



wwPDB Geometry-Only Validation Summary Report ⓘ

Mar 11, 2018 – 05:30 pm GMT

PDB ID : 4HYA
Title : HYALURONIC ACID, THE ROLE OF DIVALENT CATIONS IN CONFORMATION AND PACKING
Authors : Arnott, S.
Deposited on : 1977-11-20
Resolution : 3.00 Å(reported)

This is a wwPDB Geometry-Only 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 ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.3 (157068), CSD as539be (2018)
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk31020

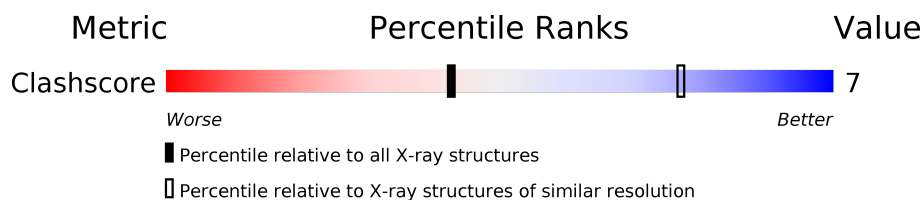
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

FIBER DIFFRACTION

The reported resolution of this entry is 3.00 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	122126	2167 (3.00-3.00)

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:

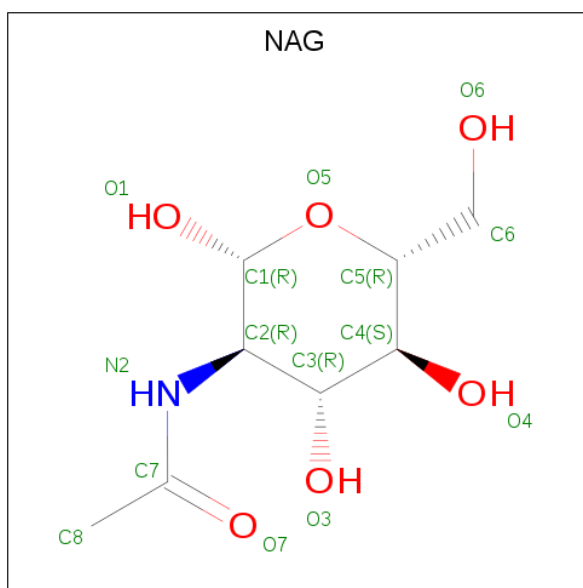
Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	GCU	A	2	X	-	-	-
2	GCU	A	4	X	-	-	-
2	GCU	A	6	X	-	-	-

2 Entry composition [i](#)

There are 4 unique types of molecules in this entry. The entry contains 138 atoms, of which 48 are hydrogens and 0 are deuteriums.

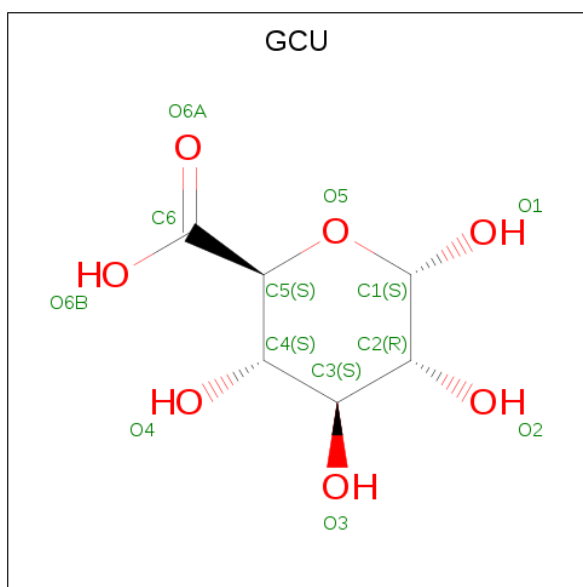
In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
1	A	1	Total	C	H	N	O	0	0
			24	8	11	1	4		
1	A	1	Total	C	H	N	O	0	0
			25	8	11	1	5		
1	A	1	Total	C	H	N	O	0	0
			25	8	11	1	5		

- Molecule 2 is D-GLUCURONIC ACID (three-letter code: GCU) (formula: $C_6H_{10}O_7$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	H	O	0	0
			17	6	5	6		
2	A	1	Total	C	H	O	0	0
			17	6	5	6		
2	A	1	Total	C	H	O	0	0
			18	6	5	7		

- Molecule 3 is CALCIUM ION (three-letter code: CA) (formula: Ca).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	3	Total	Ca	0	0
			3	3		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	9	Total	O	0	0
			9	9		

3 Residue-property plots

There is no protein, DNA or RNA chain in this entry to show sequence plots.

4 Model quality

4.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: CA, GCU, 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).

There are no protein, RNA or DNA chains available to summarize Z scores of covalent bonds and angles.

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

4.2 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	41	33	35	1	1
2	A	37	15	20	1	1
3	A	3	0	0	0	0
4	A	9	0	0	0	0
All	All	90	48	55	1	1

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 7.

All (1) 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:3:NAG:C1	2:A:4:GCU:O3	2.66	0.43

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1:NAG:C3	2:A:6:GCU:O1[1_556]	1.43	0.77

4.3 Torsion angles [i](#)

4.3.1 Protein backbone [i](#)

There are no protein molecules in this entry.

4.3.2 Protein sidechains [i](#)

There are no protein molecules in this entry.

4.3.3 RNA [i](#)

There are no RNA molecules in this entry.

4.4 Non-standard residues in protein, DNA, RNA chains [i](#)

There are no non-standard protein/DNA/RNA residues in this entry.

4.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

4.6 Ligand geometry [i](#)

Of 9 ligands modelled in this entry, 3 are monoatomic - leaving 6 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
1	NAG	A	1	2	13,13,15	0.55	0	16,17,21	1.19	2 (12%)
2	GCU	A	2	1,3	9,12,13	0.35	0	12,17,19	0.60	0
1	NAG	A	3	2	14,14,15	0.49	0	17,19,21	0.95	1 (5%)
2	GCU	A	4	1,3	9,12,13	0.24	0	12,17,19	0.47	0
1	NAG	A	5	2	14,14,15	0.49	0	17,19,21	0.93	1 (5%)
2	GCU	A	6	1,3	10,13,13	0.15	0	15,19,19	0.45	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
1	NAG	A	1	2	-	0/6/19/26	0/1/1/1
2	GCU	A	2	1,3	1/1/6/6	0/0/21/24	0/1/1/1
1	NAG	A	3	2	-	0/6/23/26	0/1/1/1
2	GCU	A	4	1,3	1/1/6/6	0/0/21/24	0/1/1/1
1	NAG	A	5	2	-	0/6/23/26	0/1/1/1
2	GCU	A	6	1,3	1/1/6/6	0/0/24/24	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(°)
1	A	1	NAG	C2-N2-C7	-3.07	118.88	122.91
1	A	3	NAG	C2-N2-C7	-2.81	118.84	122.94
1	A	5	NAG	C2-N2-C7	-2.72	118.98	122.94
1	A	1	NAG	C4-C3-C2	-2.20	110.16	112.45

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	4	GCU	C1
2	A	6	GCU	C1
2	A	2	GCU	C1

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	A	1	NAG	0	1
1	A	3	NAG	1	0
2	A	4	GCU	1	0
2	A	6	GCU	0	1

4.7 Other polymers [i](#)

There are no such residues in this entry.

4.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.