



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2026 – 05:52 PM UTC

PDB ID : 1PPI / pdb_00001ppi
Title : THE ACTIVE CENTER OF A MAMMALIAN ALPHA-AMYLASE. THE
STRUCTURE OF THE COMPLEX OF A PANCREATIC ALPHA-
AMYLASE WITH A CARBOHYDRATE INHIBITOR REFINED TO 2.2
ANGSTROMS RESOLUTION
Authors : Qian, M.; Haser, R.; Payan, F.
Deposited on : 1994-02-22
Resolution : 2.20 Å(reported)

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

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

A user guide is available at

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

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

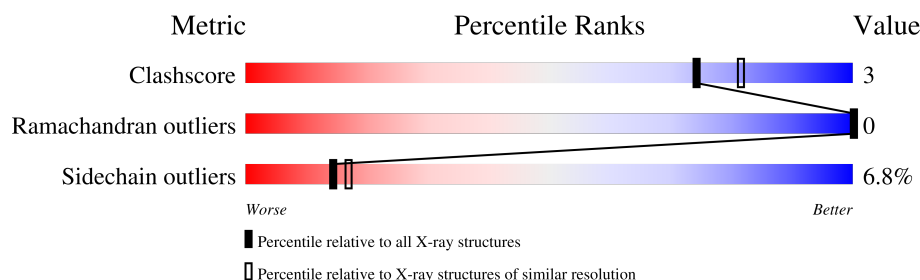
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.20 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))
Clashscore	190562	6851 (2.20-2.20)
Ramachandran outliers	187476	6768 (2.20-2.20)
Sidechain outliers	187428	6769 (2.20-2.20)

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 $\leq 5\%$.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	496	
2	B	2	
3	C	2	

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 4358 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 ALPHA-AMYLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	496	Total	C	N	O	S	0	0	0
			3908	2469	687	731	21			

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	49	VAL	ILE	conflict	UNP P00690
A	243	LYS	GLN	conflict	UNP P00690
A	310	SER	ALA	conflict	UNP P00690

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

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace
2	B	2	Total	C	O	0	0	0
			22	12	10			

- Molecule 3 is an oligosaccharide called 4,6-dideoxy-4-[[[(1S,5R,6S)-3-formyl-5,6-dihydroxy-4-oxocyclohex-2-en-1-yl]amino}-alpha-D-xylo-hex-5-enopyranose-(1-4)-beta-D-glucopyranose.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
3	C	2	Total	C	N	O	0	0	0
			33	19	1	13			

- Molecule 4 is CHLORIDE ION (CCD ID: CL) (formula: Cl).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	Cl	0	0
			1	1		

- Molecule 5 is CALCIUM ION (CCD ID: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	A	1	Total 1	Ca 1	0	0

- Molecule 6 is water.

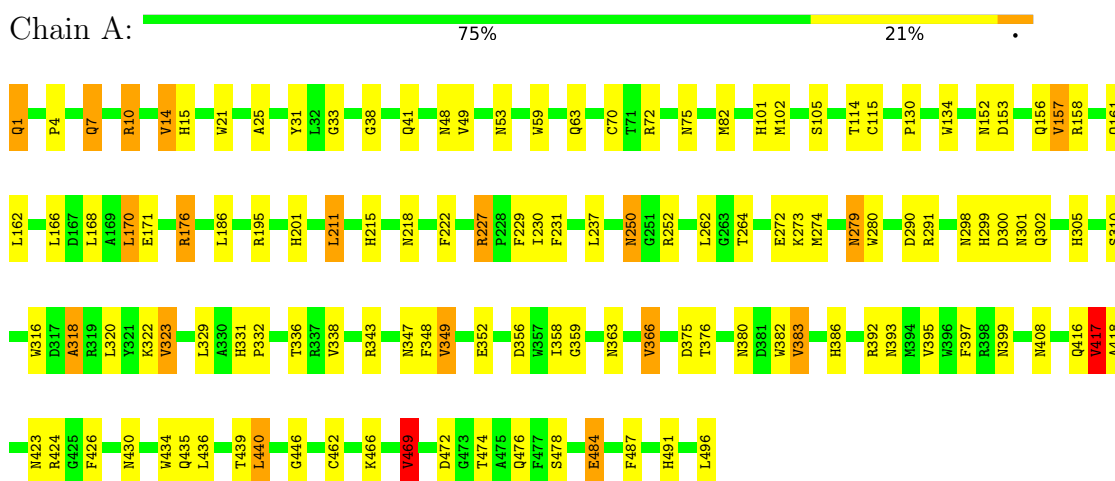
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	393	Total 393	O 393	0	0

3 Residue-property plots

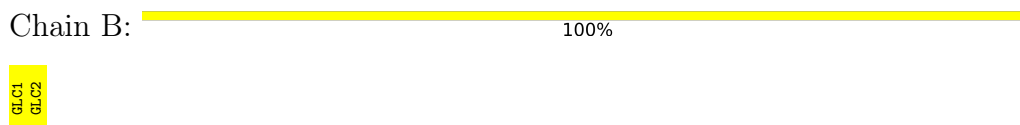
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded 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. 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.

Note EDS was not executed.

• Molecule 1: ALPHA-AMYLASE



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



• Molecule 3: 4,6-dideoxy-4-{[(1S,5R,6S)-3-formyl-5,6-dihydroxy-4-oxocyclohex-2-en-1-yl]amino}-alpha-D-xylo-hex-5-enopyranose-(1-4)-beta-D-glucopyranose



4 Data and refinement statistics

Xtriage (Phenix) and EDS were not executed - this section is therefore incomplete.

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	56.30Å 87.80Å 103.40Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 2.20	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.20)	Depositor
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	X-PLOR	Depositor
R, R_{free}	0.153 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	4358	wwPDB-VP
Average B, all atoms (Å ²)	13.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: BGC, CA, DAF, CL, 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	1.08	20/4018 (0.5%)	1.74	90/5459 (1.6%)

All (20) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	383	VAL	CA-CB	9.95	1.67	1.54
1	A	469	VAL	CA-CB	8.65	1.65	1.54
1	A	157	VAL	CA-CB	7.30	1.63	1.54
1	A	386	HIS	CD2-NE2	-7.26	1.29	1.37
1	A	15	HIS	CD2-NE2	-7.15	1.29	1.37
1	A	366	VAL	CA-CB	6.94	1.62	1.54
1	A	201	HIS	CD2-NE2	-6.88	1.30	1.37
1	A	349	VAL	CA-CB	6.57	1.62	1.54
1	A	491	HIS	CD2-NE2	-6.25	1.30	1.37
1	A	323	VAL	CA-CB	6.13	1.62	1.54
1	A	305	HIS	CD2-NE2	-5.97	1.31	1.37
1	A	299	HIS	CD2-NE2	-5.81	1.31	1.37
1	A	101	HIS	CD2-NE2	-5.58	1.31	1.37
1	A	331	HIS	CD2-NE2	-5.50	1.31	1.37
1	A	215	HIS	CD2-NE2	-5.47	1.31	1.37
1	A	230	ILE	CA-CB	5.43	1.61	1.54
1	A	376	THR	CA-CB	5.40	1.62	1.53
1	A	15	HIS	CG-ND1	-5.35	1.32	1.38
1	A	101	HIS	CG-ND1	-5.09	1.32	1.38
1	A	201	HIS	CG-ND1	-5.03	1.32	1.38

All (90) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	343	ARG	NE-CZ-NH2	-9.23	110.90	119.20

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	363	ASN	CA-CB-CG	-9.09	103.51	112.60
1	A	386	HIS	CB-CG-CD2	-8.16	120.60	131.20
1	A	231	PHE	CA-CB-CG	7.91	121.71	113.80
1	A	310	SER	N-CA-C	7.67	121.90	112.54
1	A	101	HIS	ND1-CG-CD2	7.51	113.61	106.10
1	A	476	GLN	CB-CG-CD	7.50	125.35	112.60
1	A	408	ASN	CA-CB-CG	7.48	120.08	112.60
1	A	72	ARG	NE-CZ-NH2	-7.30	112.63	119.20
1	A	201	HIS	CA-CB-CG	-7.24	106.56	113.80
1	A	301	ASN	CA-CB-CG	7.22	119.82	112.60
1	A	298	ASN	CA-CB-CG	7.18	119.78	112.60
1	A	14	VAL	CB-CA-C	-6.93	100.30	110.62
1	A	215	HIS	CA-CB-CG	6.89	120.69	113.80
1	A	417	VAL	N-CA-CB	-6.86	98.58	111.62
1	A	316	TRP	CG-CD2-CE3	6.82	140.72	133.90
1	A	397	PHE	CA-CB-CG	6.81	120.61	113.80
1	A	347	ASN	OD1-CG-ND2	-6.71	115.89	122.60
1	A	153	ASP	CA-CB-CG	6.67	119.27	112.60
1	A	491	HIS	CB-CG-CD2	-6.65	122.55	131.20
1	A	484	GLU	CB-CG-CD	6.62	123.84	112.60
1	A	399	ASN	OD1-CG-ND2	-6.55	116.05	122.60
1	A	299	HIS	CB-CG-CD2	-6.50	122.75	131.20
1	A	343	ARG	NE-CZ-NH1	6.32	127.82	121.50
1	A	423	ASN	OD1-CG-ND2	-6.30	116.30	122.60
1	A	250	ASN	OD1-CG-ND2	-6.23	116.37	122.60
1	A	380	ASN	OD1-CG-ND2	-6.18	116.42	122.60
1	A	171	GLU	CB-CG-CD	6.15	123.06	112.60
1	A	408	ASN	OD1-CG-ND2	-6.11	116.49	122.60
1	A	487	PHE	CA-CB-CG	6.09	119.89	113.80
1	A	7	GLN	OE1-CD-NE2	-6.09	116.51	122.60
1	A	152	ASN	CA-CB-CG	-6.08	106.52	112.60
1	A	41	GLN	OE1-CD-NE2	-6.06	116.54	122.60
1	A	48	ASN	OD1-CG-ND2	-5.94	116.66	122.60
1	A	318	ALA	N-CA-C	5.92	118.22	111.11
1	A	439	THR	N-CA-C	-5.92	99.08	108.73
1	A	158	ARG	CA-CB-CG	-5.92	102.27	114.10
1	A	316	TRP	CB-CG-CD1	-5.86	118.11	126.90
1	A	7	GLN	N-CA-C	-5.76	102.51	110.35
1	A	195	ARG	NE-CZ-NH1	5.70	127.20	121.50
1	A	358	ILE	O-C-N	5.68	128.46	122.67
1	A	161	GLN	OE1-CD-NE2	-5.67	116.93	122.60
1	A	273	LYS	CB-CG-CD	-5.66	98.29	111.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	491	HIS	CB-CG-ND1	5.60	131.09	122.70
1	A	349	VAL	N-CA-C	-5.58	100.30	108.11
1	A	63	GLN	CA-C-N	5.57	125.58	119.90
1	A	63	GLN	C-N-CA	5.57	125.58	119.90
1	A	72	ARG	NE-CZ-NH1	5.55	127.05	121.50
1	A	21	TRP	CG-CD2-CE3	5.54	139.44	133.90
1	A	382	TRP	CG-CD2-CE3	5.53	139.43	133.90
1	A	386	HIS	CB-CG-ND1	5.51	130.96	122.70
1	A	416	GLN	N-CA-C	-5.49	100.75	109.59
1	A	218	ASN	OD1-CG-ND2	-5.44	117.16	122.60
1	A	252	ARG	NE-CZ-NH2	-5.41	114.33	119.20
1	A	102	MET	O-C-N	-5.40	117.35	123.13
1	A	41	GLN	CG-CD-NE2	5.40	124.50	116.40
1	A	424	ARG	N-CA-C	5.37	121.59	114.12
1	A	356	ASP	CA-CB-CG	5.34	117.94	112.60
1	A	395	VAL	N-CA-C	-5.30	104.33	111.44
1	A	290	ASP	CA-CB-CG	5.30	117.90	112.60
1	A	331	HIS	CB-CG-CD2	-5.29	124.32	131.20
1	A	336	THR	N-CA-C	5.29	118.24	109.46
1	A	53	ASN	CA-CB-CG	-5.26	107.34	112.60
1	A	75	ASN	OD1-CG-ND2	-5.26	117.34	122.60
1	A	430	ASN	OD1-CG-ND2	-5.25	117.35	122.60
1	A	161	GLN	CG-CD-NE2	5.24	124.26	116.40
1	A	70	CYS	N-CA-CB	-5.23	102.26	110.79
1	A	114	THR	N-CA-C	5.19	119.24	113.01
1	A	300	ASP	CA-CB-CG	5.17	117.77	112.60
1	A	302	GLN	OE1-CD-NE2	-5.17	117.43	122.60
1	A	472	ASP	CA-CB-CG	5.15	117.75	112.60
1	A	338	VAL	N-CA-CB	-5.15	102.62	110.86
1	A	280	TRP	CG-CD2-CE3	5.14	139.04	133.90
1	A	176	ARG	NE-CZ-NH1	5.14	126.64	121.50
1	A	280	TRP	CE2-CD2-CG	-5.11	101.07	107.20
1	A	382	TRP	O-C-N	-5.10	116.75	123.02
1	A	359	GLY	CA-C-N	5.10	125.63	120.38
1	A	359	GLY	C-N-CA	5.10	125.63	120.38
1	A	156	GLN	OE1-CD-NE2	-5.10	117.50	122.60
1	A	375	ASP	CA-CB-CG	5.10	117.70	112.60
1	A	332	PRO	N-CA-C	5.08	120.21	113.86
1	A	227	ARG	N-CA-CB	-5.07	103.44	110.29
1	A	434	TRP	CE2-CD2-CG	-5.07	101.11	107.20
1	A	195	ARG	NE-CZ-NH2	-5.06	114.65	119.20
1	A	222	PHE	CA-C-N	5.06	125.33	119.92

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	222	PHE	C-N-CA	5.06	125.33	119.92
1	A	59	TRP	CB-CG-CD1	-5.05	119.32	126.90
1	A	393	ASN	OD1-CG-ND2	-5.03	117.57	122.60
1	A	176	ARG	NE-CZ-NH2	-5.01	114.69	119.20
1	A	10	ARG	CA-CB-CG	-5.01	104.08	114.10

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	3908	0	3687	23	0
2	B	22	0	19	0	0
3	C	33	0	26	1	0
4	A	1	0	0	0	0
5	A	1	0	0	0	0
6	A	393	0	0	0	0
All	All	4358	0	3732	24	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 3.

All (24) 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:A:446:GLY:HA2	1:A:469:VAL:HG22	1.67	0.76
1:A:170:LEU:O	1:A:176:ARG:HD2	1.92	0.70
1:A:7:GLN:HB3	1:A:10:ARG:HD3	1.84	0.59
1:A:7:GLN:HE21	1:A:10:ARG:HD2	1.68	0.57
1:A:279:ASN:H	1:A:279:ASN:HD22	1.55	0.55
1:A:10:ARG:HB3	1:A:38:GLY:HA2	1.88	0.55
1:A:31:TYR:OH	1:A:392:ARG:HG3	2.07	0.53
3:C:2:DAF:H6	3:C:2:DAF:H3H	1.91	0.52
1:A:1:GLN:HG3	1:A:250:ASN:O	2.11	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:4:PRO:HA	1:A:229:PHE:CG	2.47	0.50
1:A:274:MET:HE3	1:A:417:VAL:HB	1.94	0.49
1:A:436:LEU:O	1:A:478:SER:HA	2.13	0.48
1:A:105:SER:HB3	1:A:166:LEU:HD21	1.99	0.45
1:A:318:ALA:O	1:A:322:LYS:HE3	2.18	0.44
1:A:10:ARG:HH22	1:A:33:GLY:HA2	1.83	0.44
1:A:25:ALA:HB2	1:A:82:MET:HA	1.99	0.43
1:A:10:ARG:NH2	1:A:33:GLY:HA2	2.33	0.43
1:A:440:LEU:O	1:A:474:THR:HA	2.19	0.43
1:A:348:PHE:HA	1:A:352:GLU:O	2.18	0.43
1:A:1:GLN:NE2	1:A:211:LEU:HG	2.33	0.42
1:A:291:ARG:HD3	1:A:291:ARG:HA	1.80	0.42
1:A:418:ALA:HB1	1:A:426:PHE:CZ	2.54	0.41
1:A:264:THR:HG22	1:A:272:GLU:HG3	2.02	0.41
1:A:462:CYS:SG	1:A:466:LYS:HG2	2.60	0.41

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	494/496 (100%)	483 (98%)	11 (2%)	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	413/413 (100%)	385 (93%)	28 (7%)	14	17

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

Mol	Chain	Res	Type
1	A	1	GLN
1	A	14	VAL
1	A	49	VAL
1	A	115	CYS
1	A	130	PRO
1	A	134	TRP
1	A	157	VAL
1	A	162	LEU
1	A	168	LEU
1	A	170	LEU
1	A	186	LEU
1	A	211	LEU
1	A	227	ARG
1	A	237	LEU
1	A	262	LEU
1	A	279	ASN
1	A	320	LEU
1	A	323	VAL
1	A	329	LEU
1	A	349	VAL
1	A	366	VAL
1	A	383	VAL
1	A	417	VAL
1	A	435	GLN
1	A	440	LEU
1	A	469	VAL
1	A	484	GLU
1	A	496	LEU

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	7	GLN
1	A	279	ASN
1	A	399	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 ⓘ

4 monosaccharides are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z > 2$	Counts	RMSZ	# $ Z > 2$
2	GLC	B	1	3,2	11,11,12	0.73	0	15,15,17	1.19	2 (13%)
2	GLC	B	2	2	11,11,12	1.33	1 (9%)	15,15,17	0.87	0
3	BGC	C	1	3	12,12,12	0.79	0	17,17,17	1.28	2 (11%)
3	DAF	C	2	3,2	19,22,23	5.10	6 (31%)	16,32,34	2.81	7 (43%)

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	B	1	3,2	-	0/2/19/22	0/1/1/1
2	GLC	B	2	2	-	2/2/19/22	0/1/1/1
3	BGC	C	1	3	-	0/2/22/22	0/1/1/1
3	DAF	C	2	3,2	-	3/6/43/46	0/2/2/2

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	DAF	C6-C5	14.32	1.49	1.31

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	2	DAF	O4H-C4H	12.21	1.43	1.22
3	C	2	DAF	O7H-C7H	9.81	1.43	1.22
3	C	2	DAF	C5H-C4H	4.10	1.53	1.43
2	B	2	GLC	O5-C1	-3.67	1.37	1.43
3	C	2	DAF	C1H-C6H	3.01	1.54	1.50
3	C	2	DAF	C7H-C5H	2.55	1.52	1.46

All (11) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	2	DAF	O7H-C7H-C5H	-6.90	107.04	125.12
3	C	2	DAF	O4H-C4H-C5H	-5.94	107.32	122.99
3	C	2	DAF	C6H-C1H-N4	3.63	116.02	110.68
3	C	1	BGC	O4-C4-C3	-3.03	103.25	110.38
3	C	1	BGC	C4-C3-C2	-2.55	106.35	110.83
3	C	2	DAF	O2H-C2H-C1H	2.43	113.87	109.08
2	B	1	GLC	C1-C2-C3	2.39	113.12	109.64
3	C	2	DAF	C1-C2-C3	2.20	112.85	109.64
2	B	1	GLC	C2-C3-C4	-2.18	107.03	110.86
3	C	2	DAF	O2-C2-C3	-2.08	105.83	110.15
3	C	2	DAF	C6H-C5H-C7H	-2.02	117.88	121.03

There are no chirality outliers.

All (5) torsion outliers are listed below:

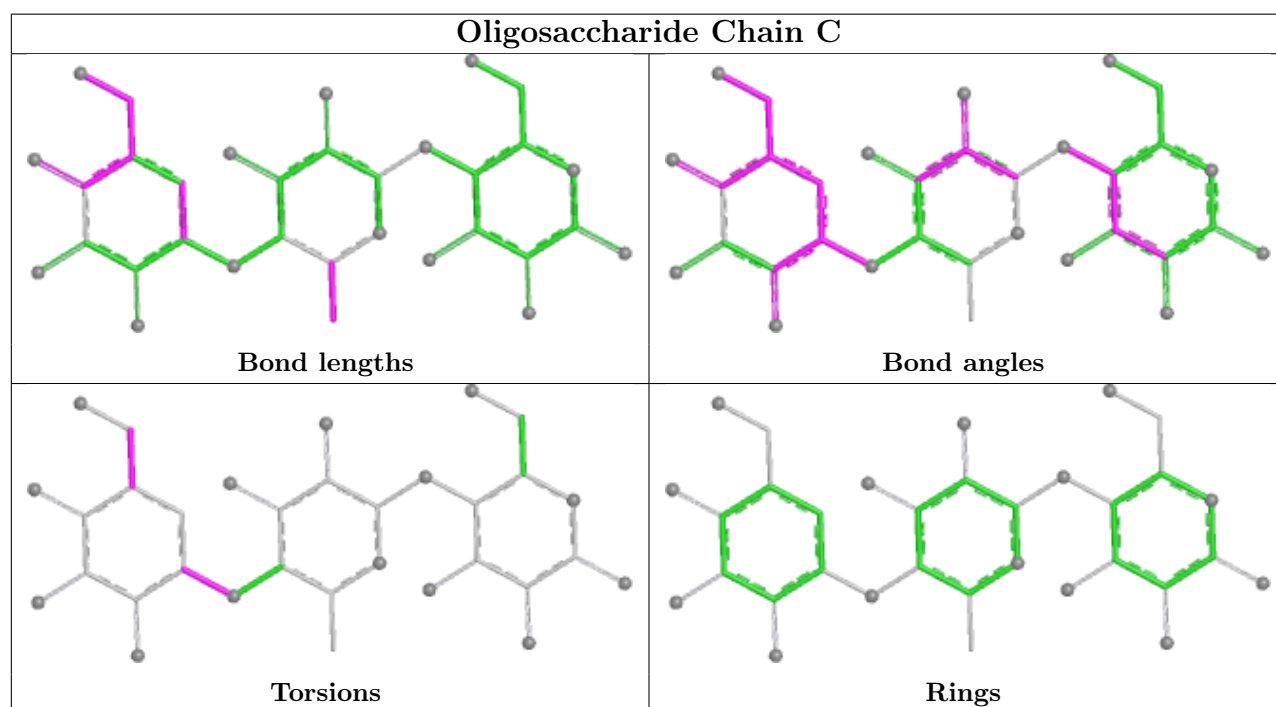
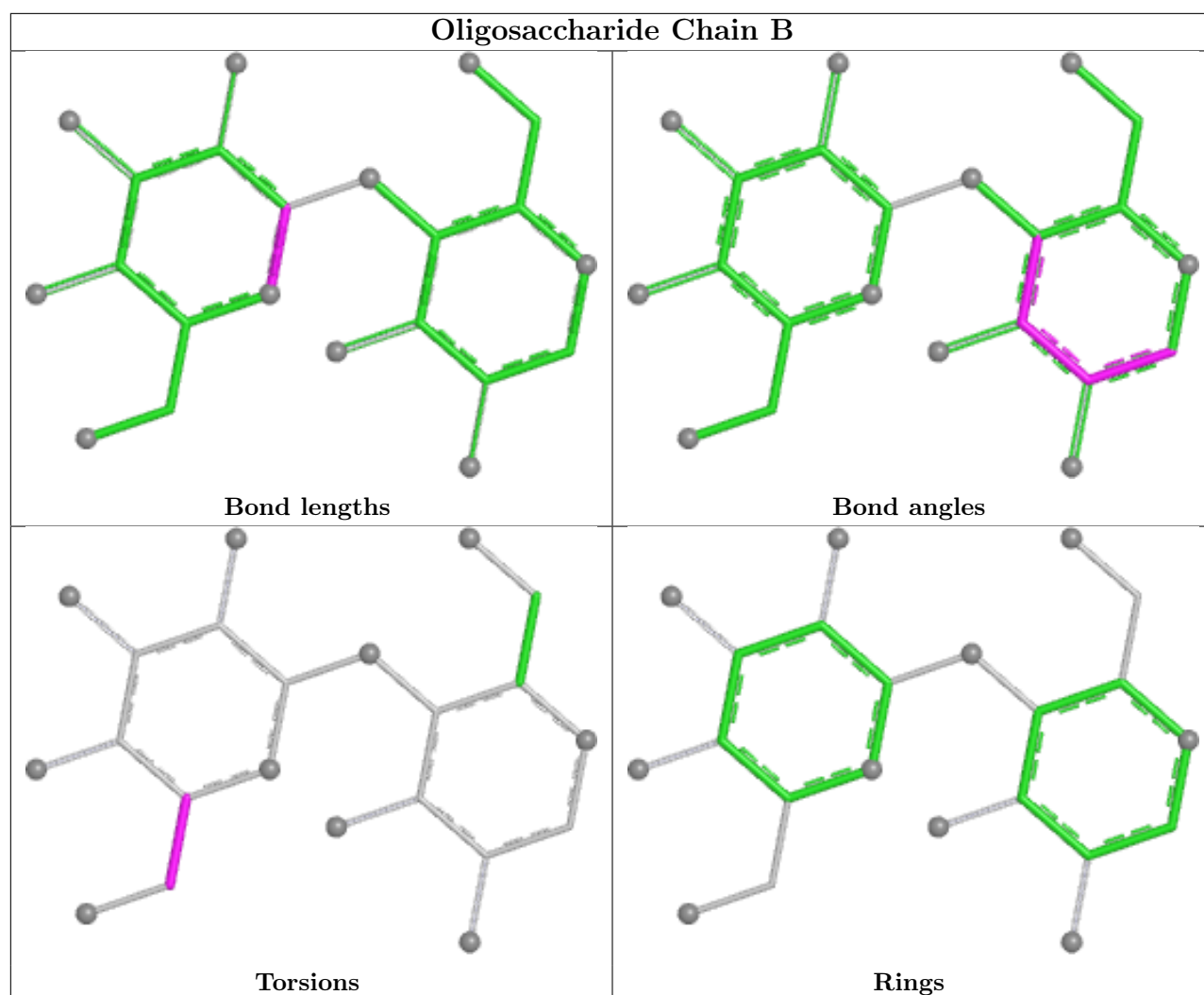
Mol	Chain	Res	Type	Atoms
3	C	2	DAF	C6H-C1H-N4-C4
3	C	2	DAF	C4H-C5H-C7H-O7H
3	C	2	DAF	C6H-C5H-C7H-O7H
2	B	2	GLC	C4-C5-C6-O6
2	B	2	GLC	O5-C5-C6-O6

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	2	DAF	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

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.