



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 9, 2018 – 10:24 am GMT

PDB ID : 3CA0
Title : Sambucus nigra agglutinin II (SNA-II), hexagonal crystal form
Authors : Maveyraud, L.; Niwa, H.; Guillet, V.; Palmer, R.A.; Reynolds, C.D.; Mourey, L.
Deposited on : 2008-02-19
Resolution : 1.95 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 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)
Xtriage (Phenix) : 1.13
EDS : trunk30967
Percentile statistics : 20171227.v01 (using entries in the PDB archive December 27th 2017)
Refmac : 5.8.0158
CCP4 : 7.0 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : trunk30967

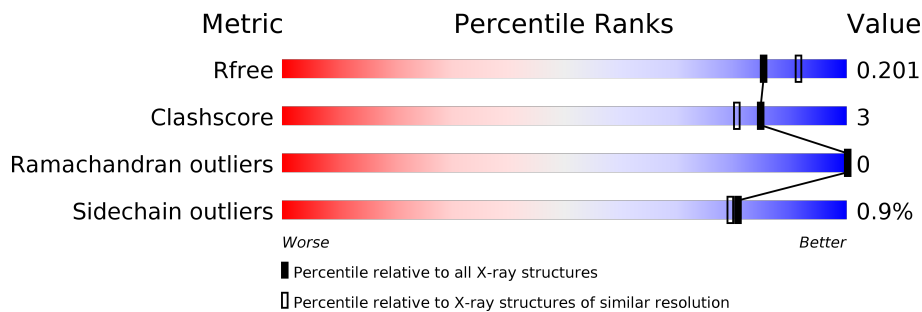
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

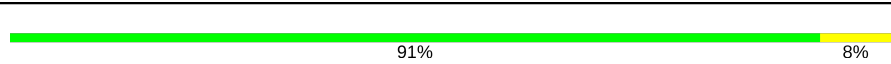
The reported resolution of this entry is 1.95 Å.

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}	111664	2220 (1.96-1.96)
Clashscore	122126	2333 (1.96-1.96)
Ramachandran outliers	120053	2314 (1.96-1.96)
Sidechain outliers	120020	2314 (1.96-1.96)

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 on the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria. 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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	258	

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
6	XYP	A	264	X	-	-	-

2 Entry composition [i](#)

There are 9 unique types of molecules in this entry. The entry contains 2570 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.

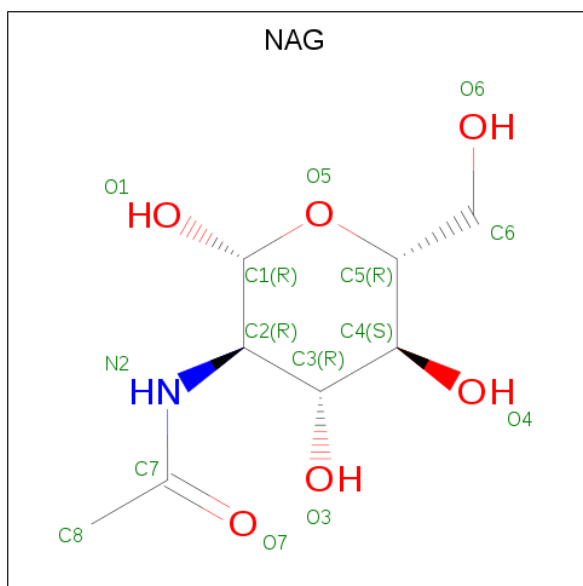
- Molecule 1 is a protein called Agglutinin II.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	257	2026	1254	363	395	14	0	6	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	224	LEU	HIS	SEE REMARK 999	UNP P33183

- Molecule 2 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula: C₈H₁₅NO₆).



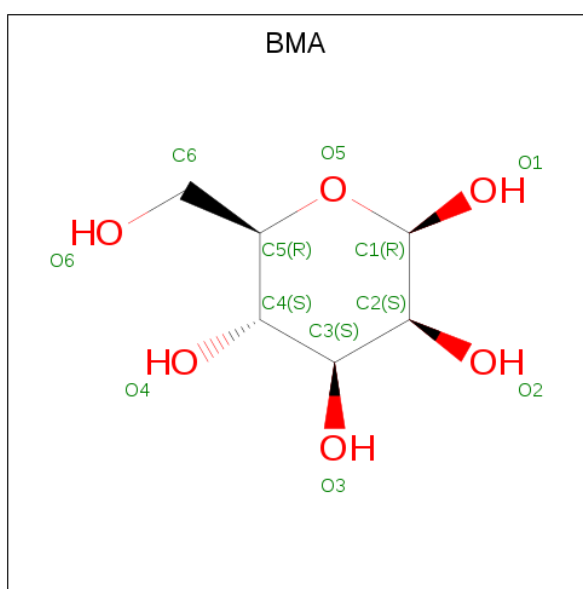
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
			Total	C	N	O		
2	A	1	14	8	1	5	0	0
2	A	1	14	8	1	5	0	0
2	A	1	14	8	1	5	0	0

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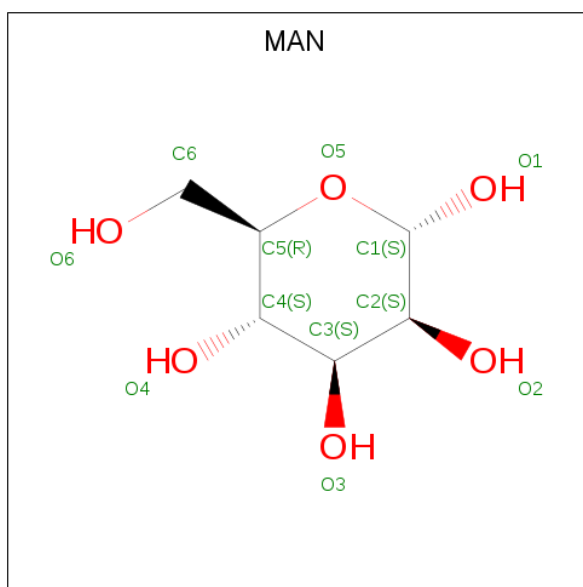
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		
2	A	1	Total	C	N	O	0	0
			14	8	1	5		

- Molecule 3 is BETA-D-MANNOSE (three-letter code: BMA) (formula: C₆H₁₂O₆).



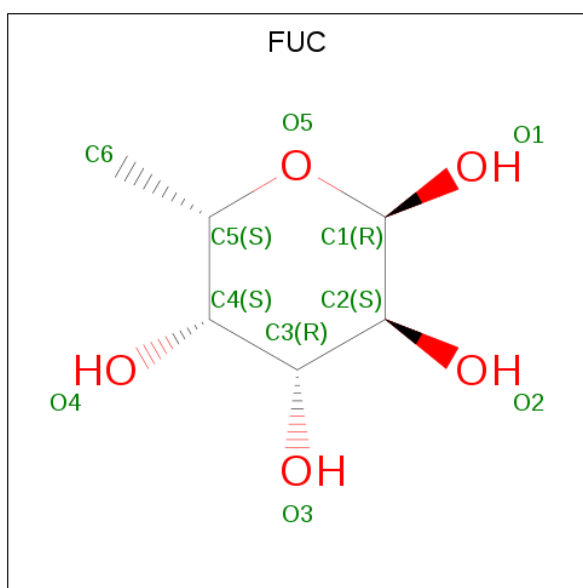
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			11	6	5		

- Molecule 4 is ALPHA-D-MANNOSE (three-letter code: MAN) (formula: C₆H₁₂O₆).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
4	A	1	Total	C	O	0	0
			11	6	5		
4	A	1	Total	C	O	0	0
			11	6	5		

- Molecule 5 is ALPHA-L-FUCOSE (three-letter code: FUC) (formula: C₆H₁₂O₅).



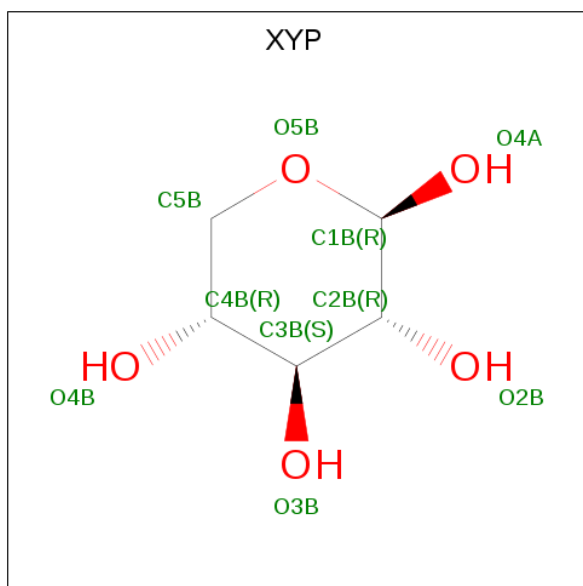
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			10	6	4		
5	A	1	Total	C	O	0	0
			10	6	4		

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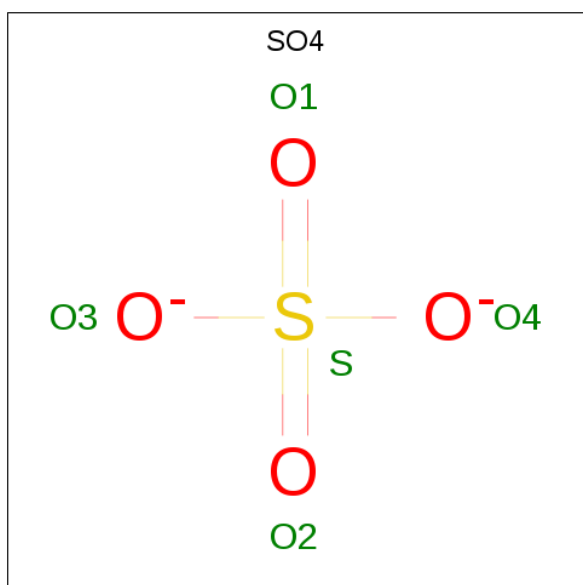
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
5	A	1	10	6	4	0	0

- Molecule 6 is BETA-D-XYLOPYRANOSE (three-letter code: XYP) (formula: C₅H₁₀O₅).



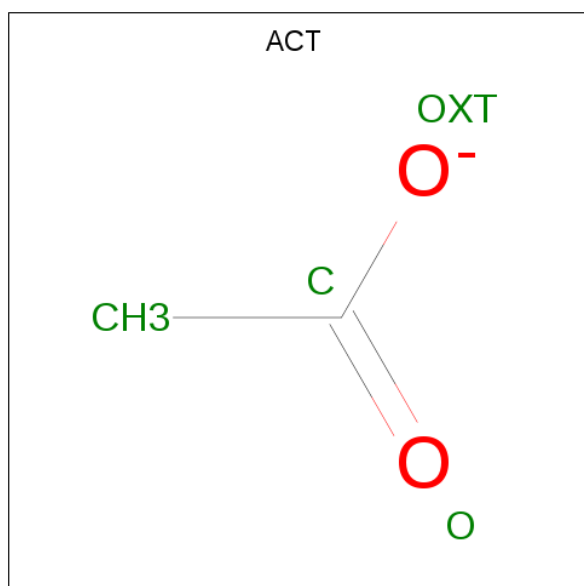
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
			Total	C	O		
6	A	1	9	5	4	0	0

- Molecule 7 is SULFATE ION (three-letter code: SO4) (formula: O₄S).



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

- Molecule 8 is ACETATE ION (three-letter code: ACT) (formula: C₂H₃O₂).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
8	A	1	Total C O 4 2 2	0	0

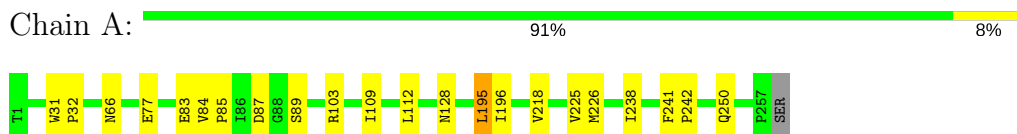
- Molecule 9 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
9	A	335	Total O 335 335	0	0

3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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.

- Molecule 1: Agglutinin II



4 Data and refinement statistics

Property	Value	Source
Space group	P 64 2 2	Depositor
Cell constants a, b, c, α , β , γ	120.20Å 120.20Å 177.34Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	20.00 – 1.95 19.91 – 1.95	Depositor EDS
% Data completeness (in resolution range)	99.0 (20.00-1.95) 99.0 (19.91-1.95)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	0.08	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.96 (at 1.94Å)	Xtrriage
Refinement program	REFMAC 5.2.0019	Depositor
R, R_{free}	0.171 , 0.194 0.181 , 0.201	Depositor DCC
R_{free} test set	2762 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	28.6	Xtrriage
Anisotropy	0.051	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 49.8	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	2570	wwPDB-VP
Average B, all atoms (Å ²)	55.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.09% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

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: XYP, BMA, NAG, FUC, ACT, MAN, SO4

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	0.94	1/2063 (0.0%)	0.88	7/2810 (0.2%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	128	ASN	CB-CG	6.06	1.65	1.51

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	103[A]	ARG	NE-CZ-NH1	-8.07	116.26	120.30
1	A	103[B]	ARG	NE-CZ-NH1	-8.07	116.26	120.30
1	A	87	ASP	CB-CG-OD2	7.00	124.60	118.30
1	A	87	ASP	CB-CG-OD1	-6.22	112.70	118.30
1	A	226	MET	CG-SD-CE	-5.73	91.03	100.20
1	A	195	LEU	CA-CB-CG	5.31	127.52	115.30
1	A	112	LEU	CB-CG-CD1	-5.17	102.20	111.00

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	2026	0	1962	11	0
2	A	98	0	84	0	0
3	A	11	0	7	0	0
4	A	22	0	20	0	0
5	A	30	0	30	0	0
6	A	9	0	7	0	0
7	A	35	0	0	0	0
8	A	4	0	3	0	0
9	A	335	0	0	4	0
All	All	2570	0	2113	11	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 (11) 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:77:GLU:HG2	9:A:1082:HOH:O	1.95	0.66
1:A:250:GLN:NE2	9:A:1084:HOH:O	2.29	0.65
1:A:84:VAL:CG1	9:A:931:HOH:O	2.57	0.52
1:A:84:VAL:HG13	9:A:931:HOH:O	2.11	0.51
1:A:241:PHE:CG	1:A:242:PRO:HD2	2.47	0.50
1:A:196:ILE:HD12	1:A:238:ILE:HG22	1.95	0.48
1:A:85:PRO:HD2	1:A:89:SER:O	2.17	0.45
1:A:66:ASN:ND2	1:A:109:ILE:HD12	2.33	0.43
1:A:218:VAL:HG22	1:A:225:VAL:HG12	2.03	0.41
1:A:31:TRP:CD2	1:A:32:PRO:HD2	2.55	0.41
1:A:66:ASN:HD21	1:A:109:ILE:HD12	1.86	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	261/258 (101%)	257 (98%)	4 (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	226/223 (101%)	223 (99%)	3 (1%)	71	68

All (3) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	83[A]	GLU
1	A	83[B]	GLU
1	A	195	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	66	ASN
1	A	164	GLN
1	A	254	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](#)

There are no carbohydrates in this entry.

5.6 Ligand geometry [i](#)

22 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
2	NAG	A	258	1,2,5	14,14,15	1.63	3 (21%)	17,19,21	1.86	5 (29%)
2	NAG	A	259	3,2	14,14,15	0.83	1 (7%)	17,19,21	1.06	1 (5%)
3	BMA	A	260	2,4,6	11,11,12	1.11	1 (9%)	15,15,17	1.78	5 (33%)
4	MAN	A	261	3	11,11,12	0.75	0	15,15,17	1.25	2 (13%)
5	FUC	A	262	2	9,10,11	1.09	0	13,14,16	2.07	2 (15%)
4	MAN	A	263	3	11,11,12	0.64	0	15,15,17	1.12	1 (6%)
6	XYP	A	264	3	9,9,10	1.40	2 (22%)	10,12,14	1.20	1 (10%)
2	NAG	A	265	1,5	14,14,15	0.78	1 (7%)	17,19,21	1.58	4 (23%)
5	FUC	A	266	2	9,10,11	0.75	0	13,14,16	1.43	2 (15%)
2	NAG	A	267	1,2	14,14,15	0.65	0	17,19,21	2.02	5 (29%)
2	NAG	A	268	2	14,14,15	0.57	0	17,19,21	1.50	3 (17%)
2	NAG	A	269	1,2,5	14,14,15	0.56	0	17,19,21	1.97	4 (23%)
2	NAG	A	270	2	14,14,15	0.62	0	17,19,21	1.28	1 (5%)
5	FUC	A	271	2	9,10,11	0.65	0	13,14,16	1.79	3 (23%)
7	SO4	A	901	-	4,4,4	0.25	0	6,6,6	0.86	0
7	SO4	A	902	-	4,4,4	0.37	0	6,6,6	0.60	0
7	SO4	A	903	-	4,4,4	0.62	0	6,6,6	0.58	0
7	SO4	A	904	-	4,4,4	0.31	0	6,6,6	0.40	0
7	SO4	A	905	-	4,4,4	0.27	0	6,6,6	0.38	0
7	SO4	A	906	-	4,4,4	0.31	0	6,6,6	0.50	0
7	SO4	A	907	-	4,4,4	0.22	0	6,6,6	0.75	0
8	ACT	A	910	-	1,3,3	2.47	1 (100%)	0,3,3	0.00	-

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	A	258	1,2,5	-	0/6/23/26	0/1/1/1
2	NAG	A	259	3,2	-	0/6/23/26	0/1/1/1
3	BMA	A	260	2,4,6	-	0/2/19/22	0/1/1/1
4	MAN	A	261	3	-	0/2/19/22	0/1/1/1
5	FUC	A	262	2	-	0/0/17/20	0/1/1/1
4	MAN	A	263	3	-	0/2/19/22	0/1/1/1
6	XYP	A	264	3	3/3/3/4	0/0/14/17	0/1/1/1
2	NAG	A	265	1,5	-	0/6/23/26	0/1/1/1
5	FUC	A	266	2	-	0/0/17/20	0/1/1/1
2	NAG	A	267	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	268	2	-	0/6/23/26	0/1/1/1
2	NAG	A	269	1,2,5	-	0/6/23/26	0/1/1/1
2	NAG	A	270	2	-	0/6/23/26	0/1/1/1
5	FUC	A	271	2	-	0/0/17/20	0/1/1/1
7	SO4	A	901	-	-	0/0/0/0	0/0/0/0
7	SO4	A	902	-	-	0/0/0/0	0/0/0/0
7	SO4	A	903	-	-	0/0/0/0	0/0/0/0
7	SO4	A	904	-	-	0/0/0/0	0/0/0/0
7	SO4	A	905	-	-	0/0/0/0	0/0/0/0
7	SO4	A	906	-	-	0/0/0/0	0/0/0/0
7	SO4	A	907	-	-	0/0/0/0	0/0/0/0
8	ACT	A	910	-	-	0/0/0/0	0/0/0/0

All (9) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	264	XYP	O5B-C5B	-2.84	1.37	1.42
3	A	260	BMA	O5-C1	-2.64	1.39	1.43
2	A	259	NAG	O5-C1	-2.62	1.39	1.43
2	A	265	NAG	O5-C1	-2.31	1.40	1.43
6	A	264	XYP	C4B-C3B	2.28	1.55	1.52
8	A	910	ACT	CH3-C	2.47	1.51	1.48
2	A	258	NAG	C4-C3	2.51	1.58	1.52
2	A	258	NAG	C8-C7	2.82	1.56	1.50
2	A	258	NAG	C2-N2	3.30	1.52	1.46

All (39) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	A	262	FUC	C1-C2-C3	-6.18	101.85	109.66
2	A	267	NAG	O5-C1-C2	-5.50	103.93	111.52
2	A	269	NAG	C4-C3-C2	-3.96	105.21	111.02
2	A	258	NAG	O4-C4-C3	-3.93	101.17	110.34
2	A	269	NAG	O5-C1-C2	-3.79	106.29	111.52
3	A	260	BMA	C3-C4-C5	-3.22	104.48	110.24
3	A	260	BMA	C1-C2-C3	-3.17	105.65	109.66
3	A	260	BMA	O3-C3-C4	-3.08	103.14	110.34
5	A	262	FUC	O2-C2-C3	-2.79	104.75	110.19
2	A	258	NAG	C3-C4-C5	-2.78	105.27	110.24
2	A	258	NAG	O5-C1-C2	-2.77	107.69	111.52
2	A	267	NAG	O3-C3-C2	-2.73	103.54	109.39
5	A	271	FUC	C1-C2-C3	-2.65	106.31	109.66
2	A	265	NAG	O5-C1-C2	-2.51	108.06	111.52
2	A	258	NAG	O3-C3-C4	-2.50	104.50	110.34
2	A	259	NAG	O3-C3-C2	-2.38	104.29	109.39
4	A	261	MAN	C2-C3-C4	-2.37	106.76	110.87
2	A	268	NAG	O7-C7-C8	-2.31	117.89	122.07
3	A	260	BMA	C6-C5-C4	-2.27	107.63	112.99
2	A	265	NAG	C4-C3-C2	-2.07	107.98	111.02
2	A	267	NAG	O3-C3-C4	2.08	115.20	110.34
3	A	260	BMA	O5-C5-C6	2.28	110.76	107.15
4	A	263	MAN	C1-O5-C5	2.33	115.39	112.19
6	A	264	XYP	O4B-C4B-C5B	2.36	113.93	109.17
2	A	265	NAG	O5-C5-C6	2.45	111.02	107.15
5	A	266	FUC	C1-O5-C5	2.46	117.84	112.39
4	A	261	MAN	O3-C3-C4	2.47	116.11	110.34
2	A	268	NAG	O5-C1-C2	2.54	115.03	111.52
2	A	265	NAG	O3-C3-C2	2.61	114.98	109.39
2	A	267	NAG	O5-C5-C6	2.76	111.51	107.15
2	A	267	NAG	C1-C2-N2	2.87	115.39	110.49
5	A	266	FUC	O5-C5-C4	2.93	114.38	109.62
2	A	270	NAG	C2-N2-C7	2.96	127.26	122.94
2	A	258	NAG	O5-C5-C6	3.05	111.98	107.15
5	A	271	FUC	O5-C5-C4	3.18	114.79	109.62
2	A	269	NAG	C1-O5-C5	3.29	116.72	112.19
5	A	271	FUC	C1-O5-C5	3.43	119.97	112.39
2	A	268	NAG	C1-O5-C5	4.00	117.70	112.19
2	A	269	NAG	C1-C2-N2	4.06	117.43	110.49

All (3) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
6	A	264	XYP	C4B
6	A	264	XYP	C2B
6	A	264	XYP	C3B

There are no torsion outliers.

There are no ring outliers.

No monomer is involved in short contacts.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

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

Unable to reproduce the depositors R factor - this section is therefore empty.

6.3 Carbohydrates

Unable to reproduce the depositors R factor - this section is therefore empty.

6.4 Ligands

Unable to reproduce the depositors R factor - this section is therefore empty.

6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.