



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 09:10 PM UTC

PDB ID : 6GNE / pdb_00006gne
Title : Catalytic domain of Starch Synthase IV from Arabidopsis thaliana bound to ADP and acarbose
Authors : Cuesta-Seijo, J.A.; Ruzanski, C.; Krucewicz, K.; Striebeck, A.; Palcic, M.M.
Deposited on : 2018-05-30
Resolution : 2.55 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

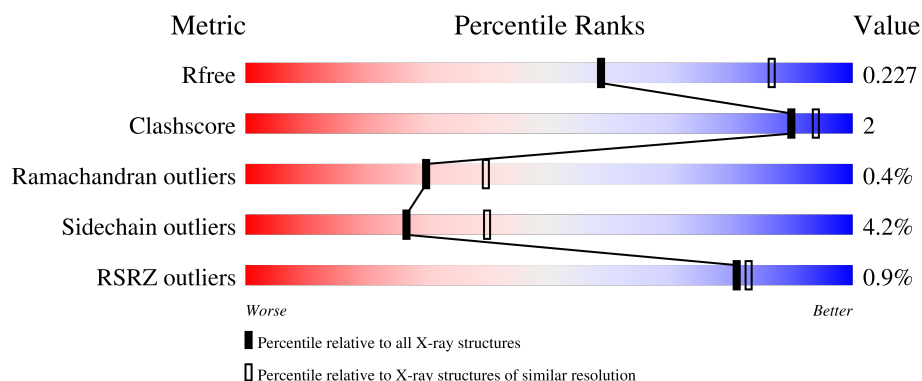
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.55 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	1091 (2.54-2.54)
Clashscore	190562	1120 (2.54-2.54)
Ramachandran outliers	187476	1106 (2.54-2.54)
Sidechain outliers	187428	1106 (2.54-2.54)
RSRZ outliers	180081	1091 (2.54-2.54)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	508	% 89% 7% ..
1	B	508	% 89% 7% ..
2	C	3	33% 67%
2	E	3	33% 67%
3	D	2	100%

2 Entry composition [i](#)

There are 5 unique types of molecules in this entry. The entry contains 8139 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 Probable starch synthase 4, chloroplastic/amyloplastic.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	493	Total	C	N	O	S	0	0	0
			3927	2506	682	725	14			
1	B	494	Total	C	N	O	S	0	0	0
			3932	2509	683	726	14			

- Molecule 2 is an oligosaccharide called 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	C	3	Total	C	N	O	0	0	0
			44	25	1	18			
2	E	3	Total	C	N	O	0	0	0
			44	25	1	18			

- Molecule 3 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	D	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 4 is ADENOSINE-5'-DIPHOSPHATE (CCD ID: ADP) (formula: C₁₀H₁₅N₅O₁₀P₂).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total 27	C 10	N 5	O 10	P 2	0	0
4	B	1	Total 27	C 10	N 5	O 10	P 2	0	0

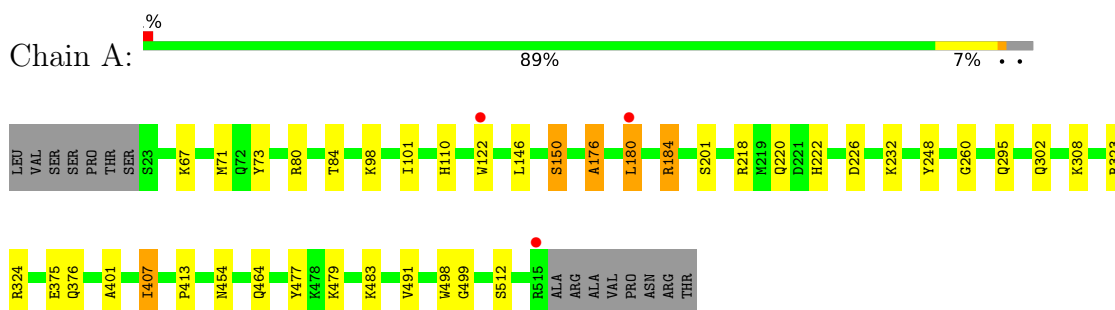
- Molecule 5 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	62	Total O 62 62	0	0
5	B	53	Total O 53 53	0	0

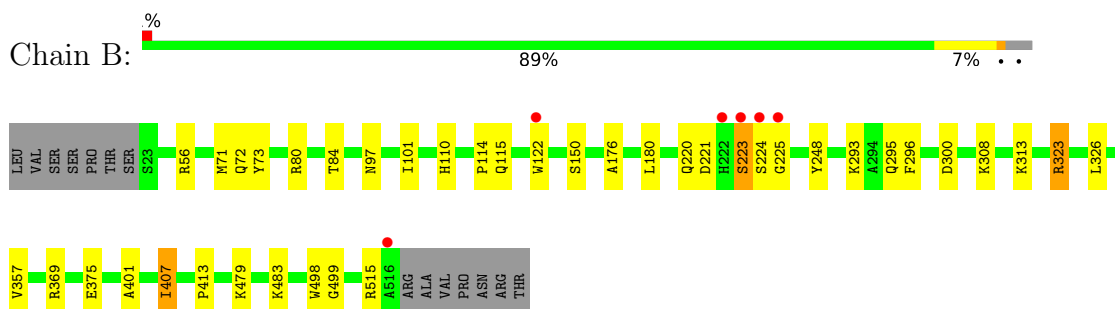
3 Residue-property plots [i](#)

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: Probable starch synthase 4, chloroplastic/amyloplastic



- Molecule 1: Probable starch synthase 4, chloroplastic/amyloplastic



- Molecule 2: 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose



- Molecule 2: 4,6-dideoxy-4-[(1S,4R,5S,6S)-4,5,6-trihydroxy-3-(hydroxymethyl)cyclohex-2-en-1-yl]amino}-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose



- Molecule 3: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain D:

100%

GLU1
GLU2

4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	129.76Å 166.94Å 47.94Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	41.87 – 2.55 41.87 – 2.55	Depositor EDS
% Data completeness (in resolution range)	93.6 (41.87-2.55) 93.6 (41.87-2.55)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.22 (at 2.54Å)	Xtriage
Refinement program	REFMAC 5.8.0189	Depositor
R, R_{free}	0.182 , 0.226 0.188 , 0.227	Depositor DCC
R_{free} test set	981 reflections (3.00%)	wwPDB-VP
Wilson B-factor (Å ²)	44.8	Xtriage
Anisotropy	0.131	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 27.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	8139	wwPDB-VP
Average B, all atoms (Å ²)	49.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.25% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: GLC, ADP, AC1

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	0.86	1/4026 (0.0%)	0.93	1/5448 (0.0%)
1	B	0.85	0/4031	0.93	0/5455
All	All	0.85	1/8057 (0.0%)	0.93	1/10903 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	176	ALA	C-N	5.09	1.37	1.33

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	324	ARG	NE-CZ-NH2	5.20	123.88	119.20

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	3927	0	3842	13	0
1	B	3932	0	3847	15	0
2	C	44	0	30	0	0
2	E	44	0	30	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	D	23	0	21	1	0
4	A	27	0	12	0	0
4	B	27	0	12	0	0
5	A	62	0	0	0	0
5	B	53	0	0	1	0
All	All	8139	0	7794	29	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.

All (29) 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:B:71:MET:SD	5:B:747:HOH:O	2.52	0.67
1:A:184:ARG:HG2	1:A:512:SER:OG	1.94	0.67
1:B:220:GLN:CD	1:B:223:SER:HB2	2.27	0.59
1:A:176:ALA:HA	1:A:180:LEU:O	2.05	0.57
1:B:176:ALA:HA	1:B:180:LEU:O	2.05	0.56
1:B:323:ARG:HH21	1:B:323:ARG:CG	2.22	0.53
1:B:223:SER:O	1:B:225:GLY:N	2.43	0.51
3:D:1:GLC:O3	3:D:2:GLC:O2	2.12	0.51
1:B:71:MET:HE2	1:B:73:TYR:CE2	2.46	0.51
1:A:71:MET:HE2	1:A:73:TYR:CE1	2.49	0.47
1:A:407:ILE:N	1:A:407:ILE:HD12	2.30	0.47
1:A:323:ARG:NH2	1:A:477:TYR:O	2.48	0.46
1:B:407:ILE:HD12	1:B:407:ILE:N	2.30	0.46
1:B:323:ARG:CG	1:B:323:ARG:NH2	2.81	0.44
1:B:296:PHE:HB2	1:B:300:ASP:O	2.17	0.44
1:B:326:LEU:HD11	1:B:357:VAL:HG23	1.98	0.44
1:A:220:GLN:O	1:A:232:LYS:HE2	2.17	0.43
1:A:222:HIS:CE1	1:A:260:GLY:HA3	2.54	0.43
1:A:101:ILE:HG22	1:A:110:HIS:CD2	2.55	0.42
1:B:101:ILE:HG22	1:B:110:HIS:CD2	2.53	0.42
1:B:248:TYR:CG	1:B:413:PRO:HA	2.55	0.42
1:A:454:ASN:HB2	1:A:491:VAL:HG22	2.01	0.41
1:A:498:TRP:O	1:A:499:GLY:C	2.63	0.41
1:A:308:LYS:HA	1:A:401:ALA:HB1	2.02	0.41
1:B:498:TRP:O	1:B:499:GLY:C	2.63	0.41
1:A:248:TYR:CG	1:A:413:PRO:HA	2.56	0.41
1:B:308:LYS:HA	1:B:401:ALA:HB1	2.03	0.41
1:A:146:LEU:O	1:A:150:SER:OG	2.37	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:97:ASN:HD22	1:B:114:PRO:HA	1.87	0.40

There are no symmetry-related clashes.

5.3 Torsion angles [i](#)

5.3.1 Protein backbone [i](#)

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

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

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	491/508 (97%)	476 (97%)	15 (3%)	0	100	100
1	B	492/508 (97%)	472 (96%)	16 (3%)	4 (1%)	16	22
All	All	983/1016 (97%)	948 (96%)	31 (3%)	4 (0%)	30	39

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	223	SER
1	B	515	ARG
1	B	221	ASP
1	B	224	SER

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	420/434 (97%)	401 (96%)	19 (4%)	24	38

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	420/434 (97%)	404 (96%)	16 (4%)	29	44
All	All	840/868 (97%)	805 (96%)	35 (4%)	26	40

All (35) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	67	LYS
1	A	80	ARG
1	A	84	THR
1	A	98	LYS
1	A	122	TRP
1	A	150	SER
1	A	180	LEU
1	A	184	ARG
1	A	201	SER
1	A	218	ARG
1	A	226	ASP
1	A	295	GLN
1	A	302	GLN
1	A	375	GLU
1	A	376	GLN
1	A	407	ILE
1	A	464	GLN
1	A	479	LYS
1	A	483	LYS
1	B	56	ARG
1	B	72	GLN
1	B	80	ARG
1	B	84	THR
1	B	115	GLN
1	B	122	TRP
1	B	150	SER
1	B	293	LYS
1	B	295	GLN
1	B	313	LYS
1	B	323	ARG
1	B	369	ARG
1	B	375	GLU
1	B	407	ILE
1	B	479	LYS
1	B	483	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (14) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	110	HIS
1	A	277	ASN
1	A	307	ASN
1	A	377	GLN
1	A	437	ASN
1	A	453	GLN
1	B	72	GLN
1	B	110	HIS
1	B	277	ASN
1	B	307	ASN
1	B	376	GLN
1	B	377	GLN
1	B	437	ASN
1	B	467	ASN

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 ⓘ

8 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	GLC	C	1	2	12,12,12	0.68	0	17,17,17	0.70	0
2	GLC	C	2	2	11,11,12	0.29	0	15,15,17	1.20	1 (6%)
2	AC1	C	3	2	21,22,23	0.71	0	22,32,34	1.11	2 (9%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
3	GLC	D	1	3	12,12,12	0.60	0	17,17,17	0.88	1 (5%)
3	GLC	D	2	3	11,11,12	0.50	0	15,15,17	1.39	3 (20%)
2	GLC	E	1	2	12,12,12	0.64	0	17,17,17	0.62	0
2	GLC	E	2	2	11,11,12	0.38	0	15,15,17	0.85	1 (6%)
2	AC1	E	3	2	21,22,23	0.75	0	22,32,34	1.28	3 (13%)

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	GLC	C	1	2	-	0/2/22/22	0/1/1/1
2	GLC	C	2	2	-	0/2/19/22	0/1/1/1
2	AC1	C	3	2	-	1/6/43/46	0/2/2/2
3	GLC	D	1	3	-	2/2/22/22	0/1/1/1
3	GLC	D	2	3	-	2/2/19/22	0/1/1/1
2	GLC	E	1	2	-	0/2/22/22	0/1/1/1
2	GLC	E	2	2	-	2/2/19/22	0/1/1/1
2	AC1	E	3	2	-	1/6/43/46	0/2/2/2

There are no bond length outliers.

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	2	GLC	C1-O5-C5	3.84	117.34	112.19
2	E	3	AC1	O3-C3-C2	-2.45	105.05	110.05
2	E	3	AC1	O3B-C3B-C4A	-2.39	104.92	109.64
3	D	2	GLC	C1-O5-C5	2.38	115.37	112.19
2	E	3	AC1	C1-C2-C3	2.28	112.97	109.64
2	C	3	AC1	O2B-C2B-C1B	2.22	113.46	109.08
3	D	2	GLC	C2-C3-C4	-2.22	106.95	110.86
3	D	2	GLC	O4-C4-C5	2.13	114.58	109.32
2	C	3	AC1	O3B-C3B-C4A	-2.05	105.58	109.64
2	E	2	GLC	C1-O5-C5	2.04	114.93	112.19
3	D	1	GLC	O5-C5-C6	2.02	111.44	106.44

There are no chirality outliers.

All (8) torsion outliers are listed below:

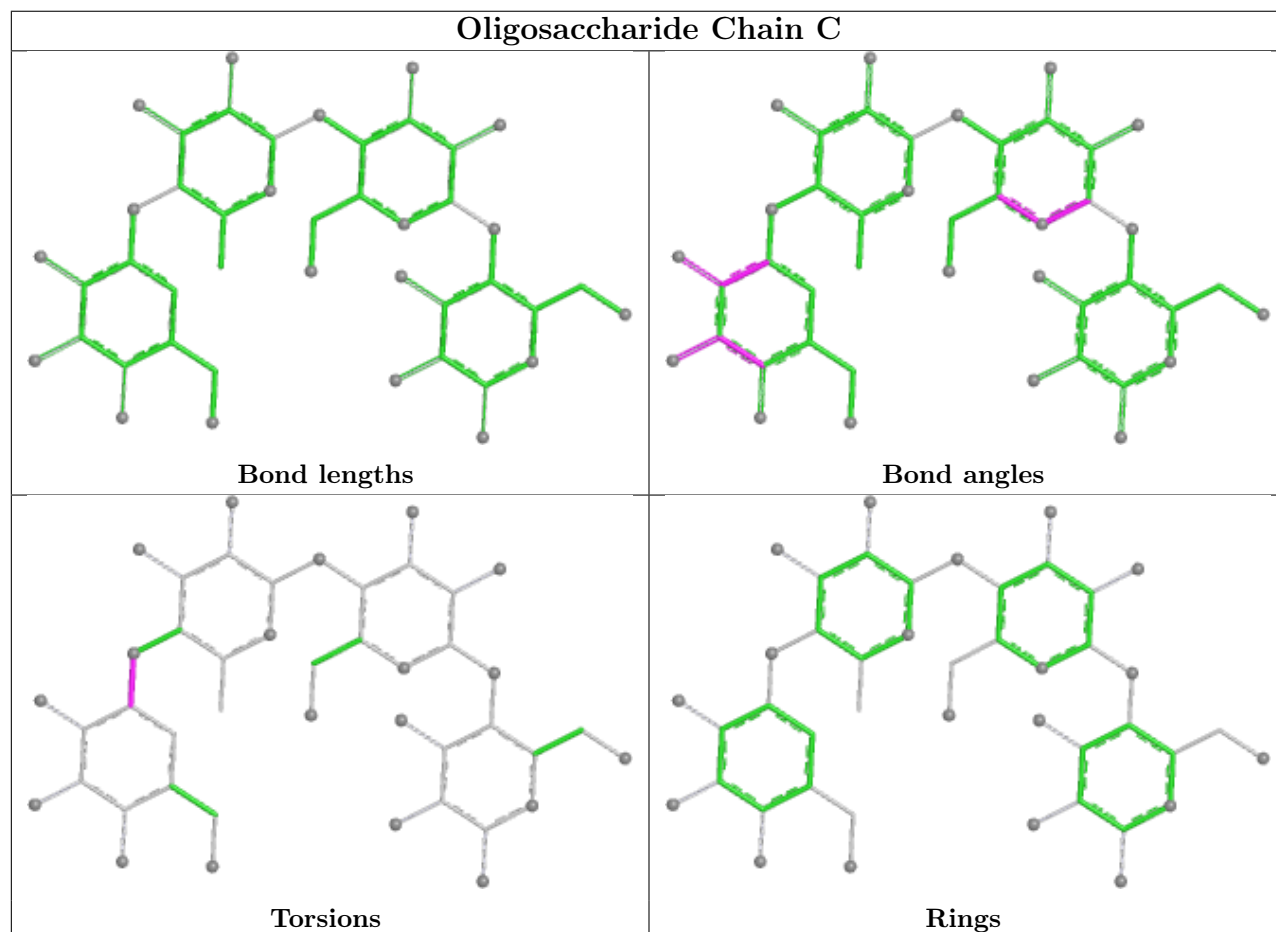
Mol	Chain	Res	Type	Atoms
3	D	1	GLC	O5-C5-C6-O6
3	D	1	GLC	C4-C5-C6-O6
2	E	2	GLC	O5-C5-C6-O6
2	E	2	GLC	C4-C5-C6-O6
3	D	2	GLC	O5-C5-C6-O6
3	D	2	GLC	C4-C5-C6-O6
2	C	3	AC1	C7B-C1B-N4A-C4
2	E	3	AC1	C7B-C1B-N4A-C4

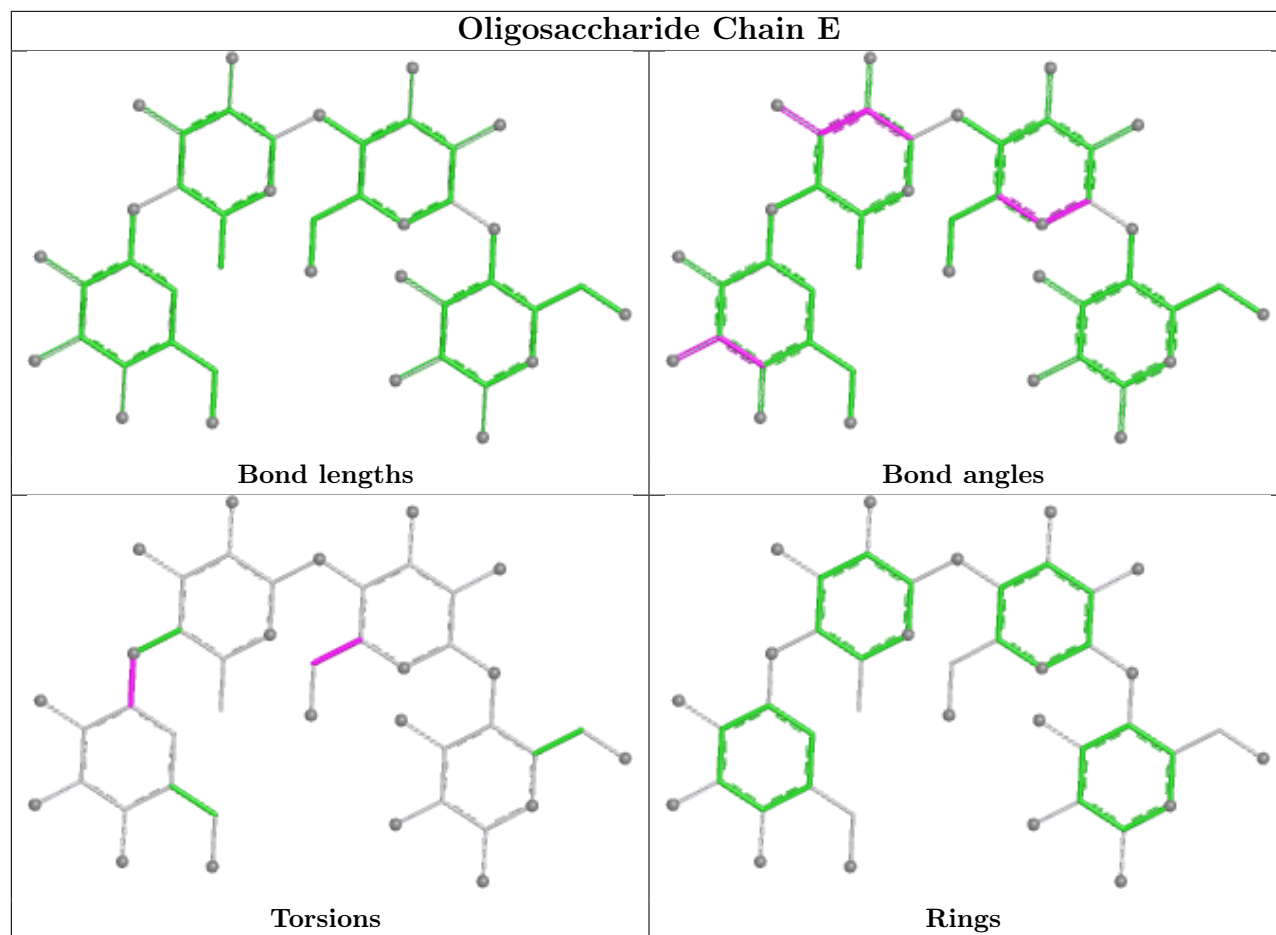
There are no ring outliers.

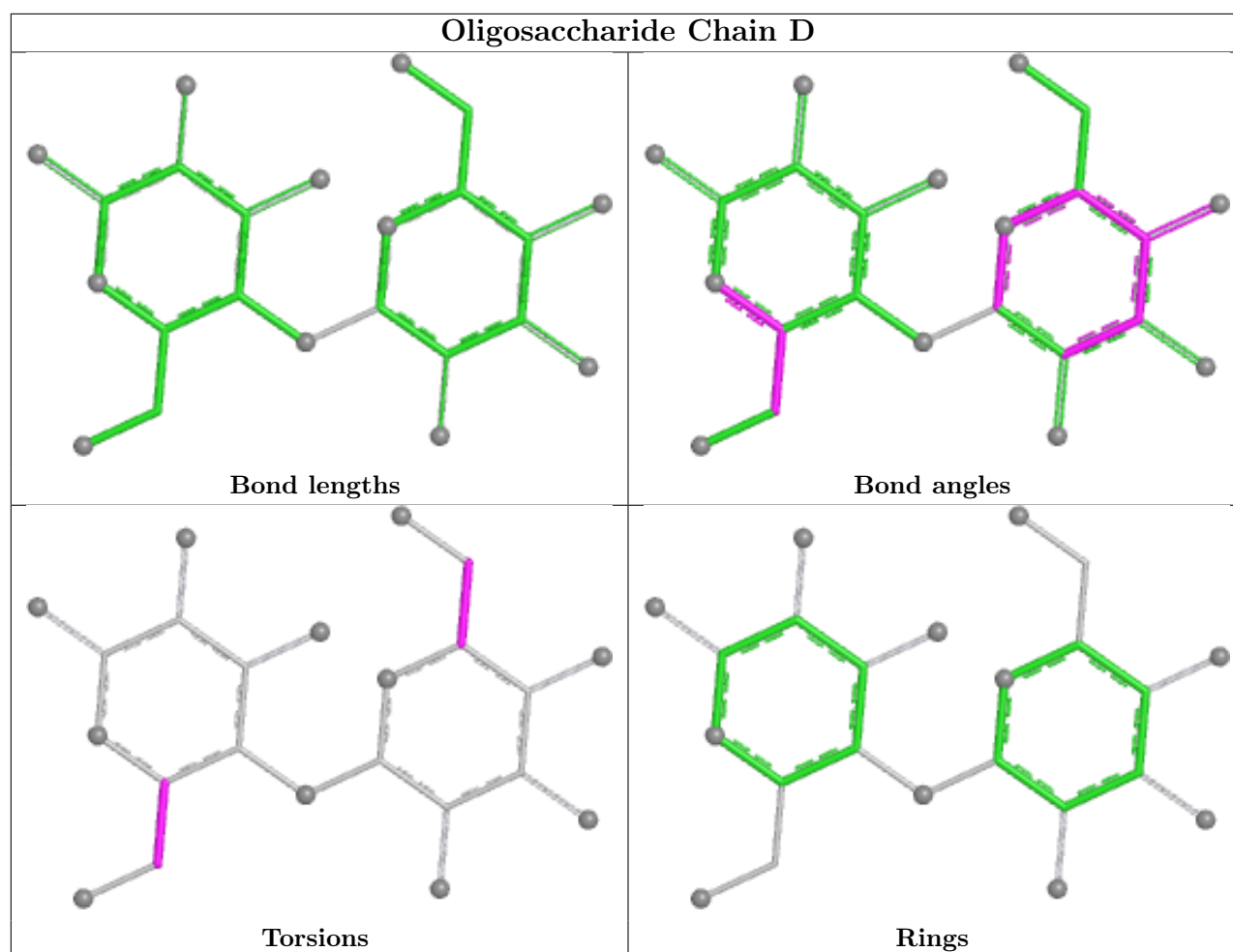
2 monomers are involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	D	2	GLC	1	0
3	D	1	GLC	1	0

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







5.6 Ligand geometry [i](#)

2 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	$\# Z > 2$
4	ADP	A	601	-	28,29,29	1.47	5 (17%)	43,45,45	1.80	9 (20%)
4	ADP	B	601	-	28,29,29	1.56	6 (21%)	43,45,45	1.67	10 (23%)

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
4	ADP	A	601	-	-	4/16/32/32	0/3/3/3
4	ADP	B	601	-	-	5/16/32/32	0/3/3/3

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	601	ADP	C5-C4	4.82	1.47	1.39
4	A	601	ADP	C5-C4	4.23	1.46	1.39
4	B	601	ADP	PA-O3A	3.51	1.63	1.59
4	A	601	ADP	C5-C6	3.27	1.50	1.41
4	B	601	ADP	C5-C6	2.72	1.48	1.41
4	B	601	ADP	C8-N7	2.70	1.36	1.31
4	A	601	ADP	C5-N7	-2.41	1.34	1.39
4	A	601	ADP	C4-N9	-2.26	1.33	1.37
4	B	601	ADP	C5-N7	-2.17	1.35	1.39
4	B	601	ADP	C4-N9	-2.10	1.33	1.37
4	A	601	ADP	C8-N7	2.07	1.35	1.31

All (19) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	601	ADP	C5-C4-N3	-5.30	119.42	126.72
4	B	601	ADP	C5-C4-N3	-4.48	120.55	126.72
4	A	601	ADP	C4-C5-N7	-4.04	105.96	110.58
4	A	601	ADP	N3-C4-N9	3.97	133.92	127.17
4	B	601	ADP	N3-C2-N1	-3.85	122.76	128.58
4	A	601	ADP	C2-N3-C4	3.76	121.01	111.83
4	B	601	ADP	N3-C4-N9	3.54	133.18	127.17
4	B	601	ADP	C2-N3-C4	3.50	120.38	111.83
4	A	601	ADP	N3-C2-N1	-3.17	123.78	128.58
4	B	601	ADP	C4-C5-N7	-3.10	107.04	110.58
4	A	601	ADP	C4-N9-C8	2.95	108.83	105.74
4	A	601	ADP	C5-N7-C8	2.93	108.05	103.45
4	B	601	ADP	C4-N9-C8	2.86	108.75	105.74
4	B	601	ADP	C2-N1-C6	2.63	123.05	118.73
4	B	601	ADP	C6-C5-N7	2.61	137.13	132.09
4	A	601	ADP	C6-C5-N7	2.47	136.86	132.09
4	A	601	ADP	N9-C8-N7	-2.42	110.50	113.94
4	B	601	ADP	C5-N7-C8	2.31	107.09	103.45
4	B	601	ADP	N9-C8-N7	-2.17	110.86	113.94

There are no chirality outliers.

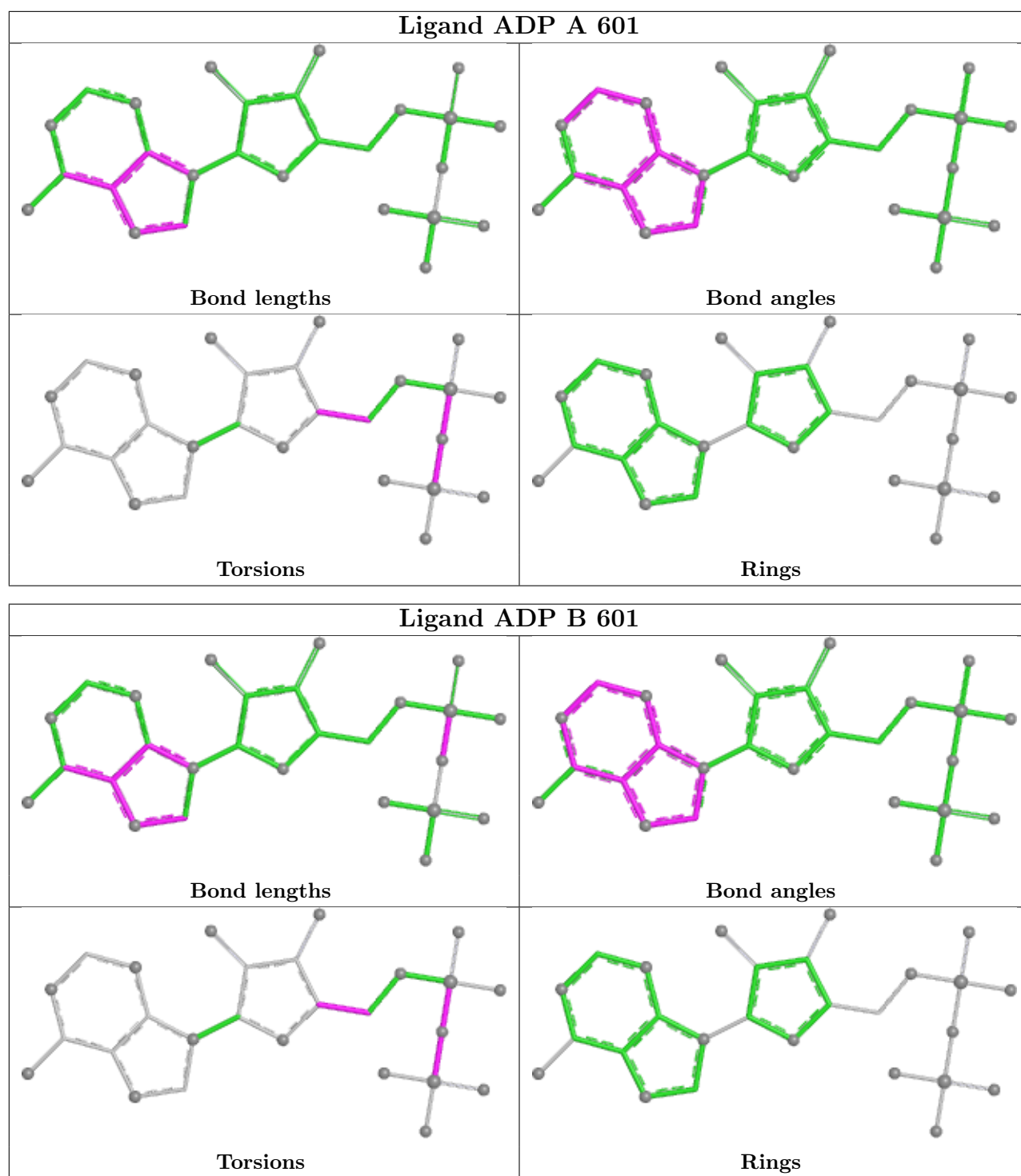
All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	601	ADP	O4'-C4'-C5'-O5'
4	A	601	ADP	C3'-C4'-C5'-O5'
4	B	601	ADP	C3'-C4'-C5'-O5'
4	B	601	ADP	O4'-C4'-C5'-O5'
4	B	601	ADP	PA-O3A-PB-O1B
4	A	601	ADP	PB-O3A-PA-O5'
4	B	601	ADP	PB-O3A-PA-O5'
4	B	601	ADP	PA-O3A-PB-O2B
4	A	601	ADP	PA-O3A-PB-O3B

There are no ring outliers.

No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



5.7 Other polymers ⓘ

There are no such residues in this entry.

5.8 Polymer linkage issues ⓘ

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	493/508 (97%)	-0.28	3 (0%) 85 88	27, 46, 81, 108	0
1	B	494/508 (97%)	-0.26	6 (1%) 76 77	27, 46, 77, 108	0
All	All	987/1016 (97%)	-0.27	9 (0%) 81 83	27, 46, 79, 108	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	225	GLY	3.4
1	B	224	SER	3.3
1	B	516	ALA	3.1
1	B	122	TRP	2.9
1	A	515	ARG	2.4
1	B	223	SER	2.3
1	B	222	HIS	2.1
1	A	122	TRP	2.1
1	A	180	LEU	2.0

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

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

6.3 Carbohydrates [i](#)

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

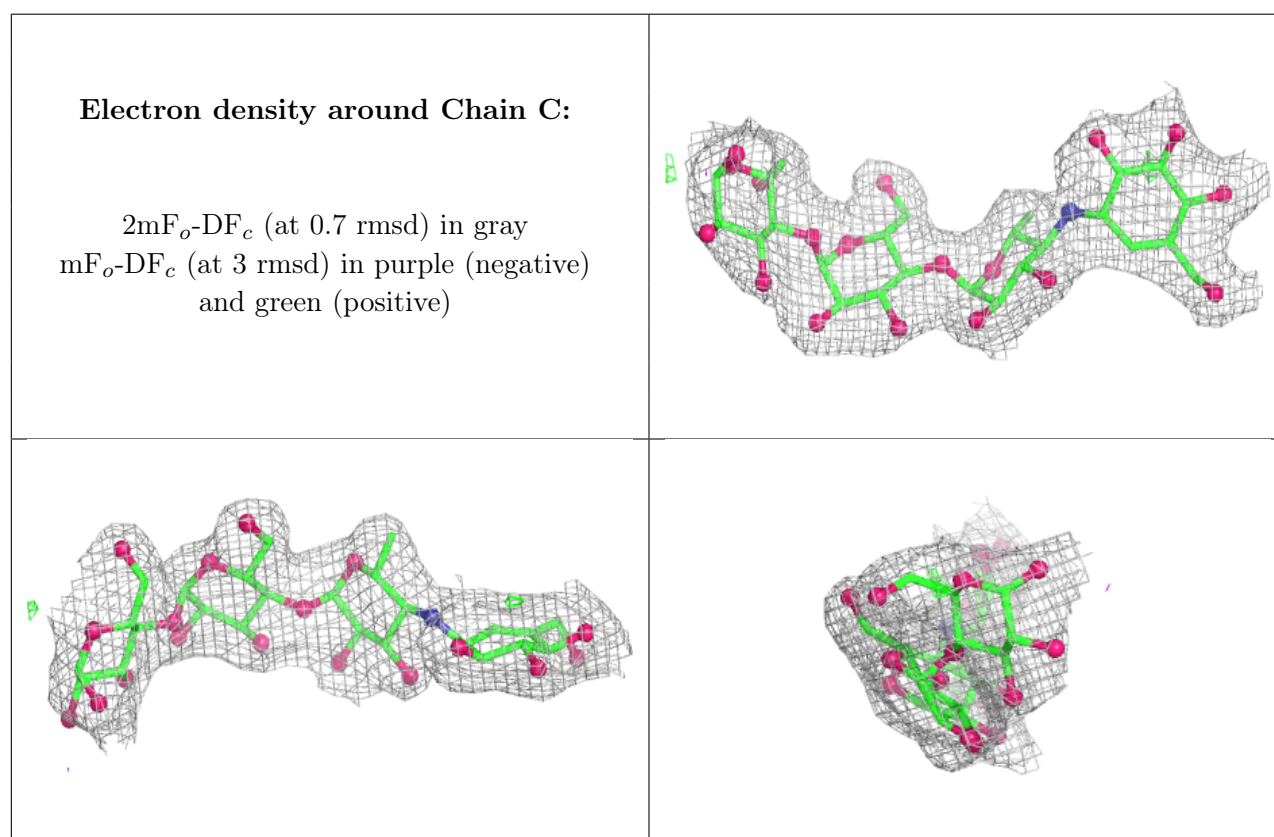
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
3	GLC	D	2	11/12	0.62	0.17	93,101,107,110	0

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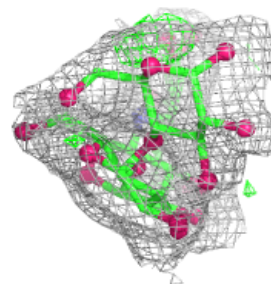
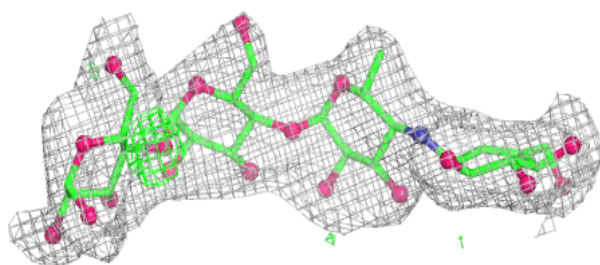
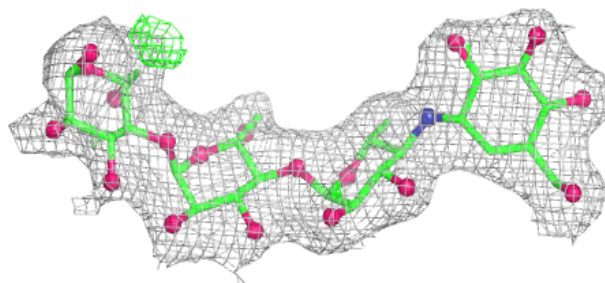
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	GLC	D	1	12/12	0.84	0.12	79,98,103,103	0
2	GLC	C	1	12/12	0.84	0.11	47,61,65,71	0
2	GLC	E	1	12/12	0.89	0.09	44,55,57,58	0
2	GLC	C	2	11/12	0.94	0.06	34,40,43,45	0
2	AC1	C	3	21/22	0.95	0.06	29,33,35,36	0
2	GLC	E	2	11/12	0.95	0.06	33,36,42,47	0
2	AC1	E	3	21/22	0.97	0.05	24,26,31,32	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.

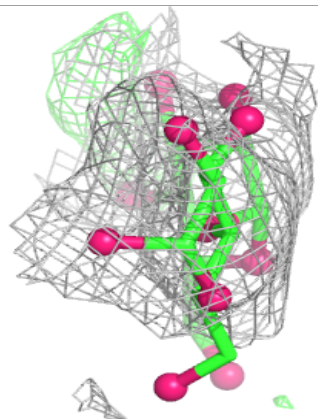
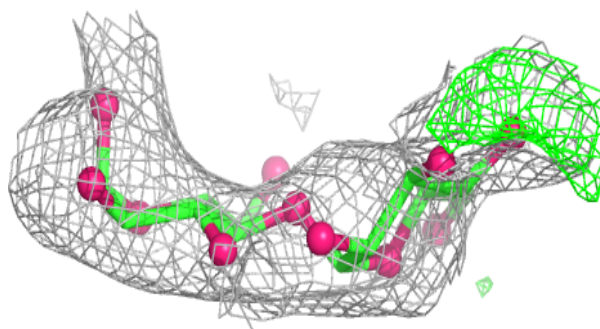
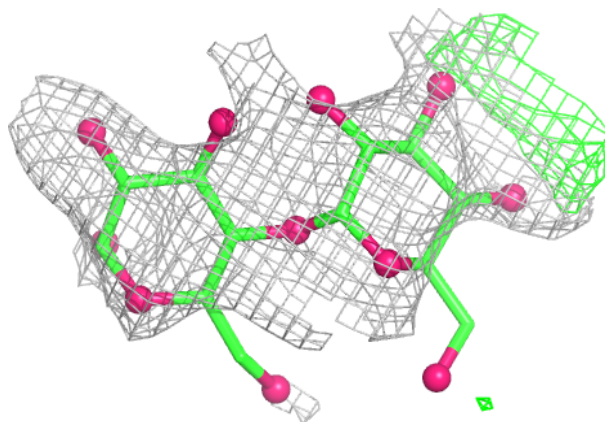


Electron density around Chain E:

$2mF_o-DF_c$ (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)

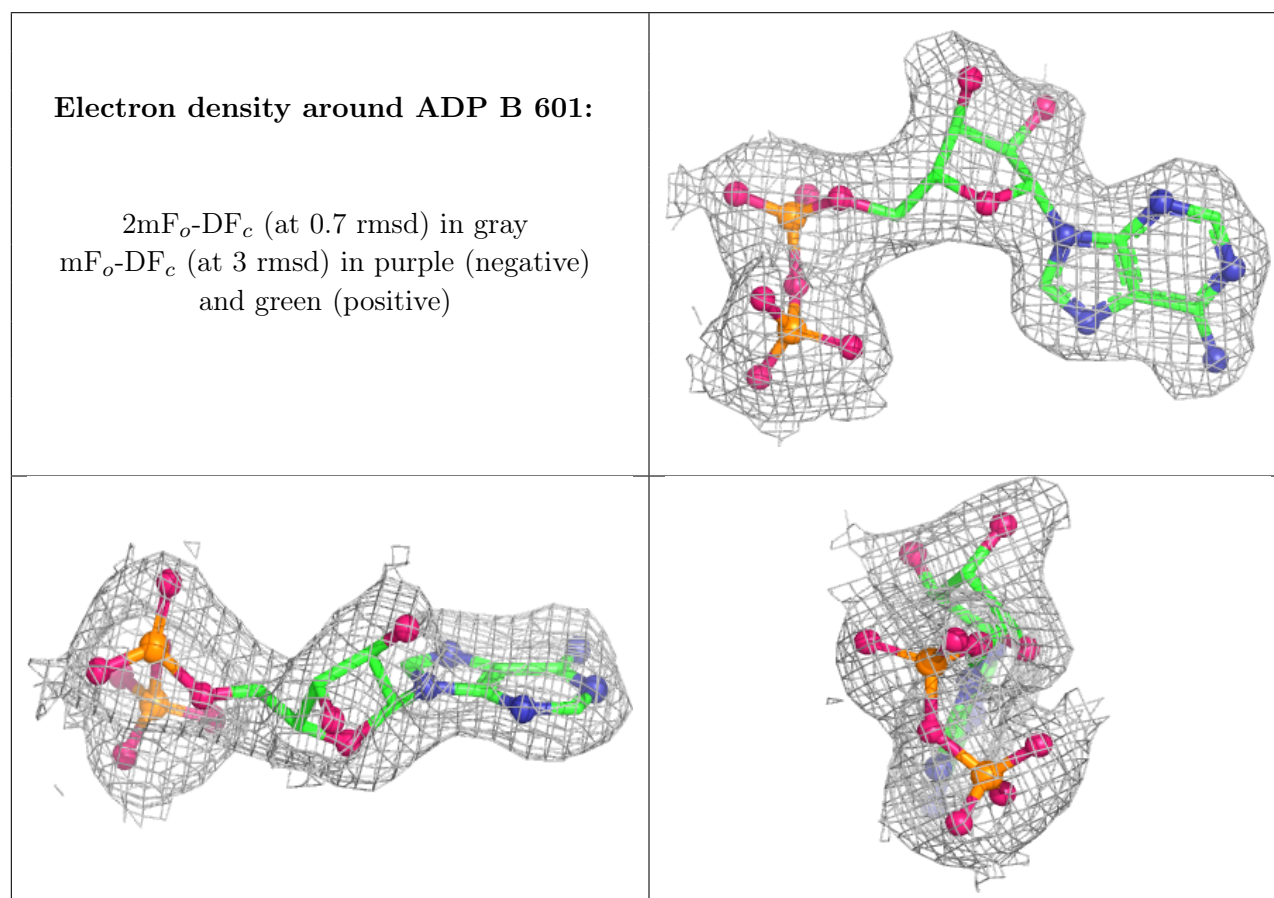


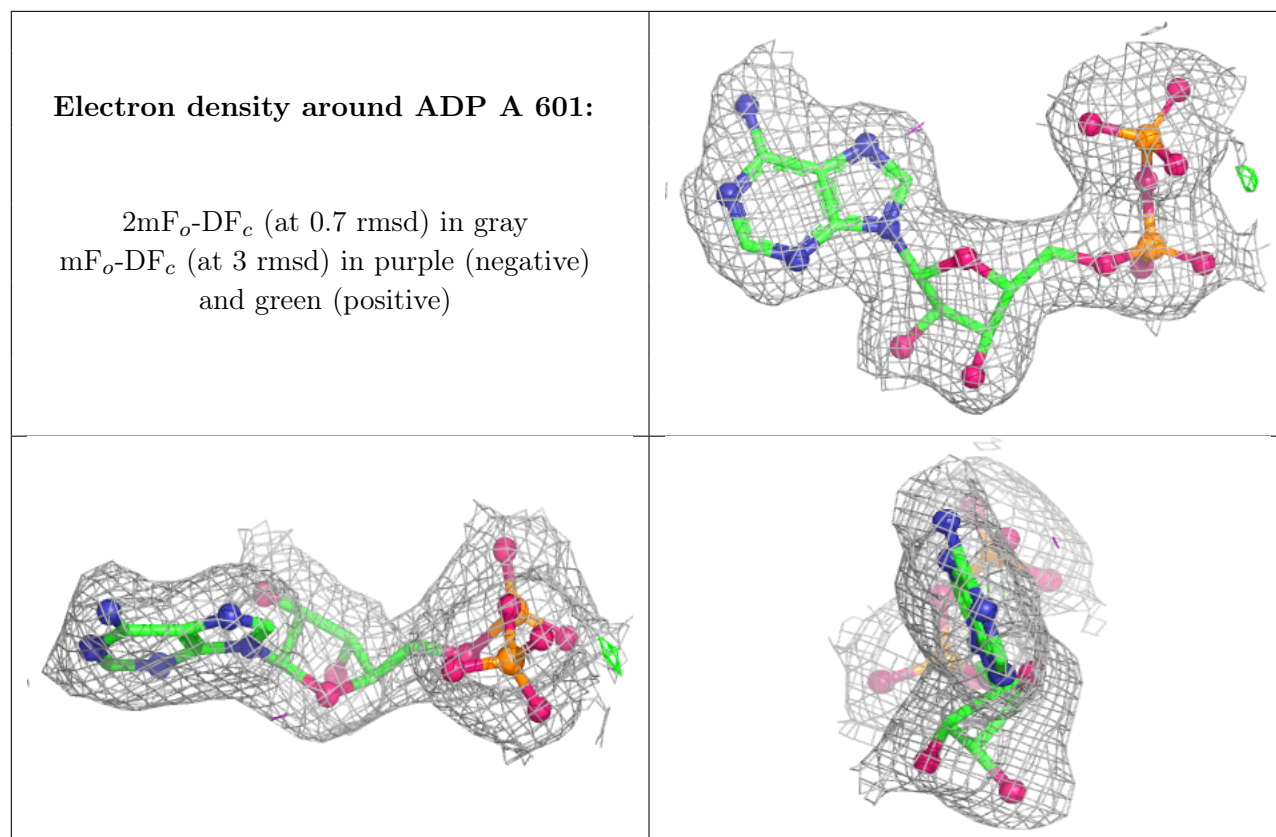
6.4 Ligands ⓘ

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(Å ²)	Q<0.9
4	ADP	B	601	27/27	0.98	0.05	29,31,34,35	0
4	ADP	A	601	27/27	0.99	0.04	27,28,29,30	0

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





6.5 Other polymers [i](#)

There are no such residues in this entry.