



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 4, 2026 – 05:10 PM UTC

PDB ID : 6X48 / pdb_00006x48
Title : Sortilin-Progranulin Interaction With Compound 17
Authors : Parthasarathy, G.; Soisson, S.M.
Deposited on : 2020-05-22
Resolution : 2.90 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

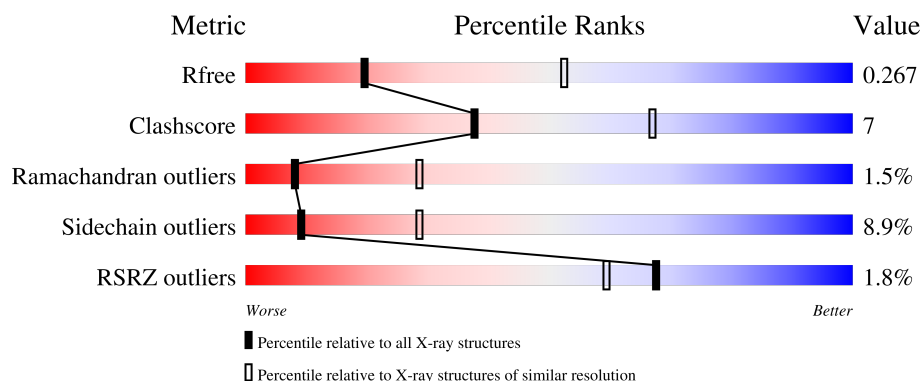
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.90 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	2481 (2.90-2.90)
Clashscore	190562	2690 (2.90-2.90)
Ramachandran outliers	187476	2623 (2.90-2.90)
Sidechain outliers	187428	2625 (2.90-2.90)
RSRZ outliers	180081	2481 (2.90-2.90)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. 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	663	2% 73% 23% ..
2	B	4	75% 25%
3	C	3	100%

2 Entry composition [i](#)

There are 7 unique types of molecules in this entry. The entry contains 5303 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 Sortilin.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	654	Total	C	N	O	S	0	0	0
			5143	3241	867	1006	29			

There is a discrepancy between the modelled and reference sequences:

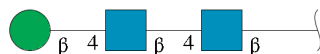
Chain	Residue	Modelled	Actual	Comment	Reference
A	617	MET	VAL	conflict	UNP Q99523

- Molecule 2 is an oligosaccharide called 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.



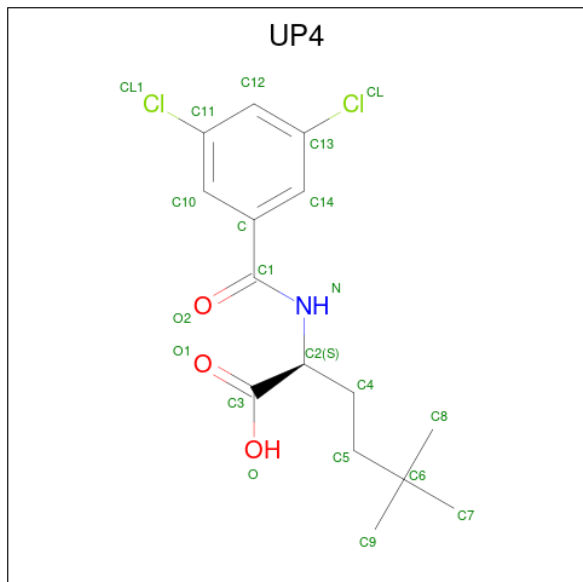
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	B	4	Total	C	N	O	0	0	0
			50	28	2	20			

- Molecule 3 is an oligosaccharide called beta-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	3	Total	C	N	O	0	0	0
			39	22	2	15			

- Molecule 4 is N-(3,5-dichlorobenzene-1-carbonyl)-5,5-dimethyl-L-norleucine (CCD ID: UP4) (formula: $C_{15}H_{19}Cl_2NO_3$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	Cl	N	O	0
			21	15	2	1	3	

- Molecule 5 is UNKNOWN LIGAND (CCD ID: UNL) (formula:) (labeled as "Ligand of Interest" by depositor).

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			18	12	6		

- Molecule 6 is GLYCEROL (CCD ID: GOL) (formula: $C_3H_8O_3$) (labeled as "Ligand of Interest" by depositor).



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

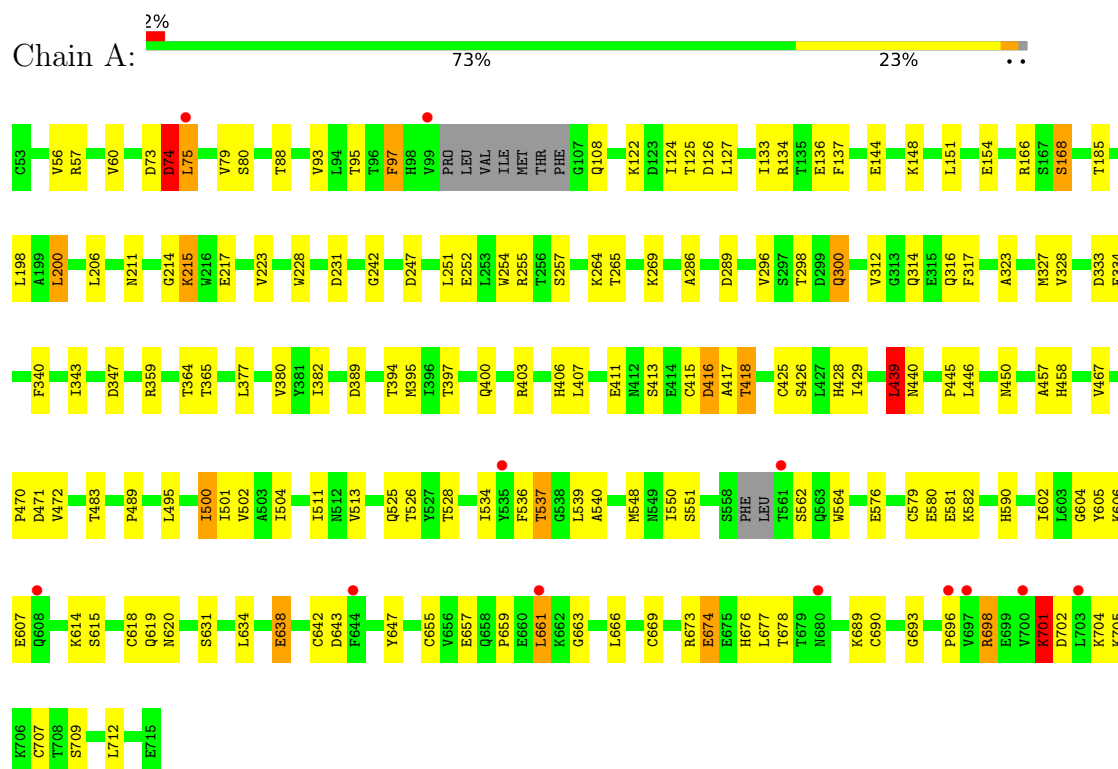
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	26	Total	O	0	0
			26	26		

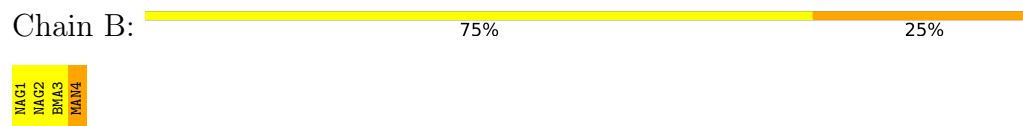
3 Residue-property plots

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.

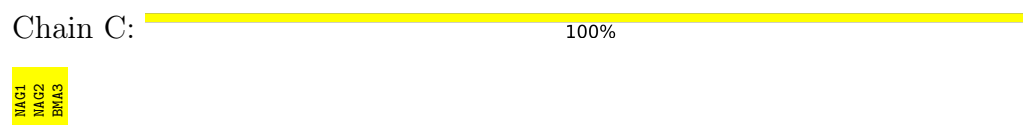
• Molecule 1: Sortilin



• Molecule 2: 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



• Molecule 3: beta-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	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	162.35Å 78.49Å 111.22Å 90.00° 127.23° 90.00°	Depositor
Resolution (Å)	64.63 – 2.90 64.63 – 2.90	Depositor EDS
% Data completeness (in resolution range)	97.2 (64.63-2.90) 97.5 (64.63-2.90)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.35 (at 2.91Å)	Xtriage
Refinement program	BUSTER 2.11.5	Depositor
R, R_{free}	0.193 , 0.252 0.206 , 0.267	Depositor DCC
R_{free} test set	1210 reflections (5.00%)	wwPDB-VP
Wilson B-factor (Å ²)	79.2	Xtriage
Anisotropy	0.501	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 67.5	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	5303	wwPDB-VP
Average B, all atoms (Å ²)	89.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.01% 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: NAG, BMA, UNL, MAN, GOL, UP4

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	0.90	4/5262 (0.1%)	1.38	43/7125 (0.6%)

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	74	ASP	CA-C	5.87	1.60	1.52
1	A	537	THR	CA-C	5.60	1.58	1.52
1	A	400	GLN	CA-C	5.53	1.60	1.53
1	A	364	THR	CA-C	5.49	1.59	1.52

All (43) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	614	LYS	CA-C-N	7.85	131.70	120.79
1	A	614	LYS	C-N-CA	7.85	131.70	120.79
1	A	74	ASP	CA-C-N	7.64	135.45	121.70
1	A	74	ASP	C-N-CA	7.64	135.45	121.70
1	A	416	ASP	CA-CB-CG	7.42	120.02	112.60
1	A	673	ARG	CA-C-N	6.75	134.44	121.54
1	A	673	ARG	C-N-CA	6.75	134.44	121.54
1	A	614	LYS	N-CA-C	-6.57	104.12	111.28
1	A	74	ASP	CA-CB-CG	6.51	119.11	112.60
1	A	343	ILE	N-CA-CB	6.49	117.79	110.72
1	A	643	ASP	CA-CB-CG	6.48	119.08	112.60
1	A	712	LEU	N-CA-C	-6.32	99.72	109.76
1	A	125	THR	CA-C-N	6.29	128.71	120.28
1	A	125	THR	C-N-CA	6.29	128.71	120.28
1	A	439	LEU	N-CA-C	-6.20	101.31	110.48
1	A	701	LYS	CA-C-N	6.17	130.62	120.94
1	A	701	LYS	C-N-CA	6.17	130.62	120.94

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	73	ASP	CA-CB-CG	6.13	118.73	112.60
1	A	327	MET	N-CA-C	5.70	115.76	108.24
1	A	97	PHE	CA-CB-CG	5.69	119.49	113.80
1	A	136	GLU	N-CA-C	-5.68	105.23	111.82
1	A	607	GLU	CB-CG-CD	5.63	122.17	112.60
1	A	389	ASP	CA-C-N	5.61	130.37	122.46
1	A	389	ASP	C-N-CA	5.61	130.37	122.46
1	A	73	ASP	CA-C-N	5.59	132.22	121.54
1	A	73	ASP	C-N-CA	5.59	132.22	121.54
1	A	501	ILE	N-CA-C	-5.37	100.66	108.17
1	A	693	GLY	CA-C-N	5.36	128.81	120.34
1	A	693	GLY	C-N-CA	5.36	128.81	120.34
1	A	702	ASP	CA-CB-CG	5.25	117.86	112.60
1	A	471	ASP	N-CA-C	-5.24	102.70	110.46
1	A	698	ARG	CA-C-N	5.22	129.14	120.94
1	A	698	ARG	C-N-CA	5.22	129.14	120.94
1	A	470	PRO	N-CA-C	5.19	119.64	111.38
1	A	673	ARG	N-CA-C	5.18	116.40	108.42
1	A	471	ASP	CA-CB-CG	5.18	117.78	112.60
1	A	347	ASP	CA-CB-CG	5.17	117.77	112.60
1	A	231	ASP	CA-CB-CG	5.16	117.76	112.60
1	A	678	THR	CB-CA-C	5.12	120.02	111.83
1	A	620	ASN	CA-CB-CG	5.07	117.67	112.60
1	A	265	THR	N-CA-C	-5.04	102.18	109.59
1	A	377	LEU	CA-C-N	5.04	128.47	121.02
1	A	377	LEU	C-N-CA	5.04	128.47	121.02

There are no chirality outliers.

There are no planarity outliers.

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	5143	0	4933	64	0
2	B	50	0	43	3	0
3	C	39	0	34	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	A	21	0	0	0	0
5	A	18	0	0	0	0
6	A	6	0	8	0	0
7	A	26	0	0	0	0
All	All	5303	0	5018	67	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (67) 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:74:ASP:HB2	1:A:75:LEU:HA	1.40	1.01
1:A:579:CYS:HG	1:A:618:CYS:HG	1.11	0.96
1:A:513:VAL:HG11	1:A:526:THR:HG23	1.56	0.88
1:A:642:CYS:HG	1:A:655:CYS:HG	1.00	0.87
1:A:416:ASP:OD1	1:A:418:THR:HG22	1.76	0.85
1:A:74:ASP:HB2	1:A:75:LEU:CA	2.08	0.84
1:A:75:LEU:HG	1:A:564:TRP:CD1	2.29	0.67
1:A:206:LEU:HB2	1:A:223:VAL:HG21	1.77	0.66
1:A:74:ASP:HB3	1:A:97:PHE:HZ	1.61	0.65
1:A:74:ASP:HB3	1:A:97:PHE:CZ	2.32	0.65
1:A:255:ARG:HH21	1:A:264:LYS:HD3	1.66	0.60
2:B:2:NAG:H4	2:B:3:BMA:O2	2.04	0.58
1:A:415:CYS:CB	1:A:425:CYS:HG	2.17	0.57
1:A:445:PRO:HB3	1:A:457:ALA:HB2	1.85	0.57
1:A:669:CYS:SG	1:A:707:CYS:HB3	2.45	0.57
1:A:394:THR:HG22	1:A:407:LEU:HD13	1.87	0.55
1:A:674:GLU:O	1:A:677:LEU:HG	2.06	0.55
1:A:698:ARG:HB2	1:A:701:LYS:NZ	2.22	0.55
1:A:211:ASN:HD21	1:A:215:LYS:HD2	1.72	0.55
1:A:513:VAL:HG11	1:A:526:THR:CG2	2.35	0.54
1:A:604:GLY:CA	1:A:690:CYS:HB3	2.38	0.53
1:A:317:PHE:H	1:A:333:ASP:HB3	1.73	0.53
1:A:606:LYS:HB2	1:A:631:SER:HB2	1.91	0.52
1:A:133:ILE:HG21	1:A:151:LEU:HD23	1.91	0.52
1:A:312:VAL:HB	1:A:316:GLN:HB2	1.91	0.52
1:A:185:THR:HG23	1:A:200:LEU:HB2	1.92	0.52
1:A:323:ALA:HB2	1:A:328:VAL:HG12	1.92	0.51
1:A:252:GLU:HB3	1:A:254:TRP:HE1	1.75	0.51
1:A:536:PHE:HZ	1:A:539:LEU:HG	1.75	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:198:LEU:HD23	1:A:228:TRP:CE2	2.46	0.50
1:A:604:GLY:HA2	1:A:690:CYS:HB3	1.94	0.49
1:A:540:ALA:HB3	1:A:551:SER:HB2	1.94	0.48
1:A:395:MET:HE1	1:A:406:HIS:CE1	2.48	0.48
1:A:440:ASN:ND2	1:A:489:PRO:HG3	2.28	0.48
1:A:458:HIS:CD2	1:A:472:VAL:HG22	2.49	0.48
1:A:75:LEU:HD21	1:A:564:TRP:HB2	1.96	0.47
1:A:340:PHE:CD1	1:A:359:ARG:HA	2.49	0.47
1:A:439:LEU:HD21	1:A:467:VAL:HA	1.96	0.47
1:A:166:ARG:NH2	1:A:214:GLY:HA2	2.31	0.46
1:A:148:LYS:HD3	1:A:168:SER:HB3	1.96	0.46
1:A:698:ARG:HB2	1:A:701:LYS:HZ3	1.81	0.45
1:A:74:ASP:CB	1:A:97:PHE:HZ	2.30	0.44
1:A:80:SER:O	1:A:93:VAL:HA	2.17	0.44
1:A:495:LEU:HB2	1:A:500:ILE:HB	1.99	0.44
1:A:605:TYR:CD1	1:A:689:LYS:HB2	2.52	0.44
1:A:705:LYS:O	1:A:709:SER:HB3	2.17	0.44
2:B:3:BMA:H62	2:B:4:MAN:H2	1.78	0.43
1:A:394:THR:HG22	1:A:407:LEU:CD1	2.47	0.43
1:A:394:THR:HB	1:A:428:HIS:HA	2.00	0.43
1:A:134:ARG:HE	1:A:137:PHE:HE2	1.66	0.43
1:A:323:ALA:CB	1:A:328:VAL:HG12	2.48	0.43
1:A:394:THR:O	1:A:395:MET:HE2	2.18	0.43
1:A:380:VAL:HA	1:A:397:THR:O	2.19	0.42
1:A:97:PHE:CD1	1:A:108:GLN:HG3	2.54	0.42
1:A:661:LEU:O	1:A:666:LEU:HB2	2.20	0.42
2:B:2:NAG:H61	2:B:3:BMA:O5	2.20	0.42
1:A:74:ASP:CB	1:A:97:PHE:CZ	3.03	0.41
1:A:394:THR:HG21	1:A:429:ILE:HG12	2.02	0.41
1:A:590:HIS:CG	1:A:602:ILE:HG13	2.55	0.41
1:A:677:LEU:HD11	1:A:704:LYS:HE2	2.03	0.41
1:A:286:ALA:HB3	1:A:289:ASP:HB3	2.02	0.41
1:A:504:ILE:HG21	1:A:536:PHE:CD2	2.56	0.41
1:A:638:GLU:H	1:A:638:GLU:HG2	1.56	0.41
1:A:647:TYR:CE1	1:A:659:PRO:HD3	2.56	0.40
1:A:56:VAL:HB	1:A:525:GLN:HE22	1.86	0.40
1:A:548:MET:SD	1:A:619:GLN:HG3	2.62	0.40
1:A:124:ILE:HB	1:A:127:LEU:HD12	2.03	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	648/663 (98%)	588 (91%)	50 (8%)	10 (2%)	8 28

All (10) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	74	ASP
1	A	300	GLN
1	A	674	GLU
1	A	581	GLU
1	A	79	VAL
1	A	417	ALA
1	A	242	GLY
1	A	247	ASP
1	A	663	GLY
1	A	696	PRO

5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	570/579 (98%)	519 (91%)	51 (9%)	9 28

All (51) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	57	ARG

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Mol	Chain	Res	Type
1	A	60	VAL
1	A	74	ASP
1	A	75	LEU
1	A	88	THR
1	A	95	THR
1	A	122	LYS
1	A	126	ASP
1	A	144	GLU
1	A	154	GLU
1	A	168	SER
1	A	200	LEU
1	A	215	LYS
1	A	217	GLU
1	A	251	LEU
1	A	257	SER
1	A	269	LYS
1	A	296	VAL
1	A	298	THR
1	A	300	GLN
1	A	314	GLN
1	A	334	GLU
1	A	365	THR
1	A	382	ILE
1	A	403	ARG
1	A	411	GLU
1	A	413	SER
1	A	418	THR
1	A	426	SER
1	A	439	LEU
1	A	446	LEU
1	A	450	ASN
1	A	483	THR
1	A	500	ILE
1	A	502	VAL
1	A	511	ILE
1	A	528	THR
1	A	534	ILE
1	A	537	THR
1	A	550	ILE
1	A	562	SER
1	A	576	GLU
1	A	580	GLU

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Mol	Chain	Res	Type
1	A	582	LYS
1	A	615	SER
1	A	634	LEU
1	A	638	GLU
1	A	657	GLU
1	A	661	LEU
1	A	676	HIS
1	A	701	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	145	ASN
1	A	204	ASN
1	A	232	ASN
1	A	308	GLN
1	A	423	ASN
1	A	506	HIS
1	A	512	ASN
1	A	563	GLN
1	A	619	GLN
1	A	658	GLN
1	A	664	HIS

5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

5.5 Carbohydrates [i](#)

7 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	2,1	14,14,15	0.25	0	17,19,21	0.80	1 (5%)
2	NAG	B	2	2	14,14,15	0.50	0	17,19,21	0.84	0
2	BMA	B	3	2	11,11,12	0.50	0	15,15,17	0.69	0
2	MAN	B	4	2	11,11,12	0.46	0	15,15,17	1.69	1 (6%)
3	NAG	C	1	3,1	14,14,15	0.34	0	17,19,21	0.85	1 (5%)
3	NAG	C	2	3	14,14,15	0.34	0	17,19,21	1.00	1 (5%)
3	BMA	C	3	3	11,11,12	0.43	0	15,15,17	0.77	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
2	NAG	B	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	2/6/23/26	0/1/1/1
2	BMA	B	3	2	-	2/2/19/22	0/1/1/1
2	MAN	B	4	2	-	0/2/19/22	0/1/1/1
3	NAG	C	1	3,1	-	0/6/23/26	0/1/1/1
3	NAG	C	2	3	-	0/6/23/26	0/1/1/1
3	BMA	C	3	3	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	4	MAN	C1-O5-C5	5.64	119.74	112.19
3	C	2	NAG	O5-C1-C2	-3.39	106.05	111.29
2	B	1	NAG	C1-C2-N2	-2.49	106.52	110.43
3	C	3	BMA	C1-O5-C5	2.44	115.46	112.19
3	C	1	NAG	C1-O5-C5	2.41	115.41	112.19

There are no chirality outliers.

All (4) torsion outliers are listed below:

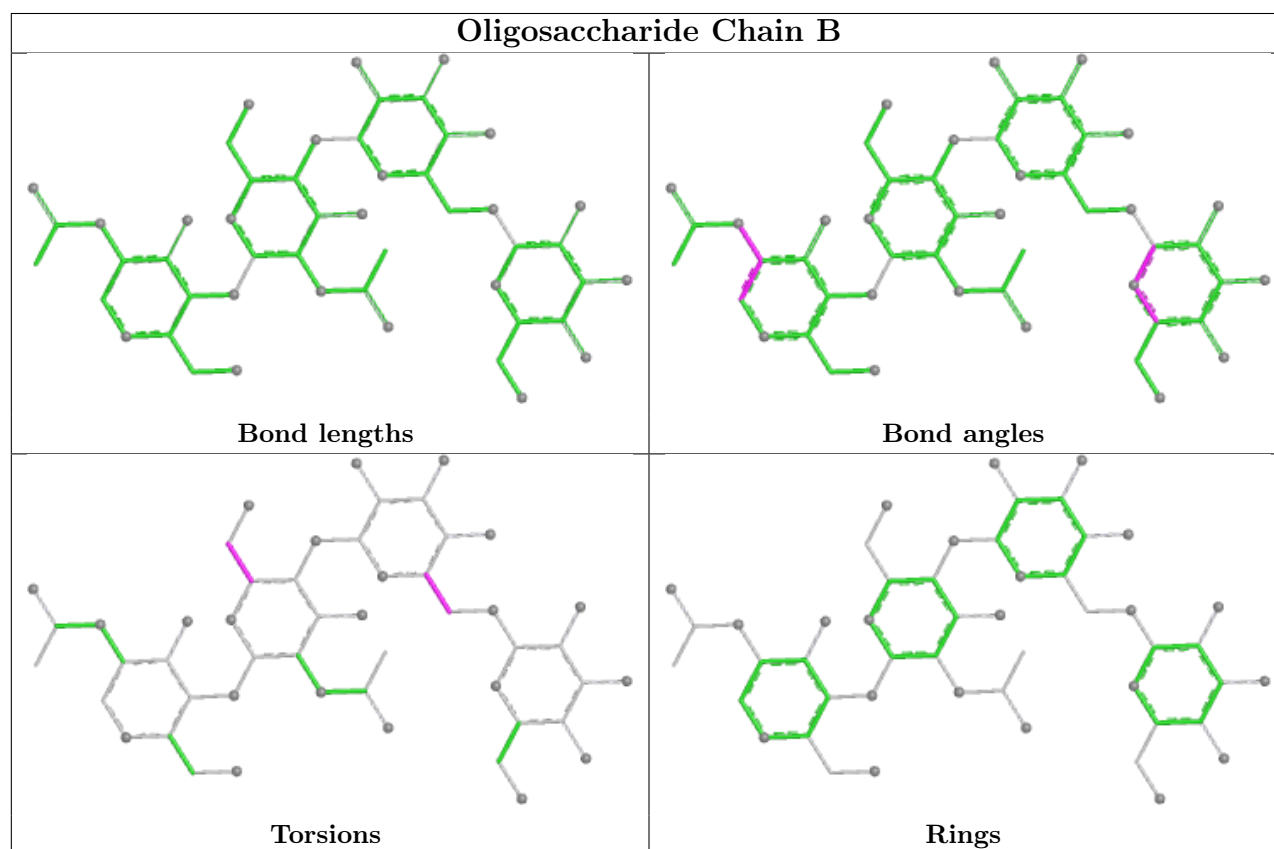
Mol	Chain	Res	Type	Atoms
2	B	3	BMA	C4-C5-C6-O6
2	B	3	BMA	O5-C5-C6-O6
2	B	2	NAG	C4-C5-C6-O6
2	B	2	NAG	O5-C5-C6-O6

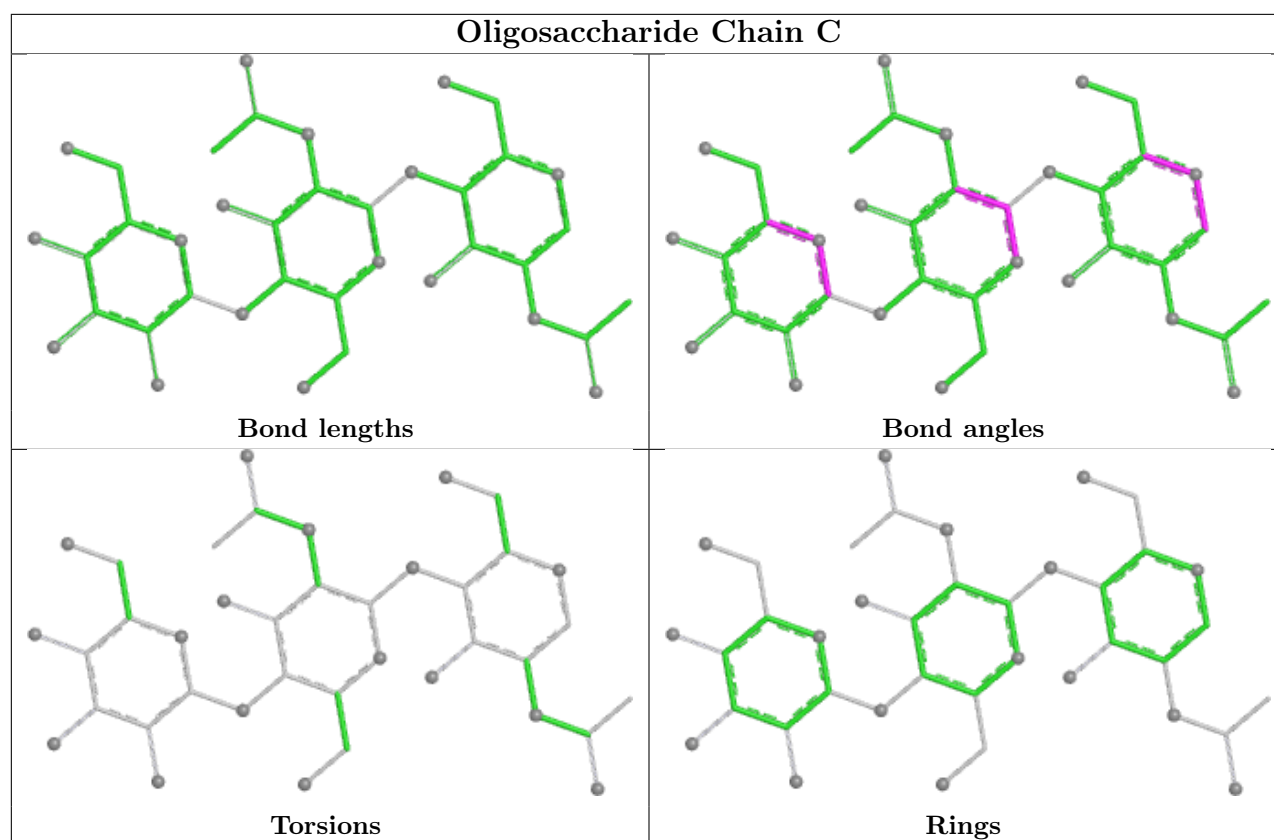
There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	2	NAG	2	0
2	B	3	BMA	3	0
2	B	4	MAN	1	0

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





5.6 Ligand geometry [i](#)

Of 3 ligands modelled in this entry, 1 is unknown - leaving 2 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	$\# Z > 2$
6	GOL	A	810	-	5,5,5	0.06	0	5,5,5	0.31	0
4	UP4	A	808	-	21,21,21	0.51	0	30,30,30	0.62	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
6	GOL	A	810	-	-	0/4/4/4	-
4	UP4	A	808	-	-	4/18/18/18	0/1/1/1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

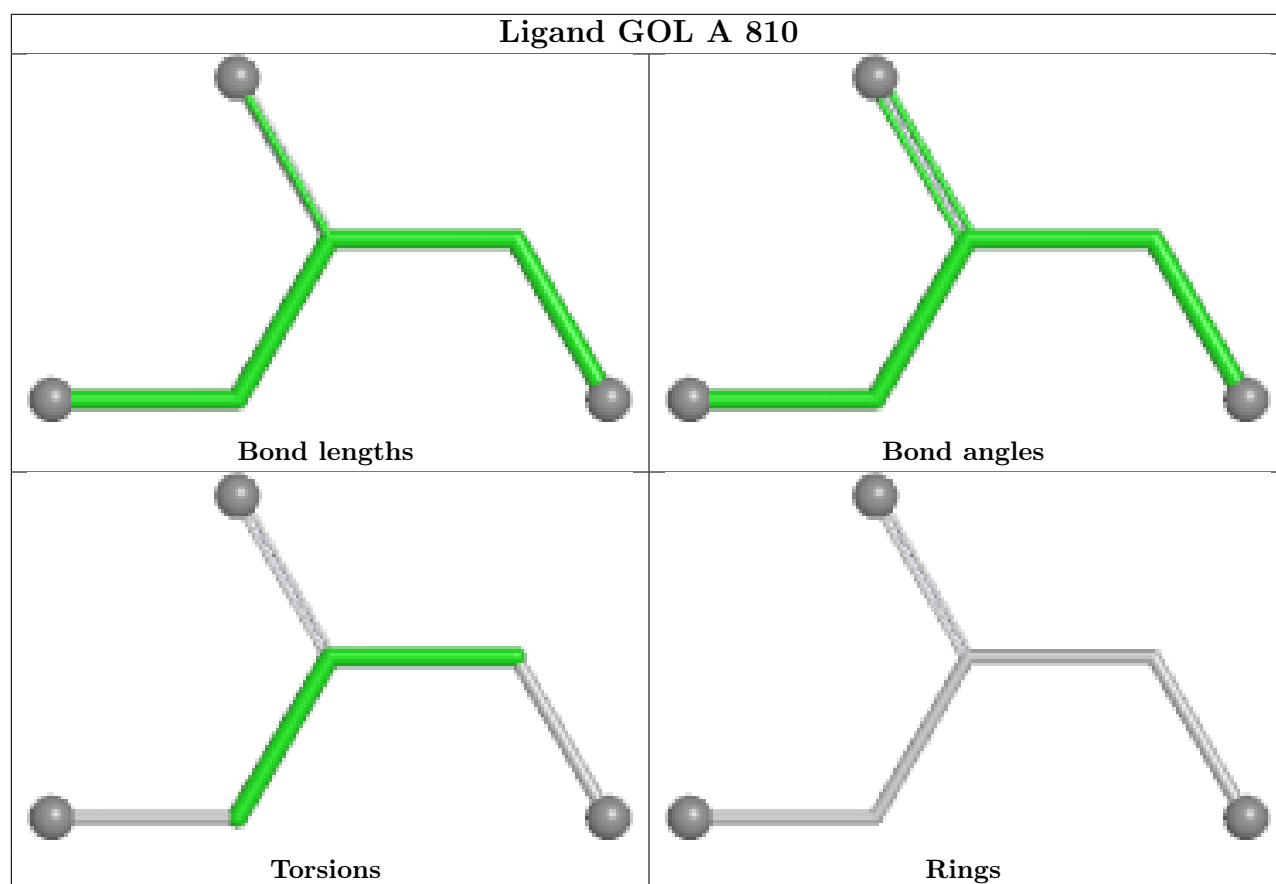
All (4) torsion outliers are listed below:

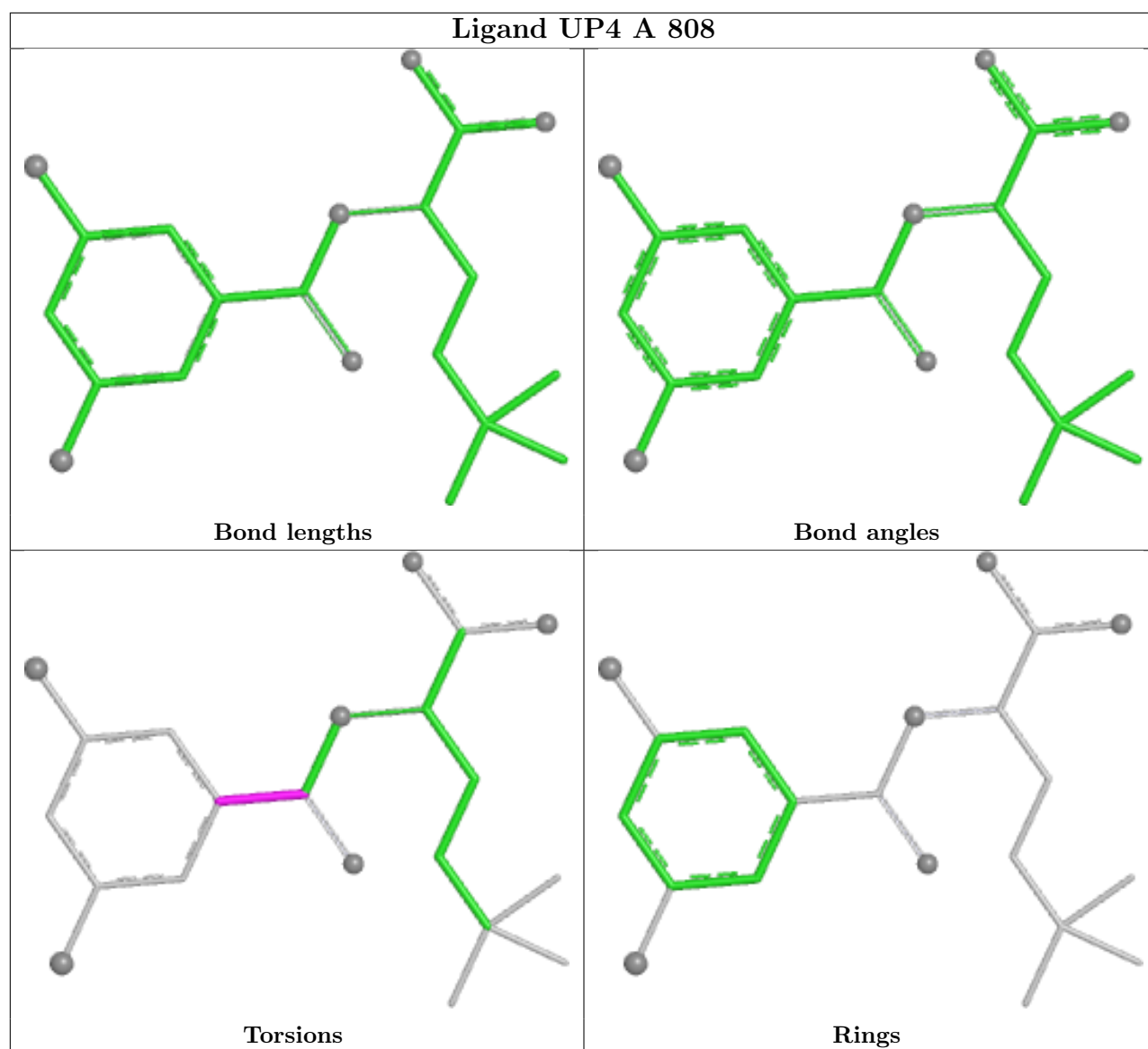
Mol	Chain	Res	Type	Atoms
4	A	808	UP4	C14-C-C1-N
4	A	808	UP4	C14-C-C1-O2
4	A	808	UP4	C10-C-C1-N
4	A	808	UP4	C10-C-C1-O2

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 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 [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	654/663 (98%)	0.09	12 (1%) 67 59	48, 89, 127, 152	0

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	99	VAL	5.0
1	A	75	LEU	3.5
1	A	696	PRO	3.4
1	A	697	VAL	3.0
1	A	561	THR	2.5
1	A	661	LEU	2.4
1	A	703	LEU	2.2
1	A	608	GLN	2.2
1	A	644	PHE	2.2
1	A	535	TYR	2.1
1	A	700	VAL	2.0
1	A	680	ASN	2.0

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

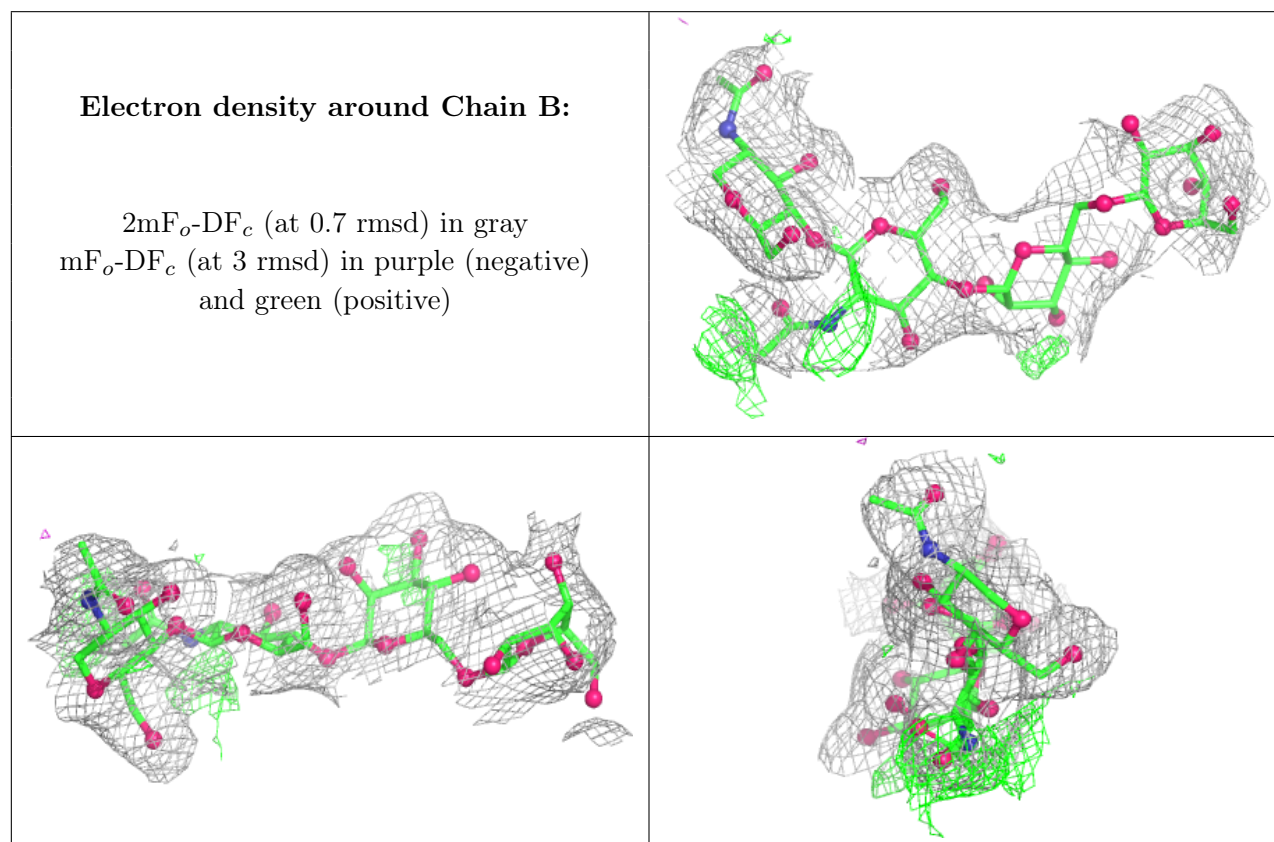
There are no non-standard protein/DNA/RNA residues in this entry.

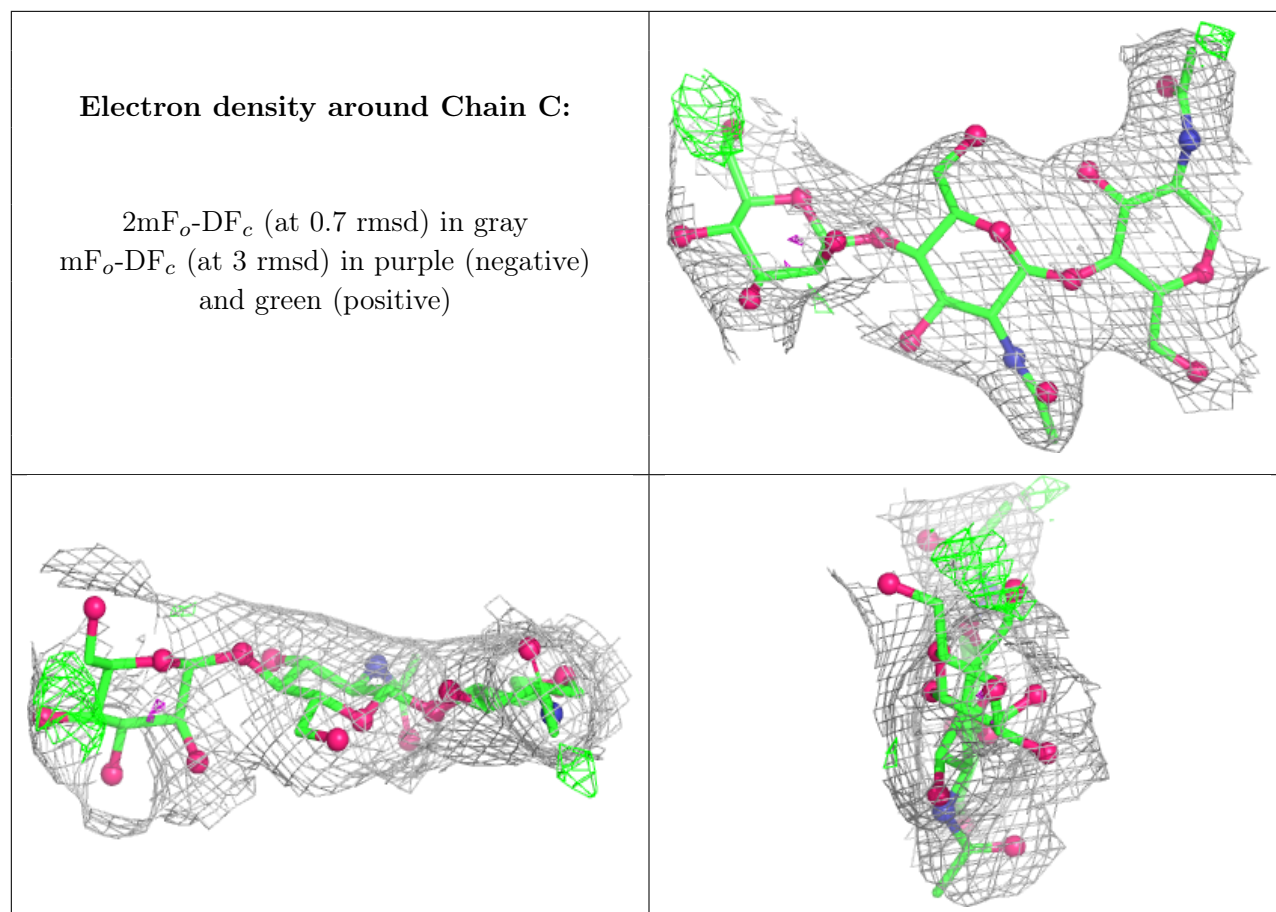
6.3 Carbohydrates [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	BMA	C	3	11/12	0.32	0.14	131,133,136,137	0
2	MAN	B	4	11/12	0.48	0.12	156,161,161,161	0
2	BMA	B	3	11/12	0.70	0.10	123,129,142,149	0
2	NAG	B	2	14/15	0.83	0.12	83,96,106,112	0
3	NAG	C	2	14/15	0.90	0.09	104,112,121,126	0
3	NAG	C	1	14/15	0.92	0.09	82,100,102,106	0
2	NAG	B	1	14/15	0.97	0.07	52,64,72,79	0

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





6.4 Ligands [i](#)

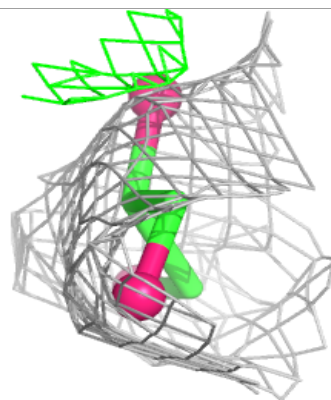
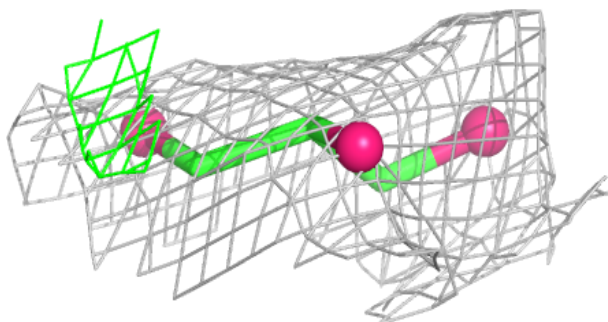
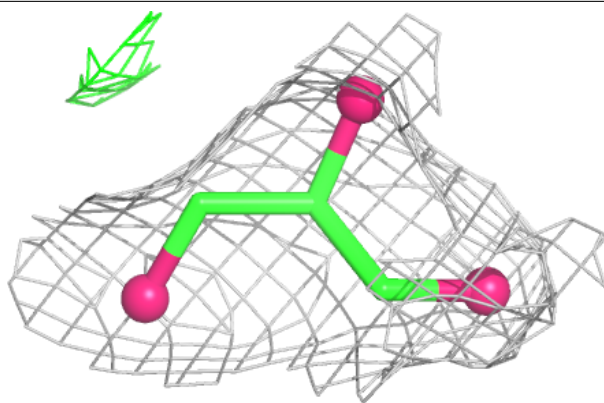
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
6	GOL	A	810	6/6	0.77	0.16	115,117,117,118	0
5	UNL	A	809	18/-	0.83	0.18	90,96,107,107	0
4	UP4	A	808	21/21	0.93	0.12	75,79,102,115	0

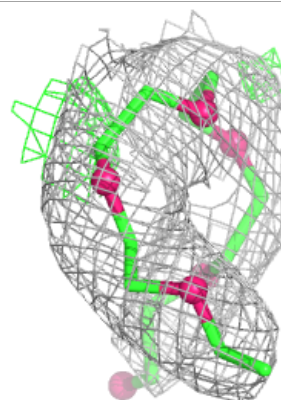
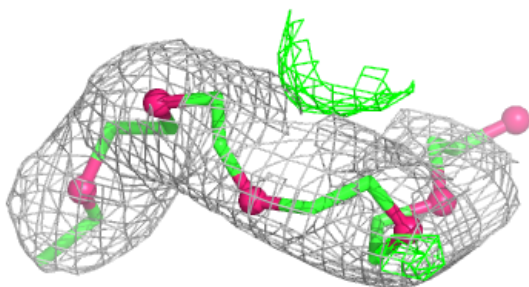
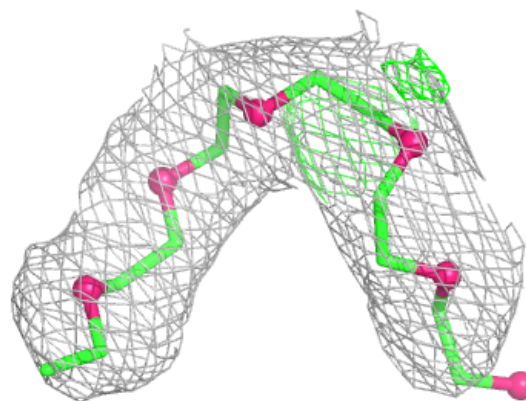
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around GOL A 810:

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

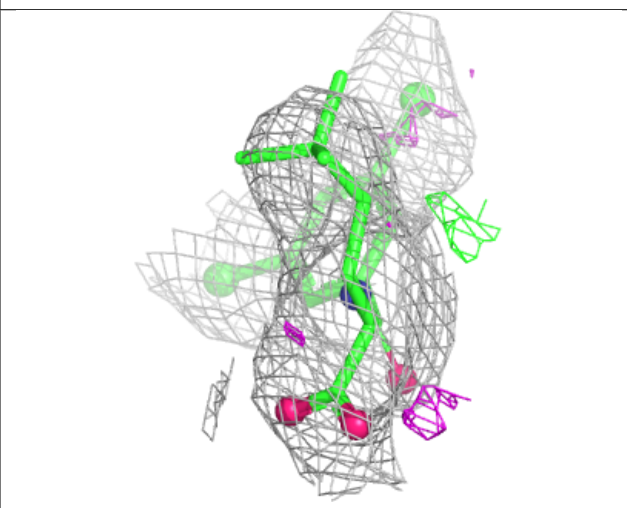
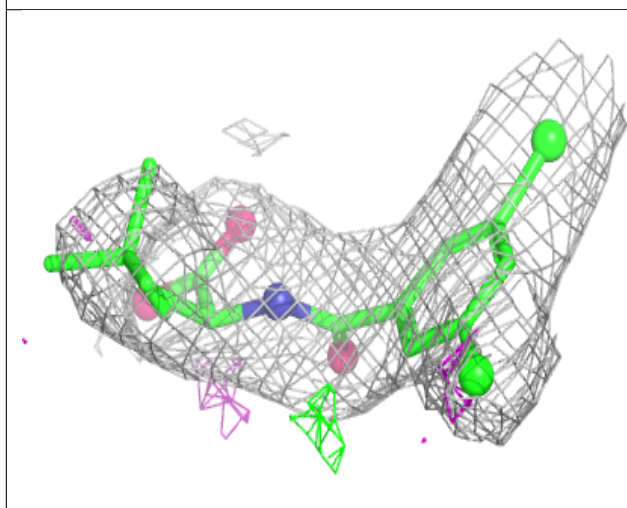
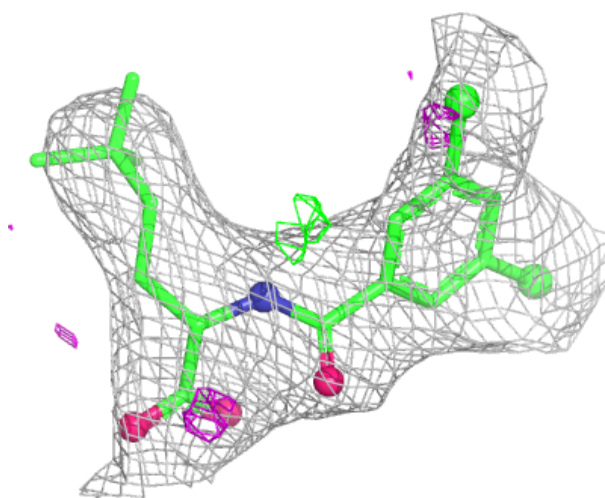
**Electron density around UNL A 809:**

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



Electron density around UP4 A 808:

$2mF_o-DF_c$ (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.