



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:29 PM UTC

PDB ID : 3IB0 / pdb_00003ib0
Title : Structural basis of the prevention of NSAID-induced damage of the gastrointestinal tract by C-terminal half (C-lobe) of bovine colostrum protein lactoferrin: Binding and structural studies of C-lobe complex with diclofenac
Authors : Mir, R.; Singh, N.; Sinha, M.; Sharma, S.; Kaur, P.; Srinivasan, A.; Singh, T.P.
Deposited on : 2009-07-15
Resolution : 1.40 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](#) ①) 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
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
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

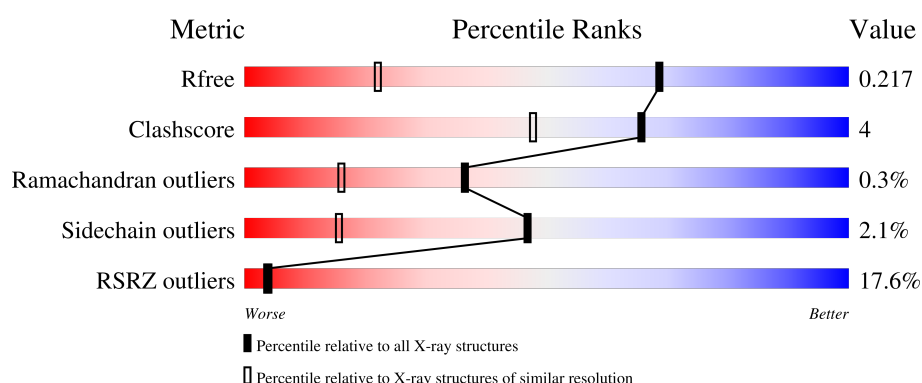
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.40 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	2563 (1.40-1.40)
Clashscore	190562	2660 (1.40-1.40)
Ramachandran outliers	187476	2611 (1.40-1.40)
Sidechain outliers	187428	2610 (1.40-1.40)
RSRZ outliers	180081	2561 (1.40-1.40)

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	345	17% 88% 9% ..
2	B	2	100%
3	C	5	40% 60%
4	D	6	67% 33%

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
3	MAN	C	4	X	-	-	-
3	MAN	C	5	X	-	-	-
4	MAN	D	4	X	-	-	-
4	MAN	D	5	X	-	-	-
4	MAN	D	6	X	-	-	-

2 Entry composition [i](#)

There are 11 unique types of molecules in this entry. The entry contains 3318 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 Lactotransferrin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	341	Total	C	N	O	S	0	1	0
			2609	1625	454	509	21			

There are 2 discrepancies between the modelled and reference sequences:

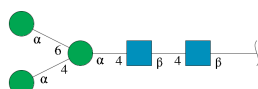
Chain	Residue	Modelled	Actual	Comment	Reference
A	565	LYS	ASN	SEE SEQUENCE DETAILS	UNP P24627
A	608	GLU	LYS	SEE SEQUENCE DETAILS	UNP P24627

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



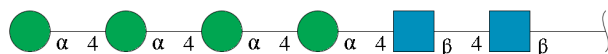
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	2	Total	C	N	O	0	0	0
			28	16	2	10			

- Molecule 3 is an oligosaccharide called alpha-D-mannopyranose-(1-4)-[alpha-D-mannopyranose-(1-6)]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
3	C	5	Total	C	N	O	0	0	0
			61	34	2	25			

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

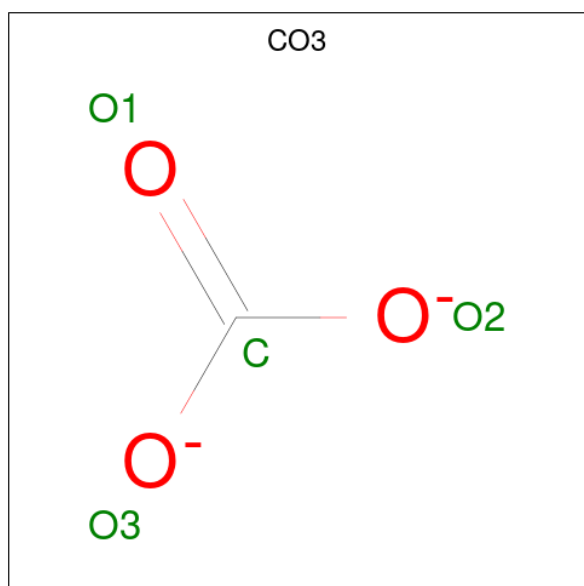


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
4	D	6	Total	C	N	O	0	0	0
			72	40	2	30			

- Molecule 5 is FE (III) ION (CCD ID: FE) (formula: Fe).

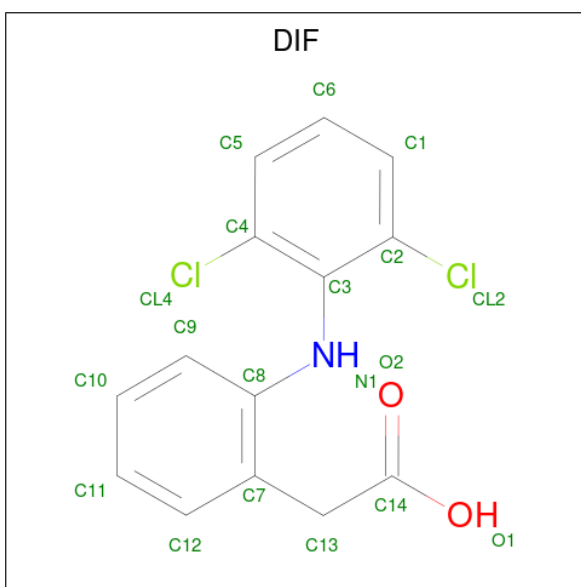
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total	Fe	0	0
			1	1		

- Molecule 6 is CARBONATE ION (CCD ID: CO3) (formula: CO₃).



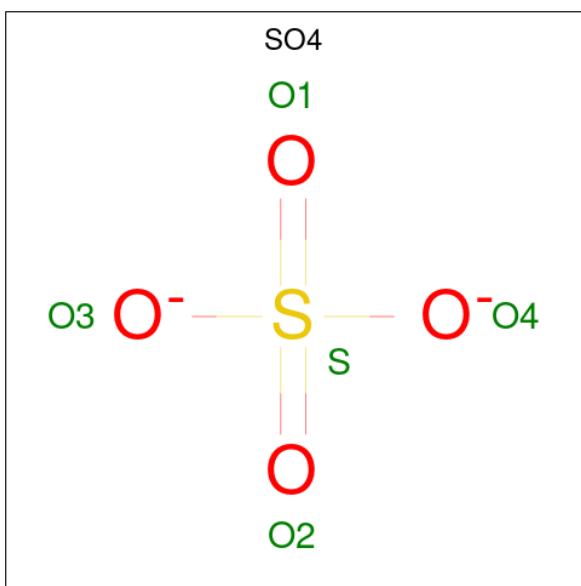
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	C	O	0	0
			4	1	3		

- Molecule 7 is 2-[2,6-DICHLOROPHENYL)AMINO]BENZENEACETIC ACID (CCD ID: DIF) (formula: C₁₄H₁₁Cl₂NO₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	Cl	N	O	0	0
			19	14	2	1	2		

- Molecule 8 is SULFATE ION (CCD ID: SO4) (formula: O₄S).

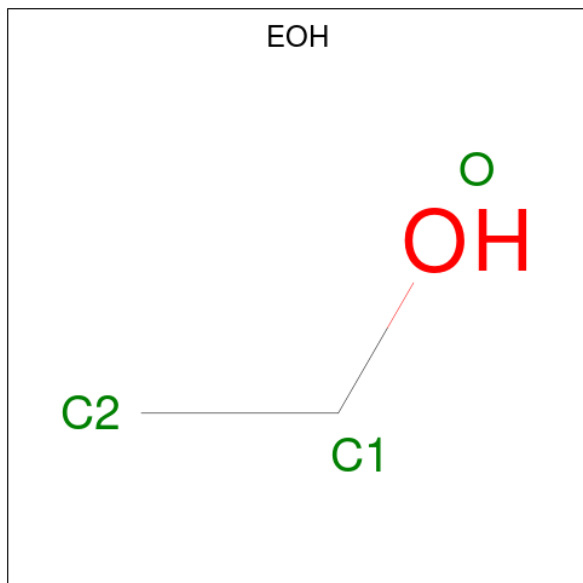


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
8	A	1	Total	O	S	0	0
			5	4	1		
8	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 9 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	2	Total	Zn	0	0
			2	2		

- Molecule 10 is ETHANOL (CCD ID: EOH) (formula: C₂H₆O).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	C	O	0	0
			3	2	1		

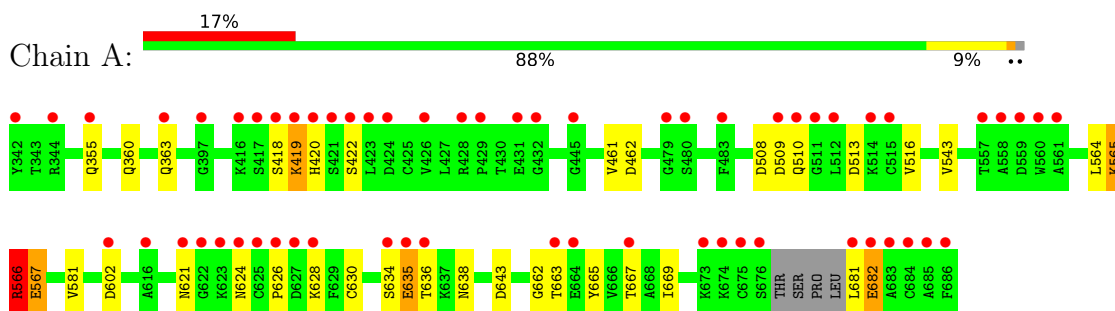
- Molecule 11 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
11	A	509	Total	O	0	0
			509	509		

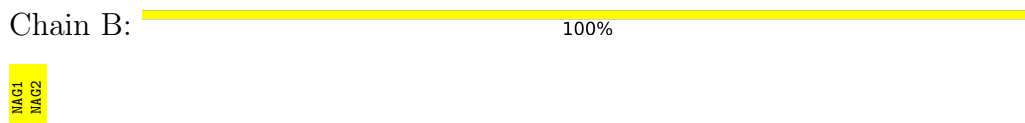
3 Residue-property plots

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: Lactotransferrin



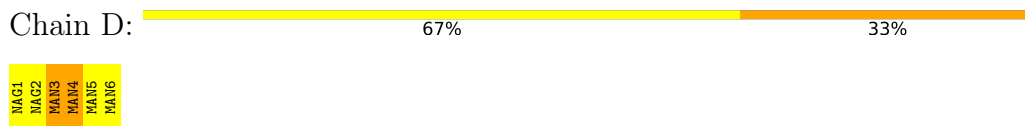
- Molecule 2: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



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



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



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	61.43Å 49.87Å 65.17Å 90.00° 107.10° 90.00°	Depositor
Resolution (Å)	62.26 – 1.40 62.26 – 1.40	Depositor EDS
% Data completeness (in resolution range)	99.6 (62.26-1.40) 99.7 (62.26-1.40)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.77 (at 1.40Å)	Xtriage
Refinement program	REFMAC 5.4.0077	Depositor
R, R_{free}	0.193 , 0.219 0.202 , 0.217	Depositor DCC
R_{free} test set	3738 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å ²)	14.9	Xtriage
Anisotropy	0.329	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 41.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	3318	wwPDB-VP
Average B, all atoms (Å ²)	23.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.13% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: SO4, FE, EOH, NAG, DIF, MAN, ZN, CO3

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	0.77	11/2660 (0.4%)	0.94	12/3601 (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	2

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	420	HIS	CB-CG	10.27	1.64	1.50
1	A	508	ASP	CA-C	8.09	1.62	1.53
1	A	419	LYS	C-N	7.25	1.43	1.33
1	A	565	LYS	C-O	-6.91	1.15	1.24
1	A	509	ASP	N-CA	6.12	1.53	1.46
1	A	564	LEU	C-O	-5.84	1.16	1.23
1	A	566	ARG	C-O	-5.56	1.17	1.24
1	A	638	ASN	CG-OD1	5.19	1.33	1.23
1	A	602	ASP	C-O	-5.12	1.17	1.24
1	A	355	GLN	CD-OE1	5.05	1.33	1.23
1	A	360	GLN	CD-OE1	5.03	1.33	1.23

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	420	HIS	CB-CA-C	-11.16	94.20	109.71
1	A	363	GLN	OE1-CD-NE2	-10.23	112.37	122.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	510	GLN	OE1-CD-NE2	-9.94	112.66	122.60
1	A	621	ASN	CA-CB-CG	9.19	121.79	112.60
1	A	420	HIS	CA-CB-CG	8.45	122.25	113.80
1	A	420	HIS	N-CA-CB	7.60	120.97	109.34
1	A	508	ASP	CA-C-N	7.57	130.75	120.38
1	A	508	ASP	C-N-CA	7.57	130.75	120.38
1	A	635	GLU	CA-C-N	6.59	134.13	121.54
1	A	635	GLU	C-N-CA	6.59	134.13	121.54
1	A	510	GLN	CG-CD-NE2	6.35	125.92	116.40
1	A	363	GLN	CG-CD-NE2	6.21	125.71	116.40

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	681	LEU	Peptide
1	A	682	GLU	Peptide

5.2 Too-close contacts ⓘ

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	2609	0	2526	18	0
2	B	28	0	25	0	0
3	C	61	0	52	0	0
4	D	72	0	60	3	0
5	A	1	0	0	0	0
6	A	4	0	0	0	0
7	A	19	0	10	4	0
8	A	10	0	0	0	0
9	A	2	0	0	0	0
10	A	3	0	6	0	0
11	A	509	0	0	0	0
All	All	3318	0	2679	21	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 4.

All (21) 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:A:662:GLY:HA2	7:A:701:DIF:H132	1.46	0.97
1:A:565:LYS:HE3	1:A:567:GLU:H	1.44	0.81
1:A:663:THR:O	1:A:667:THR:HG23	1.85	0.77
1:A:565:LYS:HE3	1:A:567:GLU:HB2	1.74	0.69
1:A:662:GLY:CA	7:A:701:DIF:H132	2.23	0.69
1:A:565:LYS:HE3	1:A:567:GLU:N	2.09	0.67
1:A:461:VAL:O	1:A:462:ASP:HB2	2.01	0.60
1:A:565:LYS:CE	1:A:567:GLU:HB2	2.35	0.57
1:A:626:PRO:HA	1:A:630:CYS:SG	2.46	0.56
1:A:566:ARG:HG2	1:A:581:VAL:HG21	1.87	0.55
1:A:662:GLY:HA2	7:A:701:DIF:C13	2.31	0.46
1:A:513:ASP:O	1:A:516:VAL:HG22	2.16	0.45
1:A:663:THR:H	7:A:701:DIF:C14	2.31	0.44
4:D:3:MAN:H3	4:D:4:MAN:O2	2.18	0.43
1:A:636:THR:HA	1:A:643:ASP:OD2	2.18	0.42
4:D:3:MAN:H3	4:D:4:MAN:C2	2.49	0.42
1:A:665:TYR:CZ	1:A:669:ILE:HD11	2.54	0.42
1:A:624:ASN:HB3	1:A:628:LYS:HB2	2.02	0.42
4:D:4:MAN:HO6	4:D:4:MAN:HO2	1.68	0.42
1:A:634:SER:O	1:A:635:GLU:HB2	2.19	0.41
1:A:566:ARG:HG2	1:A:581:VAL:CG2	2.50	0.41

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	338/345 (98%)	325 (96%)	12 (4%)	1 (0%)	36 16

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	543	VAL

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	283/286 (99%)	277 (98%)	6 (2%)	47 15

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	418	SER
1	A	419	LYS
1	A	422	SER
1	A	566	ARG
1	A	567	GLU
1	A	682	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	621	ASN
1	A	642	ASN

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 ⓘ

13 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	B	1	1,2	14,14,15	0.59	0	17,19,21	1.03	1 (5%)
2	NAG	B	2	2	14,14,15	0.58	0	17,19,21	1.36	4 (23%)
3	NAG	C	1	1,3	14,14,15	0.51	0	17,19,21	0.70	0
3	NAG	C	2	3	14,14,15	1.71	3 (21%)	17,19,21	2.28	6 (35%)
3	MAN	C	3	3	11,11,12	0.75	1 (9%)	15,15,17	2.55	8 (53%)
3	MAN	C	4	3	11,11,12	0.67	0	15,15,17	0.98	0
3	MAN	C	5	3	11,11,12	0.81	0	15,15,17	1.97	3 (20%)
4	NAG	D	1	1,4	14,14,15	0.61	0	17,19,21	1.08	1 (5%)
4	NAG	D	2	4	14,14,15	0.81	0	17,19,21	2.23	6 (35%)
4	MAN	D	3	4	11,11,12	0.89	0	15,15,17	2.69	3 (20%)
4	MAN	D	4	4	11,11,12	1.17	1 (9%)	15,15,17	2.68	8 (53%)
4	MAN	D	5	4	11,11,12	0.71	0	15,15,17	2.46	6 (40%)
4	MAN	D	6	4	11,11,12	1.37	2 (18%)	15,15,17	3.91	7 (46%)

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	B	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
3	NAG	C	1	1,3	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	MAN	C	3	3	-	0/2/19/22	0/1/1/1
3	MAN	C	4	3	1/1/4/5	0/2/19/22	0/1/1/1
3	MAN	C	5	3	1/1/4/5	0/2/19/22	0/1/1/1
4	NAG	D	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	D	2	4	-	2/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	MAN	D	3	4	-	1/2/19/22	0/1/1/1
4	MAN	D	4	4	1/1/4/5	0/2/19/22	0/1/1/1
4	MAN	D	5	4	1/1/4/5	0/2/19/22	0/1/1/1
4	MAN	D	6	4	1/1/4/5	2/2/19/22	0/1/1/1

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	NAG	O5-C1	-4.53	1.36	1.43
4	D	4	MAN	O5-C1	-2.83	1.38	1.43
4	D	6	MAN	O4-C4	-2.43	1.36	1.43
3	C	2	NAG	O7-C7	-2.36	1.18	1.23
4	D	6	MAN	O5-C5	-2.26	1.39	1.43
3	C	2	NAG	C2-N2	-2.18	1.42	1.46
3	C	3	MAN	O2-C2	-2.01	1.39	1.43

All (53) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	6	MAN	C3-C4-C5	7.29	123.45	110.23
4	D	6	MAN	O4-C4-C3	-6.94	94.01	110.38
4	D	6	MAN	C1-O5-C5	6.87	121.40	112.19
4	D	3	MAN	C1-O5-C5	6.58	121.00	112.19
4	D	3	MAN	C1-C2-C3	-6.02	100.88	109.64
4	D	5	MAN	C1-C2-C3	5.96	118.32	109.64
3	C	2	NAG	C1-O5-C5	5.54	119.61	112.19
3	C	5	MAN	C1-O5-C5	-5.39	104.96	112.19
4	D	4	MAN	C1-O5-C5	5.39	119.40	112.19
4	D	6	MAN	C2-C3-C4	5.28	120.15	110.86
4	D	2	NAG	C4-C3-C2	-4.76	104.04	111.02
4	D	4	MAN	O5-C1-C2	-4.62	99.78	110.79
4	D	3	MAN	C2-C3-C4	-4.29	103.32	110.86
3	C	2	NAG	C2-N2-C7	4.18	128.50	122.90
3	C	3	MAN	C1-C2-C3	4.14	115.67	109.64
3	C	5	MAN	C3-C4-C5	4.08	117.64	110.23
4	D	6	MAN	O4-C4-C5	-4.00	99.48	109.32
3	C	3	MAN	C3-C4-C5	-3.95	103.06	110.23
4	D	2	NAG	C6-C5-C4	-3.89	103.47	113.02
4	D	5	MAN	C3-C4-C5	3.81	117.13	110.23
3	C	3	MAN	O5-C5-C6	3.76	114.98	107.66
4	D	6	MAN	O5-C1-C2	3.75	119.73	110.79
4	D	5	MAN	O2-C2-C1	-3.69	100.77	109.22

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	D	6	MAN	O3-C3-C2	3.68	117.56	110.05
3	C	3	MAN	C1-O5-C5	3.58	116.98	112.19
4	D	2	NAG	O5-C5-C6	3.52	114.51	107.66
3	C	3	MAN	O4-C4-C5	3.48	117.91	109.32
4	D	2	NAG	O4-C4-C5	-3.34	101.11	109.32
4	D	2	NAG	O4-C4-C3	3.02	117.49	110.38
4	D	4	MAN	O5-C5-C4	2.96	118.02	110.83
2	B	2	NAG	O6-C6-C5	-2.94	101.32	111.33
4	D	4	MAN	O5-C5-C6	-2.92	101.99	107.66
4	D	1	NAG	O5-C1-C2	-2.79	106.97	111.29
4	D	4	MAN	O6-C6-C5	2.77	120.78	111.33
2	B	1	NAG	O5-C1-C2	-2.69	107.13	111.29
3	C	5	MAN	C1-C2-C3	-2.65	105.78	109.64
2	B	2	NAG	C6-C5-C4	-2.61	106.60	113.02
3	C	2	NAG	O4-C4-C3	2.55	116.39	110.38
3	C	3	MAN	O5-C1-C2	2.53	116.81	110.79
3	C	2	NAG	O3-C3-C2	-2.47	104.27	109.40
3	C	2	NAG	O7-C7-C8	-2.45	117.69	122.05
4	D	4	MAN	O4-C4-C5	2.45	115.36	109.32
2	B	2	NAG	C1-O5-C5	2.34	115.33	112.19
4	D	4	MAN	O3-C3-C2	-2.34	105.28	110.05
2	B	2	NAG	O5-C5-C6	-2.33	103.12	107.66
3	C	3	MAN	O5-C5-C4	2.32	116.47	110.83
4	D	4	MAN	C6-C5-C4	-2.32	107.33	113.02
4	D	5	MAN	O3-C3-C2	-2.26	105.43	110.05
3	C	3	MAN	O3-C3-C2	2.26	114.67	110.05
3	C	2	NAG	C3-C4-C5	-2.22	106.22	110.23
4	D	5	MAN	O5-C5-C6	2.16	111.87	107.66
4	D	5	MAN	C2-C3-C4	2.10	114.55	110.86
4	D	2	NAG	O5-C5-C4	-2.10	105.72	110.83

All (5) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	C	4	MAN	C1
3	C	5	MAN	C1
4	D	4	MAN	C1
4	D	5	MAN	C1
4	D	6	MAN	C1

All (5) torsion outliers are listed below:

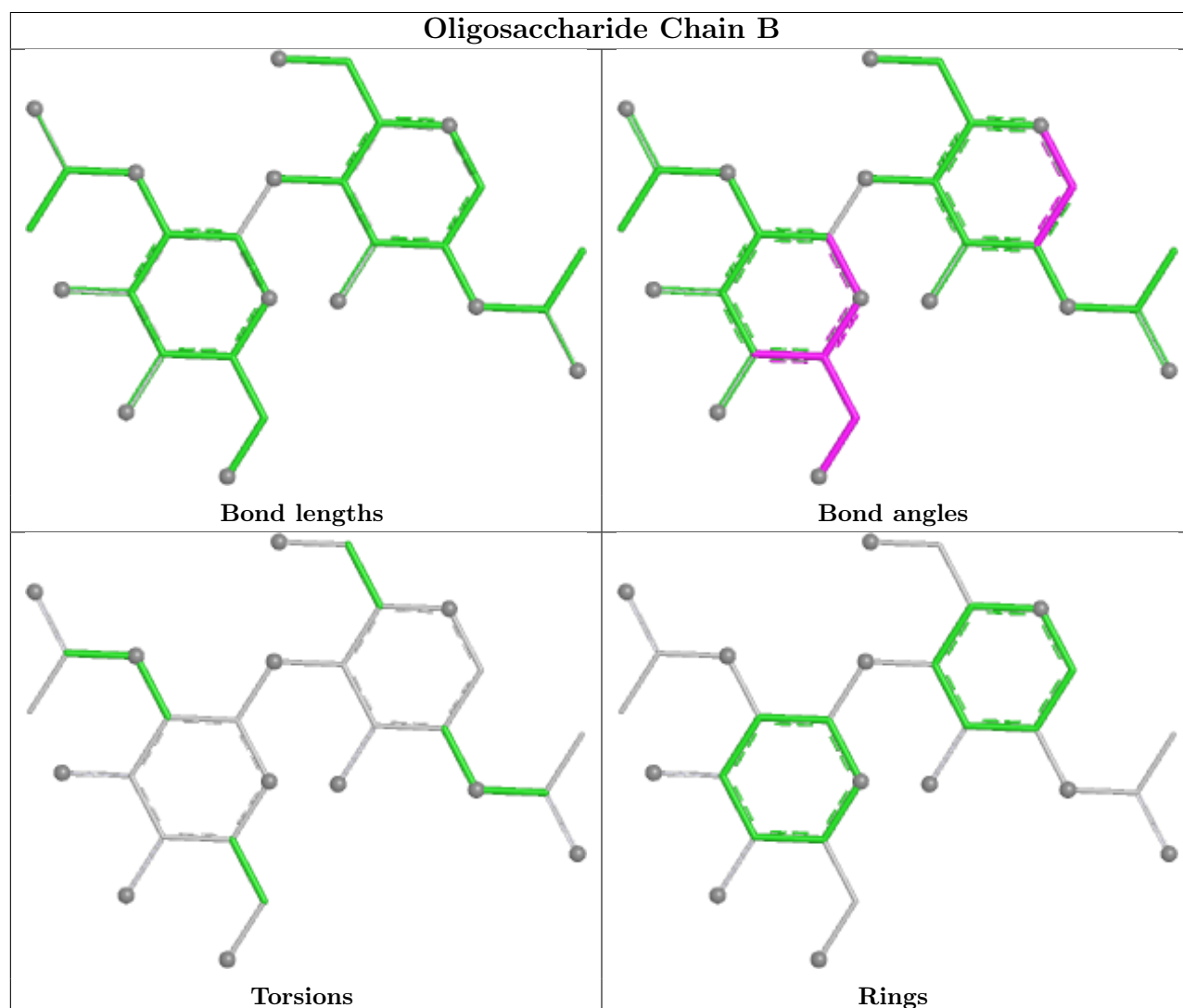
Mol	Chain	Res	Type	Atoms
4	D	6	MAN	O5-C5-C6-O6
4	D	2	NAG	O5-C5-C6-O6
4	D	2	NAG	C4-C5-C6-O6
4	D	6	MAN	C4-C5-C6-O6
4	D	3	MAN	O5-C5-C6-O6

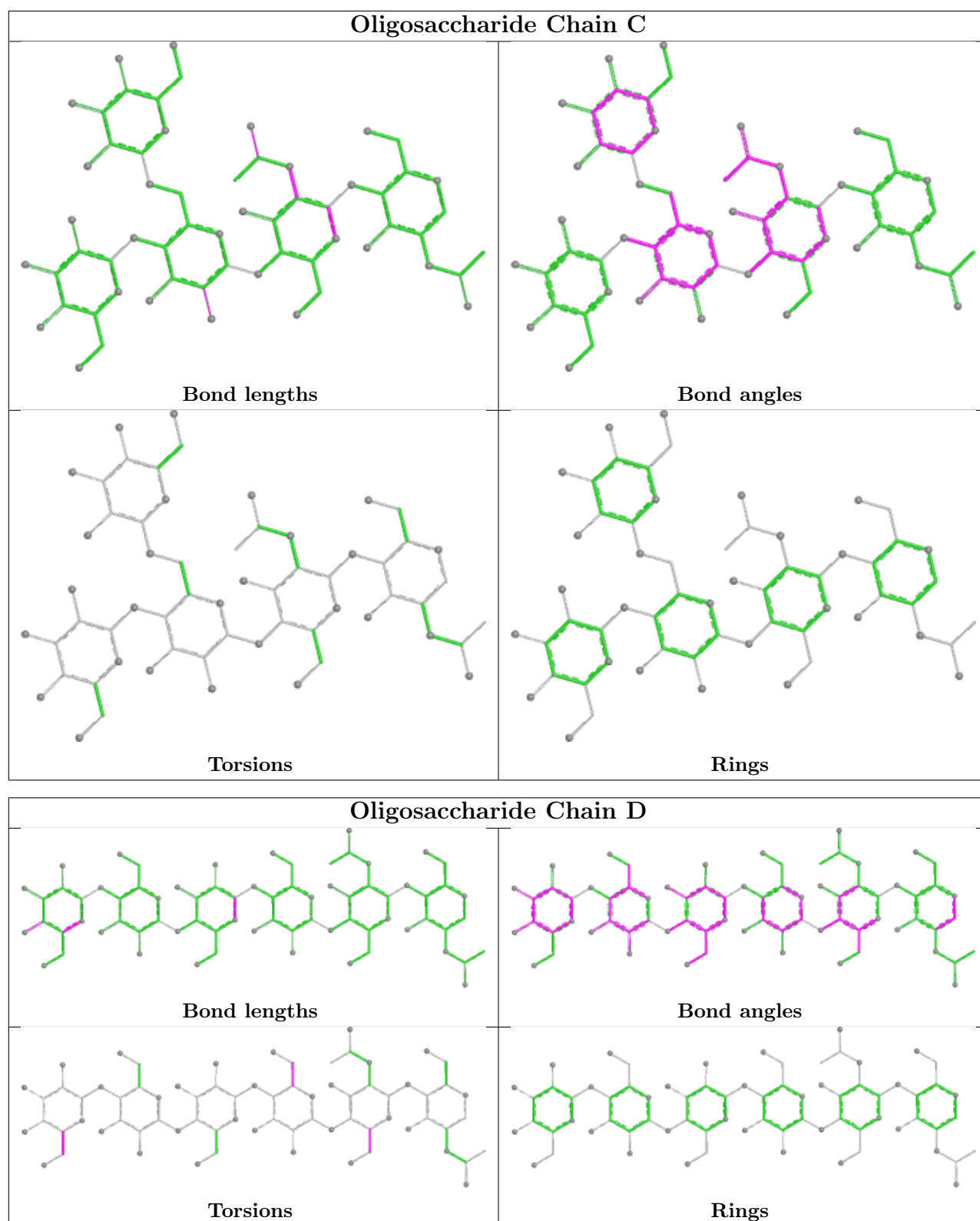
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	D	3	MAN	2	0
4	D	4	MAN	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 8 ligands modelled in this entry, 3 are monoatomic - leaving 5 for Mogul analysis.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
10	EOH	A	703	-	2,2,2	0.45	0	1,1,1	0.17	0
8	SO4	A	2	-	4,4,4	0.24	0	6,6,6	0.06	0
8	SO4	A	1	-	4,4,4	0.25	0	6,6,6	0.10	0
6	CO3	A	687	5	3,3,3	0.87	0	2,3,3	0.48	0
7	DIF	A	701	-	20,20,20	1.24	2 (10%)	27,27,27	2.44	10 (37%)

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
7	DIF	A	701	-	-	4/8/8/8	0/2/2/2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
7	A	701	DIF	C13-C7	3.95	1.57	1.51
7	A	701	DIF	C13-C14	2.27	1.55	1.51

All (10) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
7	A	701	DIF	C7-C13-C14	6.51	127.14	113.10
7	A	701	DIF	C3-N1-C8	5.89	135.76	123.02
7	A	701	DIF	C4-C3-N1	-3.74	117.04	121.97
7	A	701	DIF	C3-C2-CL2	3.36	123.10	119.28
7	A	701	DIF	C7-C8-N1	-3.18	116.00	118.59
7	A	701	DIF	O2-C14-C13	-3.15	113.43	122.94
7	A	701	DIF	C13-C7-C8	-2.62	118.32	121.40
7	A	701	DIF	C13-C7-C12	2.42	124.00	120.06
7	A	701	DIF	O1-C14-C13	2.26	122.59	113.98
7	A	701	DIF	C2-C3-N1	2.14	124.78	121.97

There are no chirality outliers.

All (4) torsion outliers are listed below:

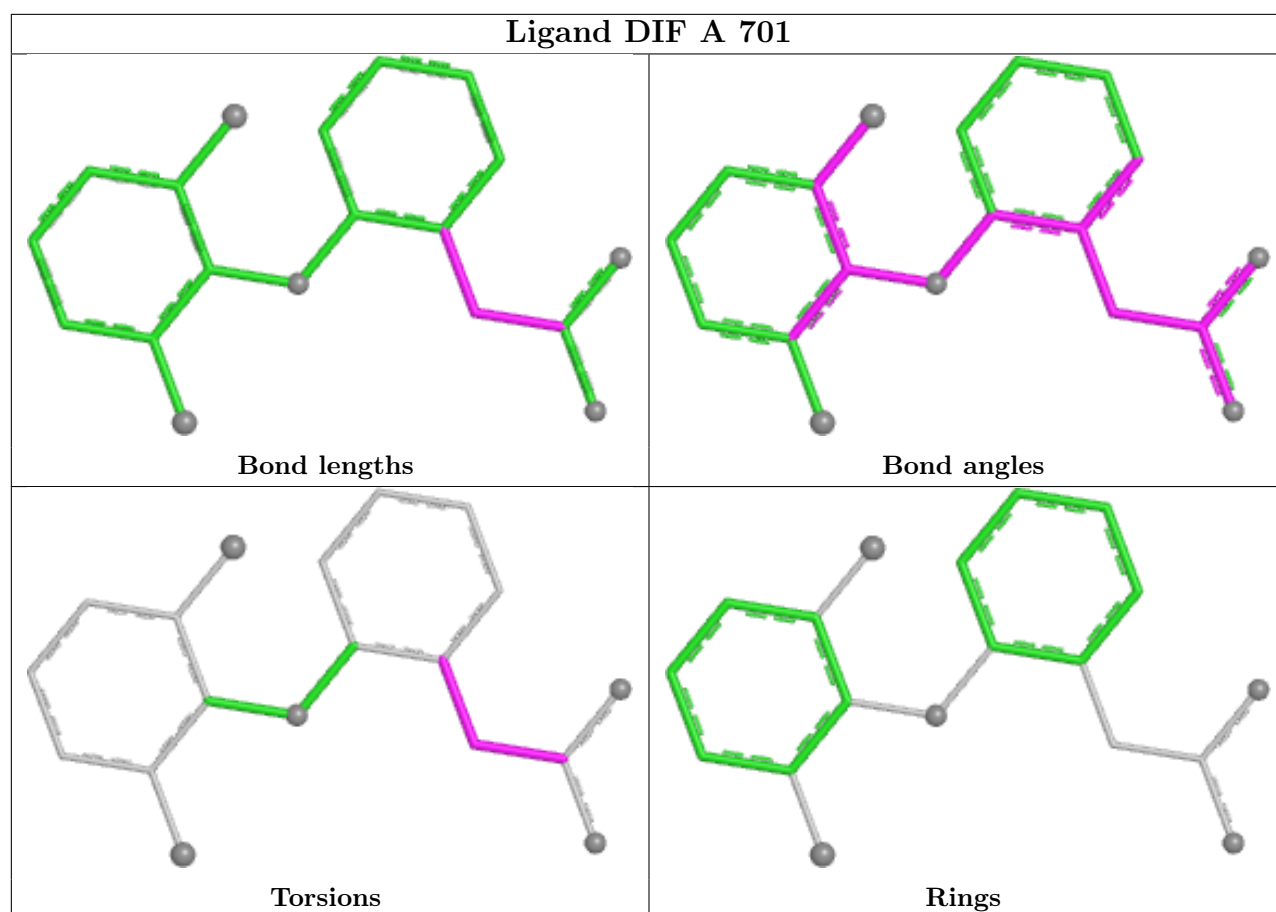
Mol	Chain	Res	Type	Atoms
7	A	701	DIF	C14-C13-C7-C8
7	A	701	DIF	C14-C13-C7-C12
7	A	701	DIF	C7-C13-C14-O1
7	A	701	DIF	C7-C13-C14-O2

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	701	DIF	4	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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	341/345 (98%)	0.80	60 (17%) 4 4	9, 17, 32, 44	1 (0%)

All (60) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	681	LEU	7.9
1	A	420	HIS	6.0
1	A	636	THR	5.2
1	A	685	ALA	5.0
1	A	683	ALA	4.9
1	A	682	GLU	4.9
1	A	635	GLU	4.5
1	A	510	GLN	4.5
1	A	423	LEU	4.2
1	A	686	PHE	4.2
1	A	424	ASP	3.8
1	A	558	ALA	3.8
1	A	628	LYS	3.8
1	A	418	SER	3.8
1	A	559	ASP	3.7
1	A	627	ASP	3.6
1	A	422	SER	3.6
1	A	684	CYS	3.4
1	A	416	LYS	3.2
1	A	634	SER	3.2
1	A	445	GLY	3.1
1	A	622	GLY	3.0
1	A	342	TYR	3.0
1	A	560	TRP	3.0
1	A	509	ASP	2.9
1	A	667	THR	2.9
1	A	432	GLY	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	428	ARG	2.8
1	A	426	VAL	2.8
1	A	561	ALA	2.8
1	A	363	GLN	2.8
1	A	483	PHE	2.7
1	A	621	ASN	2.7
1	A	624	ASN	2.5
1	A	355	GLN	2.5
1	A	344	ARG	2.5
1	A	664	GLU	2.5
1	A	557	THR	2.5
1	A	626	PRO	2.5
1	A	421	SER	2.4
1	A	417	SER	2.4
1	A	676	SER	2.4
1	A	511	GLY	2.4
1	A	515	CYS	2.4
1	A	623	LYS	2.4
1	A	625	CYS	2.3
1	A	397	GLY	2.3
1	A	602	ASP	2.3
1	A	675	CYS	2.3
1	A	429	PRO	2.3
1	A	663	THR	2.3
1	A	419	LYS	2.3
1	A	514	LYS	2.2
1	A	616	ALA	2.1
1	A	512	LEU	2.1
1	A	673	LYS	2.1
1	A	431	GLU	2.1
1	A	674	LYS	2.0
1	A	480	SER	2.0
1	A	479	GLY	2.0

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

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

6.3 Carbohydrates

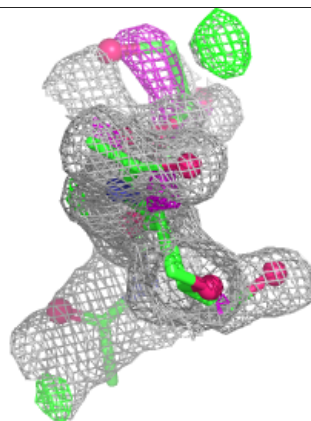
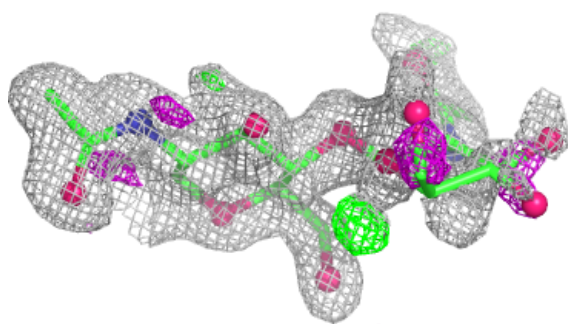
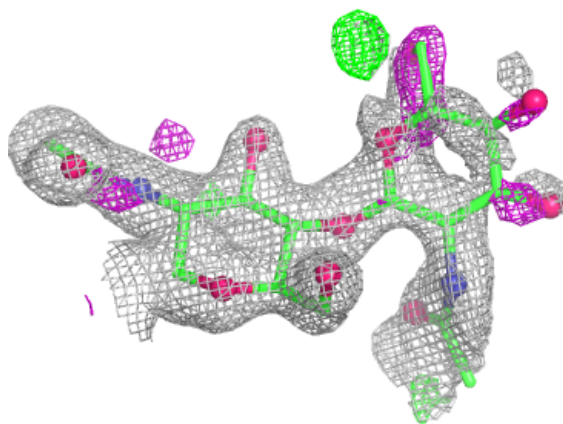
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	MAN	D	6	11/12	0.07	0.24	70,70,70,70	0
3	MAN	C	5	11/12	0.13	0.23	62,63,63,63	0
4	MAN	D	5	11/12	0.15	0.22	66,67,68,69	0
4	MAN	D	4	11/12	0.26	0.23	59,61,62,64	0
3	MAN	C	4	11/12	0.31	0.20	61,62,62,62	0
4	MAN	D	3	11/12	0.37	0.22	48,51,53,56	0
3	MAN	C	3	11/12	0.52	0.18	55,58,60,61	0
2	NAG	B	2	14/15	0.53	0.18	39,42,43,43	0
3	NAG	C	2	14/15	0.78	0.15	44,46,49,52	0
3	NAG	C	1	14/15	0.82	0.14	33,35,37,41	0
4	NAG	D	2	14/15	0.82	0.14	34,36,40,44	0
2	NAG	B	1	14/15	0.85	0.12	27,29,32,36	0
4	NAG	D	1	14/15	0.91	0.12	22,25,27,30	0

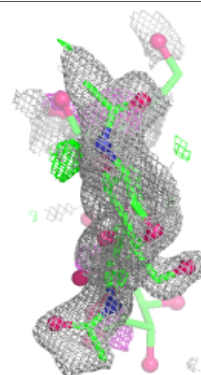
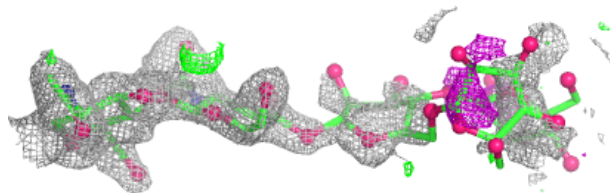
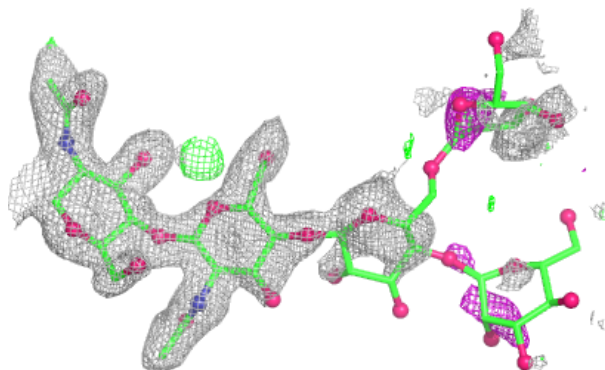
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

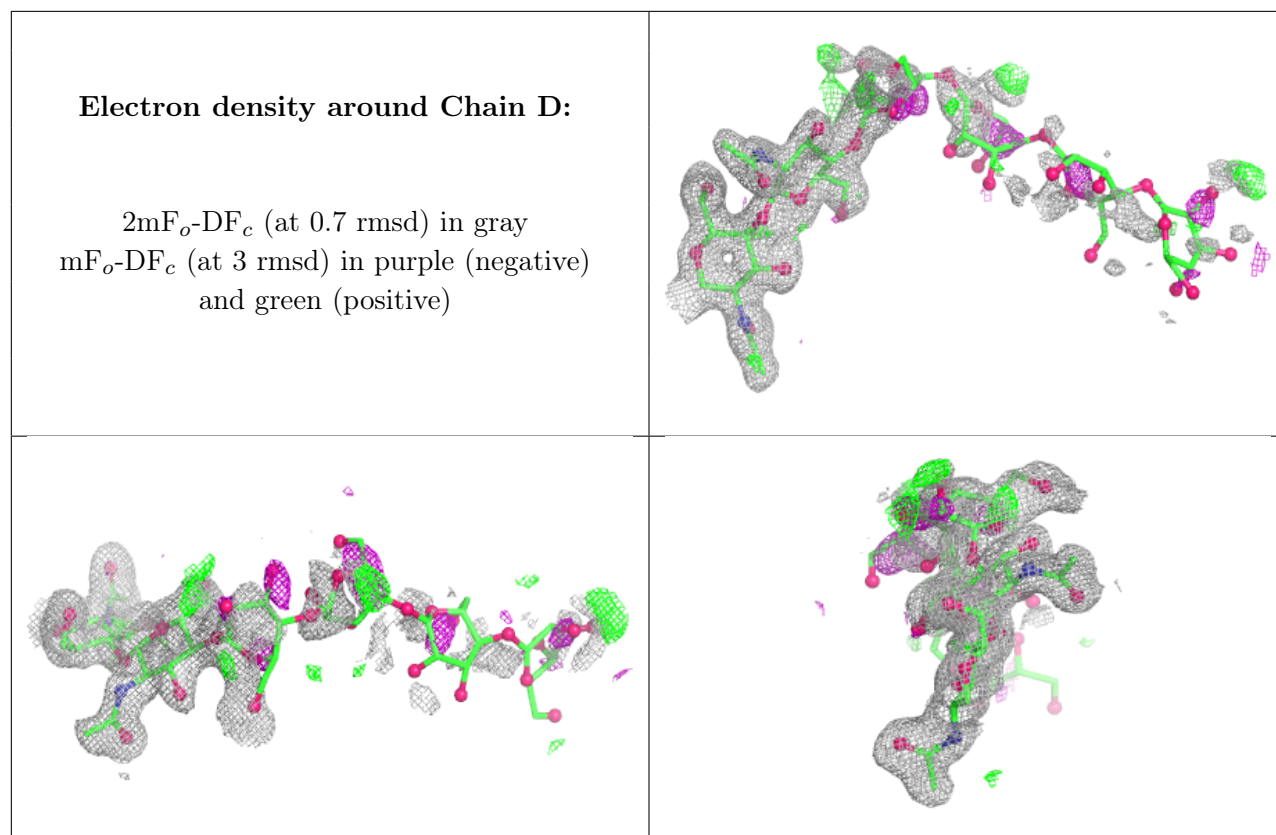
Electron density around Chain B:

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

**Electron density around Chain 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](#)

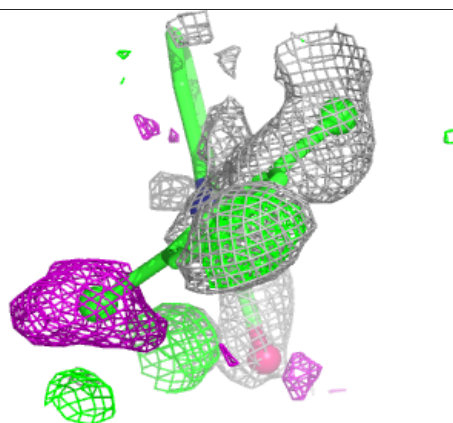
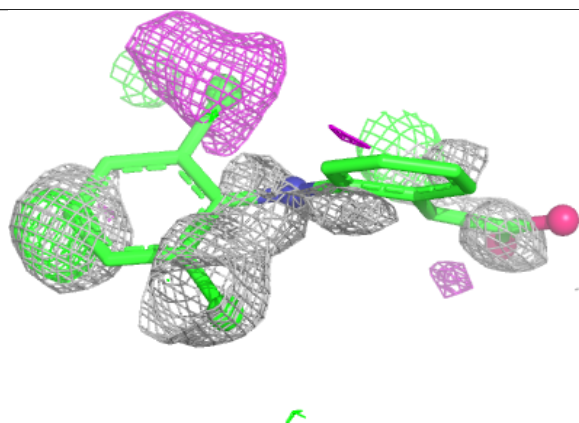
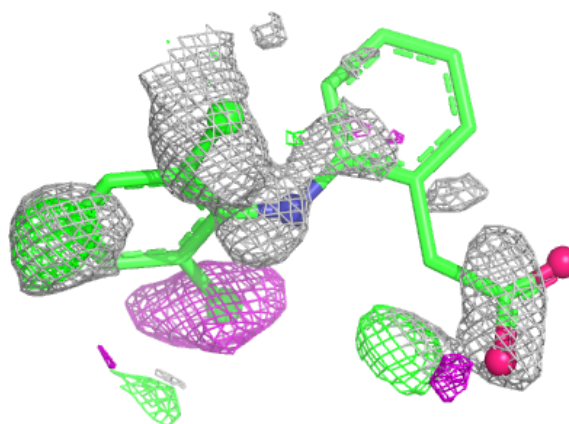
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
7	DIF	A	701	19/19	0.49	0.25	70,71,71,72	0
10	EOH	A	703	3/3	0.79	0.18	47,47,47,47	0
8	SO4	A	2	5/5	0.82	0.14	45,45,45,45	0
8	SO4	A	1	5/5	0.96	0.08	28,29,29,30	0
9	ZN	A	689	1/1	0.97	0.04	17,17,17,17	0
6	CO3	A	687	4/4	0.99	0.04	10,10,10,11	0
9	ZN	A	688	1/1	0.99	0.02	14,14,14,14	0
5	FE	A	999	1/1	1.00	0.01	9,9,9,9	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around DIF A 701:

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



6.5 Other polymers ⓘ

There are no such residues in this entry.