wwPDB X-ray Structure Validation Summary Report (i)

May 14, 2024 – 06:07 pm BST

PDB ID	:	8P67
Title	:	Crystal structure of Thermothelomyces thermophila (double mutant EE) in complex with aldotetrauronic acid
Authors	:	Dimarogona, M.; Pentari, C.; Kosinas, C.; Topakas, E.
Deposited on	:	2023-05-25
Resolution	:	1.37 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:

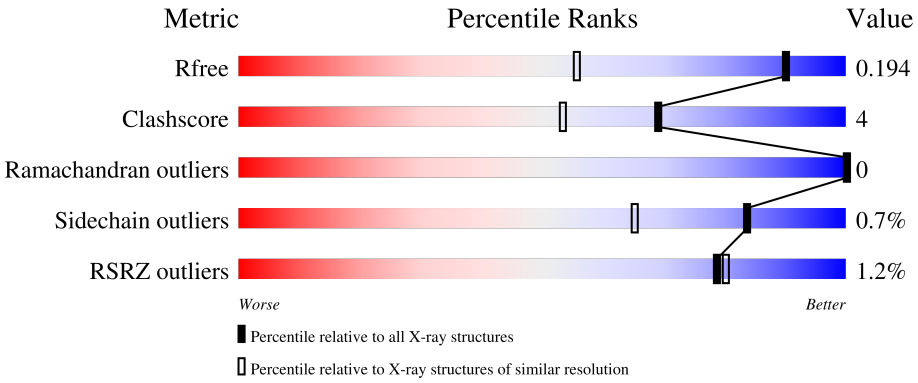
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36.2
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36.2

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 1.37 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	2907 (1.40-1.36)
Clashscore	141614	3037 (1.40-1.36)
Ramachandran outliers	138981	2970 (1.40-1.36)
Sidechain outliers	138945	2969 (1.40-1.36)
RSRZ outliers	127900	2846 (1.40-1.36)

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	482	86% 6% 8%
1	B	482	87% 5% 9%
2	C	3	100%
3	D	4	75% 25%
3	F	4	50% 50%

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Mol	Chain	Length	Quality of chain
4	E	4	25% 75%

2 Entry composition (i)

There are 6 unique types of molecules in this entry. The entry contains 7940 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 GH30 family xylanase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	444	Total	C	N	O	S	0	21	0
			3492	2178	609	689	16			
1	B	440	Total	C	N	O	S	0	12	0
			3398	2121	595	666	16			

There are 52 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1	SER	-	expression tag	UNP G2Q1N4
A	2	MET	-	expression tag	UNP G2Q1N4
A	188	ALA	GLU	engineered mutation	UNP G2Q1N4
A	278	ALA	GLU	engineered mutation	UNP G2Q1N4
A	461	LEU	-	expression tag	UNP G2Q1N4
A	462	GLU	-	expression tag	UNP G2Q1N4
A	463	GLN	-	expression tag	UNP G2Q1N4
A	464	LYS	-	expression tag	UNP G2Q1N4
A	465	LEU	-	expression tag	UNP G2Q1N4
A	466	ILE	-	expression tag	UNP G2Q1N4
A	467	SER	-	expression tag	UNP G2Q1N4
A	468	GLU	-	expression tag	UNP G2Q1N4
A	469	GLU	-	expression tag	UNP G2Q1N4
A	470	ASP	-	expression tag	UNP G2Q1N4
A	471	LEU	-	expression tag	UNP G2Q1N4
A	472	ASN	-	expression tag	UNP G2Q1N4
A	473	SER	-	expression tag	UNP G2Q1N4
A	474	ALA	-	expression tag	UNP G2Q1N4
A	475	VAL	-	expression tag	UNP G2Q1N4
A	476	ASP	-	expression tag	UNP G2Q1N4
A	477	HIS	-	expression tag	UNP G2Q1N4
A	478	HIS	-	expression tag	UNP G2Q1N4
A	479	HIS	-	expression tag	UNP G2Q1N4
A	480	HIS	-	expression tag	UNP G2Q1N4
A	481	HIS	-	expression tag	UNP G2Q1N4

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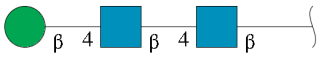
Chain	Residue	Modelled	Actual	Comment	Reference
A	482	HIS	-	expression tag	UNP G2Q1N4
B	1	SER	-	expression tag	UNP G2Q1N4
B	2	MET	-	expression tag	UNP G2Q1N4
B	188	ALA	GLU	engineered mutation	UNP G2Q1N4
B	278	ALA	GLU	engineered mutation	UNP G2Q1N4
B	461	LEU	-	expression tag	UNP G2Q1N4
B	462	GLU	-	expression tag	UNP G2Q1N4
B	463	GLN	-	expression tag	UNP G2Q1N4
B	464	LYS	-	expression tag	UNP G2Q1N4
B	465	LEU	-	expression tag	UNP G2Q1N4
B	466	ILE	-	expression tag	UNP G2Q1N4
B	467	SER	-	expression tag	UNP G2Q1N4
B	468	GLU	-	expression tag	UNP G2Q1N4
B	469	GLU	-	expression tag	UNP G2Q1N4
B	470	ASP	-	expression tag	UNP G2Q1N4
B	471	LEU	-	expression tag	UNP G2Q1N4
B	472	ASN	-	expression tag	UNP G2Q1N4
B	473	SER	-	expression tag	UNP G2Q1N4
B	474	ALA	-	expression tag	UNP G2Q1N4
B	475	VAL	-	expression tag	UNP G2Q1N4
B	476	ASP	-	expression tag	UNP G2Q1N4
B	477	HIS	-	expression tag	UNP G2Q1N4
B	478	HIS	-	expression tag	UNP G2Q1N4
B	479	HIS	-	expression tag	UNP G2Q1N4
B	480	HIS	-	expression tag	UNP G2Q1N4
B	481	HIS	-	expression tag	UNP G2Q1N4
B	482	HIS	-	expression tag	UNP G2Q1N4

- Molecule 2 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
2	C	3	Total	C	N	O	0	0	0
			39	22	2	15			

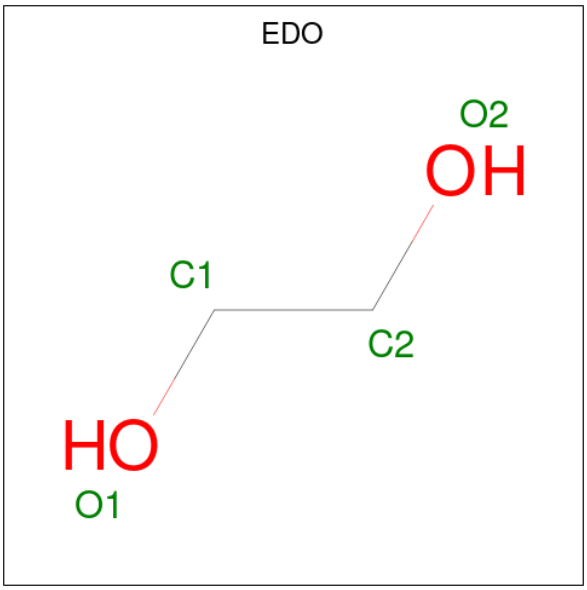
- Molecule 3 is an oligosaccharide called 4-O-methyl-alpha-D-glucopyranuronic acid-(1-2)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf	Trace
3	D	4	Total C O 41 22 19	0	0	0
3	F	4	Total C O 41 22 19	0	0	0

- Molecule 4 is an oligosaccharide called alpha-D-mannopyranose-(1-3)-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
4	E	4	Total C N O 50 28 2 20	0	0	0

- Molecule 5 is 1,2-ETHANEDIOL (three-letter code: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	1	Total C O 4 2 2	0	0
5	A	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0
5	B	1	Total C O 4 2 2	0	0

- Molecule 6 is water.

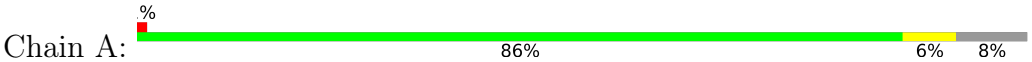
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	476	Total O 476 476	0	0
6	B	383	Total O 383 383	0	0

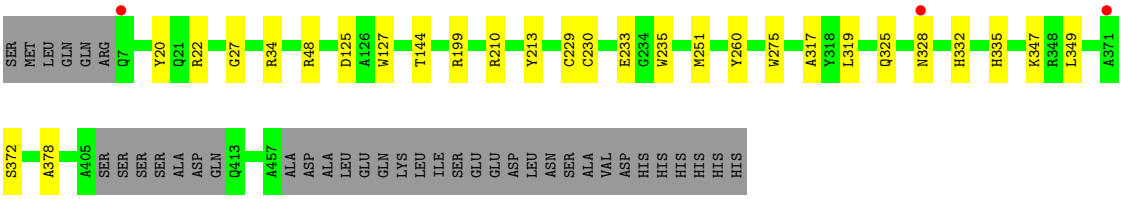
3 Residue-property plots (i)

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: GH30 family xylanase

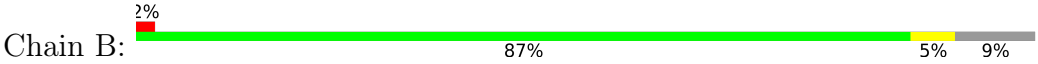
Chain A:

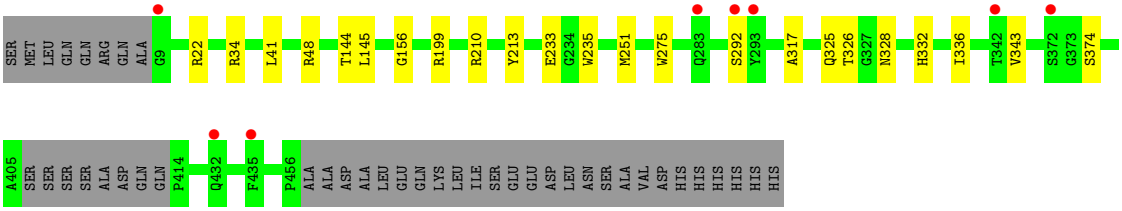




• Molecule 1: GH30 family xylanase

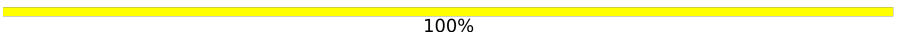
Chain B:





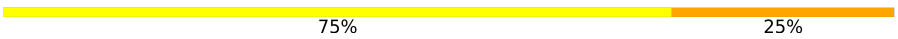
• Molecule 2: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:



• Molecule 3: 4-O-methyl-alpha-D-glucopyranuronic acid-(1-2)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose

Chain D:



• Molecule 3: 4-O-methyl-alpha-D-glucopyranuronic acid-(1-2)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose-(1-4)-beta-D-xylopyranose

Chain F:

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

Chain E:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	41.20Å 107.13Å 87.78Å 90.00° 95.75° 90.00°	Depositor
Resolution (Å)	45.70 – 1.37 45.66 – 1.37	Depositor EDS
% Data completeness (in resolution range)	98.9 (45.70-1.37) 97.5 (45.66-1.37)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.80 (at 1.37Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.163 , 0.187 0.173 , 0.194	Depositor DCC
R_{free} test set	7664 reflections (4.96%)	wwPDB-VP
Wilson B-factor (Å^2)	14.3	Xtriage
Anisotropy	0.273	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.37 , 39.4	EDS
L-test for twinning[2]	$< \|L\| > = 0.47$, $< L^2 > = 0.30$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	7940	wwPDB-VP
Average B, all atoms (Å^2)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.84% 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: BMA, EDO, MAN, NAG, XYP, GCV

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	0.70	0/3579	0.83	0/4884
1	B	0.71	0/3486	0.81	0/4754
All	All	0.70	0/7065	0.82	0/9638

There are no bond length outliers.

There are no bond angle outliers.

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	3492	0	3298	32	0
1	B	3398	0	3228	18	0
2	C	39	0	34	0	0
3	D	41	0	9	5	0
3	F	41	0	9	2	0
4	E	50	0	43	0	0
5	A	12	0	18	5	0
5	B	8	0	12	0	0
6	A	476	0	0	14	0
6	B	383	0	0	4	1
All	All	7940	0	6651	51	1

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 4.

The worst 5 of 51 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:233[B]:GLU:OE2	3:D:1:XYP:C5	2.00	1.09
1:B:233[B]:GLU:OE2	3:F:1:XYP:C5	2.05	1.04
1:B:48[B]:ARG:NH1	1:B:343:VAL:O	1.92	1.01
1:A:127[B]:TRP:CZ3	3:D:2:XYP:O3	2.18	0.95
1:A:127[A]:TRP:HZ3	6:A:916:HOH:O	1.56	0.88

All (1) 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)
6:B:980:HOH:O	6:B:981:HOH:O[1_655]	1.54	0.66

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	461/482 (96%)	445 (96%)	16 (4%)	0	100	100
1	B	448/482 (93%)	432 (96%)	16 (4%)	0	100	100
All	All	909/964 (94%)	877 (96%)	32 (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	366/379 (97%)	365 (100%)	1 (0%)	92 82
1	B	355/379 (94%)	351 (99%)	4 (1%)	73 48
All	All	721/758 (95%)	716 (99%)	5 (1%)	84 65

All (5) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	235	TRP
1	B	235	TRP
1	B	292	SER
1	B	328	ASN
1	B	374	SER

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

Mol	Chain	Res	Type
1	B	92	ASN
1	B	328	ASN
1	B	335	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)

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	NAG	C	1	1,2	14,14,15	0.88	0	17,19,21	1.21	2 (11%)
2	NAG	C	2	2	14,14,15	0.87	1 (7%)	17,19,21	1.53	5 (29%)
2	BMA	C	3	2	11,11,12	0.80	0	15,15,17	2.16	5 (33%)
3	XYP	D	1	3	10,10,10	0.17	0	14,14,14	0.68	0
3	XYP	D	2	3	9,9,10	0.56	0	10,12,14	2.03	1 (10%)
3	XYP	D	3	3	9,9,10	0.28	0	10,12,14	1.25	1 (10%)
3	GCV	D	4	3	13,13,14	0.83	0	14,18,20	1.21	2 (14%)
4	NAG	E	1	1,4	14,14,15	0.39	0	17,19,21	1.01	1 (5%)
4	NAG	E	2	4	14,14,15	0.55	0	17,19,21	1.24	2 (11%)
4	BMA	E	3	4	11,11,12	0.53	0	15,15,17	0.80	0
4	MAN	E	4	4	11,11,12	0.45	0	15,15,17	0.98	1 (6%)
3	XYP	F	1	3	10,10,10	0.38	0	14,14,14	0.79	1 (7%)
3	XYP	F	2	3	9,9,10	0.57	0	10,12,14	1.56	1 (10%)
3	XYP	F	3	3	9,9,10	0.24	0	10,12,14	0.75	1 (10%)
3	GCV	F	4	3	13,13,14	0.72	0	14,18,20	1.07	1 (7%)

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	C	1	1,2	-	0/6/23/26	0/1/1/1
2	NAG	C	2	2	-	0/6/23/26	0/1/1/1
2	BMA	C	3	2	-	0/2/19/22	0/1/1/1
3	XYP	D	1	3	-	-	0/1/1/1
3	XYP	D	2	3	-	-	0/1/1/1
3	XYP	D	3	3	-	-	0/1/1/1
3	GCV	D	4	3	-	0/6/23/26	0/1/1/1
4	NAG	E	1	1,4	-	0/6/23/26	0/1/1/1
4	NAG	E	2	4	-	0/6/23/26	0/1/1/1
4	BMA	E	3	4	-	0/2/19/22	0/1/1/1
4	MAN	E	4	4	-	1/2/19/22	0/1/1/1
3	XYP	F	1	3	-	-	0/1/1/1
3	XYP	F	2	3	-	-	0/1/1/1
3	XYP	F	3	3	-	-	0/1/1/1
3	GCV	F	4	3	-	0/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	NAG	C2-N2	-2.22	1.42	1.46

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	2	XYP	O2-C2-C3	5.82	121.80	110.14
3	F	2	XYP	O2-C2-C3	4.15	118.45	110.14
2	C	3	BMA	O5-C5-C6	4.04	113.54	107.20
2	C	3	BMA	C1-O5-C5	3.80	117.35	112.19
2	C	3	BMA	C1-C2-C3	3.66	114.16	109.67

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	E	4	MAN	O5-C5-C6-O6

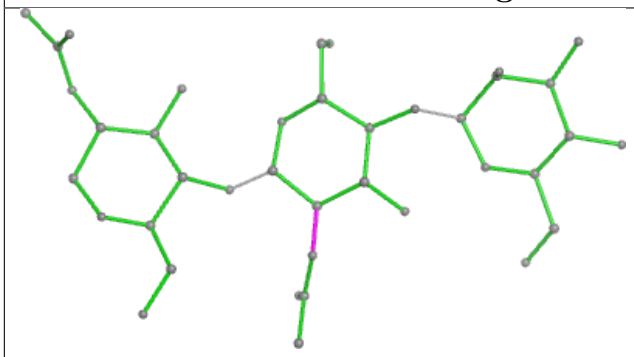
There are no ring outliers.

4 monomers are involved in 7 short contacts:

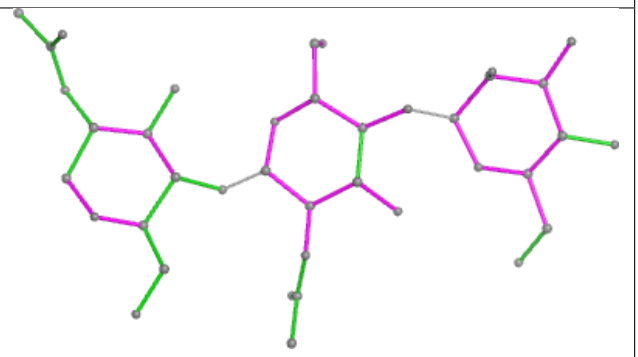
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	F	1	XYP	1	0
3	D	2	XYP	4	0
3	D	1	XYP	1	0
3	F	2	XYP	1	0

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

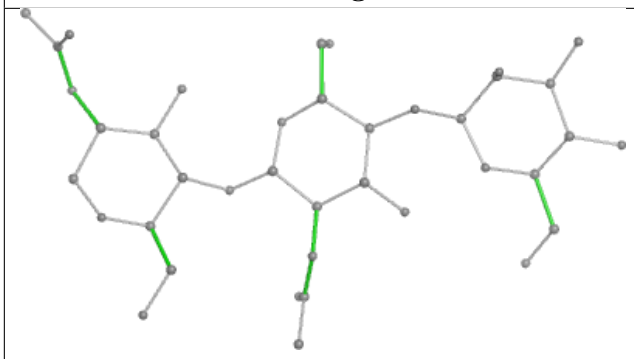
Oligosaccharide Chain C



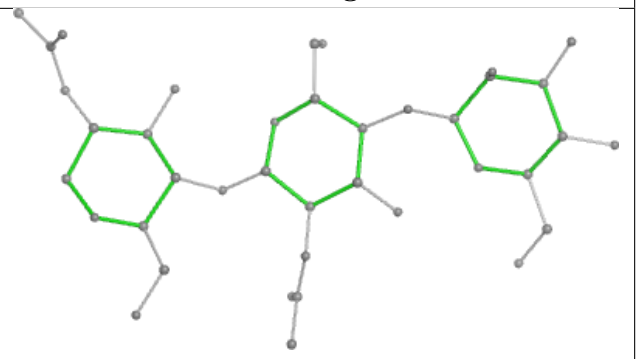
Bond lengths



Bond angles

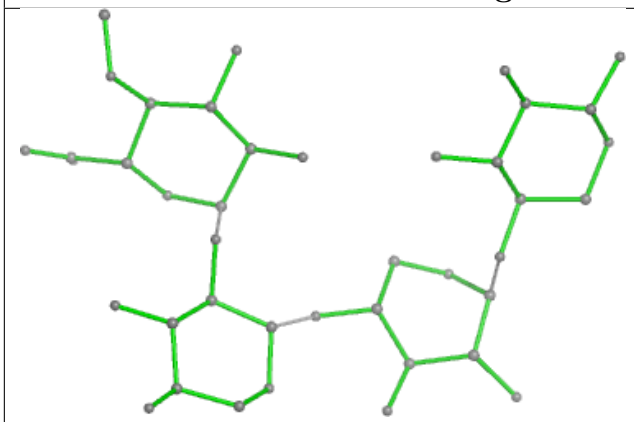


Torsions

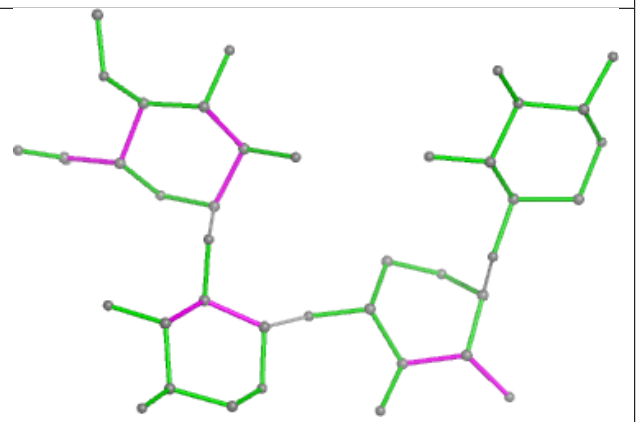


Rings

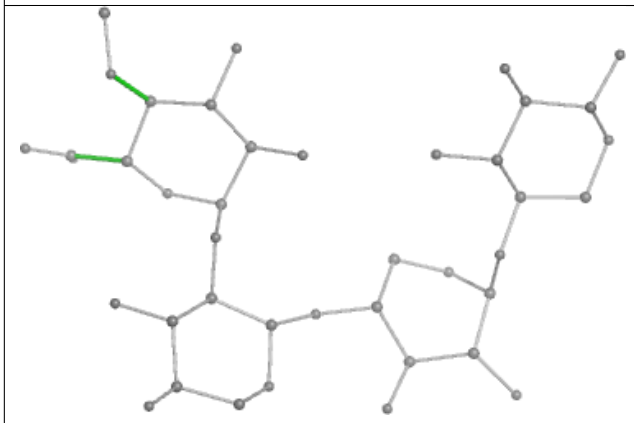
Oligosaccharide Chain D



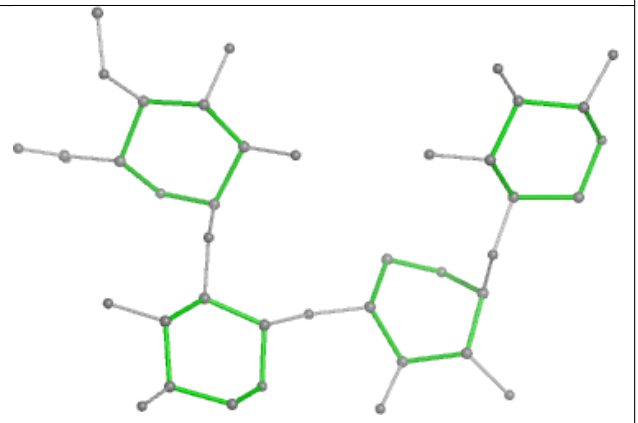
Bond lengths



Bond angles

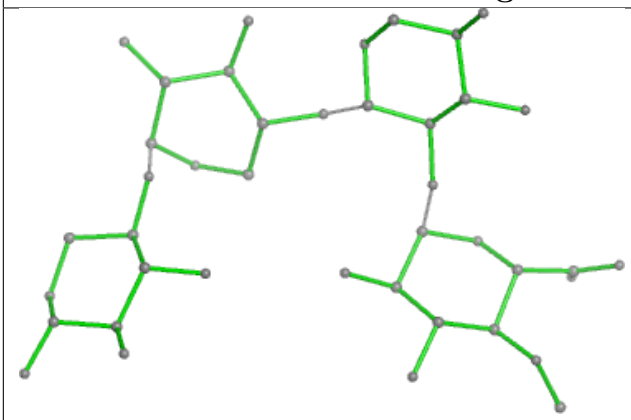


Torsions

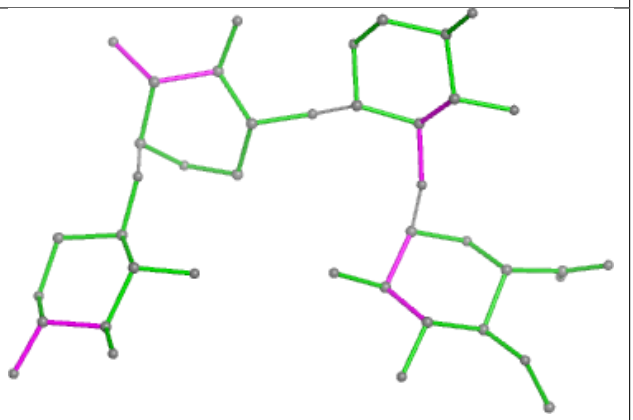


Rings

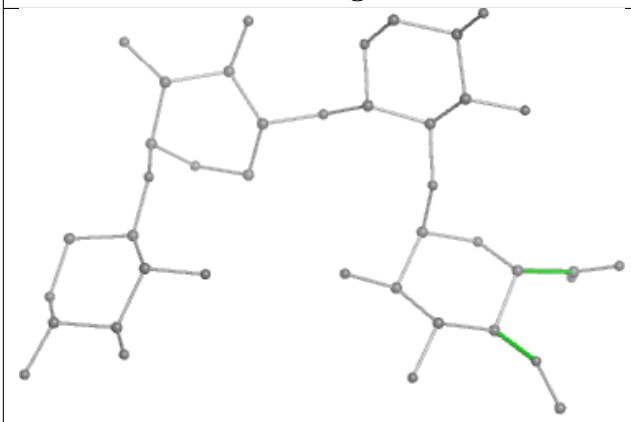
Oligosaccharide Chain F



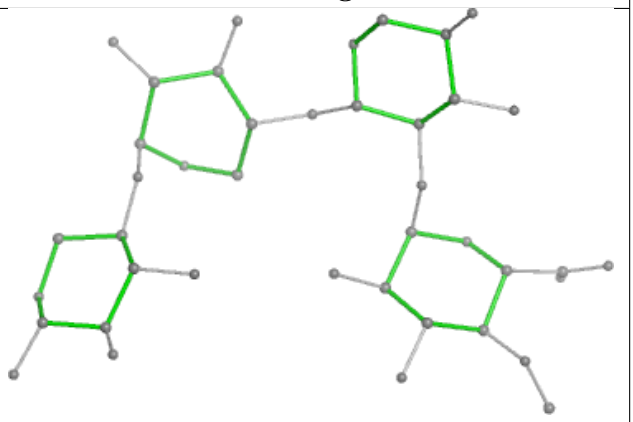
Bond lengths



Bond angles

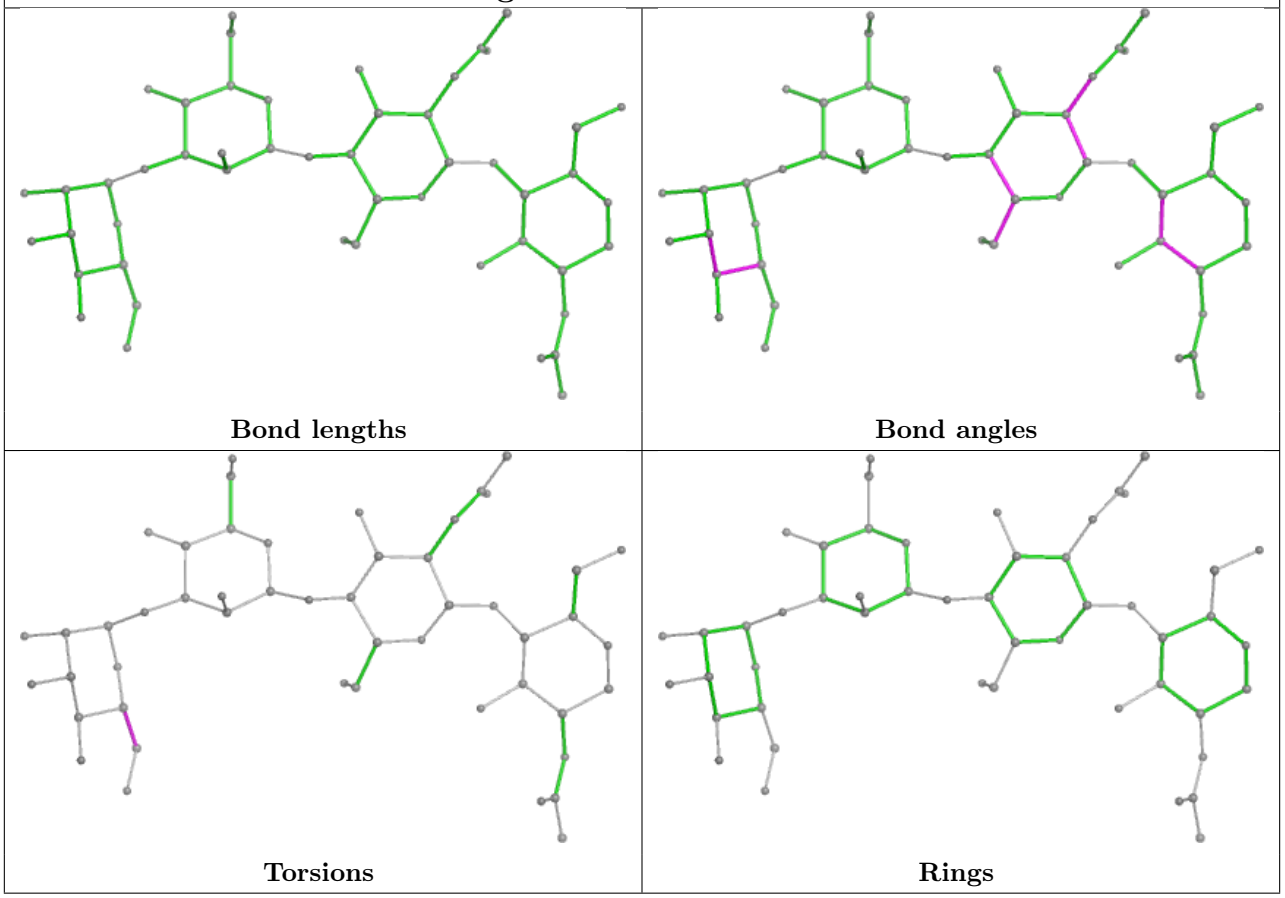


Torsions



Rings

Oligosaccharide Chain E



5.6 Ligand geometry (i)

5 ligands 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	$\#\|Z\| > 2$
5	EDO	B	502	-	3,3,3	0.21	0	2,2,2	0.22	0
5	EDO	B	501	-	3,3,3	0.10	0	2,2,2	0.40	0
5	EDO	A	503	-	3,3,3	0.18	0	2,2,2	0.47	0
5	EDO	A	502	-	3,3,3	0.21	0	2,2,2	0.45	0
5	EDO	A	501	-	3,3,3	0.46	0	2,2,2	0.32	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
5	EDO	B	502	-	-	1/1/1/1	-
5	EDO	B	501	-	-	1/1/1/1	-
5	EDO	A	503	-	-	1/1/1/1	-
5	EDO	A	502	-	-	1/1/1/1	-
5	EDO	A	501	-	-	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
5	A	502	EDO	O1-C1-C2-O2
5	B	501	EDO	O1-C1-C2-O2
5	A	503	EDO	O1-C1-C2-O2
5	B	502	EDO	O1-C1-C2-O2

There are no ring outliers.

3 monomers are involved in 5 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	503	EDO	1	0
5	A	502	EDO	1	0
5	A	501	EDO	3	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

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	444/482 (92%)	-0.37	3 (0%)	87	88	9, 14, 23, 47	0
1	B	440/482 (91%)	-0.09	8 (1%)	68	71	11, 18, 34, 51	0
All	All	884/964 (91%)	-0.23	11 (1%)	79	80	9, 16, 31, 51	0

The worst 5 of 11 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	293	TYR	3.7
1	B	372	SER	2.5
1	B	9	GLY	2.5
1	B	292	SER	2.4
1	B	432	GLN	2.3

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
3	XYP	F	1	10/10	0.65	0.21	31,42,45,46	2
3	XYP	F	2	9/10	0.68	0.17	29,40,43,45	0
2	BMA	C	3	11/12	0.71	0.14	31,37,43,44	0
3	XYP	D	2	9/10	0.75	0.20	26,35,37,38	0
3	XYP	D	1	10/10	0.78	0.22	30,43,52,53	0

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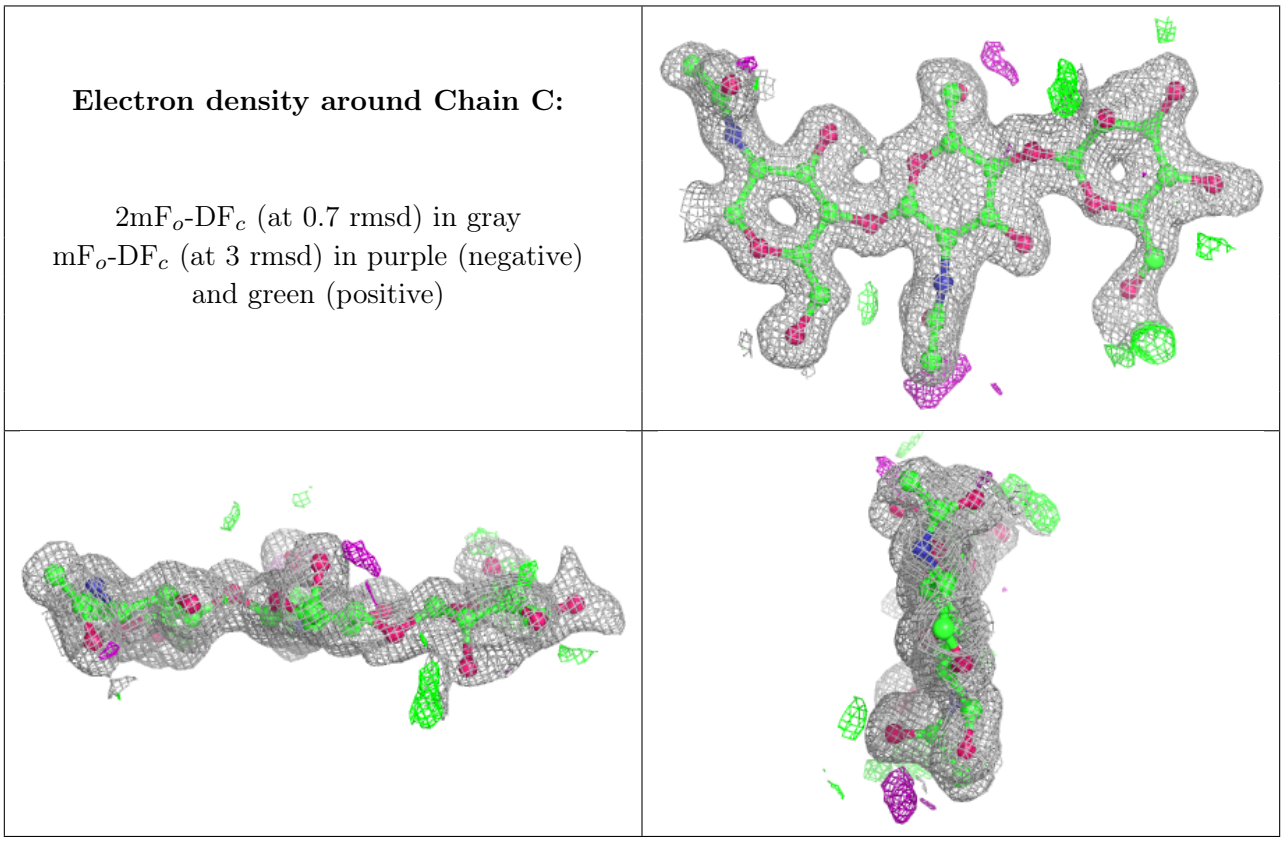
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
3	GCV	D	4	13/14	0.78	0.19	28,37,44,47	0
4	MAN	E	4	11/12	0.81	0.19	42,46,52,52	0
3	XYP	F	3	9/10	0.82	0.12	31,36,39,43	0
3	GCV	F	4	13/14	0.85	0.23	44,49,54,58	0
4	BMA	E	3	11/12	0.85	0.14	30,31,34,37	0
3	XYP	D	3	9/10	0.85	0.14	26,29,34,37	0
2	NAG	C	2	14/15	0.94	0.07	18,21,28,31	0
4	NAG	E	1	14/15	0.95	0.06	14,15,20,21	0
4	NAG	E	2	14/15	0.95	0.06	18,21,28,28	0
2	NAG	C	1	14/15	0.97	0.06	11,13,19,20	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.

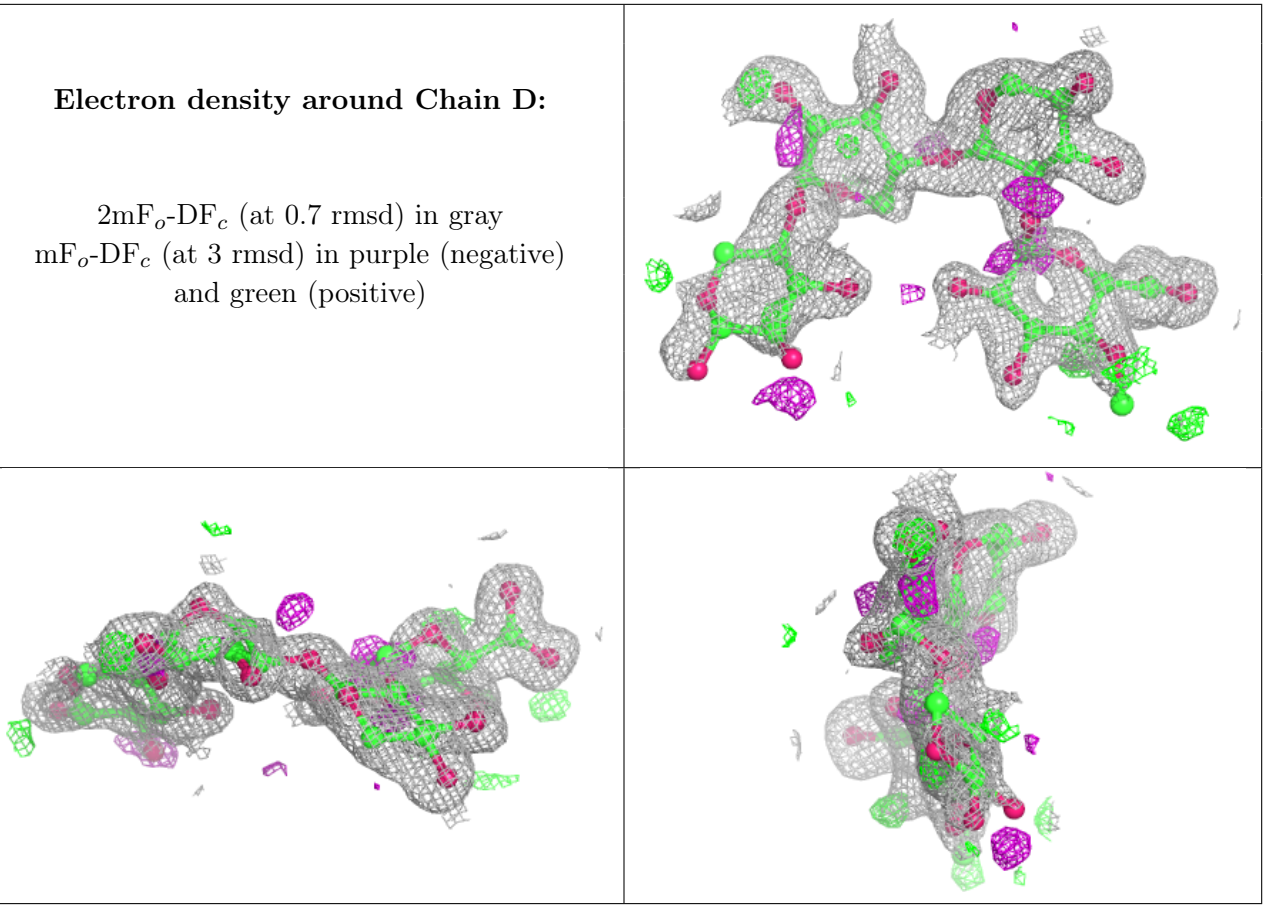
Electron density around Chain C:

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



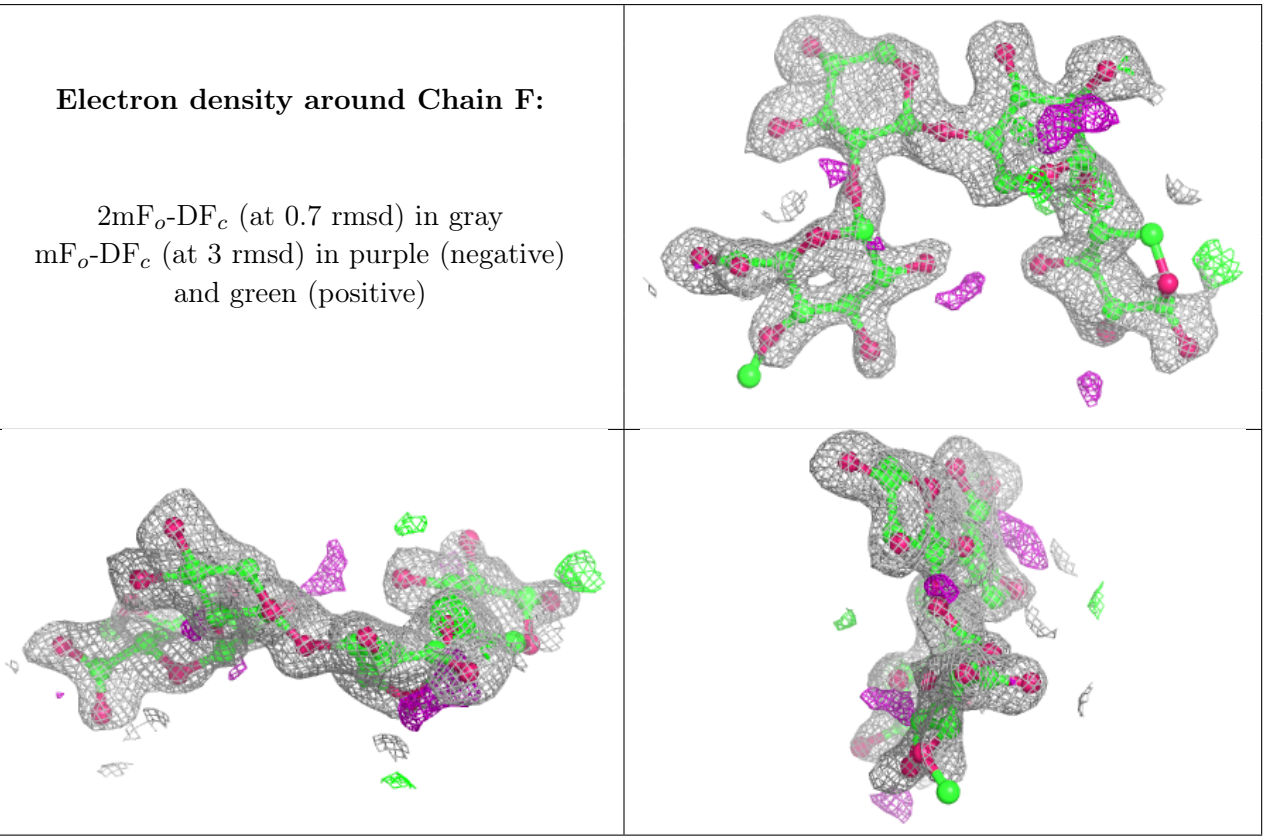
Electron density around Chain D:

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



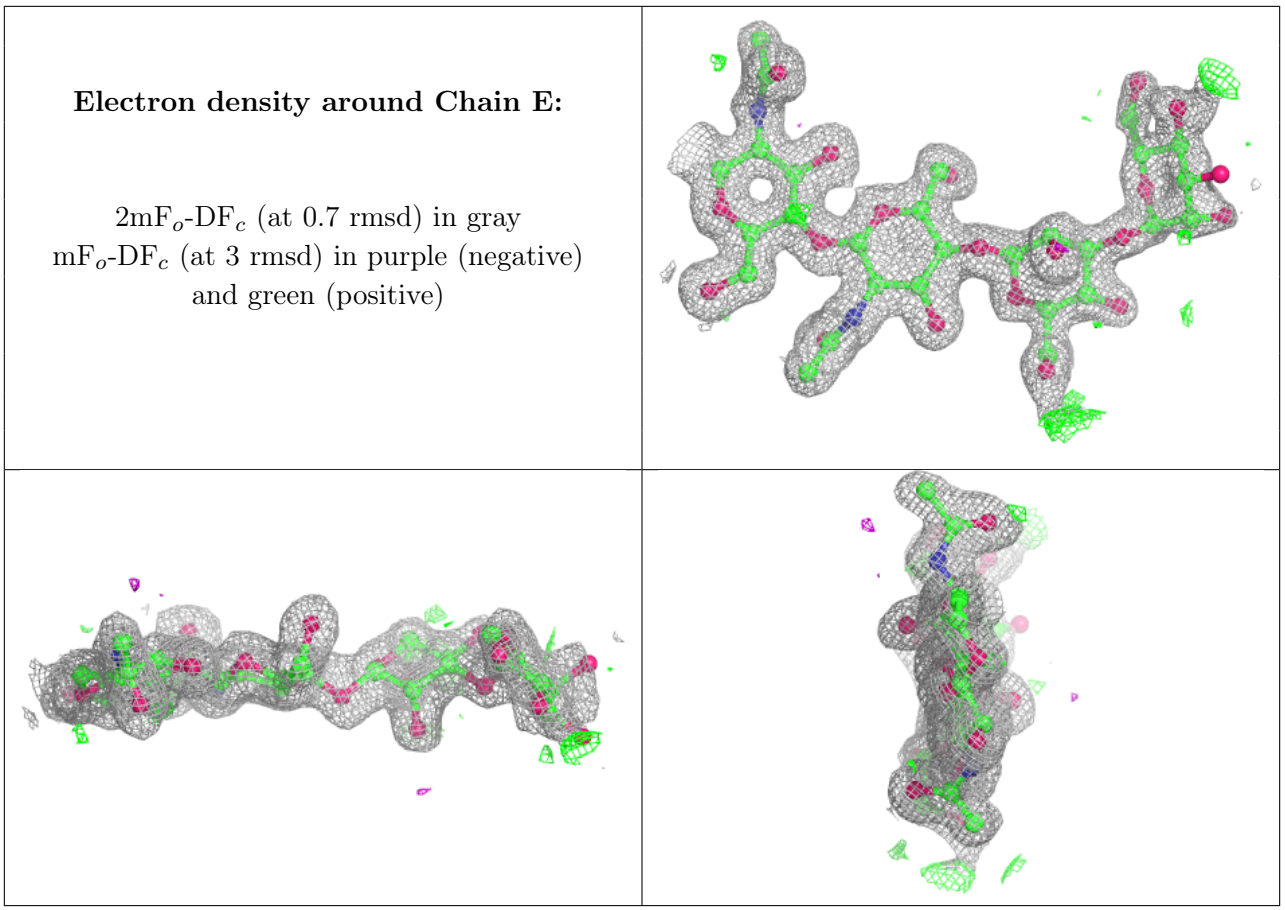
Electron density around Chain F:

$2mF_o$-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 E:

$2mF_o$-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
5	EDO	B	502	4/4	0.66	0.18	37,39,40,44	0
5	EDO	A	501	4/4	0.84	0.24	28,32,36,42	0
5	EDO	B	501	4/4	0.85	0.13	38,39,39,41	0
5	EDO	A	502	4/4	0.85	0.25	30,31,36,37	0
5	EDO	A	503	4/4	0.88	0.18	35,36,37,37	0

6.5 Other polymers

There are no such residues in this entry.