



Full wwPDB EM Validation Report ⓘ

Mar 6, 2026 – 04:16 AM UTC

PDB ID : 8TCO / pdb_00008tco
EMDB ID : EMD-41156
Title : HCMV Trimer in complex with CS2it1p2_F7K Fab and CS4tt1p1_E3K Fab
Authors : Goldsmith, J.A.; McLellan, J.S.
Deposited on : 2023-07-02
Resolution : 2.80 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 ⓘ 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:

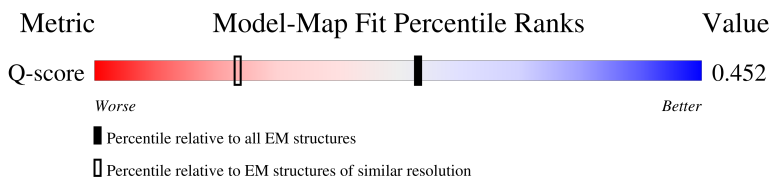
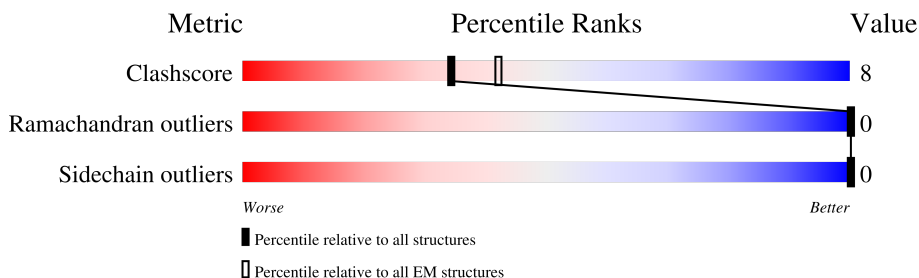
EMDB validation analysis : 0.0.1.dev132
Mogul : 2022.3.0, CSD as543be (2022)
MolProbity : 4-5-2 with Phenix2.0
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
EM percentile statistics : 202505.v01 (Using data in the EMDB archive up until May 2025)
MapQ : 1.9.13
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

1 Overall quality at a glance

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

The reported resolution of this entry is 2.80 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.



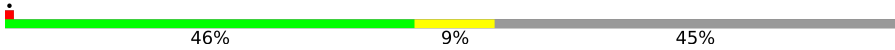
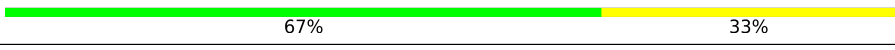
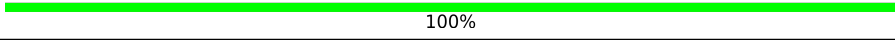
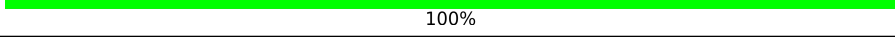
Metric	Whole archive (#Entries)	EM structures (#Entries)	Similar EM resolution (#Entries, resolution range(Å))
Clashscore	229148	23984	-
Ramachandran outliers	224038	23583	-
Sidechain outliers	223484	23102	-
Q-score	-	25397	11806 (2.30 - 3.30)

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 $\leq 5\%$. 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	743	9% 69% 18% 13%
2	B	268	66% 19% 15%
3	C	466	48% 15% 37%
4	D	215	41% 9% 50%

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Mol	Chain	Length	Quality of chain
5	E	226	
6	F	229	
7	G	234	
8	H	3	
8	J	3	
9	I	2	

2 Entry composition

There are 10 unique types of molecules in this entry. The entry contains 13222 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 Envelope glycoprotein H.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	643	Total	C	N	O	S	0	0
			5165	3305	873	962	25		

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	12	THR	ALA	conflict	UNP Q69155

- Molecule 2 is a protein called Envelope glycoprotein L.

Mol	Chain	Residues	Atoms					AltConf	Trace
2	B	229	Total	C	N	O	S	0	0
			1817	1155	321	333	8		

There are 22 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	11	MET	-	expression tag	UNP Q8JP80
B	12	SER	-	expression tag	UNP Q8JP80
B	13	VAL	-	expression tag	UNP Q8JP80
B	14	PRO	-	expression tag	UNP Q8JP80
B	15	THR	-	expression tag	UNP Q8JP80
B	16	GLN	-	expression tag	UNP Q8JP80
B	17	VAL	-	expression tag	UNP Q8JP80
B	18	LEU	-	expression tag	UNP Q8JP80
B	19	GLY	-	expression tag	UNP Q8JP80
B	20	LEU	-	expression tag	UNP Q8JP80
B	21	LEU	-	expression tag	UNP Q8JP80
B	22	LEU	-	expression tag	UNP Q8JP80
B	23	LEU	-	expression tag	UNP Q8JP80
B	24	TRP	-	expression tag	UNP Q8JP80
B	25	LEU	-	expression tag	UNP Q8JP80
B	26	THR	-	expression tag	UNP Q8JP80

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Chain	Residue	Modelled	Actual	Comment	Reference
B	27	ASP	-	expression tag	UNP Q8JP80
B	28	ALA	-	expression tag	UNP Q8JP80
B	29	ARG	-	expression tag	UNP Q8JP80
B	30	CYS	-	expression tag	UNP Q8JP80
B	41	GLU	LYS	conflict	UNP Q8JP80
B	77	ARG	GLY	conflict	UNP Q8JP80

- Molecule 3 is a protein called Envelope glycoprotein O.

Mol	Chain	Residues	Atoms					AltConf	Trace
3	C	295	Total	C	N	O	S	0	0
			2455	1583	419	437	16		

- Molecule 4 is a protein called CS4tt1p1_E3K Fab light chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
4	D	108	Total	C	N	O	S	0	0
			851	544	143	162	2		

- Molecule 5 is a protein called CS4tt1p1_E3K Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
5	E	124	Total	C	N	O	S	0	0
			949	597	169	178	5		

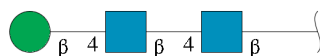
- Molecule 6 is a protein called CS2it1p2_F7K Fab heavy chain.

Mol	Chain	Residues	Atoms					AltConf	Trace
6	F	128	Total	C	N	O	S	0	0
			977	614	160	197	6		

- Molecule 7 is a protein called CS2it1p2_F7K Fab light chain.

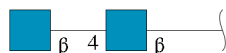
Mol	Chain	Residues	Atoms					AltConf	Trace
7	G	106	Total	C	N	O	S	0	0
			804	506	140	155	3		

- Molecule 8 is an oligosaccharide called beta-D-mannopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose.



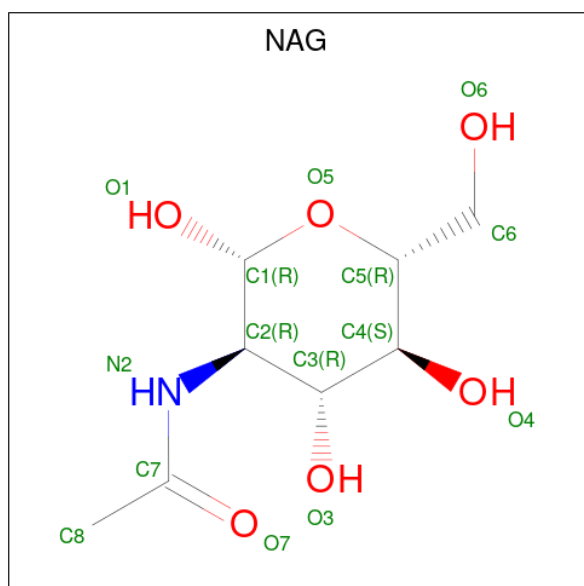
Mol	Chain	Residues	Atoms				AltConf	Trace
8	H	3	Total	C	N	O	0	0
			39	22	2	15		
8	J	3	Total	C	N	O	0	0
			39	22	2	15		

- Molecule 9 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
9	I	2	Total	C	N	O	0	0
			28	16	2	10		

- Molecule 10 is 2-acetamido-2-deoxy-beta-D-glucopyranose (CCD ID: NAG) (formula: C₈H₁₅NO₆).



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

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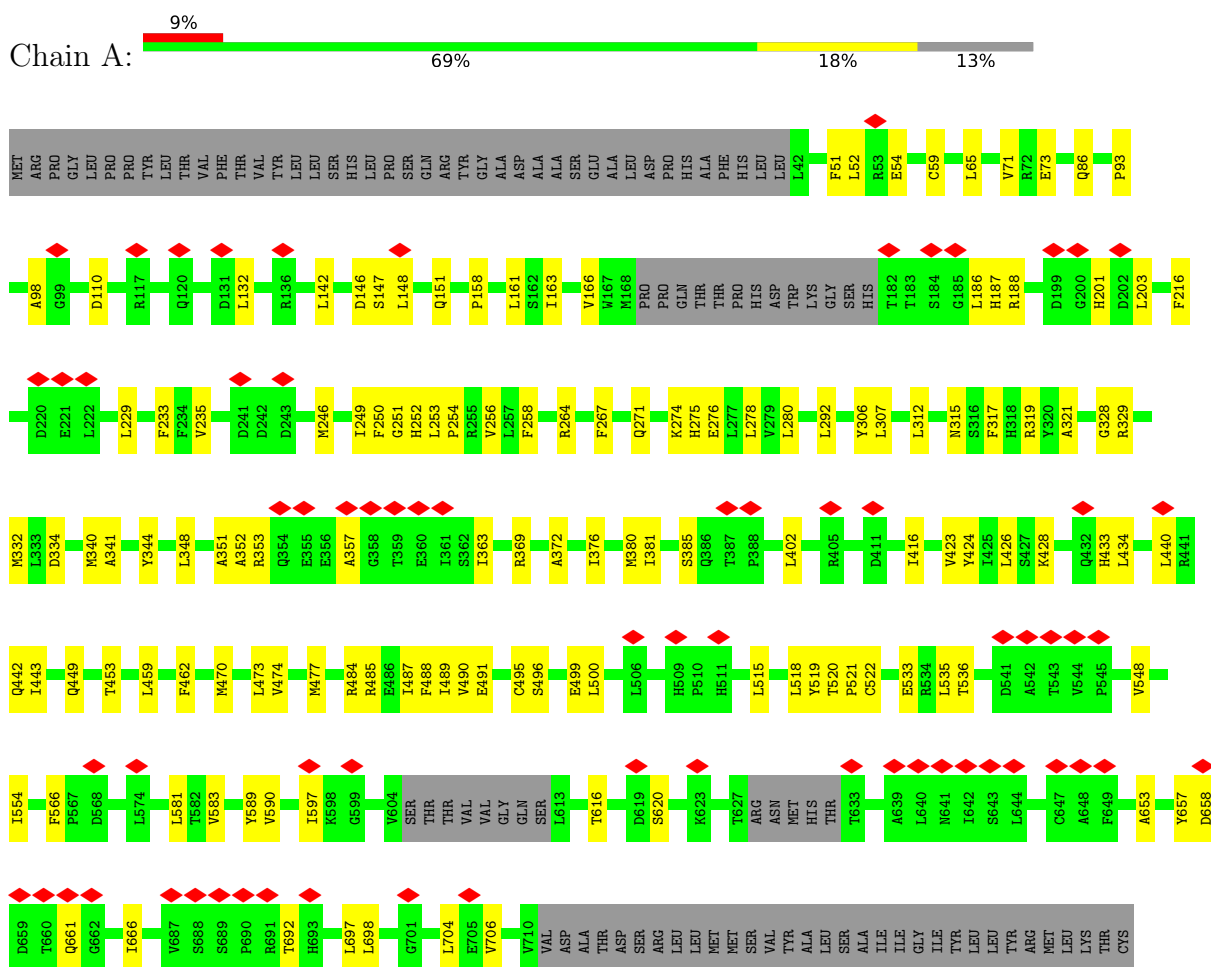
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Mol	Chain	Residues	Atoms				AltConf
10	C	1	Total	C	N	O	0
			14	8	1	5	
10	C	1	Total	C	N	O	0
			14	8	1	5	
10	C	1	Total	C	N	O	0
			14	8	1	5	
10	C	1	Total	C	N	O	0
			14	8	1	5	
10	C	1	Total	C	N	O	0
			14	8	1	5	
10	C	1	Total	C	N	O	0
			14	8	1	5	

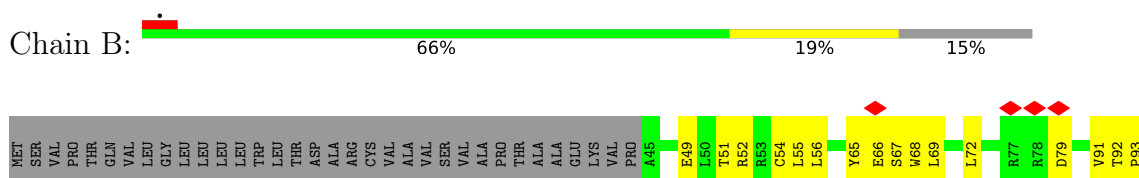
3 Residue-property plots

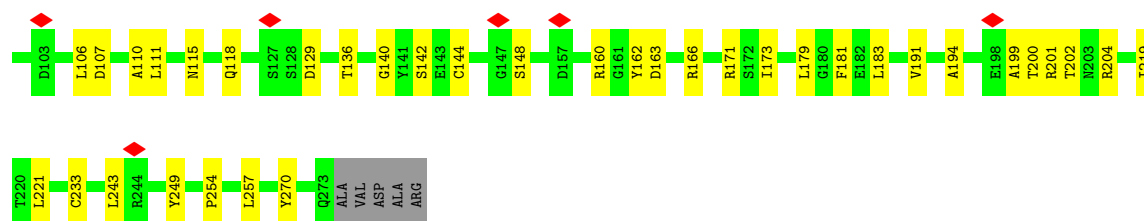
These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and atom inclusion 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: Envelope glycoprotein H

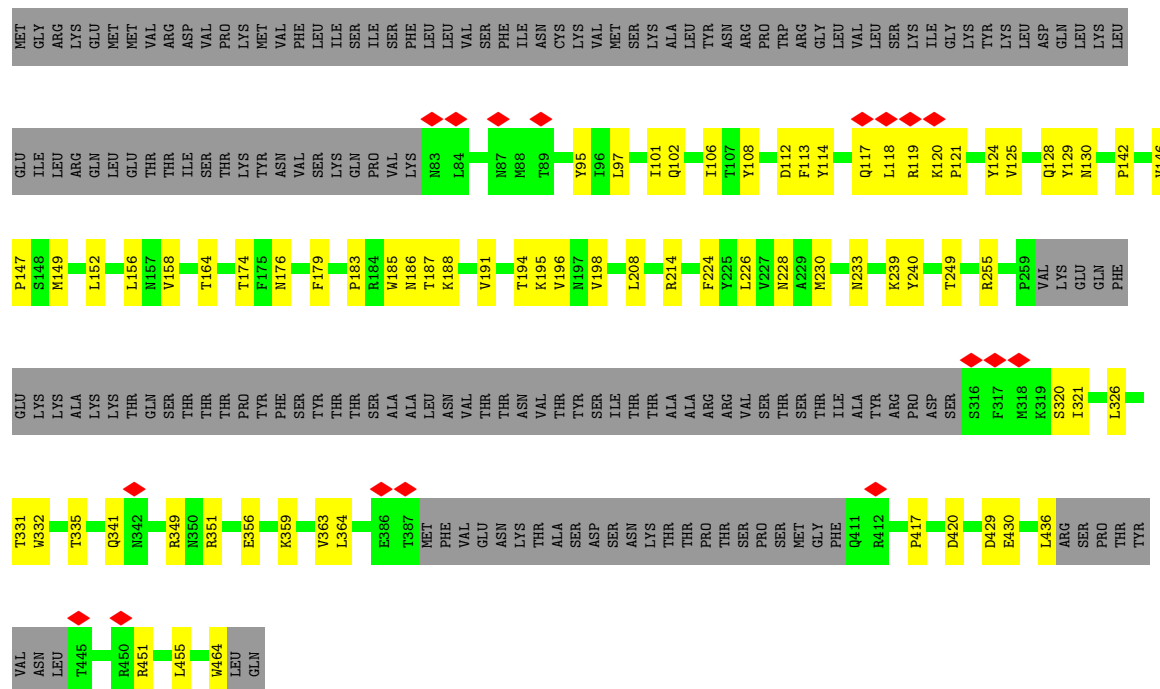


• Molecule 2: Envelope glycoprotein L

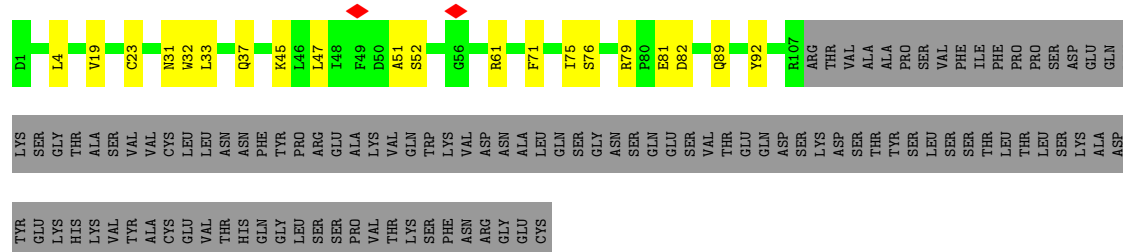




• Molecule 3: Envelope glycoprotein O



• Molecule 4: CS4tt1p1_E3K Fab light chain



• Molecule 5: CS4tt1p1_E3K Fab heavy chain



- Molecule 9: 2-acetamido-2-deoxy-beta-D-glucopyranose-(1-4)-2-acetamido-2-deoxy-beta-D-glucopyranose

Chain I:  100%

MAG1
MAG2

4 Experimental information

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, Not provided	
Number of particles used	376687	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	NONE	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/\text{\AA}^2$)	49	Depositor
Minimum defocus (nm)	800	Depositor
Maximum defocus (nm)	2200	Depositor
Magnification	Not provided	
Image detector	FEI FALCON IV (4k x 4k)	Depositor
Maximum map value	130.071	Depositor
Minimum map value	-2.593	Depositor
Average map value	0.008	Depositor
Map value standard deviation	1.180	Depositor
Recommended contour level	7.36	Depositor
Map size ($\text{\AA}$)	338.4, 338.4, 338.4	wwPDB
Map dimensions	360, 360, 360	wwPDB
Map angles ($^\circ$)	90.0, 90.0, 90.0	wwPDB
Pixel spacing ($\text{\AA}$)	0.94, 0.94, 0.94	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: BMA, NAG

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	0.13	0/5282	0.37	0/7192
2	B	0.10	0/1861	0.28	0/2540
3	C	0.13	0/2524	0.36	0/3430
4	D	0.09	0/877	0.27	0/1196
5	E	0.10	0/968	0.29	0/1303
6	F	0.08	0/997	0.25	0/1355
7	G	0.10	0/823	0.26	0/1115
All	All	0.12	0/13332	0.33	0/18131

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	5165	0	5119	93	0
2	B	1817	0	1809	37	0
3	C	2455	0	2407	50	0
4	D	851	0	808	15	0
5	E	949	0	933	14	0
6	F	977	0	938	7	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
7	G	804	0	786	8	0
8	H	39	0	34	0	0
8	J	39	0	34	0	0
9	I	28	0	25	0	0
10	A	14	0	13	0	0
10	C	84	0	78	1	0
All	All	13222	0	12984	212	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 8.

All (212) 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:235:VAL:HG12	1:A:249:ILE:HG12	1.71	0.72
1:A:65:LEU:HD12	1:A:86:GLN:HB3	1.70	0.72
3:C:114:TYR:HB3	3:C:119:ARG:HB2	1.72	0.71
2:B:66:GLU:HB2	2:B:69:LEU:HD13	1.73	0.70
6:F:93:ALA:HB3	6:F:100(K):LEU:HD23	1.73	0.70
3:C:149:MET:HG2	3:C:341:GLN:HE22	1.58	0.68
5:E:87:THR:HG23	5:E:110:THR:HA	1.76	0.68
3:C:146:VAL:O	3:C:233:ASN:ND2	2.27	0.67
3:C:224:PHE:O	3:C:228:ASN:ND2	2.28	0.66
2:B:183:LEU:HD23	2:B:249:TYR:HD2	1.60	0.66
1:A:275:HIS:HD1	1:A:306:TYR:HH	1.42	0.66
1:A:201:HIS:CE1	1:A:203:LEU:HB3	2.31	0.65
1:A:271:GLN:HE22	1:A:276:GLU:HG2	1.61	0.65
3:C:102:GLN:NE2	3:C:106:ILE:O	2.25	0.65
3:C:332:TRP:O	3:C:335:THR:OG1	2.14	0.65
1:A:485:ARG:HH22	1:A:620:SER:HA	1.62	0.64
2:B:107:ASP:OD1	2:B:204:ARG:NH1	2.31	0.64
3:C:149:MET:HE3	3:C:341:GLN:HE21	1.62	0.64
5:E:93:ALA:HB1	5:E:100(H):MET:HG2	1.80	0.63
1:A:488:PHE:CD2	1:A:566:PHE:HE2	2.17	0.63
2:B:49:GLU:OE2	2:B:52:ARG:NH2	2.32	0.62
1:A:658:ASP:OD2	1:A:661:GLN:NE2	2.31	0.61
1:A:363:ILE:HD12	1:A:402:LEU:HD11	1.81	0.61
1:A:306:TYR:HB2	1:A:312:LEU:HD12	1.82	0.61
3:C:106:ILE:HG13	10:C:505:NAG:H83	1.81	0.61
1:A:315:ASN:OD1	1:A:319:ARG:NH2	2.34	0.60
2:B:110:ALA:HB1	2:B:200:THR:HG21	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:590:VAL:HG21	1:A:597:ILE:HG21	1.84	0.60
3:C:176:ASN:O	3:C:255:ARG:NH1	2.35	0.60
5:E:29:PHE:HB2	5:E:76:GLU:HG3	1.83	0.60
4:D:89:GLN:HE22	5:E:100(H):MET:HE1	1.67	0.59
2:B:160:ARG:NH1	2:B:162:TYR:OH	2.35	0.59
3:C:356:GLU:HA	3:C:359:LYS:HB2	1.83	0.59
1:A:491:GLU:OE2	1:A:519:TYR:OH	2.20	0.59
1:A:372:ALA:O	1:A:376:ILE:HG12	2.03	0.58
2:B:144:CYS:SG	3:C:349:ARG:NH1	2.74	0.58
5:E:34:MET:HE2	5:E:78:LEU:HD22	1.85	0.58
5:E:65:GLY:O	5:E:82(B):ARG:NH2	2.38	0.57
2:B:173:ILE:HD13	2:B:221:LEU:HD21	1.85	0.57
4:D:37:GLN:HE21	4:D:45:LYS:HD3	1.69	0.57
3:C:174:THR:O	3:C:320:SER:OG	2.21	0.56
3:C:125:VAL:HG22	3:C:142:PRO:HA	1.87	0.56
1:A:329:ARG:HD3	1:A:334:ASP:OD2	2.05	0.56
1:A:166:VAL:O	1:A:442:GLN:NE2	2.36	0.56
1:A:470:MET:O	1:A:474:VAL:HG23	2.06	0.56
4:D:37:GLN:HB3	4:D:47:LEU:HD11	1.86	0.56
6:F:38:ARG:NH2	6:F:46:GLU:OE1	2.39	0.56
1:A:274:LYS:HG3	1:A:275:HIS:CE1	2.42	0.55
1:A:499:GLU:OE1	1:A:520:THR:OG1	2.24	0.55
3:C:183:PRO:HB2	3:C:185:TRP:HZ3	1.71	0.55
3:C:187:THR:HG22	3:C:188:LYS:H	1.72	0.55
5:E:23:ALA:HA	5:E:77:VAL:HG12	1.88	0.55
1:A:698:LEU:HD11	1:A:704:LEU:HG	1.88	0.54
3:C:112:ASP:HB2	3:C:124:TYR:CE2	2.42	0.54
3:C:106:ILE:HG12	3:C:130:ASN:HA	1.90	0.54
2:B:91:VAL:HG11	2:B:136:THR:HB	1.90	0.54
1:A:329:ARG:HH21	1:A:332:MET:HG3	1.73	0.53
1:A:271:GLN:NE2	1:A:276:GLU:HG2	2.24	0.53
1:A:163:ILE:HG23	1:A:416:ILE:HG22	1.90	0.53
1:A:258:PHE:CD2	1:A:264:ARG:HA	2.44	0.53
2:B:254:PRO:HG2	2:B:257:LEU:HD13	1.91	0.53
1:A:249:ILE:HB	1:A:278:LEU:HB2	1.90	0.53
1:A:329:ARG:O	1:A:329:ARG:HG3	2.09	0.53
3:C:147:PRO:HA	3:C:233:ASN:HA	1.91	0.53
5:E:82:MET:HE2	5:E:82(C):LEU:HD21	1.89	0.52
1:A:495:CYS:HB3	1:A:521:PRO:HB2	1.92	0.52
1:A:132:LEU:HD22	1:A:292:LEU:HD13	1.92	0.52
1:A:499:GLU:OE2	1:A:500:LEU:HD22	2.09	0.52

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:110:ASP:OD1	2:B:171:ARG:NH2	2.43	0.52
1:A:98:ALA:HB2	2:B:72:LEU:HD11	1.92	0.52
4:D:61:ARG:NE	4:D:82:ASP:OD2	2.43	0.51
1:A:589:TYR:CD2	1:A:697:LEU:HD23	2.46	0.51
4:D:51:ALA:O	4:D:52:SER:OG	2.27	0.51
1:A:489:ILE:HG12	1:A:583:VAL:HA	1.93	0.50
2:B:163:ASP:HB3	2:B:166:ARG:HG2	1.94	0.50
7:G:3:GLN:O	7:G:4:MET:HE2	2.11	0.50
7:G:37:GLN:HB2	7:G:47:LEU:HD11	1.94	0.50
1:A:535:LEU:HD23	1:A:548:VAL:HG13	1.94	0.50
1:A:440:LEU:HA	1:A:443:ILE:HG12	1.94	0.49
7:G:49:PHE:O	7:G:53:SER:OG	2.25	0.49
1:A:229:LEU:HD11	1:A:348:LEU:HD23	1.94	0.49
3:C:149:MET:HG2	3:C:341:GLN:NE2	2.26	0.49
3:C:351:ARG:HB3	3:C:436:LEU:HD21	1.94	0.49
1:A:449:GLN:O	1:A:453:THR:HG23	2.12	0.49
2:B:199:ALA:O	2:B:201:ARG:NH1	2.45	0.49
1:A:253:LEU:N	1:A:254:PRO:HD3	2.27	0.49
2:B:183:LEU:HD23	2:B:249:TYR:CD2	2.45	0.49
1:A:146:ASP:OD2	1:A:369:ARG:NH2	2.44	0.49
7:G:10:SER:OG	7:G:105:GLU:OE2	2.30	0.49
1:A:201:HIS:HE1	1:A:203:LEU:HB3	1.77	0.49
1:A:487:ILE:HA	1:A:490:VAL:HG12	1.95	0.49
1:A:495:CYS:HB2	1:A:499:GLU:OE2	2.12	0.48
1:A:495:CYS:HB3	1:A:521:PRO:HG2	1.94	0.48
1:A:423:VAL:HG13	1:A:473:LEU:HD11	1.96	0.48
6:F:12:LYS:HE3	6:F:18:VAL:HG23	1.96	0.48
2:B:202:THR:OG1	2:B:204:ARG:NH1	2.47	0.48
3:C:188:LYS:HD3	3:C:195:LYS:HD3	1.95	0.48
1:A:424:TYR:HE2	1:A:428:LYS:NZ	2.12	0.48
2:B:142:SER:N	3:C:186:ASN:OD1	2.35	0.48
1:A:340:MET:HE3	1:A:380:MET:SD	2.54	0.48
2:B:52:ARG:O	2:B:56:LEU:HD23	2.14	0.48
1:A:187:HIS:NE2	1:A:369:ARG:HD2	2.29	0.47
1:A:500:LEU:HD21	1:A:522:CYS:SG	2.54	0.47
5:E:24:ALA:HB3	5:E:76:GLU:HG2	1.96	0.47
1:A:188:ARG:HG2	1:A:352:ALA:HB1	1.96	0.47
4:D:4:LEU:HD22	4:D:23:CYS:SG	2.53	0.47
1:A:246:MET:HE3	1:A:292:LEU:HD11	1.96	0.47
1:A:229:LEU:HD11	1:A:348:LEU:HB3	1.96	0.47
1:A:317:PHE:CD1	1:A:376:ILE:HD12	2.49	0.47

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:597:ILE:HG23	1:A:616:THR:HG21	1.96	0.47
3:C:321:ILE:HD13	3:C:417:PRO:HG2	1.95	0.47
1:A:51:PHE:HD1	1:A:71:VAL:HG23	1.80	0.47
1:A:203:LEU:HD23	1:A:280:LEU:HD23	1.97	0.47
1:A:253:LEU:HB2	1:A:256:VAL:HG12	1.97	0.47
1:A:589:TYR:CG	1:A:697:LEU:HD23	2.49	0.47
6:F:20:VAL:HG21	6:F:90:TYR:HD2	1.80	0.47
1:A:187:HIS:HB2	1:A:351:ALA:HB1	1.97	0.47
3:C:108:TYR:HB2	3:C:164:THR:HG23	1.96	0.47
1:A:254:PRO:HG3	2:B:270:TYR:CE1	2.49	0.47
4:D:19:VAL:HG12	4:D:75:ILE:HB	1.97	0.46
4:D:33:LEU:HD13	4:D:71:PHE:CG	2.49	0.46
3:C:113:PHE:CE1	3:C:125:VAL:HG23	2.50	0.46
4:D:32:TRP:HE3	4:D:92:TYR:HA	1.80	0.46
1:A:496:SER:O	1:A:500:LEU:HD23	2.15	0.46
3:C:97:LEU:HD21	3:C:101:ILE:HG12	1.97	0.46
3:C:179:PHE:HE2	3:C:208:LEU:HD12	1.80	0.46
3:C:230:MET:HE1	3:C:331:THR:HA	1.98	0.46
1:A:706:VAL:HG12	1:A:706:VAL:O	2.16	0.46
1:A:440:LEU:HD11	1:A:477:MET:HE1	1.98	0.46
7:G:38:GLN:O	7:G:84:ALA:HB1	2.16	0.46
1:A:344:TYR:HD1	1:A:376:ILE:HG22	1.81	0.46
1:A:381:ILE:O	1:A:385:SER:HB3	2.16	0.46
5:E:39:GLN:HB2	5:E:45:LEU:HD23	1.97	0.46
1:A:328:GLY:O	1:A:329:ARG:HB3	2.16	0.46
2:B:233:CYS:SG	2:B:243:LEU:HD11	2.56	0.46
3:C:321:ILE:HD11	3:C:326:LEU:HD21	1.98	0.45
1:A:73:GLU:HB3	2:B:68:TRP:CD1	2.50	0.45
1:A:484:ARG:HA	1:A:487:ILE:HG22	1.97	0.45
3:C:363:VAL:HG23	3:C:364:LEU:HD12	1.97	0.45
2:B:181:PHE:HD1	2:B:191:VAL:HG22	1.82	0.45
1:A:142:LEU:HD23	1:A:307:LEU:HD23	1.99	0.45
1:A:581:LEU:HD11	1:A:666:ILE:HD13	1.99	0.45
1:A:653:ALA:O	1:A:697:LEU:N	2.44	0.45
1:A:161:LEU:HD11	1:A:453:THR:HG21	1.98	0.45
2:B:51:THR:O	2:B:55:LEU:HD23	2.16	0.45
1:A:250:PHE:HA	1:A:276:GLU:O	2.17	0.45
1:A:252:HIS:ND1	2:B:270:TYR:OH	2.41	0.45
2:B:111:LEU:HD23	2:B:202:THR:HG23	1.99	0.45
2:B:129:ASP:OD1	2:B:129:ASP:N	2.50	0.45
2:B:115:ASN:O	2:B:118:GLN:HG3	2.18	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
7:G:46:LEU:HD21	7:G:49:PHE:HB3	1.99	0.44
2:B:179:LEU:HD11	2:B:194:ALA:HB2	1.99	0.44
2:B:219:ILE:HG21	2:B:257:LEU:HD23	1.98	0.44
1:A:216:PHE:CE2	1:A:380:MET:HB3	2.53	0.44
3:C:183:PRO:HB2	3:C:185:TRP:CZ3	2.50	0.44
3:C:214:ARG:HB3	6:F:100(A):THR:HG23	2.00	0.44
1:A:52:LEU:HB3	1:A:54:GLU:OE1	2.18	0.44
3:C:106:ILE:HG23	3:C:129:TYR:O	2.18	0.44
1:A:59:CYS:SG	1:A:93:PRO:HD3	2.58	0.43
4:D:81:GLU:OE1	4:D:81:GLU:N	2.37	0.43
5:E:29:PHE:O	5:E:71:ARG:NH2	2.51	0.43
1:A:59:CYS:N	2:B:54:CYS:SG	2.91	0.43
3:C:239:LYS:NZ	3:C:240:TYR:HE1	2.17	0.43
6:F:48:MET:HE3	6:F:63:PHE:CD1	2.53	0.43
7:G:4:MET:HE3	7:G:90:GLN:HG2	1.99	0.43
2:B:107:ASP:OD1	2:B:204:ARG:HD2	2.18	0.43
3:C:106:ILE:HG21	3:C:128:GLN:HG2	2.00	0.43
1:A:148:LEU:HG	1:A:151:GLN:HE22	1.84	0.43
1:A:307:LEU:HD11	1:A:353:ARG:HG3	1.99	0.43
5:E:22:CYS:HB3	5:E:78:LEU:HB3	2.00	0.43
3:C:359:LYS:HA	3:C:464:TRP:HZ2	1.84	0.43
3:C:429:ASP:OD1	3:C:430:GLU:N	2.52	0.43
3:C:420:ASP:OD1	3:C:451:ARG:NH2	2.46	0.42
1:A:518:LEU:HD12	1:A:554:ILE:HD13	2.01	0.42
1:A:533:GLU:HA	1:A:536:THR:HG22	2.01	0.42
3:C:120:LYS:HB3	3:C:121:PRO:HD3	2.00	0.42
6:F:38:ARG:HB2	6:F:48:MET:SD	2.60	0.42
1:A:186:LEU:HD13	1:A:357:ALA:HB2	2.00	0.42
3:C:152:LEU:O	3:C:156:LEU:HD23	2.20	0.42
1:A:146:ASP:OD1	1:A:147:SER:N	2.53	0.42
3:C:114:TYR:CD1	3:C:119:ARG:HD2	2.55	0.42
5:E:59:TYR:OH	5:E:69:VAL:HG12	2.20	0.42
1:A:158:PRO:HD3	1:A:462:PHE:CD2	2.55	0.41
2:B:68:TRP:CD1	2:B:69:LEU:HD12	2.55	0.41
3:C:158:VAL:HG23	3:C:226:LEU:HD11	2.02	0.41
4:D:79:ARG:HB3	4:D:81:GLU:OE1	2.20	0.41
7:G:91:SER:HA	7:G:96:HIS:ND1	2.34	0.41
3:C:191:VAL:O	3:C:194:THR:HG22	2.20	0.41
2:B:79:ASP:OD1	2:B:162:TYR:OH	2.30	0.41
3:C:196:VAL:HG12	3:C:198:VAL:HG13	2.02	0.41
1:A:495:CYS:HB3	1:A:521:PRO:CB	2.51	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
2:B:140:GLY:HA3	2:B:148:SER:O	2.21	0.41
4:D:32:TRP:CE3	4:D:92:TYR:HA	2.56	0.41
1:A:233:PHE:HA	1:A:251:GLY:HA3	2.03	0.41
3:C:188:LYS:HG2	3:C:195:LYS:HG2	2.01	0.41
4:D:89:GLN:NE2	5:E:100(H):MET:HE1	2.34	0.41
1:A:426:LEU:HD11	1:A:434:LEU:HD11	2.03	0.41
1:A:657:TYR:O	1:A:692:THR:OG1	2.36	0.41
2:B:106:LEU:HD12	3:C:249:THR:HG21	2.03	0.41
1:A:258:PHE:CZ	1:A:267:PHE:HD2	2.38	0.41
1:A:341:ALA:HA	1:A:380:MET:HE2	2.03	0.41
3:C:455:LEU:HD23	3:C:455:LEU:H	1.86	0.41
4:D:31:ASN:OD1	4:D:51:ALA:HB3	2.21	0.41
1:A:433:HIS:CE1	1:A:434:LEU:HD23	2.56	0.41
1:A:459:LEU:HD22	1:A:521:PRO:HD3	2.02	0.41
2:B:65:TYR:O	2:B:67:SER:N	2.53	0.41
3:C:146:VAL:HG13	3:C:147:PRO:HD3	2.03	0.41
4:D:61:ARG:HB2	4:D:76:SER:O	2.21	0.41
3:C:117:GLN:C	3:C:118:LEU:HD23	2.46	0.40
3:C:95:TYR:CE2	3:C:97:LEU:HD13	2.55	0.40
1:A:321:ALA:HB1	1:A:515:LEU:HD13	2.03	0.40
2:B:92:THR:N	2:B:93:PRO:HD2	2.36	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	635/743 (86%)	615 (97%)	20 (3%)	0	100	100
2	B	227/268 (85%)	222 (98%)	5 (2%)	0	100	100
3	C	287/466 (62%)	276 (96%)	11 (4%)	0	100	100
4	D	106/215 (49%)	95 (90%)	11 (10%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
5	E	122/226 (54%)	119 (98%)	3 (2%)	0	100	100
6	F	126/229 (55%)	123 (98%)	3 (2%)	0	100	100
7	G	104/234 (44%)	101 (97%)	3 (3%)	0	100	100
All	All	1607/2381 (68%)	1551 (96%)	56 (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 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	583/670 (87%)	583 (100%)	0	100	100
2	B	199/230 (86%)	199 (100%)	0	100	100
3	C	275/434 (63%)	275 (100%)	0	100	100
4	D	92/188 (49%)	92 (100%)	0	100	100
5	E	101/189 (53%)	101 (100%)	0	100	100
6	F	107/195 (55%)	107 (100%)	0	100	100
7	G	90/204 (44%)	90 (100%)	0	100	100
All	All	1447/2110 (69%)	1447 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	119	GLN
1	A	318	HIS
1	A	433	HIS
1	A	530	HIS
3	C	233	ASN
3	C	341	GLN
4	D	37	GLN

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Mol	Chain	Res	Type
7	G	34	ASN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

5.4 Non-standard residues in protein, DNA, RNA chains ⓘ

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

5.5 Carbohydrates ⓘ

8 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	$\# Z > 2$
8	NAG	H	1	8,3	14,14,15	0.22	0	17,19,21	0.45	0
8	NAG	H	2	8	14,14,15	0.25	0	17,19,21	0.39	0
8	BMA	H	3	8	11,11,12	0.53	0	15,15,17	0.89	1 (6%)
9	NAG	I	1	3,9	14,14,15	0.41	0	17,19,21	0.42	0
9	NAG	I	2	9	14,14,15	0.26	0	17,19,21	0.47	0
8	NAG	J	1	8,3	14,14,15	0.39	0	17,19,21	0.43	0
8	NAG	J	2	8	14,14,15	0.23	0	17,19,21	0.65	0
8	BMA	J	3	8	11,11,12	0.53	0	15,15,17	0.74	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
8	NAG	H	1	8,3	-	0/6/23/26	0/1/1/1
8	NAG	H	2	8	-	0/6/23/26	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
8	BMA	H	3	8	-	0/2/19/22	0/1/1/1
9	NAG	I	1	3,9	-	0/6/23/26	0/1/1/1
9	NAG	I	2	9	-	0/6/23/26	0/1/1/1
8	NAG	J	1	8,3	-	1/6/23/26	0/1/1/1
8	NAG	J	2	8	-	3/6/23/26	0/1/1/1
8	BMA	J	3	8	-	0/2/19/22	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
8	H	3	BMA	C1-O5-C5	2.01	114.88	112.19

There are no chirality outliers.

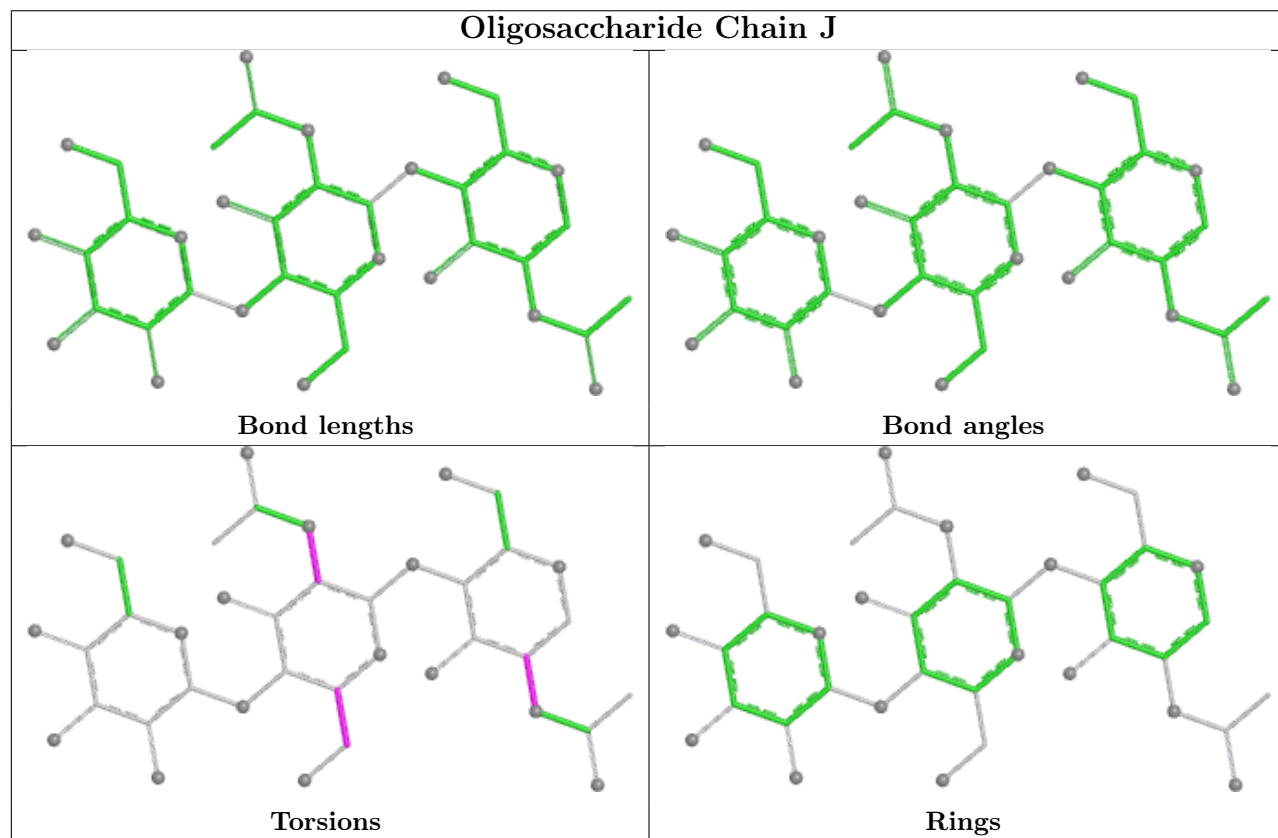
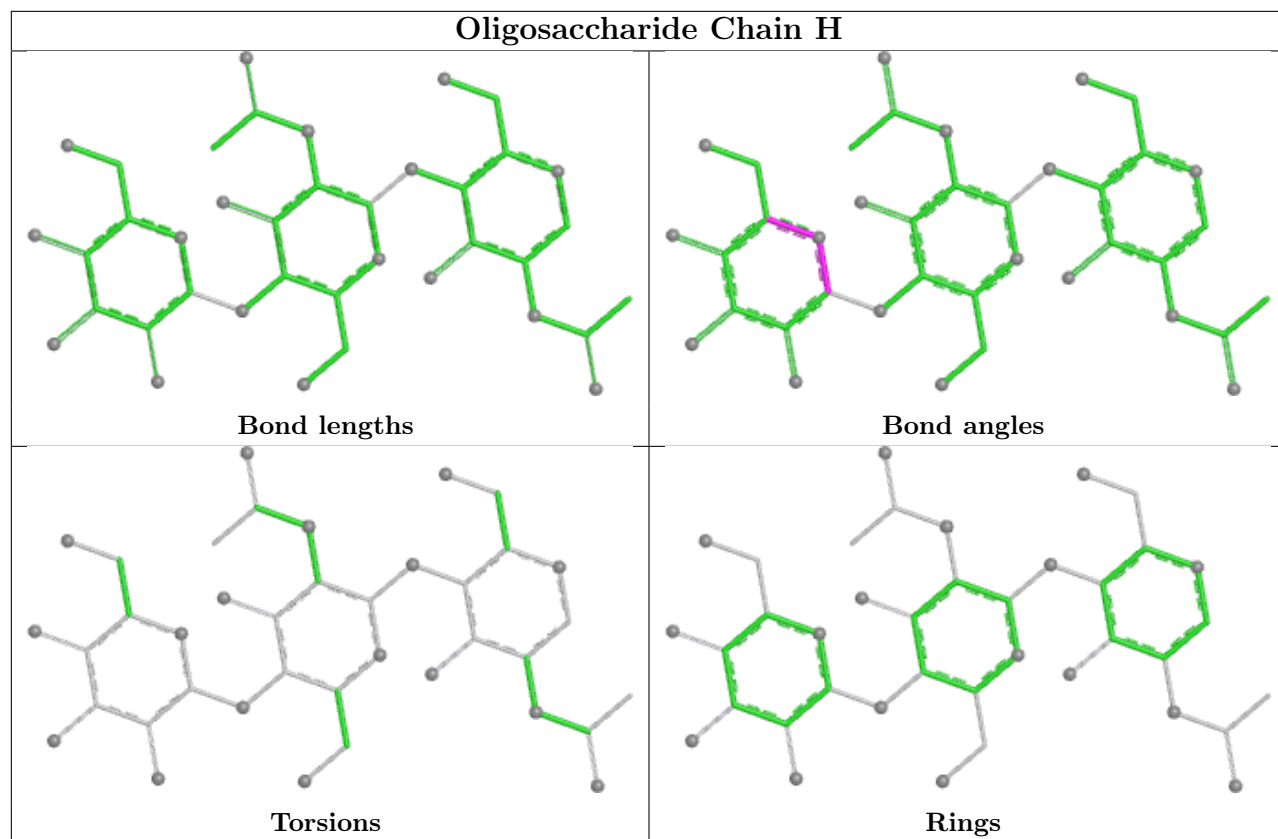
All (4) torsion outliers are listed below:

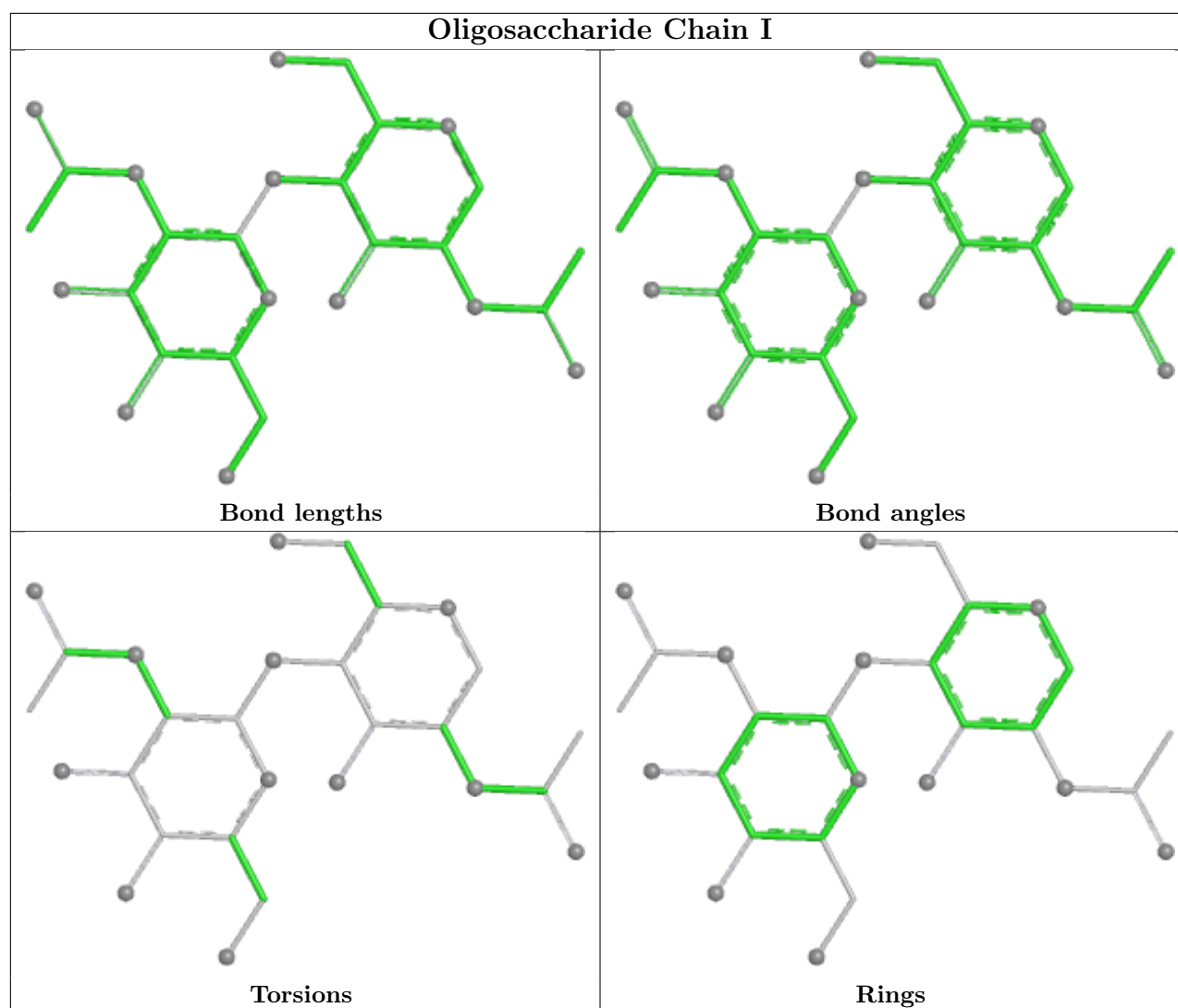
Mol	Chain	Res	Type	Atoms
8	J	2	NAG	C3-C2-N2-C7
8	J	2	NAG	O5-C5-C6-O6
8	J	1	NAG	C1-C2-N2-C7
8	J	2	NAG	C1-C2-N2-C7

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.





5.6 Ligand geometry [i](#)

7 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	$\# Z > 2$
10	NAG	C	506	3	14,14,15	0.23	0	17,19,21	0.47	0
10	NAG	C	505	3	14,14,15	0.48	0	17,19,21	0.69	1 (5%)
10	NAG	A	801	1	14,14,15	0.29	0	17,19,21	0.35	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
10	NAG	C	504	3	14,14,15	0.26	0	17,19,21	0.52	0
10	NAG	C	502	3	14,14,15	0.31	0	17,19,21	0.46	0
10	NAG	C	503	3	14,14,15	0.25	0	17,19,21	0.43	0
10	NAG	C	501	3	14,14,15	0.27	0	17,19,21	0.41	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
10	NAG	C	506	3	-	0/6/23/26	0/1/1/1
10	NAG	C	505	3	-	3/6/23/26	0/1/1/1
10	NAG	A	801	1	-	0/6/23/26	0/1/1/1
10	NAG	C	504	3	-	4/6/23/26	0/1/1/1
10	NAG	C	502	3	-	0/6/23/26	0/1/1/1
10	NAG	C	503	3	-	2/6/23/26	0/1/1/1
10	NAG	C	501	3	-	1/6/23/26	0/1/1/1

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
10	C	505	NAG	C1-O5-C5	2.15	115.07	112.19

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
10	C	504	NAG	O5-C5-C6-O6
10	C	503	NAG	O5-C5-C6-O6
10	C	503	NAG	C4-C5-C6-O6
10	C	501	NAG	O5-C5-C6-O6
10	C	505	NAG	O5-C5-C6-O6
10	C	504	NAG	C1-C2-N2-C7
10	C	504	NAG	C4-C5-C6-O6
10	C	504	NAG	C3-C2-N2-C7
10	C	505	NAG	C3-C2-N2-C7
10	C	505	NAG	C1-C2-N2-C7

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
10	C	505	NAG	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 Map visualisation [i](#)

This section contains visualisations of the EMDB entry EMD-41156. These allow visual inspection of the internal detail of the map and identification of artifacts.

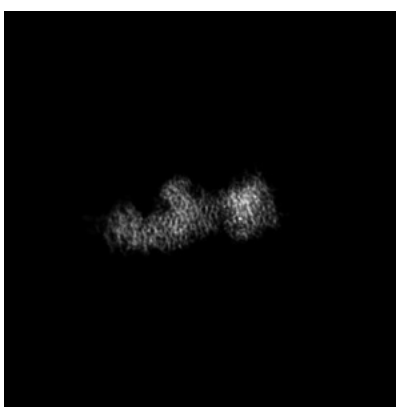
No raw map or half-maps were deposited for this entry and therefore no images, graphs, etc. pertaining to the raw map can be shown.

6.1 Orthogonal projections [i](#)

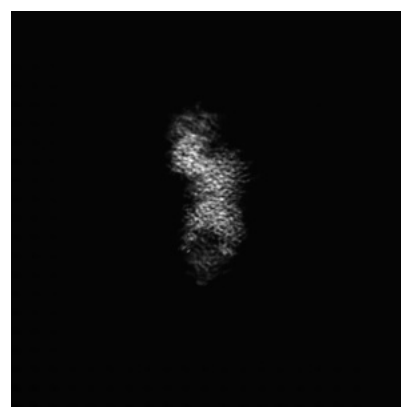
6.1.1 Primary map



X



Y

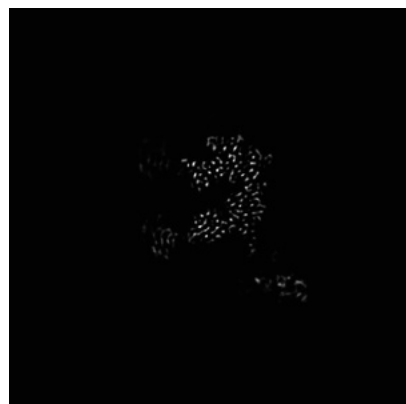


Z

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

6.2 Central slices [i](#)

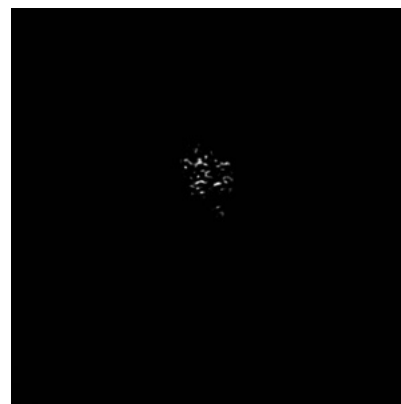
6.2.1 Primary map



X Index: 180



Y Index: 180



Z Index: 180

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: 188



Y Index: 223

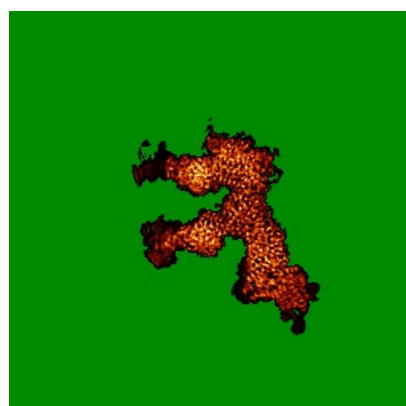


Z Index: 212

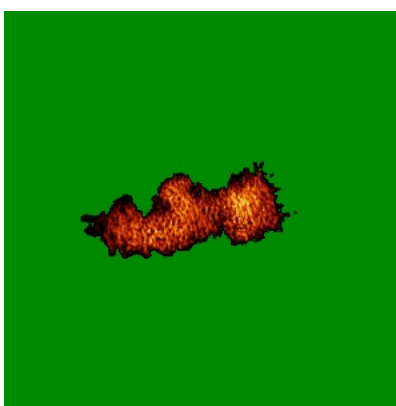
The images above show the largest variance slices of the map in three orthogonal directions.

6.4 Orthogonal standard-deviation projections (False-color) [i](#)

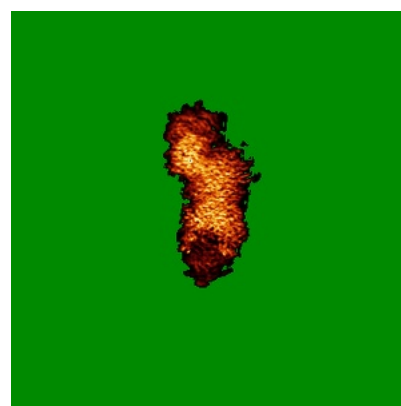
6.4.1 Primary map



X



Y

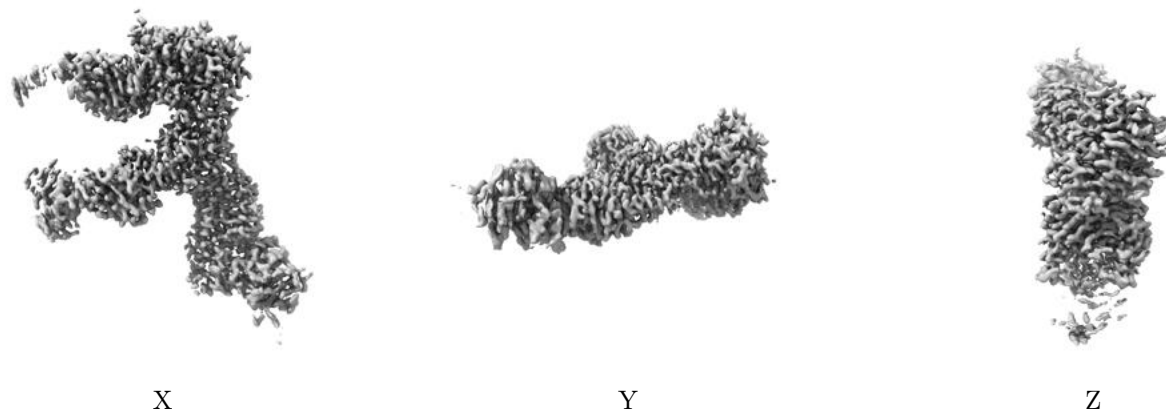


Z

The images above show the map standard deviation projections with false color in three orthogonal directions. Minimum values are shown in green, max in blue, and dark to light orange shades represent small to large values respectively.

6.5 Orthogonal surface views [i](#)

6.5.1 Primary map



The images above show the 3D surface view of the map at the recommended contour level 7.36. These images, in conjunction with the slice images, may facilitate assessment of whether an appropriate contour level has been provided.

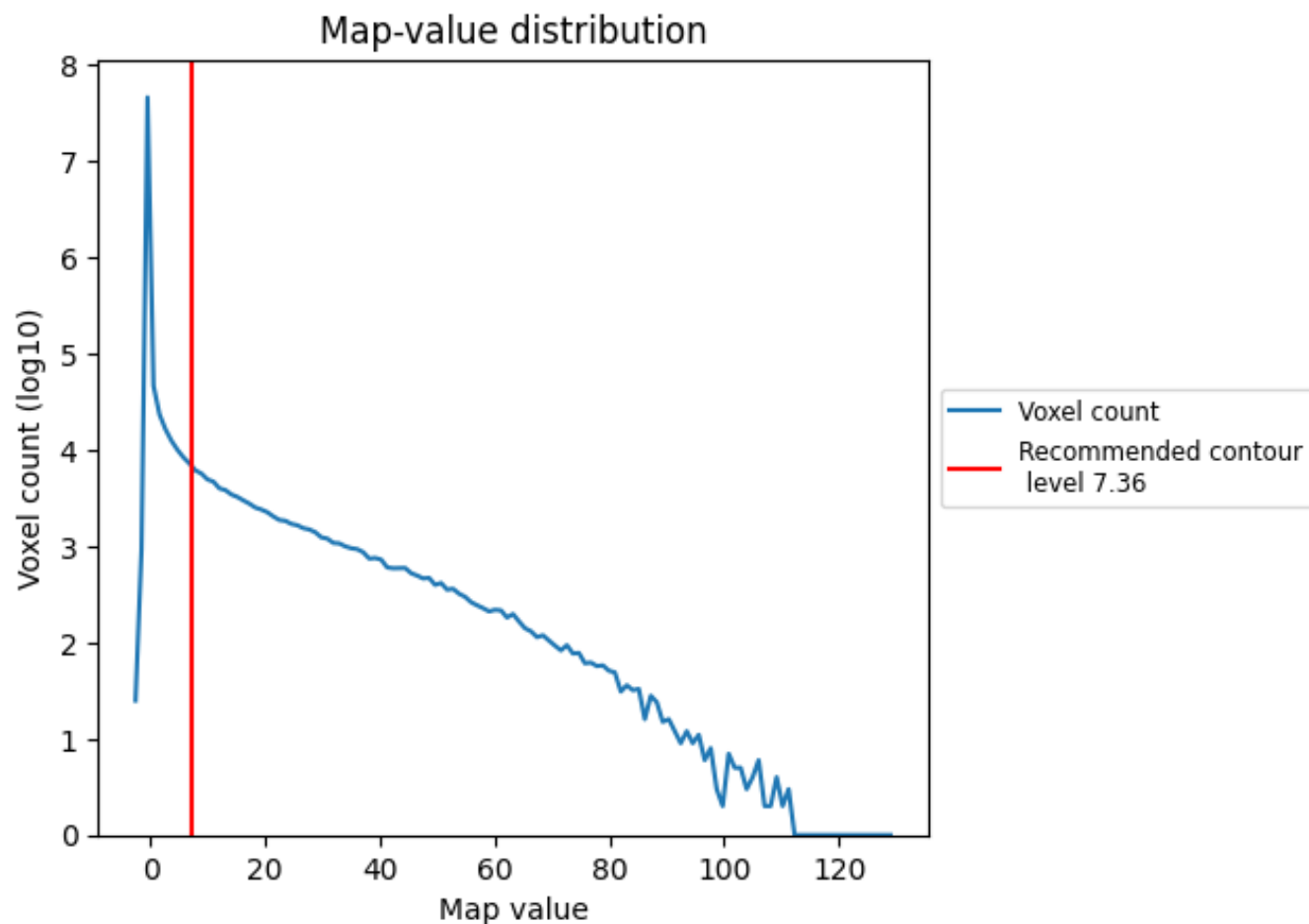
6.6 Mask visualisation [i](#)

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

7 Map analysis [i](#)

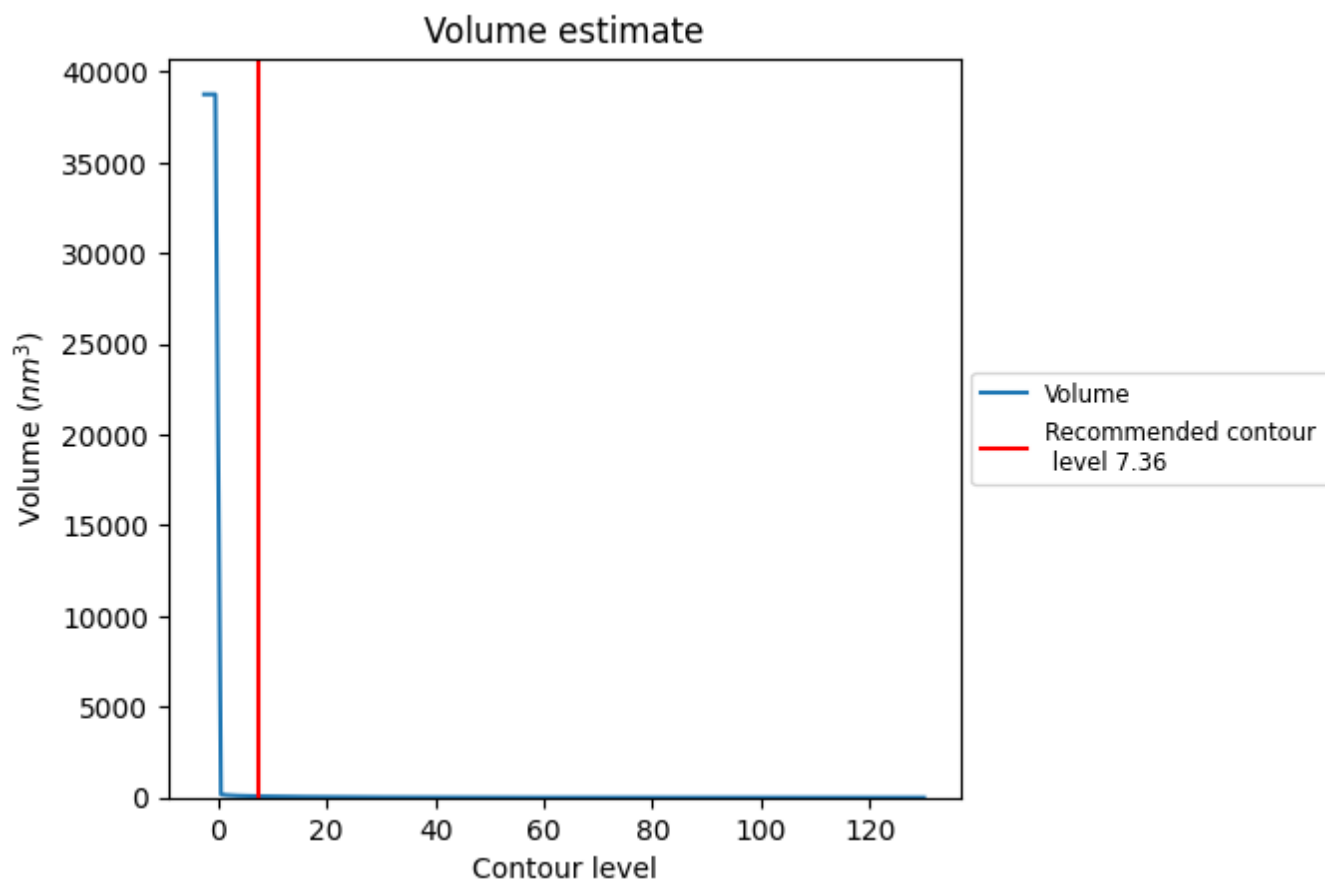
This section contains the results of statistical analysis of the map.

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.

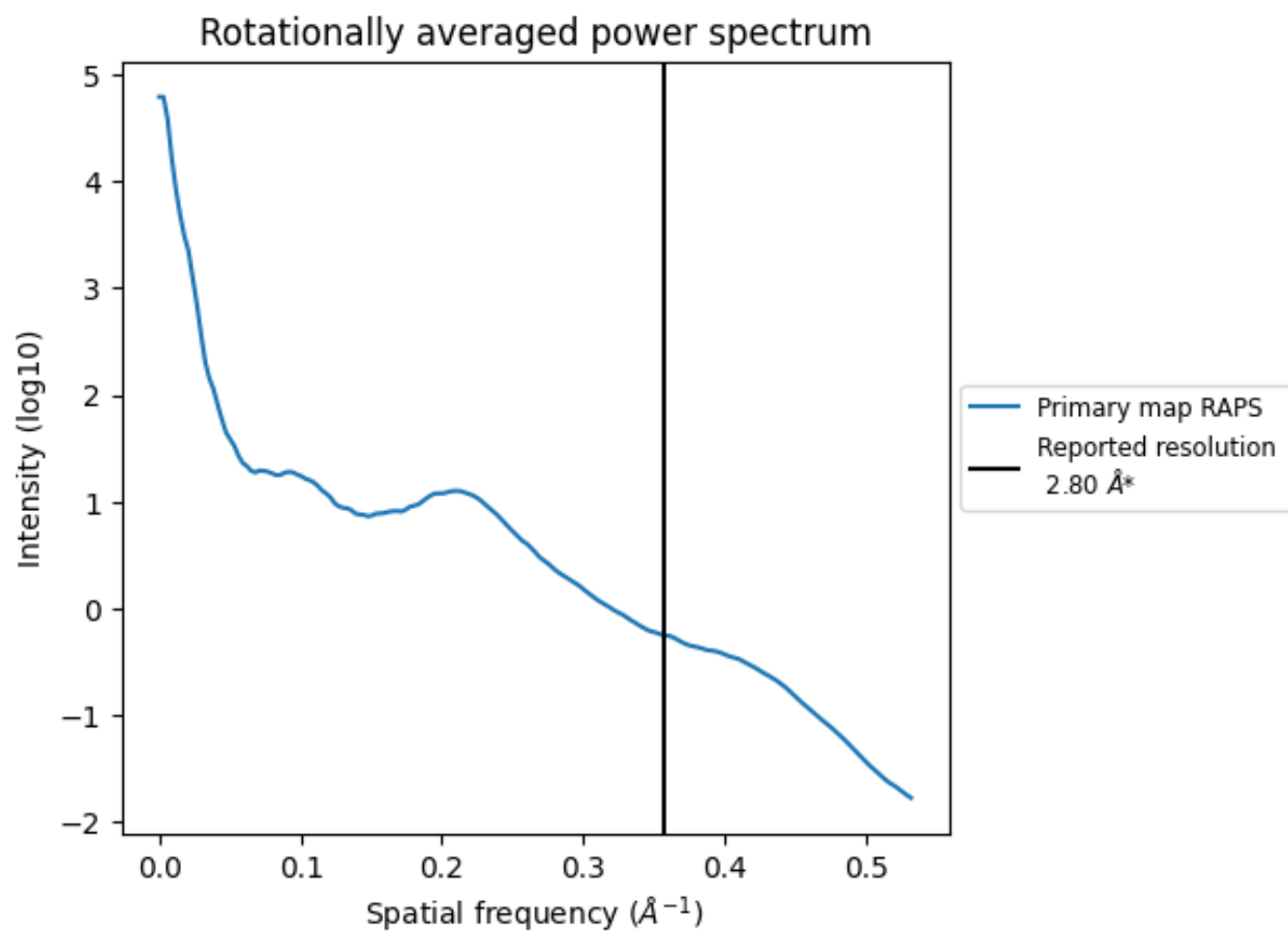
7.2 Volume estimate [i](#)



The volume at the recommended contour level is 72 nm^3 ; this corresponds to an approximate mass of 65 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 ⓘ



*Reported resolution corresponds to spatial frequency of 0.357 Å⁻¹

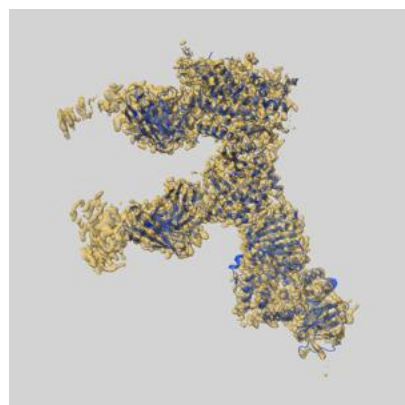
8 Fourier-Shell correlation ⓘ

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

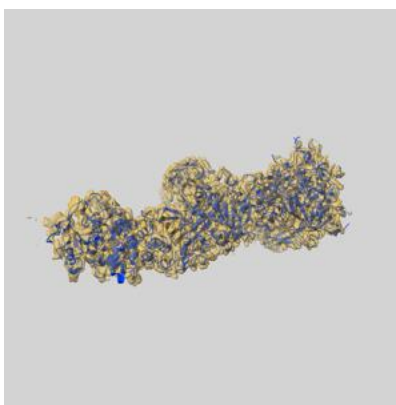
9 Map-model fit [i](#)

This section contains information regarding the fit between EMDB map EMD-41156 and PDB model 8TCO. Per-residue inclusion information can be found in section [3](#) on page [8](#).

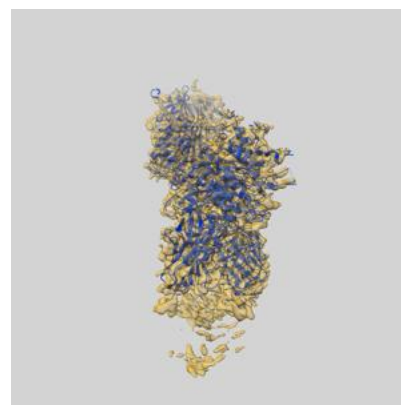
9.1 Map-model overlay [i](#)



X



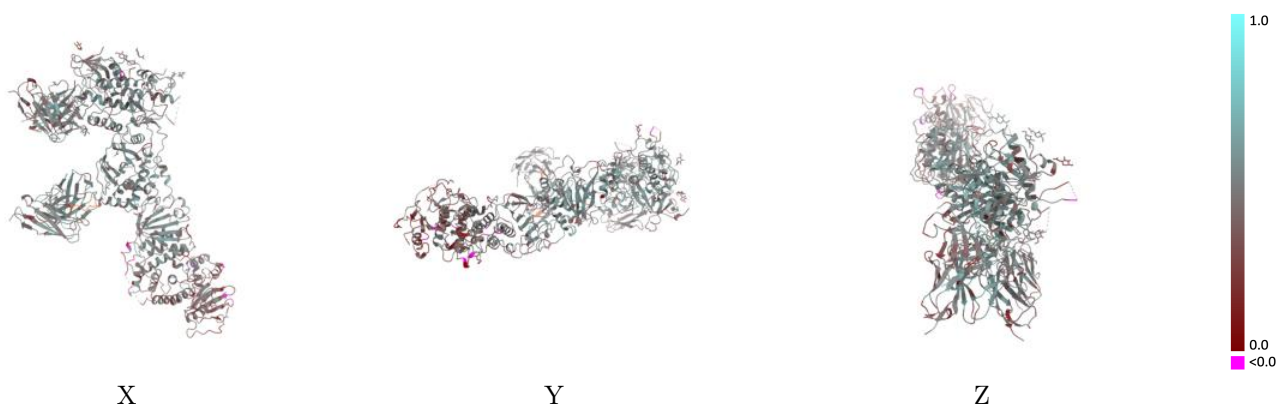
Y



Z

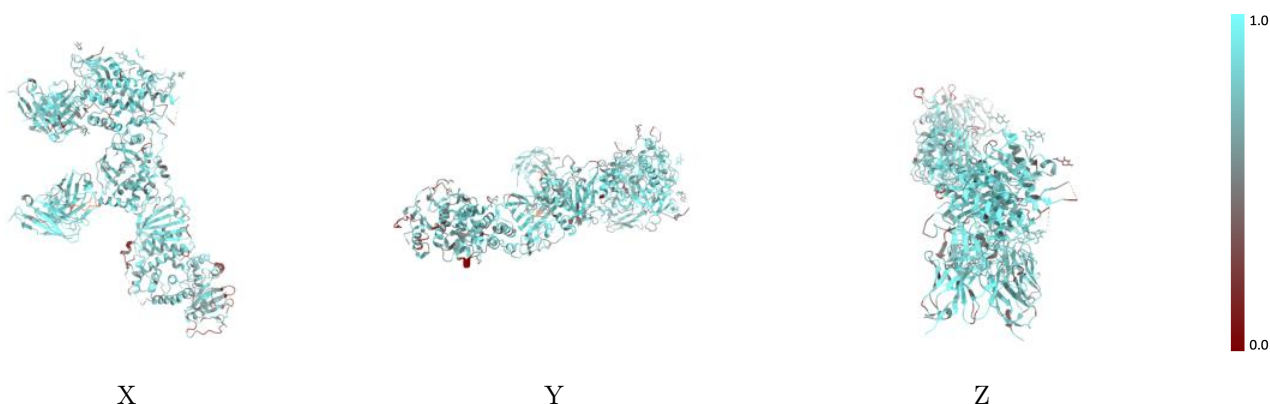
The images above show the 3D surface view of the map at the recommended contour level 7.36 at 50% transparency in yellow overlaid with a ribbon representation of the model coloured in blue. These images allow for the visual assessment of the quality of fit between the atomic model and the map.

9.2 Q-score mapped to coordinate model [i](#)



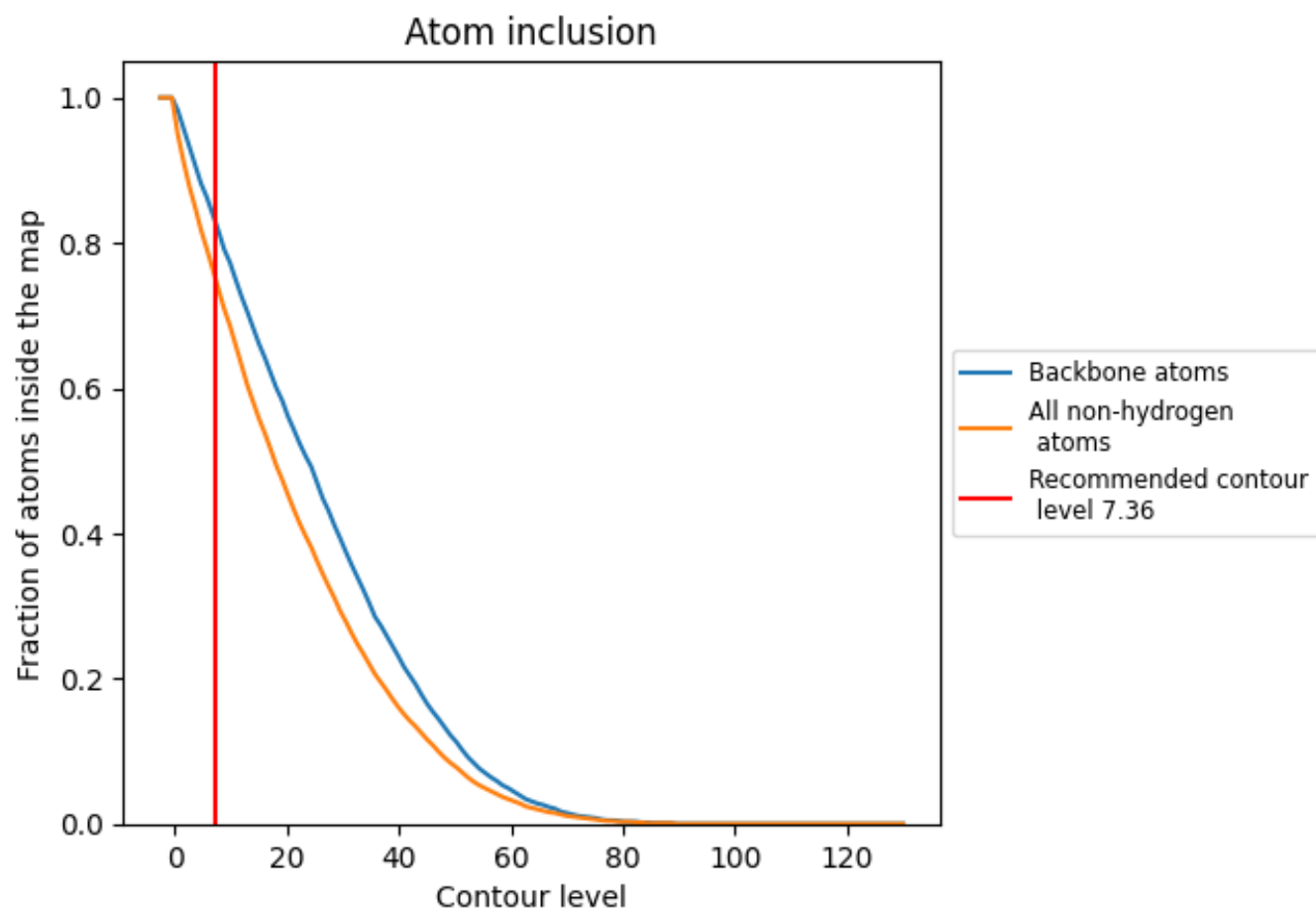
The images above show the model with each residue coloured according its Q-score. This shows their resolvability in the map with higher Q-score values reflecting better resolvability. Please note: Q-score is calculating the resolvability of atoms, and thus high values are only expected at resolutions 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](#)



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 (7.36).

9.4 Atom inclusion ⓘ



At the recommended contour level, 83% of all backbone atoms, 75% of all non-hydrogen atoms, are inside the map.

9.5 Map-model fit summary ⓘ

The table lists the average atom inclusion at the recommended contour level (7.36) and Q-score for the entire model and for each chain.

Chain	Atom inclusion	Q-score
All	0.7480	0.4520
A	0.7030	0.4100
B	0.7750	0.4970
C	0.7660	0.4730
D	0.7910	0.4750
E	0.8200	0.5070
F	0.7730	0.4540
G	0.7670	0.4640
H	0.7180	0.4400
I	0.6430	0.5090
J	0.7690	0.4780

1.0

0.0

<0.0