



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 5, 2026 – 06:18 PM UTC

PDB ID : 1H8L / pdb_00001h8l
Title : Duck Carboxypeptidase D Domain II in complex with GEMSA
Authors : Gomis-Rueth, F.X.; Coll, M.; Aviles, F.X.; Vendrell, J.; Fricker, L.D.
Deposited on : 2001-02-09
Resolution : 2.60 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

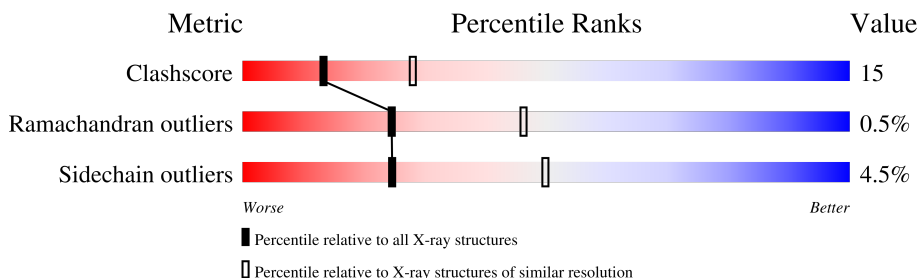
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.60 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	4347 (2.60-2.60)
Ramachandran outliers	187476	4277 (2.60-2.60)
Sidechain outliers	187428	4277 (2.60-2.60)

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	380	
2	B	3	
3	C	2	

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
3	NAG	C	1	X	-	-	-

2 Entry composition [i](#)

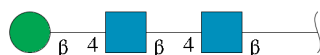
There are 8 unique types of molecules in this entry. The entry contains 3352 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 CARBOXYPEPTIDASE GP180 RESIDUES 503-882.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	380	3057	1940	518	587	12	0	0	0

- Molecule 2 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



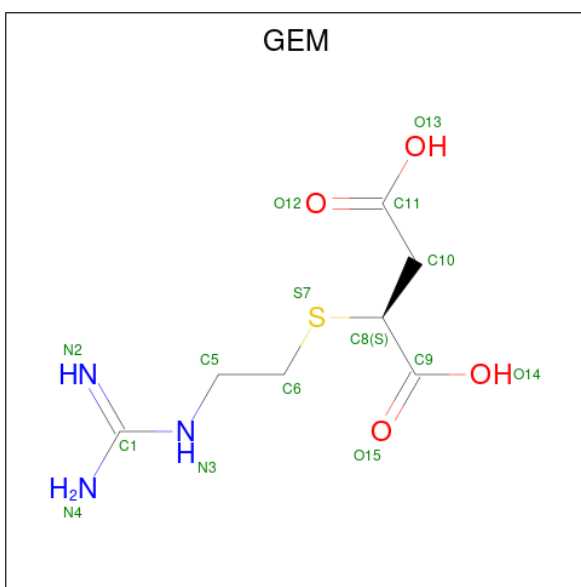
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
2	B	3	39	22	2	15	0	0	0

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	2	28	16	2	10	0	0	0

- Molecule 4 is (2-GUANIDINOETHYLMERCAPTO)SUCCINIC ACID (CCD ID: GEM) (formula: C₇H₁₃N₃O₄S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
4	A	1	Total	C	N	O	S	0	0
			15	7	3	4	1		

- Molecule 5 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
5	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 6 is SULFATE ION (CCD ID: SO4) (formula: O_4S).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
6	A	1	Total	O	S	0	0
			5	4	1		

- Molecule 7 is ZINC ION (CCD ID: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	1	Total	Zn	0	0
			1	1		

- Molecule 8 is water.

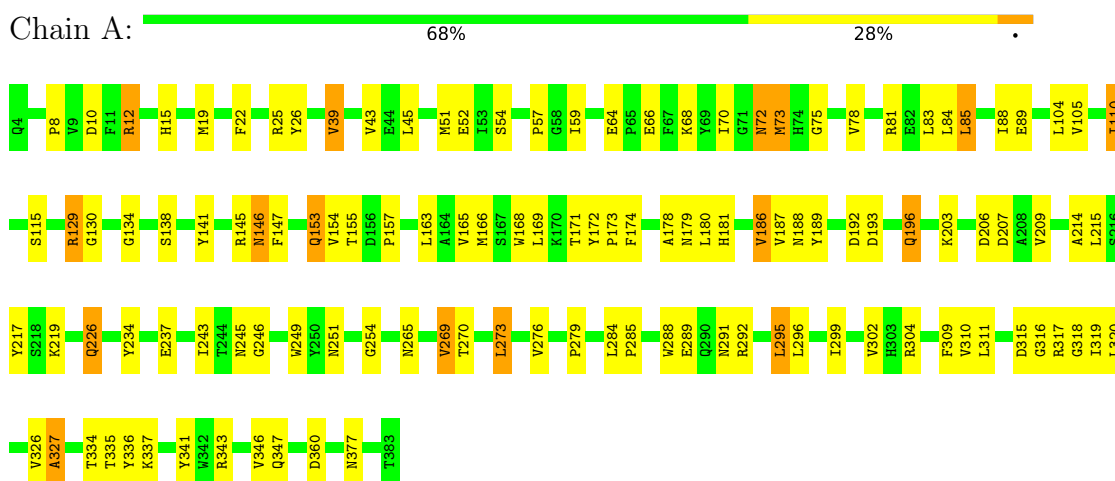
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
8	A	193	Total	O	0	0
			193	193		

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.

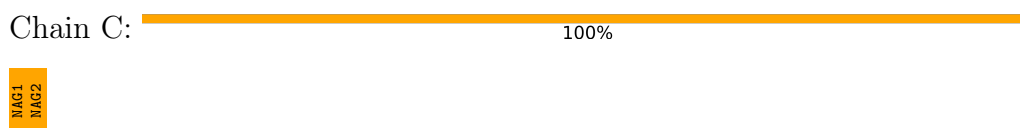
• Molecule 1: CARBOXYPEPTIDASE GP180 RESIDUES 503-882



• Molecule 2: beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose



• Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-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 3	Depositor
Cell constants a, b, c, α , β , γ	136.48 Å 136.48 Å 136.48 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	43.00 – 2.60	Depositor
% Data completeness (in resolution range)	100.0 (43.00-2.60)	Depositor
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	CNS 1.0	Depositor
R, R_{free}	0.199 , 0.239	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3352	wwPDB-VP
Average B, all atoms (Å ²)	44.0	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: NAG, BMA, SO4, GEM, ZN

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	0.44	0/3139	0.99	23/4267 (0.5%)

There are no bond length outliers.

All (23) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	64	GLU	CA-C-N	7.49	127.47	119.76
1	A	64	GLU	C-N-CA	7.49	127.47	119.76
1	A	78	VAL	N-CA-C	7.43	121.40	111.44
1	A	145	ARG	N-CA-C	-6.66	103.77	114.09
1	A	249	TRP	N-CA-C	-6.37	104.25	111.07
1	A	273	LEU	N-CA-C	5.69	120.09	113.20
1	A	237	GLU	N-CA-C	5.61	117.84	109.25
1	A	245	ASN	N-CA-C	-5.51	102.13	110.28
1	A	316	GLY	N-CA-C	-5.48	107.76	115.32
1	A	45	LEU	N-CA-C	5.46	119.23	112.24
1	A	360	ASP	CA-C-N	5.44	125.36	119.76
1	A	360	ASP	C-N-CA	5.44	125.36	119.76
1	A	110	ILE	N-CA-C	5.42	115.91	107.99
1	A	172	TYR	CA-C-N	5.40	126.59	119.84
1	A	172	TYR	C-N-CA	5.40	126.59	119.84
1	A	146	ASN	N-CA-C	5.23	119.50	113.18
1	A	85	LEU	N-CA-C	-5.15	105.75	111.36
1	A	189	TYR	CA-C-N	5.14	125.13	119.89
1	A	189	TYR	C-N-CA	5.14	125.13	119.89
1	A	234	TYR	CA-C-N	5.10	124.77	119.56
1	A	234	TYR	C-N-CA	5.10	124.77	119.56
1	A	180	LEU	N-CA-C	5.08	118.49	109.96
1	A	171	THR	N-CA-C	5.05	116.86	111.36

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	3057	0	2914	88	0
2	B	39	0	34	0	0
3	C	28	0	25	3	0
4	A	15	0	10	4	0
5	A	14	0	13	0	0
6	A	5	0	0	0	0
7	A	1	0	0	0	0
8	A	193	0	0	4	0
All	All	3352	0	2996	91	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 15.

All (91) 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:265:ASN:HD21	1:A:334:THR:HG22	1.24	1.02
1:A:315:ASP:HB3	1:A:317:ARG:HG2	1.54	0.90
1:A:265:ASN:HD21	1:A:334:THR:CG2	1.87	0.87
1:A:73:MET:HE3	1:A:181:HIS:NE2	1.92	0.83
1:A:68:LYS:HE3	1:A:169:LEU:HD21	1.61	0.82
1:A:73:MET:HE3	1:A:181:HIS:HE2	1.47	0.78
1:A:25:ARG:HH11	1:A:25:ARG:HG3	1.50	0.77
1:A:68:LYS:HE3	1:A:169:LEU:CD2	2.16	0.75
1:A:265:ASN:ND2	1:A:334:THR:HG22	2.01	0.73
1:A:163:LEU:HD23	1:A:166:MET:CE	2.19	0.72
1:A:84:LEU:O	1:A:88:ILE:HG12	1.96	0.66
1:A:39:VAL:HG21	1:A:168:TRP:HB2	1.78	0.65
1:A:153:GLN:HG3	1:A:153:GLN:O	1.96	0.64
1:A:206:ASP:OD1	1:A:343:ARG:NH2	2.32	0.62
1:A:187:VAL:CG1	1:A:243:ILE:HG22	2.30	0.62

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:73:MET:HE3	1:A:181:HIS:CE1	2.35	0.60
1:A:75:GLY:HA3	1:A:134:GLY:O	2.01	0.60
1:A:83:LEU:HD12	1:A:273:LEU:HD13	1.84	0.60
1:A:196:GLN:NE2	1:A:196:GLN:H	2.00	0.60
1:A:320:LEU:HD13	1:A:337:LYS:HA	1.84	0.59
1:A:129:ARG:HG3	1:A:130:GLY:N	2.17	0.59
1:A:309:PHE:N	1:A:377:ASN:OD1	2.36	0.58
1:A:59:ILE:HG13	1:A:59:ILE:O	2.03	0.58
1:A:73:MET:CE	1:A:181:HIS:HE2	2.16	0.57
1:A:163:LEU:HD23	1:A:166:MET:HE3	1.84	0.57
1:A:187:VAL:HG13	1:A:243:ILE:HG22	1.88	0.56
1:A:310:VAL:HG12	1:A:319:ILE:HD12	1.86	0.56
1:A:66:GLU:HG3	1:A:173:PRO:HD2	1.88	0.56
4:A:801:GEM:O14	4:A:801:GEM:O12	2.24	0.56
1:A:377:ASN:ND2	3:C:1:NAG:H83	2.23	0.54
1:A:315:ASP:CB	1:A:317:ARG:HG2	2.32	0.54
1:A:54:SER:HA	1:A:105:VAL:HG13	1.88	0.54
1:A:73:MET:HB3	8:A:2096:HOH:O	2.07	0.53
1:A:304:ARG:HB2	8:A:2150:HOH:O	2.08	0.53
1:A:129:ARG:HG2	8:A:2037:HOH:O	2.09	0.52
1:A:147:PHE:O	1:A:154:VAL:HG21	2.09	0.52
1:A:12:ARG:CG	1:A:12:ARG:HH11	2.22	0.52
1:A:196:GLN:H	1:A:196:GLN:HE21	1.55	0.52
1:A:70:ILE:O	1:A:179:ASN:HA	2.09	0.52
1:A:188:ASN:HB3	1:A:270:THR:HB	1.91	0.52
1:A:346:VAL:HG12	1:A:347:GLN:N	2.25	0.52
1:A:25:ARG:HH11	1:A:25:ARG:CG	2.18	0.52
1:A:203:LYS:HG3	1:A:207:ASP:HB2	1.92	0.51
1:A:165:VAL:O	1:A:169:LEU:HG	2.10	0.51
1:A:326:VAL:O	1:A:327:ALA:C	2.55	0.50
1:A:188:ASN:OD1	1:A:246:GLY:HA2	2.13	0.49
1:A:10:ASP:OD2	1:A:12:ARG:HD3	2.12	0.49
1:A:187:VAL:HG11	1:A:214:ALA:O	2.12	0.49
1:A:12:ARG:HH11	1:A:12:ARG:HG2	1.78	0.48
1:A:299:ILE:O	1:A:302:VAL:HG12	2.13	0.48
1:A:188:ASN:CG	4:A:801:GEM:HC51	2.38	0.48
1:A:291:ASN:O	1:A:295:LEU:HD22	2.13	0.48
1:A:311:LEU:HD23	1:A:318:GLY:HA2	1.96	0.48
1:A:377:ASN:ND2	3:C:1:NAG:C7	2.77	0.47
1:A:22:PHE:CD2	1:A:85:LEU:HD22	2.49	0.47
1:A:335:THR:HG22	1:A:341:TYR:HB3	1.97	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:147:PHE:O	1:A:254:GLY:HA2	2.15	0.46
1:A:129:ARG:HG3	1:A:130:GLY:H	1.78	0.46
1:A:104:LEU:HD22	1:A:110:ILE:HD11	1.96	0.46
1:A:12:ARG:CG	1:A:12:ARG:NH1	2.79	0.45
1:A:39:VAL:CG2	1:A:168:TRP:HB2	2.46	0.45
1:A:68:LYS:HB3	1:A:174:PHE:CE2	2.53	0.44
1:A:187:VAL:HG13	1:A:214:ALA:HB1	2.00	0.44
1:A:226:GLN:OE1	1:A:226:GLN:HA	2.17	0.44
1:A:336:TYR:CG	1:A:337:LYS:N	2.85	0.44
1:A:284:LEU:N	1:A:285:PRO:HD2	2.33	0.43
4:A:801:GEM:O12	4:A:801:GEM:C9	2.67	0.43
1:A:206:ASP:CG	1:A:343:ARG:HH22	2.26	0.42
3:C:2:NAG:H82	3:C:2:NAG:H2	1.92	0.42
1:A:15:HIS:HB2	8:A:2015:HOH:O	2.19	0.42
1:A:19:MET:HE3	1:A:81:ARG:NE	2.34	0.42
1:A:25:ARG:CG	1:A:25:ARG:NH1	2.78	0.42
1:A:39:VAL:HG21	1:A:168:TRP:CG	2.54	0.42
1:A:72:ASN:HB3	1:A:115:SER:HA	2.01	0.42
1:A:141:TYR:CZ	1:A:157:PRO:HD2	2.54	0.42
1:A:215:LEU:O	1:A:219:LYS:HB2	2.20	0.42
1:A:186:VAL:HG22	1:A:187:VAL:N	2.35	0.42
1:A:289:GLU:OE2	1:A:292:ARG:NH2	2.53	0.42
1:A:43:VAL:HB	1:A:138:SER:HB3	2.02	0.42
1:A:52:GLU:OE2	1:A:57:PRO:HA	2.19	0.42
1:A:336:TYR:CZ	1:A:337:LYS:HD3	2.55	0.42
1:A:19:MET:CE	1:A:81:ARG:HG3	2.50	0.41
1:A:26:TYR:OH	1:A:89:GLU:HG3	2.21	0.41
1:A:178:ALA:HA	1:A:269:VAL:O	2.20	0.41
1:A:25:ARG:HG3	1:A:25:ARG:NH1	2.27	0.41
1:A:346:VAL:CG1	1:A:347:GLN:N	2.83	0.41
1:A:192:ASP:OD1	4:A:801:GEM:N2	2.53	0.41
1:A:193:ASP:HB2	1:A:251:ASN:OD1	2.20	0.41
1:A:8:PRO:HD2	1:A:288:TRP:NE1	2.36	0.40
1:A:217:TYR:HE2	1:A:295:LEU:HD13	1.86	0.40
1:A:276:VAL:O	1:A:279:PRO:HD3	2.22	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	378/380 (100%)	356 (94%)	20 (5%)	2 (0%)	24	46

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	327	ALA
1	A	186	VAL

5.3.2 Protein sidechains

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	335/335 (100%)	320 (96%)	15 (4%)	24	50

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	12	ARG
1	A	39	VAL
1	A	51	MET
1	A	72	ASN
1	A	73	MET
1	A	129	ARG
1	A	146	ASN
1	A	153	GLN
1	A	155	THR

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Mol	Chain	Res	Type
1	A	196	GLN
1	A	209	VAL
1	A	226	GLN
1	A	269	VAL
1	A	295	LEU
1	A	296	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (12) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	4	GLN
1	A	86	ASN
1	A	106	GLN
1	A	153	GLN
1	A	196	GLN
1	A	248	GLN
1	A	263	ASN
1	A	265	ASN
1	A	290	GLN
1	A	330	ASN
1	A	331	HIS
1	A	375	GLN

5.3.3 RNA [i](#)

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](#)

5 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	NAG	B	1	2,1	14,14,15	0.48	0	17,19,21	0.73	1 (5%)
2	NAG	B	2	2	14,14,15	0.50	0	17,19,21	0.73	1 (5%)
2	BMA	B	3	2	11,11,12	0.51	0	15,15,17	0.29	0
3	NAG	C	1	3,1	14,14,15	0.64	0	17,19,21	1.17	1 (5%)
3	NAG	C	2	3	14,14,15	0.51	0	17,19,21	0.94	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
2	NAG	B	1	2,1	-	0/6/23/26	0/1/1/1
2	NAG	B	2	2	-	0/6/23/26	0/1/1/1
2	BMA	B	3	2	-	0/2/19/22	0/1/1/1
3	NAG	C	1	3,1	1/1/5/7	4/6/23/26	0/1/1/1
3	NAG	C	2	3	-	4/6/23/26	0/1/1/1

There are no bond length outliers.

All (4) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	C	1	NAG	C4-C3-C2	-3.29	106.20	111.02
3	C	2	NAG	C2-N2-C7	-2.20	119.95	122.90
2	B	2	NAG	C2-N2-C7	-2.05	120.15	122.90
2	B	1	NAG	C2-N2-C7	-2.01	120.21	122.90

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
3	C	1	NAG	C1

All (8) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	1	NAG	C8-C7-N2-C2
3	C	1	NAG	O7-C7-N2-C2

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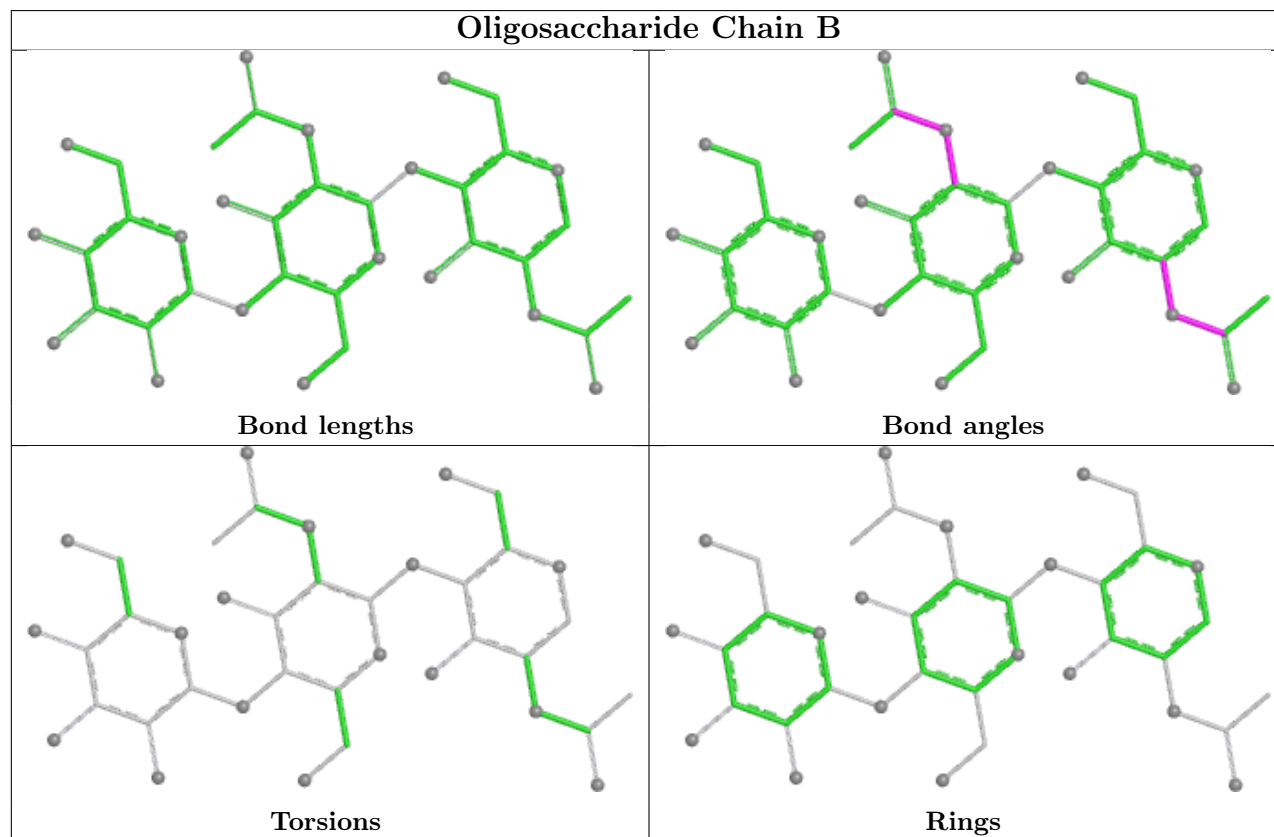
Mol	Chain	Res	Type	Atoms
3	C	2	NAG	C8-C7-N2-C2
3	C	2	NAG	O7-C7-N2-C2
3	C	2	NAG	O5-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6
3	C	1	NAG	C3-C2-N2-C7
3	C	1	NAG	C4-C5-C6-O6

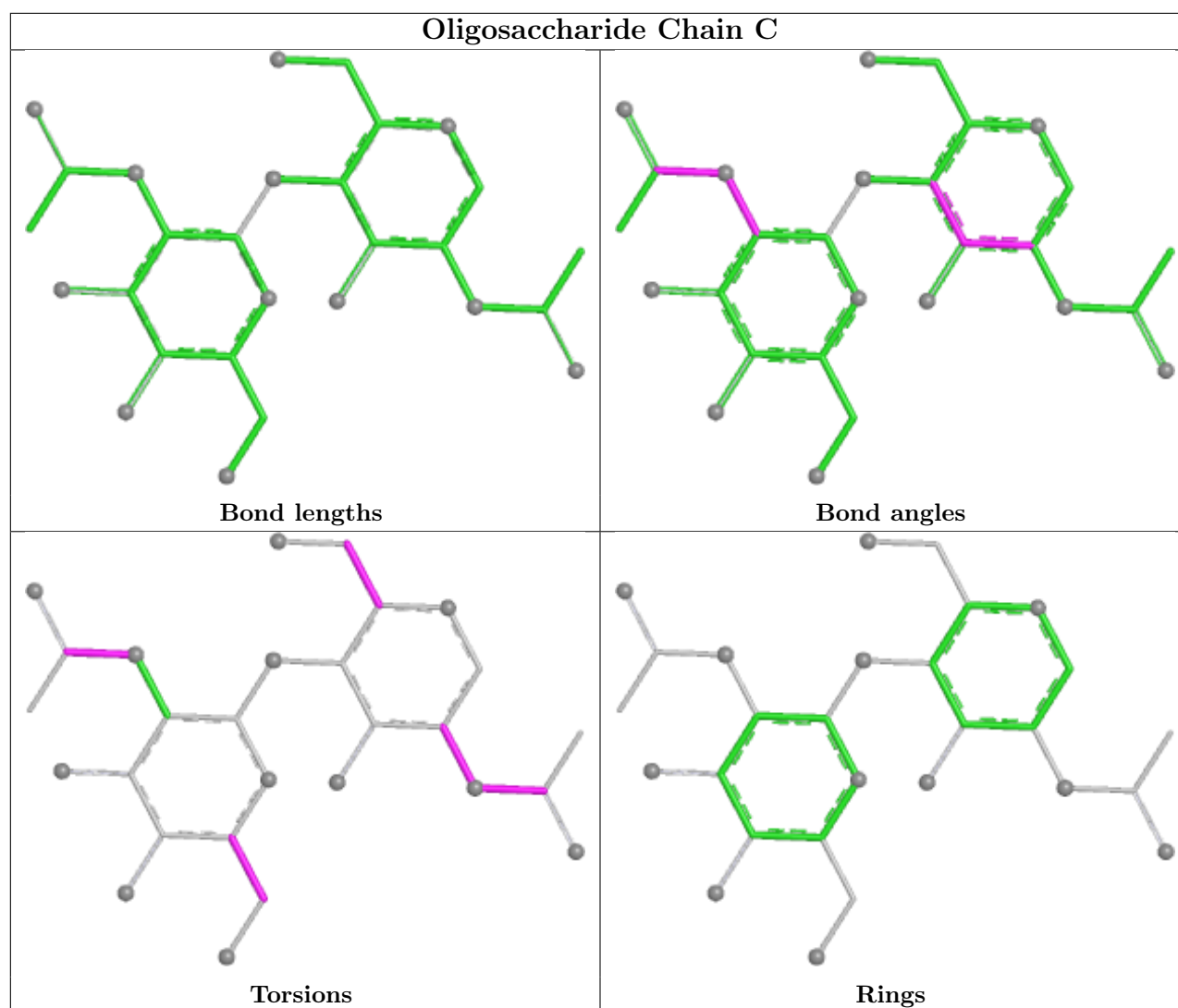
There are no ring outliers.

2 monomers are involved in 3 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	2	NAG	1	0
3	C	1	NAG	2	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 4 ligands modelled in this entry, 1 is monoatomic - leaving 3 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	GEM	A	801	7	14,14,14	1.08	1 (7%)	11,17,17	0.64	0
5	NAG	A	911	1	14,14,15	0.45	0	17,19,21	0.85	1 (5%)
6	SO4	A	998	-	4,4,4	0.38	0	6,6,6	0.21	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
4	GEM	A	801	7	-	2/15/15/15	-
5	NAG	A	911	1	-	2/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	A	801	GEM	O13-C11	-2.12	1.23	1.30

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	911	NAG	C2-N2-C7	-2.54	119.50	122.90

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	A	911	NAG	C8-C7-N2-C2
5	A	911	NAG	O7-C7-N2-C2
4	A	801	GEM	S7-C8-C9-O15
4	A	801	GEM	C9-C8-S7-C6

There are no ring outliers.

1 monomer is involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	A	801	GEM	4	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

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.