



wwPDB X-ray Structure Validation Summary Report ⓘ

Apr 17, 2019 – 08:00 PM EDT

PDB ID : 4B5D
Title : Capitella teleta AChBP in complex with psychonidine (3-((2(S)- Azetidinyloxy)-5-((1S,2R)-2-(2-hydroxyethyl)cyclopropyl)pyridine)
Authors : Nys, M.; Ulens, C.
Deposited on : 2012-08-03
Resolution : 2.19 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 ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.8.0 (224370), CSD as540be (2019)
Xtriage (Phenix) : 1.13
EDS : rb-20031633
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) : rb-20031633

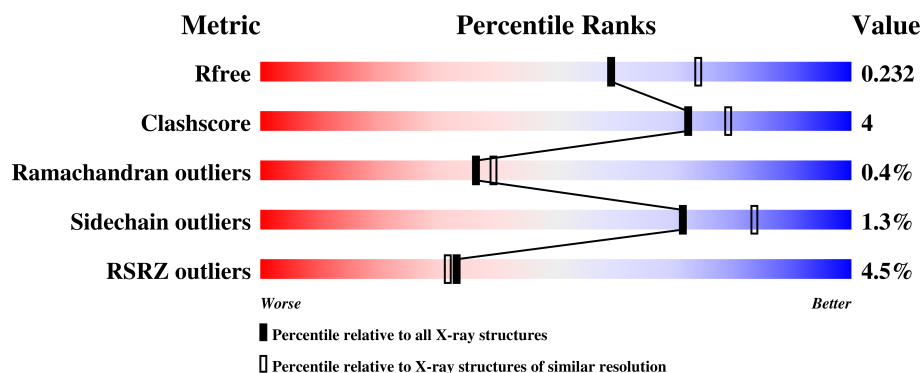
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.19 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	4343 (2.20-2.20)
Clashscore	122126	5027 (2.20-2.20)
Ramachandran outliers	120053	4952 (2.20-2.20)
Sidechain outliers	120020	4953 (2.20-2.20)
RSRZ outliers	108989	4245 (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 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 $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	230	<div> <div>2%</div> <div>83% 9% 8%</div> </div>
1	B	230	<div> <div>3%</div> <div>83% 8% 8%</div> </div>
1	C	230	<div> <div>8%</div> <div>84% 8% 8%</div> </div>
1	D	230	<div> <div>4%</div> <div>80% 11% 8%</div> </div>
1	E	230	<div> <div>3%</div> <div>82% 10% 8%</div> </div>

2 Entry composition [i](#)

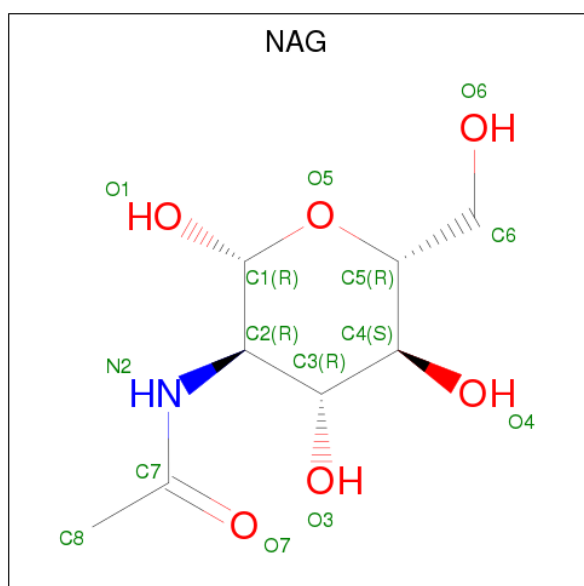
There are 4 unique types of molecules in this entry. The entry contains 8938 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 CAPITELLA TELETA ACHBP.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	211	Total	C	N	O	S	0	0	0
			1702	1098	272	323	9			
1	B	211	Total	C	N	O	S	0	0	0
			1702	1098	272	323	9			
1	C	211	Total	C	N	O	S	0	0	0
			1702	1098	272	323	9			
1	D	211	Total	C	N	O	S	0	0	0
			1702	1098	272	323	9			
1	E	211	Total	C	N	O	S	0	0	0
			1702	1098	272	323	9			

- Molecule 2 is N-ACETYL-D-GLUCOSAMINE (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



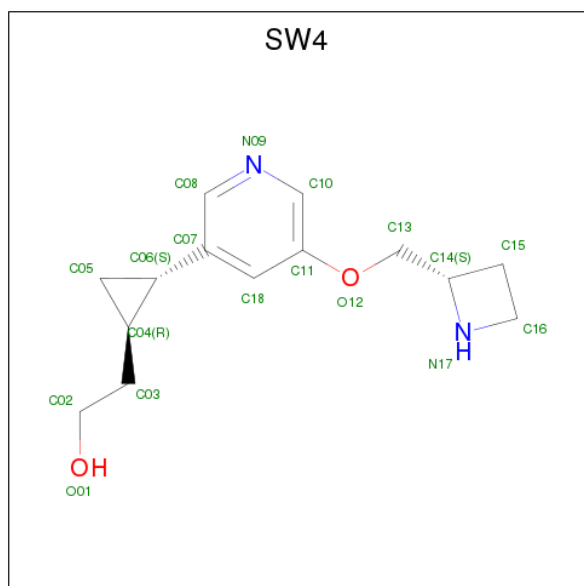
Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
2	A	1	Total	C	N	O	0	0
			14	8	1	5		

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

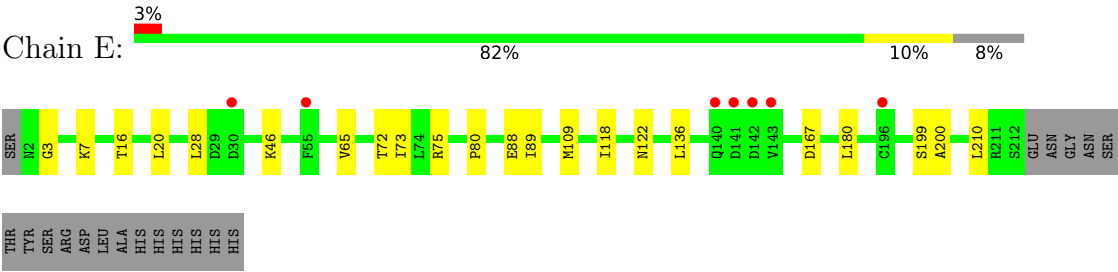
- Molecule 3 is 2-[(1R,2S)-2-[5-[[[(2S)-azetidin-2-yl]methoxy]pyridin-3-yl]cyclopropyl]ethanol (three-letter code: SW4) (formula: C₁₄H₂₀N₂O₂).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total	C	N	O	0	0
			18	14	2	2		
3	B	1	Total	C	N	O	0	0
			18	14	2	2		
3	C	1	Total	C	N	O	0	0
			18	14	2	2		
3	D	1	Total	C	N	O	0	0
			18	14	2	2		
3	E	1	Total	C	N	O	0	0
			18	14	2	2		

- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	80	Total 80	O 80	0	0
4	B	60	Total 60	O 60	0	0
4	C	30	Total 30	O 30	0	0
4	D	28	Total 28	O 28	0	0
4	E	42	Total 42	O 42	0	0



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	81.36Å 114.28Å 135.79Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.43 – 2.19 47.43 – 2.20	Depositor EDS
% Data completeness (in resolution range)	97.9 (47.43-2.19) 97.9 (47.43-2.20)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.63 (at 2.20Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE: 1.7.3_928)	Depositor
R, R_{free}	0.191 , 0.242 0.183 , 0.232	Depositor DCC
R_{free} test set	3180 reflections (4.97%)	wwPDB-VP
Wilson B-factor (Å ²)	43.1	Xtriage
Anisotropy	0.215	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 47.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	8938	wwPDB-VP
Average B, all atoms (Å ²)	51.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.25% 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: NAG, SW4

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	0.46	0/1740	0.57	0/2361
1	B	0.41	0/1740	0.54	0/2361
1	C	0.36	0/1740	0.50	0/2361
1	D	0.38	0/1740	0.50	0/2361
1	E	0.41	0/1740	0.53	0/2361
All	All	0.40	0/8700	0.53	0/11805

There are no bond length outliers.

There are no bond angle outliers.

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	1702	0	1679	14	0
1	B	1702	0	1679	15	0
1	C	1702	0	1679	10	0
1	D	1702	0	1679	16	0
1	E	1702	0	1679	15	0
2	A	28	0	25	0	0
2	B	14	0	13	0	0
2	C	14	0	13	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	D	14	0	13	0	0
2	E	28	0	25	0	0
3	A	18	0	19	1	0
3	B	18	0	19	3	0
3	C	18	0	19	1	0
3	D	18	0	19	1	0
3	E	18	0	19	0	0
4	A	80	0	0	3	1
4	B	60	0	0	2	1
4	C	30	0	0	0	0
4	D	28	0	0	0	0
4	E	42	0	0	2	0
All	All	8938	0	8579	63	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 4.

The worst 5 of 63 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:D:184:GLU:HB3	1:D:209:ALA:HB3	1.66	0.75
1:B:196:CYS:SG	4:B:2057:HOH:O	2.48	0.71
1:A:196:CYS:SG	4:A:2075:HOH:O	2.49	0.69
1:D:5:MET:HG3	1:D:81:PRO:HB2	1.79	0.65
3:D:1213:SW4:H051	1:E:118:ILE:HG13	1.82	0.61

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)
4:A:2067:HOH:O	4:B:2050:HOH:O[4_555]	2.19	0.01

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	209/230 (91%)	204 (98%)	4 (2%)	1 (0%)	31	33
1	B	209/230 (91%)	202 (97%)	7 (3%)	0	100	100
1	C	209/230 (91%)	201 (96%)	7 (3%)	1 (0%)	31	33
1	D	209/230 (91%)	198 (95%)	9 (4%)	2 (1%)	17	15
1	E	209/230 (91%)	202 (97%)	7 (3%)	0	100	100
All	All	1045/1150 (91%)	1007 (96%)	34 (3%)	4 (0%)	36	39

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	29	ASP
1	D	80	PRO
1	D	29	ASP
1	A	29	ASP

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	193/210 (92%)	191 (99%)	2 (1%)	78	88
1	B	193/210 (92%)	190 (98%)	3 (2%)	65	79
1	C	193/210 (92%)	191 (99%)	2 (1%)	78	88
1	D	193/210 (92%)	189 (98%)	4 (2%)	56	70
1	E	193/210 (92%)	191 (99%)	2 (1%)	78	88
All	All	965/1050 (92%)	952 (99%)	13 (1%)	71	83

5 of 13 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	30	ASP

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Mol	Chain	Res	Type
1	C	77	ASP
1	D	196	CYS
1	B	198	GLU
1	D	145	SER

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

Mol	Chain	Res	Type
1	D	177	GLN
1	D	188	GLN
1	D	190	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](#)

12 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	$\# Z > 2$
3	SW4	A	1213	-	19,20,20	2.20	4 (21%)	19,27,27	2.47	6 (31%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	NAG	A	677	1,2	14,14,15	0.50	0	17,19,21	1.03	1 (5%)
2	NAG	A	678	2	14,14,15	0.55	0	17,19,21	0.69	0
3	SW4	B	1213	-	19,20,20	2.33	4 (21%)	19,27,27	2.30	6 (31%)
2	NAG	B	677	1	14,14,15	0.54	0	17,19,21	1.27	1 (5%)
3	SW4	C	1213	-	19,20,20	2.34	4 (21%)	19,27,27	2.29	6 (31%)
2	NAG	C	677	1	14,14,15	0.53	0	17,19,21	1.58	3 (17%)
3	SW4	D	1213	-	19,20,20	2.28	4 (21%)	19,27,27	2.24	5 (26%)
2	NAG	D	677	1	14,14,15	0.49	0	17,19,21	1.41	1 (5%)
3	SW4	E	1213	-	19,20,20	2.21	4 (21%)	19,27,27	2.30	5 (26%)
2	NAG	E	677	1,2	14,14,15	0.63	0	17,19,21	0.96	0
2	NAG	E	678	2	14,14,15	0.66	0	17,19,21	0.81	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
3	SW4	A	1213	-	-	0/11/23/23	0/2/3/3
2	NAG	A	677	1,2	-	0/6/23/26	0/1/1/1
2	NAG	A	678	2	-	0/6/23/26	0/1/1/1
3	SW4	B	1213	-	-	0/11/23/23	0/2/3/3
2	NAG	B	677	1	-	0/6/23/26	0/1/1/1
3	SW4	C	1213	-	-	0/11/23/23	0/2/3/3
2	NAG	C	677	1	-	0/6/23/26	0/1/1/1
3	SW4	D	1213	-	-	0/11/23/23	0/2/3/3
2	NAG	D	677	1	-	0/6/23/26	0/1/1/1
3	SW4	E	1213	-	-	0/11/23/23	0/2/3/3
2	NAG	E	677	1,2	-	2/6/23/26	0/1/1/1
2	NAG	E	678	2	-	0/6/23/26	0/1/1/1

The worst 5 of 20 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	1213	SW4	C15-C14	-7.51	1.46	1.54
3	B	1213	SW4	C15-C14	-7.23	1.46	1.54
3	D	1213	SW4	C15-C14	-7.07	1.46	1.54
3	A	1213	SW4	C15-C14	-6.90	1.47	1.54
3	E	1213	SW4	C15-C14	-6.74	1.47	1.54

The worst 5 of 34 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	B	1213	SW4	C03-C04-C06	-5.81	107.19	122.13
3	C	1213	SW4	C03-C04-C06	-5.44	108.16	122.13
3	D	1213	SW4	C03-C04-C06	-4.97	109.35	122.13
3	A	1213	SW4	C03-C04-C06	-4.73	109.97	122.13
3	E	1213	SW4	C03-C04-C06	-4.61	110.27	122.13

There are no chirality outliers.

All (2) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	E	677	NAG	O7-C7-N2-C2
2	E	677	NAG	C8-C7-N2-C2

There are no ring outliers.

4 monomers are involved in 6 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	1213	SW4	1	0
3	B	1213	SW4	3	0
3	C	1213	SW4	1	0
3	D	1213	SW4	1	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](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	211/230 (91%)	0.25	5 (2%) 59 56	21, 37, 73, 101	0
1	B	211/230 (91%)	0.21	7 (3%) 46 44	23, 41, 78, 116	0
1	C	211/230 (91%)	0.46	18 (8%) 11 9	32, 55, 89, 118	0
1	D	211/230 (91%)	0.29	10 (4%) 31 30	34, 55, 91, 123	0
1	E	211/230 (91%)	0.18	7 (3%) 46 44	27, 45, 76, 104	0
All	All	1055/1150 (91%)	0.28	47 (4%) 33 32	21, 47, 85, 123	0

The worst 5 of 47 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	196	CYS	6.1
1	C	55	PHE	4.4
1	C	81	PRO	4.1
1	E	55	PHE	4.0
1	C	196	CYS	4.0

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

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

6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum,

median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(\AA^2)	Q<0.9
2	NAG	E	678	14/15	0.67	0.26	105,124,132,134	0
2	NAG	A	678	14/15	0.78	0.17	100,112,116,117	0
2	NAG	C	677	14/15	0.89	0.12	70,77,84,85	0
2	NAG	D	677	14/15	0.90	0.12	64,78,83,83	0
3	SW4	D	1213	18/18	0.94	0.12	41,49,69,75	0
3	SW4	B	1213	18/18	0.95	0.13	32,47,73,83	0
3	SW4	C	1213	18/18	0.95	0.14	49,57,81,89	0
2	NAG	B	677	14/15	0.95	0.09	38,53,61,64	0
2	NAG	E	677	14/15	0.96	0.13	45,68,84,86	0
3	SW4	A	1213	18/18	0.97	0.14	25,31,53,60	0
3	SW4	E	1213	18/18	0.97	0.15	25,40,56,57	0
2	NAG	A	677	14/15	0.97	0.09	44,57,66,82	0

6.5 Other polymers [i](#)

There are no such residues in this entry.