



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 12:04 AM UTC

PDB ID : 6M3Z / pdb_00006m3z
Title : X-ray structure of a Drosophila dopamine transporter with NET-like mutations (D121G/S426M/F471L) in milnacipran bound form
Authors : Shabareesh, P.; Mallela, A.K.; Joseph, D.; Penmatsa, A.
Deposited on : 2020-03-04
Resolution : 3.11 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
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

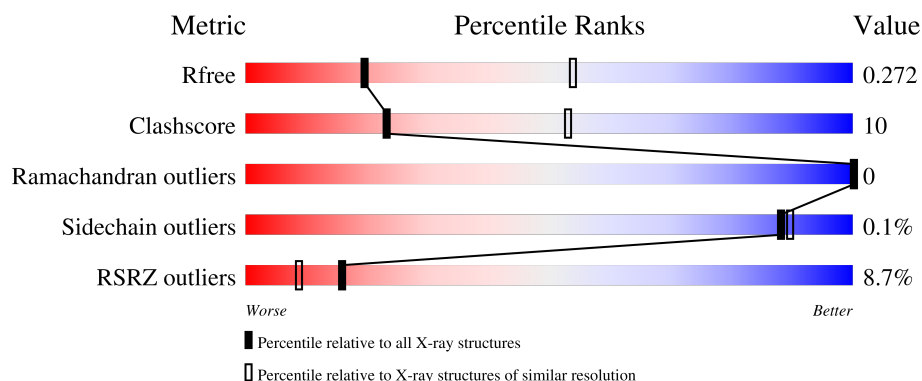
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.11 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	1816 (3.14-3.10)
Clashscore	190562	1906 (3.14-3.10)
Ramachandran outliers	187476	1802 (3.14-3.10)
Sidechain outliers	187428	1802 (3.14-3.10)
RSRZ outliers	180081	1816 (3.14-3.10)

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	536	10% 78% 22%
2	L	214	10% 75% 25%
3	H	219	5% 76% 22% .
4	B	2	100%
4	C	2	100%

2 Entry composition

There are 12 unique types of molecules in this entry. The entry contains 7670 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 Sodium-dependent dopamine transporter.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	536	Total	C	N	O	S	0	0	0
			4237	2840	658	720	19			

There are 46 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	74	ALA	VAL	engineered mutation	UNP Q7K4Y6
A	121	GLY	ASP	engineered mutation	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	GLN	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ARG	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	PRO	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	?	-	ILE	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLN	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6

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Chain	Residue	Modelled	Actual	Comment	Reference
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLU	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	TYR	deletion	UNP Q7K4Y6
A	?	-	MET	deletion	UNP Q7K4Y6
A	?	-	ASN	deletion	UNP Q7K4Y6
A	?	-	GLY	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	LEU	deletion	UNP Q7K4Y6
A	?	-	ASP	deletion	UNP Q7K4Y6
A	?	-	THR	deletion	UNP Q7K4Y6
A	?	-	SER	deletion	UNP Q7K4Y6
A	?	-	ALA	deletion	UNP Q7K4Y6
A	?	-	VAL	deletion	UNP Q7K4Y6
A	415	ALA	LEU	engineered mutation	UNP Q7K4Y6
A	426	MET	SER	engineered mutation	UNP Q7K4Y6
A	471	LEU	PHE	engineered mutation	UNP Q7K4Y6

- Molecule 2 is a protein called Antibody fragment 9D5 Light chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	L	214	Total	C	N	O	S	0	0	0
			1634	1015	272	339	8			

- Molecule 3 is a protein called Antibody fragment 9D5 heavy chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
3	H	216	Total	C	N	O	S	0	0	0
			1633	1026	278	321	8			

- Molecule 4 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



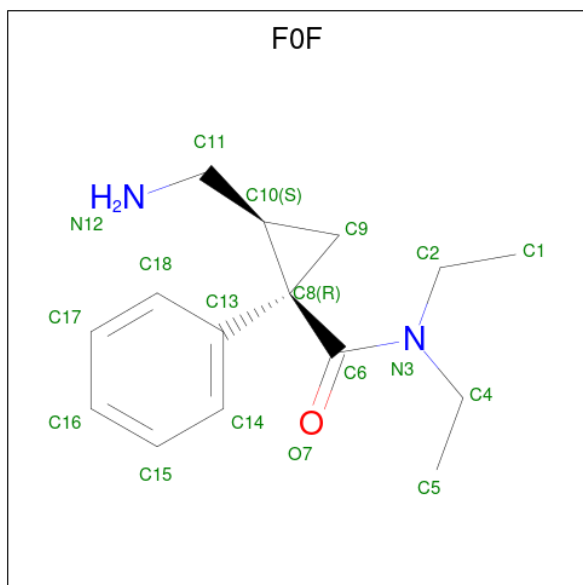
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	B	2	Total	C	O	0	0	0
			23	12	11			

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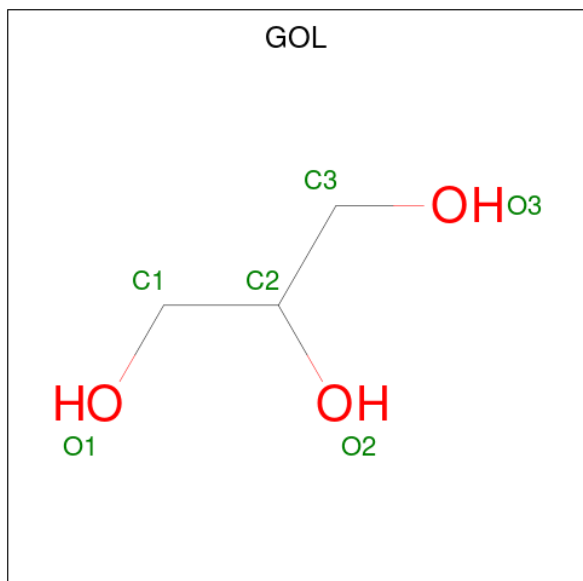
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
4	C	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 5 is (1R,2S)-2-(aminomethyl)-N,N-diethyl-1-phenyl-cyclopropane-1-carboxamide (CCD ID: F0F) (formula: C₁₅H₂₂N₂O) (labeled as "Ligand of Interest" by depositor).



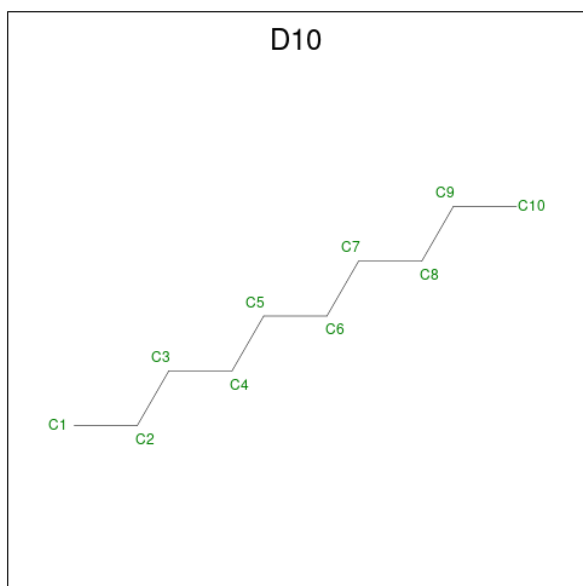
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			18	15	2	1		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: C₃H₈O₃).



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

- Molecule 7 is DECANE (CCD ID: D10) (formula: $C_{10}H_{22}$).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	C	0	0
			10	10		

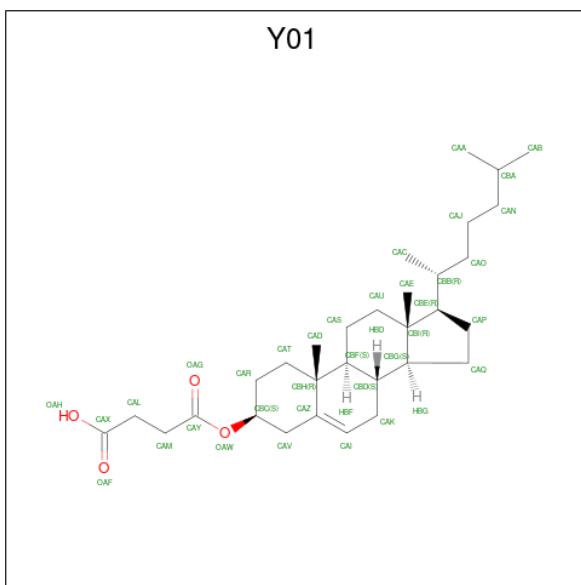
- Molecule 8 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	1	Total	Cl	0	0
			1	1		

- Molecule 9 is SODIUM ION (CCD ID: NA) (formula: Na).

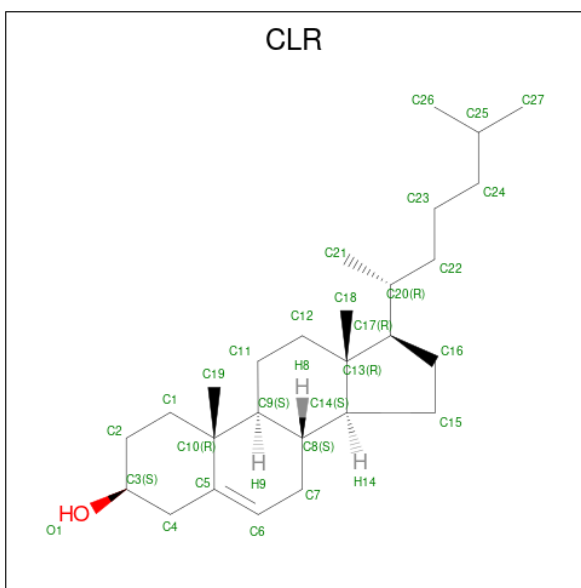
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	2	Total	Na	0	0
			2	2		

- Molecule 10 is CHOLESTEROL HEMISUCCINATE (CCD ID: Y01) (formula: $C_{31}H_{50}O_4$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
10	A	1	Total	C	O	0	0
			35	31	4		

- Molecule 11 is CHOLESTEROL (CCD ID: CLR) (formula: $C_{27}H_{46}O$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
11	A	1	Total	C	O	0	0
			28	27	1		

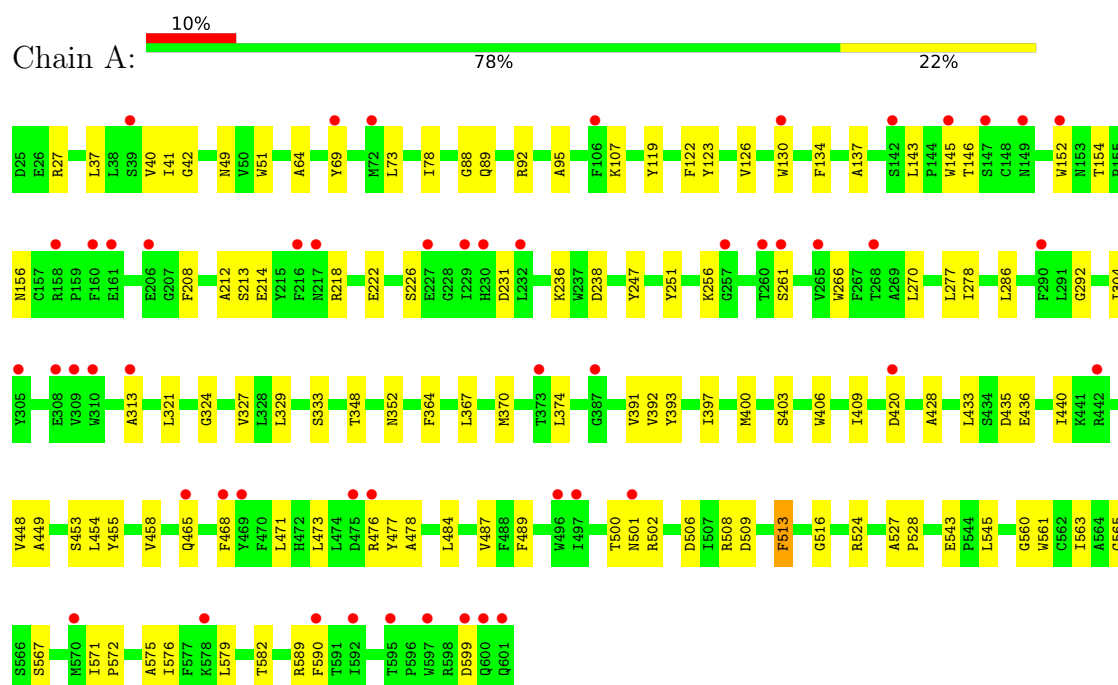
- Molecule 12 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
12	A	8	Total 8	O 8	0	0
12	L	8	Total 8	O 8	0	0
12	H	4	Total 4	O 4	0	0

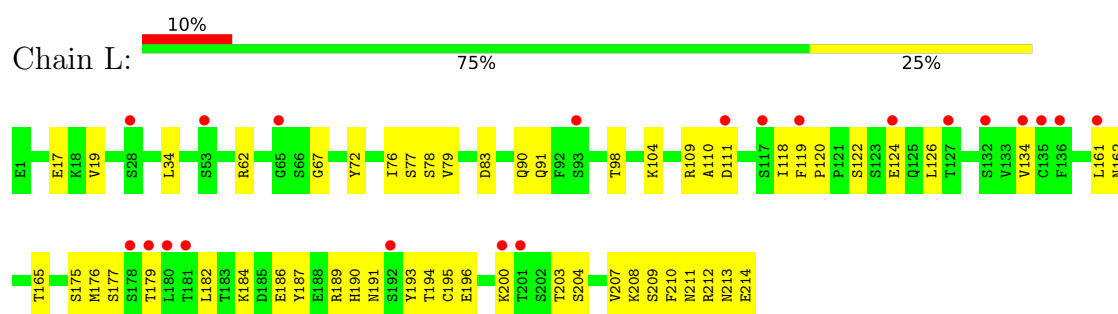
3 Residue-property plots [i](#)

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.

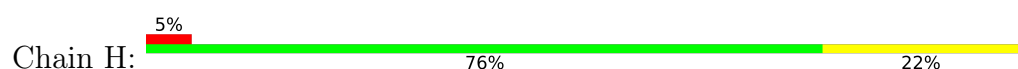
• Molecule 1: Sodium-dependent dopamine transporter

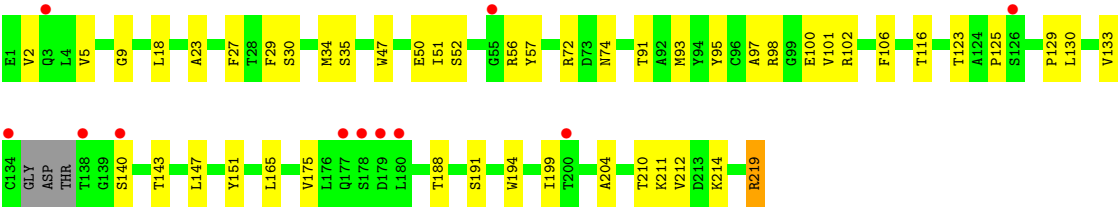


• Molecule 2: Antibody fragment 9D5 Light chain



• Molecule 3: Antibody fragment 9D5 heavy chain





● Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain B: 100%



● Molecule 4: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain C: 100%



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	97.00Å 141.60Å 168.25Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.55 – 3.11 48.55 – 3.11	Depositor EDS
% Data completeness (in resolution range)	99.5 (48.55-3.11) 99.6 (48.55-3.11)	Depositor EDS
R_{merge}	0.17	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.31 (at 3.12Å)	Xtriage
Refinement program	PHENIX 1.13_2998	Depositor
R, R_{free}	0.222 , 0.264 0.230 , 0.272	Depositor DCC
R_{free} test set	2069 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	94.9	Xtriage
Anisotropy	0.164	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.28 , 36.6	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	0.89	EDS
Total number of atoms	7670	wwPDB-VP
Average B, all atoms (Å ²)	84.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.55% 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: Y01, GLC, NA, CLR, D10, GOL, F0F, CL

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	0.46	0/4379	0.65	1/5981 (0.0%)
2	L	0.49	0/1672	0.70	0/2271
3	H	0.53	1/1671 (0.1%)	0.72	0/2273
All	All	0.48	1/7722 (0.0%)	0.68	1/10525 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	H	123	THR	C-N	5.92	1.50	1.33

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	513	PHE	O-C-N	-5.82	117.99	121.71

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	4237	0	4163	87	0
2	L	1634	0	1552	40	0
3	H	1633	0	1587	38	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	B	23	0	21	0	0
4	C	23	0	21	2	0
5	A	18	0	0	0	0
6	A	6	0	8	0	0
7	A	10	0	22	0	0
8	A	1	0	0	0	0
9	A	2	0	0	0	0
10	A	35	0	50	3	0
11	A	28	0	46	1	0
12	A	8	0	0	1	0
12	H	4	0	0	0	0
12	L	8	0	0	1	0
All	All	7670	0	7470	156	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 10.

All (156) 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:H:140:SER:O	3:H:191:SER:HB2	1.44	1.15
3:H:140:SER:O	3:H:191:SER:CB	2.01	1.07
4:C:1:GLC:O3	4:C:2:GLC:O2	1.78	0.97
2:L:134:VAL:HG12	2:L:179:THR:HG23	1.58	0.82
2:L:109:ARG:NH1	2:L:110:ALA:O	2.14	0.81
1:A:321:LEU:HD23	1:A:352:ASN:HD22	1.47	0.80
2:L:111:ASP:OD2	2:L:200:LYS:NZ	2.20	0.75
3:H:91:THR:HG23	3:H:116:THR:HA	1.68	0.74
1:A:261:SER:OG	12:A:801:HOH:O	2.07	0.71
1:A:364:PHE:HA	1:A:367:LEU:HB2	1.72	0.71
1:A:73:LEU:HD23	10:A:707:Y01:HAC2	1.75	0.69
1:A:152:TRP:O	1:A:218:ARG:HD3	1.93	0.68
3:H:140:SER:O	3:H:191:SER:HB3	1.92	0.66
1:A:502:ARG:NH1	1:A:599:ASP:OD2	2.30	0.65
2:L:124:GLU:HG2	3:H:214:LYS:NZ	2.13	0.64
2:L:191:ASN:ND2	2:L:213:ASN:OD1	2.28	0.64
2:L:196:GLU:HG2	2:L:207:VAL:HG23	1.81	0.62
3:H:93:MET:HE3	3:H:95:TYR:OH	2.00	0.62
2:L:186:GLU:HG2	2:L:189:ARG:HH21	1.65	0.61
1:A:579:LEU:HD21	1:A:590:PHE:HE1	1.64	0.60
2:L:118:ILE:HD11	2:L:195:CYS:HB3	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:124:GLU:HG2	3:H:214:LYS:HZ3	1.67	0.60
1:A:27:ARG:NH2	1:A:435:ASP:OD2	2.35	0.60
2:L:120:PRO:HB3	2:L:210:PHE:CZ	2.38	0.59
1:A:370:MET:HG2	1:A:374:LEU:HD12	1.83	0.59
3:H:52:SER:HB3	3:H:57:TYR:HB2	1.84	0.59
1:A:393:TYR:CE1	1:A:397:ILE:HD11	2.38	0.58
1:A:251:TYR:CE1	1:A:448:VAL:HG23	2.38	0.58
3:H:5:VAL:HG23	3:H:23:ALA:HB3	1.85	0.58
1:A:397:ILE:HG23	1:A:406:TRP:HB2	1.85	0.58
1:A:582:THR:O	1:A:589:ARG:NH2	2.36	0.58
2:L:119:PHE:HB2	2:L:134:VAL:HG22	1.84	0.58
2:L:90:GLN:HG2	2:L:91:GLN:N	2.19	0.57
2:L:193:TYR:HB2	2:L:210:PHE:CE1	2.40	0.57
2:L:162:ASN:HB3	2:L:176:MET:HE3	1.85	0.57
3:H:51:ILE:HD13	3:H:72:ARG:HG3	1.87	0.57
1:A:477:TYR:CD2	1:A:560:GLY:HA3	2.41	0.56
2:L:187:TYR:CE2	2:L:212:ARG:HD2	2.41	0.56
1:A:292:GLY:HA3	1:A:364:PHE:O	2.06	0.55
2:L:120:PRO:HB3	2:L:210:PHE:CE2	2.41	0.55
1:A:489:PHE:HD2	1:A:571:ILE:HG21	1.71	0.55
1:A:277:LEU:HB2	11:A:710:CLR:H263	1.87	0.55
3:H:9:GLY:HA2	3:H:18:LEU:HD13	1.88	0.55
1:A:516:GLY:HA3	10:A:707:Y01:OAF	2.07	0.55
2:L:118:ILE:HG12	2:L:208:LYS:HB3	1.89	0.55
1:A:582:THR:O	1:A:589:ARG:HD2	2.07	0.54
2:L:210:PHE:HB2	3:H:133:VAL:HG11	1.90	0.54
1:A:69:TYR:HA	1:A:313:ALA:HB1	1.90	0.54
1:A:433:LEU:HB3	1:A:440:ILE:HD11	1.90	0.53
2:L:190:HIS:O	2:L:212:ARG:NH1	2.41	0.53
2:L:67:GLY:HA3	2:L:72:TYR:HA	1.90	0.53
1:A:37:LEU:O	1:A:41:ILE:HG12	2.09	0.53
1:A:156:ASN:HB3	1:A:208:PHE:CD2	2.44	0.53
1:A:278:ILE:HD11	1:A:409:ILE:HD13	1.89	0.52
3:H:129:PRO:HD3	3:H:214:LYS:HE2	1.90	0.52
3:H:29:PHE:O	3:H:72:ARG:NH2	2.42	0.52
2:L:91:GLN:NE2	2:L:98:THR:OG1	2.43	0.52
1:A:95:ALA:HA	1:A:329:LEU:HD23	1.91	0.52
1:A:143:LEU:HD13	1:A:145:TRP:CZ2	2.44	0.52
3:H:9:GLY:HA2	3:H:18:LEU:CD1	2.40	0.52
1:A:123:TYR:O	1:A:126:VAL:HG12	2.09	0.51
1:A:370:MET:O	1:A:374:LEU:HB2	2.10	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:500:THR:OG1	1:A:524:ARG:NH1	2.43	0.51
2:L:34:LEU:HD22	2:L:72:TYR:CD2	2.46	0.51
3:H:125:PRO:HB3	3:H:151:TYR:HB3	1.92	0.51
1:A:473:LEU:HD12	1:A:545:LEU:HD23	1.93	0.51
2:L:194:THR:HG23	2:L:209:SER:HB2	1.92	0.51
2:L:122:SER:OG	3:H:129:PRO:HD2	2.11	0.51
3:H:130:LEU:HD21	3:H:147:LEU:HB2	1.93	0.51
2:L:203:THR:OG1	2:L:204:SER:N	2.43	0.50
1:A:433:LEU:CB	1:A:440:ILE:HD11	2.42	0.50
1:A:49:ASN:ND2	1:A:352:ASN:OD1	2.45	0.50
1:A:73:LEU:O	1:A:78:ILE:HG12	2.12	0.49
2:L:126:LEU:O	2:L:184:LYS:HE2	2.12	0.49
1:A:476:ARG:HD3	1:A:545:LEU:HD13	1.93	0.49
1:A:89:GLN:O	1:A:92:ARG:HD2	2.13	0.49
1:A:489:PHE:CD2	1:A:571:ILE:HG21	2.48	0.49
1:A:561:TRP:C	1:A:563:ILE:H	2.21	0.49
1:A:143:LEU:O	1:A:146:THR:HG22	2.13	0.48
3:H:2:VAL:HG23	3:H:27:PHE:CD1	2.48	0.48
1:A:501:ASN:OD1	1:A:502:ARG:N	2.46	0.48
2:L:34:LEU:HD22	2:L:72:TYR:CG	2.48	0.48
1:A:327:VAL:HG22	1:A:428:ALA:HB2	1.95	0.48
1:A:222:GLU:OE1	1:A:465:GLN:NE2	2.44	0.48
1:A:508:ARG:NH2	3:H:50:GLU:OE2	2.32	0.48
4:C:1:GLC:H4	4:C:2:GLC:H2	1.76	0.47
1:A:324:GLY:HA3	1:A:487:VAL:HG22	1.96	0.47
1:A:214:GLU:O	1:A:218:ARG:HB2	2.13	0.47
1:A:572:PRO:O	1:A:576:ILE:HG12	2.14	0.47
2:L:19:VAL:HG22	2:L:76:ILE:HB	1.96	0.47
1:A:393:TYR:HE1	1:A:397:ILE:HD11	1.80	0.47
1:A:154:THR:OG1	1:A:214:GLU:OE2	2.29	0.47
1:A:286:LEU:HD11	1:A:400:MET:HE1	1.97	0.47
2:L:120:PRO:HG2	3:H:219:ARG:CZ	2.45	0.47
3:H:143:THR:HG23	3:H:188:THR:HG22	1.97	0.47
1:A:454:LEU:O	1:A:458:VAL:HG12	2.15	0.46
1:A:565:GLY:C	1:A:567:SER:H	2.23	0.46
2:L:213:ASN:HB2	2:L:214:GLU:OE1	2.16	0.46
2:L:182:LEU:CD1	2:L:187:TYR:HB2	2.46	0.45
1:A:370:MET:HE1	1:A:392:VAL:CG1	2.46	0.45
1:A:95:ALA:HA	1:A:329:LEU:CD2	2.47	0.45
1:A:251:TYR:HE1	1:A:448:VAL:HG23	1.82	0.45
1:A:107:LYS:NZ	1:A:436:GLU:OE2	2.39	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:H:194:TRP:HD1	3:H:199:ILE:HG12	1.81	0.45
1:A:575:ALA:O	1:A:579:LEU:HB2	2.17	0.44
2:L:118:ILE:HG23	2:L:118:ILE:HD12	1.65	0.44
3:H:34:MET:HB3	3:H:34:MET:HE3	1.73	0.44
2:L:176:MET:HG2	2:L:177:SER:N	2.31	0.44
1:A:527:ALA:HB3	1:A:528:PRO:HD3	1.99	0.44
1:A:64:ALA:O	1:A:304:ILE:HD11	2.17	0.44
3:H:204:ALA:HB1	3:H:211:LYS:HZ3	1.83	0.44
1:A:508:ARG:NE	3:H:100:GLU:O	2.41	0.44
3:H:30:SER:HB3	3:H:74:ASN:HB3	2.00	0.44
1:A:40:VAL:HG12	1:A:348:THR:HG21	2.00	0.44
1:A:509:ASP:O	3:H:102:ARG:NH1	2.51	0.43
3:H:35:SER:OG	3:H:47:TRP:NE1	2.51	0.43
1:A:506:ASP:OD1	3:H:57:TYR:OH	2.36	0.43
1:A:397:ILE:CG2	1:A:406:TRP:HB2	2.48	0.43
2:L:161:LEU:HD21	3:H:175:VAL:HB	2.00	0.43
2:L:104:LYS:NZ	12:L:304:HOH:O	2.50	0.43
1:A:484:LEU:HD23	1:A:484:LEU:HA	1.87	0.43
2:L:211:ASN:C	2:L:213:ASN:H	2.27	0.43
1:A:256:LYS:HD3	1:A:256:LYS:HA	1.88	0.42
3:H:204:ALA:HB1	3:H:211:LYS:NZ	2.33	0.42
1:A:40:VAL:CG1	1:A:348:THR:HG21	2.50	0.42
1:A:42:GLY:C	1:A:420:ASP:HB3	2.44	0.42
1:A:476:ARG:NH2	1:A:543:GLU:O	2.51	0.42
3:H:97:ALA:HB1	3:H:106:PHE:HB3	2.01	0.42
1:A:122:PHE:CE1	1:A:458:VAL:HG11	2.55	0.42
1:A:130:TRP:HH2	1:A:468:PHE:HD1	1.68	0.42
10:A:707:Y01:HAP1	10:A:707:Y01:HAC1	1.80	0.42
1:A:400:MET:HE2	1:A:400:MET:HB3	1.86	0.41
3:H:27:PHE:CE2	3:H:98:ARG:HD2	2.55	0.41
1:A:236:LYS:HE3	1:A:238:ASP:OD1	2.20	0.41
2:L:17:GLU:O	2:L:79:VAL:HG23	2.19	0.41
3:H:165:LEU:HD12	3:H:165:LEU:HA	1.88	0.41
1:A:88:GLY:O	1:A:333:SER:HA	2.20	0.41
1:A:278:ILE:HD13	1:A:278:ILE:HG21	1.75	0.41
1:A:226:SER:OG	1:A:231:ASP:O	2.28	0.41
1:A:449:ALA:O	1:A:453:SER:OG	2.30	0.41
1:A:403:SER:HA	1:A:406:TRP:HD1	1.85	0.41
1:A:502:ARG:HG3	3:H:56:ARG:CZ	2.51	0.41
1:A:212:ALA:C	1:A:391:VAL:HG13	2.46	0.41
1:A:247:TYR:CZ	1:A:455:TYR:HB3	2.56	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:L:62:ARG:NH1	2:L:83:ASP:OD2	2.53	0.41
3:H:210:THR:HG22	3:H:212:VAL:HG13	2.03	0.41
1:A:51:TRP:CD1	1:A:51:TRP:C	3.00	0.40
1:A:266:TRP:O	1:A:270:LEU:HB2	2.22	0.40
1:A:513:PHE:HB3	3:H:101:VAL:HG13	2.02	0.40
1:A:134:PHE:HA	1:A:137:ALA:HB3	2.04	0.40
1:A:213:SER:N	1:A:391:VAL:HG13	2.37	0.40
1:A:468:PHE:HA	1:A:471:LEU:HD12	2.02	0.40
1:A:565:GLY:C	1:A:567:SER:N	2.80	0.40
2:L:165:THR:HG23	2:L:175:SER:O	2.21	0.40
1:A:119:TYR:HB3	1:A:478:ALA:HB1	2.04	0.40
2:L:77:SER:OG	2:L:78:SER:N	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	534/536 (100%)	504 (94%)	30 (6%)	0	100	100
2	L	212/214 (99%)	202 (95%)	10 (5%)	0	100	100
3	H	212/219 (97%)	202 (95%)	10 (5%)	0	100	100
All	All	958/969 (99%)	908 (95%)	50 (5%)	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	434/440 (99%)	434 (100%)	0	100	100
2	L	186/187 (100%)	186 (100%)	0	100	100
3	H	182/187 (97%)	181 (100%)	1 (0%)	81	83
All	All	802/814 (98%)	801 (100%)	1 (0%)	88	90

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
3	H	219	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	91	ASN
1	A	601	GLN
2	L	38	GLN
2	L	39	GLN
2	L	54	ASN
2	L	162	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 ⓘ

4 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	GLC	B	1	4	12,12,12	0.50	0	17,17,17	0.96	1 (5%)
4	GLC	B	2	4	11,11,12	0.37	0	15,15,17	1.05	1 (6%)
4	GLC	C	1	4	12,12,12	0.50	0	17,17,17	0.97	1 (5%)
4	GLC	C	2	4	11,11,12	0.42	0	15,15,17	0.97	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	GLC	B	1	4	-	0/2/22/22	0/1/1/1
4	GLC	B	2	4	-	0/2/19/22	0/1/1/1
4	GLC	C	1	4	-	1/2/22/22	0/1/1/1
4	GLC	C	2	4	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	2	GLC	C1-O5-C5	-3.21	107.89	112.19
4	C	1	GLC	C1-O5-C5	-2.96	107.93	113.65
4	C	2	GLC	C1-O5-C5	-2.83	108.39	112.19
4	B	1	GLC	C1-O5-C5	-2.80	108.23	113.65

There are no chirality outliers.

All (1) torsion outliers are listed below:

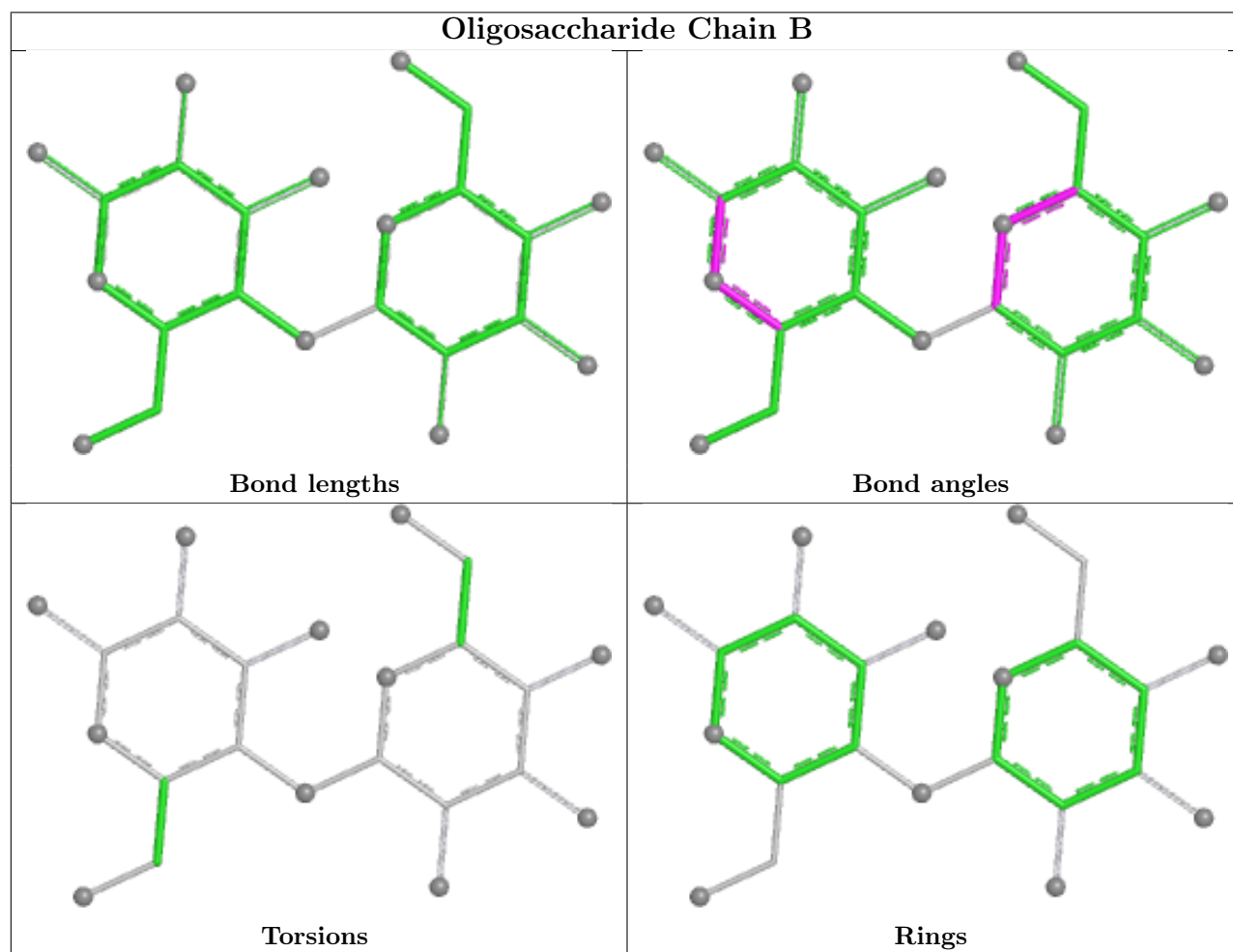
Mol	Chain	Res	Type	Atoms
4	C	1	GLC	O5-C5-C6-O6

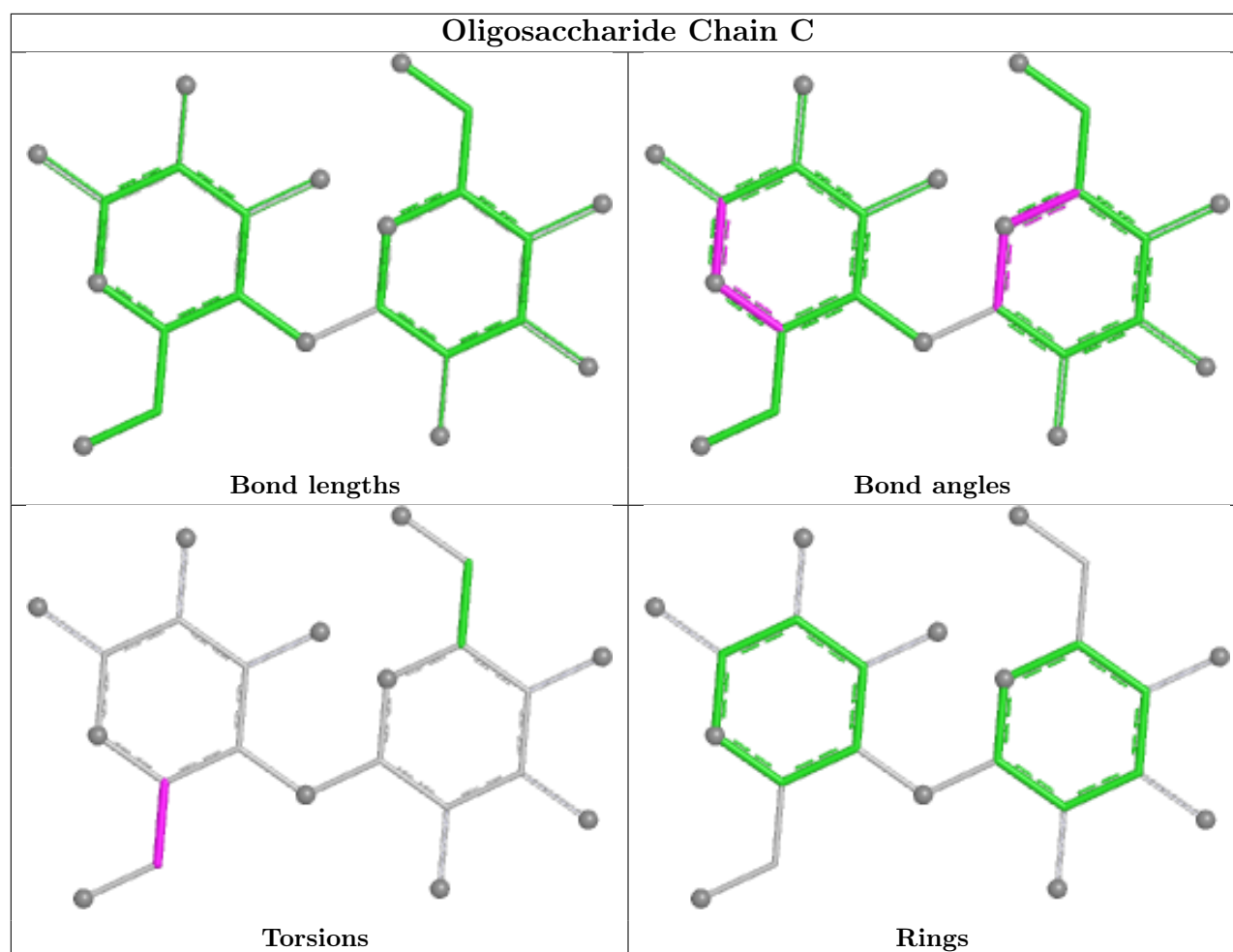
There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	2	GLC	2	0
4	C	1	GLC	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](#)

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	$\# Z > 2$
11	CLR	A	710	-	31,31,31	0.96	1 (3%)	48,48,48	1.61	9 (18%)
6	GOL	A	702	-	5,5,5	0.59	0	5,5,5	0.94	0
10	Y01	A	707	-	38,38,38	1.29	6 (15%)	57,57,57	1.91	16 (28%)
7	D10	A	703	-	9,9,9	0.63	0	8,8,8	0.28	0
5	F0F	A	701	-	19,19,19	1.79	2 (10%)	23,27,27	2.24	2 (8%)

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
11	CLR	A	710	-	-	2/10/68/68	0/4/4/4
6	GOL	A	702	-	-	3/4/4/4	-
10	Y01	A	707	-	-	6/19/77/77	0/4/4/4
7	D10	A	703	-	-	2/7/7/7	-
5	F0F	A	701	-	-	8/22/30/30	0/2/2/2

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	701	F0F	C6-N3	5.95	1.45	1.35
5	A	701	F0F	O7-C6	2.88	1.26	1.22
10	A	707	Y01	OAH-CAX	2.79	1.40	1.30
10	A	707	Y01	CAT-CBH	2.52	1.58	1.54
10	A	707	Y01	CBB-CBE	2.19	1.58	1.54
10	A	707	Y01	OAW-CAY	2.19	1.40	1.34
10	A	707	Y01	CBH-CBF	2.14	1.59	1.56
11	A	710	CLR	C10-C9	2.03	1.59	1.56
10	A	707	Y01	CAS-CBF	2.02	1.57	1.53

All (27) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	701	F0F	C9-C10-C11	-8.59	103.71	120.58
10	A	707	Y01	CBI-CBE-CBB	5.67	128.25	119.50
11	A	710	CLR	C4-C5-C10	5.10	122.95	116.42
5	A	701	F0F	O7-C6-C8	-5.04	114.04	120.33
11	A	710	CLR	C1-C2-C3	4.45	116.38	110.48
10	A	707	Y01	CAT-CBH-CBF	4.05	114.10	108.74
10	A	707	Y01	CBG-CBI-CBE	-3.73	95.82	100.10
10	A	707	Y01	CBC-CAV-CAZ	-3.65	106.06	111.45
10	A	707	Y01	OAW-CAY-CAM	3.43	118.90	111.48
11	A	710	CLR	C10-C5-C6	-3.39	117.99	122.93
11	A	710	CLR	C4-C5-C6	-3.20	116.23	120.57
10	A	707	Y01	CAK-CBD-CBG	-3.07	106.59	110.93
11	A	710	CLR	C11-C9-C10	2.89	116.65	113.08
10	A	707	Y01	CAM-CAL-CAX	-2.73	106.42	113.67
11	A	710	CLR	C8-C7-C6	2.70	116.51	112.76

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
11	A	710	CLR	C11-C9-C8	-2.58	108.17	111.78
10	A	707	Y01	CAQ-CBG-CBI	2.49	106.77	103.84
10	A	707	Y01	CAV-CAZ-CAI	-2.47	117.22	120.57
10	A	707	Y01	CAS-CBF-CBH	2.44	116.10	113.08
10	A	707	Y01	CBH-CBF-CBD	-2.38	109.24	112.71
10	A	707	Y01	CAP-CBE-CBB	-2.34	108.64	112.18
10	A	707	Y01	CAC-CBB-CBE	2.34	116.40	112.88
10	A	707	Y01	CAK-CAI-CAZ	-2.32	121.11	125.02
11	A	710	CLR	C23-C22-C20	-2.25	108.77	115.08
10	A	707	Y01	CAO-CBB-CBE	2.22	114.94	110.33
11	A	710	CLR	C2-C1-C10	2.11	117.28	112.78
10	A	707	Y01	CAQ-CBG-CBD	-2.10	115.74	119.10

There are no chirality outliers.

All (21) torsion outliers are listed below:

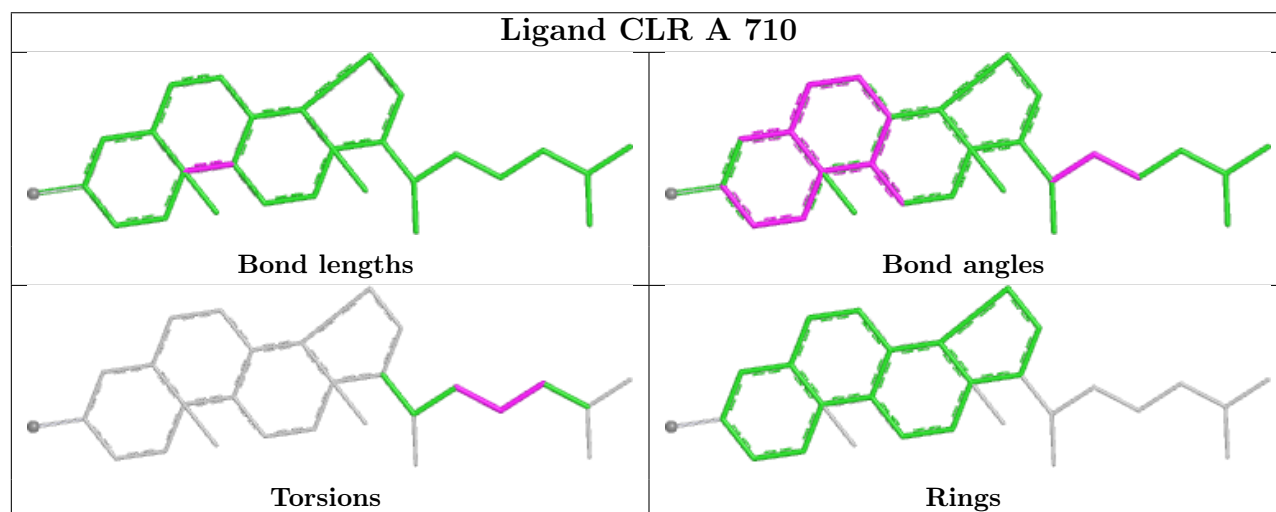
Mol	Chain	Res	Type	Atoms
5	A	701	F0F	C8-C10-C11-N12
5	A	701	F0F	C9-C10-C11-N12
5	A	701	F0F	N3-C6-C8-C10
6	A	702	GOL	O1-C1-C2-C3
10	A	707	Y01	CAO-CBB-CBE-CBI
10	A	707	Y01	CAC-CBB-CBE-CAP
10	A	707	Y01	CAO-CBB-CBE-CAP
6	A	702	GOL	O1-C1-C2-O2
6	A	702	GOL	O2-C2-C3-O3
10	A	707	Y01	CAN-CAJ-CAO-CBB
11	A	710	CLR	C22-C23-C24-C25
10	A	707	Y01	CAC-CBB-CBE-CBI
5	A	701	F0F	C14-C13-C8-C10
7	A	703	D10	C7-C8-C9-C10
5	A	701	F0F	C5-C4-N3-C6
11	A	710	CLR	C20-C22-C23-C24
7	A	703	D10	C1-C2-C3-C4
5	A	701	F0F	C18-C13-C8-C10
10	A	707	Y01	CAJ-CAN-CBA-CAB
5	A	701	F0F	C14-C13-C8-C9
5	A	701	F0F	C18-C13-C8-C9

There are no ring outliers.

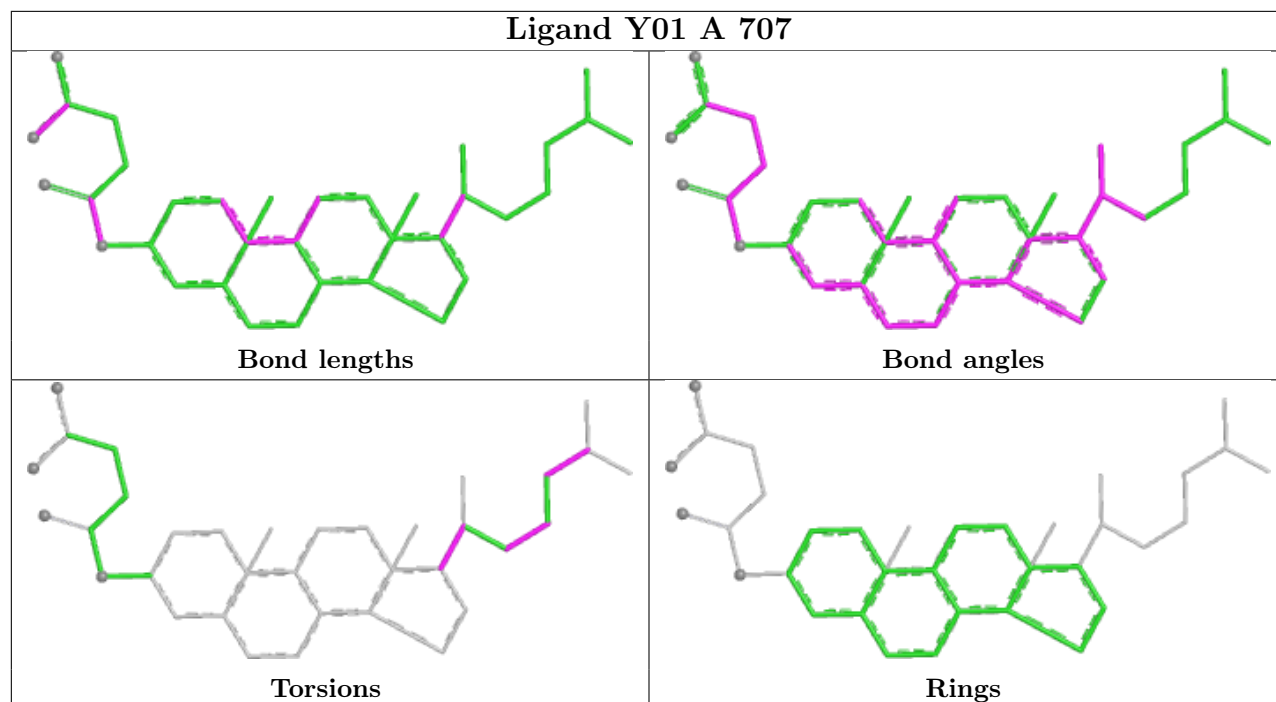
2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
11	A	710	CLR	1	0
10	A	707	Y01	3	0

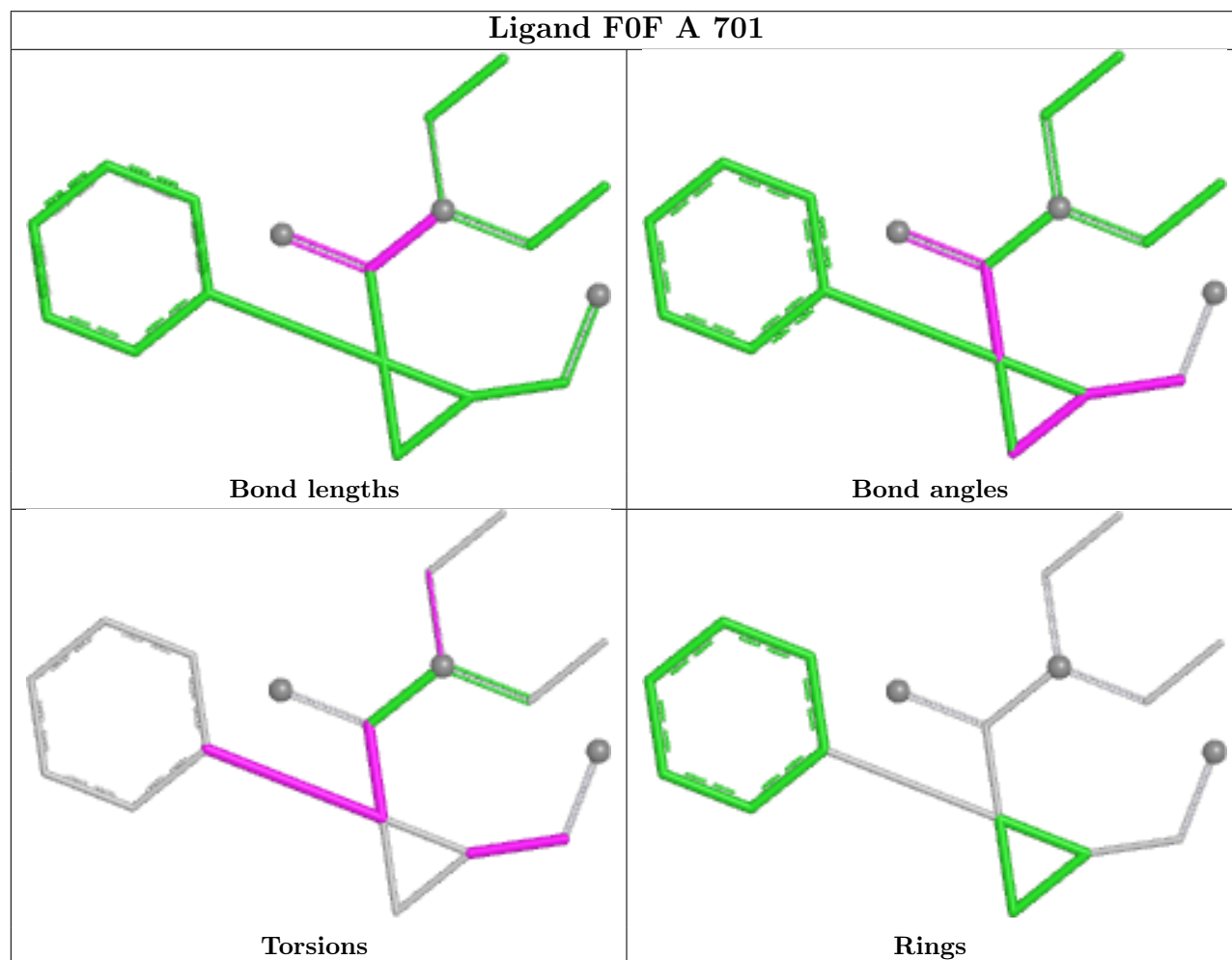
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.



Ligand Y01 A 707



Ligand F0F A 701



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	536/536 (100%)	0.62	52 (9%)	13 7	65, 84, 108, 130	0
2	L	214/214 (100%)	0.53	21 (9%)	13 7	63, 81, 105, 118	0
3	H	216/219 (98%)	0.25	11 (5%)	33 18	63, 79, 104, 125	0
All	All	966/969 (99%)	0.51	84 (8%)	16 9	63, 82, 106, 130	0

All (84) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
3	H	178	SER	9.0
1	A	600	GLN	8.2
2	L	200	LYS	6.5
3	H	177	GLN	5.8
1	A	305	TYR	5.5
1	A	599	ASP	4.9
2	L	53	SER	4.9
1	A	497	ILE	4.7
2	L	119	PHE	4.7
1	A	227	GLU	4.2
2	L	134	VAL	4.1
2	L	181	THR	3.8
1	A	216	PHE	3.7
1	A	601	GLN	3.5
1	A	590	PHE	3.4
1	A	387	GLY	3.4
1	A	39	SER	3.4
1	A	420	ASP	3.3
1	A	308	GLU	3.3
3	H	138	THR	3.2
1	A	496	TRP	3.1
1	A	261	SER	3.1
1	A	72	MET	2.9

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Mol	Chain	Res	Type	RSRZ
1	A	217	ASN	2.9
2	L	161	LEU	2.9
1	A	230	HIS	2.9
1	A	468	PHE	2.9
1	A	147	SER	2.8
3	H	140	SER	2.8
1	A	592	ILE	2.8
3	H	180	LEU	2.8
1	A	570	MET	2.7
2	L	135	CYS	2.7
2	L	178	SER	2.7
1	A	161	GLU	2.7
3	H	179	ASP	2.6
1	A	475	ASP	2.5
1	A	501	ASN	2.5
1	A	130	TRP	2.5
1	A	442	ARG	2.5
2	L	179	THR	2.5
2	L	136	PHE	2.5
1	A	260	THR	2.4
1	A	469	TYR	2.4
3	H	3	GLN	2.4
1	A	106	PHE	2.4
1	A	145	TRP	2.4
1	A	465	GLN	2.4
3	H	126	SER	2.4
2	L	124	GLU	2.3
1	A	158	ARG	2.3
1	A	257	GLY	2.3
2	L	127	THR	2.3
3	H	200	THR	2.3
1	A	265	VAL	2.3
1	A	149	ASN	2.3
2	L	65	GLY	2.3
2	L	132	SER	2.3
1	A	152	TRP	2.2
1	A	229	ILE	2.2
1	A	309	VAL	2.2
1	A	232	LEU	2.2
1	A	476	ARG	2.2
2	L	28	SER	2.2
1	A	160	PHE	2.2

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Mol	Chain	Res	Type	RSRZ
2	L	117	SER	2.1
2	L	180	LEU	2.1
1	A	310	TRP	2.1
2	L	111	ASP	2.1
1	A	206	GLU	2.1
1	A	142	SER	2.1
1	A	69	TYR	2.1
2	L	201	THR	2.1
3	H	55	GLY	2.1
1	A	373	THR	2.0
1	A	595	THR	2.0
1	A	578	LYS	2.0
2	L	93	SER	2.0
2	L	192	SER	2.0
1	A	597	TRP	2.0
1	A	268	THR	2.0
1	A	313	ALA	2.0
1	A	290	PHE	2.0
3	H	134	CYS	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](#)

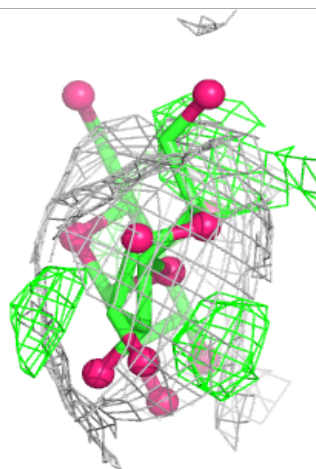
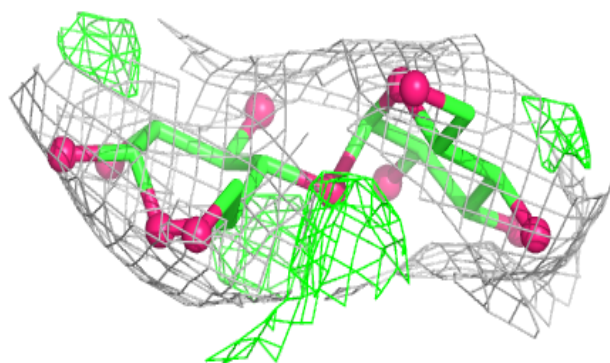
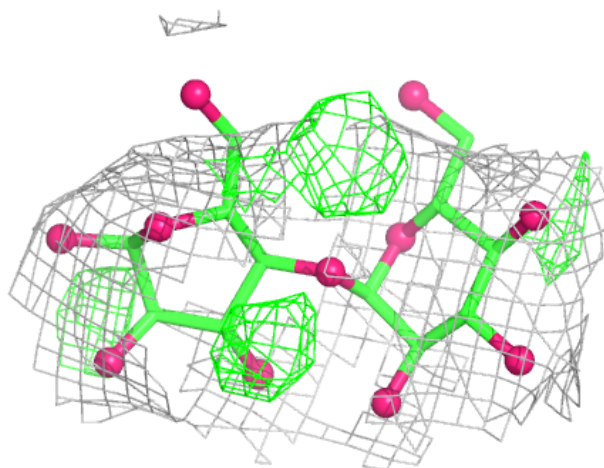
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

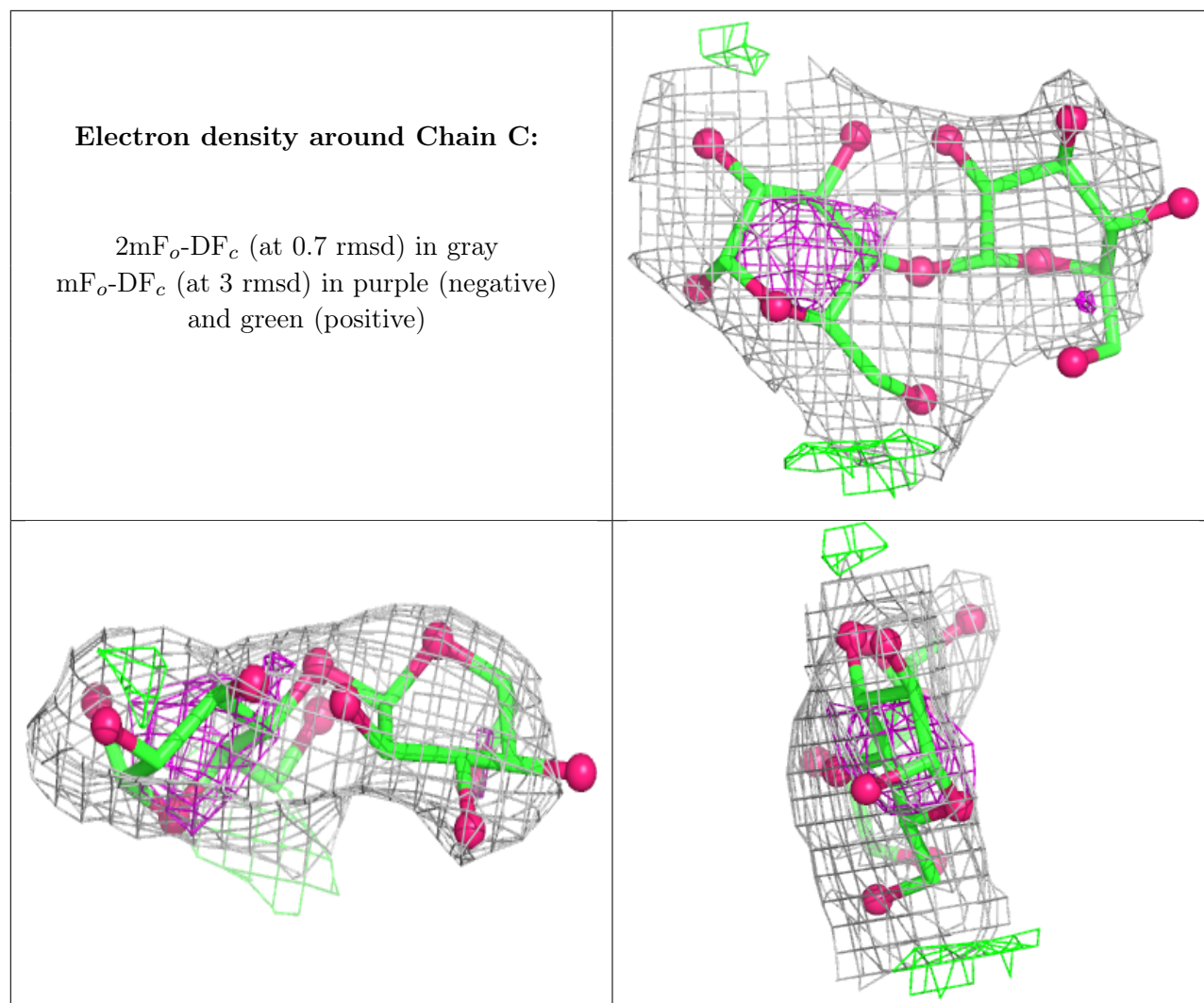
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	GLC	B	1	12/12	-	-	105,117,121,129	0
4	GLC	B	2	11/12	-	-	102,114,120,122	0
4	GLC	C	1	12/12	-	-	101,107,110,116	0
4	GLC	C	2	11/12	-	-	97,106,111,112	0

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)





6.4 Ligands ⓘ

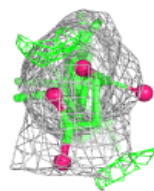
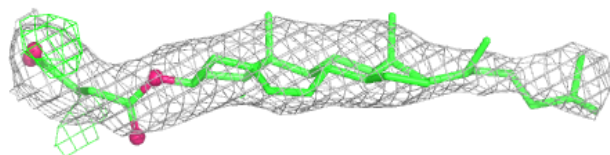
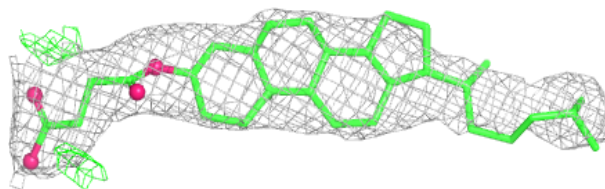
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
6	GOL	A	702	6/6	0.69	0.27	92,94,107,108	0
7	D10	A	703	10/10	0.85	0.25	74,92,95,98	0
10	Y01	A	707	35/35	0.85	0.21	77,101,109,113	0
9	NA	A	705	1/1	0.91	0.15	83,83,83,83	0
5	F0F	A	701	18/18	0.93	0.20	71,79,83,87	0
11	CLR	A	710	28/28	0.93	0.14	73,86,91,93	0
9	NA	A	706	1/1	0.96	0.13	73,73,73,73	0
8	CL	A	704	1/1	0.98	0.06	78,78,78,78	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.

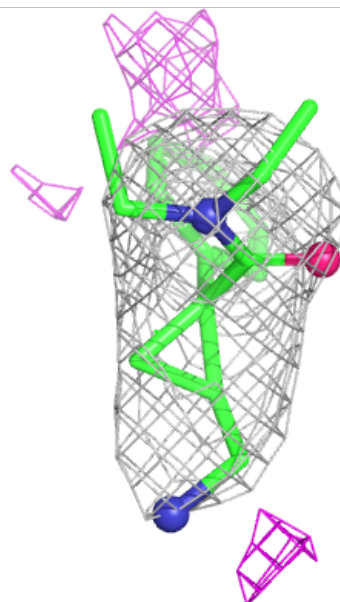
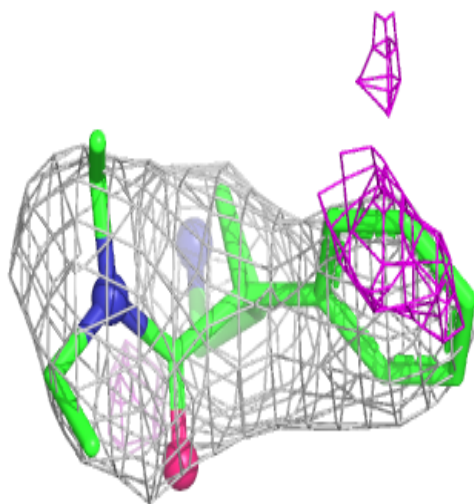
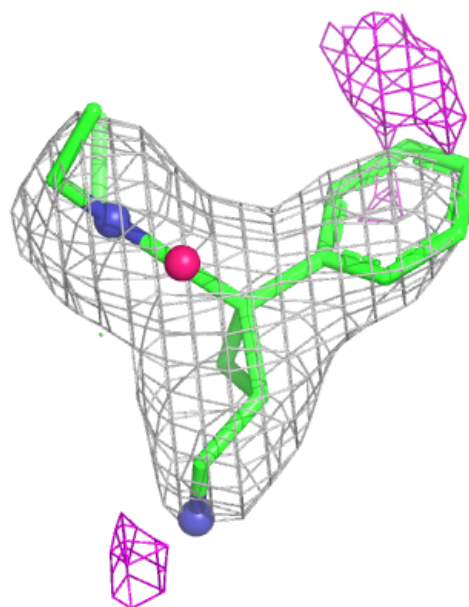
Electron density around Y01 A 707:

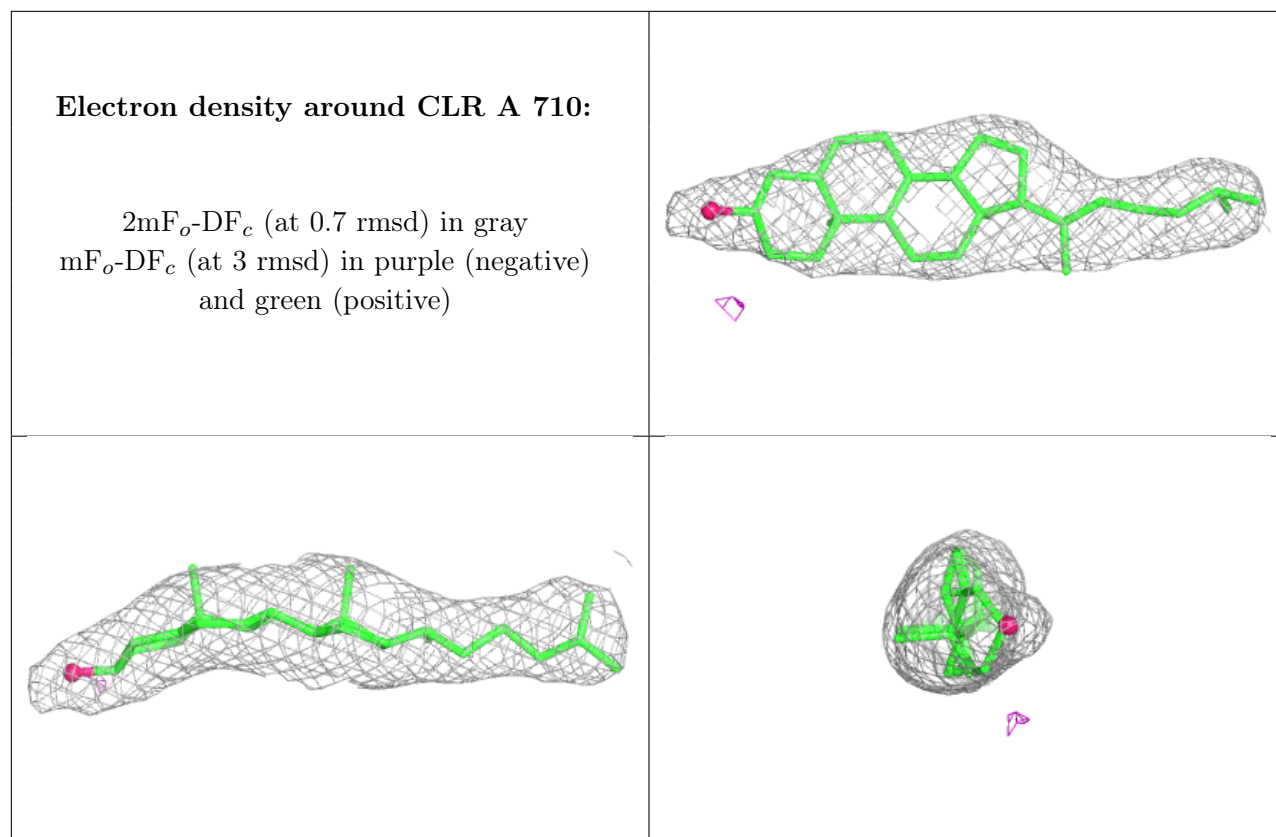
$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



Electron density around F0F 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 [i](#)

There are no such residues in this entry.