wwPDB X-ray Structure Validation Summary Report (i)

May 27, 2026 – 01:14 pm BST

PDB ID	:	9S88 / pdb_00009s88
Title	:	Amuc0121_S1_15 in complex with O6 sulfated Lewis A antigen (6'S-LeA)
Authors	:	Dey, D.; Cartmell, A.
Deposited on	:	2025-08-05
Resolution	:	1.92 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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:

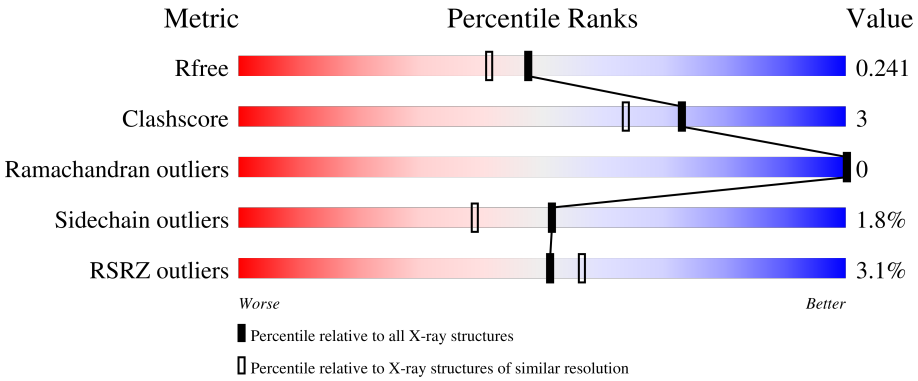
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 1.92 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	1188 (1.92-1.92)
Clashscore	190562	1209 (1.92-1.92)
Ramachandran outliers	187476	1195 (1.92-1.92)
Sidechain outliers	187428	1195 (1.92-1.92)
RSRZ outliers	180081	1188 (1.92-1.92)

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 <=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	496	% 93% 5% •
1	B	496	10% 92% 6% •
1	C	496	3% 91% 7% ••
1	D	496	% 93% 7%
1	E	496	% 92% 7% •

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Mol	Chain	Length	Quality of chain
2	I	3	100%
2	J	3	100%
2	K	3	67% 33%
2	L	3	33% 67%
2	M	3	33% 67%

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
4	BR	E	602	-	-	X	-

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 19672 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 Sulfatase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	488	Total	C	N	O	S	0	8	0
			3841	2428	684	712	17			
1	B	487	Total	C	N	O	S	0	0	0
			3758	2379	662	701	16			
1	C	488	Total	C	N	O	S	0	3	0
			3797	2400	672	709	16			
1	D	495	Total	C	N	O	S	0	4	0
			3863	2437	685	725	16			
1	E	489	Total	C	N	O	S	0	6	0
			3837	2424	685	712	16			

There are 20 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	78	SER	CYS	conflict	UNP B2ULS2
A	237	LYS	ARG	conflict	UNP B2ULS2
A	249	VAL	ILE	conflict	UNP B2ULS2
A	512	SER	PRO	conflict	UNP B2ULS2
B	78	SER	CYS	conflict	UNP B2ULS2
B	237	LYS	ARG	conflict	UNP B2ULS2
B	249	VAL	ILE	conflict	UNP B2ULS2
B	512	SER	PRO	conflict	UNP B2ULS2
C	78	SER	CYS	conflict	UNP B2ULS2
C	237	LYS	ARG	conflict	UNP B2ULS2
C	249	VAL	ILE	conflict	UNP B2ULS2
C	512	SER	PRO	conflict	UNP B2ULS2
D	78	SER	CYS	conflict	UNP B2ULS2
D	237	LYS	ARG	conflict	UNP B2ULS2
D	249	VAL	ILE	conflict	UNP B2ULS2
D	512	SER	PRO	conflict	UNP B2ULS2
E	78	SER	CYS	conflict	UNP B2ULS2
E	237	LYS	ARG	conflict	UNP B2ULS2
E	249	VAL	ILE	conflict	UNP B2ULS2

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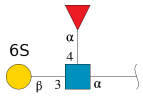
Chain	Residue	Modelled	Actual	Comment	Reference
E	512	SER	PRO	conflict	UNP B2ULS2

- Molecule 2 is an oligosaccharide called 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
2	I	3	Total C N O S 40 20 1 18 1	0	0	0
2	J	3	Total C N O S 40 20 1 18 1	0	0	0
2	K	3	Total C N O S 40 20 1 18 1	0	0	0
2	L	3	Total C N O S 40 20 1 18 1	0	0	0
2	M	3	Total C N O S 40 20 1 18 1	0	0	0

- Molecule 3 is IODIDE ION (CCD ID: IOD) (formula: I).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	1	Total I 1 1	0	0
3	E	1	Total I 1 1	0	0

- Molecule 4 is BROMIDE ION (CCD ID: BR) (formula: Br).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total Br 1 1	0	0
4	C	2	Total Br 2 2	0	0
4	D	1	Total Br 1 1	0	0
4	E	2	Total Br 2 2	0	0

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total Ca 1 1	0	0
5	B	1	Total Ca 1 1	0	0
5	C	1	Total Ca 1 1	0	0
5	D	1	Total Ca 1 1	0	0
5	E	1	Total Ca 1 1	0	0

- Molecule 6 is water.

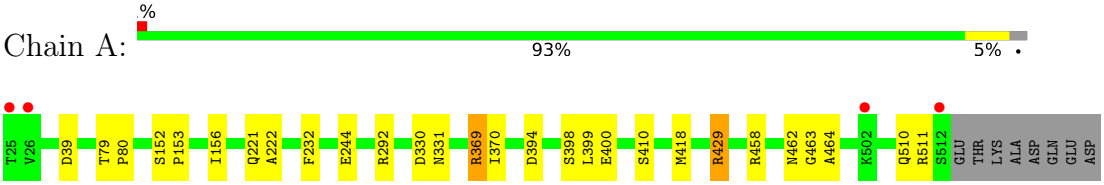
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	106	Total O 106 106	0	0
6	B	15	Total O 15 15	0	0
6	C	52	Total O 52 52	0	0
6	D	76	Total O 76 76	0	0
6	E	114	Total O 114 114	0	0

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.

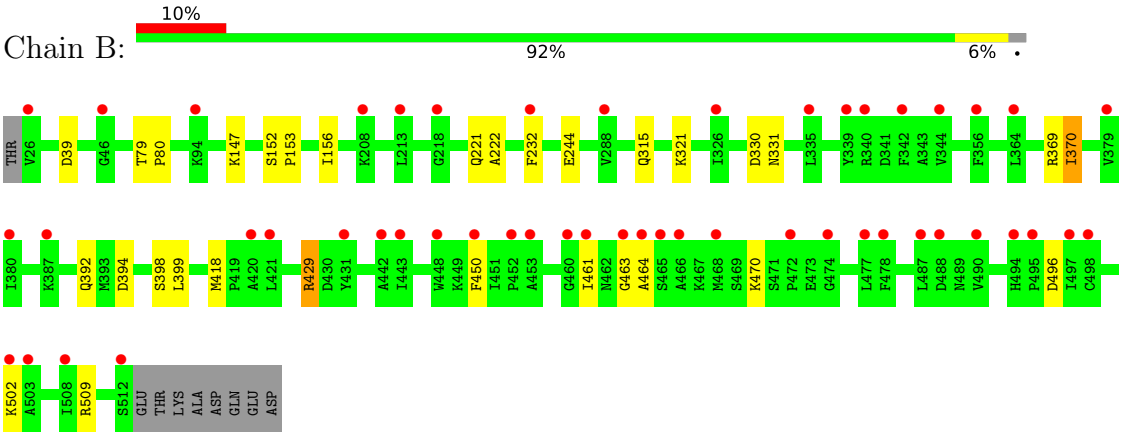
• Molecule 1: Sulfatase

Chain A:



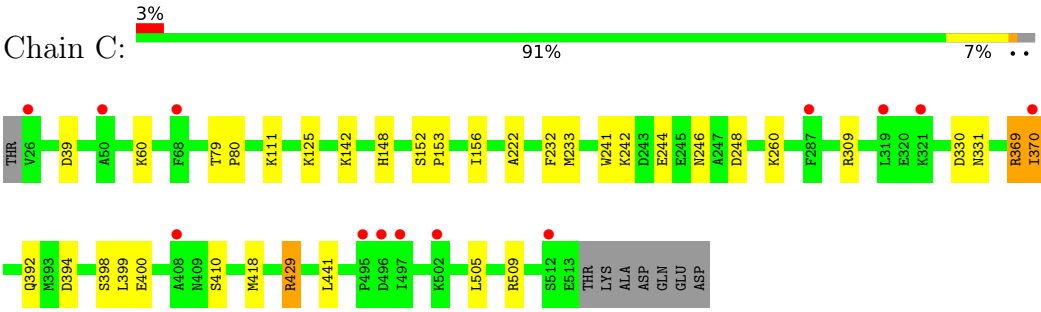
• Molecule 1: Sulfatase

Chain B:



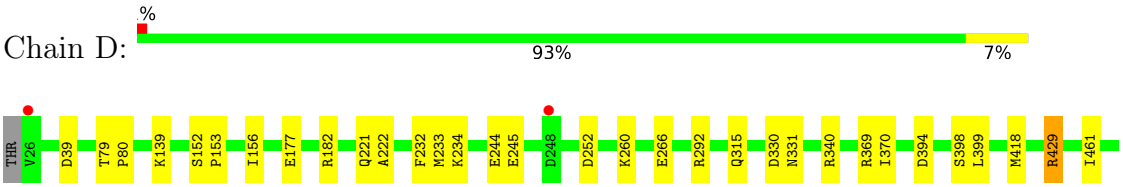
• Molecule 1: Sulfatase

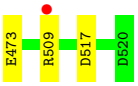
Chain C:



• Molecule 1: Sulfatase

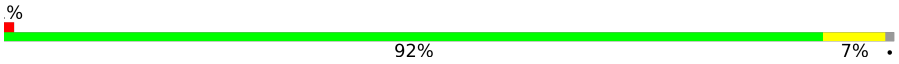
Chain D:

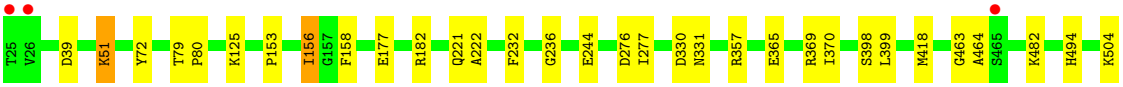


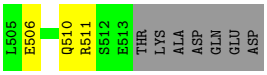


• Molecule 1: Sulfatase

Chain E:

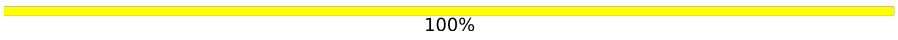






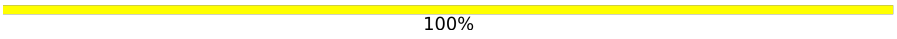
• Molecule 2: 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose

Chain I:



• Molecule 2: 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose

Chain J:



• Molecule 2: 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose

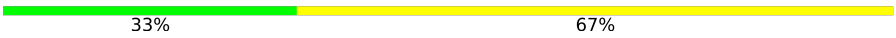
Chain K:

• Molecule 2: 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose

Chain L:

• Molecule 2: 6-O-sulfo-beta-D-galactopyranose-(1-3)-[alpha-L-fucopyranose-(1-4)]2-acetamido-2-deoxy-alpha-D-glucopyranose

Chain M:




NDG1
G6S2
FUC3

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	135.04Å 64.15Å 151.36Å 90.00° 104.88° 90.00°	Depositor
Resolution (Å)	57.86 – 1.92 57.86 – 1.92	Depositor EDS
% Data completeness (in resolution range)	99.4 (57.86-1.92) 99.8 (57.86-1.92)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.38 (at 1.91Å)	Xtriage
Refinement program	REFMAC 5.8.0430 (refmacat 0.4.105)	Depositor
R, R_{free}	0.208 , 0.236 0.215 , 0.241	Depositor DCC
R_{free} test set	9703 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å^2)	29.8	Xtriage
Anisotropy	0.489	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.35 , 29.1	EDS
L-test for twinning[2]	$< \|L\| > = 0.51$, $< L^2 > = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	19672	wwPDB-VP
Average B, all atoms (Å^2)	39.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 2.95% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ 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: BR, FUC, G6S, CA, IOD, NDG

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	0.61	0/3929	0.97	4/5303 (0.1%)
1	B	0.56	0/3846	0.98	9/5194 (0.2%)
1	C	0.60	0/3885	0.97	4/5245 (0.1%)
1	D	0.59	0/3951	0.98	7/5333 (0.1%)
1	E	0.62	0/3925	0.98	3/5297 (0.1%)
All	All	0.60	0/19536	0.98	27/26372 (0.1%)

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	4
1	B	0	3
1	C	0	2
1	D	0	4
1	E	0	2
All	All	0	15

There are no bond length outliers.

The worst 5 of 27 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	147	LYS	CB-CG-CD	7.18	127.80	111.30
1	D	473	GLU	CG-CD-OE2	-6.74	102.89	118.40
1	B	244	GLU	CB-CG-CD	6.63	123.87	112.60
1	B	244	GLU	CG-CD-OE1	6.47	133.29	118.40
1	D	473	GLU	CG-CD-OE1	6.31	132.92	118.40

There are no chirality outliers.

5 of 15 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	292	ARG	Sidechain
1	A	369	ARG	Sidechain
1	A	429[A]	ARG	Sidechain
1	A	511	ARG	Sidechain
1	B	369	ARG	Sidechain

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	3841	0	3843	20	0
1	B	3758	0	3751	23	0
1	C	3797	0	3784	28	0
1	D	3863	0	3843	19	2
1	E	3837	0	3834	32	1
2	I	40	0	29	0	0
2	J	40	0	29	0	0
2	K	40	0	29	1	0
2	L	40	0	29	1	0
2	M	40	0	29	0	0
3	A	1	0	0	0	0
3	E	1	0	0	1	0
4	A	1	0	0	0	0
4	C	2	0	0	0	0
4	D	1	0	0	0	0
4	E	2	0	0	3	1
5	A	1	0	0	0	0
5	B	1	0	0	0	0
5	C	1	0	0	0	0
5	D	1	0	0	0	0
5	E	1	0	0	0	0
6	A	106	0	0	1	0
6	B	15	0	0	0	0
6	C	52	0	0	1	0
6	D	76	0	0	1	0
6	E	114	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
All	All	19672	0	19200	122	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 3.

The worst 5 of 122 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:E:494:HIS:NE2	4:E:602:BR:BR	2.45	1.05
1:C:248:ASP:OD1	1:C:309[B]:ARG:NH2	1.92	1.01
1:E:494:HIS:CE1	4:E:602:BR:BR	2.72	0.97
1:D:398:SER:C	1:D:418:MET:HE2	1.97	0.88
1:B:398:SER:C	1:B:418:MET:HE2	1.99	0.87

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:245:GLU:OE2	1:E:482:LYS:NZ[1_545]	2.18	0.02
1:D:252:ASP:OD2	4:E:602:BR:BR[1_545]	2.19	0.01

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	494/496 (100%)	476 (96%)	18 (4%)	0	100	100
1	B	485/496 (98%)	467 (96%)	18 (4%)	0	100	100
1	C	489/496 (99%)	472 (96%)	17 (4%)	0	100	100
1	D	497/496 (100%)	480 (97%)	17 (3%)	0	100	100
1	E	493/496 (99%)	473 (96%)	20 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
All	All	2458/2480 (99%)	2368 (96%)	90 (4%)	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	408/407 (100%)	403 (99%)	5 (1%)	63 57
1	B	399/407 (98%)	393 (98%)	6 (2%)	57 47
1	C	403/407 (99%)	394 (98%)	9 (2%)	45 32
1	D	410/407 (101%)	399 (97%)	11 (3%)	39 24
1	E	407/407 (100%)	400 (98%)	7 (2%)	53 41
All	All	2027/2035 (100%)	1989 (98%)	38 (2%)	51 37

5 of 38 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	D	370	ILE
1	E	244	GLU
1	D	517[A]	ASP
1	E	125	LYS
1	E	370	ILE

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 12 such sidechains are listed below:

Mol	Chain	Res	Type
1	D	122	HIS
1	D	347	ASN
1	E	493	GLN
1	E	122	HIS
1	B	347	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 (i)

15 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	NDG	I	1	2	15,15,15	0.33	0	21,21,21	1.18	2 (9%)
2	G6S	I	2	5,2	15,15,16	0.66	0	20,22,24	1.38	3 (15%)
2	FUC	I	3	2	10,10,11	0.37	0	14,14,16	0.96	1 (7%)
2	NDG	J	1	2	15,15,15	0.53	0	21,21,21	1.37	3 (14%)
2	G6S	J	2	5,2	15,15,16	0.54	0	20,22,24	1.43	3 (15%)
2	FUC	J	3	2	10,10,11	0.44	0	14,14,16	2.00	2 (14%)
2	NDG	K	1	2	15,15,15	0.70	1 (6%)	21,21,21	2.95	9 (42%)
2	G6S	K	2	5,2	15,15,16	0.61	0	20,22,24	1.30	3 (15%)
2	FUC	K	3	2	10,10,11	0.41	0	14,14,16	1.60	3 (21%)
2	NDG	L	1	2	15,15,15	0.78	0	21,21,21	1.79	4 (19%)
2	G6S	L	2	5,2	15,15,16	0.63	0	20,22,24	1.26	2 (10%)
2	FUC	L	3	2	10,10,11	0.41	0	14,14,16	1.23	3 (21%)
2	NDG	M	1	2	15,15,15	0.42	0	21,21,21	1.51	3 (14%)
2	G6S	M	2	5,2	15,15,16	0.56	0	20,22,24	1.02	2 (10%)
2	FUC	M	3	2	10,10,11	0.41	0	14,14,16	0.84	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
2	NDG	I	1	2	-	1/6/26/26	0/1/1/1
2	G6S	I	2	5,2	-	0/6/23/26	0/1/1/1
2	FUC	I	3	2	-	-	0/1/1/1
2	NDG	J	1	2	-	1/6/26/26	0/1/1/1
2	G6S	J	2	5,2	-	0/6/23/26	0/1/1/1
2	FUC	J	3	2	-	-	0/1/1/1
2	NDG	K	1	2	-	1/6/26/26	0/1/1/1
2	G6S	K	2	5,2	-	0/6/23/26	0/1/1/1
2	FUC	K	3	2	-	-	0/1/1/1
2	NDG	L	1	2	-	2/6/26/26	0/1/1/1
2	G6S	L	2	5,2	-	0/6/23/26	0/1/1/1
2	FUC	L	3	2	-	-	0/1/1/1
2	NDG	M	1	2	-	2/6/26/26	0/1/1/1
2	G6S	M	2	5,2	-	0/6/23/26	0/1/1/1
2	FUC	M	3	2	-	-	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	1	NDG	C1-C2	2.15	1.55	1.52

The worst 5 of 43 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	K	1	NDG	O5-C1-C2	7.60	117.15	109.52
2	J	3	FUC	C1-C2-C3	6.25	117.35	109.67
2	K	1	NDG	C1-C2-N2	5.49	117.09	110.73
2	M	1	NDG	C3-C4-C5	4.76	118.74	110.24
2	K	1	NDG	C1-O5-C5	4.60	122.34	113.66

There are no chirality outliers.

5 of 7 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	M	1	NDG	O5-C5-C6-O6
2	L	1	NDG	O5-C5-C6-O6
2	I	1	NDG	O5-C5-C6-O6
2	J	1	NDG	O5-C5-C6-O6
2	K	1	NDG	O5-C5-C6-O6

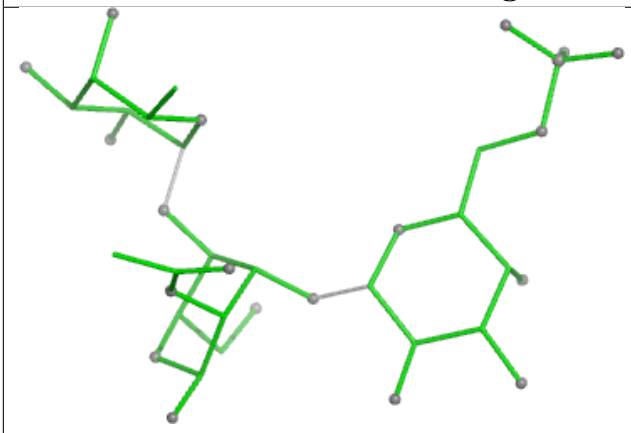
There are no ring outliers.

3 monomers are involved in 2 short contacts:

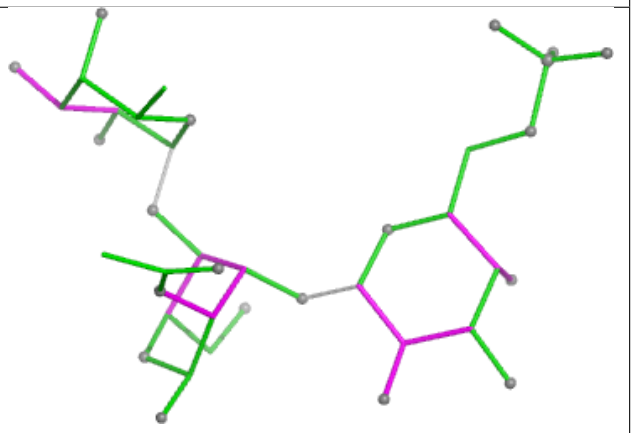
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	1	NDG	1	0
2	L	3	FUC	1	0
2	K	3	FUC	1	0

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

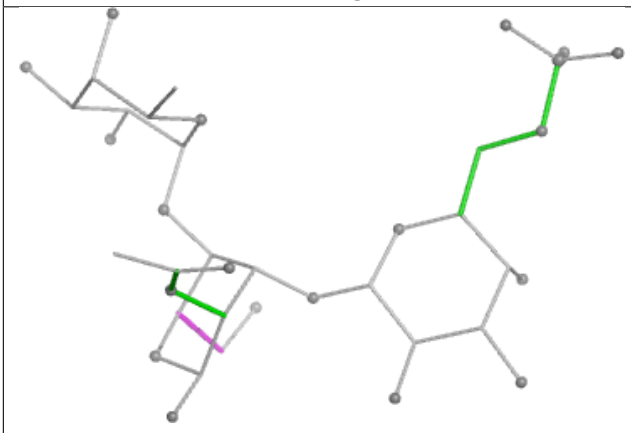
Oligosaccharide Chain I



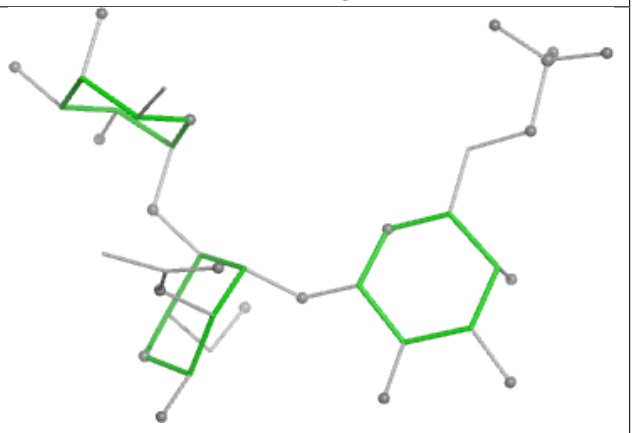
Bond lengths



Bond angles

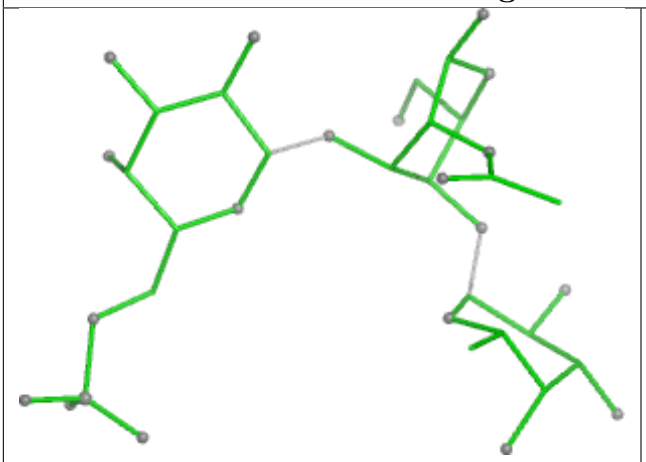


Torsions

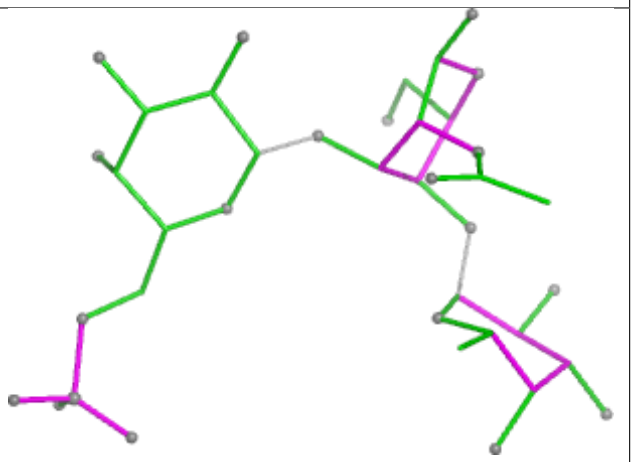


Rings

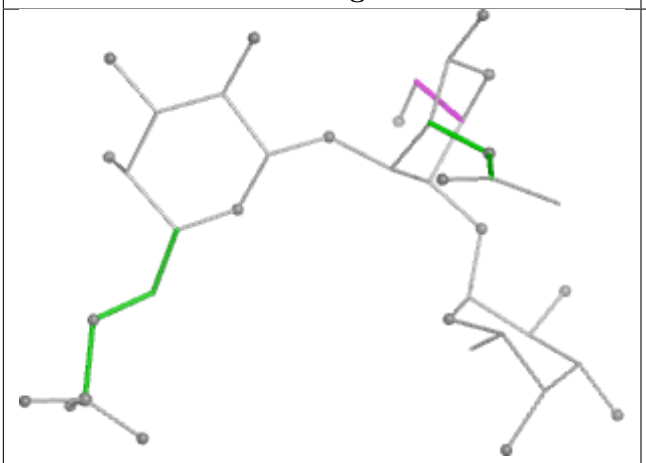
Oligosaccharide Chain J



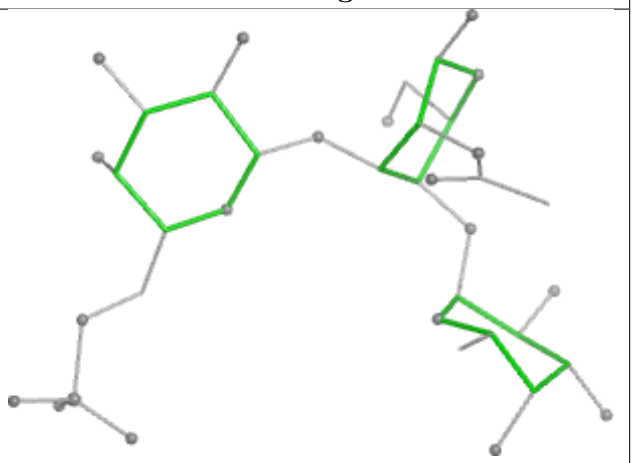
Bond lengths



Bond angles

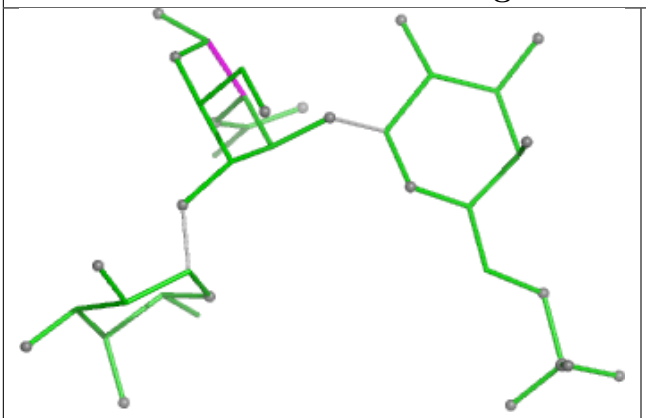


Torsions

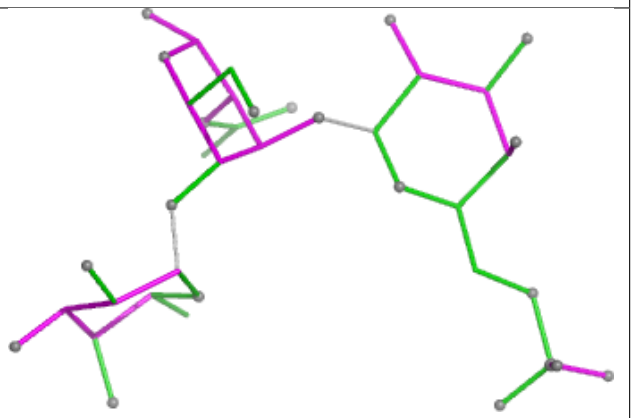


Rings

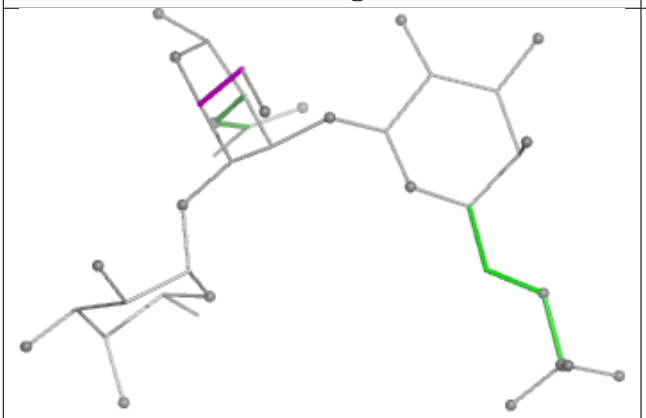
Oligosaccharide Chain K



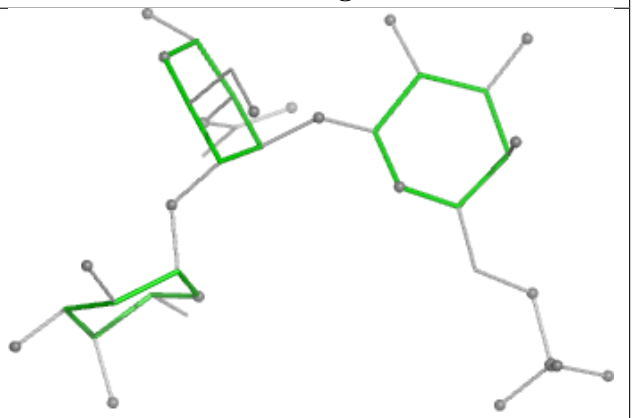
Bond lengths



Bond angles

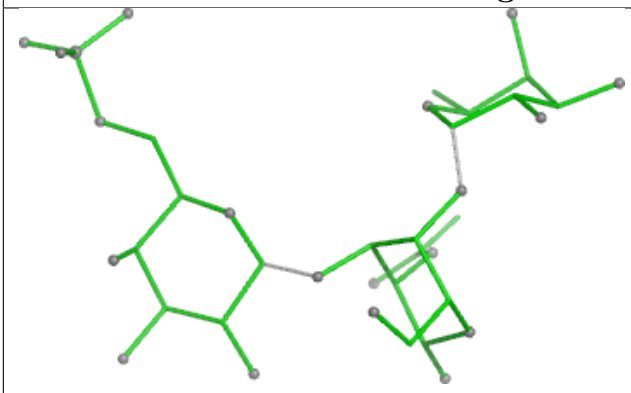


Torsions

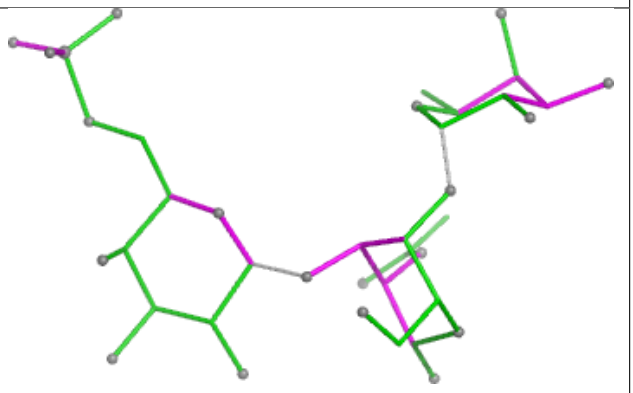


Rings

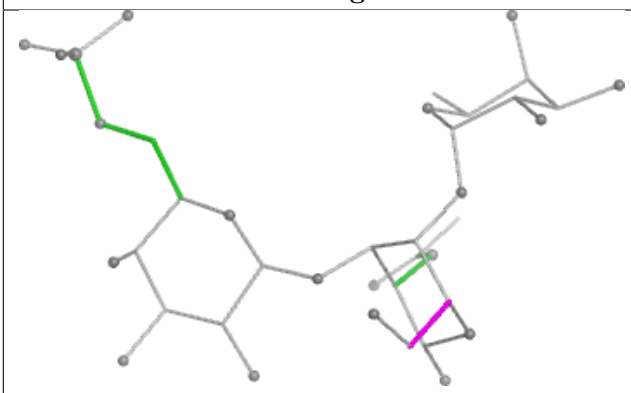
Oligosaccharide Chain L



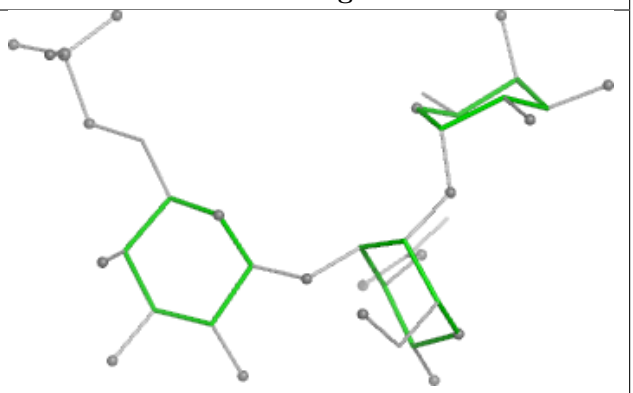
Bond lengths



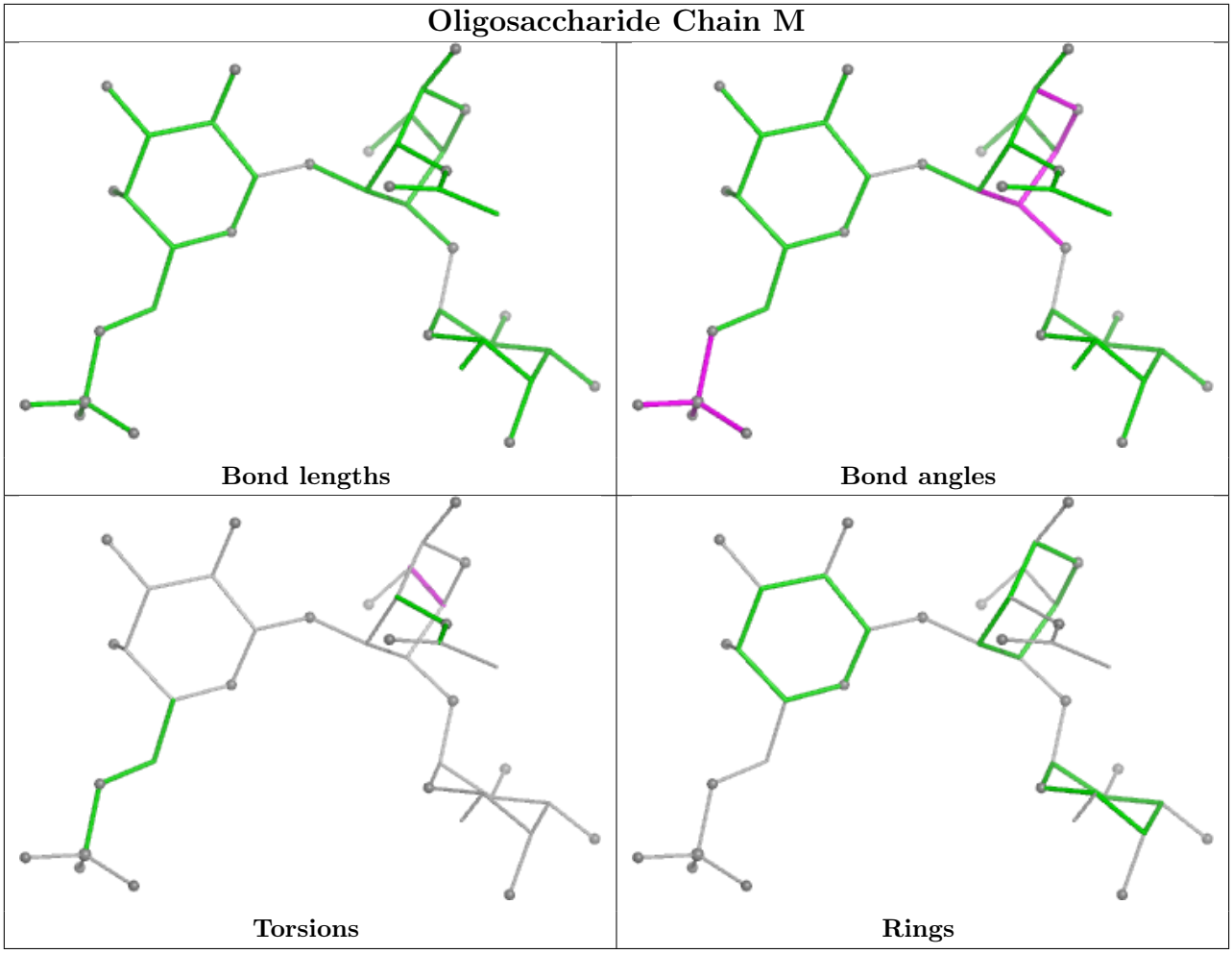
Bond angles



Torsions



Rings



5.6 Ligand geometry

Of 13 ligands modelled in this entry, 13 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

5.7 Other polymers

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, 95^{th} 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	488/496 (98%)	-0.00	4 (0%) 82 88	14, 32, 50, 76	8 (1%)
1	B	487/496 (98%)	0.91	50 (10%) 12 16	34, 48, 74, 92	0
1	C	488/496 (98%)	0.49	16 (3%) 49 54	18, 39, 62, 79	3 (0%)
1	D	495/496 (99%)	0.17	3 (0%) 85 89	16, 35, 52, 71	4 (0%)
1	E	489/496 (98%)	-0.04	3 (0%) 85 89	14, 30, 49, 72	6 (1%)
All	All	2447/2480 (98%)	0.30	76 (3%) 51 56	14, 36, 62, 92	21 (0%)

The worst 5 of 76 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	464	ALA	5.1
1	B	461	ILE	4.2
1	B	26	VAL	4.0
1	B	453	ALA	3.6
1	B	502	LYS	3.6

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, 95^{th} 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
2	FUC	I	3	10/11	0.79	0.15	29,31,33,34	0

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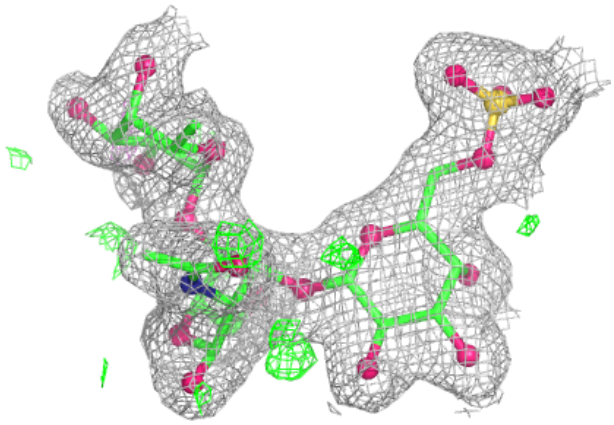
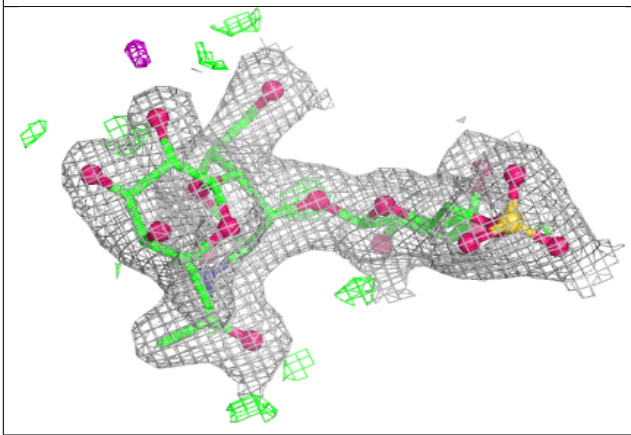
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	NDG	I	1	15/15	0.82	0.14	28,30,34,34	0
2	FUC	J	3	10/11	0.90	0.10	55,74,82,83	0
2	NDG	J	1	15/15	0.94	0.07	58,65,78,84	0
2	G6S	J	2	15/16	0.99	0.04	36,45,52,54	0
2	G6S	I	2	15/16	0.99	0.04	23,24,27,27	0
2	NDG	K	1	15/15	-	-	31,43,47,47	0
2	G6S	K	2	15/16	-	-	26,27,30,31	0
2	FUC	K	3	10/11	-	-	45,49,56,61	0
2	NDG	L	1	15/15	-	-	34,61,70,70	0
2	G6S	L	2	15/16	-	-	25,27,33,34	0
2	FUC	L	3	10/11	-	-	68,76,85,89	0
2	NDG	M	1	15/15	-	-	28,37,42,42	0
2	G6S	M	2	15/16	-	-	22,24,27,27	0
2	FUC	M	3	10/11	-	-	35,41,42,42	0

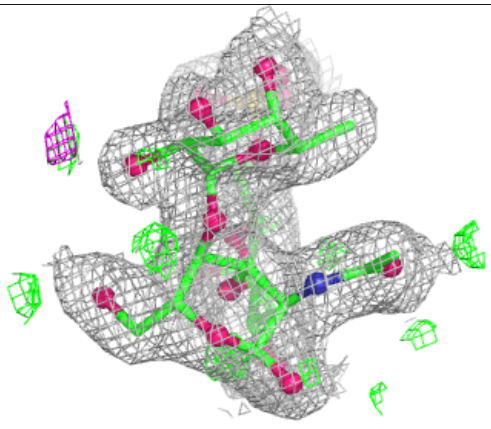
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain I:

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

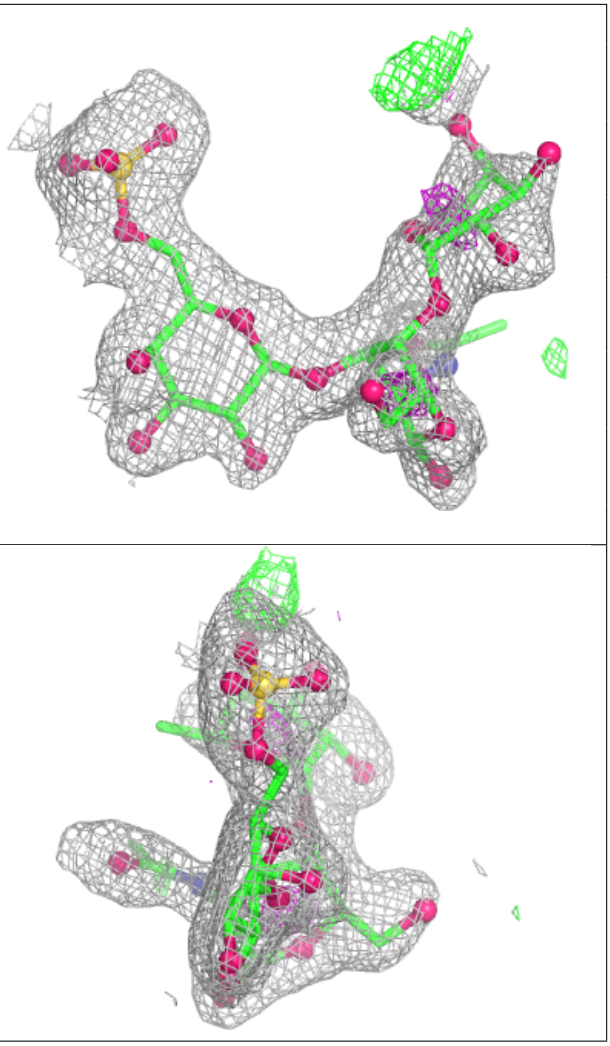






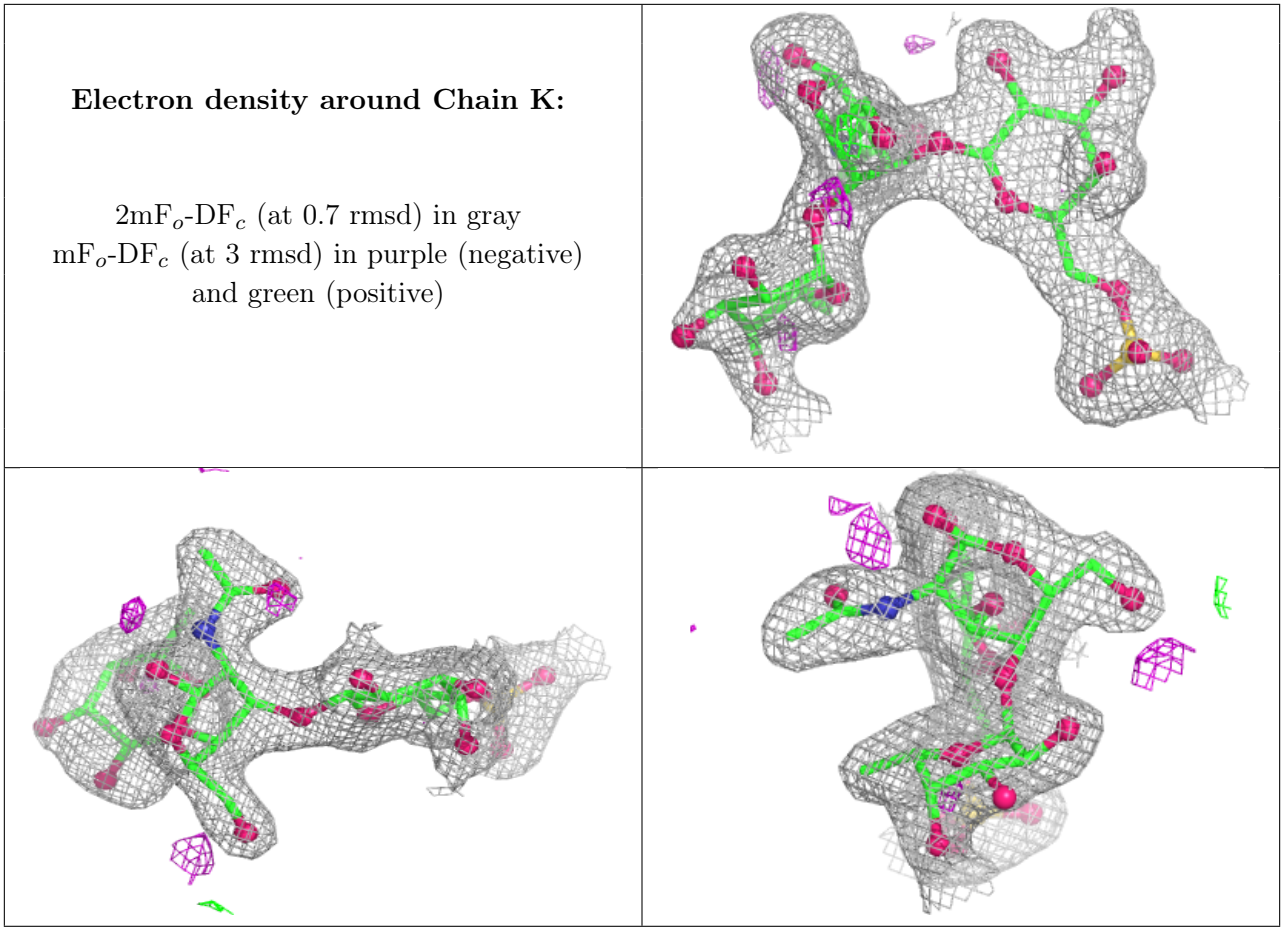
Electron density around Chain J:

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



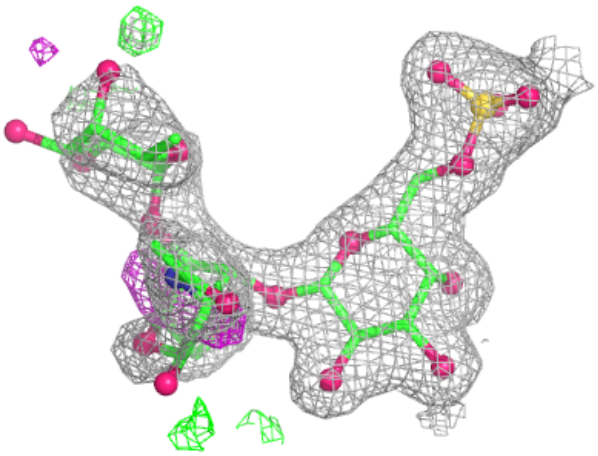
Electron density around Chain K:

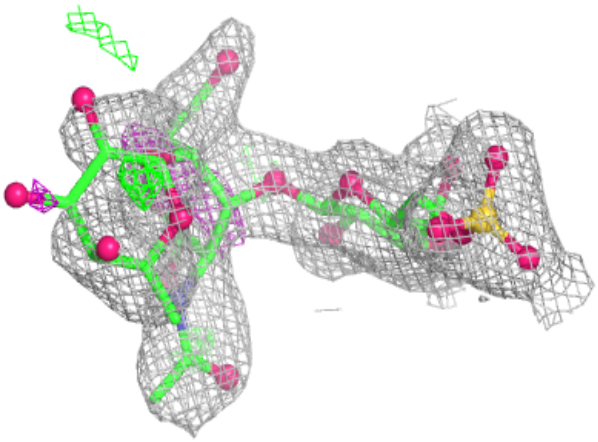
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

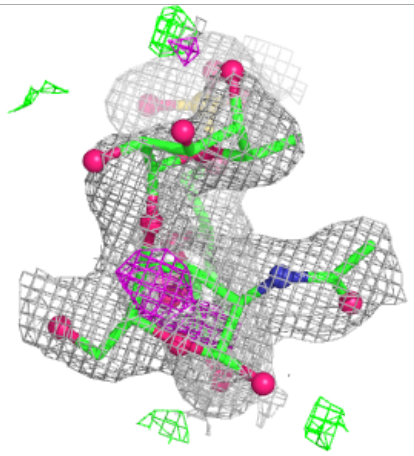


Electron density around Chain L:

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

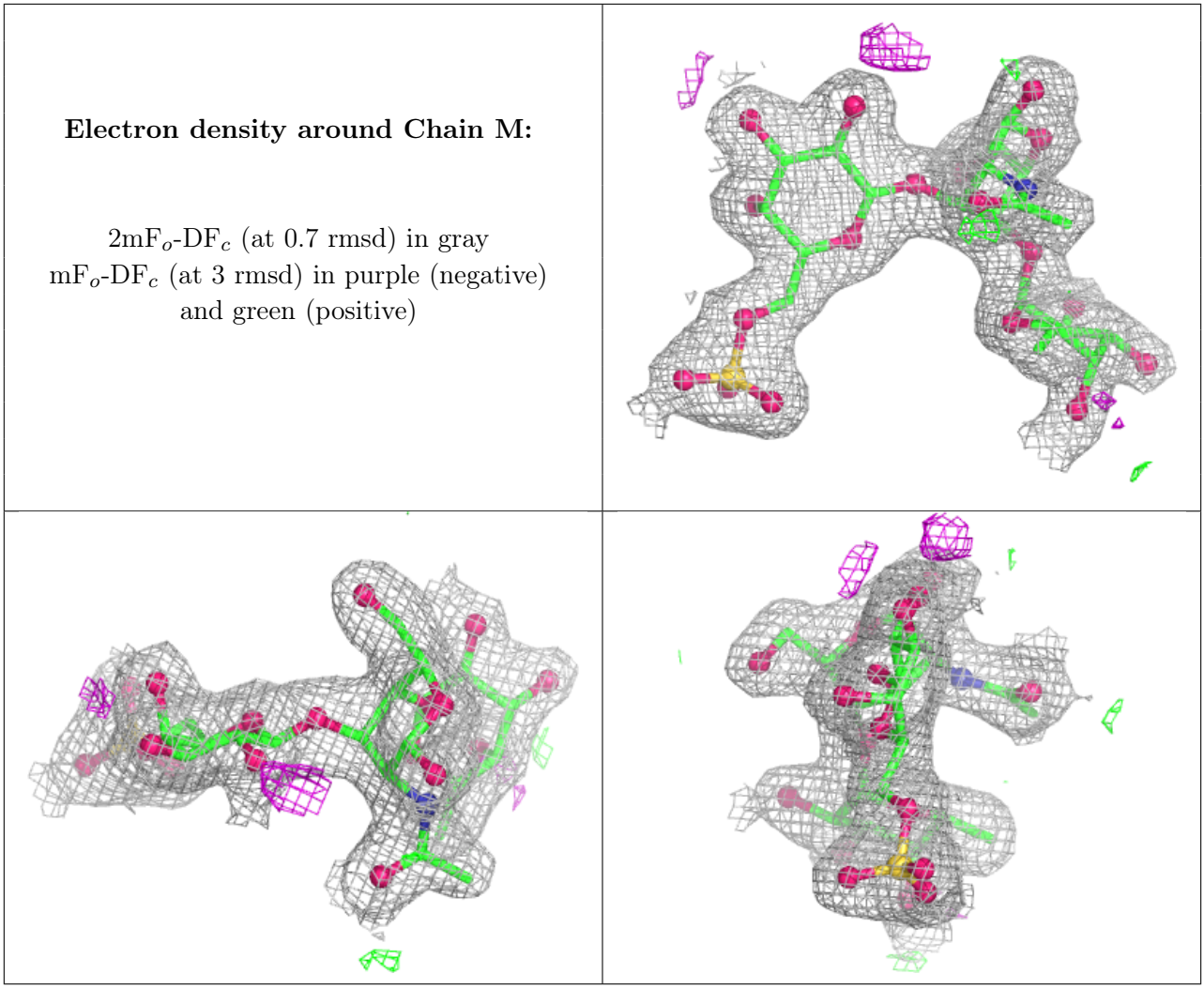






Electron density around Chain M:

$2mF_o$-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, 95^{th} 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
3	IOD	A	601	1/1	0.89	0.35	148,148,148,148	0
3	IOD	E	601	1/1	0.96	0.19	113,113,113,113	0
4	BR	C	603	1/1	0.96	0.17	63,63,63,63	0
4	BR	E	602	1/1	0.97	0.11	63,63,63,63	0
5	CA	B	601	1/1	0.98	0.12	44,44,44,44	1
5	CA	E	604	1/1	0.98	0.03	23,23,23,23	1
4	BR	E	603	1/1	0.99	0.07	51,51,51,51	0
5	CA	A	603	1/1	0.99	0.02	22,22,22,22	1
4	BR	D	601	1/1	0.99	0.03	46,46,46,46	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	CA	C	602	1/1	0.99	0.02	24,24,24,24	1
5	CA	D	602	1/1	0.99	0.03	22,22,22,22	1
4	BR	C	601	1/1	0.99	0.03	44,44,44,44	0
4	BR	A	602	1/1	1.00	0.03	45,45,45,45	0

6.5 Other polymers (i)

There are no such residues in this entry.