WORLD WIDE wwPDB PROTEIN DATA BANK

wwPDB X-ray Structure Validation Summary Report (i)

Jan 9, 2024 – 03:52 pm GMT

PDB ID	:	8ACF
Title	:	Structure of the argX-117 in complex with a complement C2 fragment at low pH
Authors	:	Olesen, H.G.; Andersen, G.R.
Deposited on	:	2022-07-05
Resolution	:	1.80 Å(reported)

The following versions of software and data (see references (i)) were used in the production of this report:

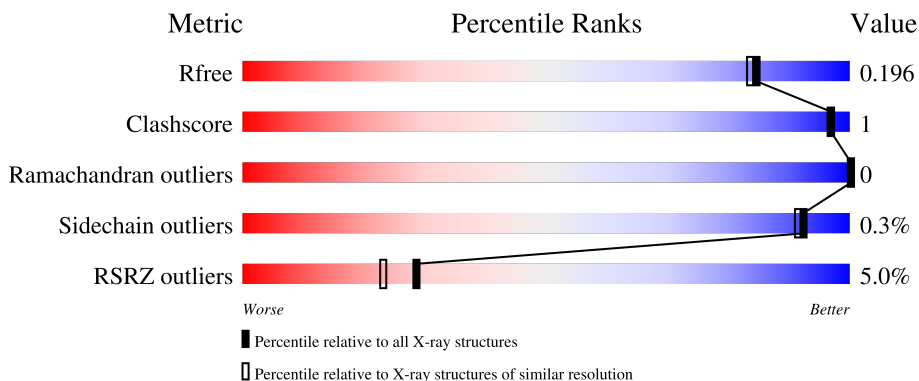|		
MolProbity	:	4.02b-467
Mogul	:	1.8.4, CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	2.36
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance ⓘ

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

The reported resolution of this entry is 1.80 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	Percentile Ranks	Value
Rfree		0.196
Clashscore		1
Ramachandran outliers		0
Sidechain outliers		0.3%
RSRZ outliers		5.0%

Worse *Better*

▮ Percentile relative to all X-ray structures
▯ Percentile relative to X-ray structures of similar resolution

Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R$_{free}$	130704	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)
RSRZ outliers	127900	5850 (1.80-1.80)

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	197	14% / 69% · 30%
2	H	219	.% / 98% ·
3	K	128	3% / 95% · ·
4	L	218	.% / 95% · ·
5	X	4	50% 50%

2 Entry composition ⓘ

There are 9 unique types of molecules in this entry. The entry contains 10807 atoms, of which 5085 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 Complement C2b fragment.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	138	Total	C	H	N	O	S	0	0	0
			1993	635	963	190	194	11			

- Molecule 2 is a protein called Heavy chain of mAb ARGX-117 Fab.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
2	H	219	Total	C	H	N	O	S	0	0	0
			3245	1034	1598	272	334	7			

- Molecule 3 is a protein called Nanobody specific for the kappa-light chain.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
3	K	125	Total	C	H	N	O	S	0	0	0
			1872	600	902	174	192	4			

- Molecule 4 is a protein called Light chain of mAb ARGX-117 Fab.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
4	L	215	Total	C	H	N	O	S	0	0	0
			3286	1040	1622	284	335	5			

- Molecule 5 is an oligosaccharide called alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

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

- Molecule 6 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula: $C_8H_{18}N_2O_4S$).
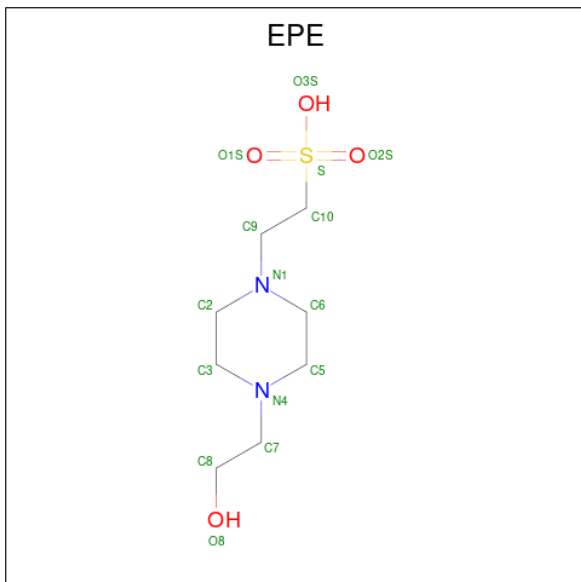
EPE

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
6	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		
6	L	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

- Molecule 7 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	H	1	Total	Ca	0	0
			1	1		

- Molecule 8 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	K	1	Total	Cl	0	0
			1	1		
8	L	1	Total	Cl	0	0
			1	1		

- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	39	Total	O	0	0
			39	39		

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| Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	H	131	Total 131	O 131	0	0
9	K	47	Total 47	O 47	0	0
9	L	111	Total 111	O 111	0	0

3 Residue-property plots ⓘ

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.
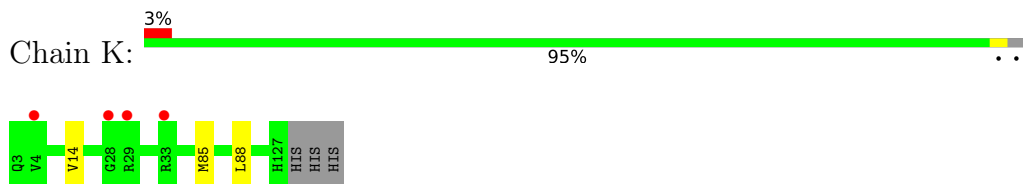
• Molecule 1: Complement C2b fragment
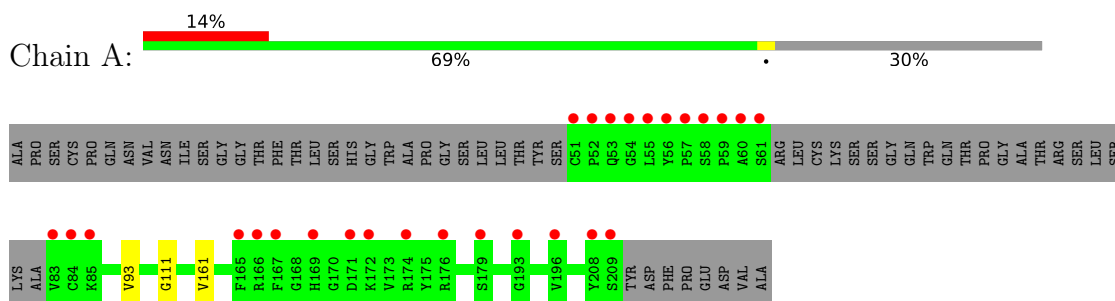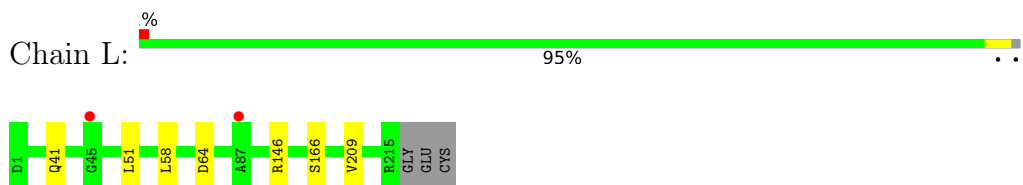
Chain A:

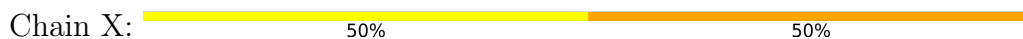• Molecule 2: Heavy chain of mAb ARGX-117 Fab
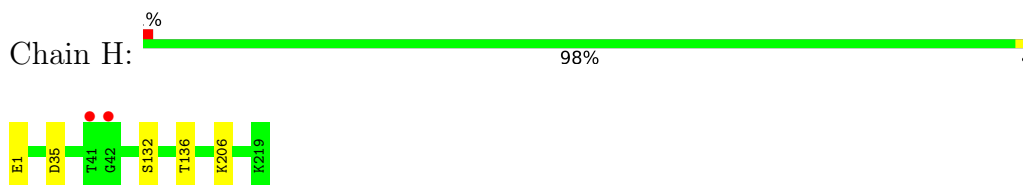
Chain H:

• Molecule 3: Nanobody specific for the kappa-light chain

Chain K:

• Molecule 4: Light chain of mAb ARGX-117 Fab

Chain L:

• Molecule 5: alpha-D-mannopyranose-(1-6)-beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain X:

NAG1 NAG2 BMA3 MAN4

4 Data and refinement statistics ⓘ

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α, β, γ	71.83Å 89.14Å 146.49Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	44.57 – 1.80 44.57 – 1.80	Depositor EDS
% Data completeness (in resolution range)	100.0 (44.57-1.80) 100.0 (44.57-1.80)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	1.28 (at 1.79Å)	Xtriage
Refinement program	PHENIX 1.19.2_4158	Depositor
R, R_{free}	0.178 , 0.199 0.174 , 0.196	Depositor DCC
R_{free} test set	4399 reflections (5.01%)	wwPDB-VP
Wilson B-factor (Å^2)	38.5	Xtriage
Anisotropy	0.164	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.39 , 48.6	EDS
L-test for twinning [2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.97	EDS
Total number of atoms	10807	wwPDB-VP
Average B, all atoms (Å^2)	53.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.12% of the height of the origin peak. No significant pseudotranslation is detected.*

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[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: NAG, BMA, EPE, CL, CA, MAN

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	0.51	0/1058	0.69	0/1436
2	H	0.70	0/1685	0.71	0/2294
3	K	0.70	0/992	0.71	0/1341
4	L	0.78	2/1700 (0.1%)	0.74	1/2307 (0.0%)
All	All	0.69	2/5435 (0.0%)	0.72	1/7378 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	L	209	VAL	CB-CG2	-9.04	1.33	1.52
4	L	166	SER	CB-OG	-7.00	1.33	1.42

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	L	146	ARG	NE-CZ-NH1	5.53	123.06	120.30

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	1030	963	963	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	H	1647	1598	1598	1	1
3	K	970	902	902	2	0
4	L	1664	1622	1621	2	0
5	X	50	0	43	2	0
6	A	15	0	18	0	1
6	L	15	0	18	1	0
7	H	1	0	0	0	0
8	K	1	0	0	0	0
8	L	1	0	0	0	0
9	A	39	0	0	0	0
9	H	131	0	0	0	0
9	K	47	0	0	0	0
9	L	111	0	0	0	0
All	All	5722	5085	5163	9	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 1.

The worst 5 of 9 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)
5:X:2:NAG:H4	5:X:3:BMA:O2	1.99	0.59
1:A:111:GLY:HA2	5:X:1:NAG:H82	1.89	0.55
4:L:58:LEU:HD11	4:L:64:ASP:HA	1.94	0.49
6:L:301:EPE:H31	6:L:301:EPE:H81	1.77	0.46
1:A:93:VAL:HG21	1:A:161:VAL:HG22	1.99	0.43

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)
2:H:206:LYS:NZ	6:A:301:EPE:O2S[3_645]	2.14	0.06

5.3 Torsion angles ⓘ

5.3.1 Protein backbone ⓘ

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	134/197 (68%)	131 (98%)	3 (2%)	0	100	100
2	H	217/219 (99%)	215 (99%)	2 (1%)	0	100	100
3	K	123/128 (96%)	118 (96%)	5 (4%)	0	100	100
4	L	213/218 (98%)	208 (98%)	5 (2%)	0	100	100
All	All	687/762 (90%)	672 (98%)	15 (2%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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	113/161 (70%)	113 (100%)	0	100	100
2	H	185/185 (100%)	183 (99%)	2 (1%)	73	68
3	K	101/104 (97%)	101 (100%)	0	100	100
4	L	189/191 (99%)	189 (100%)	0	100	100
All	All	588/641 (92%)	586 (100%)	2 (0%)	92	91

All (2) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	H	1	GLU
2	H	35	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

4 monosaccharides are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
5	NAG	X	1	5,1	14,14,15	0.41	0	17,19,21	0.49	0
5	NAG	X	2	5	14,14,15	1.09	1 (7%)	17,19,21	0.71	0
5	BMA	X	3	5	11,11,12	1.85	1 (9%)	15,15,17	2.50	5 (33%)
5	MAN	X	4	5	11,11,12	1.50	1 (9%)	15,15,17	2.07	5 (33%)

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	NAG	X	1	5,1	-	0/6/23/26	0/1/1/1
5	NAG	X	2	5	-	0/6/23/26	0/1/1/1
5	BMA	X	3	5	-	0/2/19/22	0/1/1/1
5	MAN	X	4	5	-	0/2/19/22	0/1/1/1

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	X	3	BMA	C1-C2	5.66	1.65	1.52
5	X	4	MAN	O5-C1	4.30	1.50	1.43

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	X	2	NAG	O5-C1	-3.93	1.37	1.43

The worst 5 of 10 bond angle outliers are listed below:

| Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	X	3	BMA	O2-C2-C3	-5.93	98.26	110.14
5	X	3	BMA	O2-C2-C1	5.10	119.58	109.15
5	X	4	MAN	C1-C2-C3	4.84	115.61	109.67
5	X	4	MAN	C2-C3-C4	3.81	117.49	110.89
5	X	3	BMA	C1-C2-C3	2.80	113.11	109.67

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

3 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	X	2	NAG	1	0
5	X	1	NAG	1	0
5	X	3	BMA	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 X

Bond lengths

Bond angles

Torsions

Rings
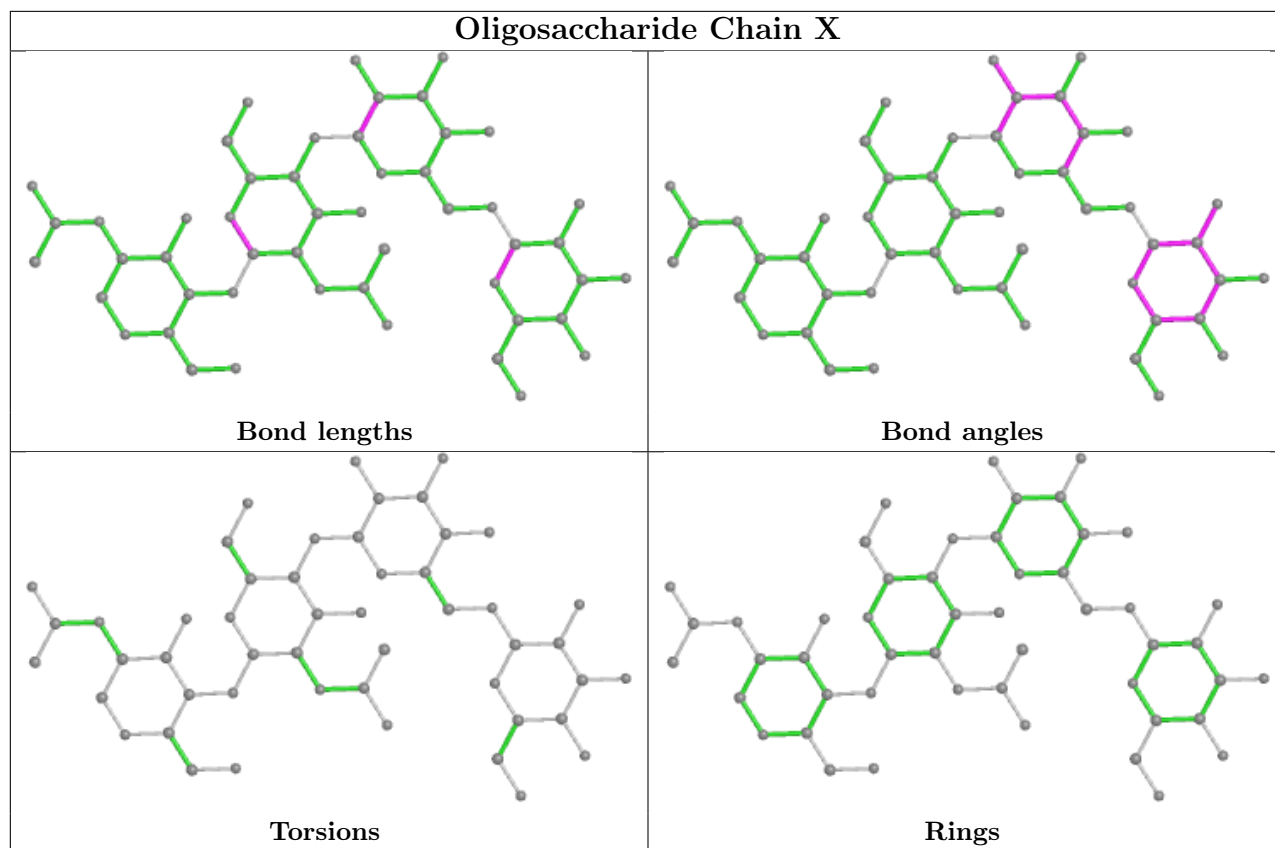
5.6   Ligand geometry ⓘ

Of 5 ligands modelled in this entry, 3 are monoatomic - leaving 2 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	#$|Z| > 2$	Counts	RMSZ	#$|Z| > 2$
6	EPE	L	301	-	15,15,15	1.32	3 (20%)	18,20,20	2.00	5 (27%)
6	EPE	A	301	-	15,15,15	1.29	2 (13%)	18,20,20	2.27	5 (27%)

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	EPE	L	301	-	-	6/9/19/19	0/1/1/1
6	EPE	A	301	-	-	7/9/19/19	0/1/1/1

All (5) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	301	EPE	C10-S	3.77	1.82	1.77
6	L	301	EPE	C10-S	3.54	1.82	1.77
6	L	301	EPE	O1S-S	2.22	1.51	1.45
6	L	301	EPE	O2S-S	2.07	1.51	1.45
6	A	301	EPE	O1S-S	2.03	1.51	1.45

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
6	A	301	EPE	O2S-S-C10	5.60	113.66	106.92
6	A	301	EPE	O3S-S-O2S	-4.89	99.31	111.27
6	L	301	EPE	O3S-S-O1S	-4.09	101.28	111.27
6	L	301	EPE	O1S-S-C10	3.73	111.40	106.92
6	L	301	EPE	O3S-S-C10	3.53	111.47	105.77

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	301	EPE	S-C10-C9-N1
6	A	301	EPE	C9-C10-S-O1S
6	A	301	EPE	C9-C10-S-O2S
6	L	301	EPE	C10-C9-N1-C2
6	L	301	EPE	C10-C9-N1-C6

There are no ring outliers.

2 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
6	L	301	EPE	1	0
6	A	301	EPE	0	1

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data ⓘ

6.1 Protein, DNA and RNA chains ⓘ

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

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2			OWAB(Å^2)	Q<0.9
1	A	138/197 (70%)	1.03	27 (19%)	1	0	33, 62, 103, 142	0
2	H	219/219 (100%)	-0.00	2 (0%)	84	82	30, 42, 68, 109	0
3	K	125/128 (97%)	0.06	4 (3%)	47	41	31, 44, 73, 92	0
4	L	215/218 (98%)	0.07	2 (0%)	84	82	29, 39, 59, 81	0
All	All	697/762 (91%)	0.24	35 (5%)	28	23	29, 43, 84, 142	0

The worst 5 of 35 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	83	VAL	10.2
1	A	60	ALA	9.1
1	A	59	PRO	8.3
1	A	51	CYS	6.7
1	A	84	CYS	6.5

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, 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.
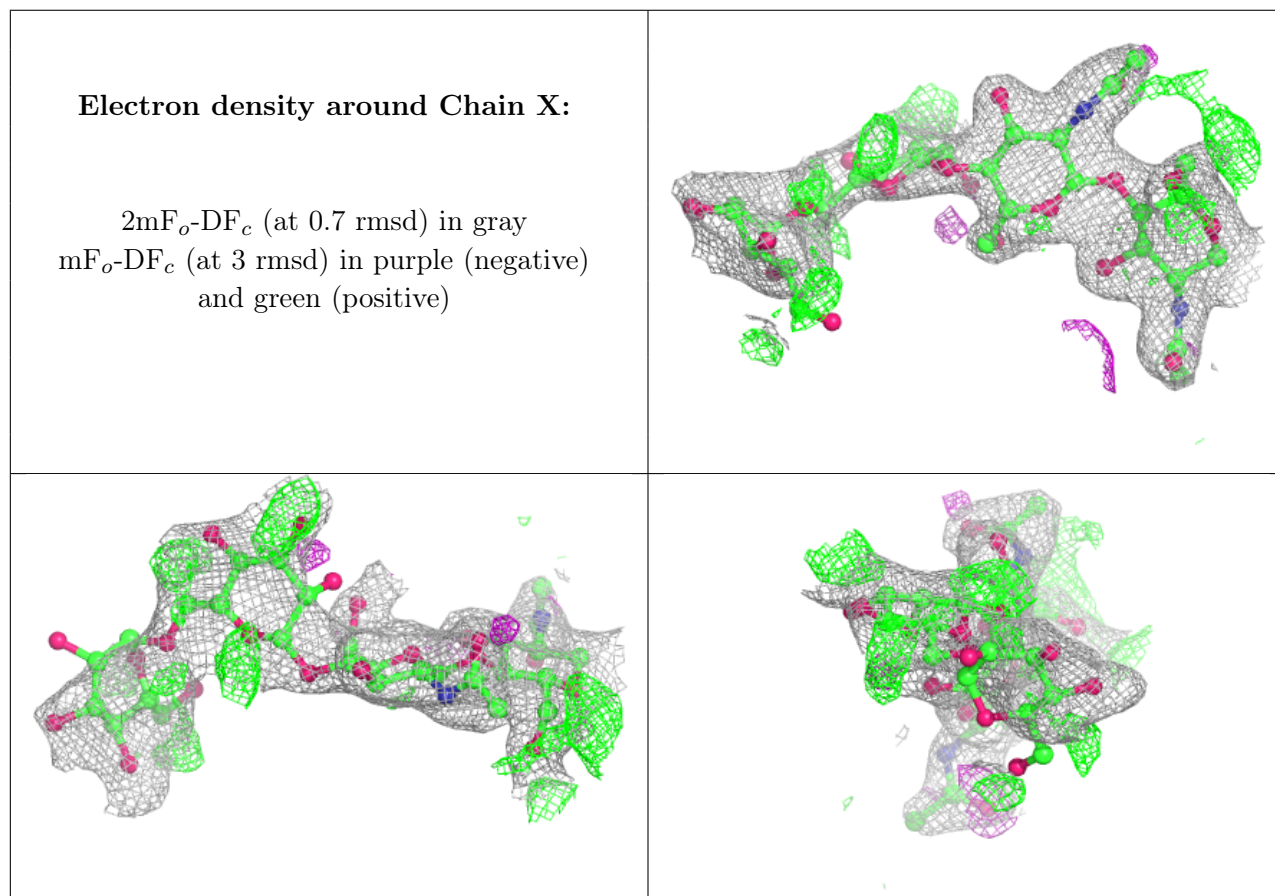
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
5	MAN	X	4	11/12	0.61	0.32	95,129,161,166	0
5	BMA	X	3	11/12	0.63	0.28	95,114,124,164	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\mathring{A}^2$)	Q<0.9
5	NAG	X	2	14/15	0.88	0.14	56,64,88,99	0
5	NAG	X	1	14/15	0.89	0.14	45,51,60,63	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 X:

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

6.4 Ligands ⓘ

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\mathring{A}^2$)	Q<0.9
6	EPE	L	301	15/15	0.84	0.17	59,71,116,122	0
6	EPE	A	301	15/15	0.85	0.18	50,83,98,111	0
8	CL	L	302	1/1	0.92	0.06	65,65,65,65	0
8	CL	K	201	1/1	0.94	0.11	68,68,68,68	0
7	CA	H	301	1/1	1.00	0.16	32,32,32,32	0

6.5 Other polymers ⓘ

There are no such residues in this entry.