



Full wwPDB X-ray Structure Validation Report ⓘ

Oct 17, 2023 – 09:42 PM EDT

PDB ID : 1V3M
Title : Crystal structure of F283Y mutant cyclodextrin glycosyltransferase complexed with a pseudo-tetraose derived from acarbose
Authors : Kanai, R.; Haga, K.; Akiba, T.; Yamane, K.; Harata, K.
Deposited on : 2003-11-03
Resolution : 2.00 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 : 4.02b-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

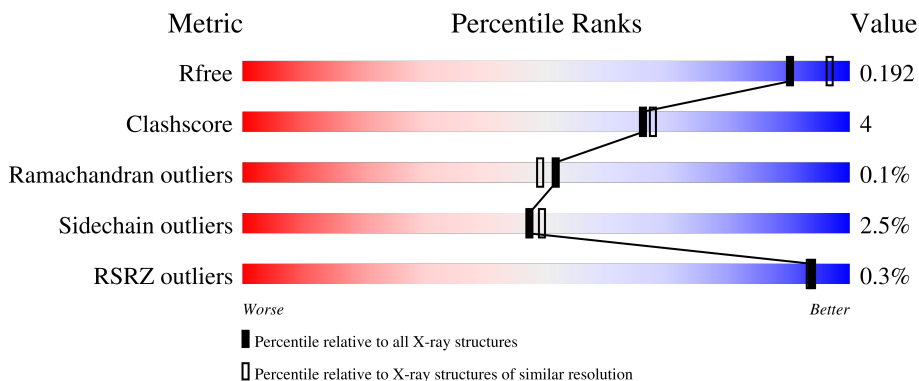
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.00 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	8085 (2.00-2.00)
Clashscore	141614	9178 (2.00-2.00)
Ramachandran outliers	138981	9054 (2.00-2.00)
Sidechain outliers	138945	9053 (2.00-2.00)
RSRZ outliers	127900	7900 (2.00-2.00)

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	686	 86% 13%
1	B	686	 84% 15%
2	C	2	 50% 50%
2	D	2	 100%
3	E	2	 100%

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
2	GAL	C	1	X	-	-	-
2	GLD	C	2	-	-	-	X
2	GAL	D	1	X	-	-	X
3	GLC	E	1	-	-	-	X
4	GLC	A	711	-	-	-	X
4	GLC	B	801	-	-	-	X
6	GAL	A	731	X	-	-	-
6	GAL	B	811	X	-	-	X
6	GAL	B	831	X	-	-	X

2 Entry composition [i](#)

There are 8 unique types of molecules in this entry. The entry contains 11486 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.

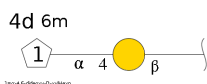
- Molecule 1 is a protein called Cyclomalto-dextrin glucanotransferase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	686	5313	3354	906	1037	16	0	0	0
1	B	686	5313	3354	906	1037	16	0	0	0

There are 6 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	283	TYR	PHE	engineered mutation	UNP P05618
A	452	PRO	ARG	SEE REMARK 999	UNP P05618
A	454	GLY	ALA	SEE REMARK 999	UNP P05618
B	283	TYR	PHE	engineered mutation	UNP P05618
B	452	PRO	ARG	SEE REMARK 999	UNP P05618
B	454	GLY	ALA	SEE REMARK 999	UNP P05618

- Molecule 2 is an oligosaccharide called 4,6-dideoxy-alpha-D-xylo-hexopyranose-(1-4)-beta-D-galactopyranose.



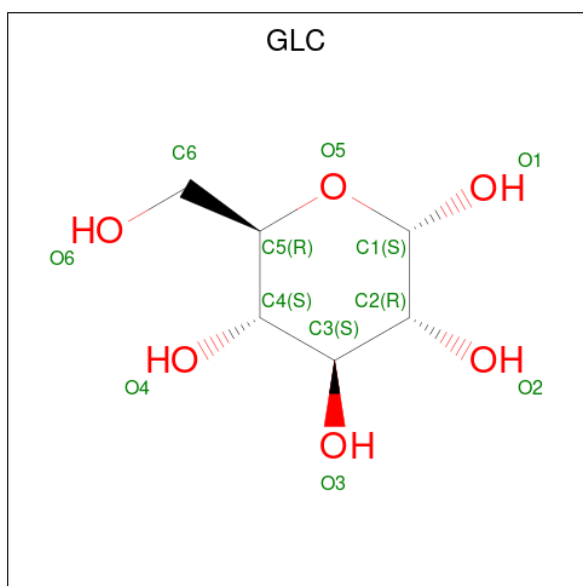
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
			Total	C	O			
2	C	2	21	12	9	0	0	0
2	D	2	21	12	9	0	0	0

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



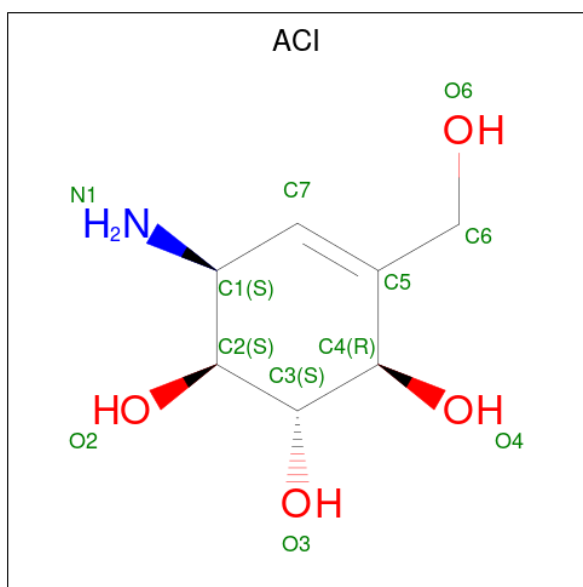
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
3	E	2	Total	C	O	0	0	0
			23	12	11			

- Molecule 4 is alpha-D-glucopyranose (three-letter code: GLC) (formula: C₆H₁₂O₆).



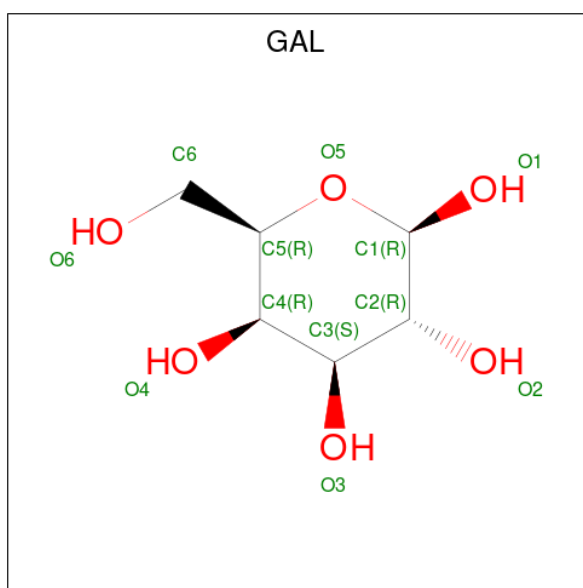
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			11	6	5		
4	A	1	Total	C	O	0	0
			12	6	6		
4	A	1	Total	C	O	0	0
			12	6	6		
4	B	1	Total	C	O	0	0
			11	6	5		

- Molecule 5 is 6-AMINO-4-HYDROXYMETHYL-CYCLOHEX-4-ENE-1,2,3-TRIOL (three-letter code: ACI) (formula: C₇H₁₃NO₄).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	
			Total	C	N			O
5	A	1	12	7	1	4	0	0
5	B	1	12	7	1	4	0	0

- Molecule 6 is beta-D-galactopyranose (three-letter code: GAL) (formula: $C_6H_{12}O_6$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	12	6	6	0	0
6	B	1	12	6	6	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	B	1	12	6	6	0	0

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ca		
7	A	2	2	2	0	0
7	B	2	2	2	0	0

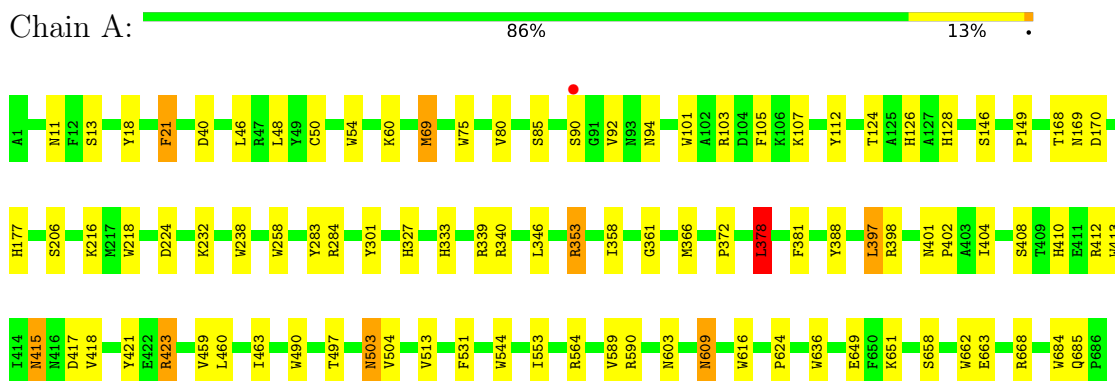
- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	A	342	342	342	0	0
8	B	343	343	343	0	0

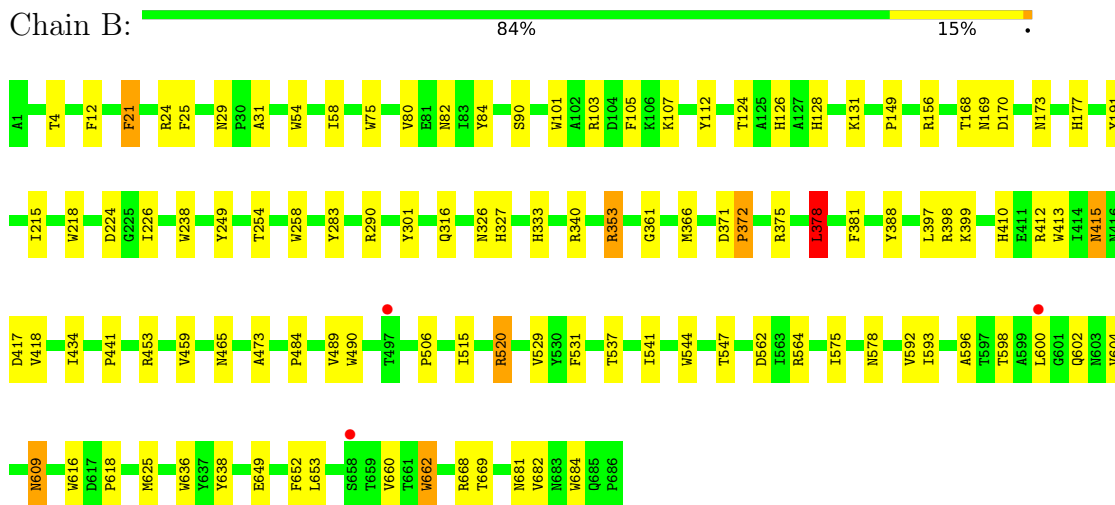
3 Residue-property plots

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: Cyclomaltodextrin glucanotransferase




- Molecule 1: Cyclomaltodextrin glucanotransferase



- Molecule 2: 4,6-dideoxy-alpha-D-xylo-hexopyranose-(1-4)-beta-D-galactopyranose



- Molecule 2: 4,6-dideoxy-alpha-D-xylo-hexopyranose-(1-4)-beta-D-galactopyranose

Chain D:  100%

GAL1
GLD2

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

Chain E:  100%

GLC1
GLC2

4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	64.09Å 73.60Å 78.30Å 84.93° 105.12° 101.00°	Depositor
Resolution (Å)	10.00 – 2.00 10.00 – 2.00	Depositor EDS
% Data completeness (in resolution range)	92.2 (10.00-2.00) 92.2 (10.00-2.00)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	4.61 (at 2.01Å)	Xtrriage
Refinement program	X-PLOR 3.1	Depositor
R, R_{free}	0.163 , 0.218 0.144 , 0.192	Depositor DCC
R_{free} test set	5093 reflections (6.08%)	wwPDB-VP
Wilson B-factor (Å ²)	20.3	Xtrriage
Anisotropy	0.063	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 52.6	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.97	EDS
Total number of atoms	11486	wwPDB-VP
Average B, all atoms (Å ²)	20.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.75% 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: GAL, GLD, CA, ACI, GLC

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	0.78	0/5447	1.42	64/7431 (0.9%)
1	B	0.78	0/5447	1.38	62/7431 (0.8%)
All	All	0.78	0/10894	1.40	126/14862 (0.8%)

There are no bond length outliers.

All (126) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	398	ARG	NE-CZ-NH2	-18.02	111.29	120.30
1	A	398	ARG	NE-CZ-NH1	14.05	127.33	120.30
1	A	69	MET	CG-SD-CE	-11.63	81.58	100.20
1	B	413	TRP	CD1-CG-CD2	9.19	113.65	106.30
1	B	616	TRP	CD1-CG-CD2	9.08	113.56	106.30
1	A	378	LEU	CA-CB-CG	8.79	135.52	115.30
1	B	490	TRP	CD1-CG-CD2	8.65	113.22	106.30
1	A	616	TRP	CD1-CG-CD2	8.55	113.14	106.30
1	A	662	TRP	CD1-CG-CD2	8.52	113.11	106.30
1	A	103	ARG	NE-CZ-NH2	-8.44	116.08	120.30
1	B	75	TRP	CD1-CG-CD2	8.30	112.94	106.30
1	B	662	TRP	CD1-CG-CD2	8.28	112.92	106.30
1	B	490	TRP	CE2-CD2-CG	-8.24	100.70	107.30
1	A	54	TRP	CD1-CG-CD2	8.19	112.86	106.30
1	A	490	TRP	CD1-CG-CD2	8.03	112.72	106.30
1	A	101	TRP	CD1-CG-CD2	7.97	112.68	106.30
1	A	616	TRP	CE2-CD2-CG	-7.93	100.96	107.30
1	B	636	TRP	CD1-CG-CD2	7.92	112.64	106.30
1	A	75	TRP	CD1-CG-CD2	7.86	112.58	106.30
1	B	616	TRP	CE2-CD2-CG	-7.84	101.03	107.30
1	A	54	TRP	CE2-CD2-CG	-7.77	101.08	107.30
1	B	238	TRP	CD1-CG-CD2	7.76	112.51	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	684	TRP	CD1-CG-CD2	7.66	112.42	106.30
1	B	684	TRP	CE2-CD2-CG	-7.64	101.19	107.30
1	B	413	TRP	CE2-CD2-CG	-7.63	101.19	107.30
1	B	684	TRP	CD1-CG-CD2	7.51	112.31	106.30
1	A	662	TRP	CE2-CD2-CG	-7.45	101.34	107.30
1	A	490	TRP	CE2-CD2-CG	-7.45	101.34	107.30
1	A	684	TRP	CE2-CD2-CG	-7.38	101.39	107.30
1	B	218	TRP	CE2-CD2-CG	-7.35	101.42	107.30
1	B	218	TRP	CD1-CG-CD2	7.33	112.17	106.30
1	B	544	TRP	CD1-CG-CD2	7.27	112.11	106.30
1	B	75	TRP	CE2-CD2-CG	-7.26	101.49	107.30
1	B	112	TYR	CB-CG-CD2	-7.25	116.65	121.00
1	B	258	TRP	CD1-CG-CD2	7.23	112.08	106.30
1	A	238	TRP	CD1-CG-CD2	7.22	112.08	106.30
1	A	636	TRP	CD1-CG-CD2	7.21	112.07	106.30
1	A	218	TRP	CD1-CG-CD2	7.19	112.05	106.30
1	B	636	TRP	CE2-CD2-CG	-7.15	101.58	107.30
1	A	353	ARG	NE-CZ-NH2	-7.14	116.73	120.30
1	B	24	ARG	NE-CZ-NH1	7.13	123.86	120.30
1	B	101	TRP	CD1-CG-CD2	7.12	112.00	106.30
1	B	662	TRP	CE2-CD2-CG	-7.12	101.60	107.30
1	B	238	TRP	CE2-CD2-CG	-7.12	101.61	107.30
1	B	301	TYR	CB-CG-CD1	-7.12	116.73	121.00
1	A	112	TYR	CB-CG-CD2	-7.10	116.74	121.00
1	A	398	ARG	CG-CD-NE	-7.06	96.98	111.80
1	A	218	TRP	CE2-CD2-CG	-7.04	101.67	107.30
1	B	353	ARG	NE-CZ-NH2	-7.02	116.79	120.30
1	B	544	TRP	CE2-CD2-CG	-7.01	101.69	107.30
1	A	636	TRP	CE2-CD2-CG	-7.00	101.70	107.30
1	A	544	TRP	CD1-CG-CD2	6.96	111.86	106.30
1	A	75	TRP	CE2-CD2-CG	-6.90	101.78	107.30
1	A	101	TRP	CE2-CD2-CG	-6.88	101.79	107.30
1	A	216	LYS	CB-CG-CD	-6.86	93.76	111.60
1	A	413	TRP	CD1-CG-CD2	6.83	111.77	106.30
1	B	101	TRP	CE2-CD2-CG	-6.83	101.84	107.30
1	A	238	TRP	CE2-CD2-CG	-6.81	101.86	107.30
1	A	544	TRP	CE2-CD2-CG	-6.80	101.86	107.30
1	A	258	TRP	CE2-CD2-CG	-6.53	102.08	107.30
1	A	413	TRP	CE2-CD2-CG	-6.48	102.11	107.30
1	B	412	ARG	NE-CZ-NH1	6.48	123.54	120.30
1	B	258	TRP	CE2-CD2-CG	-6.47	102.13	107.30
1	B	54	TRP	CD1-CG-CD2	6.45	111.46	106.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	258	TRP	CD1-CG-CD2	6.43	111.45	106.30
1	B	24	ARG	NE-CZ-NH2	-6.36	117.12	120.30
1	A	283	TYR	CB-CG-CD1	-6.35	117.19	121.00
1	A	18	TYR	CB-CG-CD1	-6.34	117.20	121.00
1	B	520	ARG	NE-CZ-NH2	6.34	123.47	120.30
1	B	353	ARG	NE-CZ-NH1	6.32	123.46	120.30
1	B	54	TRP	CE2-CD2-CG	-6.23	102.31	107.30
1	A	412	ARG	NE-CZ-NH2	-6.15	117.23	120.30
1	B	684	TRP	CG-CD2-CE3	6.14	139.43	133.90
1	B	398	ARG	NE-CZ-NH1	6.13	123.36	120.30
1	A	564	ARG	NE-CZ-NH1	-6.10	117.25	120.30
1	A	616	TRP	CG-CD2-CE3	6.10	139.39	133.90
1	A	668	ARG	NE-CZ-NH1	-5.97	117.31	120.30
1	B	249	TYR	CB-CG-CD2	-5.94	117.44	121.00
1	A	340	ARG	NE-CZ-NH1	5.93	123.27	120.30
1	A	50	CYS	CA-CB-SG	-5.92	103.34	114.00
1	A	284	ARG	NE-CZ-NH2	-5.85	117.38	120.30
1	A	75	TRP	CG-CD2-CE3	5.78	139.10	133.90
1	B	413	TRP	CG-CD1-NE1	-5.75	104.35	110.10
1	A	616	TRP	CB-CG-CD1	-5.68	119.61	127.00
1	B	490	TRP	CG-CD2-CE3	5.67	139.00	133.90
1	B	218	TRP	CG-CD2-CE3	5.64	138.98	133.90
1	A	353	ARG	NE-CZ-NH1	5.61	123.11	120.30
1	A	75	TRP	CG-CD1-NE1	-5.60	104.50	110.10
1	B	413	TRP	CB-CG-CD1	-5.58	119.75	127.00
1	B	75	TRP	CG-CD1-NE1	-5.58	104.53	110.10
1	A	531	PHE	N-CA-C	-5.52	96.11	111.00
1	A	238	TRP	CG-CD2-CE3	5.50	138.85	133.90
1	B	238	TRP	CG-CD1-NE1	-5.48	104.62	110.10
1	B	238	TRP	CG-CD2-CE3	5.47	138.83	133.90
1	A	423	ARG	NE-CZ-NH2	5.47	123.03	120.30
1	A	412	ARG	NE-CZ-NH1	5.41	123.00	120.30
1	B	662	TRP	CG-CD1-NE1	-5.41	104.69	110.10
1	B	616	TRP	CB-CG-CD1	-5.39	120.00	127.00
1	B	156	ARG	NE-CZ-NH1	5.38	122.99	120.30
1	A	103	ARG	NE-CZ-NH1	5.35	122.97	120.30
1	A	636	TRP	CG-CD2-CE3	5.34	138.70	133.90
1	B	616	TRP	CG-CD1-NE1	-5.33	104.77	110.10
1	B	103	ARG	NE-CZ-NH2	-5.31	117.64	120.30
1	A	413	TRP	CB-CG-CD1	-5.24	120.19	127.00
1	B	564	ARG	NE-CZ-NH1	-5.23	117.69	120.30
1	A	421	TYR	CB-CG-CD1	-5.22	117.87	121.00

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	684	TRP	CB-CG-CD1	-5.21	120.23	127.00
1	B	490	TRP	CB-CG-CD1	-5.19	120.25	127.00
1	B	290	ARG	NE-CZ-NH2	5.16	122.88	120.30
1	B	413	TRP	CG-CD2-CE3	5.16	138.54	133.90
1	B	283	TYR	CB-CG-CD1	-5.16	117.91	121.00
1	B	191	TYR	CB-CG-CD2	-5.15	117.91	121.00
1	B	531	PHE	N-CA-C	-5.15	97.09	111.00
1	A	684	TRP	CG-CD2-CE3	5.15	138.53	133.90
1	A	258	TRP	N-CA-C	-5.13	97.16	111.00
1	A	301	TYR	CB-CG-CD2	-5.13	117.92	121.00
1	B	490	TRP	CG-CD1-NE1	-5.12	104.98	110.10
1	B	84	TYR	CB-CG-CD1	-5.11	117.93	121.00
1	B	541	ILE	N-CA-C	-5.10	97.22	111.00
1	A	238	TRP	CG-CD1-NE1	-5.06	105.04	110.10
1	A	339	ARG	NE-CZ-NH1	5.06	122.83	120.30
1	A	590	ARG	NE-CZ-NH2	-5.06	117.77	120.30
1	A	589	VAL	CG1-CB-CG2	-5.05	102.81	110.90
1	A	616	TRP	CG-CD1-NE1	-5.04	105.06	110.10
1	B	378	LEU	CB-CG-CD2	-5.03	102.44	111.00
1	B	388	TYR	CB-CG-CD1	-5.00	118.00	121.00

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	5313	0	5050	37	0
1	B	5313	0	5050	46	0
2	C	21	0	20	1	0
2	D	21	0	20	0	0
3	E	23	0	21	0	0
4	A	35	0	34	2	0
4	B	11	0	10	0	0
5	A	12	0	11	1	0
5	B	12	0	11	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
6	A	12	0	12	0	0
6	B	24	0	24	0	0
7	A	2	0	0	0	0
7	B	2	0	0	0	0
8	A	342	0	0	6	0
8	B	343	0	0	4	0
All	All	11486	0	10263	84	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 4.

All (84) 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:316:GLN:HE22	1:B:578:ASN:HD22	1.33	0.75
1:B:149:PRO:HG3	1:B:168:THR:HG21	1.73	0.71
1:B:340:ARG:HH12	1:B:465:ASN:HD22	1.37	0.71
1:A:90:SER:HB2	4:A:711:GLC:O3	1.96	0.66
1:A:177:HIS:HD2	8:A:1327:HOH:O	1.84	0.59
1:A:333:HIS:HD2	8:A:1528:HOH:O	1.86	0.59
1:A:503:ASN:HD22	1:A:504:VAL:H	1.53	0.57
1:B:333:HIS:HD2	8:B:1591:HOH:O	1.88	0.57
1:A:11:ASN:ND2	8:A:1522:HOH:O	2.37	0.57
1:B:124:THR:O	1:B:128:HIS:HD2	1.88	0.56
1:B:397:LEU:HD21	1:B:459:VAL:HG21	1.88	0.55
1:B:126:HIS:HE1	1:B:224:ASP:OD1	1.90	0.55
1:A:170:ASP:OD1	1:A:177:HIS:HE1	1.90	0.54
1:B:609:ASN:ND2	1:B:649:GLU:H	2.07	0.53
1:A:609:ASN:ND2	1:A:649:GLU:H	2.06	0.53
1:B:593:ILE:HG21	1:B:604:VAL:HG11	1.90	0.53
1:A:126:HIS:HE1	1:A:224:ASP:OD2	1.92	0.52
1:B:170:ASP:OD1	1:B:177:HIS:HE1	1.92	0.52
1:B:340:ARG:HH12	1:B:465:ASN:ND2	2.06	0.52
1:A:603:ASN:HB3	1:A:624:PRO:HB3	1.92	0.52
1:A:361:GLY:HA3	1:A:366:MET:SD	2.50	0.51
1:A:415:ASN:HD22	1:A:418:VAL:H	1.58	0.51
1:B:625:MET:HG2	1:B:638:TYR:HB2	1.91	0.51
1:B:80:VAL:HB	1:B:105:PHE:HA	1.92	0.51
1:A:415:ASN:ND2	1:A:417:ASP:H	2.09	0.50
1:B:361:GLY:HA3	1:B:366:MET:SD	2.52	0.50
1:A:651:LYS:H22	4:A:721:GLC:H4	1.76	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:649:GLU:HG2	1:B:669:THR:HG22	1.94	0.50
1:A:69:MET:HE3	1:A:388:TYR:CD1	2.46	0.49
5:A:702:ACI:HN11	2:C:1:GAL:H61	1.77	0.49
1:B:4:THR:HB	1:B:399:LYS:HD2	1.95	0.48
1:A:124:THR:O	1:A:128:HIS:HD2	1.96	0.48
1:A:60:LYS:HA	1:A:60:LYS:HD3	1.75	0.48
1:A:92:VAL:HG13	1:A:94:ASN:HD21	1.79	0.47
1:B:378:LEU:HD21	1:B:381:PHE:CZ	2.49	0.47
1:B:596:ALA:HB1	1:B:604:VAL:HG21	1.95	0.47
1:A:378:LEU:HD11	1:A:381:PHE:CZ	2.49	0.47
1:B:80:VAL:HA	1:B:107:LYS:O	2.15	0.47
1:B:593:ILE:HD13	1:B:652:PHE:CD2	2.50	0.46
1:A:149:PRO:HG3	1:A:168:THR:HG21	1.97	0.46
1:B:58:ILE:HG23	1:B:124:THR:HG21	1.98	0.45
1:A:92:VAL:HG13	1:A:94:ASN:ND2	2.31	0.45
1:A:397:LEU:HB3	1:A:404:ILE:HD12	1.99	0.45
1:B:441:PRO:HD3	1:B:484:PRO:HG3	1.98	0.45
1:A:346:LEU:HD22	1:A:358:ILE:HD12	1.99	0.45
1:B:506:PRO:HD2	1:B:515:ILE:HG22	1.98	0.45
1:B:29:ASN:HD21	1:B:31:ALA:HB3	1.82	0.45
1:A:408:SER:O	1:A:423:ARG:HA	2.17	0.45
1:B:453:ARG:HH12	1:B:473:ALA:HB2	1.80	0.45
1:B:649:GLU:HA	1:B:668:ARG:O	2.17	0.45
1:A:397:LEU:HD21	1:A:459:VAL:HG11	1.99	0.45
1:A:663:GLU:HB2	1:A:685:GLN:O	2.17	0.44
1:B:592:VAL:HB	1:B:681:ASN:HA	2.00	0.44
1:B:25:PHE:HB3	8:B:1563:HOH:O	2.17	0.44
1:B:418:VAL:HA	1:B:434:ILE:O	2.18	0.44
1:A:40:ASP:HB2	1:A:48:LEU:HD12	1.99	0.43
1:A:232:LYS:HD3	8:A:1623:HOH:O	2.18	0.43
1:A:415:ASN:ND2	1:A:418:VAL:H	2.16	0.43
1:B:410:HIS:HB2	8:B:1139:HOH:O	2.18	0.43
1:A:80:VAL:HB	1:A:105:PHE:HA	2.00	0.43
1:A:410:HIS:HB2	8:A:1367:HOH:O	2.19	0.43
1:B:226:ILE:HB	1:B:254:THR:HG23	2.00	0.43
1:B:21:PHE:HE1	1:B:327:HIS:HB3	1.84	0.42
1:B:598:THR:HB	1:B:602:GLN:HB3	1.99	0.42
1:B:653:LEU:HD12	1:B:660:VAL:HG13	2.02	0.42
1:B:215:ILE:HD12	1:B:215:ILE:HA	1.88	0.42
1:A:21:PHE:HE2	1:A:327:HIS:HB3	1.84	0.42
1:B:459:VAL:HG22	1:B:489:VAL:HB	2.02	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:415:ASN:ND2	1:B:417:ASP:H	2.19	0.41
1:A:126:HIS:HD2	8:A:1143:HOH:O	2.01	0.41
1:B:371:ASP:HA	1:B:372:PRO:HA	1.93	0.41
1:A:401:ASN:HA	1:A:402:PRO:HD2	1.94	0.41
1:B:177:HIS:HD2	8:B:1579:HOH:O	2.04	0.41
1:B:618:PRO:HG3	1:B:662:TRP:CZ2	2.56	0.41
1:A:80:VAL:HA	1:A:107:LYS:O	2.21	0.41
1:A:146:SER:HA	1:A:168:THR:OG1	2.20	0.41
1:A:513:VAL:HB	1:A:553:ILE:HD12	2.03	0.41
1:A:460:LEU:O	1:A:463:ILE:HG12	2.20	0.40
1:B:12:PHE:CZ	1:B:131:LYS:HD3	2.56	0.40
1:B:593:ILE:HD12	1:B:682:VAL:HG23	2.02	0.40
1:B:372:PRO:HA	1:B:375:ARG:HD2	2.04	0.40
1:B:520:ARG:HD3	1:B:547:THR:HG22	2.02	0.40
1:B:562:ASP:HB3	1:B:575:ILE:HG23	2.03	0.40
1:B:21:PHE:CE1	1:B:327:HIS:HB3	2.57	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	684/686 (100%)	665 (97%)	19 (3%)	0	100 100
1	B	684/686 (100%)	665 (97%)	18 (3%)	1 (0%)	51 49
All	All	1368/1372 (100%)	1330 (97%)	37 (3%)	1 (0%)	51 49

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	600	LEU

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	564/564 (100%)	549 (97%)	15 (3%)	44	46
1	B	564/564 (100%)	551 (98%)	13 (2%)	50	53
All	All	1128/1128 (100%)	1100 (98%)	28 (2%)	47	49

All (28) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	13	SER
1	A	21	PHE
1	A	46	LEU
1	A	85	SER
1	A	169	ASN
1	A	206	SER
1	A	353	ARG
1	A	372	PRO
1	A	378	LEU
1	A	397	LEU
1	A	415	ASN
1	A	497	THR
1	A	503	ASN
1	A	609	ASN
1	A	658	SER
1	B	21	PHE
1	B	82	ASN
1	B	90	SER
1	B	169	ASN
1	B	173	ASN
1	B	326	ASN
1	B	353	ARG
1	B	372	PRO
1	B	378	LEU
1	B	415	ASN
1	B	529	VAL
1	B	537	THR

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Mol	Chain	Res	Type
1	B	609	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (29) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	11	ASN
1	A	62	ASN
1	A	94	ASN
1	A	126	HIS
1	A	128	HIS
1	A	177	HIS
1	A	333	HIS
1	A	415	ASN
1	A	427	ASN
1	A	503	ASN
1	A	548	GLN
1	A	609	ASN
1	B	29	ASN
1	B	93	ASN
1	B	126	HIS
1	B	128	HIS
1	B	177	HIS
1	B	203	ASN
1	B	270	HIS
1	B	316	GLN
1	B	326	ASN
1	B	333	HIS
1	B	410	HIS
1	B	415	ASN
1	B	465	ASN
1	B	548	GLN
1	B	595	ASN
1	B	609	ASN
1	B	683	ASN

5.3.3 RNA

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](#)

6 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	C	1	2	12,12,12	0.99	1 (8%)	17,17,17	1.43	3 (17%)
2	GLD	C	2	2,5	9,9,10	1.32	2 (22%)	10,12,14	2.03	3 (30%)
2	GAL	D	1	2	12,12,12	1.15	0	17,17,17	1.27	3 (17%)
2	GLD	D	2	2,5	9,9,10	1.08	1 (11%)	10,12,14	1.66	3 (30%)
3	GLC	E	1	3	12,12,12	1.73	3 (25%)	17,17,17	1.15	1 (5%)
3	GLC	E	2	3	11,11,12	0.98	1 (9%)	15,15,17	1.84	4 (26%)

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	C	1	2	1/1/5/5	0/2/22/22	0/1/1/1
2	GLD	C	2	2,5	-	-	0/1/1/1
2	GAL	D	1	2	1/1/5/5	1/2/22/22	0/1/1/1
2	GLD	D	2	2,5	-	-	0/1/1/1
3	GLC	E	1	3	-	0/2/22/22	0/1/1/1
3	GLC	E	2	3	-	1/2/19/22	0/1/1/1

All (8) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	E	1	GLC	C4-C5	3.55	1.60	1.53
3	E	1	GLC	C4-C3	2.78	1.59	1.52

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	2	GLD	C4-C5	2.74	1.56	1.51
2	D	2	GLD	C4-C5	2.56	1.56	1.51
3	E	1	GLC	C1-C2	2.41	1.58	1.52
2	C	1	GAL	C4-C5	2.27	1.57	1.53
2	C	2	GLD	C4-C3	2.07	1.56	1.52
3	E	2	GLC	C1-C2	2.06	1.56	1.52

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	E	2	GLC	C1-O5-C5	5.27	119.34	112.19
2	C	2	GLD	C3-C4-C5	5.02	119.31	111.23
2	C	1	GAL	C3-C4-C5	3.41	116.31	110.24
3	E	1	GLC	C1-O5-C5	3.12	119.55	113.66
2	D	2	GLD	C4-C3-C2	-2.89	106.70	110.27
2	D	1	GAL	C4-C3-C2	-2.83	105.89	110.82
2	C	1	GAL	O2-C2-C1	2.74	115.53	109.16
2	C	2	GLD	O2-C2-C1	2.58	114.44	109.15
2	D	2	GLD	O5-C1-C2	2.56	114.72	110.77
3	E	2	GLC	O2-C2-C1	2.42	114.10	109.15
2	D	2	GLD	C3-C4-C5	-2.29	107.55	111.23
2	D	1	GAL	O2-C2-C1	2.14	114.12	109.16
2	C	2	GLD	O5-C1-C2	-2.13	107.48	110.77
3	E	2	GLC	O2-C2-C3	-2.11	105.91	110.14
2	D	1	GAL	O3-C3-C4	2.06	115.11	110.35
3	E	2	GLC	C1-C2-C3	2.04	112.18	109.67
2	C	1	GAL	O4-C4-C5	-2.01	104.31	109.30

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	C	1	GAL	C4
2	D	1	GAL	C4

All (2) torsion outliers are listed below:

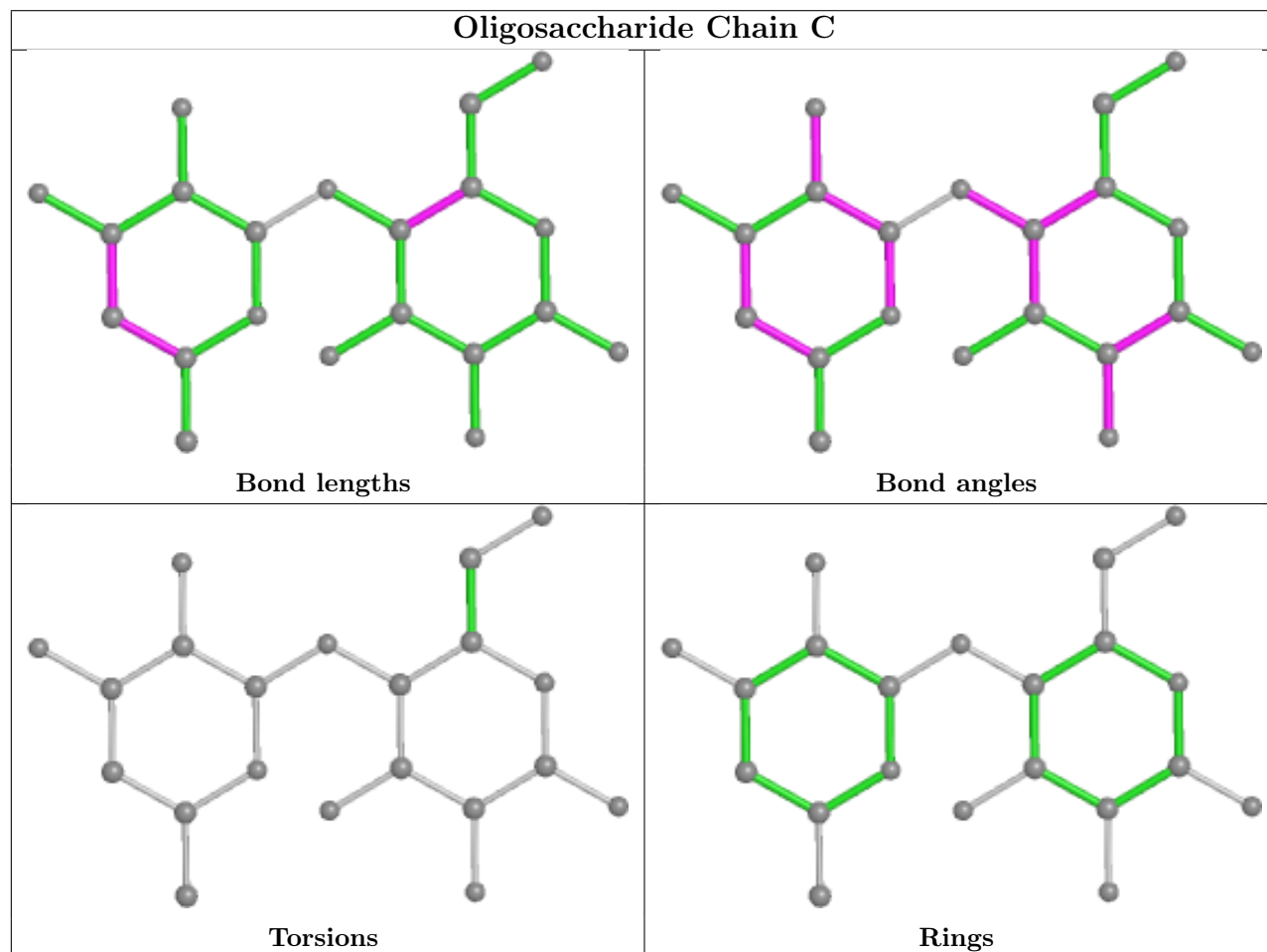
Mol	Chain	Res	Type	Atoms
2	D	1	GAL	O5-C5-C6-O6
3	E	2	GLC	O5-C5-C6-O6

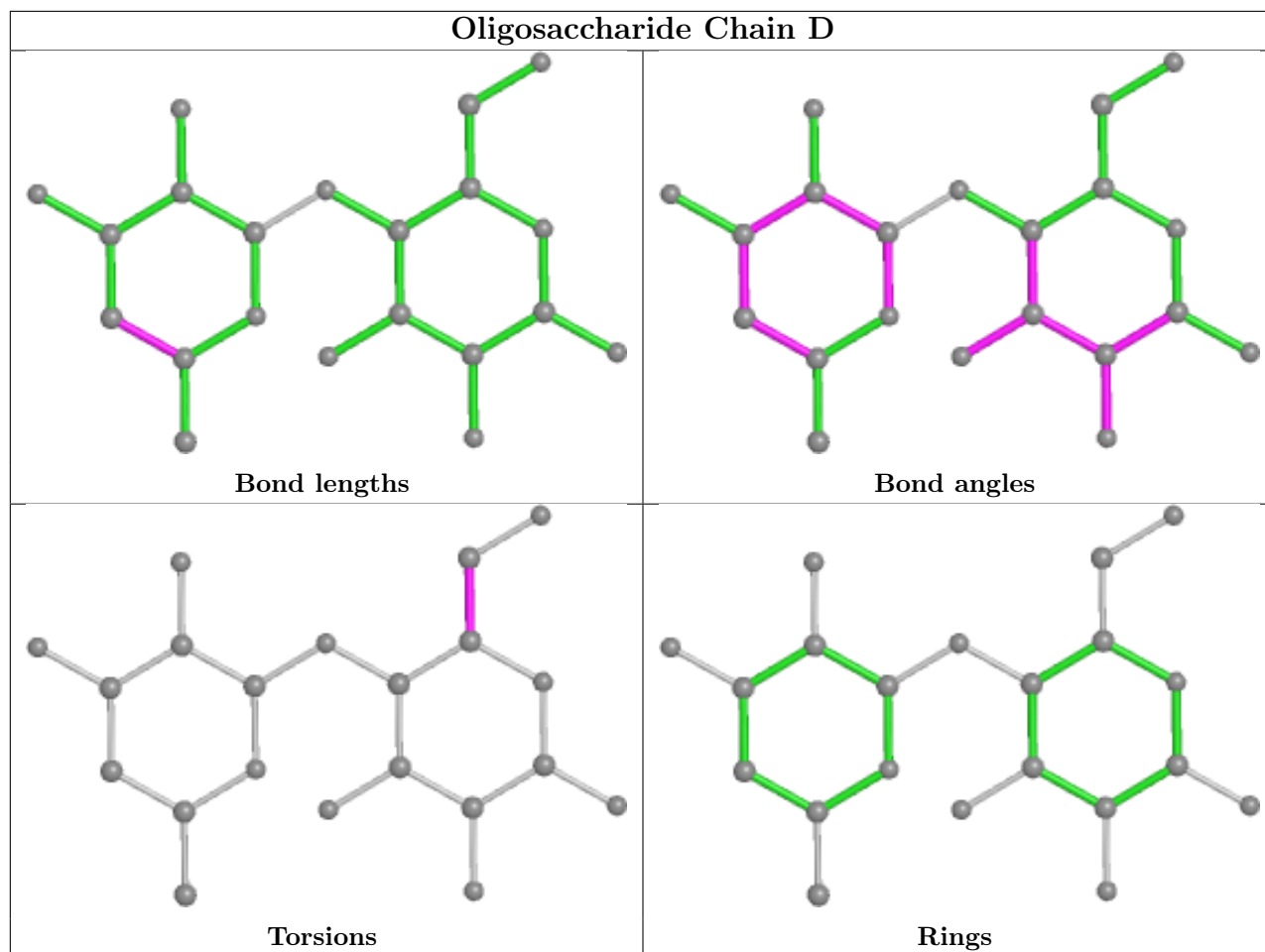
There are no ring outliers.

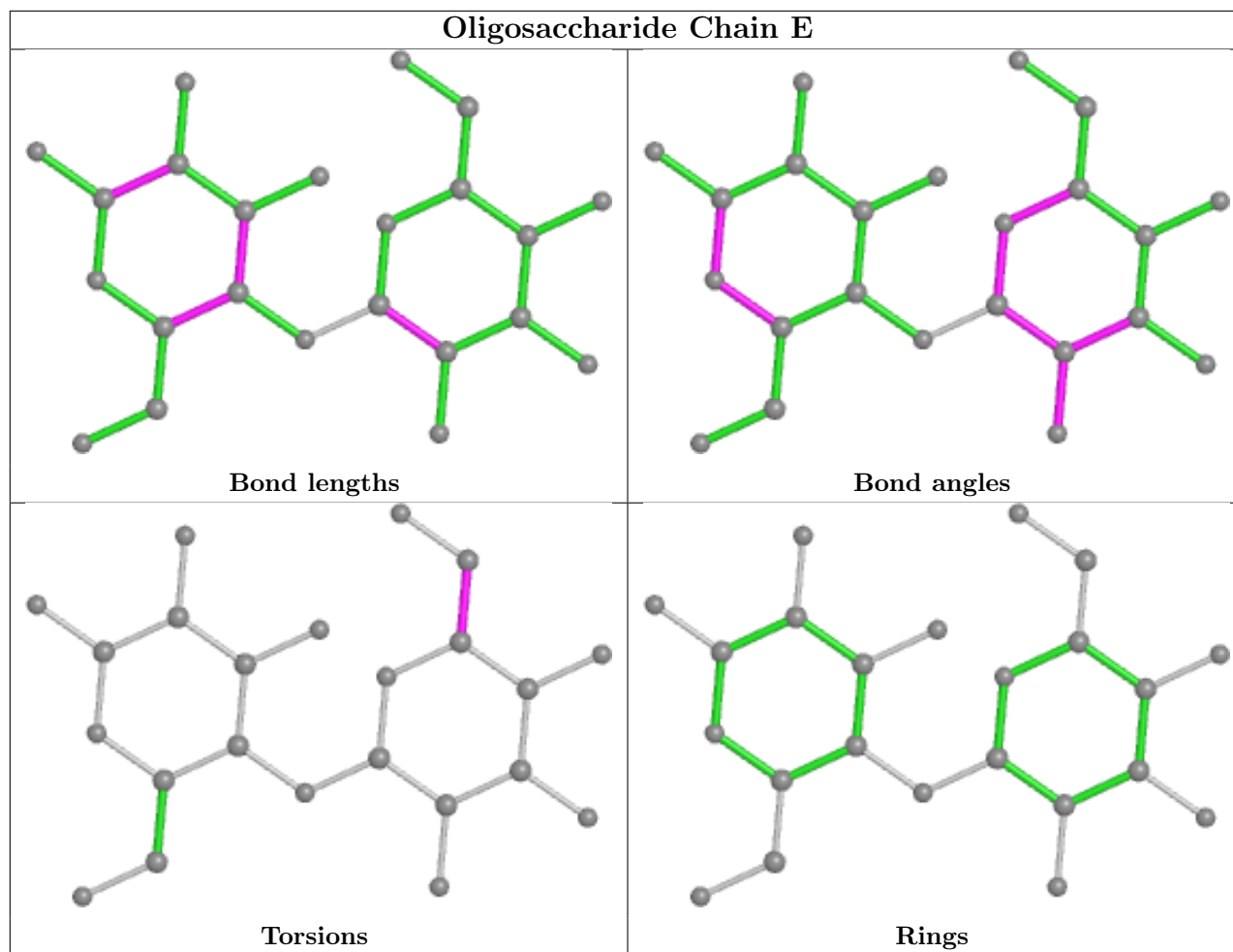
1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	1	GAL	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](#)

Of 13 ligands modelled in this entry, 4 are monoatomic - leaving 9 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$
4	GLC	A	711	-	12,12,12	1.05	1 (8%)	17,17,17	1.57	1 (5%)
4	GLC	A	721	-	12,12,12	1.12	1 (8%)	17,17,17	1.58	4 (23%)
6	GAL	A	731	-	12,12,12	1.24	1 (8%)	17,17,17	0.83	1 (5%)
5	ACI	B	802	2,4	12,12,12	2.32	2 (16%)	11,17,17	1.78	4 (36%)
4	GLC	B	801	5	11,11,12	1.28	2 (18%)	15,15,17	1.45	3 (20%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	ACI	A	702	2,4	12,12,12	2.58	2 (16%)	11,17,17	1.50	3 (27%)
6	GAL	B	831	-	12,12,12	0.89	0	17,17,17	0.86	0
4	GLC	A	701	5	11,11,12	0.99	1 (9%)	15,15,17	2.12	6 (40%)
6	GAL	B	811	-	12,12,12	0.98	1 (8%)	17,17,17	1.06	1 (5%)

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	GLC	A	711	-	-	1/2/22/22	0/1/1/1
4	GLC	A	721	-	-	0/2/22/22	0/1/1/1
6	GAL	A	731	-	1/1/5/5	0/2/22/22	0/1/1/1
5	ACI	B	802	2,4	-	0/2/22/22	0/1/1/1
4	GLC	B	801	5	-	2/2/19/22	0/1/1/1
5	ACI	A	702	2,4	-	0/2/22/22	0/1/1/1
6	GAL	B	831	-	1/1/5/5	1/2/22/22	0/1/1/1
4	GLC	A	701	5	-	2/2/19/22	0/1/1/1
6	GAL	B	811	-	1/1/5/5	1/2/22/22	0/1/1/1

All (11) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	A	702	ACI	C4-C5	6.13	1.56	1.51
5	A	702	ACI	C7-C5	5.53	1.40	1.32
5	B	802	ACI	C7-C5	5.50	1.40	1.32
5	B	802	ACI	C4-C5	4.80	1.55	1.51
6	A	731	GAL	C4-C5	3.21	1.59	1.53
4	B	801	GLC	C4-C5	2.77	1.58	1.53
4	A	721	GLC	C4-C5	2.49	1.58	1.53
6	B	811	GAL	C4-C5	2.45	1.58	1.53
4	A	701	GLC	C4-C5	2.41	1.58	1.53
4	A	711	GLC	O5-C1	2.41	1.48	1.42
4	B	801	GLC	C1-C2	2.15	1.57	1.52

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	711	GLC	C1-O5-C5	4.78	122.69	113.66
4	A	721	GLC	C1-O5-C5	4.14	121.47	113.66

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	701	GLC	O5-C1-C2	3.87	116.74	110.77
4	A	701	GLC	C1-C2-C3	3.71	114.23	109.67
4	A	701	GLC	C1-O5-C5	3.49	116.92	112.19
5	B	802	ACI	C7-C1-N1	3.31	116.67	110.71
5	A	702	ACI	C2-C3-C4	-3.06	105.31	110.18
5	B	802	ACI	C2-C1-N1	-2.81	105.68	111.40
4	B	801	GLC	C1-O5-C5	2.70	115.85	112.19
6	B	811	GAL	O4-C4-C3	-2.69	104.12	110.35
4	A	701	GLC	C3-C4-C5	-2.56	105.67	110.24
6	A	731	GAL	C1-O5-C5	2.51	118.39	113.66
4	A	721	GLC	O4-C4-C3	-2.45	104.68	110.35
4	A	701	GLC	O4-C4-C5	2.30	115.01	109.30
5	B	802	ACI	C2-C3-C4	-2.25	106.61	110.18
5	A	702	ACI	O2-C2-C1	2.22	113.21	108.96
4	A	701	GLC	O2-C2-C3	-2.19	105.75	110.14
4	A	721	GLC	O4-C4-C5	2.18	114.70	109.30
4	A	721	GLC	O5-C1-C2	2.06	113.97	110.28
5	A	702	ACI	O3-C3-C4	2.04	113.59	109.68
4	B	801	GLC	C1-C2-C3	2.04	112.17	109.67
5	B	802	ACI	O3-C3-C4	2.03	113.57	109.68
4	B	801	GLC	O4-C4-C5	2.01	114.28	109.30

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
6	A	731	GAL	C4
6	B	811	GAL	C4
6	B	831	GAL	C4

All (7) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	701	GLC	O5-C5-C6-O6
4	A	701	GLC	C4-C5-C6-O6
4	A	711	GLC	O5-C5-C6-O6
6	B	831	GAL	O5-C5-C6-O6
6	B	811	GAL	O5-C5-C6-O6
4	B	801	GLC	C4-C5-C6-O6
4	B	801	GLC	O5-C5-C6-O6

There are no ring outliers.

3 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	711	GLC	1	0
4	A	721	GLC	1	0
5	A	702	ACI	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	686/686 (100%)	-0.88	1 (0%) 95 95	9, 16, 29, 50	0
1	B	686/686 (100%)	-0.75	3 (0%) 92 92	11, 19, 37, 58	0
All	All	1372/1372 (100%)	-0.82	4 (0%) 94 93	9, 17, 33, 58	0

All (4) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	600	LEU	4.3
1	A	90	SER	3.2
1	B	658	SER	2.4
1	B	497	THR	2.2

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

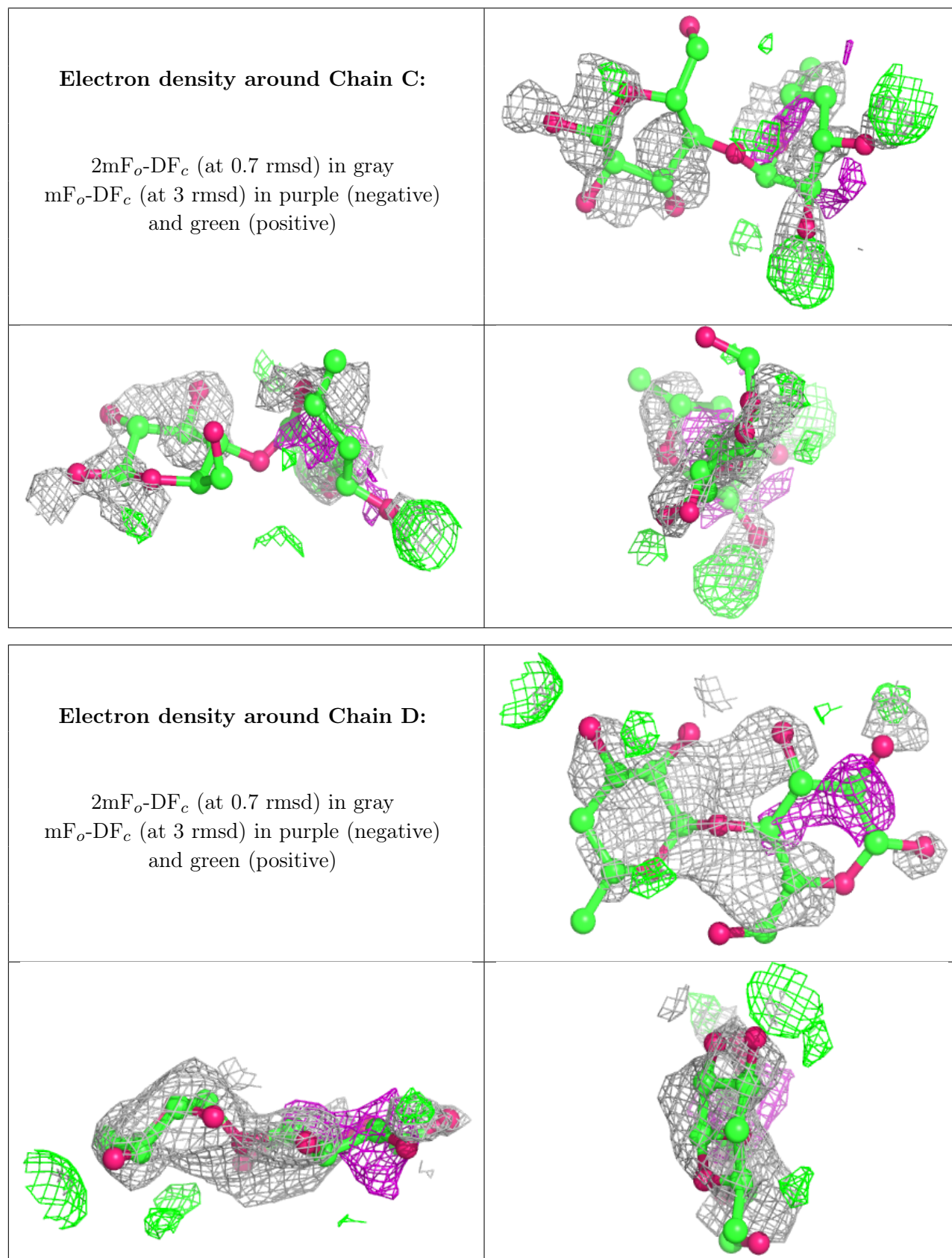
There are no non-standard protein/DNA/RNA residues in this entry.

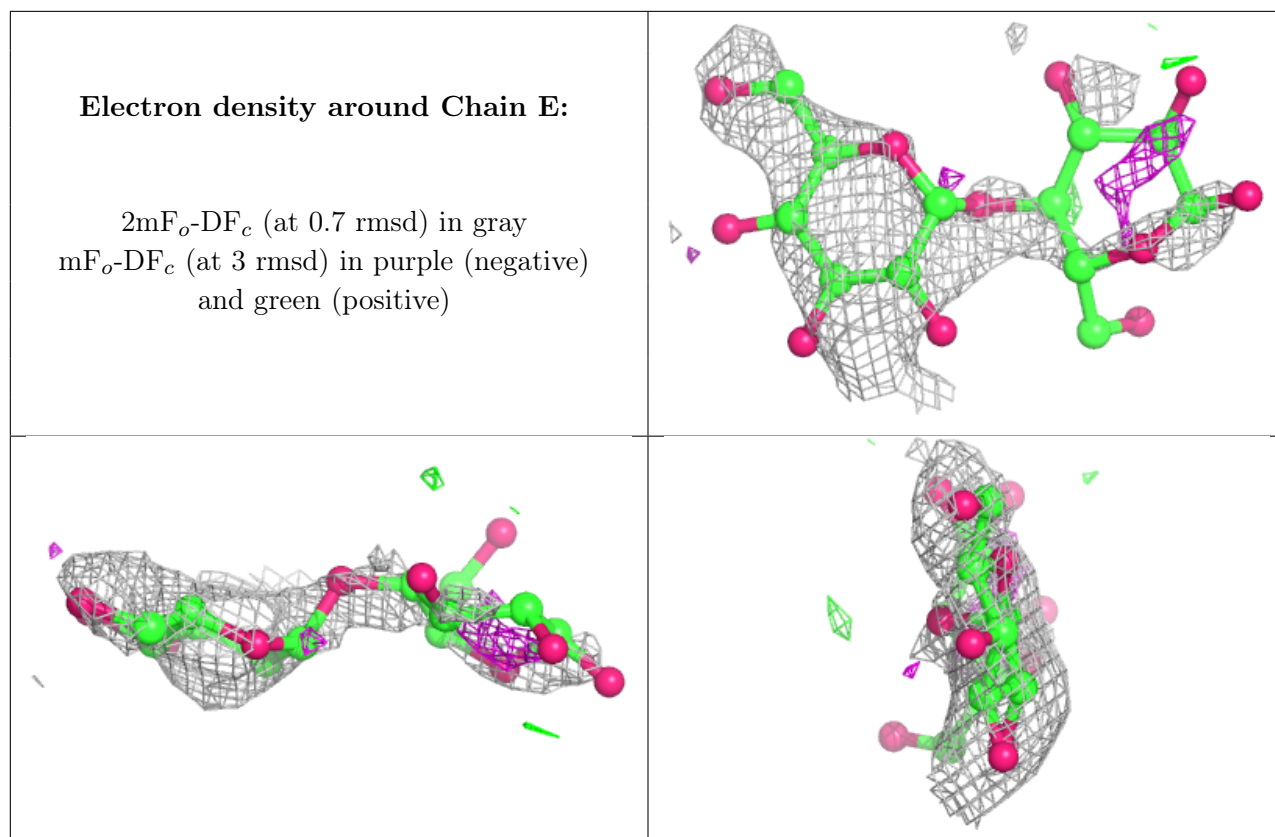
6.3 Carbohydrates [i](#)

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	D	1	12/12	0.35	0.45	74,78,79,81	0
2	GLD	C	2	9/10	0.45	0.40	60,64,65,66	0
3	GLC	E	1	12/12	0.50	0.50	71,72,73,73	0
2	GAL	C	1	12/12	0.71	0.34	70,73,76,77	0
3	GLC	E	2	11/12	0.83	0.34	70,71,72,74	0
2	GLD	D	2	9/10	0.85	0.22	72,74,75,75	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.





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
4	GLC	A	711	12/12	0.30	0.53	71,74,75,76	0
4	GLC	B	801	11/12	0.41	0.45	70,72,73,74	0
6	GAL	B	811	12/12	0.53	0.58	76,79,79,79	0
5	ACI	A	702	12/12	0.54	0.39	62,67,70,70	0
4	GLC	A	721	12/12	0.59	0.32	68,70,71,72	0
6	GAL	A	731	12/12	0.60	0.36	59,61,62,63	0
4	GLC	A	701	11/12	0.65	0.36	64,69,70,71	0
5	ACI	B	802	12/12	0.70	0.38	64,68,71,71	0
6	GAL	B	831	12/12	0.73	0.42	73,76,79,79	0
7	CA	A	688	1/1	0.96	0.09	18,18,18,18	0
7	CA	B	690	1/1	0.96	0.06	19,19,19,19	0
7	CA	B	689	1/1	0.97	0.04	15,15,15,15	0
7	CA	A	687	1/1	0.98	0.08	13,13,13,13	0

6.5 Other polymers [i](#)

There are no such residues in this entry.