wwPDB X-ray Structure Validation Summary Report (i)

Feb 20, 2024 – 01:39 AM EST

PDB ID	:	4MBZ
Title	:	Structure of B-Lymphotropic Polyomavirus VP1 in complex with 3'-sialyllactosamine
Authors	:	Khan, Z.M.; Neu, U.; Stehle, T.
Deposited on	:	2013-08-21
Resolution	:	1.75 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 (i)) were used in the production of this report:

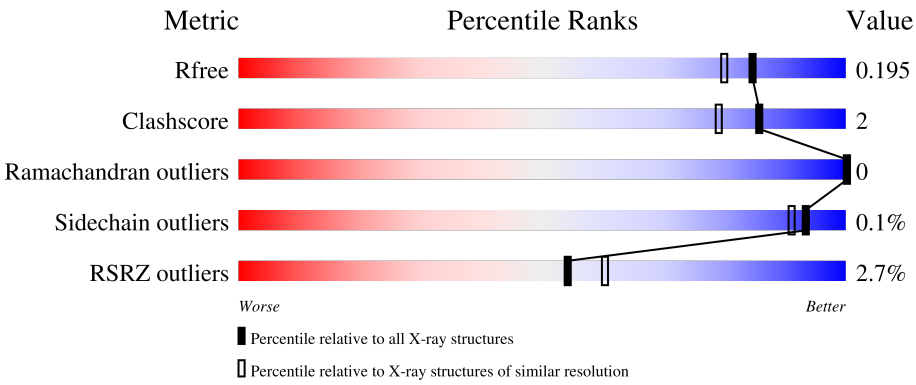
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 1.75 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}	130704	2340 (1.76-1.76)
Clashscore	141614	2466 (1.76-1.76)
Ramachandran outliers	138981	2437 (1.76-1.76)
Sidechain outliers	138945	2437 (1.76-1.76)
RSRZ outliers	127900	2298 (1.76-1.76)

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	278	% 95%
1	B	278	% 93% 5%
1	C	278	% 94% 5%
1	D	278	4% 95%
1	E	278	% 96%

Continued on next page...

Continued from previous page...

Mol	Chain	Length	Quality of chain
1	F	278	4% 96%
1	G	278	3% 95%
1	H	278	3% 96%
1	I	278	5% 95%
1	J	278	4% 96%
2	K	2	50% 50%
2	L	2	100%
2	M	2	50% 50%
2	N	2	50% 50%
2	O	2	100%
2	P	2	50% 50%
3	Q	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
6	EDO	B	406	-	-	X	-

2 Entry composition (i)

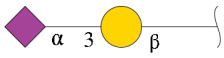
There are 8 unique types of molecules in this entry. The entry contains 24643 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 Major Capsid Protein VP1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	277	2168	1374	354	427	13	0	10	0
1	B	274	2125	1345	350	417	13	0	8	0
1	C	275	2156	1367	354	422	13	0	12	0
1	D	274	2137	1356	349	419	13	0	11	0
1	E	277	2144	1358	351	422	13	0	7	0
1	F	274	2119	1341	349	416	13	0	7	0
1	G	271	2097	1329	345	410	13	0	7	0
1	H	273	2127	1347	347	420	13	0	10	0
1	I	274	2138	1350	352	423	13	0	9	0
1	J	277	2142	1354	353	422	13	0	6	0

- Molecule 2 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galacto pyranose.



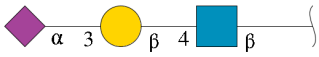
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	K	2	32	17	1	14	0	0	0
2	L	2	32	17	1	14	0	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	M	2	32	17	1	14	0	0	0
2	N	2	32	17	1	14	0	0	0
2	O	2	32	17	1	14	0	0	0
2	P	2	32	17	1	14	0	0	0

- Molecule 3 is an oligosaccharide called N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galacto pyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	Q	3	46	25	2	19	0	0	0

- Molecule 4 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
4	A	1	1	1	0	0
4	B	1	1	1	0	0
4	C	1	1	1	0	0
4	D	1	1	1	0	0
4	E	1	1	1	0	0
4	F	1	1	1	0	0
4	G	1	1	1	0	0
4	H	1	1	1	0	0
4	I	1	1	1	0	0

Continued on next page...

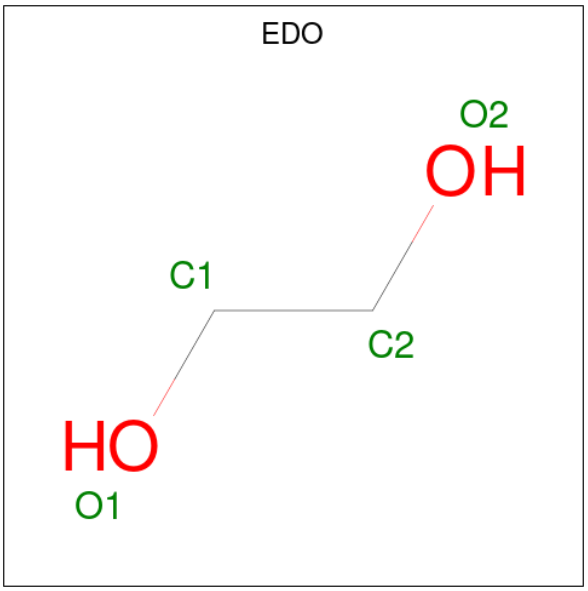
Continued from previous page...

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
4	J	1	1	1	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Cl		
5	A	1	1	1	0	0
5	B	1	1	1	0	0
5	C	1	1	1	0	0
5	D	1	1	1	0	0
5	E	1	1	1	0	0
5	F	1	1	1	0	0
5	G	1	1	1	0	0
5	H	1	1	1	0	0
5	I	1	1	1	0	0
5	J	1	1	1	0	0

- Molecule 6 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



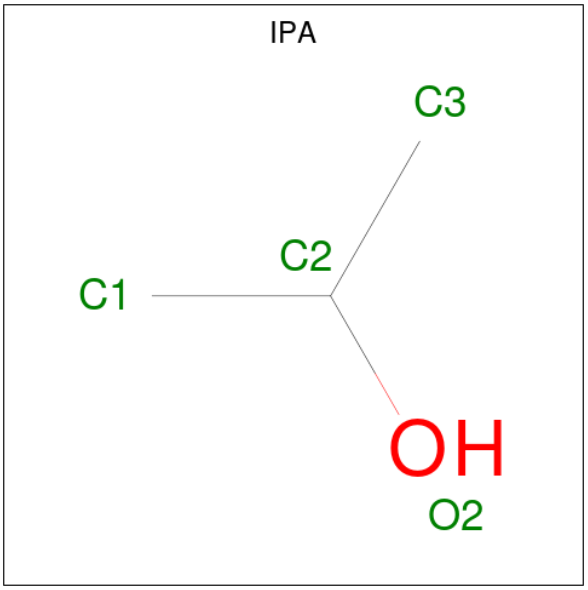
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	4	2	2	0	0
6	A	1	4	2	2	0	0
6	B	1	4	2	2	0	0
6	B	1	4	2	2	0	0
6	B	1	4	2	2	0	0
6	B	1	4	2	2	0	0
6	B	1	4	2	2	0	0
6	C	1	4	2	2	0	0
6	C	1	4	2	2	0	0
6	D	1	4	2	2	0	0
6	D	1	4	2	2	0	0
6	E	1	4	2	2	0	0
6	E	1	4	2	2	0	0
6	E	1	4	2	2	0	0

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	F	1	4	2	2	0	0
6	G	1	4	2	2	0	0
6	G	1	4	2	2	0	0
6	H	1	4	2	2	0	0
6	I	1	4	2	2	0	0
6	I	1	4	2	2	0	0
6	J	1	4	2	2	0	0
6	J	1	4	2	2	0	0
6	J	1	4	2	2	0	0

- Molecule 7 is ISOPROPYL ALCOHOL (three-letter code: IPA) (formula: C_3H_8O).



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

Continued on next page...

Continued from previous page...

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
7	C	1	4	3	1	0	0
7	D	1	4	3	1	0	0
7	E	1	4	3	1	0	0
7	F	1	4	3	1	0	0
7	G	1	4	3	1	0	0
7	H	1	4	3	1	0	0
7	I	1	4	3	1	0	0
7	J	1	4	3	1	0	0

- Molecule 8 is water.

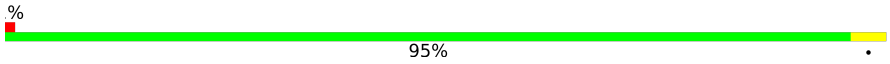
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	A	359	359	359	0	0
8	B	328	328	328	0	0
8	C	330	330	330	0	0
8	D	283	283	283	0	0
8	E	346	346	346	0	0
8	F	275	275	275	0	0
8	G	230	230	230	0	0
8	H	235	235	235	0	0
8	I	246	246	246	0	0
8	J	268	268	268	0	0

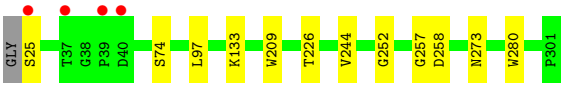
3 Residue-property plots (i)

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: Major Capsid Protein VP1

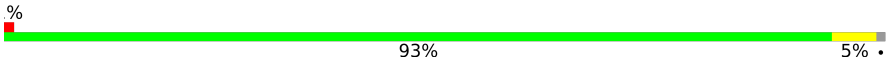
Chain A:





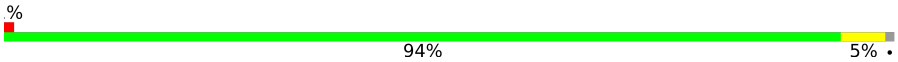
- Molecule 1: Major Capsid Protein VP1

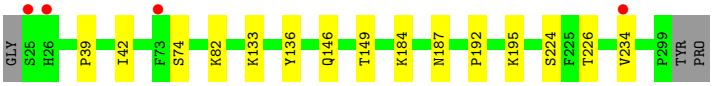
Chain B:



- Molecule 1: Major Capsid Protein VP1

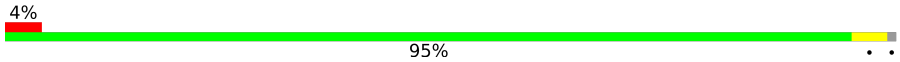
Chain C:

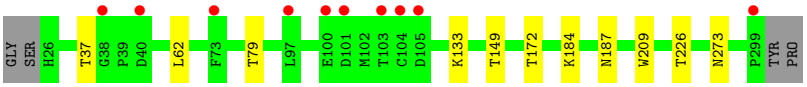




- Molecule 1: Major Capsid Protein VP1

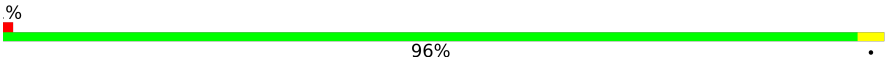
Chain D:

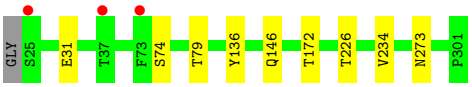




- Molecule 1: Major Capsid Protein VP1

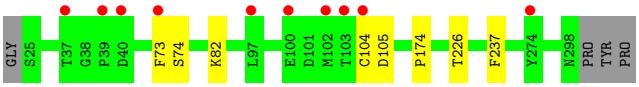
Chain E:





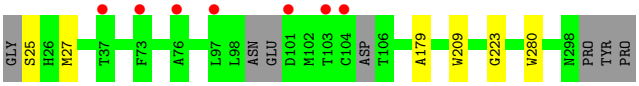
- Molecule 1: Major Capsid Protein VP1

Chain F: 4% 96%



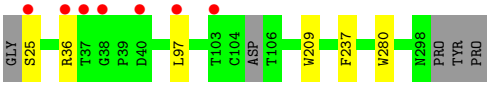
• Molecule 1: Major Capsid Protein VP1

Chain G: 3% 95%



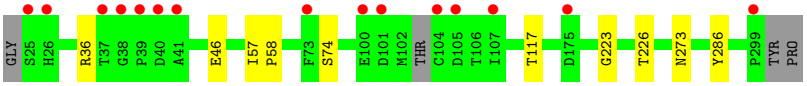
• Molecule 1: Major Capsid Protein VP1

Chain H: 3% 96%



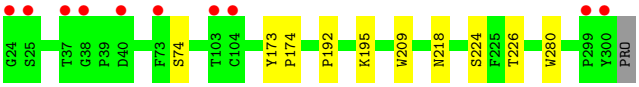
• Molecule 1: Major Capsid Protein VP1

Chain I: 5% 95%



• Molecule 1: Major Capsid Protein VP1

Chain J: 4% 96%



• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain K: 50% 50%

• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain L: 100%

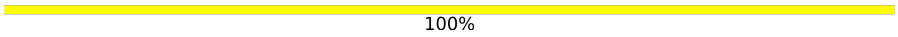
• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain M:

• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain N:

• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain O: 

• Molecule 2: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose

Chain P:

• Molecule 3: N-acetyl-alpha-neuraminic acid-(2-3)-beta-D-galactopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain Q:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	150.16Å 97.24Å 234.22Å 90.00° 96.21° 90.00°	Depositor
Resolution (Å)	48.75 – 1.75 48.75 – 1.75	Depositor EDS
% Data completeness (in resolution range)	99.0 (48.75-1.75) 99.1 (48.75-1.75)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.22 (at 1.75Å)	Xtriage
Refinement program	REFMAC 5.8.0025	Depositor
R, R_{free}	0.165 , 0.195 0.165 , 0.195	Depositor DCC
R_{free} test set	16696 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	18.4	Xtriage
Anisotropy	0.501	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 43.6	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	24643	wwPDB-VP
Average B, all atoms (Å^2)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.04% 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 (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: NAG, GAL, SIA, IPA, EDO, CL, CA

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	0.56	2/2242 (0.1%)	0.66	0/3056
1	B	0.55	2/2192 (0.1%)	0.65	0/2983
1	C	0.52	0/2233	0.63	0/3040
1	D	0.51	1/2217 (0.0%)	0.62	0/3022
1	E	0.54	0/2214	0.64	0/3018
1	F	0.49	0/2186	0.60	0/2976
1	G	0.50	2/2159 (0.1%)	0.61	0/2937
1	H	0.49	2/2203 (0.1%)	0.61	0/2998
1	I	0.48	0/2205	0.58	0/3002
1	J	0.50	2/2202 (0.1%)	0.58	0/3000
All	All	0.51	11/22053 (0.0%)	0.62	0/30032

The worst 5 of 11 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	J	209	TRP	CD2-CE2	5.31	1.47	1.41
1	H	209	TRP	CD2-CE2	5.29	1.47	1.41
1	A	209	TRP	CD2-CE2	5.18	1.47	1.41
1	J	280	TRP	CD2-CE2	5.15	1.47	1.41
1	B	110	TRP	CD2-CE2	5.14	1.47	1.41

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen

atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2168	0	2148	11	0
1	B	2125	0	2115	16	0
1	C	2156	0	2161	14	0
1	D	2137	0	2141	9	0
1	E	2144	0	2129	9	0
1	F	2119	0	2112	7	0
1	G	2097	0	2088	4	0
1	H	2127	0	2114	3	0
1	I	2138	0	2112	16	0
1	J	2142	0	2116	6	0
2	K	32	0	28	2	0
2	L	32	0	28	5	0
2	M	32	0	28	3	0
2	N	32	0	28	2	0
2	O	32	0	28	3	0
2	P	32	0	28	2	0
3	Q	46	0	40	2	0
4	A	1	0	0	0	0
4	B	1	0	0	0	0
4	C	1	0	0	0	0
4	D	1	0	0	0	0
4	E	1	0	0	0	0
4	F	1	0	0	0	0
4	G	1	0	0	0	0
4	H	1	0	0	0	0
4	I	1	0	0	0	0
4	J	1	0	0	0	0
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
5	F	1	0	0	0	0
5	G	1	0	0	0	0
5	H	1	0	0	0	0
5	I	1	0	0	0	0
5	J	1	0	0	0	0
6	A	8	0	12	2	0
6	B	20	0	30	6	0
6	C	8	0	12	0	0
6	D	8	0	12	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	E	12	0	18	1	0
6	F	4	0	6	0	0
6	G	8	0	12	1	0
6	H	4	0	6	1	0
6	I	8	0	12	2	0
6	J	12	0	18	1	0
7	A	4	0	8	2	0
7	B	4	0	8	1	0
7	C	4	0	8	1	0
7	D	4	0	8	1	0
7	E	4	0	8	0	0
7	F	4	0	8	0	0
7	G	4	0	8	1	0
7	H	4	0	8	1	0
7	I	4	0	8	1	0
7	J	4	0	8	1	0
8	A	359	0	0	6	0
8	B	328	0	0	3	0
8	C	330	0	0	4	0
8	D	283	0	0	1	0
8	E	346	0	0	4	0
8	F	275	0	0	1	0
8	G	230	0	0	1	0
8	H	235	0	0	0	0
8	I	246	0	0	1	0
8	J	268	0	0	1	0
All	All	24643	0	21662	95	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 2.

The worst 5 of 95 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:I:36[B]:ARG:HH11	1:I:36[B]:ARG:CG	1.71	1.02
1:I:36[B]:ARG:HH11	1:I:36[B]:ARG:HG3	1.25	0.99
1:I:36[B]:ARG:CB	1:I:36[B]:ARG:NH1	2.31	0.94
1:I:36[B]:ARG:NH1	1:I:36[B]:ARG:HB3	1.83	0.92
1:I:226[B]:THR:HG23	8:I:713:HOH:O	1.69	0.91

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	285/278 (102%)	280 (98%)	5 (2%)	0	100	100
1	B	278/278 (100%)	270 (97%)	8 (3%)	0	100	100
1	C	285/278 (102%)	278 (98%)	7 (2%)	0	100	100
1	D	283/278 (102%)	276 (98%)	7 (2%)	0	100	100
1	E	282/278 (101%)	276 (98%)	6 (2%)	0	100	100
1	F	279/278 (100%)	271 (97%)	8 (3%)	0	100	100
1	G	272/278 (98%)	263 (97%)	9 (3%)	0	100	100
1	H	279/278 (100%)	272 (98%)	7 (2%)	0	100	100
1	I	279/278 (100%)	273 (98%)	6 (2%)	0	100	100
1	J	281/278 (101%)	275 (98%)	6 (2%)	0	100	100
All	All	2803/2780 (101%)	2734 (98%)	69 (2%)	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	247/237 (104%)	246 (100%)	1 (0%)	91	87
1	B	242/237 (102%)	242 (100%)	0	100	100
1	C	247/237 (104%)	247 (100%)	0	100	100
1	D	245/237 (103%)	245 (100%)	0	100	100

Continued on next page...

Continued from previous page...

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	244/237 (103%)	244 (100%)	0	100	100
1	F	241/237 (102%)	241 (100%)	0	100	100
1	G	238/237 (100%)	238 (100%)	0	100	100
1	H	243/237 (102%)	241 (99%)	2 (1%)	81	72
1	I	243/237 (102%)	243 (100%)	0	100	100
1	J	242/237 (102%)	242 (100%)	0	100	100
All	All	2432/2370 (103%)	2429 (100%)	3 (0%)	93	91

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	25	SER
1	H	25	SER
1	H	97	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	182	ASN
1	F	44	GLN
1	J	182	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	GAL	K	1	2	12,12,12	0.53	0	17,17,17	0.74	0
2	SIA	K	2	2	20,20,21	0.71	0	24,28,31	1.10	2 (8%)
2	GAL	L	1	2	12,12,12	0.53	0	17,17,17	1.46	3 (17%)
2	SIA	L	2	2	20,20,21	0.67	0	24,28,31	1.48	4 (16%)
2	GAL	M	1	2	12,12,12	0.52	0	17,17,17	0.70	0
2	SIA	M	2	2	20,20,21	0.93	1 (5%)	24,28,31	1.18	2 (8%)
2	GAL	N	1	2	12,12,12	0.58	0	17,17,17	0.80	0
2	SIA	N	2	2	20,20,21	0.78	0	24,28,31	1.49	5 (20%)
2	GAL	O	1	2	12,12,12	0.56	0	17,17,17	0.60	0
2	SIA	O	2	2	20,20,21	0.55	0	24,28,31	1.09	2 (8%)
2	GAL	P	1	2	12,12,12	0.57	0	17,17,17	0.77	0
2	SIA	P	2	2	20,20,21	0.70	0	24,28,31	1.13	2 (8%)
3	NAG	Q	1	3	15,15,15	0.53	0	21,21,21	1.04	1 (4%)
3	GAL	Q	2	3	11,11,12	0.62	0	15,15,17	1.02	1 (6%)
3	SIA	Q	3	3	20,20,21	0.67	0	24,28,31	1.31	5 (20%)

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	GAL	K	1	2	-	1/2/22/22	0/1/1/1
2	SIA	K	2	2	-	1/18/34/38	0/1/1/1
2	GAL	L	1	2	-	2/2/22/22	0/1/1/1
2	SIA	L	2	2	-	6/18/34/38	0/1/1/1
2	GAL	M	1	2	-	1/2/22/22	0/1/1/1
2	SIA	M	2	2	-	6/18/34/38	0/1/1/1
2	GAL	N	1	2	-	1/2/22/22	0/1/1/1
2	SIA	N	2	2	-	0/18/34/38	0/1/1/1
2	GAL	O	1	2	-	1/2/22/22	0/1/1/1
2	SIA	O	2	2	-	2/18/34/38	0/1/1/1
2	GAL	P	1	2	-	1/2/22/22	0/1/1/1
2	SIA	P	2	2	-	0/18/34/38	0/1/1/1
3	NAG	Q	1	3	-	0/6/26/26	0/1/1/1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
3	GAL	Q	2	3	-	1/2/19/22	0/1/1/1
3	SIA	Q	3	3	-	0/18/34/38	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	M	2	SIA	C2-C1	2.25	1.54	1.52

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

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	L	1	GAL	C1-O5-C5	4.12	121.44	113.66
2	M	2	SIA	O6-C2-C1	3.58	114.72	107.70
2	N	2	SIA	O6-C2-C1	3.44	114.44	107.70
2	L	2	SIA	O6-C2-C1	3.41	114.38	107.70
2	K	2	SIA	C6-O6-C2	3.20	118.18	111.34

There are no chirality outliers.

5 of 23 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	L	2	SIA	C5-C6-C7-C8
2	L	2	SIA	C5-C6-C7-O7
2	L	2	SIA	O6-C6-C7-C8
2	L	2	SIA	O6-C6-C7-O7
2	M	2	SIA	O8-C8-C9-O9

There are no ring outliers.

12 monomers are involved in 19 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	1	GAL	2	0
2	N	1	GAL	1	0
2	K	2	SIA	2	0
2	P	1	GAL	1	0
2	N	2	SIA	1	0
3	Q	1	NAG	1	0
2	M	1	GAL	1	0
3	Q	2	GAL	1	0
2	M	2	SIA	2	0
2	P	2	SIA	1	0

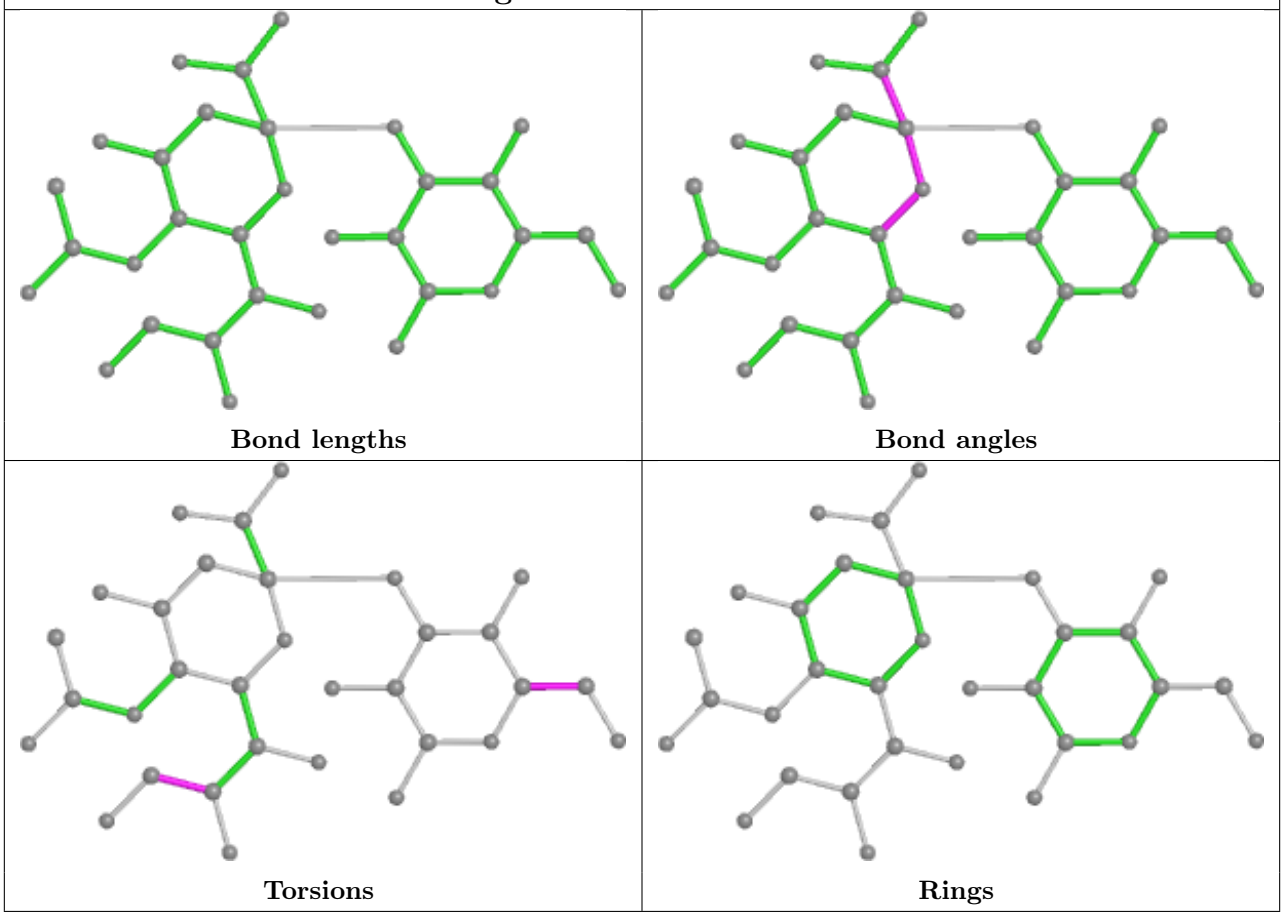
Continued on next page...

Continued from previous page...

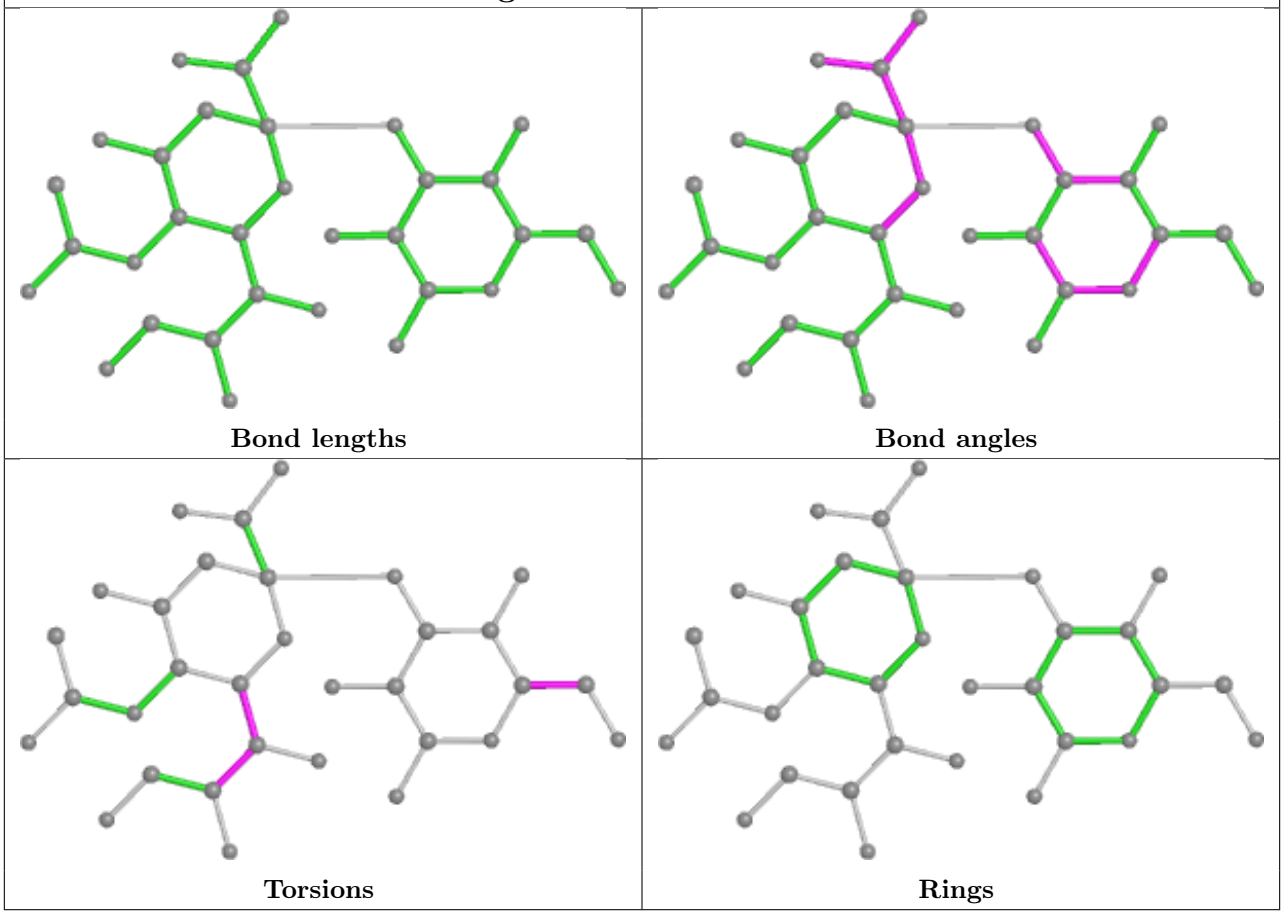
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	2	SIA	4	0
2	O	1	GAL	3	0

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

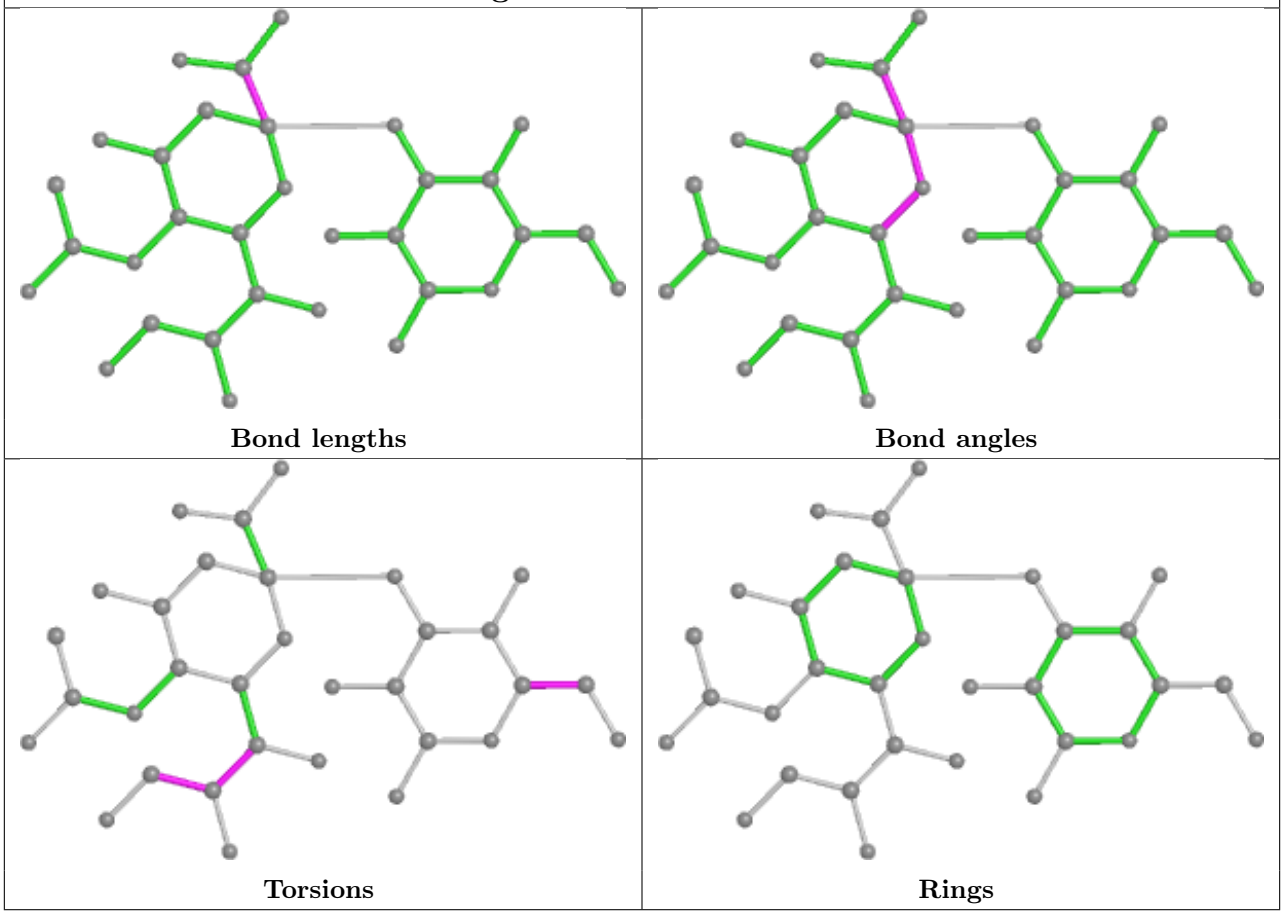
Oligosaccharide Chain K



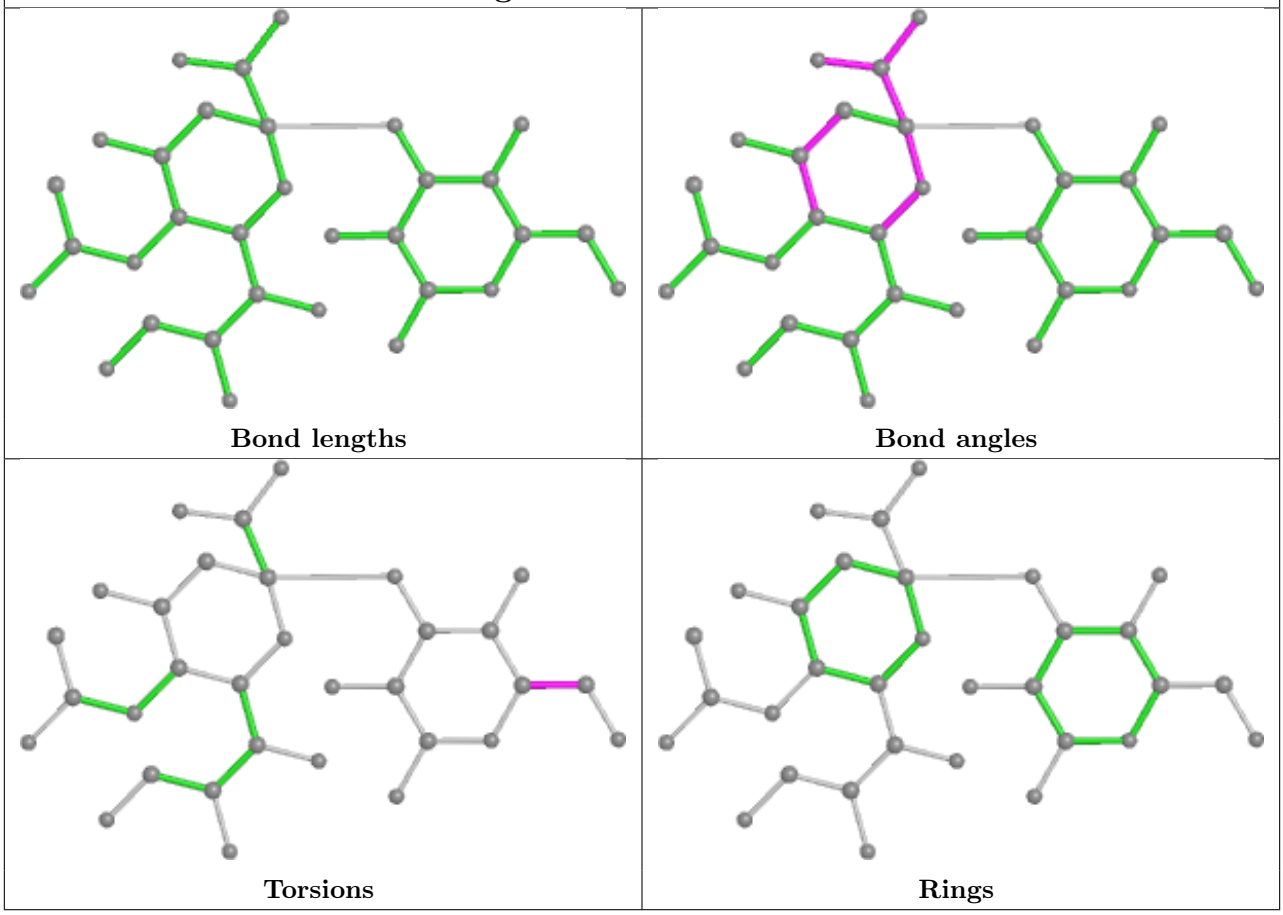
Oligosaccharide Chain L



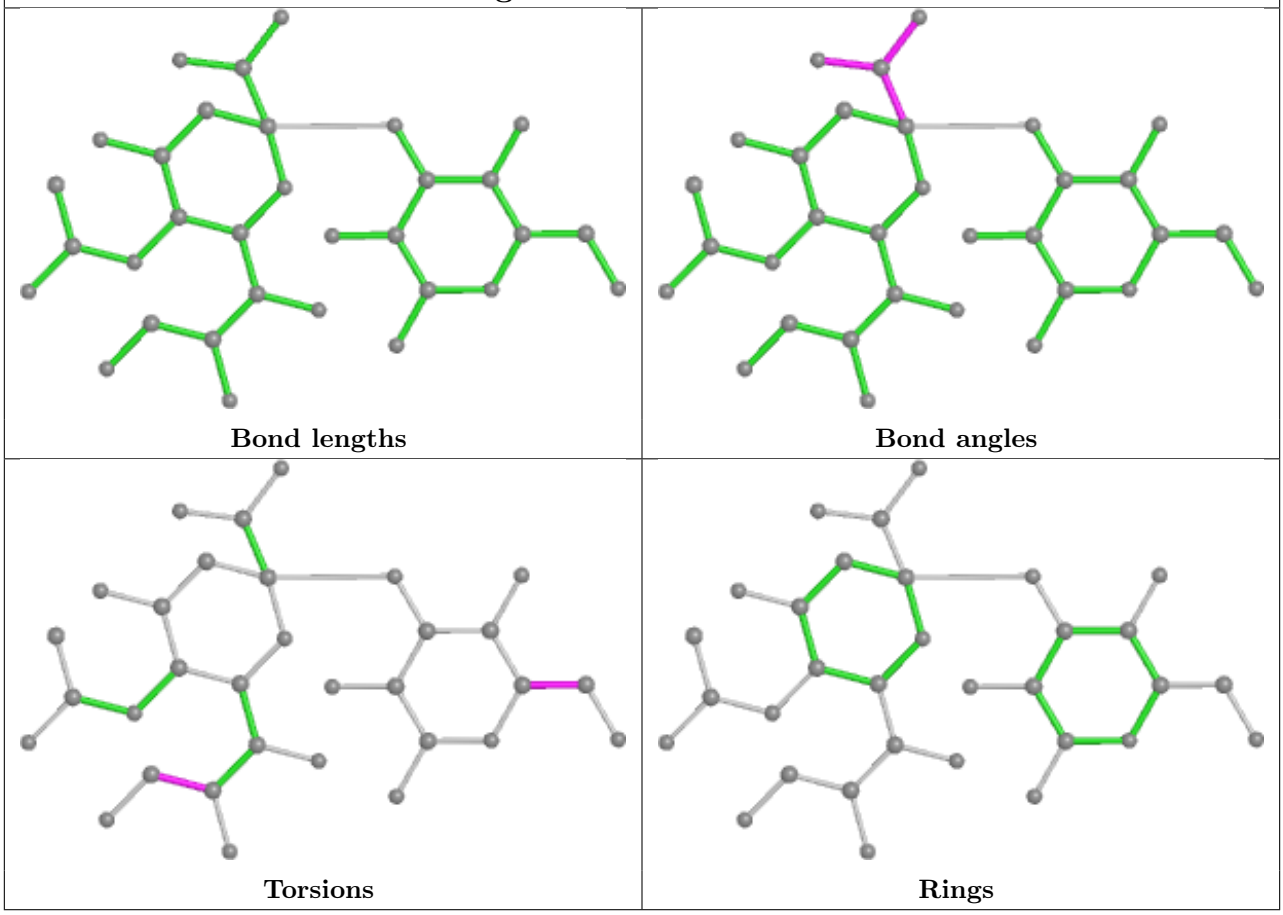
Oligosaccharide Chain M



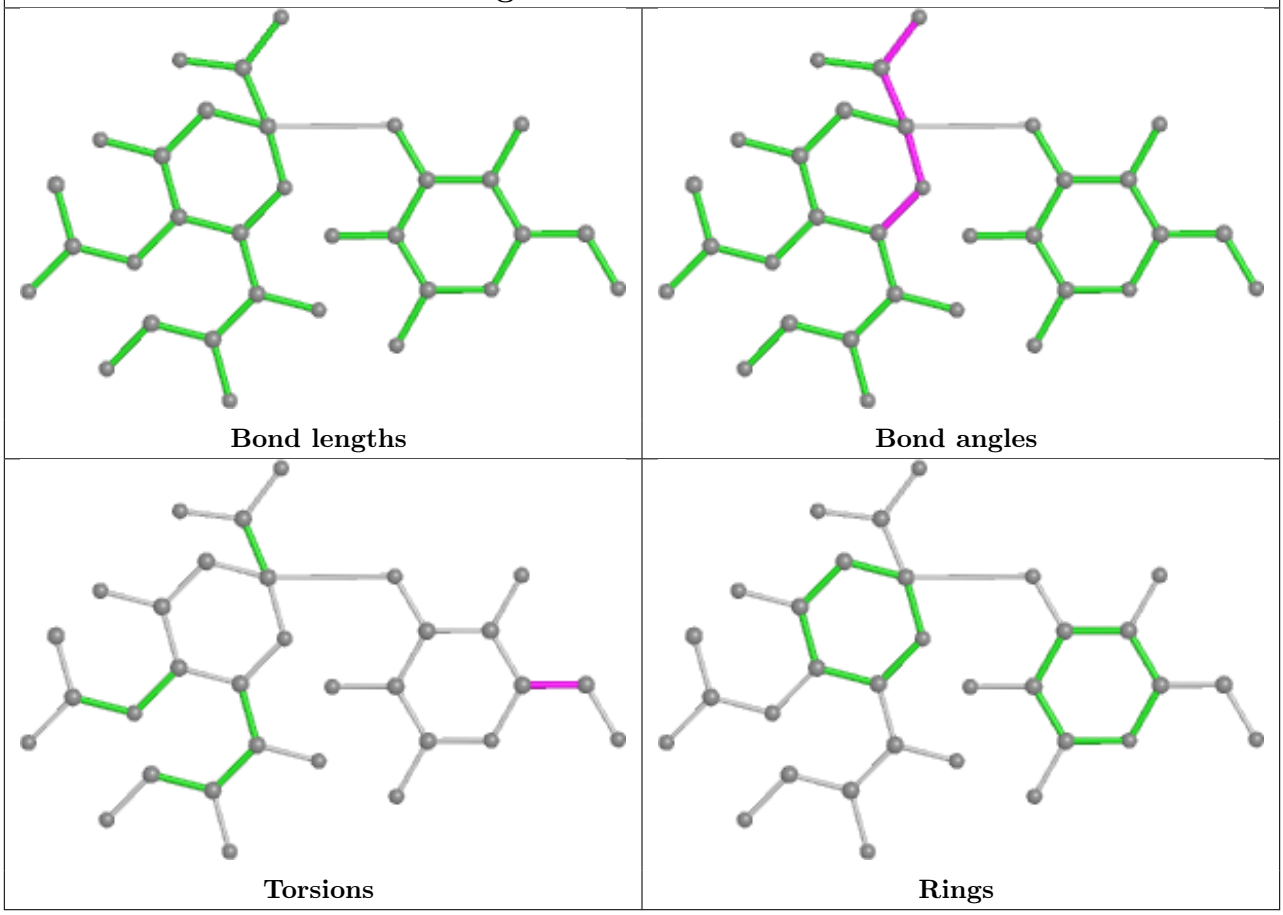
Oligosaccharide Chain N



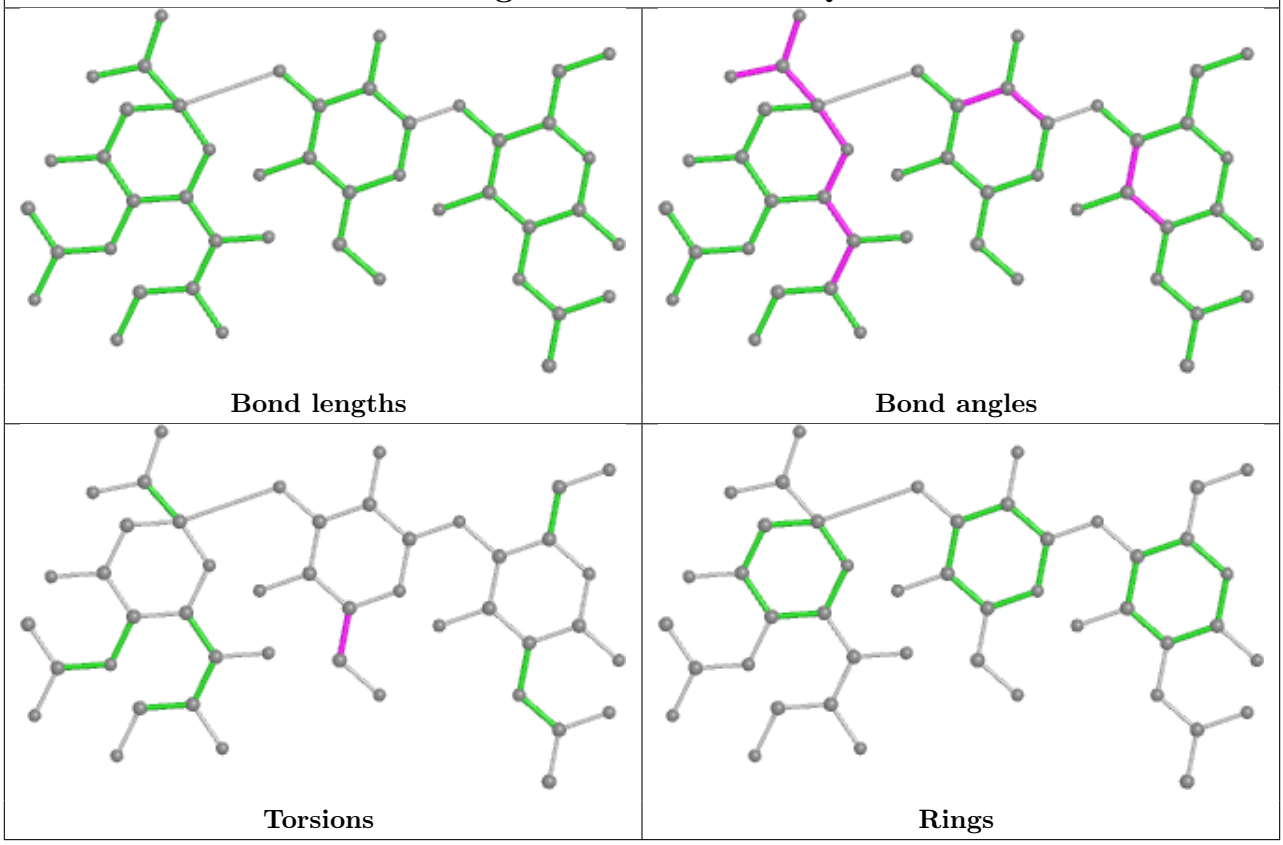
Oligosaccharide Chain O



Oligosaccharide Chain P



Oligosaccharide Chain Q



5.6 Ligand geometry (i)

Of 53 ligands modelled in this entry, 20 are monoatomic - leaving 33 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	EDO	E	403	-	3,3,3	0.52	0	2,2,2	0.21	0
6	EDO	B	404	-	3,3,3	0.48	0	2,2,2	0.27	0
6	EDO	B	405	-	3,3,3	0.40	0	2,2,2	0.52	0
6	EDO	B	407	-	3,3,3	0.45	0	2,2,2	0.52	0
6	EDO	C	404	-	3,3,3	0.42	0	2,2,2	0.41	0
7	IPA	H	404	-	3,3,3	0.44	0	3,3,3	0.48	0
6	EDO	A	403	-	3,3,3	0.40	0	2,2,2	0.43	0
7	IPA	B	408	-	3,3,3	0.48	0	3,3,3	0.75	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
7	IPA	J	406	-	3,3,3	0.42	0	3,3,3	0.50	0
6	EDO	E	404	-	3,3,3	0.44	0	2,2,2	0.46	0
6	EDO	E	405	-	3,3,3	0.54	0	2,2,2	0.22	0
7	IPA	F	404	-	3,3,3	0.46	0	3,3,3	0.42	0
7	IPA	I	405	-	3,3,3	0.50	0	3,3,3	0.53	0
6	EDO	I	404	-	3,3,3	0.42	0	2,2,2	0.26	0
6	EDO	G	404	-	3,3,3	0.47	0	2,2,2	0.35	0
7	IPA	A	405	-	3,3,3	0.50	0	3,3,3	0.62	0
6	EDO	A	404	-	3,3,3	0.54	0	2,2,2	0.23	0
7	IPA	C	405	-	3,3,3	0.37	0	3,3,3	0.54	0
6	EDO	J	404	-	3,3,3	0.43	0	2,2,2	0.34	0
7	IPA	E	406	-	3,3,3	0.42	0	3,3,3	0.55	0
7	IPA	G	405	-	3,3,3	0.39	0	3,3,3	0.55	0
6	EDO	D	403	-	3,3,3	0.45	0	2,2,2	0.55	0
6	EDO	H	403	-	3,3,3	0.49	0	2,2,2	0.36	0
6	EDO	C	403	-	3,3,3	0.43	0	2,2,2	0.20	0
6	EDO	F	403	-	3,3,3	0.38	0	2,2,2	0.65	0
6	EDO	J	403	-	3,3,3	0.49	0	2,2,2	0.38	0
7	IPA	D	405	-	3,3,3	0.41	0	3,3,3	0.64	0
6	EDO	I	403	-	3,3,3	0.42	0	2,2,2	0.44	0
6	EDO	J	405	-	3,3,3	0.53	0	2,2,2	0.34	0
6	EDO	B	403	-	3,3,3	0.40	0	2,2,2	0.53	0
6	EDO	G	403	-	3,3,3	0.52	0	2,2,2	0.28	0
6	EDO	B	406	-	3,3,3	0.50	0	2,2,2	0.60	0
6	EDO	D	404	-	3,3,3	0.43	0	2,2,2	0.36	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	EDO	E	403	-	-	1/1/1/1	-
6	EDO	B	404	-	-	1/1/1/1	-
6	EDO	B	405	-	-	0/1/1/1	-
6	EDO	B	407	-	-	1/1/1/1	-
6	EDO	C	404	-	-	0/1/1/1	-
6	EDO	A	403	-	-	1/1/1/1	-
6	EDO	E	404	-	-	1/1/1/1	-
6	EDO	E	405	-	-	1/1/1/1	-
6	EDO	I	404	-	-	1/1/1/1	-
6	EDO	G	404	-	-	0/1/1/1	-
6	EDO	A	404	-	-	0/1/1/1	-

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
6	EDO	J	404	-	-	1/1/1/1	-
6	EDO	D	403	-	-	1/1/1/1	-
6	EDO	H	403	-	-	0/1/1/1	-
6	EDO	C	403	-	-	0/1/1/1	-
6	EDO	F	403	-	-	1/1/1/1	-
6	EDO	J	403	-	-	0/1/1/1	-
6	EDO	I	403	-	-	1/1/1/1	-
6	EDO	J	405	-	-	1/1/1/1	-
6	EDO	B	403	-	-	0/1/1/1	-
6	EDO	G	403	-	-	1/1/1/1	-
6	EDO	B	406	-	-	1/1/1/1	-
6	EDO	D	404	-	-	0/1/1/1	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 14 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	J	404	EDO	O1-C1-C2-O2
6	D	403	EDO	O1-C1-C2-O2
6	F	403	EDO	O1-C1-C2-O2
6	I	403	EDO	O1-C1-C2-O2
6	J	405	EDO	O1-C1-C2-O2

There are no ring outliers.

18 monomers are involved in 18 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	B	405	EDO	1	0
7	H	404	IPA	1	0
6	A	403	EDO	1	0
7	B	408	IPA	1	0
7	J	406	IPA	1	0
6	E	405	EDO	1	0
7	I	405	IPA	1	0
6	I	404	EDO	2	0
7	A	405	IPA	2	0
6	A	404	EDO	1	0
7	C	405	IPA	1	0
7	G	405	IPA	1	0

Continued on next page...

Continued from previous page...

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	H	403	EDO	1	0
7	D	405	IPA	1	0
6	J	405	EDO	1	0
6	G	403	EDO	1	0
6	B	406	EDO	5	0
6	D	404	EDO	1	0

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (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	277/278 (99%)	-0.34	4 (1%)	75	82	12, 17, 34, 77	0
1	B	274/278 (98%)	-0.24	4 (1%)	73	80	11, 16, 41, 59	0
1	C	275/278 (98%)	-0.28	4 (1%)	73	80	12, 18, 40, 80	0
1	D	274/278 (98%)	-0.25	10 (3%)	42	49	13, 20, 49, 97	0
1	E	277/278 (99%)	-0.31	3 (1%)	80	86	12, 18, 35, 83	0
1	F	274/278 (98%)	-0.21	10 (3%)	42	49	18, 25, 46, 90	0
1	G	271/278 (97%)	-0.14	7 (2%)	56	62	18, 26, 49, 76	0
1	H	273/278 (98%)	-0.17	7 (2%)	56	62	18, 27, 49, 81	0
1	I	274/278 (98%)	-0.07	15 (5%)	25	31	17, 25, 52, 97	0
1	J	277/278 (99%)	-0.20	10 (3%)	42	49	16, 24, 54, 86	0
All	All	2746/2780 (98%)	-0.22	74 (2%)	54	60	11, 22, 46, 97	0

The worst 5 of 74 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	73	PHE	5.7
1	I	101	ASP	5.7
1	J	24	GLY	5.4
1	I	73	PHE	5.2
1	A	37[A]	THR	4.7

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

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

6.3 Carbohydrates (i)

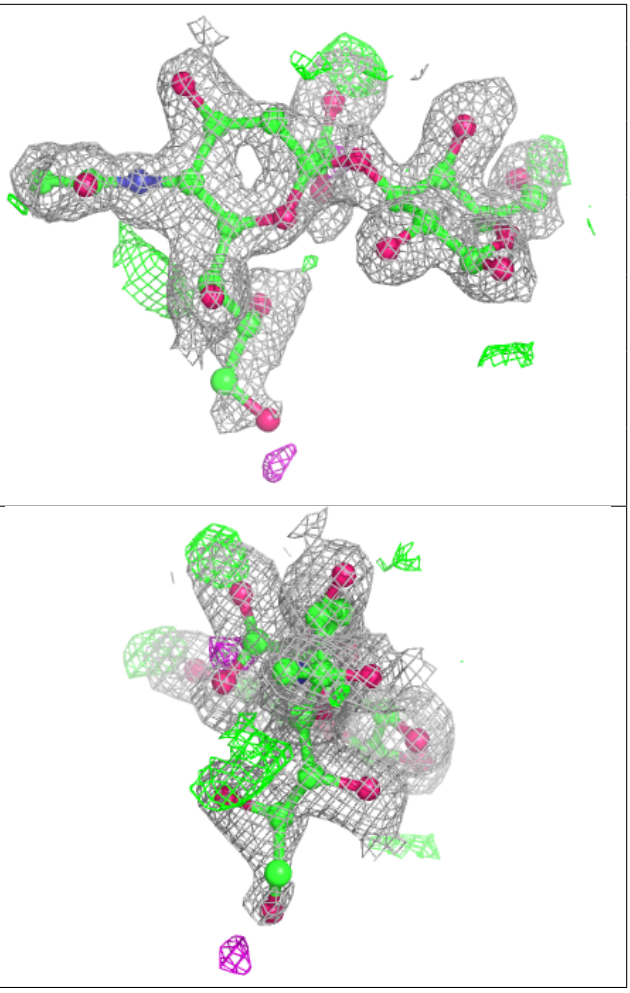
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	GAL	L	1	12/12	0.72	0.26	32,35,40,40	12
2	GAL	M	1	12/12	0.74	0.25	36,45,48,48	12
2	GAL	O	1	12/12	0.75	0.26	34,40,47,50	12
2	SIA	L	2	20/21	0.76	0.20	20,31,37,40	20
2	GAL	K	1	12/12	0.82	0.22	28,34,38,45	12
2	SIA	M	2	20/21	0.83	0.25	24,40,55,56	20
2	SIA	O	2	20/21	0.83	0.20	28,36,45,45	20
2	GAL	P	1	12/12	0.83	0.27	40,50,59,60	0
2	SIA	K	2	20/21	0.85	0.20	21,30,45,52	20
2	SIA	P	2	20/21	0.85	0.22	33,43,60,61	0
3	NAG	Q	1	15/15	0.86	0.28	53,63,86,88	0
2	GAL	N	1	12/12	0.87	0.21	39,49,54,55	0
3	GAL	Q	2	11/12	0.87	0.24	35,42,47,47	0
2	SIA	N	2	20/21	0.89	0.22	28,38,55,68	0
3	SIA	Q	3	20/21	0.90	0.19	30,40,57,63	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.

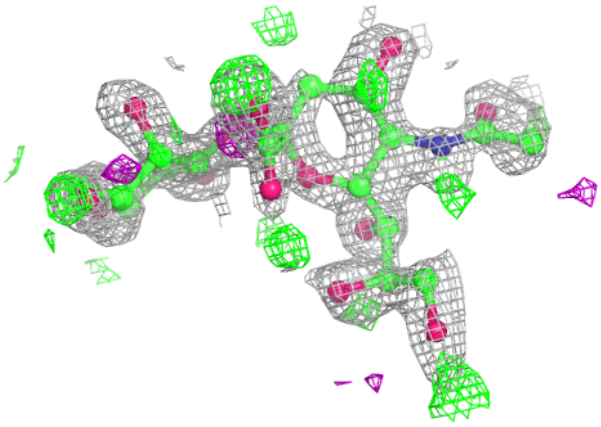
Electron density around Chain K:

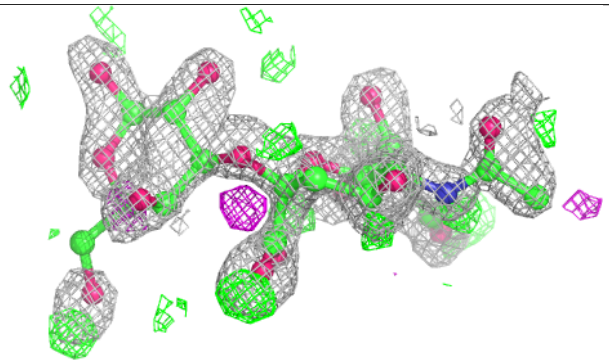
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

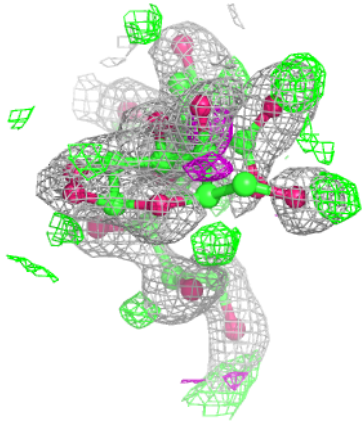


Electron density around Chain L:

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

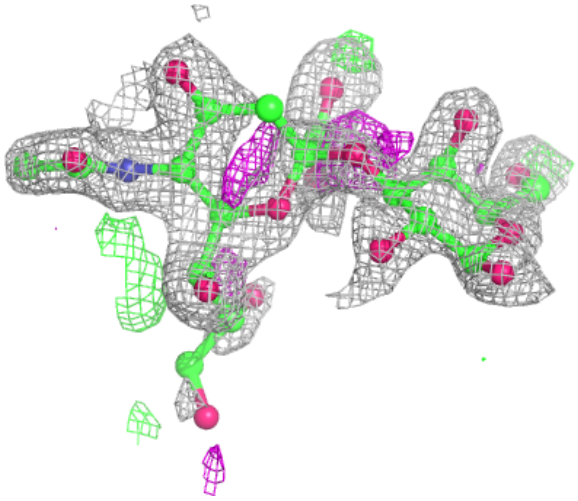


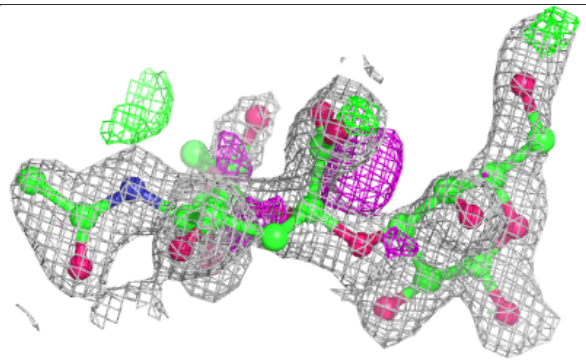


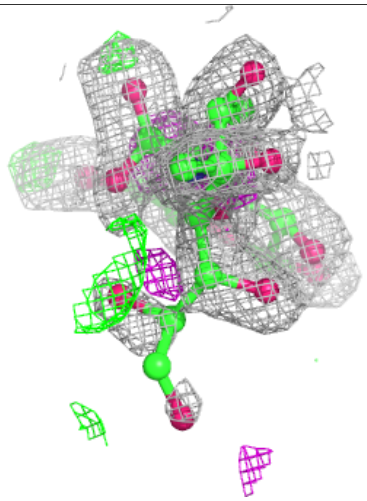


Electron density around Chain M:

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

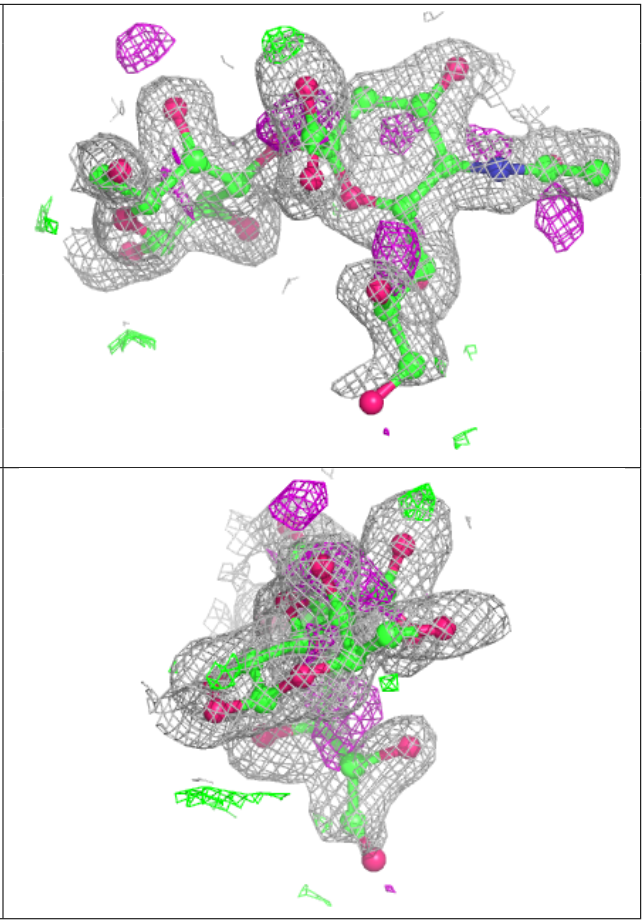






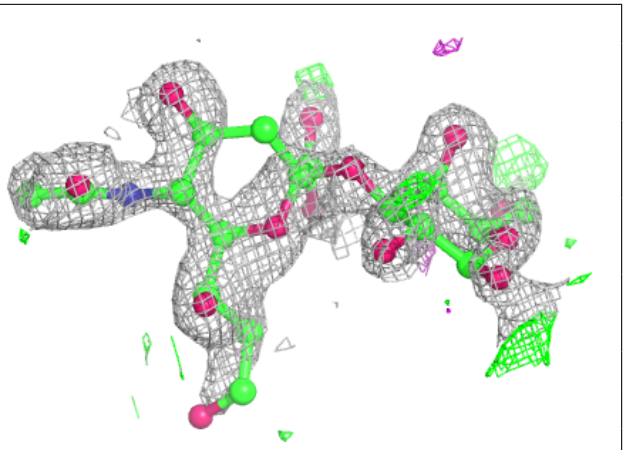
Electron density around Chain N:

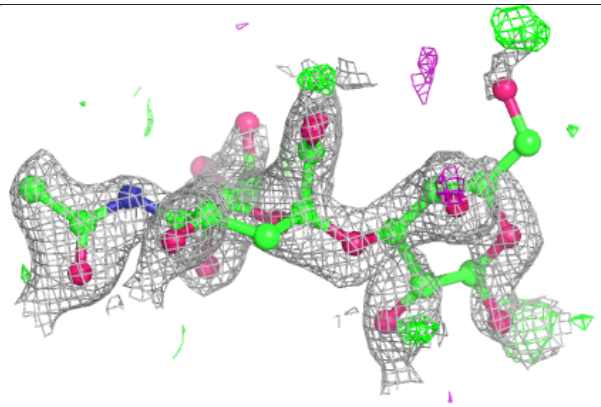
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

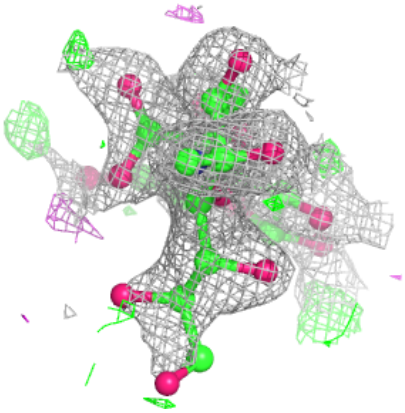


Electron density around Chain O:

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

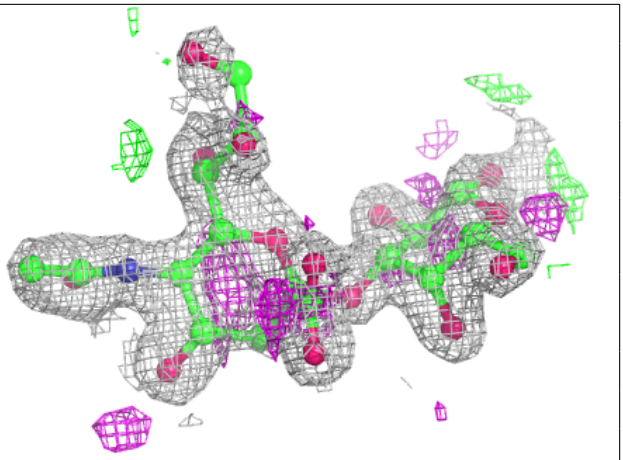


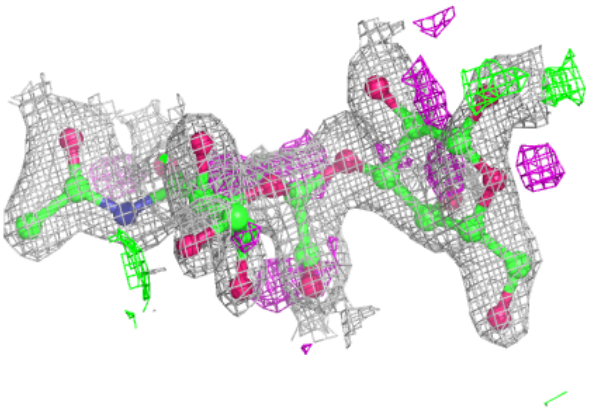




Electron density around Chain P:

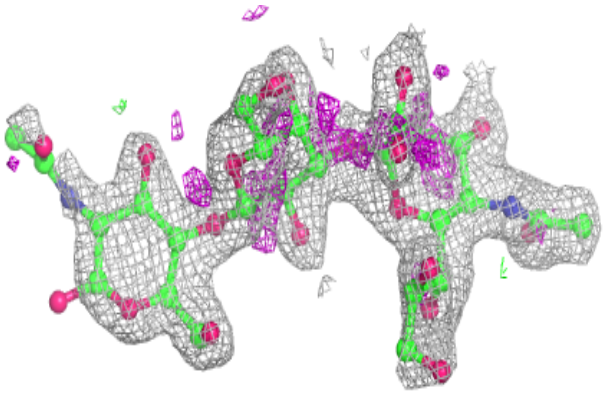
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

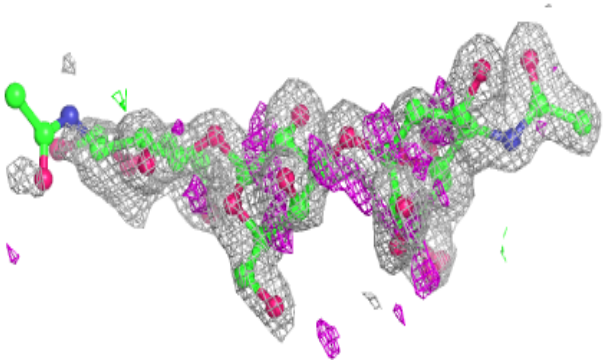


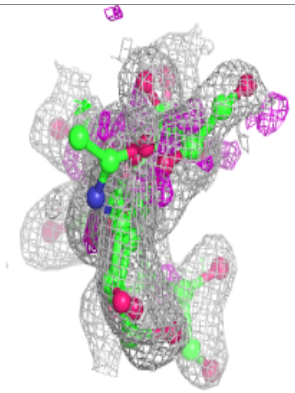


Electron density around Chain Q:

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







6.4 Ligands (i)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
6	EDO	J	405	4/4	0.83	0.18	32,38,44,50	0
6	EDO	E	405	4/4	0.85	0.14	34,36,37,43	0
6	EDO	E	404	4/4	0.86	0.11	39,40,44,45	0
7	IPA	A	405	4/4	0.87	0.23	18,28,29,40	0
7	IPA	G	405	4/4	0.88	0.18	29,34,35,35	0
7	IPA	I	405	4/4	0.89	0.17	29,31,32,33	0
6	EDO	G	404	4/4	0.91	0.09	41,45,47,50	0
7	IPA	B	408	4/4	0.91	0.22	20,27,28,29	0
6	EDO	F	403	4/4	0.92	0.17	28,40,46,49	0
7	IPA	H	404	4/4	0.92	0.16	33,34,34,40	0
7	IPA	F	404	4/4	0.92	0.18	37,37,38,40	0
7	IPA	J	406	4/4	0.92	0.20	30,34,35,39	0
6	EDO	J	403	4/4	0.93	0.14	27,38,46,46	0
6	EDO	B	407	4/4	0.93	0.14	32,35,48,50	0
6	EDO	D	403	4/4	0.93	0.15	31,34,44,59	0
6	EDO	I	403	4/4	0.93	0.21	36,43,50,51	0
7	IPA	D	405	4/4	0.93	0.17	26,32,33,36	0
6	EDO	B	406	4/4	0.94	0.11	27,32,33,39	0
6	EDO	A	403	4/4	0.94	0.18	23,33,36,46	0
5	CL	G	402	1/1	0.95	0.07	37,37,37,37	0
6	EDO	H	403	4/4	0.95	0.09	28,36,39,42	0
7	IPA	E	406	4/4	0.95	0.16	25,27,28,28	0
6	EDO	B	404	4/4	0.95	0.18	23,30,43,45	0
7	IPA	C	405	4/4	0.96	0.18	28,29,29,30	0
6	EDO	C	404	4/4	0.96	0.11	30,36,38,39	0
6	EDO	B	405	4/4	0.96	0.12	20,33,34,37	0
6	EDO	D	404	4/4	0.96	0.12	23,32,33,46	0
6	EDO	E	403	4/4	0.96	0.11	20,34,36,38	0
6	EDO	B	403	4/4	0.96	0.10	26,33,34,37	0
6	EDO	A	404	4/4	0.96	0.12	18,35,37,39	0
6	EDO	C	403	4/4	0.96	0.16	23,32,40,45	0
4	CA	H	401	1/1	0.97	0.07	40,40,40,40	0
6	EDO	I	404	4/4	0.97	0.10	24,32,35,35	0
4	CA	J	401	1/1	0.97	0.04	26,26,26,26	1
4	CA	C	401	1/1	0.97	0.05	23,23,23,23	1
6	EDO	G	403	4/4	0.97	0.10	23,38,38,44	0
4	CA	F	401	1/1	0.97	0.04	23,23,23,23	1

Continued on next page...

Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	CA	G	401	1/1	0.97	0.06	24,24,24,24	1
5	CL	H	402	1/1	0.98	0.06	35,35,35,35	0
5	CL	I	402	1/1	0.98	0.07	33,33,33,33	0
4	CA	D	401	1/1	0.98	0.04	21,21,21,21	1
6	EDO	J	404	4/4	0.98	0.13	35,37,46,48	0
4	CA	A	401	1/1	0.98	0.04	19,19,19,19	1
5	CL	D	402	1/1	0.99	0.04	28,28,28,28	0
5	CL	E	402	1/1	0.99	0.06	28,28,28,28	0
5	CL	F	402	1/1	0.99	0.05	34,34,34,34	0
4	CA	B	401	1/1	0.99	0.06	20,20,20,20	1
4	CA	I	401	1/1	0.99	0.04	23,23,23,23	1
4	CA	E	401	1/1	0.99	0.04	20,20,20,20	1
5	CL	J	402	1/1	0.99	0.03	31,31,31,31	0
5	CL	C	402	1/1	0.99	0.04	26,26,26,26	0
5	CL	B	402	1/1	1.00	0.04	27,27,27,27	0
5	CL	A	402	1/1	1.00	0.04	25,25,25,25	0

6.5 Other polymers (i)

There are no such residues in this entry.