Full wwPDB X-ray Structure Validation Report ⓘ

Mar 27, 2025 – 12:10 PM JST

PDB ID	:	8ZCS
Title	:	Crystal structure of the MBP-MCL1 complex with highly selective and potent Cyclic peptide inhibitor
Authors	:	Li, F.W.
Deposited on	:	2024-04-30
Resolution	:	2.79 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:

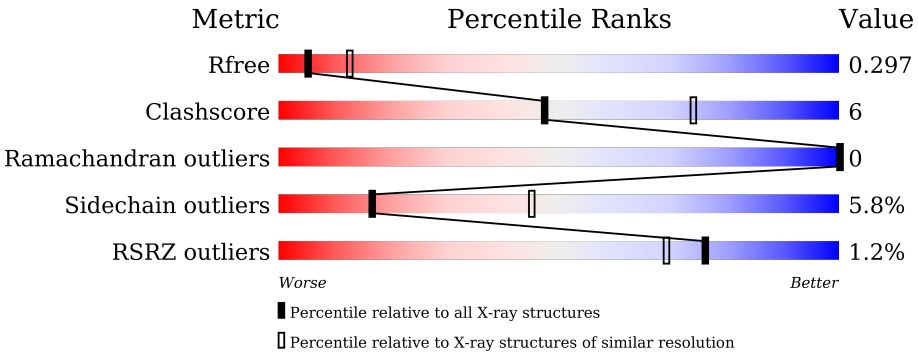
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	1.21
EDS	:	3.0
Percentile statistics	:	20231227.v01 (using entries in the PDB archive December 27th 2023)
CCP4	:	9.0.004 (Gargrove)
Density-Fitness	:	1.0.11
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.41.2

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 2.79 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}	164625	3657 (2.80-2.80)
Clashscore	180529	4123 (2.80-2.80)
Ramachandran outliers	177936	4071 (2.80-2.80)
Sidechain outliers	177891	4073 (2.80-2.80)
RSRZ outliers	164620	3659 (2.80-2.80)

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	522	84% 13%
1	B	522	78% 16% 5%
2	C	14	79% 14% 7%
3	D	4	100%
4	E	5	80% 20%

2 Entry composition (i)

There are 5 unique types of molecules in this entry. The entry contains 8150 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 Maltose/maltodextrin-binding periplasmic protein,Induced myeloid leukemia cell differentiation protein Mcl-1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	508	Total	C	N	O	S	0	1	0
			3944	2525	661	749	9			
1	B	496	Total	C	N	O	S	0	0	0
			3821	2440	641	731	9			

There are 26 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-196	GLY	-	expression tag	UNP P0AEX9
A	-24	ALA	GLU	conflict	UNP P0AEX9
A	-23	ALA	ASN	conflict	UNP P0AEX9
A	43	ALA	LYS	conflict	UNP P0AEX9
A	171	GLY	-	linker	UNP P0AEX9
A	172	SER	-	linker	UNP P0AEX9
A	194	ALA	LYS	conflict	UNP Q07820
A	197	ALA	LYS	conflict	UNP Q07820
A	201	ALA	ARG	conflict	UNP Q07820
A	322	SER	-	expression tag	UNP Q07820
A	323	GLU	-	expression tag	UNP Q07820
A	324	HIS	-	expression tag	UNP Q07820
A	325	HIS	-	expression tag	UNP Q07820
B	-196	GLY	-	expression tag	UNP P0AEX9
B	-24	ALA	GLU	conflict	UNP P0AEX9
B	-23	ALA	ASN	conflict	UNP P0AEX9
B	43	ALA	LYS	conflict	UNP P0AEX9
B	171	GLY	-	linker	UNP P0AEX9
B	172	SER	-	linker	UNP P0AEX9
B	194	ALA	LYS	conflict	UNP Q07820
B	197	ALA	LYS	conflict	UNP Q07820
B	201	ALA	ARG	conflict	UNP Q07820
B	322	SER	-	expression tag	UNP Q07820
B	323	GLU	-	expression tag	UNP Q07820

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Chain	Residue	Modelled	Actual	Comment	Reference
B	324	HIS	-	expression tag	UNP Q07820
B	325	HIS	-	expression tag	UNP Q07820

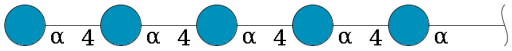
- Molecule 2 is a protein called TYR-LEU-LEU-PHE-TRP-ARG-ASP-GLU-LEU-ILE-LEU-LEU-CCJ-NH2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	C	14	Total	C	N	O	S	0	0	1
			123	85	18	19	1			

- Molecule 3 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
3	D	4	Total	C	O	0	0	0
			45	24	21			

- Molecule 4 is an oligosaccharide called alpha-D-glucopyranose-(1-4)-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
4	E	5	Total	C	O	0	0	0
			56	30	26			

- Molecule 5 is water.

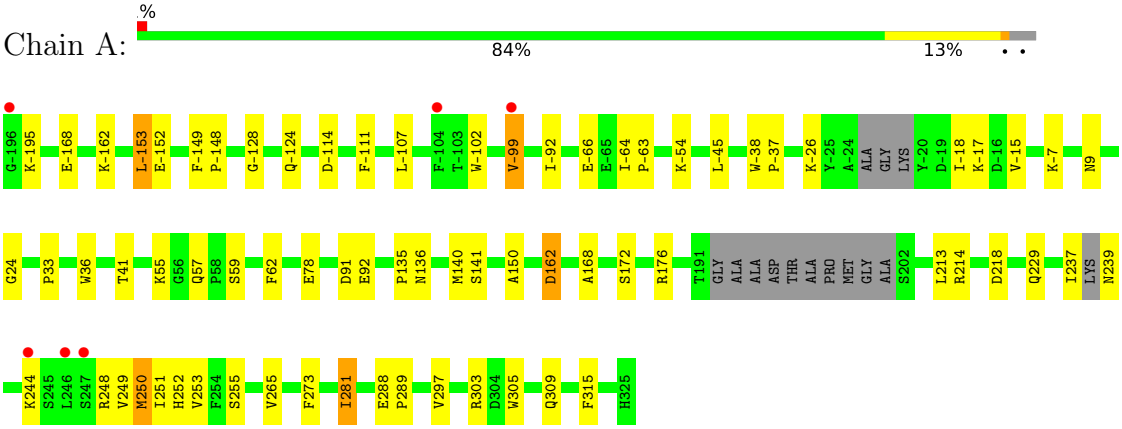
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	95	Total	O	0	0
			95	95		
5	B	64	Total	O	0	0
			64	64		
5	C	2	Total	O	0	0
			2	2		

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.

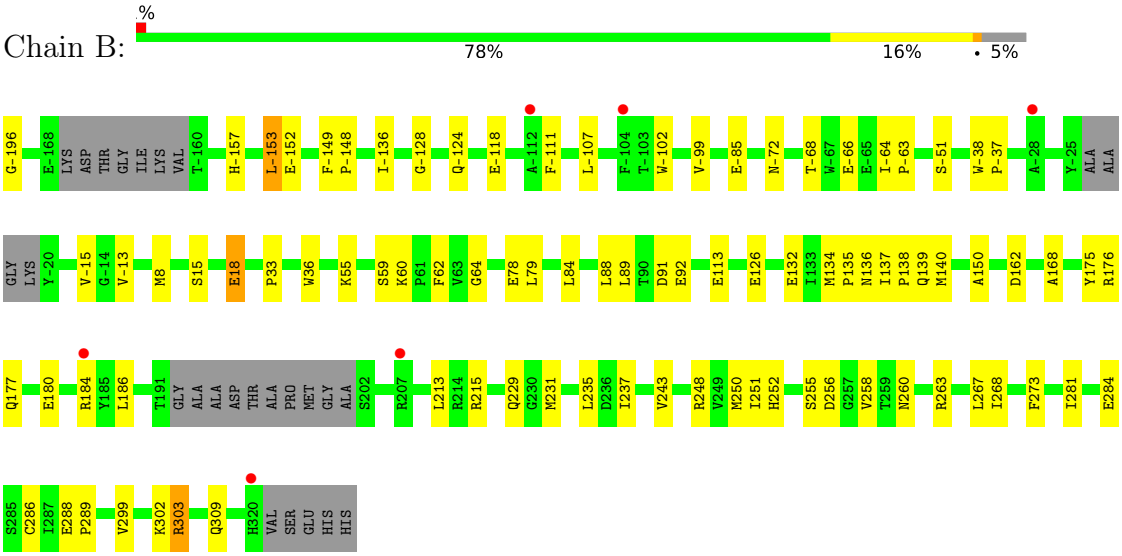
• Molecule 1: Maltose/maltodextrin-binding periplasmic protein,Induced myeloid leukemia cell differentiation protein Mcl-1

Chain A:



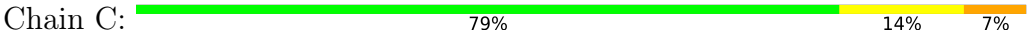
• Molecule 1: Maltose/maltodextrin-binding periplasmic protein,Induced myeloid leukemia cell differentiation protein Mcl-1

Chain B:



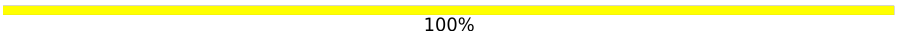
• Molecule 2: TYR-LEU-LEU-PHE-TRP-ARG-ASP-GLU-LEU-ILE-LEU-LEU-CCJ-NH2

Chain C:



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

Chain D:



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

Chain E:

4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α, β, γ	57.85Å 75.71Å 121.22Å 90.00° 95.77° 90.00°	Depositor
Resolution (Å)	47.21 – 2.79 47.21 – 2.79	Depositor EDS
% Data completeness (in resolution range)	80.5 (47.21-2.79) 80.7 (47.21-2.79)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	6.62 (at 2.77Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.204 , 0.296 0.209 , 0.297	Depositor DCC
R_{free} test set	1269 reflections (4.90%)	wwPDB-VP
Wilson B-factor (Å^2)	45.7	Xtriage
Anisotropy	0.029	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.34 , 49.9	EDS
L-test for twinning[2]	$< \|L\| > = 0.48$, $< L^2 > = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.92	EDS
Total number of atoms	8150	wwPDB-VP
Average B, all atoms (Å^2)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 4.30% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: GLC, CCJ, NH2

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	0.69	0/4036	0.80	0/5479
1	B	0.69	0/3903	0.80	0/5300
2	C	0.62	0/116	0.79	0/157
All	All	0.69	0/8055	0.80	0/10936

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand.A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
2	C	0	1

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
2	C	8	LEU	Mainchain

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	3944	0	3849	39	0
1	B	3821	0	3724	49	0
2	C	123	0	116	3	0
3	D	45	0	39	0	0
4	E	56	0	48	1	0
5	A	95	0	0	8	0
5	B	64	0	0	13	0
5	C	2	0	0	0	0
All	All	8150	0	7776	87	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 6.

All (87) 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:286:CYS:SG	5:B:404:HOH:O	2.38	0.81
1:A:229:GLN:HG2	5:A:492:HOH:O	1.81	0.79
1:B:84:LEU:O	1:B:89:LEU:HD13	1.84	0.78
1:A:-128:GLY:HA3	1:A:136:ASN:O	1.85	0.77
1:A:57:GLN:HG3	5:A:413:HOH:O	1.86	0.75
1:B:-157:HIS:ND1	5:B:401:HOH:O	2.20	0.75
1:B:-128:GLY:HA3	1:B:136:ASN:O	1.87	0.74
1:A:237:ILE:O	1:A:239:ASN:HA	1.92	0.70
1:A:55:LYS:HB2	5:A:413:HOH:O	1.90	0.70
1:B:-153:LEU:HD22	5:B:421:HOH:O	1.91	0.68
1:A:250:MET:HB3	1:A:297:VAL:HG21	1.76	0.67
1:B:60:LYS:HE3	5:B:409:HOH:O	1.96	0.65
1:B:-153:LEU:HD13	5:B:421:HOH:O	1.98	0.63
1:B:250:MET:HB3	1:B:267:LEU:CD1	2.30	0.62
1:B:-196:GLY:CA	5:B:415:HOH:O	2.50	0.59
1:B:150:ALA:HB2	1:B:168:ALA:HB2	1.86	0.58
1:A:-7:LYS:HE2	1:A:162:ASP:HA	1.87	0.56
1:B:137:ILE:HD12	1:B:139:GLN:HB2	1.87	0.55
1:B:-111:PHE:HZ	1:B:89:LEU:HD22	1.71	0.55
1:B:-15:VAL:HG12	1:B:-13:VAL:HG23	1.90	0.54
1:B:260:ASN:HD21	1:B:263:ARG:HD2	1.73	0.53
1:A:248:ARG:HA	1:A:251:ILE:HG12	1.91	0.53
1:A:305:TRP:O	1:A:309:GLN:HG2	2.08	0.53
1:A:253:VAL:HG22	1:A:297:VAL:HG11	1.92	0.52
1:A:-111:PHE:HB2	5:A:462:HOH:O	2.10	0.51
1:B:288:GLU:HB3	1:B:289:PRO:HD3	1.93	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:237:ILE:HG21	1:B:243:VAL:HG23	1.92	0.50
1:B:256:ASP:HB2	1:B:263:ARG:HH12	1.76	0.50
1:B:229:GLN:HG3	1:B:273:PHE:HZ	1.77	0.49
1:B:256:ASP:HA	2:C:-3:TYR:OH	2.12	0.49
1:B:-72:ASN:HB3	5:B:433:HOH:O	2.12	0.48
1:A:135:PRO:O	1:A:140:MET:HG3	2.13	0.48
1:A:55:LYS:CB	5:A:413:HOH:O	2.56	0.47
1:A:288:GLU:HB3	1:A:289:PRO:HD3	1.96	0.47
1:B:-85:GLU:OE1	4:E:1:GLC:O2	2.28	0.47
1:A:265:VAL:CG2	1:A:315:PHE:HE1	2.28	0.47
1:B:18:GLU:HB3	5:B:405:HOH:O	2.15	0.47
1:B:299:VAL:O	1:B:303:ARG:HB2	2.15	0.46
1:A:-99:VAL:O	1:A:-92:ILE:HG12	2.16	0.46
1:A:214:ARG:O	1:A:218:ASP:HB2	2.14	0.46
1:A:-38:TRP:N	1:A:-37:PRO:HD2	2.31	0.46
1:A:-66:GLU:OE2	1:A:55:LYS:N	2.40	0.46
1:B:255:SER:HB3	1:B:302:LYS:HZ1	1.81	0.46
1:A:-195:LYS:HE3	1:B:258:VAL:HB	1.97	0.45
1:A:-114:ASP:HB2	5:A:462:HOH:O	2.16	0.45
1:A:-64:ILE:N	1:A:-63:PRO:CD	2.80	0.45
1:B:-64:ILE:N	1:B:-63:PRO:CD	2.80	0.45
1:B:135:PRO:O	1:B:140:MET:HG3	2.16	0.45
1:A:303:ARG:HD3	5:A:449:HOH:O	2.16	0.45
1:A:265:VAL:HG22	1:A:315:PHE:HE1	1.80	0.44
1:A:150:ALA:HB2	1:A:168:ALA:HB2	2.00	0.44
1:B:248:ARG:O	1:B:252:HIS:CD2	2.71	0.44
1:B:231:MET:HG2	2:C:8:LEU:HD11	2.00	0.44
1:A:-149:PHE:N	1:A:-148:PRO:HD2	2.32	0.43
1:B:-149:PHE:N	1:B:-148:PRO:HD2	2.34	0.43
1:B:175:TYR:HB3	5:B:434:HOH:O	2.19	0.43
1:A:-153:LEU:HG	1:A:-152:GLU:N	2.34	0.43
1:B:-153:LEU:HG	1:B:-152:GLU:N	2.33	0.43
1:A:281:ILE:HG23	1:A:281:ILE:O	2.19	0.43
1:B:64:GLY:HA2	1:B:134:MET:HE3	2.00	0.43
1:B:235:LEU:HD11	2:C:8:LEU:HD21	2.01	0.43
1:A:24:GLY:HA2	5:A:406:HOH:O	2.18	0.42
1:B:213:LEU:HD12	1:B:213:LEU:HA	1.85	0.42
1:B:284:GLU:HB2	5:B:408:HOH:O	2.18	0.42
1:B:60:LYS:CE	5:B:409:HOH:O	2.63	0.42
1:A:-15:VAL:HG11	1:A:172:SER:HB2	2.02	0.42
1:B:-38:TRP:N	1:B:-37:PRO:HD2	2.35	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:213:LEU:HD21	1:B:268:ILE:HG21	2.02	0.42
1:B:-66:GLU:OE2	1:B:55:LYS:N	2.42	0.42
1:B:281:ILE:O	1:B:281:ILE:HG23	2.20	0.41
1:A:229:GLN:HG3	1:A:273:PHE:HZ	1.85	0.41
1:B:-157:HIS:CE1	5:B:401:HOH:O	2.68	0.41
1:A:-107:LEU:HD12	1:A:-102:TRP:CZ2	2.55	0.41
1:A:-38:TRP:N	1:A:-37:PRO:CD	2.83	0.41
1:B:-107:LEU:HD12	1:B:-102:TRP:CZ2	2.55	0.41
1:B:33:PRO:HA	1:B:36:TRP:CE2	2.55	0.41
1:B:89:LEU:HD12	1:B:89:LEU:N	2.35	0.41
1:B:260:ASN:ND2	1:B:263:ARG:HD2	2.34	0.41
1:A:33:PRO:HA	1:A:36:TRP:CE2	2.55	0.41
1:A:-168:GLU:OE2	1:A:-162:LYS:HA	2.21	0.41
1:B:-68:THR:HB	1:B:-66:GLU:OE1	2.21	0.41
1:A:252:HIS:HB3	1:A:255:SER:OG	2.20	0.41
1:A:78:GLU:CD	1:A:78:GLU:H	2.23	0.41
1:A:-45:LEU:HD12	1:A:9:ASN:O	2.20	0.40
1:B:137:ILE:HB	1:B:138:PRO:HD2	2.02	0.40
1:B:180:GLU:HG3	5:B:458:HOH:O	2.21	0.40
1:A:213:LEU:HD12	1:A:213:LEU:HA	1.88	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	501/522 (96%)	477 (95%)	24 (5%)	0	100	100
1	B	488/522 (94%)	469 (96%)	19 (4%)	0	100	100
2	C	11/14 (79%)	11 (100%)	0	0	100	100
All	All	1000/1058 (94%)	957 (96%)	43 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	406/422 (96%)	387 (95%)	19 (5%)	22 54
1	B	391/422 (93%)	363 (93%)	28 (7%)	12 34
2	C	12/12 (100%)	12 (100%)	0	100 100
All	All	809/856 (94%)	762 (94%)	47 (6%)	17 45

All (47) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	-153	LEU
1	A	-124	GLN
1	A	-99	VAL
1	A	-54	LYS
1	A	-26	LYS
1	A	-18	ILE
1	A	-17	LYS
1	A	41	THR
1	A	59	SER
1	A	62	PHE
1	A	91	ASP
1	A	92	GLU
1	A	141	SER
1	A	162	ASP
1	A	176	ARG
1	A	244	LYS
1	A	249	VAL
1	A	250	MET
1	A	281	ILE
1	B	-153	LEU
1	B	-136	ILE
1	B	-124	GLN
1	B	-118	GLU

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Mol	Chain	Res	Type
1	B	-99	VAL
1	B	-51	SER
1	B	8	MET
1	B	15	SER
1	B	18	GLU
1	B	59	SER
1	B	62	PHE
1	B	78	GLU
1	B	79	LEU
1	B	88	LEU
1	B	91	ASP
1	B	92	GLU
1	B	113	GLU
1	B	126	GLU
1	B	132	GLU
1	B	162	ASP
1	B	176	ARG
1	B	177	GLN
1	B	184	ARG
1	B	186	LEU
1	B	215	ARG
1	B	251	ILE
1	B	303	ARG
1	B	309	GLN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (7) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	-147	GLN
1	A	229	GLN
1	A	324	HIS
1	B	9	ASN
1	B	177	GLN
1	B	223	ASN
1	B	252	HIS

5.3.3 RNA

There are no RNA molecules in this entry.

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

1 non-standard protein/DNA/RNA residue is 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	CCJ	C	9	2	7,8,10	1.61	1 (14%)	3,8,12	2.25	1 (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
2	CCJ	C	9	2	-	2/4/7/10	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	9	CCJ	OZ1-CE	3.87	1.41	1.19

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	C	9	CCJ	OZ1-CE-CD	-3.86	106.67	125.62

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	9	CCJ	N-CA-CB-SG
2	C	9	CCJ	C-CA-CB-SG

There are no ring outliers.

No monomer is involved in short contacts.

5.5 Carbohydrates (i)

9 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	$\#\|Z\| > 2$
3	GLC	D	1	3	12,12,12	0.78	0	17,17,17	1.72	5 (29%)
3	GLC	D	2	3	11,11,12	0.50	0	15,15,17	1.44	1 (6%)
3	GLC	D	3	3	11,11,12	0.44	0	15,15,17	1.47	3 (20%)
3	GLC	D	4	3	11,11,12	1.46	1 (9%)	15,15,17	2.82	6 (40%)
4	GLC	E	1	4	12,12,12	0.48	0	17,17,17	1.40	3 (17%)
4	GLC	E	2	4	11,11,12	0.64	0	15,15,17	1.65	2 (13%)
4	GLC	E	3	4	11,11,12	0.99	1 (9%)	15,15,17	1.82	3 (20%)
4	GLC	E	4	4	11,11,12	0.87	0	15,15,17	2.71	4 (26%)
4	GLC	E	5	4	11,11,12	0.82	0	15,15,17	2.30	2 (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
3	GLC	D	1	3	-	0/2/22/22	0/1/1/1
3	GLC	D	2	3	-	0/2/19/22	0/1/1/1
3	GLC	D	3	3	-	1/2/19/22	0/1/1/1
3	GLC	D	4	3	-	2/2/19/22	0/1/1/1
4	GLC	E	1	4	-	2/2/22/22	0/1/1/1
4	GLC	E	2	4	-	0/2/19/22	0/1/1/1
4	GLC	E	3	4	-	0/2/19/22	0/1/1/1
4	GLC	E	4	4	-	2/2/19/22	0/1/1/1
4	GLC	E	5	4	-	2/2/19/22	0/1/1/1

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	4	GLC	C4-C5	2.58	1.58	1.53
4	E	3	GLC	C2-C3	2.03	1.55	1.52

All (29) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	E	4	GLC	C1-O5-C5	8.40	123.57	112.19
3	D	4	GLC	C1-O5-C5	7.75	122.69	112.19
4	E	5	GLC	C1-O5-C5	7.47	122.32	112.19
3	D	4	GLC	O2-C2-C1	4.16	117.67	109.15
4	E	3	GLC	O3-C3-C2	4.00	117.66	109.99
4	E	5	GLC	O5-C5-C6	3.48	112.65	107.20
3	D	2	GLC	C1-O5-C5	3.45	116.87	112.19
4	E	2	GLC	C1-O5-C5	3.44	116.85	112.19
4	E	2	GLC	C1-C2-C3	-3.43	105.44	109.67
3	D	4	GLC	O4-C4-C5	3.43	117.82	109.30
4	E	4	GLC	C1-C2-C3	3.24	113.65	109.67
4	E	3	GLC	O3-C3-C4	-3.10	103.19	110.35
3	D	4	GLC	O5-C5-C6	-3.01	102.49	107.20
3	D	3	GLC	O5-C5-C6	2.96	111.85	107.20
4	E	4	GLC	O5-C1-C2	2.82	115.12	110.77
3	D	3	GLC	C1-O5-C5	-2.75	108.46	112.19
4	E	3	GLC	O4-C4-C3	-2.69	104.12	110.35
4	E	1	GLC	O3-C3-C2	-2.65	104.22	110.35
3	D	1	GLC	O4-C4-C3	-2.63	104.27	110.35
4	E	4	GLC	O5-C5-C4	2.56	117.06	110.83
3	D	3	GLC	C3-C4-C5	-2.52	105.74	110.24
4	E	1	GLC	C4-C3-C2	-2.37	106.69	110.82
3	D	1	GLC	O3-C3-C2	-2.33	104.97	110.35
3	D	4	GLC	C3-C4-C5	-2.23	106.25	110.24
4	E	1	GLC	C3-C4-C5	2.21	114.18	110.24
3	D	1	GLC	O2-C2-C3	-2.19	105.28	110.35
3	D	1	GLC	C6-C5-C4	2.17	118.10	113.00
3	D	4	GLC	O5-C5-C4	2.12	115.98	110.83
3	D	1	GLC	O2-C2-C1	2.09	114.02	109.16

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	E	4	GLC	O5-C5-C6-O6
4	E	5	GLC	O5-C5-C6-O6

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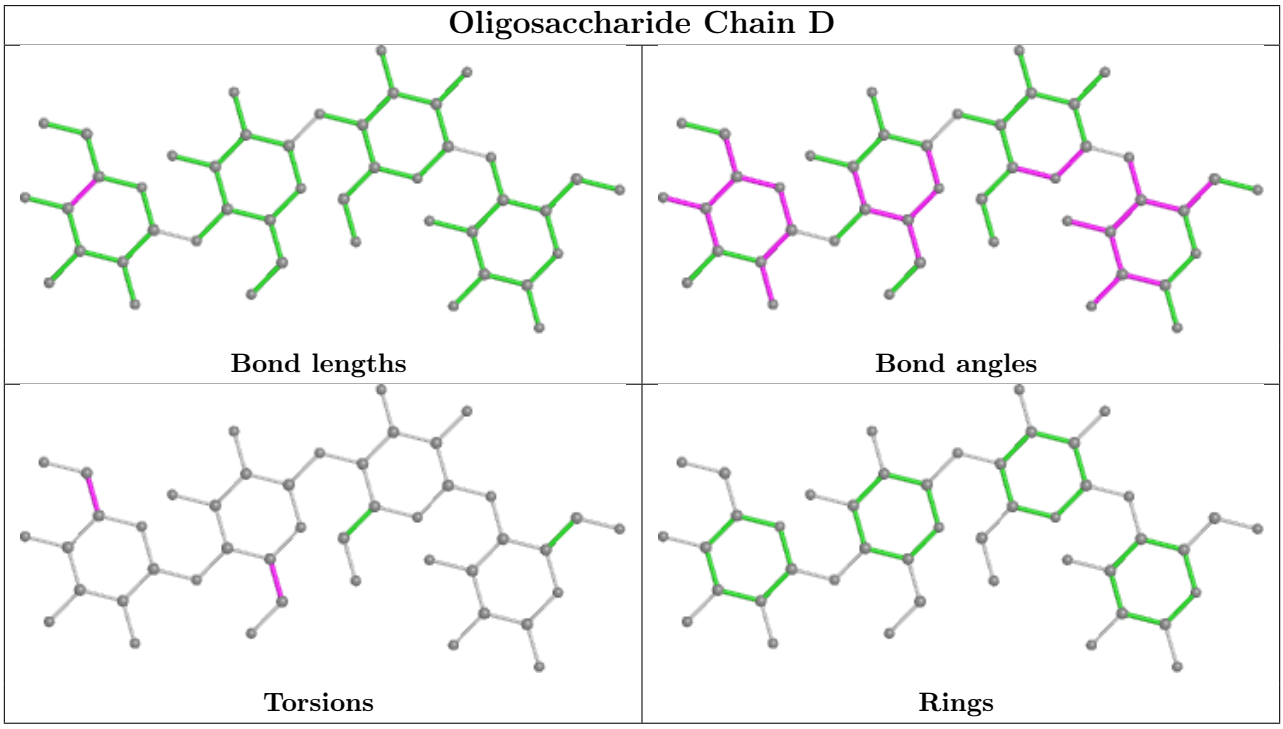
Mol	Chain	Res	Type	Atoms
4	E	5	GLC	C4-C5-C6-O6
3	D	4	GLC	O5-C5-C6-O6
4	E	1	GLC	C4-C5-C6-O6
4	E	4	GLC	C4-C5-C6-O6
3	D	4	GLC	C4-C5-C6-O6
4	E	1	GLC	O5-C5-C6-O6
3	D	3	GLC	O5-C5-C6-O6

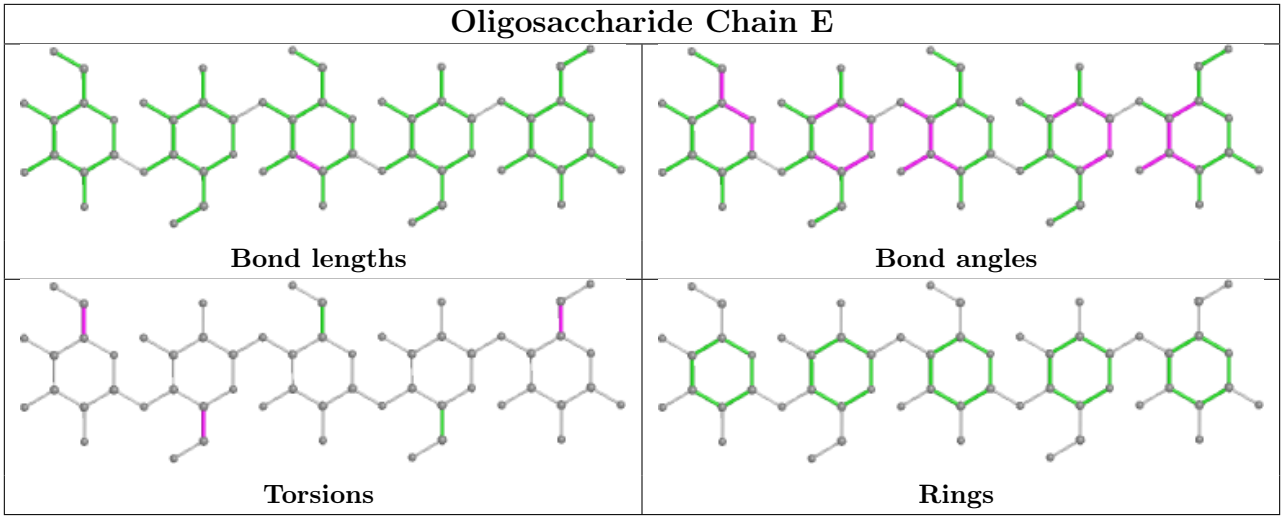
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	E	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

There are no ligands in this entry.

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, 95^{th} percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled 'Q< 0.9' lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å^2)	Q<0.9
1	A	508/522 (97%)	-0.14	6 (1%) 76 69	19, 42, 76, 98	1 (0%)
1	B	496/522 (95%)	0.13	6 (1%) 76 69	28, 55, 88, 108	0
2	C	12/14 (85%)	-0.15	0 100 100	29, 44, 55, 62	0
All	All	1016/1058 (96%)	-0.01	12 (1%) 76 69	19, 49, 84, 108	1 (0%)

All (12) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	246	LEU	3.6
1	B	-104	PHE	3.3
1	A	-104	PHE	3.0
1	A	-196	GLY	2.9
1	B	-28	ALA	2.9
1	B	320	HIS	2.4
1	B	-112	ALA	2.4
1	A	-99	VAL	2.4
1	A	244	LYS	2.3
1	B	207	ARG	2.2
1	B	184	ARG	2.1
1	A	247	SER	2.0

6.2 Non-standard residues in protein, DNA, RNA chains

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	CCJ	C	9	9/11	0.93	0.09	46,48,58,59	0

6.3 Carbohydrates (i)

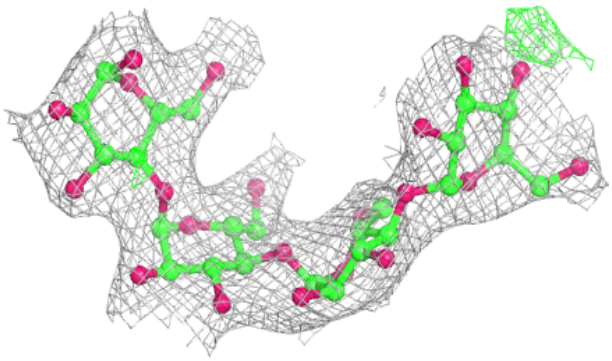
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

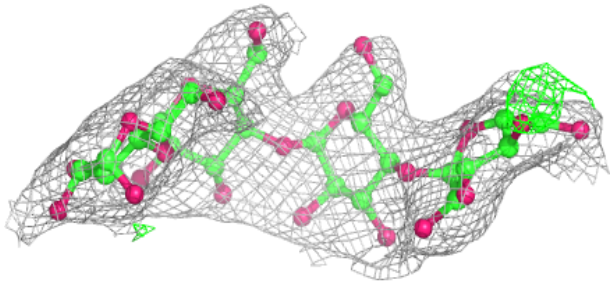
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
4	GLC	E	5	11/12	0.80	0.09	59,71,73,76	0
4	GLC	E	4	11/12	0.86	0.09	50,53,57,62	0
3	GLC	D	4	11/12	0.86	0.09	36,39,43,45	0
4	GLC	E	3	11/12	0.94	0.07	33,36,41,48	0
3	GLC	D	3	11/12	0.96	0.06	24,27,29,35	0
3	GLC	D	1	12/12	0.96	0.06	22,24,25,26	0
4	GLC	E	1	12/12	0.96	0.06	22,25,27,30	0
4	GLC	E	2	11/12	0.97	0.05	25,28,31,32	0
3	GLC	D	2	11/12	0.97	0.05	25,26,27,27	0

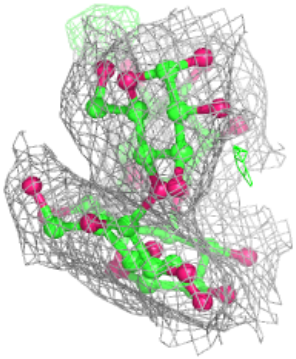
The following is a graphical depiction of the model fit to experimental electron density for oligosaccharide. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around Chain D:

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

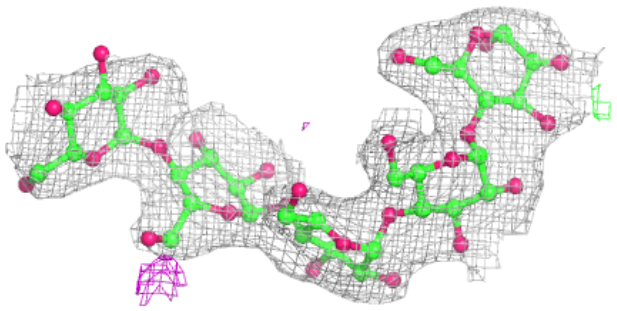


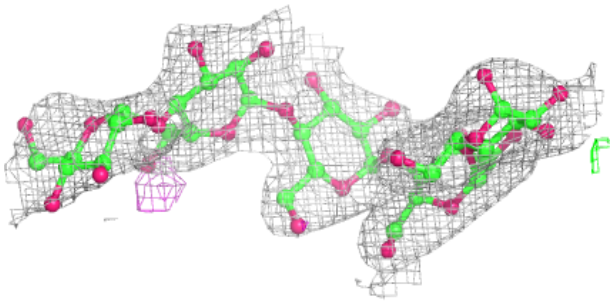


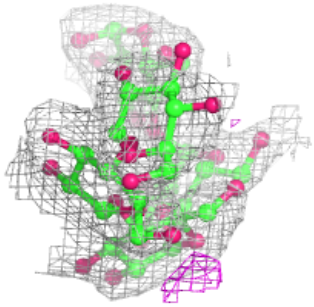


Electron density around Chain E:

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







6.4 Ligands

There are no ligands in this entry.

6.5 Other polymers

There are no such residues in this entry.