



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 13, 2017 – 03:42 am GMT

PDB ID : 1B7A
Title : STRUCTURE OF THE PHOSPHATIDYLETHANOLAMINE-BINDING
PROTEIN FROM BOVINE BRAIN
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Deposited on : 1999-01-21
Resolution : 2.25 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

<http://wwpdb.org/validation/2016/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	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	recalc28949

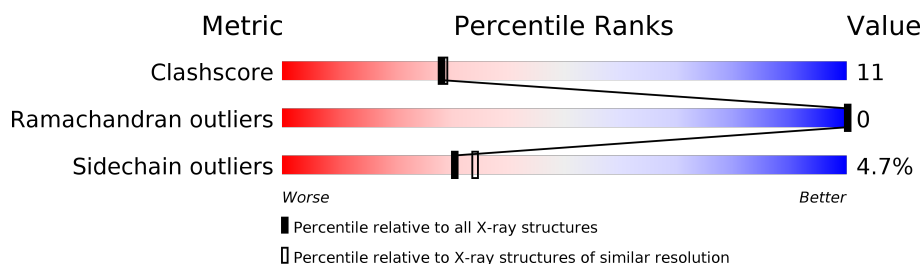
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.25 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	112137	1178 (2.26-2.26)
Ramachandran outliers	110173	1145 (2.26-2.26)
Sidechain outliers	110143	1146 (2.26-2.26)

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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	186	
1	B	186	

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	OPE	A	1501[A]	-	X	-	-
2	OPE	B	2501[A]	-	-	X	-

2 Entry composition [i](#)

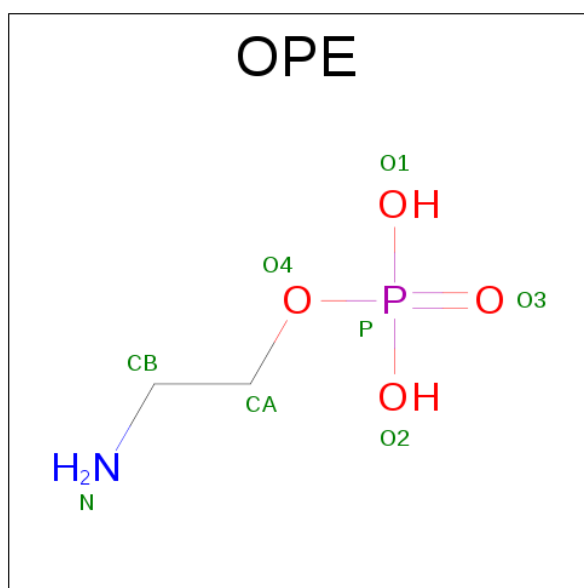
There are 3 unique types of molecules in this entry. The entry contains 3145 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 PHOSPHATIDYLETHANOLAMINE-BINDING PROTEIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	186	Total	C	N	O	S	0	1	0
			1470	936	252	279	3			
1	B	186	Total	C	N	O	S	0	3	0
			1479	940	254	282	3			

- Molecule 2 is PHOSPHORIC ACID MONO-(2-AMINO-ETHYL) ESTER (three-letter code: OPE) (formula: $C_2H_8NO_4P$).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	1
			16	4	2	8	2		
2	B	1	Total	C	N	O	P	0	1
			16	4	2	8	2		

- Molecule 3 is water.

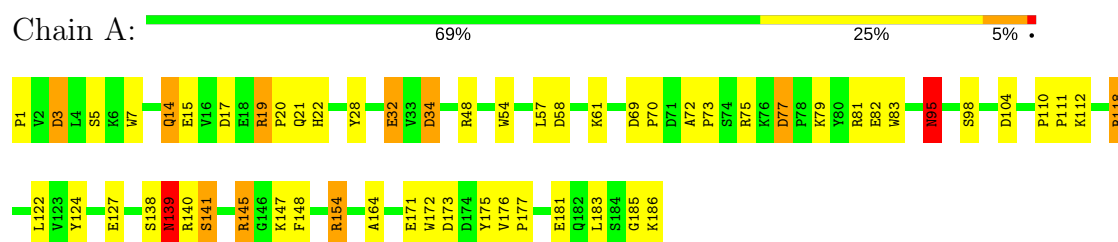
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	93	Total 93	O 93	0	0
3	B	71	Total 71	O 71	0	0

3 Residue-property plots [i](#)

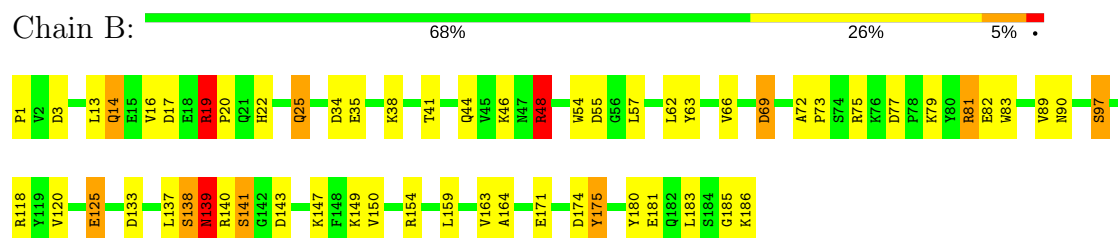
These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are 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. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). 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: PHOSPHATIDYLETHANOLAMINE-BINDING PROTEIN



• Molecule 1: PHOSPHATIDYLETHANOLAMINE-BINDING PROTEIN



4 Data and refinement statistics

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

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, α , β , γ	44.20Å 77.16Å 107.48Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	12.50 – 2.25	Depositor
% Data completeness (in resolution range)	90.0 (12.50-2.25)	Depositor
R_{merge}	0.06	Depositor
R_{sym}	4.90	Depositor
Refinement program	REFMAC	Depositor
R, R_{free}	0.208 , 0.279	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	3145	wwPDB-VP
Average B, all atoms (Å ²)	24.0	wwPDB-VP

5 Model quality

5.1 Standard geometry

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

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	0.74	0/1513	1.83	41/2056 (2.0%)
1	B	0.71	0/1521	1.75	40/2063 (1.9%)
All	All	0.73	0/3034	1.79	81/4119 (2.0%)

Chiral center outliers are detected by calculating the chiral volume of a chiral center and verifying if the center is modelled as a planar moiety or with the opposite hand. A planarity outlier is detected by checking planarity of atoms in a peptide group, atoms in a mainchain group or atoms of a sidechain that are expected to be planar.

Mol	Chain	#Chirality outliers	#Planarity outliers
1	A	0	1
1	B	0	3
All	All	0	4

There are no bond length outliers.

All (81) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	48	ARG	NE-CZ-NH2	18.78	129.69	120.30
1	B	19	ARG	NE-CZ-NH1	13.83	127.21	120.30
1	A	139	ASN	CB-CA-C	-11.68	87.05	110.40
1	A	75	ARG	NE-CZ-NH2	-11.42	114.59	120.30
1	B	81	ARG	CD-NE-CZ	10.33	138.06	123.60
1	A	98	SER	CA-C-N	10.29	136.78	116.20
1	A	118	ARG	NE-CZ-NH2	-9.73	115.44	120.30
1	B	140	ARG	NE-CZ-NH1	9.71	125.16	120.30
1	A	81	ARG	NE-CZ-NH1	9.45	125.02	120.30
1	B	139	ASN	CB-CA-C	-9.28	91.84	110.40
1	B	77	ASP	CB-CG-OD1	9.25	126.63	118.30
1	A	145	ARG	NE-CZ-NH1	-9.08	115.76	120.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	118	ARG	NE-CZ-NH1	8.88	124.74	120.30
1	B	175	TYR	CB-CG-CD1	8.64	126.19	121.00
1	B	77	ASP	CB-CG-OD2	-8.58	110.58	118.30
1	B	139	ASN	N-CA-CB	-8.55	95.21	110.60
1	A	48	ARG	NH1-CZ-NH2	-8.22	110.36	119.40
1	B	3	ASP	CB-CG-OD1	8.20	125.68	118.30
1	B	17	ASP	CB-CG-OD1	8.06	125.56	118.30
1	A	98	SER	CA-C-O	-8.04	103.22	120.10
1	A	140	ARG	CD-NE-CZ	7.94	134.71	123.60
1	A	171	GLU	OE1-CD-OE2	-7.76	113.98	123.30
1	A	19	ARG	NE-CZ-NH2	-7.67	116.47	120.30
1	A	185	GLY	C-N-CA	7.64	140.80	121.70
1	A	175	TYR	CB-CG-CD1	7.50	125.50	121.00
1	A	15	GLU	OE1-CD-OE2	-7.48	114.32	123.30
1	B	19	ARG	NH1-CZ-NH2	-7.41	111.25	119.40
1	A	81	ARG	NE-CZ-NH2	-7.38	116.61	120.30
1	B	118	ARG	NE-CZ-NH1	7.27	123.94	120.30
1	A	154	ARG	NE-CZ-NH2	-7.26	116.67	120.30
1	A	173	ASP	CB-CG-OD2	-7.26	111.77	118.30
1	A	139	ASN	N-CA-CB	-7.24	97.56	110.60
1	A	69	ASP	CB-CG-OD2	7.24	124.81	118.30
1	A	186	LYS	N-CA-C	7.19	130.40	111.00
1	B	48	ARG	NE-CZ-NH1	7.10	123.85	120.30
1	B	81	ARG	NE-CZ-NH2	7.03	123.82	120.30
1	A	81	ARG	CD-NE-CZ	6.99	133.38	123.60
1	B	138	SER	C-N-CA	6.67	138.38	121.70
1	A	104	ASP	CB-CG-OD2	6.67	124.30	118.30
1	B	133	ASP	CB-CG-OD1	6.62	124.25	118.30
1	A	95	ASN	CB-CG-OD1	6.54	134.69	121.60
1	B	181	GLU	N-CA-CB	6.53	122.36	110.60
1	B	125	GLU	OE1-CD-OE2	6.52	131.13	123.30
1	B	185[A]	GLY	C-N-CA	6.51	137.97	121.70
1	B	185[B]	GLY	C-N-CA	6.51	137.97	121.70
1	A	173	ASP	CB-CG-OD1	6.32	123.99	118.30
1	A	75	ARG	NH1-CZ-NH2	6.32	126.35	119.40
1	A	122	LEU	CA-CB-CG	6.31	129.82	115.30
1	B	175	TYR	CB-CG-CD2	-6.20	117.28	121.00
1	A	104	ASP	CB-CG-OD1	6.17	123.85	118.30
1	B	55	ASP	CB-CG-OD1	6.09	123.78	118.30
1	A	127	GLU	OE1-CD-OE2	-6.05	116.03	123.30
1	A	185	GLY	CA-C-O	6.04	131.47	120.60
1	A	104	ASP	OD1-CG-OD2	-6.03	111.85	123.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	3	ASP	CB-CG-OD1	5.97	123.68	118.30
1	B	143	ASP	CB-CG-OD2	5.78	123.50	118.30
1	B	17	ASP	OD1-CG-OD2	-5.77	112.34	123.30
1	B	171	GLU	OE1-CD-OE2	-5.71	116.44	123.30
1	B	140	ARG	NE-CZ-NH2	-5.68	117.46	120.30
1	A	77	ASP	CB-CG-OD2	-5.65	113.22	118.30
1	B	19	ARG	CD-NE-CZ	5.59	131.43	123.60
1	B	186[A]	LYS	N-CA-C	5.58	126.06	111.00
1	B	186[B]	LYS	N-CA-C	5.58	126.06	111.00
1	A	175	TYR	CB-CG-CD2	-5.55	117.67	121.00
1	A	28	TYR	CB-CG-CD1	-5.49	117.71	121.00
1	B	69	ASP	CB-CG-OD2	5.49	123.24	118.30
1	B	97	SER	CA-C-N	5.46	129.22	117.20
1	B	174	ASP	CB-CG-OD2	-5.42	113.42	118.30
1	A	28	TYR	CB-CG-CD2	5.39	124.23	121.00
1	B	174	ASP	CB-CG-OD1	5.36	123.12	118.30
1	B	138	SER	CA-C-O	5.29	131.20	120.10
1	A	17	ASP	N-CA-CB	5.21	119.97	110.60
1	A	34	ASP	CB-CG-OD2	5.15	122.94	118.30
1	B	66	VAL	CG1-CB-CG2	-5.13	102.69	110.90
1	A	32	GLU	OE1-CD-OE2	5.13	129.45	123.30
1	B	75	ARG	NE-CZ-NH2	5.12	122.86	120.30
1	A	138	SER	C-N-CA	5.08	134.41	121.70
1	B	143	ASP	OD1-CG-OD2	-5.07	113.67	123.30
1	B	185[A]	GLY	CA-C-O	5.04	129.68	120.60
1	B	185[B]	GLY	CA-C-O	5.04	129.68	120.60
1	B	143	ASP	CB-CG-OD1	5.03	122.83	118.30

There are no chirality outliers.

All (4) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	139	ASN	Mainchain
1	B	13	LEU	Mainchain
1	B	139	ASN	Mainchain
1	B	83	TRP	Mainchain

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	1470	0	1435	25	0
1	B	1479	0	1436	31	0
2	A	16	0	4	5	0
2	B	16	0	4	7	0
3	A	93	0	0	0	0
3	B	71	0	0	5	0
All	All	3145	0	2879	65	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 11.

All (65) 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)
2:B:2501[B]:OPE:CB	2:B:2501[B]:OPE:N	1.69	1.56
2:A:1501[A]:OPE:N	2:A:1501[A]:OPE:CB	1.71	1.51
2:A:1501[B]:OPE:N	2:A:1501[B]:OPE:CB	1.69	1.50
2:B:2501[A]:OPE:N	2:B:2501[A]:OPE:CB	1.71	1.50
2:B:2501[A]:OPE:N	2:B:2501[A]:OPE:CA	2.07	1.18
2:A:1501[A]:OPE:CA	2:A:1501[A]:OPE:N	2.05	1.17
2:B:2501[B]:OPE:CA	2:B:2501[B]:OPE:N	2.10	1.12
2:A:1501[B]:OPE:N	2:A:1501[B]:OPE:CA	2.12	1.11
1:A:14:GLN:H	1:A:14:GLN:HE21	1.14	0.96
1:A:58:ASP:HB3	1:A:61:LYS:HD2	1.61	0.83
1:B:14:GLN:H	1:B:14:GLN:HE21	1.30	0.80
1:B:19:ARG:NH1	1:B:20:PRO:O	2.19	0.75
1:B:19:ARG:HG2	1:B:19:ARG:HH11	1.54	0.72
1:A:14:GLN:H	1:A:14:GLN:NE2	1.88	0.70
1:B:16:VAL:HG21	1:B:120:VAL:HG21	1.74	0.70
1:B:73:PRO:HA	2:B:2501[B]:OPE:CB	2.31	0.61
1:A:14:GLN:N	1:A:14:GLN:HE21	1.92	0.61
1:B:35:GLU:HG2	3:B:2569:HOH:O	2.02	0.58
1:A:54:TRP:CH2	1:A:57:LEU:HD13	2.39	0.57
1:B:141:SER:HA	1:B:183:LEU:O	2.06	0.55
1:A:124:TYR:CE2	1:A:154:ARG:HG2	2.41	0.55
1:A:3:ASP:OD1	1:A:5:SER:OG	2.25	0.55
1:B:25:GLN:HA	1:B:25:GLN:HE21	1.73	0.53
1:B:22:HIS:O	1:B:164:ALA:HA	2.07	0.53
2:B:2501[A]:OPE:N	2:B:2501[A]:OPE:O4	2.42	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:48:ARG:HG2	3:B:2536:HOH:O	2.09	0.52
1:A:58:ASP:CB	1:A:61:LYS:HD2	2.37	0.50
1:B:41:THR:OG1	1:B:44:GLN:HG3	2.11	0.50
1:B:34:ASP:OD1	1:B:38:LYS:HD2	2.12	0.49
1:A:95:ASN:HD22	1:A:95:ASN:C	2.16	0.49
1:A:82:GLU:HB2	1:A:148:PHE:O	2.12	0.48
1:A:141:SER:HA	1:A:183:LEU:O	2.12	0.48
1:B:1:PRO:HD2	3:B:2569:HOH:O	2.13	0.48
1:A:112:LYS:HB2	1:A:172:TRP:CD1	2.49	0.48
1:B:1:PRO:N	1:B:34:ASP:O	2.47	0.47
1:B:19:ARG:NH1	1:B:19:ARG:HG2	2.24	0.46
1:A:181:GLU:HG3	1:B:180:TYR:CE2	2.51	0.46
1:B:72:ALA:HA	1:B:73:PRO:HA	1.70	0.45
1:A:7:TRP:CE2	1:A:20:PRO:HD3	2.52	0.44
1:B:137:LEU:HB3	3:B:2556:HOH:O	2.17	0.44
1:A:72:ALA:HA	1:A:73:PRO:HA	1.79	0.44
1:B:73:PRO:HD3	1:B:79:LYS:HG2	1.98	0.44
1:B:154:ARG:HA	1:B:159:LEU:HD12	2.00	0.43
1:A:83:TRP:CH2	1:A:145:ARG:HG3	2.54	0.43
1:B:62:LEU:HB3	1:B:90:ASN:HA	2.00	0.43
1:A:5:SER:HA	1:A:19:ARG:NH2	2.34	0.43
1:B:63:TYR:CE1	1:B:125:GLU:HG3	2.53	0.43
1:B:149:LYS:O	1:B:150:VAL:C	2.57	0.42
1:A:176:VAL:HB	1:A:177:PRO:HD3	2.00	0.42
1:B:138:SER:HB2	3:B:2558:HOH:O	2.20	0.42
1:A:73:PRO:HD2	1:A:77:ASP:O	2.19	0.42
1:A:110:PRO:HA	1:A:111:PRO:HD3	1.87	0.42
1:A:124:TYR:CZ	1:A:154:ARG:HG2	2.55	0.42
2:A:1501[A]:OPE:CA	2:A:1501[A]:OPE:HN1	2.19	0.41
1:A:70:PRO:HD2	1:A:118:ARG:O	2.21	0.41
1:B:54:TRP:CH2	1:B:57:LEU:HD13	2.56	0.41
1:B:89:VAL:O	1:B:90:ASN:HB2	2.21	0.41
1:A:22:HIS:O	1:A:164:ALA:HA	2.21	0.41
1:A:73:PRO:HD2	1:A:79:LYS:HG2	2.03	0.41
1:B:81:ARG:HA	1:B:82:GLU:HA	1.72	0.41
1:B:69:ASP:OD2	2:B:2501[A]:OPE:O3	2.39	0.40
1:A:1:PRO:N	1:A:34:ASP:O	2.53	0.40
1:B:46:LYS:HB2	1:B:175:TYR:CZ	2.56	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

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	184/186 (99%)	180 (98%)	4 (2%)	0	100	100
1	B	185/186 (100%)	176 (95%)	9 (5%)	0	100	100
All	All	369/372 (99%)	356 (96%)	13 (4%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains

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	161/162 (99%)	154 (96%)	7 (4%)	33	39
1	B	161/162 (99%)	153 (95%)	8 (5%)	28	31
All	All	322/324 (99%)	307 (95%)	15 (5%)	30	34

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	14	GLN
1	A	21	GLN
1	A	32	GLU
1	A	95	ASN
1	A	139	ASN
1	A	141	SER
1	A	147	LYS
1	B	14	GLN

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Mol	Chain	Res	Type
1	B	19	ARG
1	B	25	GLN
1	B	48	ARG
1	B	139	ASN
1	B	141	SER
1	B	147	LYS
1	B	163	VAL

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (6) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	14	GLN
1	A	95	ASN
1	A	139	ASN
1	B	14	GLN
1	B	25	GLN
1	B	139	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 carbohydrates 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	OPE	A	1501[A]	-	7,7,7	4.64	4 (57%)	9,9,9	3.11	6 (66%)
2	OPE	A	1501[B]	-	7,7,7	4.58	3 (42%)	9,9,9	5.27	2 (22%)
2	OPE	B	2501[A]	-	7,7,7	4.55	3 (42%)	9,9,9	2.95	3 (33%)
2	OPE	B	2501[B]	-	7,7,7	4.59	3 (42%)	9,9,9	4.53	3 (33%)

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	OPE	A	1501[A]	-	-	0/5/5/5	0/0/0/0
2	OPE	A	1501[B]	-	-	0/5/5/5	0/0/0/0
2	OPE	B	2501[A]	-	-	0/5/5/5	0/0/0/0
2	OPE	B	2501[B]	-	-	0/5/5/5	0/0/0/0

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1501[B]	OPE	CB-CA	-10.50	1.07	1.50
2	B	2501[B]	OPE	CB-CA	-10.38	1.07	1.50
2	A	1501[A]	OPE	CB-CA	-10.20	1.08	1.50
2	B	2501[A]	OPE	CB-CA	-10.07	1.08	1.50
2	A	1501[A]	OPE	P-O1	-2.18	1.45	1.54
2	B	2501[B]	OPE	CB-N	2.86	1.69	1.46
2	A	1501[B]	OPE	CB-N	2.91	1.69	1.46
2	A	1501[A]	OPE	CB-N	3.10	1.71	1.46
2	B	2501[A]	OPE	CB-N	3.10	1.71	1.46
2	A	1501[B]	OPE	P-O3	4.91	1.67	1.50
2	A	1501[A]	OPE	P-O3	5.07	1.68	1.50
2	B	2501[B]	OPE	P-O3	5.11	1.68	1.50
2	B	2501[A]	OPE	P-O3	5.23	1.68	1.50

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1501[A]	OPE	O2-P-O4	-2.69	99.58	106.73
2	A	1501[A]	OPE	CA-CB-N	-2.57	91.57	114.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	B	2501[A]	OPE	CA-CB-N	-2.44	92.79	114.45
2	B	2501[B]	OPE	CA-CB-N	-2.05	96.22	114.45
2	A	1501[A]	OPE	O2-P-O1	2.06	115.92	107.61
2	A	1501[A]	OPE	O1-P-O4	2.18	112.53	106.73
2	A	1501[A]	OPE	P-O4-CA	5.00	132.05	118.30
2	B	2501[B]	OPE	O4-CA-CB	5.10	128.18	109.10
2	B	2501[A]	OPE	O4-CA-CB	5.28	128.84	109.10
2	B	2501[A]	OPE	P-O4-CA	6.09	135.08	118.30
2	A	1501[A]	OPE	O4-CA-CB	6.25	132.49	109.10
2	A	1501[B]	OPE	O4-CA-CB	8.64	141.43	109.10
2	B	2501[B]	OPE	P-O4-CA	12.31	152.20	118.30
2	A	1501[B]	OPE	P-O4-CA	12.99	154.08	118.30

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1501[A]	OPE	3	0
2	A	1501[B]	OPE	2	0
2	B	2501[A]	OPE	4	0
2	B	2501[B]	OPE	3	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

EDS was not executed - this section is therefore empty.

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

EDS was not executed - this section is therefore empty.

6.3 Carbohydrates

EDS was not executed - this section is therefore empty.

6.4 Ligands

EDS was not executed - this section is therefore empty.

6.5 Other polymers

EDS was not executed - this section is therefore empty.