	0.14	71,72,73,73	0
5	GOL	H	301	6/6	0.97	0.07	40,40,41,41	0

6.5 Other polymers [i](#)

There are no such residues in this entry.