Full wwPDB X-ray Structure Validation Report ⓘ

Sep 12, 2024 – 10:08 AM JST

PDB ID	:	8X8K
Title	:	Crystal structure of STBD1 CBM20 domain in complex with maltotetraose
Authors	:	Zhang, Y.C.; Pan, L.F.
Deposited on	:	2023-11-27
Resolution	:	2.10 Å(reported)

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

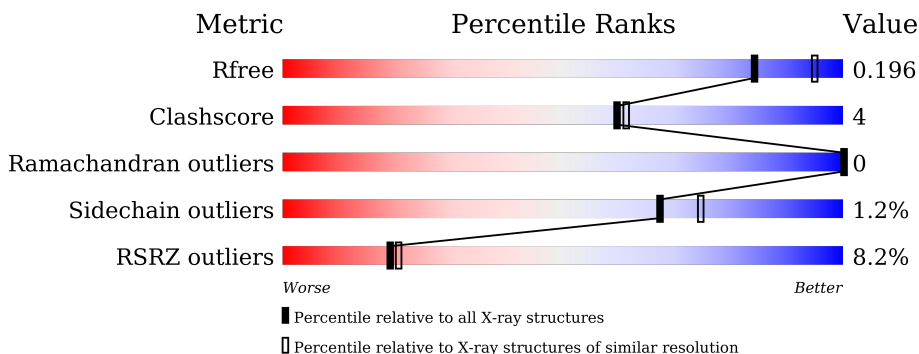|		
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.13
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.002 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.38.2

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 2.10 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.
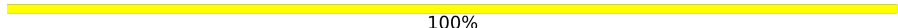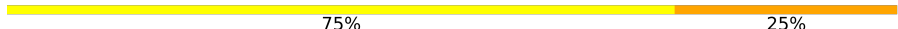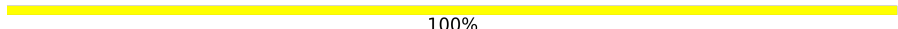
Metric	Percentile Ranks	Value
Rfree		0.196
Clashscore		4
Ramachandran outliers		0
Sidechain outliers		1.2%
RSRZ outliers		8.2%

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}	164625	6234 (2.10-2.10)
Clashscore	180529	6893 (2.10-2.10)
Ramachandran outliers	177936	6839 (2.10-2.10)
Sidechain outliers	177891	6840 (2.10-2.10)
RSRZ outliers	164620	6234 (2.10-2.10)

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	99	5% — 85% 13% ·
1	B	99	% — 93% 5% ·
1	C	99	4% — 85% 14% ·
1	D	99	22% — 87% 11% ·
2	F	4	100%
2	G	4	25% 75%

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Mol	Chain	Length	Quality of chain
2	H	4	100%
2	I	4	50% 50%
2	J	4	75% 25%
2	K	4	100%

2 Entry composition (i)

There are 4 unique types of molecules in this entry. The entry contains 3589 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 Starch-binding domain-containing protein 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	97	Total	C	N	O	S	0	0	0
			799	517	139	141	2			
1	B	97	Total	C	N	O	S	0	0	0
			799	518	139	140	2			
1	C	98	Total	C	N	O	S	0	0	0
			808	522	141	143	2			
1	D	97	Total	C	N	O	S	0	0	0
			782	509	134	137	2			

- Molecule 2 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	F	4	Total	C	O	0	0	0
			45	24	21			
2	G	4	Total	C	O	0	0	0
			45	24	21			
2	H	4	Total	C	O	0	0	0
			45	24	21			
2	I	4	Total	C	O	0	0	0
			45	24	21			
2	J	4	Total	C	O	0	0	0
			45	24	21			
2	K	4	Total	C	O	0	0	0
			45	24	21			

- Molecule 3 is GLYCEROL (three-letter code: GOL) (formula: $C_3H_8O_3$).

GOL

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	C	1	Total 6	C 3	O 3	0	0
3	D	1	Total 6	C 3	O 3	0	0
3	D	1	Total 6	C 3	O 3	0	0

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	34	Total 34	O 34	0	0
4	B	35	Total 35	O 35	0	0
4	C	27	Total 27	O 27	0	0
4	D	17	Total 17	O 17	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, orang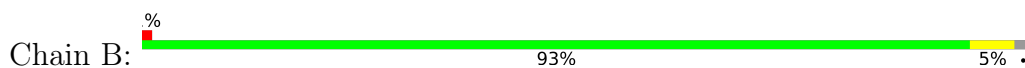e = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

- Molecule 1: Starch-binding domain-containing protein 1
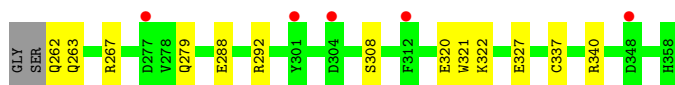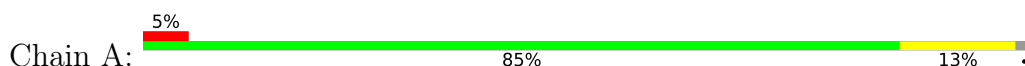
Chain A:

5%
85%
13%

GLY SER Q262 Q263 R267 D277 V278 Q279 E288 R292 Y301 D304 S308 F312 E320 W321 K322 E327 C337 R340 D348 H358

- Molecule 1: Starch-binding domain-containing protein 1

Chain B:

%
93%
5%

GLY SER Q262 C289 F312 D316 E320 R340 K349 H358

- Molecule 1: Starch-binding domain-containing protein 1

Chain C:

4%
85%
14%

GLY S261 R267 S275 T276 D277 V278 Q279 R292 Y296 N302 S310 V318 W321 K322 F323 E335 R340 E343 A353 H358

- Molecule 1: Starch-binding domain-containing protein 1

Chain D:

22%
87%
11%

GLY SER Q262 Q263 F268 Y272 V278 Q279 F280 V283 T284 C289 L290 T295 Y296 I297 P298 G305 F306 W307 S308 I311 F312 A315 D316 T317 W321 K322 F323 V324 L325 V326 E327 R333 N339 L342 H358

- Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain F:

100%
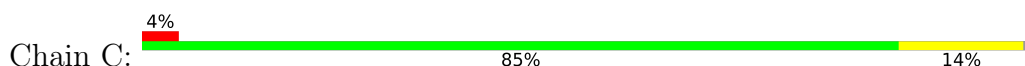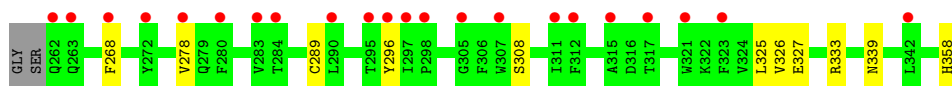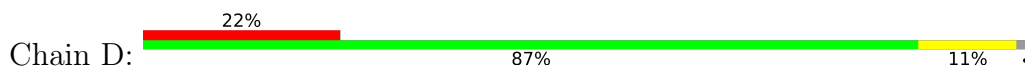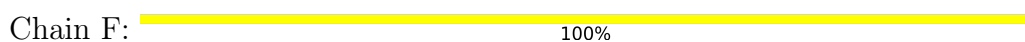
GLC1 GLC2 GLC3 GLC4

• Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain G:

• Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain H:

• Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain I:

• Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain J:

• Molecule 2: alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose-(1-4)-alpha-D-glucopyranose

Chain K:

4 Data and refinement statistics ⓘ

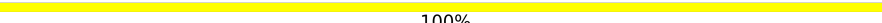| Property	Value	Source
Space group	P 32 2 1	Depositor
Cell constants a, b, c, α, β, γ	74.88Å 74.88Å 163.09Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	41.66 – 2.10 41.66 – 2.17	Depositor EDS
% Data completeness (in resolution range)	100.0 (41.66-2.10) 99.9 (41.66-2.17)	Depositor EDS
R_{merge}	0.11	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	2.13 (at 2.18Å)	Xtriage
Refinement program	PHENIX 1.19rc4_4035	Depositor
R, R_{free}	0.186 , 0.226 0.199 , 0.196	Depositor DCC
R_{free} test set	1362 reflections (4.78%)	wwPDB-VP
Wilson B-factor (Å^2)	52.7	Xtriage
Anisotropy	0.162	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.31 , 41.4	EDS
L-test for twinning[2]	$< |L| > = 0.49, < L^2 > = 0.32$	Xtriage
Estimated twinning fraction	0.025 for -h,-k,l	Xtriage
F_o,F_c correlation	0.95	EDS
Total number of atoms	3589	wwPDB-VP
Average B, all atoms (Å^2)	57.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.83% 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: GOL, 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	0.48	0/828	0.60	0/1132
1	B	0.47	0/828	0.59	0/1131
1	C	0.47	0/837	0.61	0/1143
1	D	0.37	0/811	0.56	0/1111
All	All	0.45	0/3304	0.59	0/4517

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	799	0	731	9	0
1	B	799	0	736	3	0
1	C	808	0	745	10	0
1	D	782	0	706	6	0
2	F	45	0	39	0	0
2	G	45	0	39	0	0
2	H	45	0	39	0	0
2	I	45	0	39	1	0
2	J	45	0	39	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	K	45	0	39	0	0
3	C	6	0	8	2	0
3	D	12	0	16	1	0
4	A	34	0	0	0	0
4	B	35	0	0	0	0
4	C	27	0	0	1	0
4	D	17	0	0	1	0
All	All	3589	0	3176	28	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 (28) 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:C:267:ARG:HH12	3:C:401:GOL:H32	1.44	0.83
1:A:292:ARG:HD3	1:B:312:PHE:HZ	1.51	0.73
1:C:302:ASN:OD1	4:C:501:HOH:O	2.10	0.68
1:A:292:ARG:HD3	1:B:312:PHE:CZ	2.37	0.57
1:D:278:VAL:HG23	1:D:327:GLU:HG3	1.86	0.57
1:C:323:PHE:HB2	1:C:335:GLU:HG3	1.87	0.57
1:A:288:GLU:HB2	1:A:292:ARG:NH2	2.24	0.52
1:C:267:ARG:NH1	3:C:401:GOL:H32	2.20	0.50
1:C:321:TRP:CZ2	1:C:340:ARG:HD3	2.48	0.49
1:D:327:GLU:O	4:D:501:HOH:O	2.20	0.48
1:A:279:GLN:HG2	1:A:327:GLU:HG3	1.97	0.47
1:A:320:GLU:HA	1:A:340:ARG:O	2.15	0.47
1:D:296:TYR:CZ	1:D:326:VAL:HG11	2.50	0.46
1:A:321:TRP:CZ2	1:A:340:ARG:HD3	2.52	0.45
1:C:267:ARG:HA	1:C:310:SER:HA	1.99	0.45
1:C:292:ARG:HG2	1:C:292:ARG:HH11	1.83	0.44
1:C:276:THR:HG23	1:C:279:GLN:HG3	1.99	0.44
1:A:322:LYS:HE2	1:A:337:CYS:O	2.18	0.44
1:C:318:VAL:HG22	1:C:343:GLU:HG3	2.00	0.43
1:D:268:PHE:O	1:D:308:SER:HA	2.19	0.42
1:D:325:LEU:HB3	1:D:333:ARG:HB3	2.00	0.42
3:D:402:GOL:H31	2:J:1:GLC:H5	2.00	0.42
2:I:2:GLC:H61	2:I:3:GLC:O6	2.20	0.41
1:A:267:ARG:NE	1:A:308:SER:OG	2.53	0.41
1:D:339:ASN:O	1:D:358:HIS:HE1	2.04	0.40
1:B:320:GLU:HA	1:B:340:ARG:O	2.21	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:262:GLN:NE2	1:A:263:GLN:H	2.20	0.40
1:C:276:THR:OG1	1:C:277:ASP:N	2.55	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	95/99 (96%)	94 (99%)	1 (1%)	0	100	100
1	B	95/99 (96%)	92 (97%)	3 (3%)	0	100	100
1	C	96/99 (97%)	91 (95%)	5 (5%)	0	100	100
1	D	95/99 (96%)	94 (99%)	1 (1%)	0	100	100
All	All	381/396 (96%)	371 (97%)	10 (3%)	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	84/88 (96%)	84 (100%)	0	100	100
1	B	84/88 (96%)	82 (98%)	2 (2%)	44	49
1	C	86/88 (98%)	85 (99%)	1 (1%)	67	74

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	80/88 (91%)	79 (99%)	1 (1%)	65	72
All	All	334/352 (95%)	330 (99%)	4 (1%)	67	74

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	B	316	ASP
1	B	349	LYS
1	C	275	SER
1	D	289	CYS

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

Mol	Chain	Res	Type
1	A	262	GLN
1	C	262	GLN
1	C	302	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 ⓘ

24 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	F	1	2	12,12,12	0.75	0	17,17,17	1.23	2 (11%)
2	GLC	F	2	2	11,11,12	1.12	0	15,15,17	1.29	4 (26%)
2	GLC	F	3	2	11,11,12	0.99	1 (9%)	15,15,17	1.13	1 (6%)
2	GLC	F	4	2	11,11,12	1.00	1 (9%)	15,15,17	1.10	1 (6%)
2	GLC	G	1	2	12,12,12	0.79	0	17,17,17	0.84	0
2	GLC	G	2	2	11,11,12	1.09	1 (9%)	15,15,17	1.00	1 (6%)
2	GLC	G	3	2	11,11,12	0.87	0	15,15,17	1.02	1 (6%)
2	GLC	G	4	2	11,11,12	0.97	0	15,15,17	1.61	4 (26%)
2	GLC	H	1	2	12,12,12	0.56	0	17,17,17	0.93	1 (5%)
2	GLC	H	2	2	11,11,12	1.22	1 (9%)	15,15,17	1.14	2 (13%)
2	GLC	H	3	2	11,11,12	0.87	0	15,15,17	1.20	2 (13%)
2	GLC	H	4	2	11,11,12	1.19	1 (9%)	15,15,17	1.40	2 (13%)
2	GLC	I	1	2	12,12,12	0.63	0	17,17,17	1.97	5 (29%)
2	GLC	I	2	2	11,11,12	1.02	0	15,15,17	3.03	7 (46%)
2	GLC	I	3	2	11,11,12	1.07	2 (18%)	15,15,17	2.22	5 (33%)
2	GLC	I	4	2	11,11,12	1.02	0	15,15,17	1.02	1 (6%)
2	GLC	J	1	2	12,12,12	0.69	0	17,17,17	1.26	3 (17%)
2	GLC	J	2	2	11,11,12	1.10	1 (9%)	15,15,17	1.50	3 (20%)
2	GLC	J	3	2	11,11,12	0.88	0	15,15,17	1.19	2 (13%)
2	GLC	J	4	2	11,11,12	0.87	0	15,15,17	1.40	2 (13%)
2	GLC	K	1	2	12,12,12	0.71	0	17,17,17	0.87	1 (5%)
2	GLC	K	2	2	11,11,12	1.04	0	15,15,17	1.26	2 (13%)
2	GLC	K	3	2	11,11,12	0.86	0	15,15,17	1.25	3 (20%)
2	GLC	K	4	2	11,11,12	1.02	0	15,15,17	1.07	1 (6%)

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	F	1	2	-	2/2/22/22	0/1/1/1
2	GLC	F	2	2	-	0/2/19/22	0/1/1/1
2	GLC	F	3	2	-	0/2/19/22	0/1/1/1
2	GLC	F	4	2	-	2/2/19/22	0/1/1/1
2	GLC	G	1	2	-	0/2/22/22	0/1/1/1
2	GLC	G	2	2	-	2/2/19/22	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	GLC	G	3	2	-	0/2/19/22	0/1/1/1
2	GLC	G	4	2	-	2/2/19/22	0/1/1/1
2	GLC	H	1	2	-	0/2/22/22	0/1/1/1
2	GLC	H	2	2	-	0/2/19/22	0/1/1/1
2	GLC	H	3	2	-	0/2/19/22	0/1/1/1
2	GLC	H	4	2	-	0/2/19/22	0/1/1/1
2	GLC	I	1	2	-	2/2/22/22	0/1/1/1
2	GLC	I	2	2	-	2/2/19/22	0/1/1/1
2	GLC	I	3	2	-	2/2/19/22	0/1/1/1
2	GLC	I	4	2	-	1/2/19/22	0/1/1/1
2	GLC	J	1	2	-	0/2/22/22	0/1/1/1
2	GLC	J	2	2	-	2/2/19/22	0/1/1/1
2	GLC	J	3	2	-	0/2/19/22	0/1/1/1
2	GLC	J	4	2	-	0/2/19/22	0/1/1/1
2	GLC	K	1	2	-	2/2/22/22	0/1/1/1
2	GLC	K	2	2	-	0/2/19/22	0/1/1/1
2	GLC	K	3	2	-	0/2/19/22	0/1/1/1
2	GLC	K	4	2	-	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)
2	H	2	GLC	O5-C1	-2.94	1.39	1.43
2	F	4	GLC	O5-C1	-2.17	1.40	1.43
2	I	3	GLC	C1-C2	2.17	1.57	1.52
2	H	4	GLC	O5-C1	-2.15	1.40	1.43
2	J	2	GLC	O5-C1	-2.13	1.40	1.43
2	I	3	GLC	O2-C2	-2.11	1.38	1.43
2	F	3	GLC	O2-C2	-2.10	1.38	1.43
2	G	2	GLC	O5-C1	-2.08	1.40	1.43

All (56) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	I	2	GLC	C1-O5-C5	6.47	120.96	112.19
2	I	3	GLC	C2-C3-C4	-5.55	101.28	110.89
2	I	2	GLC	C2-C3-C4	-5.22	101.86	110.89
2	I	2	GLC	O5-C1-C2	4.80	118.18	110.77
2	I	2	GLC	C3-C4-C5	-4.29	102.58	110.24
2	I	1	GLC	C3-C4-C5	-4.00	103.10	110.24
2	I	1	GLC	C4-C3-C2	-3.86	104.08	110.82

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	I	3	GLC	C1-O5-C5	3.65	117.14	112.19
2	F	1	GLC	O5-C1-C2	3.40	116.35	110.28
2	H	3	GLC	O5-C1-C2	-3.27	105.72	110.77
2	J	2	GLC	C6-C5-C4	-3.18	105.54	113.00
2	H	4	GLC	O5-C5-C6	3.18	112.19	107.20
2	G	4	GLC	C1-C2-C3	3.17	113.57	109.67
2	F	4	GLC	O5-C1-C2	-3.12	105.95	110.77
2	I	1	GLC	C1-O5-C5	3.10	119.52	113.66
2	I	2	GLC	O4-C4-C5	3.05	116.88	109.30
2	G	4	GLC	C2-C3-C4	2.99	116.07	110.89
2	J	3	GLC	O5-C1-C2	-2.96	106.20	110.77
2	I	1	GLC	O5-C1-C2	2.96	115.56	110.28
2	I	3	GLC	O4-C4-C5	2.95	116.62	109.30
2	I	1	GLC	O4-C4-C5	2.88	116.44	109.30
2	J	4	GLC	O5-C5-C6	2.85	111.68	107.20
2	K	3	GLC	C1-O5-C5	2.82	116.02	112.19
2	I	2	GLC	C1-C2-C3	2.78	113.08	109.67
2	I	4	GLC	C1-O5-C5	-2.76	108.45	112.19
2	J	2	GLC	O5-C1-C2	-2.73	106.56	110.77
2	H	4	GLC	C2-C3-C4	-2.72	106.19	110.89
2	J	1	GLC	C3-C4-C5	-2.72	105.39	110.24
2	I	3	GLC	O2-C2-C1	2.70	114.68	109.15
2	K	1	GLC	O5-C5-C4	2.62	114.44	109.69
2	J	4	GLC	C6-C5-C4	-2.54	107.05	113.00
2	I	3	GLC	C3-C4-C5	-2.48	105.81	110.24
2	J	1	GLC	C1-O5-C5	2.43	118.26	113.66
2	J	1	GLC	O5-C1-C2	2.42	114.60	110.28
2	I	2	GLC	O2-C2-C1	2.42	114.10	109.15
2	K	2	GLC	C2-C3-C4	-2.35	106.82	110.89
2	G	4	GLC	C3-C4-C5	2.35	114.44	110.24
2	K	2	GLC	C1-O5-C5	2.34	115.36	112.19
2	F	2	GLC	C6-C5-C4	-2.33	107.56	113.00
2	F	2	GLC	O3-C3-C2	-2.32	105.55	109.99
2	K	3	GLC	C2-C3-C4	-2.30	106.92	110.89
2	F	3	GLC	O5-C1-C2	-2.22	107.34	110.77
2	F	1	GLC	O5-C5-C6	2.20	111.91	106.44
2	H	1	GLC	C6-C5-C4	-2.17	107.92	113.00
2	F	2	GLC	C1-O5-C5	2.16	115.12	112.19
2	K	3	GLC	O5-C5-C6	2.16	110.59	107.20
2	J	2	GLC	C3-C4-C5	-2.13	106.44	110.24
2	H	2	GLC	O5-C1-C2	-2.11	107.52	110.77
2	H	2	GLC	C3-C4-C5	-2.09	106.50	110.24

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	K	4	GLC	O5-C1-C2	2.06	113.96	110.77
2	G	3	GLC	O5-C5-C6	2.06	110.43	107.20
2	F	2	GLC	O2-C2-C1	2.05	113.35	109.15
2	J	3	GLC	C6-C5-C4	-2.05	108.20	113.00
2	G	2	GLC	C6-C5-C4	-2.05	108.21	113.00
2	G	4	GLC	O5-C5-C6	2.04	110.40	107.20
2	H	3	GLC	C3-C4-C5	-2.03	106.62	110.24

There are no chirality outliers.
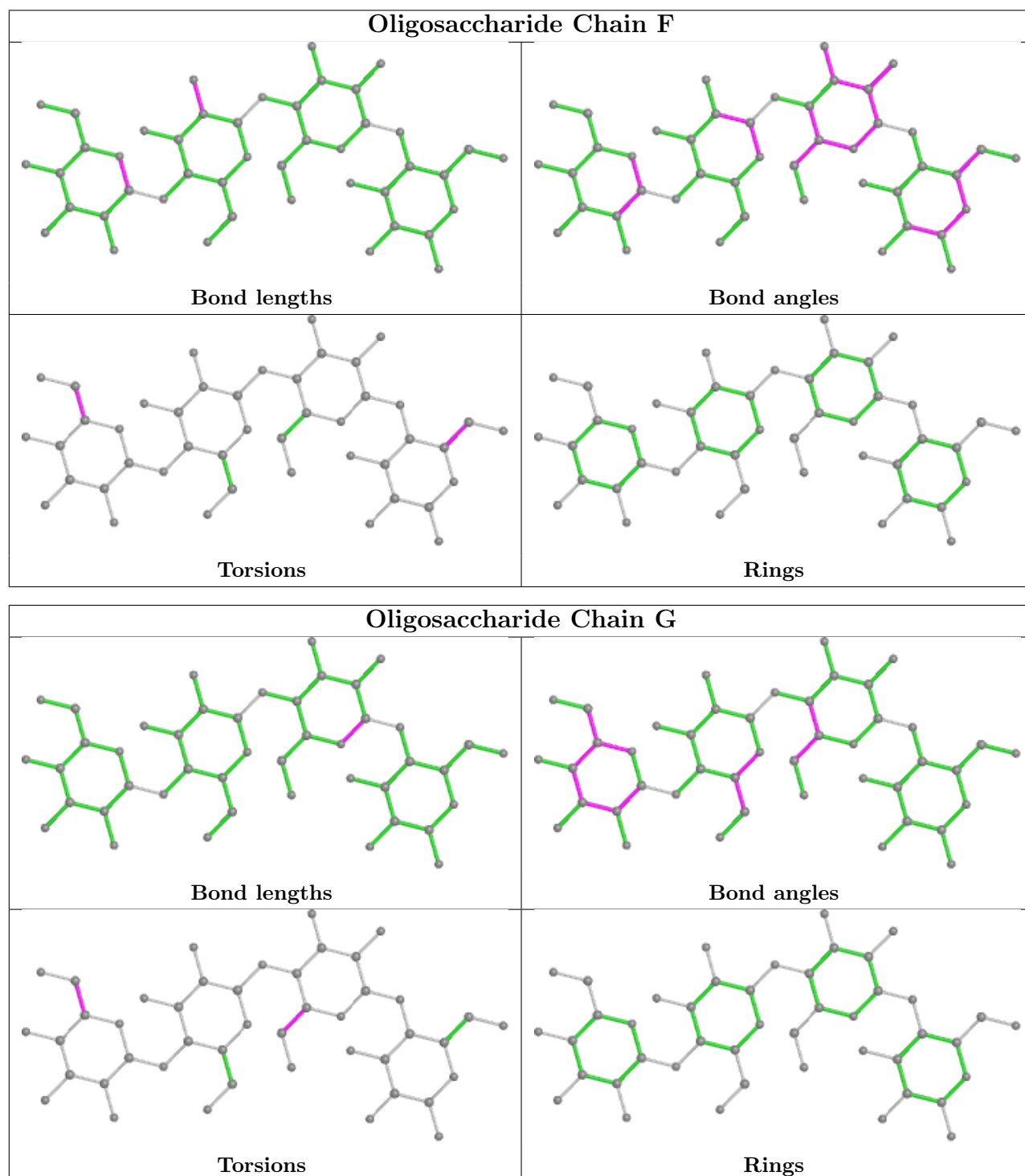
All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	K	1	GLC	O5-C5-C6-O6
2	F	4	GLC	C4-C5-C6-O6
2	G	2	GLC	O5-C5-C6-O6
2	I	2	GLC	O5-C5-C6-O6
2	G	2	GLC	C4-C5-C6-O6
2	K	1	GLC	C4-C5-C6-O6
2	F	4	GLC	O5-C5-C6-O6
2	G	4	GLC	O5-C5-C6-O6
2	I	2	GLC	C4-C5-C6-O6
2	J	2	GLC	O5-C5-C6-O6
2	G	4	GLC	C4-C5-C6-O6
2	I	3	GLC	O5-C5-C6-O6
2	J	2	GLC	C4-C5-C6-O6
2	I	3	GLC	C4-C5-C6-O6
2	I	1	GLC	C4-C5-C6-O6
2	K	4	GLC	O5-C5-C6-O6
2	F	1	GLC	C4-C5-C6-O6
2	F	1	GLC	O5-C5-C6-O6
2	I	1	GLC	O5-C5-C6-O6
2	I	4	GLC	O5-C5-C6-O6

There are no ring outliers.

3 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	I	2	GLC	1	0
2	J	1	GLC	1	0
2	I	3	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.

Oligosaccharide Chain F

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain G

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain H

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain I

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain J

Bond lengths

Bond angles

Torsions

Rings

Oligosaccharide Chain K

Bond lengths

Bond angles

Torsions

Rings

5.6 Ligand geometry ⓘ

3 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	$\#|Z| > 2$
3	GOL	C	401	-	5,5,5	0.80	0	5,5,5	0.99	0
3	GOL	D	401	-	5,5,5	1.05	0	5,5,5	0.82	0
3	GOL	D	402	-	5,5,5	1.02	0	5,5,5	0.93	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
3	GOL	C	401	-	-	0/4/4/4	-
3	GOL	D	401	-	-	4/4/4/4	-
3	GOL	D	402	-	-	4/4/4/4	-

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	D	401	GOL	O1-C1-C2-C3
3	D	401	GOL	C1-C2-C3-O3
3	D	402	GOL	O1-C1-C2-C3
3	D	402	GOL	O2-C2-C3-O3
3	D	402	GOL	C1-C2-C3-O3
3	D	401	GOL	O2-C2-C3-O3
3	D	402	GOL	O1-C1-C2-O2
3	D	401	GOL	O1-C1-C2-O2

There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	401	GOL	2	0
3	D	402	GOL	1	0

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 ⓘ

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(Å²)	Q<0.9
1	A	97/99 (97%)	0.66	5 (5%) 34	36	35, 49, 72, 94	0
1	B	97/99 (97%)	0.43	1 (1%) 79	80	34, 48, 73, 86	0
1	C	98/99 (98%)	0.68	4 (4%) 42	44	40, 52, 78, 92	0
1	D	97/99 (97%)	1.47	22 (22%) 3	3	47, 72, 95, 101	0
All	All	389/396 (98%)	0.81	32 (8%) 19	21	34, 55, 88, 101	0

All (32) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	296	TYR	4.1
1	D	290	LEU	3.7
1	D	311	ILE	3.5
1	D	315	ALA	3.4
1	D	312	PHE	3.3
1	C	296	TYR	3.1
1	D	298	PRO	2.9
1	B	289	CYS	2.9
1	C	278	VAL	2.8
1	D	262	GLN	2.7
1	C	318	VAL	2.7
1	A	304	ASP	2.7
1	D	263	GLN	2.6
1	A	301	TYR	2.5
1	C	353	ALA	2.5
1	D	280	PHE	2.4
1	D	283	VAL	2.4
1	D	297	ILE	2.4
1	D	268	PHE	2.3
1	D	323	PHE	2.3
1	D	272	TYR	2.3

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Mol	Chain	Res	Type	RSRZ
1	D	317	THR	2.3
1	D	278	VAL	2.3
1	A	277	ASP	2.2
1	A	348	ASP	2.2
1	D	307	TRP	2.1
1	D	321	TRP	2.1
1	D	342	LEU	2.1
1	D	295	THR	2.1
1	D	305	GLY	2.1
1	A	312	PHE	2.1
1	D	284	THR	2.1

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 ⓘ

SUGAR-RSR INFOmissingINFO

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
3	GOL	D	402	6/6	0.78	0.13	67,67,71,72	0
3	GOL	D	401	6/6	0.80	0.13	65,70,72,74	0
3	GOL	C	401	6/6	0.83	0.12	58,61,68,70	0

6.5 Other polymers ⓘ

There are no such residues in this entry.