



Full wwPDB X-ray Structure Validation Report ⓘ

Aug 3, 2023 – 07:47 AM EDT

PDB ID : 1G85
Title : CRYSTAL STRUCTURE OF BOVINE ODORANT BINDING PROTEIN
COMPLEXED WITH IS NATURAL LIGAND
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Deposited on : 2000-11-16
Resolution : 1.80 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 : 4.02b-467
Mogul : 1.8.5 (274361), CSD as541be (2020)
Xtriage (Phenix) : 1.13
EDS : 2.34
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac : 5.8.0158
CCP4 : 7.0.044 (Gargrove)
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.34

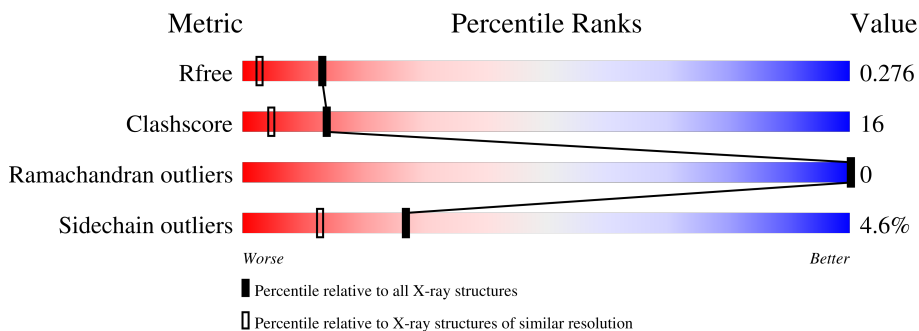
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.80 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}	130704	5950 (1.80-1.80)
Clashscore	141614	6793 (1.80-1.80)
Ramachandran outliers	138981	6697 (1.80-1.80)
Sidechain outliers	138945	6696 (1.80-1.80)

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 $\leq 5\%$.

Mol	Chain	Length	Quality of chain
1	A	159	80% (green), 19% (yellow), . (orange), . (red)
1	B	159	70% (green), 25% (yellow), . (orange), . (red), . (grey)

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	3OL	A	1001[A]	X	X	-	-
2	3OL	B	1004[B]	X	-	-	-

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 2831 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.

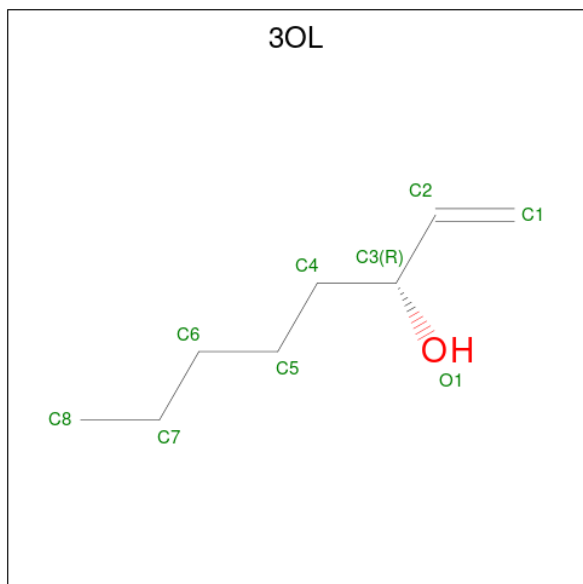
- Molecule 1 is a protein called ODORANT-BINDING PROTEIN.

Mol	Chain	Residues	Atoms			ZeroOcc	AltConf	Trace	
			Total	C	N				O
1	A	159	1341	847	229	265	2	4	0
1	B	155	1304	826	223	255	0	3	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	117	GLY	GLU	conflict	UNP P07435
A	154	ASN	ASP	conflict	UNP P07435
B	117	GLY	GLU	conflict	UNP P07435
B	154	ASN	ASP	conflict	UNP P07435

- Molecule 2 is (3R)-oct-1-en-3-ol (three-letter code: 3OL) (formula: C₈H₁₆O).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	A	1	Total C O 9 8 1	0	1
2	A	1	Total C O 9 8 1	0	1
2	B	1	Total C O 9 8 1	0	1
2	B	1	Total C O 9 8 1	0	1

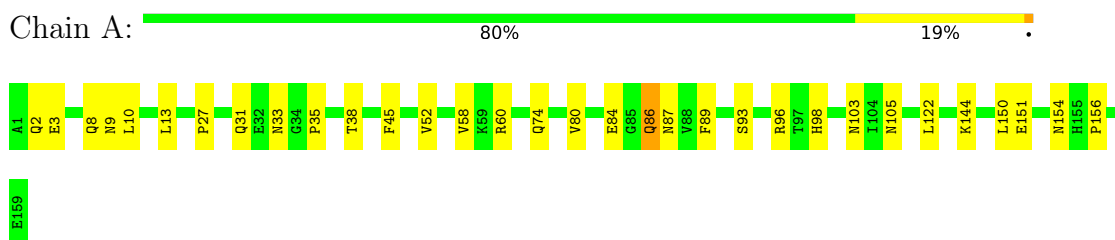
- Molecule 3 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	69	Total O 69 69	0	0
3	B	81	Total O 81 81	0	0

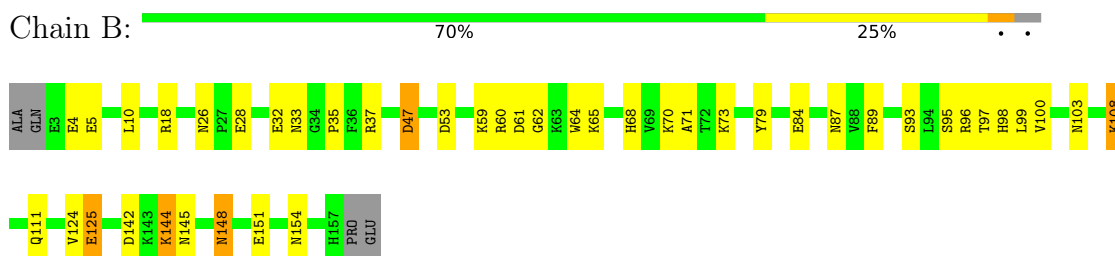
3 Residue-property plots [i](#)

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.

- Molecule 1: ODORANT-BINDING PROTEIN



- Molecule 1: ODORANT-BINDING PROTEIN



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	55.90Å 65.50Å 42.70Å 90.00° 98.80° 90.00°	Depositor
Resolution (Å)	25.30 – 1.80 27.62 – 1.80	Depositor EDS
% Data completeness (in resolution range)	(Not available) (25.30-1.80) 96.1 (27.62-1.80)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	3.35 (at 1.80Å)	Xtrriage
Refinement program	CNS	Depositor
R, R_{free}	0.203 , 0.228 0.263 , 0.276	Depositor DCC
R_{free} test set	1317 reflections (4.86%)	wwPDB-VP
Wilson B-factor (Å ²)	35.5	Xtrriage
Anisotropy	0.273	Xtrriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.33 , 79.7	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
F_o, F_c correlation	0.93	EDS
Total number of atoms	2831	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.17% 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: 3OL

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	0.37	0/1373	0.59	0/1855
1	B	0.44	0/1334	0.63	0/1803
All	All	0.41	0/2707	0.61	0/3658

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

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	1341	0	1274	33	0
1	B	1304	0	1243	46	0
2	A	18	0	32	2	0
2	B	18	0	32	8	0
3	A	69	0	0	3	0
3	B	81	0	0	9	0
All	All	2831	0	2581	83	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.

All (83) 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:89[B]:PHE:HB3	1:A:103:ASN:HD22	1.15	1.08
1:B:108:LYS:HD3	1:B:108:LYS:H	1.23	1.04
1:B:89[B]:PHE:HB3	1:B:103:ASN:HD22	1.41	0.84
1:A:154:ASN:HB3	1:B:37[B]:ARG:NH2	2.00	0.75
2:B:1003[A]:3OL:H52	3:B:1085:HOH:O	1.86	0.75
1:B:108:LYS:HD3	1:B:108:LYS:N	2.02	0.74
1:A:93[B]:SER:OG	1:A:98:HIS:HE1	1.72	0.72
1:A:89[B]:PHE:HB3	1:A:103:ASN:ND2	1.98	0.72
1:A:151:GLU:O	1:A:151:GLU:HG3	1.90	0.69
1:A:2:GLN:HG3	1:A:3:GLU:N	2.08	0.68
1:A:87:ASN:HD21	1:A:105:ASN:HD22	1.44	0.66
1:B:144:LYS:HD2	1:B:145:ASN:ND2	2.13	0.64
1:A:87:ASN:ND2	1:A:105:ASN:HD22	1.95	0.64
1:B:111:GLN:HB2	3:B:1027:HOH:O	1.97	0.63
1:B:87:ASN:HB3	1:B:103:ASN:HD21	1.63	0.63
1:B:53:ASP:OD2	1:B:68:HIS:HE1	1.82	0.63
1:B:26:ASN:OD1	1:B:28:GLU:HG2	2.00	0.62
2:B:1004[B]:3OL:H51	3:B:1085:HOH:O	2.00	0.60
1:A:96[B]:ARG:HD2	1:A:96[B]:ARG:N	2.18	0.59
1:A:96[B]:ARG:HD2	1:A:96[B]:ARG:H	1.68	0.58
1:B:89[B]:PHE:HB3	1:B:103:ASN:ND2	2.17	0.57
2:B:1003[A]:3OL:C5	3:B:1085:HOH:O	2.48	0.57
1:B:60:ARG:HH21	1:B:65:LYS:HE3	1.70	0.57
1:A:74:GLN:NE2	1:A:80:VAL:HG13	2.19	0.57
2:B:1004[B]:3OL:H71	3:B:1085:HOH:O	2.05	0.57
1:A:154:ASN:HB3	1:B:37[B]:ARG:HH22	1.69	0.57
1:A:35:PRO:HB2	1:A:84:GLU:HG3	1.87	0.56
1:A:87:ASN:HB3	1:A:103:ASN:HD21	1.70	0.55
1:A:38:THR:HG22	1:A:58:VAL:CG1	2.37	0.55
1:B:18:ARG:HH12	1:B:154:ASN:ND2	2.05	0.55
1:B:142:ASP:HB3	1:B:144:LYS:HZ3	1.70	0.55
1:B:96:ARG:NH2	1:B:125:GLU:OE2	2.40	0.53
1:A:93[B]:SER:OG	1:A:98:HIS:CE1	2.57	0.53
1:B:35:PRO:HB2	1:B:84:GLU:HG3	1.90	0.53
1:A:35:PRO:HB3	1:A:60:ARG:NH2	2.24	0.52
1:B:142:ASP:OD1	1:B:144:LYS:HG3	2.10	0.52
1:A:60:ARG:HH22	1:A:84:GLU:CD	2.13	0.52
1:A:13:LEU:HD11	1:A:96[B]:ARG:HH21	1.75	0.51
1:B:124:VAL:O	1:B:124:VAL:HG23	2.10	0.51
1:B:73:LYS:HB2	1:B:79:TYR:CE2	2.46	0.51
1:B:148:ASN:C	1:B:148:ASN:HD22	2.14	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:95:SER:OG	1:B:98:HIS:HD2	1.93	0.50
1:B:93:SER:OG	1:B:98:HIS:HE1	1.94	0.50
1:A:154:ASN:CB	1:B:37[B]:ARG:HH22	2.26	0.48
2:B:1003[A]:3OL:C6	3:B:1085:HOH:O	2.62	0.48
1:B:47:ASP:OD2	1:B:47:ASP:N	2.47	0.47
2:B:1004[B]:3OL:C5	3:B:1085:HOH:O	2.61	0.47
1:A:60:ARG:HG3	3:A:1065:HOH:O	2.14	0.47
1:B:142:ASP:CB	1:B:144:LYS:HZ3	2.26	0.47
1:A:2:GLN:HG3	1:A:3:GLU:H	1.80	0.47
1:B:71:ALA:CB	1:B:89[B]:PHE:CE1	2.99	0.46
1:B:32:GLU:O	1:B:33:ASN:HB2	2.16	0.46
1:B:148:ASN:ND2	1:B:151:GLU:H	2.13	0.46
1:B:60:ARG:HD2	1:B:61:ASP:CG	2.36	0.46
1:A:45:PHE:CD1	1:A:52:VAL:HG22	2.51	0.45
1:B:10:LEU:HD23	1:B:47:ASP:OD2	2.16	0.45
1:A:154:ASN:O	1:B:37[B]:ARG:NH2	2.50	0.45
1:B:10:LEU:HB3	1:B:47:ASP:OD2	2.17	0.45
1:B:60:ARG:HD2	1:B:61:ASP:OD2	2.17	0.45
1:A:156:PRO:HG3	1:B:64:TRP:CZ3	2.52	0.44
1:B:71:ALA:HB1	1:B:89[B]:PHE:CE1	2.52	0.44
1:A:38:THR:HG21	2:A:1002[B]:3OL:O1	2.17	0.44
1:B:95:SER:OG	1:B:98:HIS:CD2	2.70	0.44
1:B:99:LEU:HD12	1:B:100:VAL:N	2.33	0.44
1:A:38:THR:HG22	1:A:58:VAL:HG11	1.99	0.43
1:B:53:ASP:OD2	1:B:70:LYS:HG3	2.18	0.43
1:B:124:VAL:HG22	3:B:1073:HOH:O	2.17	0.43
1:B:59:LYS:HZ3	1:B:62:GLY:HA2	1.84	0.43
1:B:71:ALA:HB1	1:B:89[B]:PHE:HE1	1.84	0.43
1:A:10:LEU:HA	1:A:13:LEU:HD13	2.01	0.42
3:A:1040:HOH:O	1:B:97:THR:HB	2.19	0.42
1:B:59:LYS:NZ	1:B:62:GLY:HA2	2.33	0.42
1:B:71:ALA:CB	1:B:89[B]:PHE:HE1	2.31	0.42
1:A:27:PRO:O	1:A:31:GLN:HG3	2.19	0.42
1:A:86:GLN:HE21	1:A:86:GLN:HB3	1.53	0.42
2:B:1003[A]:3OL:H42	2:B:1003[A]:3OL:H11	1.88	0.42
1:B:18:ARG:HH12	1:B:154:ASN:HD21	1.66	0.42
1:B:60:ARG:HH11	1:B:60:ARG:HG3	1.84	0.42
2:A:1002[B]:3OL:H42	2:A:1002[B]:3OL:H11	1.70	0.41
2:B:1004[B]:3OL:C7	3:B:1085:HOH:O	2.67	0.41
1:A:96[A]:ARG:HD3	3:A:1031:HOH:O	2.20	0.41
1:A:89[B]:PHE:CB	1:A:103:ASN:HD22	2.06	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:122:LEU:HD12	1:A:122:LEU:N	2.36	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	161/159 (101%)	157 (98%)	4 (2%)	0	100	100
1	B	156/159 (98%)	154 (99%)	2 (1%)	0	100	100
All	All	317/318 (100%)	311 (98%)	6 (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	148/144 (103%)	142 (96%)	6 (4%)	30	16
1	B	144/144 (100%)	137 (95%)	7 (5%)	25	11
All	All	292/288 (101%)	279 (96%)	13 (4%)	27	13

All (13) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	8	GLN
1	A	9	ASN
1	A	33	ASN
1	A	86	GLN
1	A	144	LYS
1	A	150	LEU
1	B	4	GLU
1	B	5	GLU
1	B	47	ASP
1	B	108	LYS
1	B	125	GLU
1	B	144	LYS
1	B	148	ASN

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (18) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	8	GLN
1	A	9	ASN
1	A	31	GLN
1	A	33	ASN
1	A	68	HIS
1	A	74	GLN
1	A	86	GLN
1	A	87	ASN
1	A	98	HIS
1	A	103	ASN
1	A	152	ASN
1	A	154	ASN
1	B	68	HIS
1	B	98	HIS
1	B	103	ASN
1	B	145	ASN
1	B	148	ASN
1	B	154	ASN

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 monosaccharides in this entry.

5.6 Ligand geometry [i](#)

4 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	3OL	A	1001[A]	-	8,8,8	1.47	2 (25%)	8,8,8	1.56	2 (25%)
2	3OL	A	1002[B]	-	8,8,8	0.81	0	8,8,8	1.73	3 (37%)
2	3OL	B	1004[B]	-	8,8,8	1.53	2 (25%)	8,8,8	1.51	1 (12%)
2	3OL	B	1003[A]	-	8,8,8	0.84	0	8,8,8	1.74	3 (37%)

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	3OL	A	1001[A]	-	1/1/1/2	6/7/7/7	-
2	3OL	A	1002[B]	-	-	4/7/7/7	-
2	3OL	B	1004[B]	-	1/1/1/2	4/7/7/7	-
2	3OL	B	1003[A]	-	-	6/7/7/7	-

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	1004[B]	3OL	C1-C2	3.14	1.45	1.29

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1001[A]	3OL	C1-C2	3.06	1.45	1.29
2	B	1004[B]	3OL	O1-C3	2.82	1.49	1.43
2	A	1001[A]	3OL	O1-C3	2.61	1.48	1.43

All (9) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1001[A]	3OL	C4-C3-C2	-3.49	105.50	111.57
2	B	1004[B]	3OL	C4-C3-C2	-3.42	105.61	111.57
2	B	1003[A]	3OL	C5-C4-C3	3.04	121.23	115.12
2	A	1002[B]	3OL	C5-C4-C3	2.98	121.11	115.12
2	B	1003[A]	3OL	C3-C2-C1	-2.86	107.59	126.15
2	A	1002[B]	3OL	C3-C2-C1	-2.82	107.85	126.15
2	A	1002[B]	3OL	C6-C5-C4	2.08	120.98	113.62
2	A	1001[A]	3OL	C5-C4-C3	-2.03	111.04	115.12
2	B	1003[A]	3OL	C6-C5-C4	2.02	120.75	113.62

All (2) chirality outliers are listed below:

Mol	Chain	Res	Type	Atom
2	A	1001[A]	3OL	C3
2	B	1004[B]	3OL	C3

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1001[A]	3OL	C1-C2-C3-O1
2	A	1001[A]	3OL	C1-C2-C3-C4
2	A	1001[A]	3OL	C2-C3-C4-C5
2	A	1001[A]	3OL	O1-C3-C4-C5
2	A	1002[B]	3OL	C1-C2-C3-O1
2	A	1002[B]	3OL	O1-C3-C4-C5
2	B	1003[A]	3OL	C1-C2-C3-O1
2	B	1003[A]	3OL	C2-C3-C4-C5
2	B	1003[A]	3OL	O1-C3-C4-C5
2	B	1004[B]	3OL	C1-C2-C3-O1
2	B	1004[B]	3OL	C2-C3-C4-C5
2	B	1004[B]	3OL	O1-C3-C4-C5
2	A	1001[A]	3OL	C4-C5-C6-C7
2	A	1001[A]	3OL	C5-C6-C7-C8
2	A	1002[B]	3OL	C2-C3-C4-C5
2	A	1002[B]	3OL	C1-C2-C3-C4

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Mol	Chain	Res	Type	Atoms
2	B	1003[A]	3OL	C1-C2-C3-C4
2	B	1004[B]	3OL	C1-C2-C3-C4
2	B	1003[A]	3OL	C4-C5-C6-C7
2	B	1003[A]	3OL	C5-C6-C7-C8

There are no ring outliers.

3 monomers are involved in 10 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1002[B]	3OL	2	0
2	B	1004[B]	3OL	4	0
2	B	1003[A]	3OL	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

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.