wwPDB X-ray Structure Validation Summary Report (i)

Nov 7, 2023 – 01:34 AM EST

PDB ID	:	1BCR
Title	:	COMPLEX OF THE WHEAT SERINE CARBOXYPEPTIDASE, CPDW-II, WITH THE MICROBIAL PEPTIDE ALDEHYDE INHIBITOR, ANTIPAIN, AND ARGININE AT ROOM TEMPERATURE
Authors	:	Bullock, T.L.; Remington, S.J.
Deposited on	:	1995-11-03
Resolution	:	2.50 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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 (i) 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 (i)) were used in the production of this report:

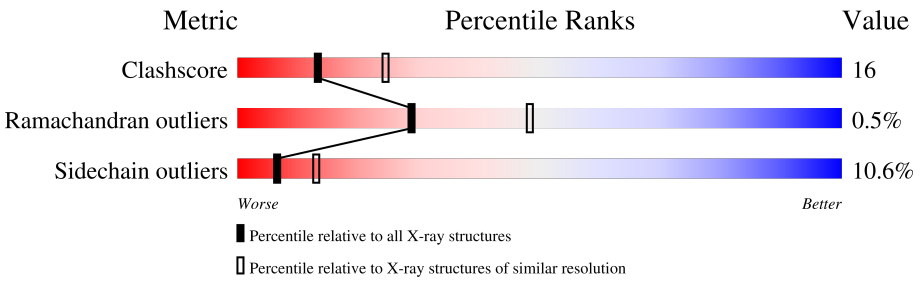
MolProbity	:	4.02b-467
Mogul	:	1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.50 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	141614	5346 (2.50-2.50)
Ramachandran outliers	138981	5231 (2.50-2.50)
Sidechain outliers	138945	5233 (2.50-2.50)

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%

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	263	56% 33% 6% •
2	B	160	58% 31% 5% • 5%
3	C	4	25% 25% 50%
4	D	3	100%
5	E	2	50% 50%

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	OAR	C	4	-	-	X	-
4	FUC	D	2	X	-	-	-
5	NAG	E	2	X	-	-	-
6	NAG	A	1131	X	-	-	-
7	ARG	A	426	-	-	X	-

2 Entry composition (i)

There are 8 unique types of molecules in this entry. The entry contains 3489 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 SERINE CARBOXYPEPTIDASE II.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	254	1991	1274	333	377	7	0	0	0

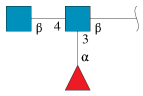
- Molecule 2 is a protein called SERINE CARBOXYPEPTIDASE II.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	152	1196	768	205	217	6	0	0	0

- Molecule 3 is a protein called ANTIPAIN.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
3	C	2	18	11	5	2	0	0	0

- Molecule 4 is an oligosaccharide called alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose.

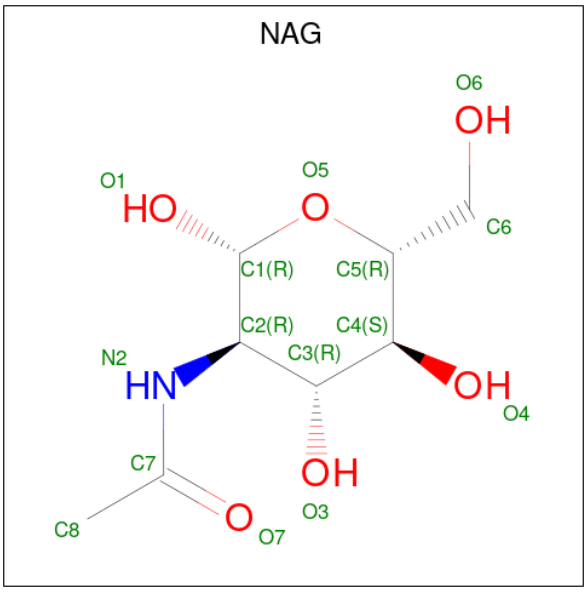


Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
4	D	3	38	22	2	14	0	0	0

- Molecule 5 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

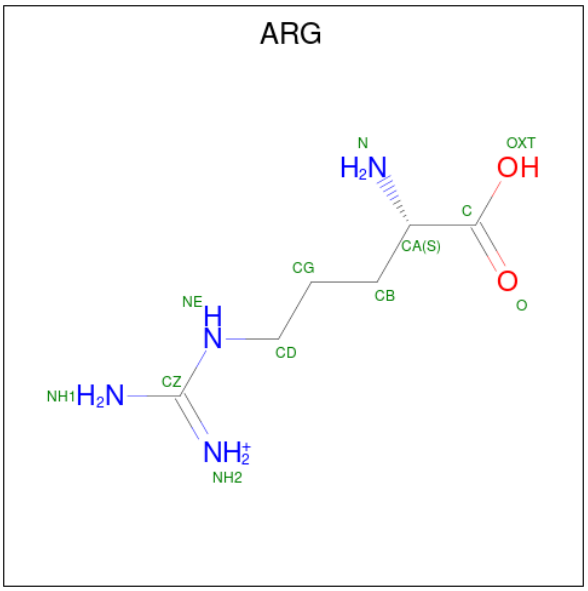
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
			Total	C	N	O			
5	E	2	28	16	2	10	0	0	0

- Molecule 6 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



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

- Molecule 7 is ARGININE (three-letter code: ARG) (formula: $C_6H_{15}N_4O_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
7	A	1	12	6	4	2	0	0

- Molecule 8 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
8	A	113	113	113	0	0
			Total	O		
8	B	76	76	76	0	0
			Total	O		
8	C	3	3	3	0	0

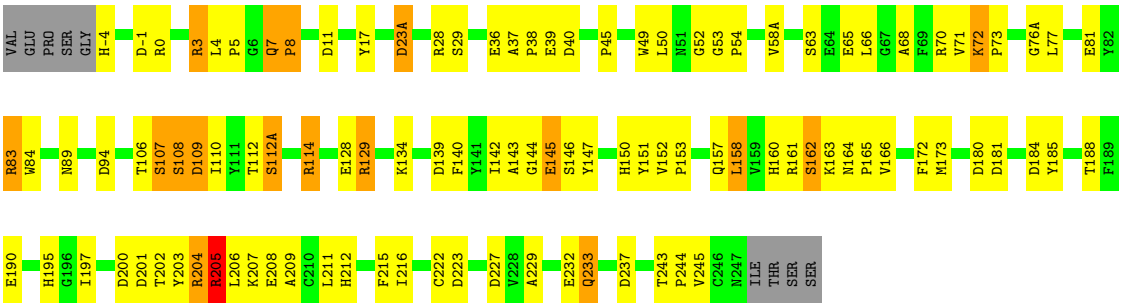
3 Residue-property plots (i)

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. 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.

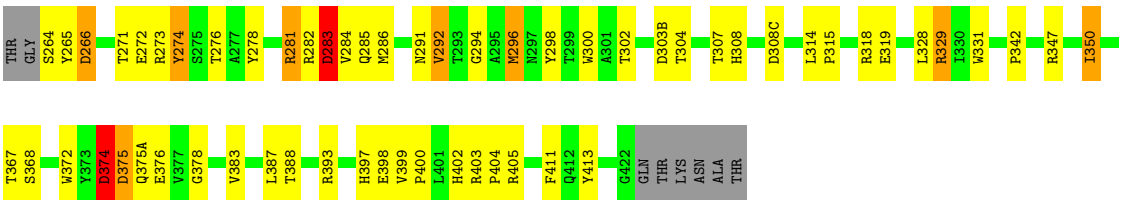
• Molecule 1: SERINE CARBOXYPEPTIDASE II

Chain A: 56% 33% 6% •



• Molecule 2: SERINE CARBOXYPEPTIDASE II

Chain B: 58% 31% 5% • 5%



• Molecule 3: ANTIPAIN

Chain C: 25% 25% 50%

• Molecule 4: alpha-L-fucopyranose-(1-3)-[2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)]2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D: 100%

• Molecule 5: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain E:

4 Data and refinement statistics (i)

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

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	98.40Å 98.40Å 209.50Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	21.00 – 2.50	Depositor
% Data completeness (in resolution range)	(Not available) (21.00-2.50)	Depositor
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
Refinement program	TNT	Depositor
R, R_{free}	0.162 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3489	wwPDB-VP
Average B, all atoms (Å^2)	27.0	wwPDB-VP

5 Model quality (i)

5.1 Standard geometry (i)

Bond lengths and bond angles in the following residue types are not validated in this section: OAR, FUC, NAG

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	1.09	6/2054 (0.3%)	1.50	43/2803 (1.5%)
2	B	1.02	3/1236 (0.2%)	1.43	17/1693 (1.0%)
3	C	1.53	0/6	2.13	0/7
All	All	1.07	9/3296 (0.3%)	1.48	60/4503 (1.3%)

The worst 5 of 9 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	81	GLU	CD-OE1	7.52	1.33	1.25
1	A	208	GLU	CD-OE1	7.50	1.33	1.25
1	A	39	GLU	CD-OE1	7.29	1.33	1.25
2	B	376	GLU	CD-OE2	6.85	1.33	1.25
1	A	128	GLU	CD-OE2	5.66	1.31	1.25

The worst 5 of 60 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	A	114	ARG	NE-CZ-NH1	15.69	128.14	120.30
1	A	114	ARG	NE-CZ-NH2	-12.20	114.20	120.30
2	B	266	ASP	CB-CG-OD2	-9.82	109.46	118.30
1	A	129	ARG	NE-CZ-NH1	9.12	124.86	120.30
1	A	203	TYR	CB-CG-CD2	-8.57	115.86	121.00

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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	1991	0	1839	65	0
2	B	1196	0	1130	41	0
3	C	18	0	19	6	0
4	D	38	0	34	0	0
5	E	28	0	24	4	0
6	A	14	0	13	2	0
7	A	12	0	12	7	0
8	A	113	0	0	7	0
8	B	76	0	0	4	0
8	C	3	0	0	0	0
All	All	3489	0	3071	103	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 16.

The worst 5 of 103 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:112:THR:HG23	1:A:114:ARG:HH22	1.08	1.08
1:A:5:PRO:HG2	2:B:284:VAL:HG22	1.47	0.94
1:A:3:ARG:HH11	1:A:3:ARG:HB3	1.40	0.85
1:A:112:THR:CG2	1:A:114:ARG:HH22	1.90	0.82
1:A:112:THR:HG23	1:A:114:ARG:NH2	1.92	0.82

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	252/263 (96%)	238 (94%)	13 (5%)	1 (0%)	34	54
2	B	150/160 (94%)	140 (93%)	9 (6%)	1 (1%)	22	39
All	All	402/423 (95%)	378 (94%)	22 (6%)	2 (0%)	29	48

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	107	SER
2	B	292	VAL

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	204/215 (95%)	181 (89%)	23 (11%)	6	11
2	B	123/133 (92%)	112 (91%)	11 (9%)	9	19
3	C	1/2 (50%)	1 (100%)	0	100	100
All	All	328/350 (94%)	294 (90%)	34 (10%)	6	13

5 of 34 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	302	THR
2	B	328	LEU
2	B	374	ASP
1	A	158	LEU
1	A	112(A)	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	7	GLN

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Mol	Chain	Res	Type
1	A	117	HIS
1	A	217	HIS
1	A	233	GLN
2	B	308	HIS

5.3.3 RNA (i)

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	$\#\|Z\| > 2$
3	OAR	C	4	1,3	10,10,10	1.07	1 (10%)	9,11,11	1.42	1 (11%)

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	OAR	C	4	1,3	-	3/9/9/9	-

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	4	OAR	CB-CA	-2.12	1.50	1.53

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	C	4	OAR	CB-CA-C	-3.27	107.78	112.25

There are no chirality outliers.

All (3) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	C	4	OAR	NE-CD-CG-CB
3	C	4	OAR	O-C-CA-CB
3	C	4	OAR	N-CA-CB-CG

There are no ring outliers.

1 monomer is involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	C	4	OAR	6	0

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	$\#\|Z\| > 2$
4	NAG	D	1	4,1	14,14,15	0.78	0	17,19,21	2.33	5 (29%)
4	FUC	D	2	4	10,10,11	3.54	3 (30%)	14,14,16	3.88	9 (64%)
4	NAG	D	3	4	14,14,15	2.08	6 (42%)	17,19,21	3.50	7 (41%)
5	NAG	E	1	5,2	14,14,15	0.97	1 (7%)	17,19,21	2.75	6 (35%)
5	NAG	E	2	5	14,14,15	1.45	2 (14%)	17,19,21	3.40	8 (47%)

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	NAG	D	1	4,1	-	2/6/23/26	0/1/1/1
4	FUC	D	2	4	1/1/4/5	-	0/1/1/1
4	NAG	D	3	4	-	2/6/23/26	0/1/1/1
5	NAG	E	1	5,2	-	4/6/23/26	0/1/1/1
5	NAG	E	2	5	1/1/5/7	4/6/23/26	0/1/1/1

The worst 5 of 12 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	2	FUC	O5-C1	9.15	1.58	1.43
4	D	2	FUC	O5-C5	5.34	1.55	1.43
4	D	3	NAG	O4-C4	4.92	1.54	1.43
4	D	2	FUC	C4-C3	3.17	1.60	1.52
5	E	2	NAG	C4-C5	2.76	1.58	1.53

The worst 5 of 35 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
4	D	3	NAG	O6-C6-C5	11.52	150.83	111.29
4	D	2	FUC	O3-C3-C2	9.37	127.94	109.99
5	E	2	NAG	C1-C2-N2	8.76	125.45	110.49
4	D	2	FUC	C2-C3-C4	-8.06	96.95	110.89
5	E	1	NAG	O6-C6-C5	7.52	137.09	111.29

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
4	D	2	FUC	C5
5	E	2	NAG	C2

5 of 12 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
5	E	1	NAG	C8-C7-N2-C2
5	E	1	NAG	O7-C7-N2-C2
5	E	2	NAG	C8-C7-N2-C2
5	E	2	NAG	O7-C7-N2-C2
4	D	3	NAG	C8-C7-N2-C2

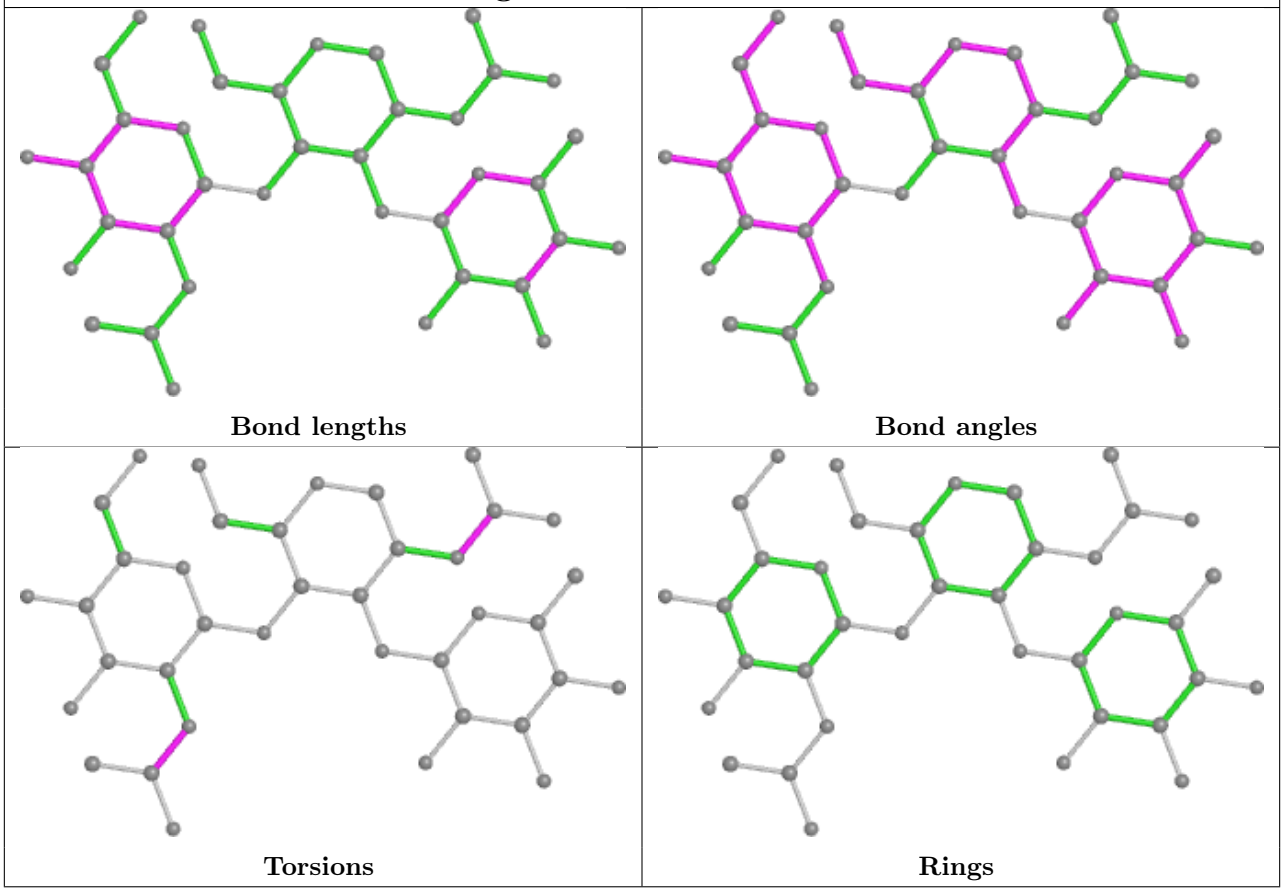
There are no ring outliers.

1 monomer is involved in 4 short contacts:

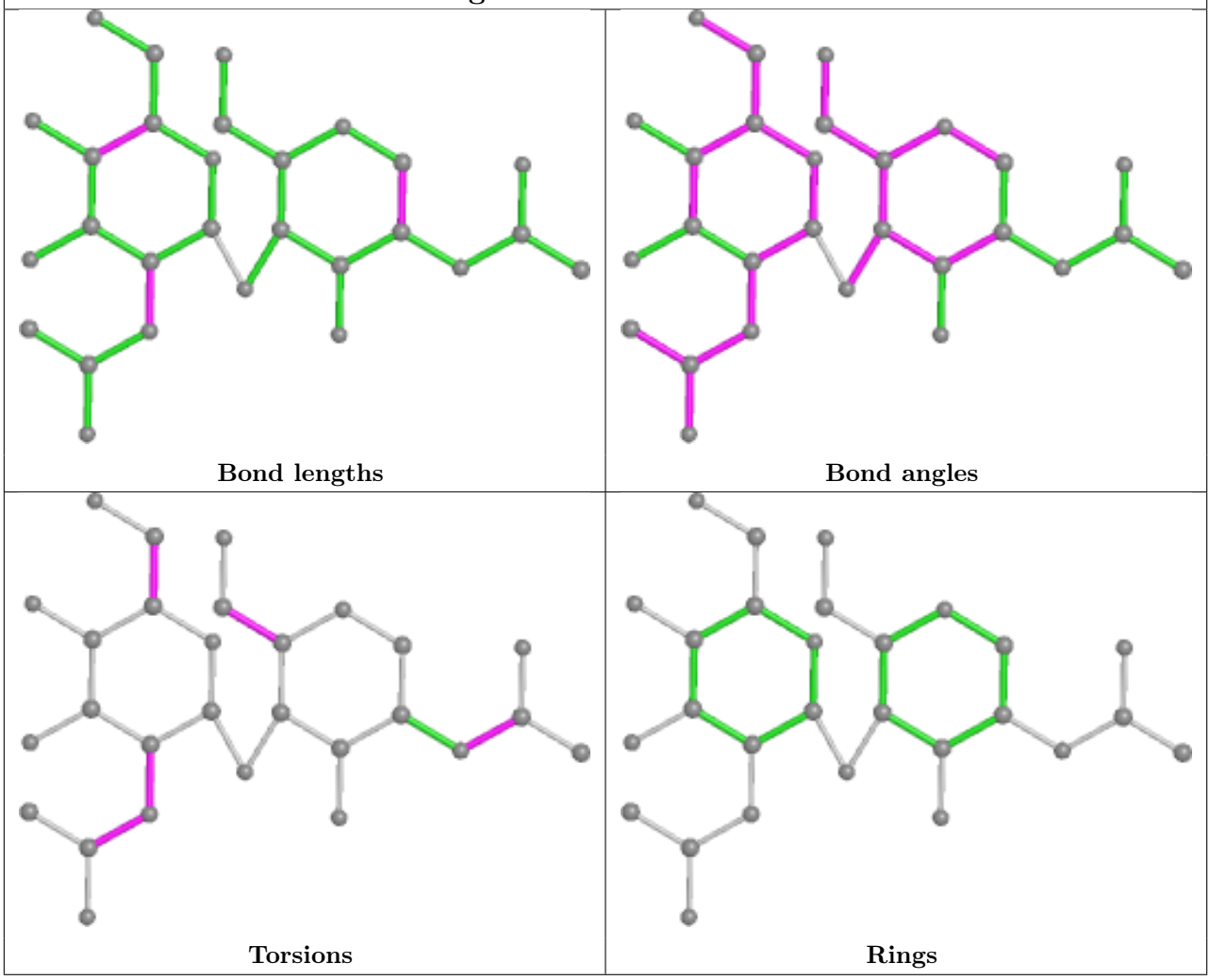
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	E	1	NAG	4	0

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 D



Oligosaccharide Chain E



5.6 Ligand geometry (i)

2 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	$\#\|Z\| > 2$
7	ARG	A	426	-	10,11,11	0.71	0	11,13,13	1.10	0
6	NAG	A	1131	1	14,14,15	0.91	0	17,19,21	2.11	6 (35%)

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
7	ARG	A	426	-	-	5/11/11/11	-
6	NAG	A	1131	1	1/1/5/7	5/6/23/26	1/1/1/1

There are no bond length outliers.

The worst 5 of 6 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	1131	NAG	C1-O5-C5	4.84	118.75	112.19
6	A	1131	NAG	C4-C3-C2	-4.11	105.00	111.02
6	A	1131	NAG	C2-N2-C7	3.01	127.18	122.90
6	A	1131	NAG	O6-C6-C5	2.64	120.35	111.29
6	A	1131	NAG	O7-C7-C8	-2.34	117.71	122.06

All (1) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
6	A	1131	NAG	C2

5 of 10 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	1131	NAG	C3-C2-N2-C7
6	A	1131	NAG	C8-C7-N2-C2
6	A	1131	NAG	O7-C7-N2-C2
7	A	426	ARG	NE-CD-CG-CB
7	A	426	ARG	CA-CB-CG-CD

All (1) ring outliers are listed below:

Mol	Chain	Res	Type	Atoms
6	A	1131	NAG	C1-C2-C3-C4-C5-O5

2 monomers are involved in 9 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
7	A	426	ARG	7	0
6	A	1131	NAG	2	0

5.7 Other polymers (i)

There are no such residues in this entry.

5.8 Polymer linkage issues (i)

There are no chain breaks in this entry.

6 Fit of model and data (i)

6.1 Protein, DNA and RNA chains (i)

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates (i)

EDS was not executed - this section is therefore empty.

6.4 Ligands (i)

EDS was not executed - this section is therefore empty.

6.5 Other polymers (i)

EDS was not executed - this section is therefore empty.