Full wwPDB EM Validation Report (i)

Nov 9, 2022 – 01:11 AM JST

PDB ID	:	6A91
EMDB ID	:	EMD-6996
Title	:	Complex of voltage-gated sodium channel NavPaS from American cockroach Periplaneta americana bound with saxitoxin and Dc1a
Authors	:	Shen, H.Z.; li, Z.Q.; Jiang, Y.; Pan, X.J.; Wu, J.P.; Cristofori-Armstrong, B.; Smith, J.J.; Chin, Y.K.Y.; Lei, J.L.; Zhou, Q.; King, G.F.; Yan, N.
Deposited on	:	2018-07-11
Resolution	:	3.20 Å(reported)

This is a Full wwPDB EM 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/EMValidationReportHelp
with specific help available everywhere you see the (i) 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 (1)) were used in the production of this report:

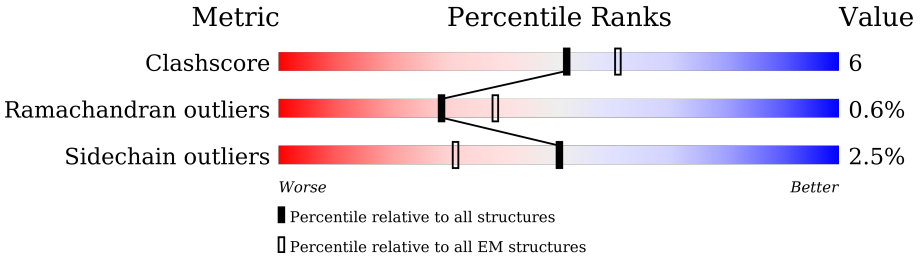
EMDB validation analysis	:	0.0.1.dev43
Mogul	:	1.8.5 (274361), CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	1.9.9
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.31.2

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
ELECTRON MICROSCOPY

The reported resolution of this entry is 3.20 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)	EM structures (#Entries)
Clashscore	158937	4297
Ramachandran outliers	154571	4023
Sidechain outliers	154315	3826

The table below summarises the geometric issues observed across the polymeric chains and their fit to the map. The red, orange, yellow and green segments of the 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 <=5% The upper red bar (where present) indicates the fraction of residues that have poor fit to the EM map (all-atom inclusion < 40%). The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	1596	29% 73% 9% • 17%
2	B	57	40% 86% 12% •
3	C	2	50% 50%
3	D	2	50% 100%

2 Entry composition (i)

There are 7 unique types of molecules in this entry. The entry contains 11182 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, 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 Sodium channel protein PaFPC1.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
1	A	1323	10537	6984	1696	1791	66	0	0

There are 43 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-42	MET	-	expression tag	UNP D0E0C2
A	-41	ALA	-	expression tag	UNP D0E0C2
A	-40	SER	-	expression tag	UNP D0E0C2
A	-39	TRP	-	expression tag	UNP D0E0C2
A	-38	SER	-	expression tag	UNP D0E0C2
A	-37	HIS	-	expression tag	UNP D0E0C2
A	-36	PRO	-	expression tag	UNP D0E0C2
A	-35	GLN	-	expression tag	UNP D0E0C2
A	-34	PHE	-	expression tag	UNP D0E0C2
A	-33	GLU	-	expression tag	UNP D0E0C2
A	-32	LYS	-	expression tag	UNP D0E0C2
A	-31	GLY	-	expression tag	UNP D0E0C2
A	-30	GLY	-	expression tag	UNP D0E0C2
A	-29	GLY	-	expression tag	UNP D0E0C2
A	-28	ALA	-	expression tag	UNP D0E0C2
A	-27	ARG	-	expression tag	UNP D0E0C2
A	-26	GLY	-	expression tag	UNP D0E0C2
A	-25	GLY	-	expression tag	UNP D0E0C2
A	-24	SER	-	expression tag	UNP D0E0C2
A	-23	GLY	-	expression tag	UNP D0E0C2
A	-22	GLY	-	expression tag	UNP D0E0C2
A	-21	GLY	-	expression tag	UNP D0E0C2
A	-20	SER	-	expression tag	UNP D0E0C2
A	-19	TRP	-	expression tag	UNP D0E0C2
A	-18	SER	-	expression tag	UNP D0E0C2
A	-17	HIS	-	expression tag	UNP D0E0C2
A	-16	PRO	-	expression tag	UNP D0E0C2
A	-15	GLN	-	expression tag	UNP D0E0C2

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Chain	Residue	Modelled	Actual	Comment	Reference
A	-14	PHE	-	expression tag	UNP D0E0C2
A	-13	GLU	-	expression tag	UNP D0E0C2
A	-12	LYS	-	expression tag	UNP D0E0C2
A	-11	GLY	-	expression tag	UNP D0E0C2
A	-10	PHE	-	expression tag	UNP D0E0C2
A	-9	ASP	-	expression tag	UNP D0E0C2
A	-8	TYR	-	expression tag	UNP D0E0C2
A	-7	LYS	-	expression tag	UNP D0E0C2
A	-6	ASP	-	expression tag	UNP D0E0C2
A	-5	ASP	-	expression tag	UNP D0E0C2
A	-4	ASP	-	expression tag	UNP D0E0C2
A	-3	ASP	-	expression tag	UNP D0E0C2
A	-2	LYS	-	expression tag	UNP D0E0C2
A	-1	GLY	-	expression tag	UNP D0E0C2
A	0	THR	-	expression tag	UNP D0E0C2

- Molecule 2 is a protein called Mu-diguetoxin-Dc1a.

Mol	Chain	Residues	Atoms					AltConf	Trace
			Total	C	N	O	S		
2	B	57	449	279	77	85	8	0	0

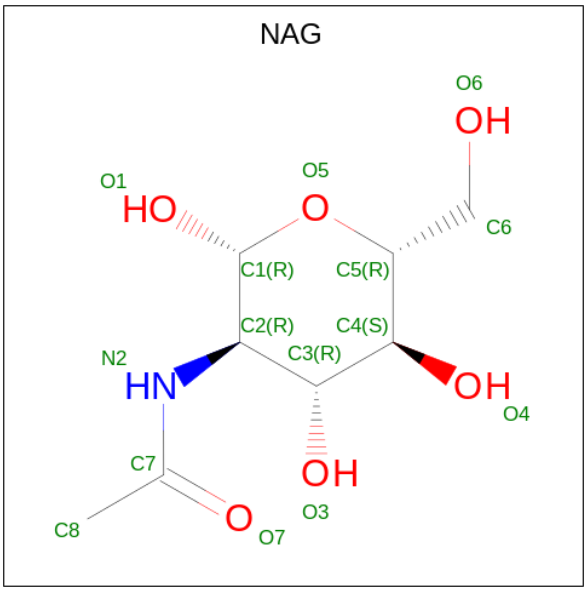
There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	1	SER	-	expression tag	UNP P49126

- Molecule 3 is an oligosaccharide called 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.

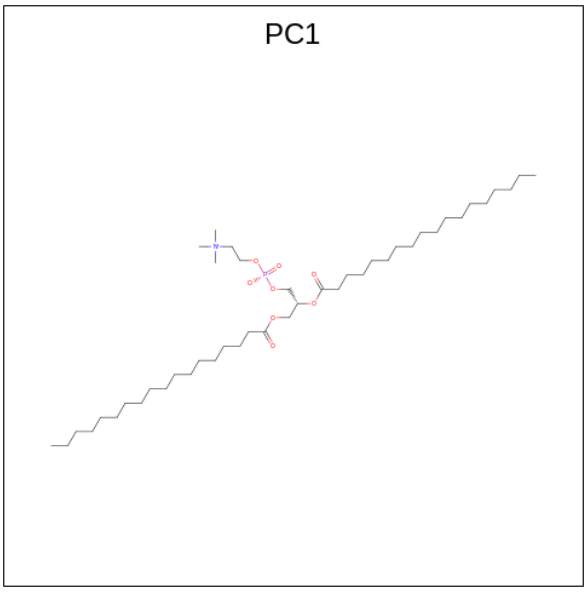
Mol	Chain	Residues	Atoms				AltConf	Trace
			Total	C	N	O		
3	C	2	28	16	2	10	0	0
			Total	C	N	O		
3	D	2	28	16	2	10	0	0

- Molecule 4 is 2-acetamido-2-deoxy-beta-D-glucopyranose (three-letter code: NAG) (formula: $C_8H_{15}NO_6$).



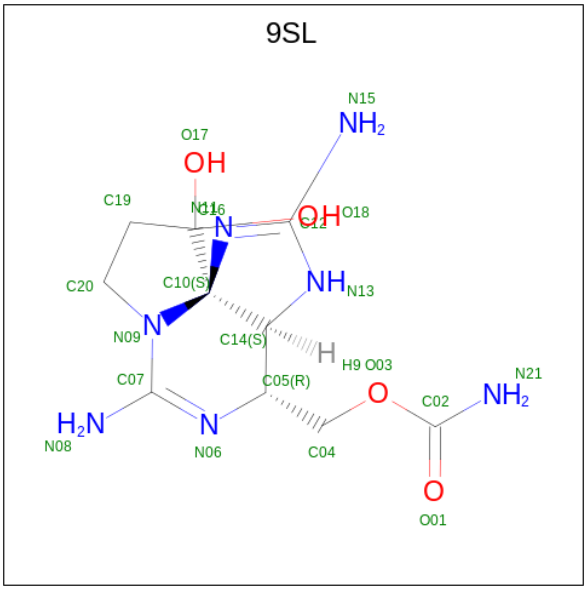
Mol	Chain	Residues	Atoms				AltConf
			Total	C	N	O	
4	A	1	42	24	3	15	0
4	A	1	42	24	3	15	0
4	A	1	42	24	3	15	0

- Molecule 5 is 1,2-DIACYL-SN-GLYCERO-3-PHOSPHOCHOLINE (three-letter code: PC1) (formula: $C_{44}H_{88}NO_8P$).



Mol	Chain	Residues	Atoms					AltConf
5	A	1	Total 74	C 55	N 1	O 16	P 2	0
5	A	1	Total 74	C 55	N 1	O 16	P 2	0

- Molecule 6 is [(3aS,4R,10aS)-2,6-diamino-10,10-dihydroxy-3a,4,9,10-tetrahydro-3H,8H-pyrrolo[1,2-c]purin-4-yl]methyl carbamate (three-letter code: 9SL) (formula: $C_{10}H_{17}N_7O_4$).



Mol	Chain	Residues	Atoms				AltConf
6	A	1	Total 21	C 10	N 7	O 4	0

- Molecule 7 is water.

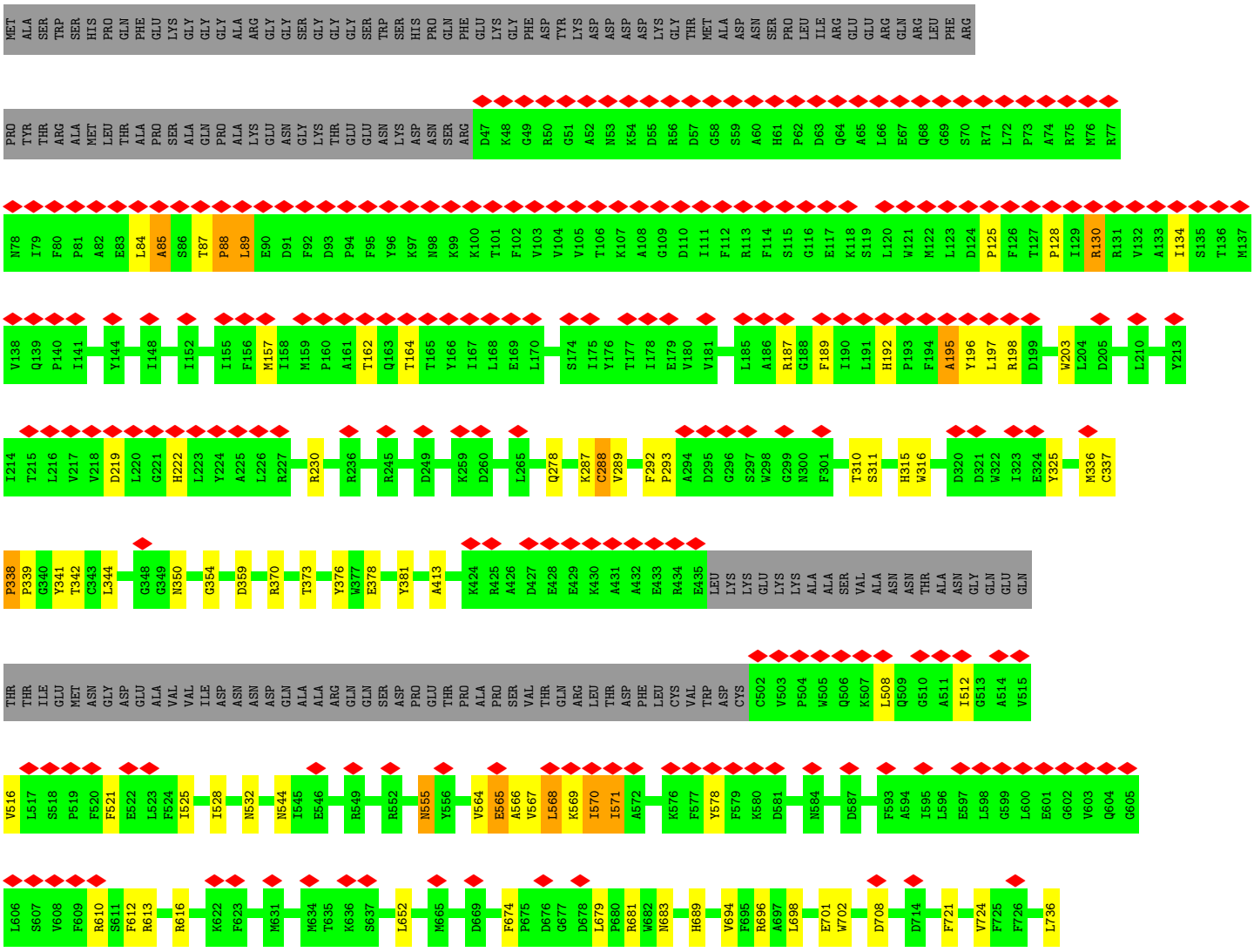
Mol	Chain	Residues	Atoms		AltConf
7	A	2	Total 2	O 2	0
7	B	1	Total 1	O 1	0

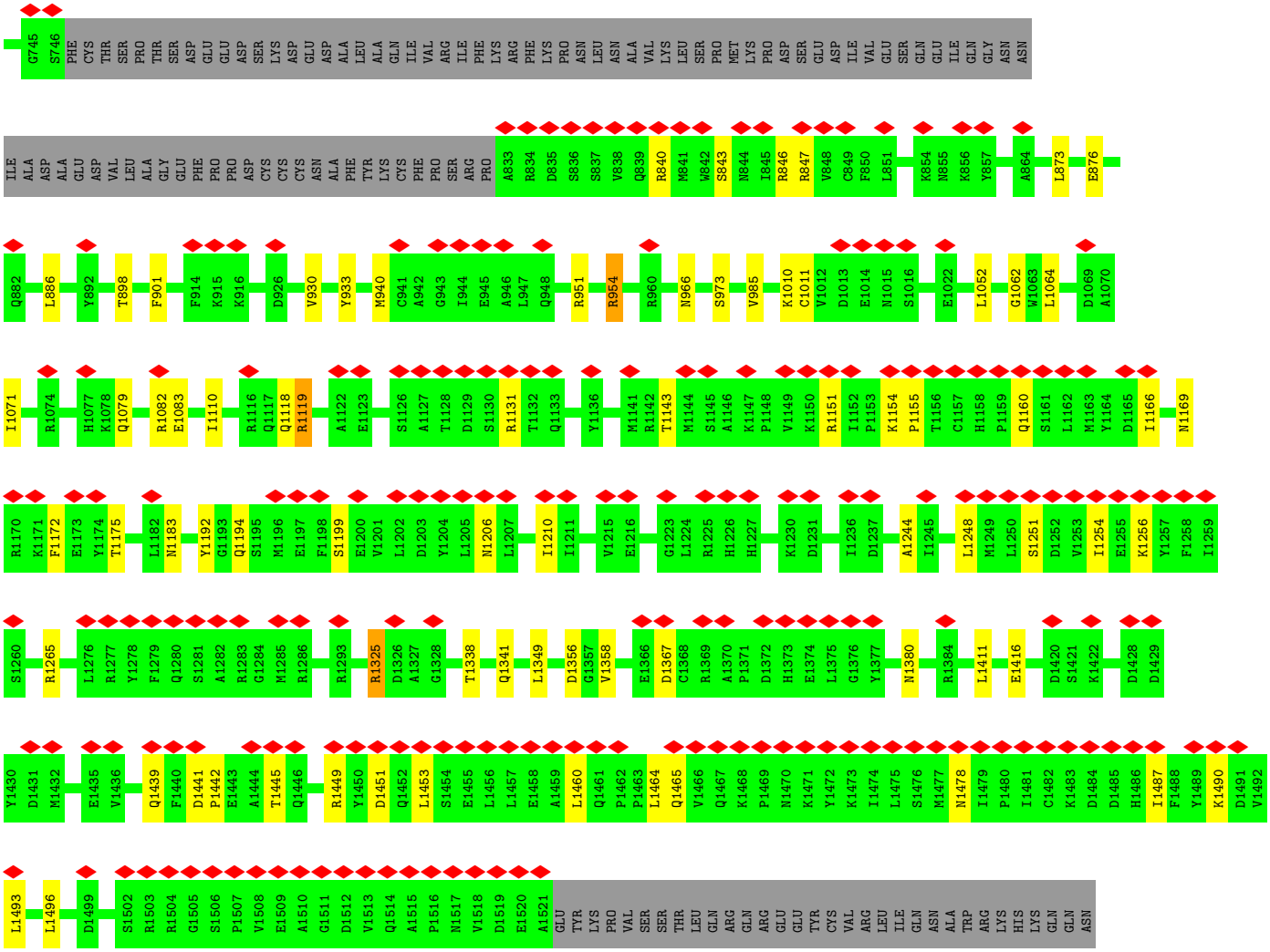
3 Residue-property plots (i)

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 and atom inclusion in map 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 diamond above a residue indicates a poor fit to the EM map for this residue (all-atom inclusion < 40%). 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: Sodium channel protein PaFPC1

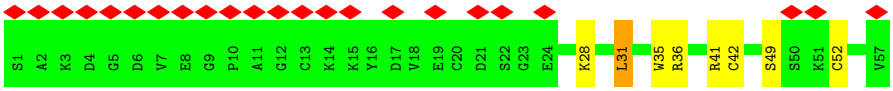
Chain A:





• Molecule 2: Mu-diguetoxin-Dc1a

Chain B:

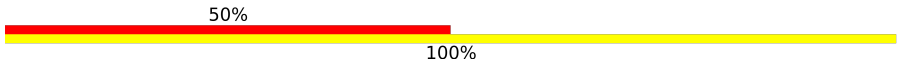


• Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain C:

• Molecule 3: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain D:



NAG1
NAG2

4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	166805	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	FEI TITAN KRIOS	Depositor
Voltage (kV)	300	Depositor
Electron dose ($e^-/Å^2$)	48	Depositor
Minimum defocus (nm)	Not provided	
Maximum defocus (nm)	Not provided	
Magnification	Not provided	
Image detector	GATAN K2 QUANTUM (4k x 4k)	Depositor
Maximum map value	0.280	Depositor
Minimum map value	-0.171	Depositor
Average map value	0.000	Depositor
Map value standard deviation	0.006	Depositor
Recommended contour level	0.08	Depositor
Map size (Å)	349.12, 349.12, 349.12	wwPDB
Map dimensions	320, 320, 320	wwPDB
Map angles (°)	90.0, 90.0, 90.0	wwPDB
Pixel spacing (Å)	1.091, 1.091, 1.091	Depositor

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: 9SL, NAG, PC1

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	0.41	0/10817	0.62	0/14715
2	B	0.38	0/459	0.66	0/614
All	All	0.41	0/11276	0.62	0/15329

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	10537	0	10375	120	0
2	B	449	0	420	5	0
3	C	28	0	25	0	0
3	D	28	0	25	0	0
4	A	42	0	39	10	0
5	A	74	0	95	13	0
6	A	21	0	0	4	0
7	A	2	0	0	0	0
7	B	1	0	0	0	0
All	All	11182	0	10979	128	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 6.

All (128) 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:315:HIS:CE1	4:A:1606:NAG:H83	1.78	1.18
1:A:1052:LEU:CD2	5:A:1609:PC1:H252	1.74	1.15
1:A:315:HIS:NE2	4:A:1606:NAG:H83	1.64	1.13
1:A:1052:LEU:HD21	5:A:1609:PC1:H252	1.28	1.13
1:A:1052:LEU:CD2	5:A:1609:PC1:C25	2.36	1.03
1:A:289:VAL:HG11	1:A:310:THR:HG23	1.54	0.89
4:A:1605:NAG:H83	4:A:1605:NAG:H3	1.63	0.81
1:A:315:HIS:CE1	4:A:1606:NAG:C8	2.63	0.79
1:A:566:ALA:O	1:A:570:ILE:HG23	1.84	0.78
1:A:701:GLU:OE2	6:A:1610:9SL:C04	2.33	0.77
1:A:315:HIS:HE2	4:A:1606:NAG:H83	1.49	0.73
1:A:373:THR:HG21	1:A:702:TRP:HE1	1.52	0.72
1:A:1052:LEU:CD2	5:A:1609:PC1:H251	2.18	0.72
1:A:512:ILE:HD12	1:A:571:ILE:CD1	2.20	0.71
1:A:612:PHE:HE1	5:A:1608:PC1:C38	2.04	0.71
1:A:315:HIS:NE2	4:A:1606:NAG:C8	2.49	0.71
1:A:189:PHE:H	1:A:195:ALA:HB1	1.58	0.68
1:A:1052:LEU:HD23	5:A:1609:PC1:C25	2.24	0.66
1:A:512:ILE:CD1	1:A:571:ILE:HD13	2.26	0.66
1:A:338:PRO:HB2	1:A:339:PRO:CD	2.25	0.66
1:A:564:VAL:O	1:A:567:VAL:HG12	1.97	0.65
1:A:532:ASN:HD21	1:A:616:ARG:HH11	1.45	0.64
1:A:315:HIS:HE2	4:A:1606:NAG:C8	2.08	0.64
1:A:612:PHE:CE1	5:A:1608:PC1:C38	2.81	0.63
1:A:1064:LEU:HD13	6:A:1610:9SL:O03	1.99	0.62
1:A:508:LEU:HD13	1:A:571:ILE:HD11	1.81	0.62
1:A:901:PHE:HB3	1:A:930:VAL:HG22	1.81	0.62
1:A:278:GLN:HB3	1:A:1265:ARG:HD3	1.82	0.61
1:A:370:ARG:NH1	1:A:376:TYR:O	2.33	0.61
1:A:1011:CYS:HB3	1:A:1079:GLN:HE22	1.65	0.61
1:A:84:LEU:O	1:A:85:ALA:HB2	2.01	0.60
1:A:1052:LEU:HD22	5:A:1609:PC1:C25	2.30	0.60
1:A:512:ILE:HD12	1:A:571:ILE:HD13	1.82	0.59
1:A:512:ILE:CD1	1:A:571:ILE:CD1	2.81	0.59
1:A:516:VAL:HG21	1:A:568:LEU:HD23	1.83	0.59
2:B:28:LYS:HD3	2:B:35:TRP:HB3	1.84	0.59
1:A:898:THR:HG22	1:A:933:TYR:HB3	1.86	0.58
1:A:570:ILE:HG13	1:A:571:ILE:N	2.18	0.58

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1155:PRO:HG2	1:A:1160:GLN:HB3	1.85	0.58
1:A:1210:ILE:HD11	1:A:1244:ALA:HB1	1.86	0.57
1:A:508:LEU:CD1	1:A:571:ILE:HD11	2.34	0.57
1:A:350:ASN:HB3	1:A:354:GLY:HA2	1.87	0.56
1:A:197:LEU:HD12	1:A:203:TRP:HD1	1.70	0.56
1:A:516:VAL:CG2	1:A:568:LEU:CD2	2.83	0.56
1:A:873:LEU:HD22	1:A:954:ARG:HE	1.70	0.55
1:A:525:ILE:HD11	1:A:565:GLU:HG2	1.88	0.55
1:A:555:ASN:OD1	1:A:613:ARG:NH2	2.40	0.55
1:A:973:SER:OG	1:A:1118:GLN:NE2	2.39	0.55
1:A:567:VAL:HG13	1:A:568:LEU:N	2.21	0.54
1:A:1349:LEU:HD11	1:A:1358:VAL:HG21	1.90	0.54
1:A:1338:THR:OG1	1:A:1341:GLN:NE2	2.41	0.54
1:A:1166:ILE:HD12	1:A:1169:ASN:HD22	1.72	0.54
1:A:288:CYS:HA	1:A:342:THR:O	2.07	0.54
1:A:525:ILE:CD1	1:A:565:GLU:HG2	2.38	0.53
1:A:610:ARG:NH1	2:B:49:SER:OG	2.41	0.53
1:A:219:ASP:OD1	1:A:222:HIS:NE2	2.42	0.53
1:A:338:PRO:HB2	1:A:339:PRO:HD2	1.90	0.53
1:A:567:VAL:O	1:A:571:ILE:HG22	2.09	0.52
1:A:1464:LEU:HD22	1:A:1496:LEU:HB3	1.90	0.52
1:A:843:SER:HA	1:A:846:ARG:HB3	1.91	0.52
1:A:311:SER:O	4:A:1607:NAG:H82	2.10	0.52
1:A:378:GLU:OE2	6:A:1610:9SL:N11	2.43	0.51
1:A:516:VAL:CG2	1:A:568:LEU:HD23	2.41	0.51
1:A:681:ARG:HD2	1:A:1082:ARG:HH21	1.75	0.51
1:A:674:PHE:HE1	1:A:708:ASP:HB2	1.76	0.51
1:A:1151:ARG:HE	1:A:1442:PRO:HB3	1.75	0.51
1:A:341:TYR:O	1:A:342:THR:OG1	2.24	0.51
1:A:1052:LEU:HD23	5:A:1609:PC1:H251	1.88	0.50
1:A:985:VAL:HG21	1:A:1110:ILE:HD11	1.93	0.50
1:A:1254:ILE:HG22	1:A:1256:LYS:HG3	1.92	0.50
1:A:544:ASN:OD1	2:B:41:ARG:NH1	2.46	0.49
4:A:1605:NAG:C1	4:A:1605:NAG:C8	2.91	0.49
1:A:287:LYS:HD3	1:A:325:TYR:HB2	1.95	0.49
5:A:1609:PC1:O22	5:A:1609:PC1:H32	2.10	0.49
1:A:1052:LEU:HD22	5:A:1609:PC1:H271	1.95	0.49
1:A:130:ARG:HE	1:A:134:ILE:HD11	1.78	0.48
2:B:31:LEU:HD11	2:B:36:ARG:HD2	1.95	0.48
1:A:512:ILE:HD13	1:A:571:ILE:HD13	1.94	0.48
1:A:1119:ARG:NH2	1:A:1416:GLU:OE1	2.46	0.48

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:157:MET:HG2	1:A:230:ARG:HH12	1.78	0.48
1:A:1460:LEU:O	1:A:1465:GLN:NE2	2.35	0.48
1:A:162:THR:HG23	1:A:164:THR:H	1.79	0.47
5:A:1609:PC1:O13	5:A:1609:PC1:H2	2.15	0.47
1:A:1143:THR:HG23	1:A:1493:LEU:HD12	1.96	0.46
1:A:516:VAL:HG21	1:A:568:LEU:CD2	2.45	0.46
1:A:525:ILE:HD11	1:A:565:GLU:CG	2.45	0.46
1:A:567:VAL:CG1	1:A:568:LEU:N	2.79	0.46
1:A:694:VAL:HG13	1:A:724:VAL:HG21	1.98	0.46
1:A:88:PRO:O	1:A:89:LEU:CB	2.64	0.46
1:A:652:LEU:HD21	1:A:698:LEU:HD13	1.98	0.46
1:A:289:VAL:HG22	1:A:316:TRP:CD1	2.51	0.46
1:A:378:GLU:HA	1:A:381:TYR:HB3	1.98	0.45
1:A:689:HIS:NE2	1:A:1083:GLU:OE2	2.49	0.45
1:A:189:PHE:HD2	1:A:192:HIS:HE1	1.64	0.45
1:A:516:VAL:HG23	1:A:568:LEU:CD2	2.47	0.45
1:A:1052:LEU:HD22	5:A:1609:PC1:H251	1.96	0.45
1:A:1062:GLY:N	6:A:1610:9SL:O01	2.41	0.45
1:A:1194:GLN:NE2	1:A:1199:SER:OG	2.49	0.44
1:A:1325:ARG:NH2	1:A:1367:ASP:O	2.49	0.44
1:A:289:VAL:HB	1:A:344:LEU:HD12	2.00	0.44
1:A:1441:ASP:OD1	1:A:1445:THR:OG1	2.35	0.44
1:A:679:LEU:HD22	1:A:683:ASN:HD22	1.83	0.44
1:A:721:PHE:HA	1:A:724:VAL:HG12	2.00	0.43
1:A:1356:ASP:N	1:A:1356:ASP:OD1	2.48	0.43
4:A:1605:NAG:H3	4:A:1605:NAG:C8	2.36	0.43
1:A:565:GLU:OE2	1:A:565:GLU:HA	2.19	0.43
1:A:569:LYS:HB3	1:A:578:TYR:CE1	2.54	0.42
1:A:569:LYS:HB3	1:A:578:TYR:HE1	1.83	0.42
1:A:1453:LEU:HD12	1:A:1487:ILE:HD13	2.01	0.42
1:A:876:GLU:OE2	1:A:951:ARG:NH2	2.47	0.42
1:A:359:ASP:HB2	1:A:1192:TYR:HB2	2.01	0.42
1:A:316:TRP:HE3	1:A:325:TYR:HE2	1.67	0.42
1:A:289:VAL:N	1:A:342:THR:O	2.48	0.41
1:A:512:ILE:HD12	1:A:571:ILE:HD11	1.96	0.41
1:A:1490:LYS:HE3	1:A:1490:LYS:HB2	1.88	0.41
1:A:1449:ARG:HG2	1:A:1451:ASP:H	1.86	0.41
1:A:196:TYR:HD2	1:A:197:LEU:HD22	1.85	0.41
1:A:521:PHE:HZ	1:A:565:GLU:OE2	2.04	0.41
1:A:652:LEU:HD22	1:A:694:VAL:HG12	2.03	0.41
1:A:528:ILE:O	1:A:532:ASN:N	2.50	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:338:PRO:HG2	1:A:341:TYR:CD1	2.56	0.40
2:B:42:CYS:HA	2:B:52:CYS:HA	2.03	0.40
1:A:413:ALA:HA	1:A:1411:LEU:HD13	2.03	0.40
1:A:292:PHE:HA	1:A:293:PRO:HD3	1.92	0.40
1:A:1172:PHE:HA	1:A:1175:THR:HG22	2.02	0.40
1:A:1071:ILE:HG22	1:A:1083:GLU:HA	2.04	0.40
1:A:1248:LEU:O	1:A:1251:SER:OG	2.38	0.40
1:A:1325:ARG:HB3	1:A:1380:ASN:HB2	2.02	0.40

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 PDB entries followed by that with respect to all EM entries.

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	1317/1596 (82%)	1209 (92%)	100 (8%)	8 (1%)	25	64
2	B	55/57 (96%)	48 (87%)	7 (13%)	0	100	100
All	All	1372/1653 (83%)	1257 (92%)	107 (8%)	8 (1%)	29	64

All (8) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	87	THR
1	A	88	PRO
1	A	125	PRO
1	A	85	ALA
1	A	89	LEU
1	A	195	ALA
1	A	128	PRO
1	A	338	PRO

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 PDB entries followed by that with respect to all EM entries.

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	1096/1411 (78%)	1068 (97%)	28 (3%)	46	76
2	B	50/50 (100%)	49 (98%)	1 (2%)	55	80
All	All	1146/1461 (78%)	1117 (98%)	29 (2%)	50	77

All (29) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	130	ARG
1	A	187	ARG
1	A	198	ARG
1	A	288	CYS
1	A	336	MET
1	A	337	CYS
1	A	555	ASN
1	A	565	GLU
1	A	568	LEU
1	A	570	ILE
1	A	571	ILE
1	A	696	ARG
1	A	736	LEU
1	A	840	ARG
1	A	847	ARG
1	A	886	LEU
1	A	940	MET
1	A	954	ARG
1	A	966	ASN
1	A	1010	LYS
1	A	1119	ARG
1	A	1131	ARG
1	A	1154	LYS
1	A	1183	ASN
1	A	1206	ASN
1	A	1325	ARG
1	A	1439	GLN

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Mol	Chain	Res	Type
1	A	1478	ASN
2	B	31	LEU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	192	HIS
1	A	532	ASN
1	A	966	ASN
1	A	1056	GLN
1	A	1118	GLN
1	A	1169	ASN
1	A	1194	GLN
1	A	1341	GLN
1	A	1478	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)

4 monosaccharides 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	NAG	C	1	3,1	14,14,15	0.57	0	17,19,21	0.64	0
3	NAG	C	2	3	14,14,15	0.41	0	17,19,21	0.82	1 (5%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
3	NAG	D	1	3,1	14,14,15	1.33	1 (7%)	17,19,21	1.15	3 (17%)
3	NAG	D	2	3	14,14,15	0.77	0	17,19,21	0.92	1 (5%)

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	NAG	C	1	3,1	-	4/6/23/26	0/1/1/1
3	NAG	C	2	3	-	2/6/23/26	0/1/1/1
3	NAG	D	1	3,1	-	1/6/23/26	0/1/1/1
3	NAG	D	2	3	-	1/6/23/26	0/1/1/1

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	D	1	NAG	O5-C1	-4.64	1.36	1.43

All (5) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
3	D	2	NAG	C2-N2-C7	2.85	126.96	122.90
3	C	2	NAG	C1-O5-C5	2.63	115.76	112.19
3	D	1	NAG	C4-C3-C2	2.25	114.31	111.02
3	D	1	NAG	O3-C3-C2	-2.19	104.93	109.47
3	D	1	NAG	C1-O5-C5	-2.18	109.24	112.19

There are no chirality outliers.

All (8) torsion outliers are listed below:

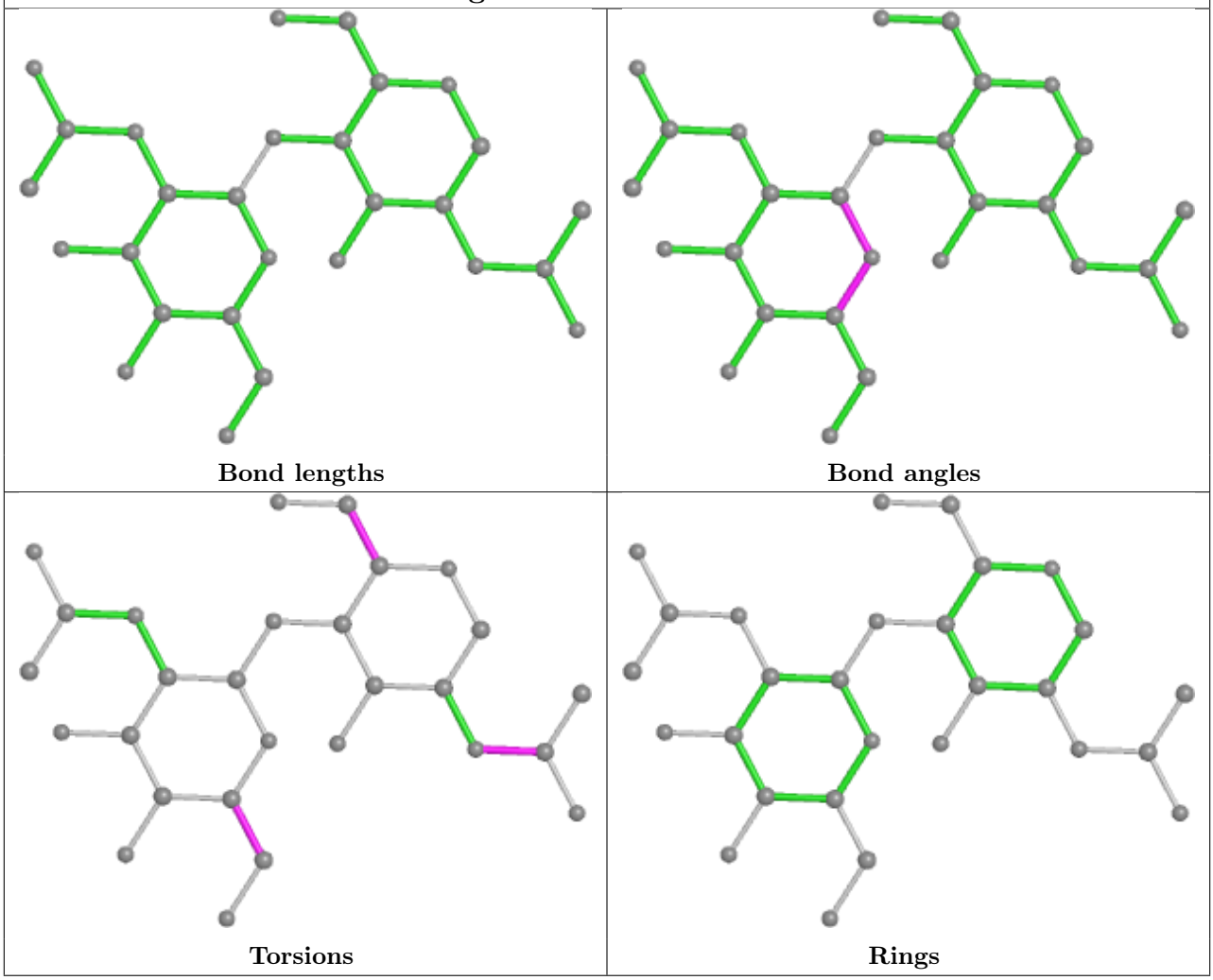
Mol	Chain	Res	Type	Atoms
3	C	1	NAG	O5-C5-C6-O6
3	C	2	NAG	O5-C5-C6-O6
3	C	2	NAG	C4-C5-C6-O6
3	C	1	NAG	C4-C5-C6-O6
3	C	1	NAG	C8-C7-N2-C2
3	C	1	NAG	O7-C7-N2-C2
3	D	1	NAG	C1-C2-N2-C7
3	D	2	NAG	C3-C2-N2-C7

There are no ring outliers.

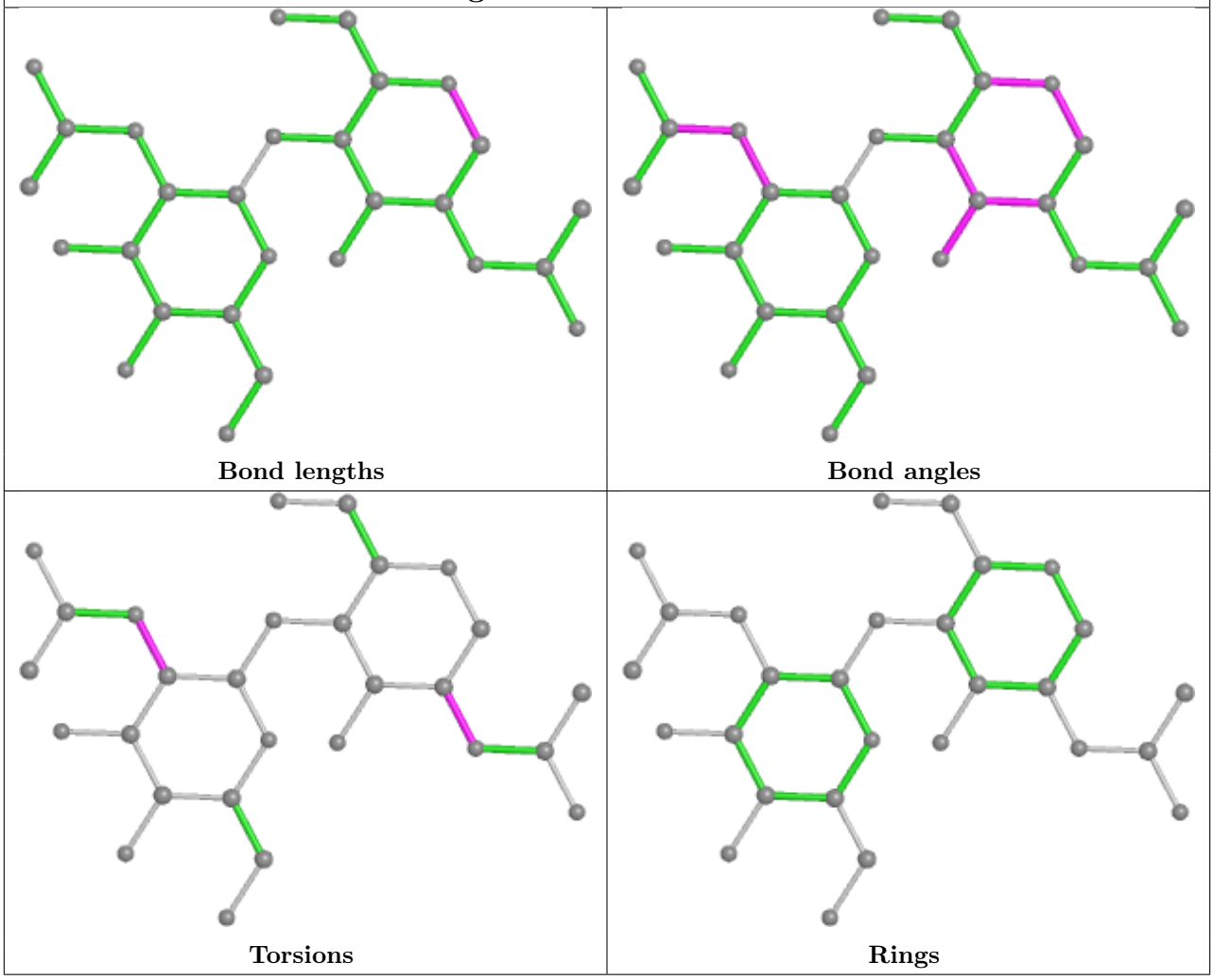
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for oligosaccharide.

Oligosaccharide Chain C



Oligosaccharide Chain D



5.6 Ligand geometry (i)

6 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	$\#\|Z\| > 2$
5	PC1	A	1609	-	39,39,53	1.28	5 (12%)	43,44,61	0.96	2 (4%)
4	NAG	A	1605	1	14,14,15	0.29	0	17,19,21	0.61	0
6	9SL	A	1610	-	17,23,23	3.60	8 (47%)	13,37,37	3.16	8 (61%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#\|Z\| > 2$	Counts	RMSZ	$\#\|Z\| > 2$
5	PC1	A	1608	-	33,33,53	1.29	3 (9%)	39,41,61	1.10	3 (7%)
4	NAG	A	1606	1	14,14,15	0.30	0	17,19,21	0.61	0
4	NAG	A	1607	1	14,14,15	0.28	0	17,19,21	0.37	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
5	PC1	A	1609	-	-	25/41/41/57	-
4	NAG	A	1605	1	-	3/6/23/26	0/1/1/1
6	9SL	A	1610	-	-	4/5/53/53	0/3/3/3
5	PC1	A	1608	-	-	20/37/37/57	-
4	NAG	A	1606	1	-	4/6/23/26	0/1/1/1
4	NAG	A	1607	1	-	0/6/23/26	0/1/1/1

All (16) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
6	A	1610	9SL	C12-N13	9.01	1.49	1.35
6	A	1610	9SL	C02-N21	6.10	1.44	1.33
6	A	1610	9SL	C07-N08	5.73	1.44	1.34
6	A	1610	9SL	C12-N15	4.69	1.45	1.34
6	A	1610	9SL	C05-C14	3.81	1.61	1.52
5	A	1609	PC1	P-O13	3.21	1.67	1.54
6	A	1610	9SL	O01-C02	-3.09	1.17	1.21
5	A	1608	PC1	O31-C31	3.05	1.42	1.33
5	A	1609	PC1	O21-C21	3.01	1.42	1.34
5	A	1609	PC1	O31-C31	3.00	1.42	1.33
5	A	1608	PC1	O21-C21	2.92	1.42	1.34
6	A	1610	9SL	O03-C02	2.86	1.39	1.35
6	A	1610	9SL	C05-N06	-2.64	1.43	1.47
5	A	1608	PC1	O21-C2	-2.43	1.40	1.46
5	A	1609	PC1	O21-C2	-2.43	1.40	1.46
5	A	1609	PC1	P-O11	2.16	1.67	1.60

All (13) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
6	A	1610	9SL	O03-C02-N21	7.85	120.83	111.08

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
5	A	1608	PC1	O21-C21-C22	4.00	120.11	111.50
5	A	1609	PC1	O21-C21-C22	3.89	119.89	111.50
6	A	1610	9SL	O03-C02-O01	-3.84	119.44	123.07
6	A	1610	9SL	N09-C07-N06	-3.54	120.49	125.42
6	A	1610	9SL	O01-C02-N21	-3.50	119.73	125.51
6	A	1610	9SL	N13-C12-N11	-3.14	107.48	115.45
6	A	1610	9SL	O03-C04-C05	2.74	113.82	108.40
5	A	1608	PC1	O31-C31-C32	2.57	119.98	111.91
5	A	1609	PC1	O31-C31-C32	2.57	119.96	111.91
6	A	1610	9SL	N15-C12-N13	2.28	126.20	122.64
5	A	1608	PC1	C14-N-C12	2.25	119.12	109.92
6	A	1610	9SL	C19-C20-N09	-2.08	101.47	103.83

There are no chirality outliers.

All (56) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1605	NAG	C3-C2-N2-C7
4	A	1605	NAG	C8-C7-N2-C2
4	A	1605	NAG	O7-C7-N2-C2
5	A	1608	PC1	C11-O13-P-O12
5	A	1608	PC1	C1-O11-P-O12
5	A	1608	PC1	C1-O11-P-O14
5	A	1608	PC1	O13-C11-C12-N
5	A	1609	PC1	C1-O11-P-O12
5	A	1609	PC1	C1-O11-P-O14
5	A	1609	PC1	C1-O11-P-O13
5	A	1609	PC1	C2-C1-O11-P
6	A	1610	9SL	O01-C02-O03-C04
6	A	1610	9SL	N21-C02-O03-C04
6	A	1610	9SL	O03-C04-C05-N06
6	A	1610	9SL	O03-C04-C05-C14
5	A	1609	PC1	C32-C31-O31-C3
5	A	1609	PC1	O32-C31-O31-C3
4	A	1606	NAG	O5-C5-C6-O6
5	A	1608	PC1	C21-C22-C23-C24
5	A	1608	PC1	C11-O13-P-O11
5	A	1608	PC1	C1-O11-P-O13
5	A	1609	PC1	C3A-C3B-C3C-C3D
5	A	1608	PC1	C32-C33-C34-C35
5	A	1609	PC1	C38-C39-C3A-C3B
5	A	1609	PC1	C34-C35-C36-C37

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Mol	Chain	Res	Type	Atoms
5	A	1608	PC1	C24-C25-C26-C27
5	A	1608	PC1	C34-C35-C36-C37
5	A	1609	PC1	C32-C33-C34-C35
5	A	1608	PC1	C22-C23-C24-C25
5	A	1608	PC1	C33-C34-C35-C36
5	A	1609	PC1	C22-C21-O21-C2
5	A	1609	PC1	C39-C3A-C3B-C3C
4	A	1606	NAG	C4-C5-C6-O6
5	A	1609	PC1	O22-C21-O21-C2
5	A	1609	PC1	C28-C29-C2A-C2B
5	A	1609	PC1	C26-C27-C28-C29
5	A	1608	PC1	C22-C21-O21-C2
5	A	1609	PC1	C22-C23-C24-C25
5	A	1608	PC1	O22-C21-O21-C2
5	A	1608	PC1	C23-C24-C25-C26
5	A	1609	PC1	C21-C22-C23-C24
5	A	1609	PC1	C3-C2-O21-C21
5	A	1608	PC1	C25-C26-C27-C28
5	A	1608	PC1	O11-C1-C2-C3
5	A	1609	PC1	C27-C28-C29-C2A
5	A	1609	PC1	C2A-C2B-C2C-C2D
5	A	1608	PC1	C2-C1-O11-P
5	A	1609	PC1	O11-C1-C2-C3
5	A	1608	PC1	O11-C1-C2-O21
5	A	1608	PC1	C3-C2-O21-C21
5	A	1609	PC1	O31-C31-C32-C33
4	A	1606	NAG	C1-C2-N2-C7
5	A	1609	PC1	O21-C21-C22-C23
4	A	1606	NAG	C3-C2-N2-C7
5	A	1609	PC1	O22-C21-C22-C23
5	A	1609	PC1	C36-C37-C38-C39

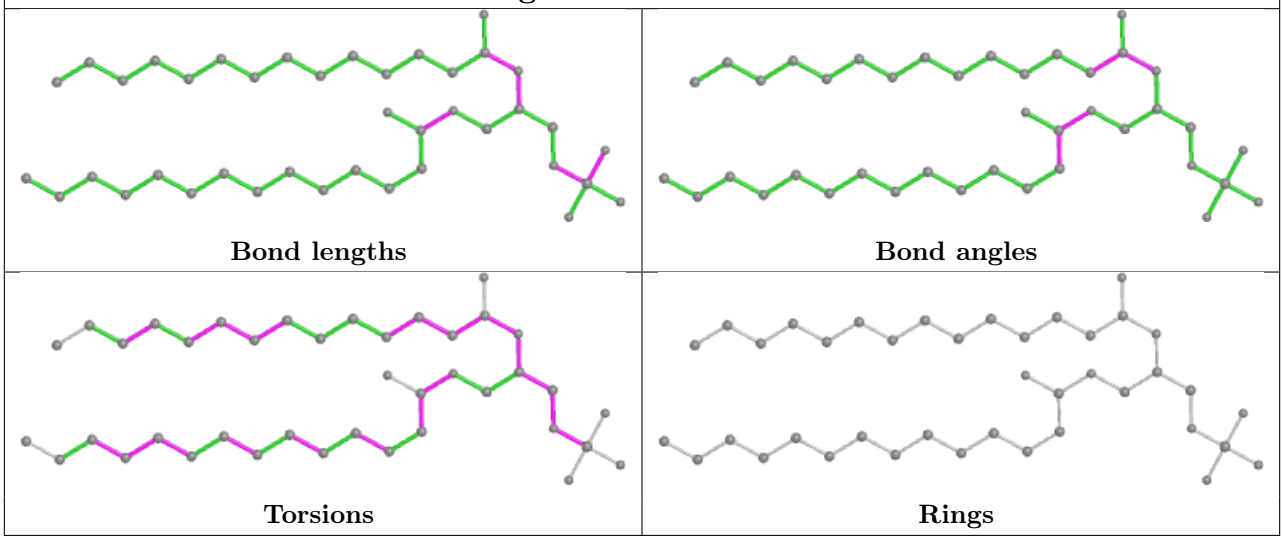
There are no ring outliers.

6 monomers are involved in 27 short contacts:

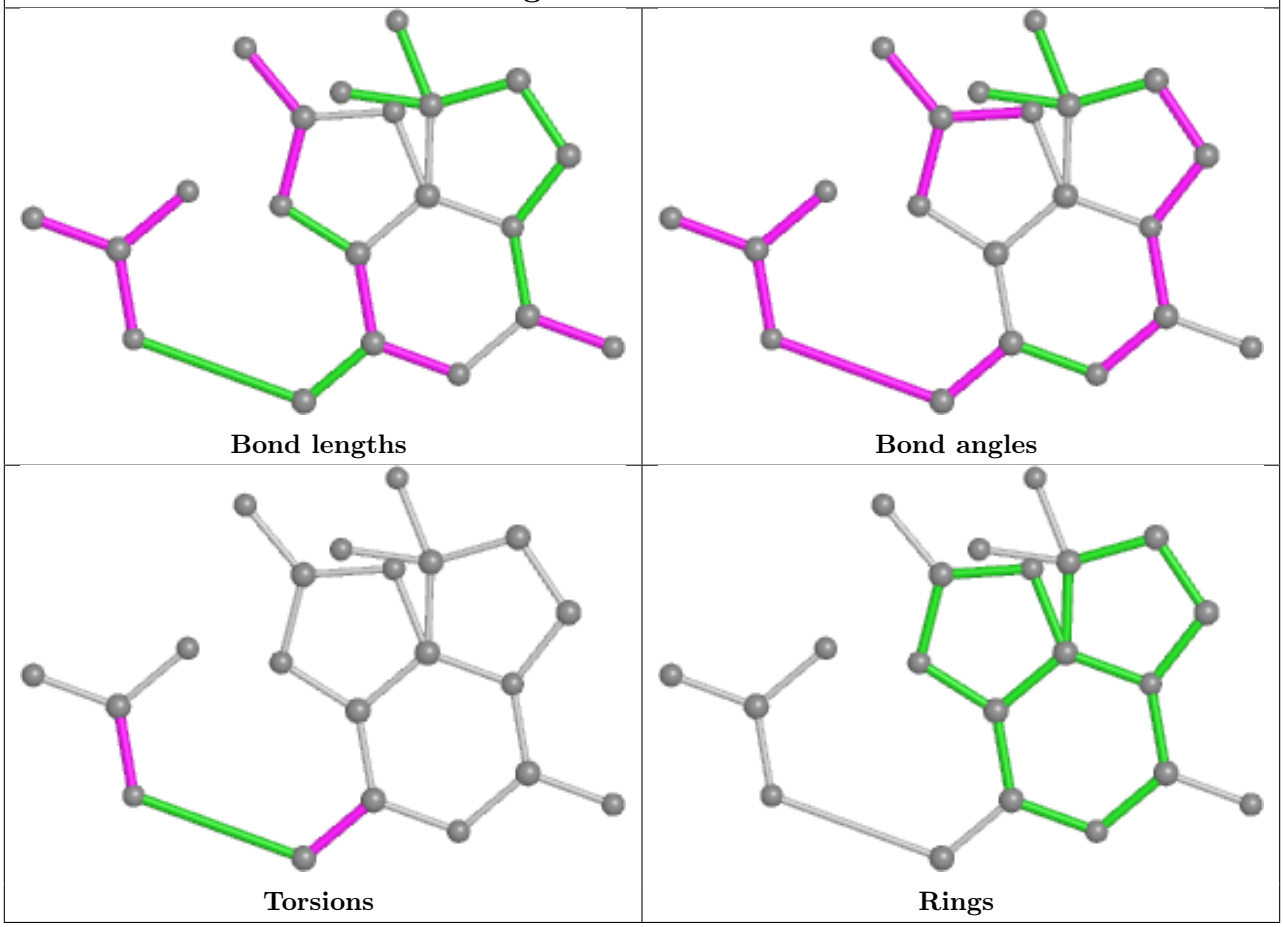
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	1609	PC1	11	0
4	A	1605	NAG	3	0
6	A	1610	9SL	4	0
5	A	1608	PC1	2	0
4	A	1606	NAG	6	0
4	A	1607	NAG	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less then 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.

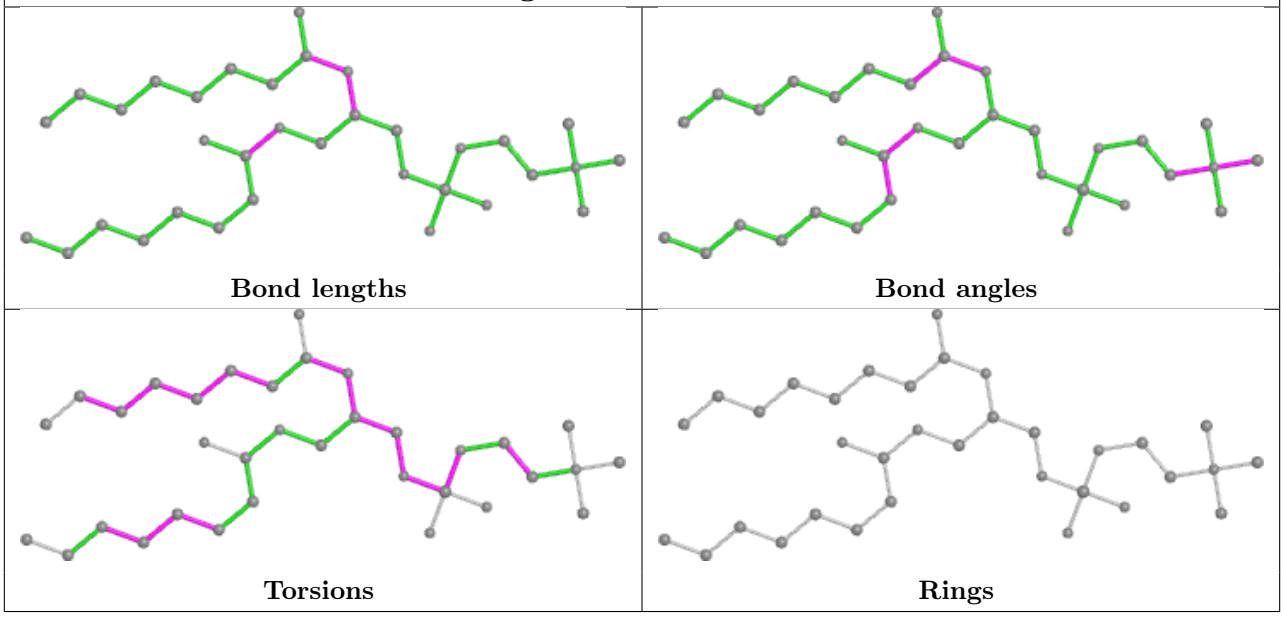
Ligand PC1 A 1609



Ligand 9SL A 1610



Ligand PC1 A 1608



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.

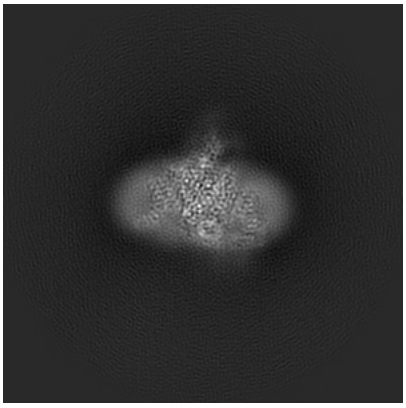
6 Map visualisation (i)

This section contains visualisations of the EMDB entry EMD-6996. These allow visual inspection of the internal detail of the map and identification of artifacts.

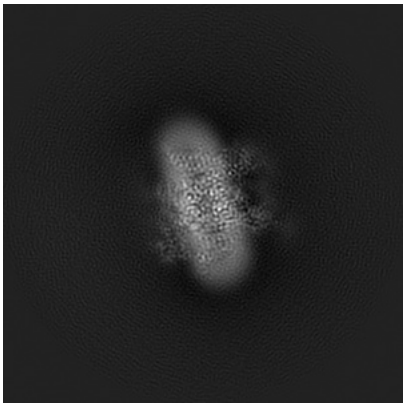
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections (i)

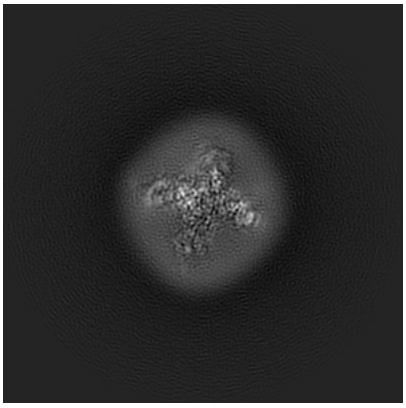
6.1.1 Primary map



X



Y

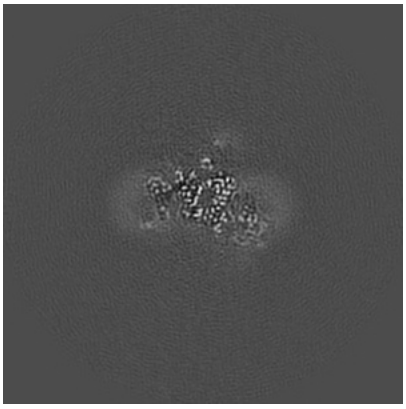


Z

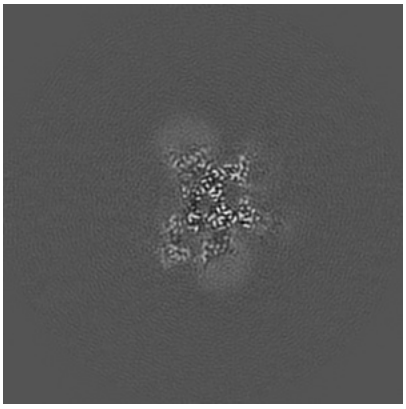
The images above show the map projected in three orthogonal directions.

6.2 Central slices (i)

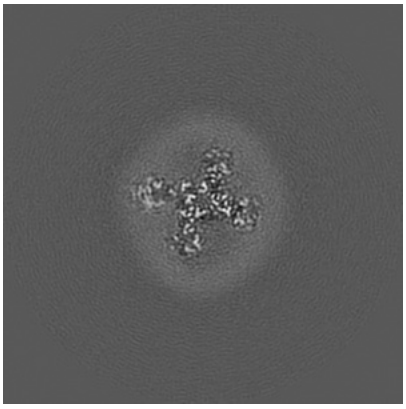
6.2.1 Primary map



X Index: 160



Y Index: 160

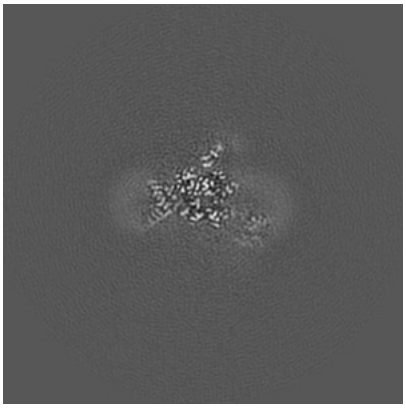


Z Index: 160

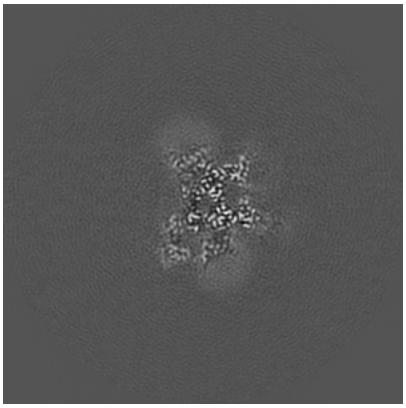
The images above show central slices of the map in three orthogonal directions.

6.3 Largest variance slices (i)

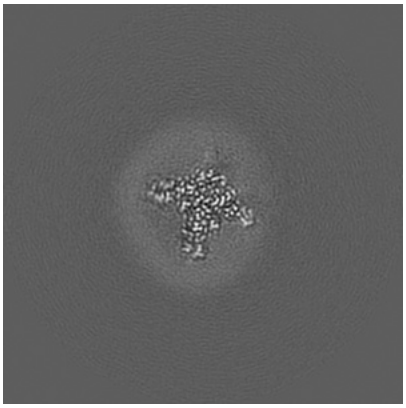
6.3.1 Primary map



X Index: 156



Y Index: 160



Z Index: 173

The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal surface views (i)

6.4.1 Primary map

X

Y

Z

The images above show the 3D surface view of the map at the recommended contour level 0.08. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

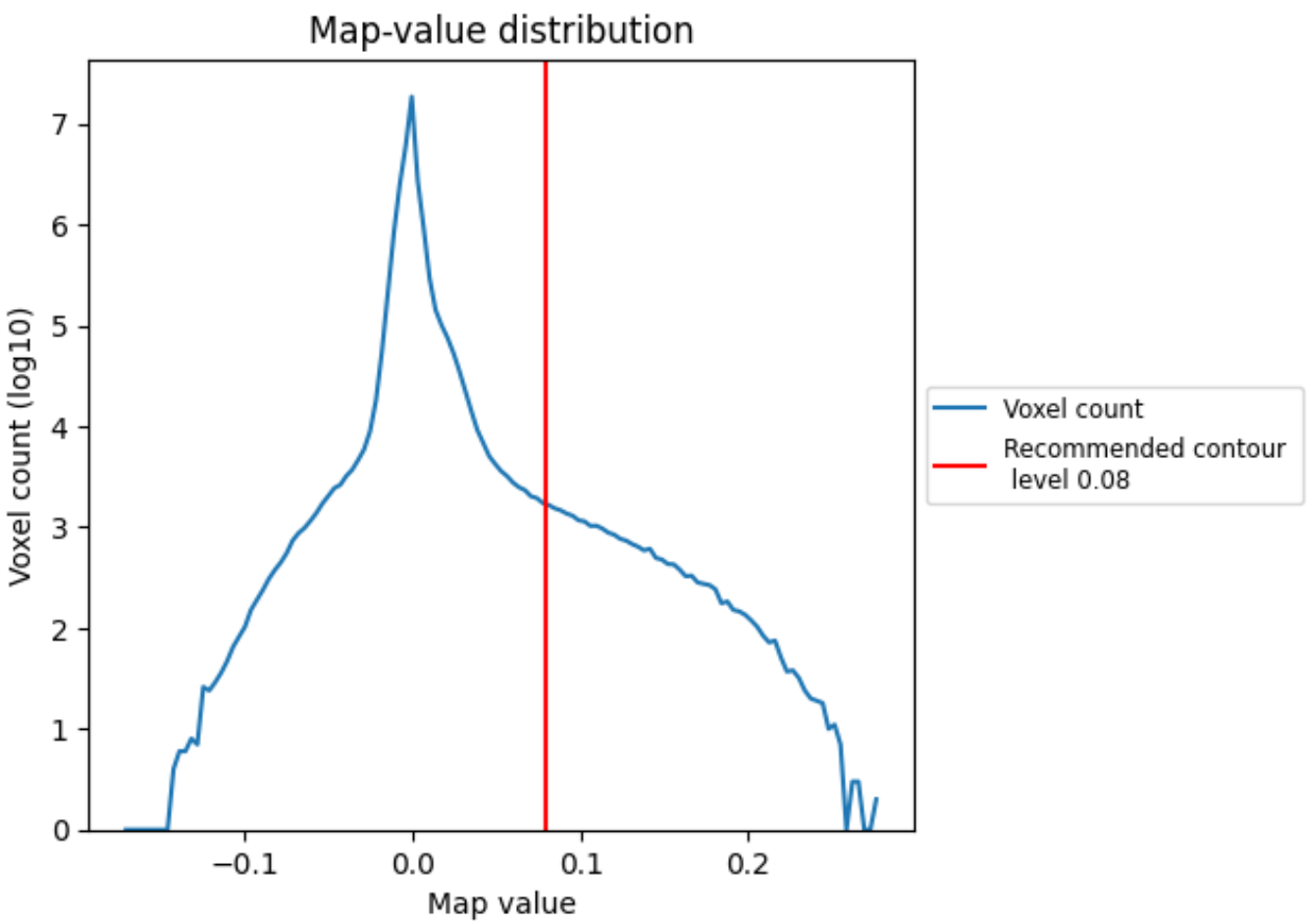
6.5 Mask visualisation (i)

This section was not generated. No masks/segmentation were deposited.

7 Map analysis (i)

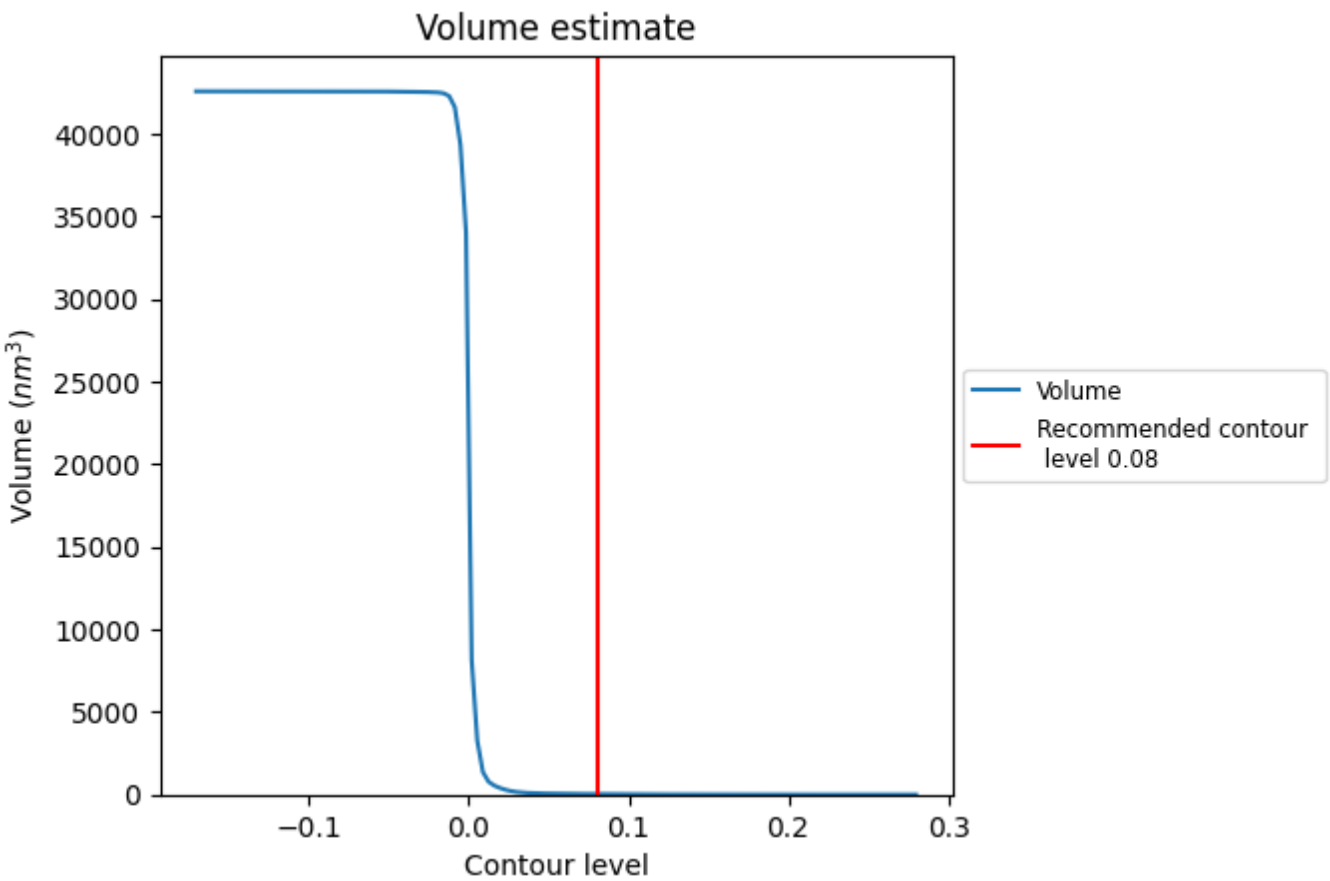
This section contains the results of statistical analysis of the map.

7.1 Map-value distribution (i)



The map-value distribution is plotted in 128 intervals along the x-axis. The y-axis is logarithmic. A spike in this graph at zero usually indicates that the volume has been masked.

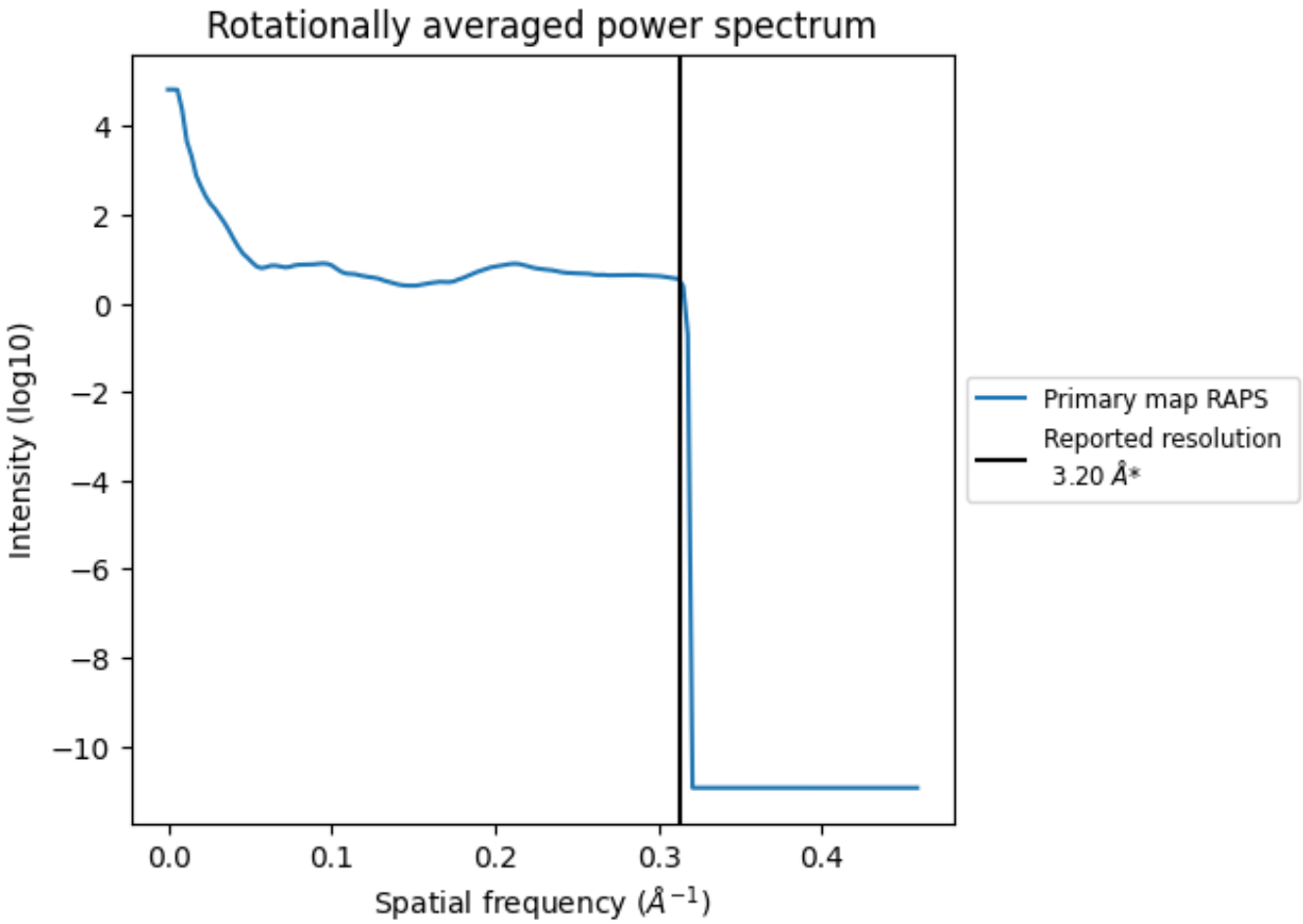
7.2 Volume estimate (i)



The volume at the recommended contour level is 32 nm^3; this corresponds to an approximate mass of 29 kDa.

The volume estimate graph shows how the enclosed volume varies with the contour level. The recommended contour level is shown as a vertical line and the intersection between the line and the curve gives the volume of the enclosed surface at the given level.

7.3 Rotationally averaged power spectrum (i)



*Reported resolution corresponds to spatial frequency of 0.312 Å^{-1}

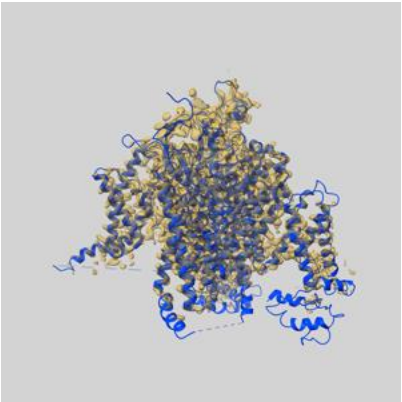
8 Fourier-Shell correlation (i)

This section was not generated. No FSC curve or half-maps provided.

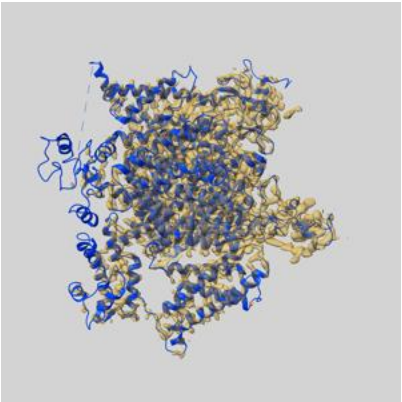
9 Map-model fit (i)

This section contains information regarding the fit between EMDB map EMD-6996 and PDB model 6A91. Per-residue inclusion information can be found in section 3 on page 7.

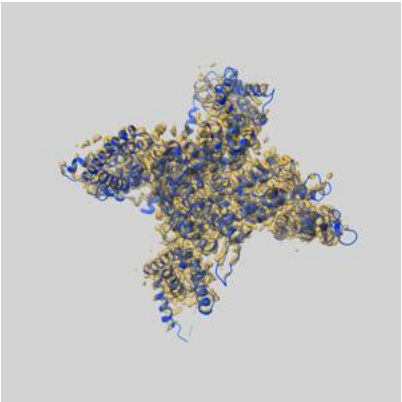
9.1 Map-model overlay (i)



X



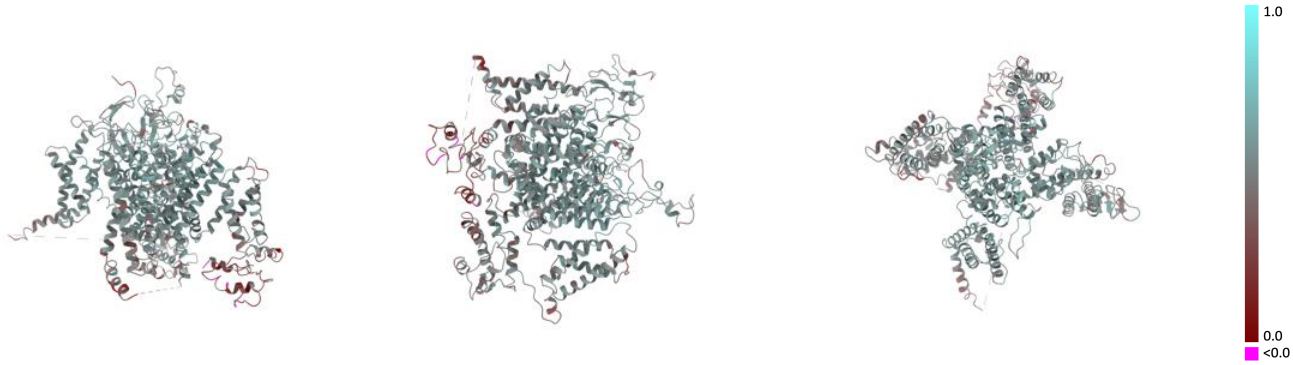
Y



Z

The images above show the 3D surface view of the map at the recommended contour level 0.08 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

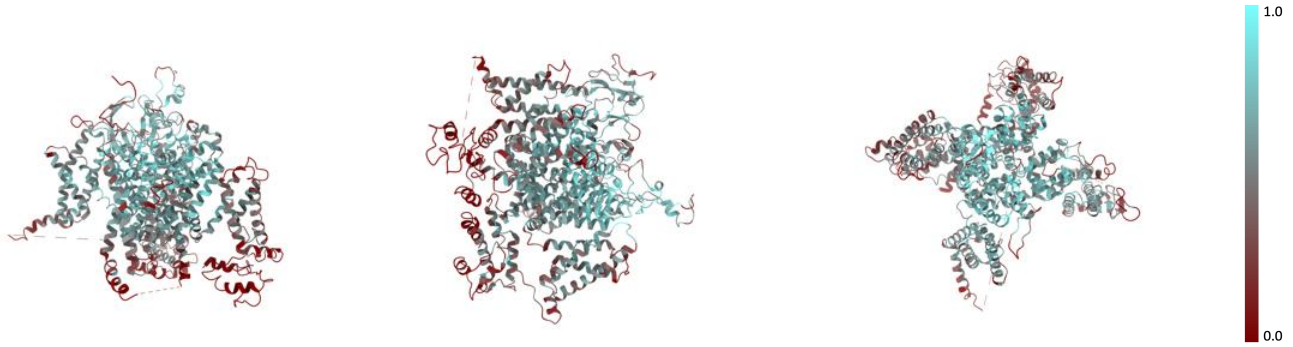
9.2 Q-score mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions at which atoms can be resolved. Low Q-score values may therefore be expected for many entries.

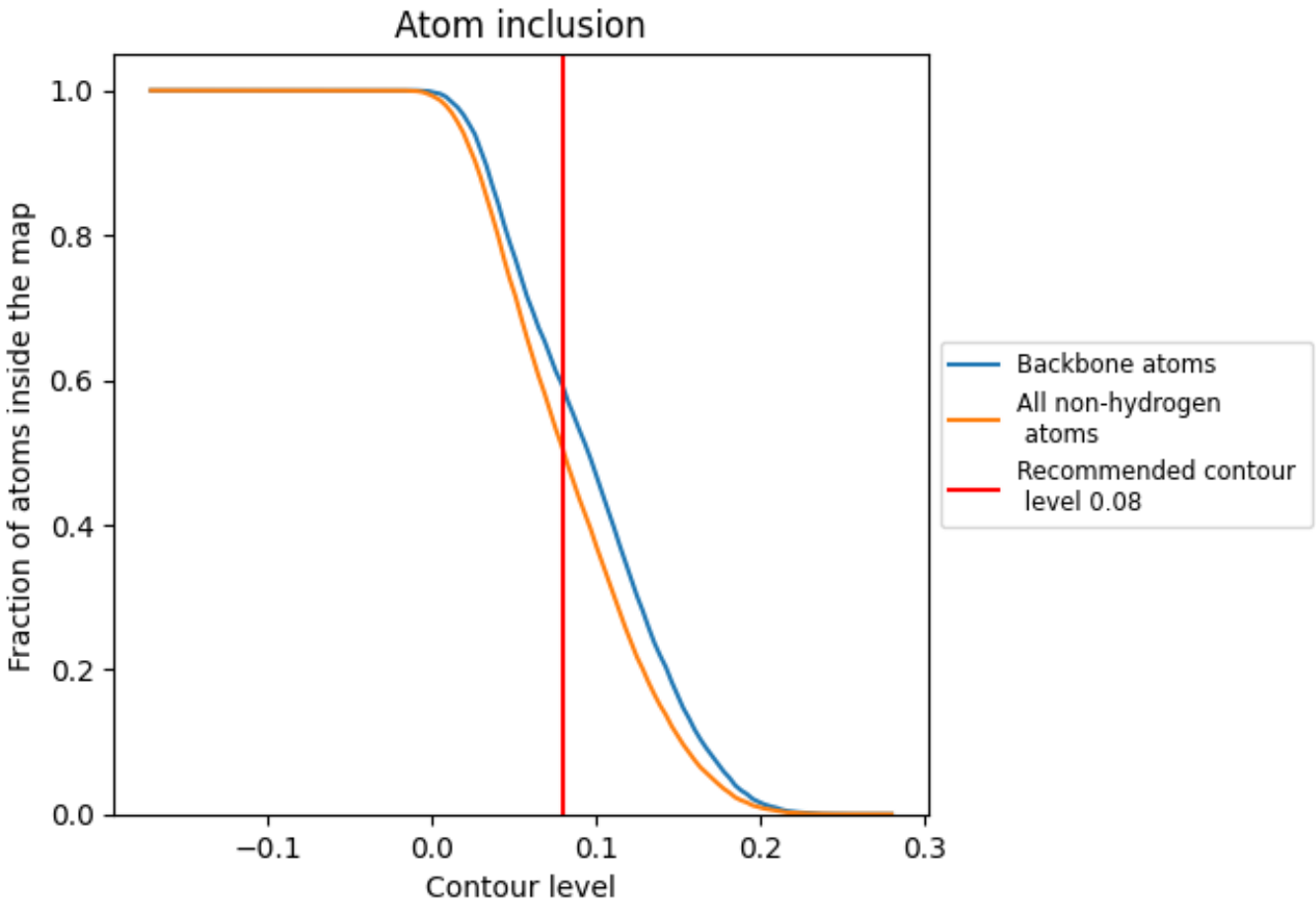
9.3 Atom inclusion mapped to coordinate model (i)



X Y Z

The images above show the model with each residue coloured according to its atom inclusion. This shows to what extent they are inside the map at the recommended contour level (0.08).

9.4 Atom inclusion (i)



At the recommended contour level, 59% of all backbone atoms, 50% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary (i)

The table lists the average atom inclusion at the recommended contour level (0.08) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.5037	0.5150
A	0.5057	0.5150
B	0.4886	0.5190
C	0.5714	0.4630
D	0.2857	0.3210