Full wwPDB EM Validation Report ⓘ

Nov 6, 2023 – 11:59 pm GMT

PDB ID	:	8BC3
EMDB ID	:	EMD-15961
Title	:	Cryo-EM Structure of a BmSF-TAL - Sulfofructose Schiff Base Complex
Authors	:	Snow, A.J.D.; Sharma, M.; Blaza, J.; Davies, G.J.
Deposited on	:	2022-10-14
Resolution	:	2.10 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:

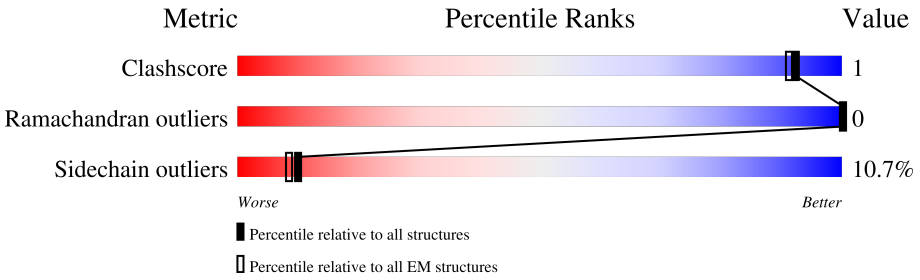
EMDB validation analysis	:	0.0.1.dev70
Mogul	:	1.8.4, CSD as541be (2020)
MolProbity	:	4.02b-467
buster-report	:	1.1.7 (2018)
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
MapQ	:	FAILED
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.36

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 2.10 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%

Mol	Chain	Length	Quality of chain
1	A	226	85% 10% •
1	B	226	85% 10% • •
1	C	226	86% 9% •
1	D	226	84% 11% • •
1	E	226	85% 11% •
1	F	226	85% 11% • •
1	G	226	85% 11% •
1	H	226	86% 10% •
1	I	226	85% 11% •

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Mol	Chain	Length	Quality of chain
1	J	226	86% 10%

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	QC9	A	301	-	X	-	-
2	QC9	B	301	-	X	-	-
2	QC9	C	301	-	X	-	-
2	QC9	D	301	-	X	-	-
2	QC9	E	301	-	X	-	-
2	QC9	F	301	-	X	-	-
2	QC9	G	301	-	X	-	-
2	QC9	H	301	-	X	-	-
2	QC9	I	301	-	X	-	-
2	QC9	J	301	-	X	-	-

2 Entry composition

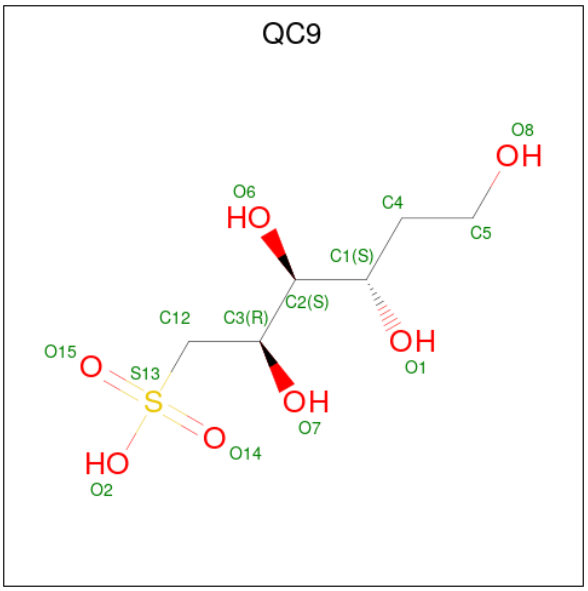
There are 3 unique types of molecules in this entry. The entry contains 16880 atoms, of which 0 are hydrogens and 0 are deuteriums.

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 BmSF-TAL.

Mol	Chain	Residues	Atoms					AltConf	Trace
1	A	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	H	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	B	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	C	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	D	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	E	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	F	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	G	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	I	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		
1	J	217	Total	C	N	O	S	0	0
			1624	1048	270	302	4		

- Molecule 2 is (2 {R},3 {S},4 {S})-2,3,4,6-tetrakis(oxidanyl)hexane-1-sulfonic acid (three-letter code: QC9) (formula: $C_6H_{14}O_7S$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms	AltConf
2	A	1	Total C O S 14 6 7 1	0
2	H	1	Total C O S 14 6 7 1	0
2	B	1	Total C O S 14 6 7 1	0
2	C	1	Total C O S 14 6 7 1	0
2	D	1	Total C O S 14 6 7 1	0
2	E	1	Total C O S 14 6 7 1	0
2	F	1	Total C O S 14 6 7 1	0
2	G	1	Total C O S 14 6 7 1	0
2	I	1	Total C O S 14 6 7 1	0
2	J	1	Total C O S 14 6 7 1	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms	AltConf
3	A	50	Total O 50 50	0
3	H	50	Total O 50 50	0

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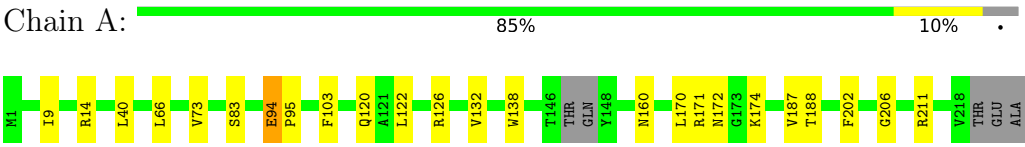
Mol	Chain	Residues	Atoms	AltConf
3	B	50	Total O 50 50	0
3	C	50	Total O 50 50	0
3	D	50	Total O 50 50	0
3	E	50	Total O 50 50	0
3	F	50	Total O 50 50	0
3	G	50	Total O 50 50	0
3	I	50	Total O 50 50	0
3	J	50	Total O 50 50	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

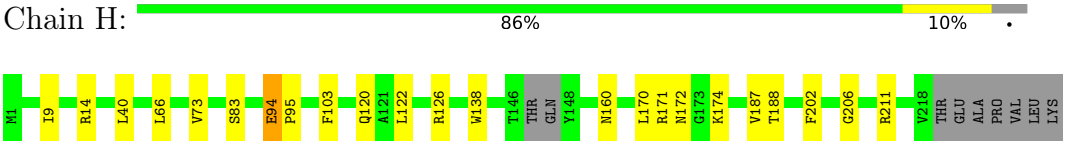
• Molecule 1: BmSF-TAL

Chain A:



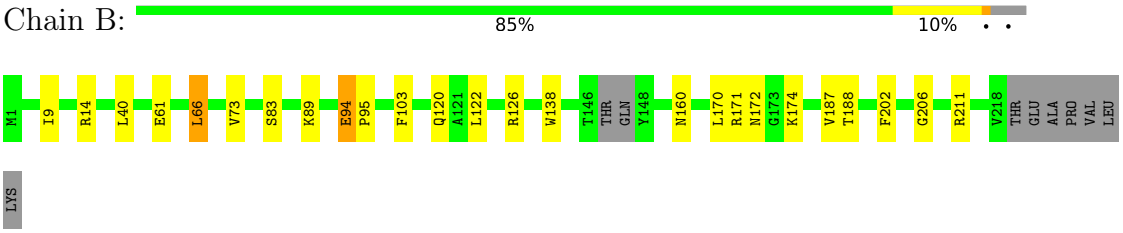
• Molecule 1: BmSF-TAL

Chain H:



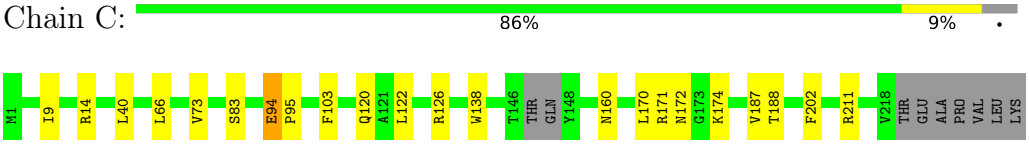
• Molecule 1: BmSF-TAL

Chain B:



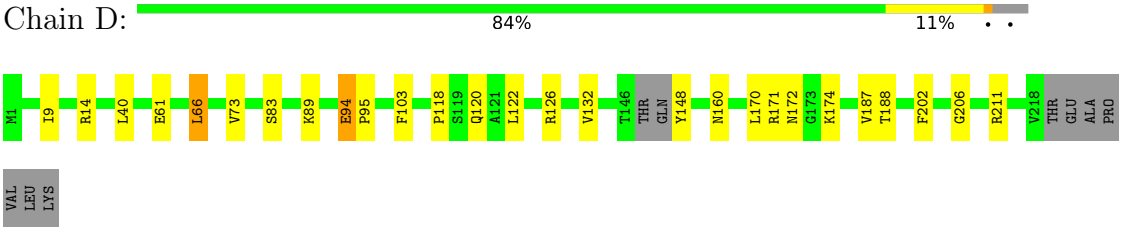
• Molecule 1: BmSF-TAL

Chain C:



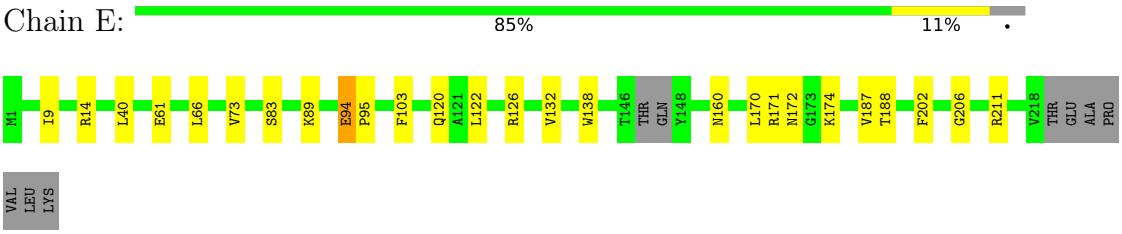
• Molecule 1: BmSF-TAL

Chain D:



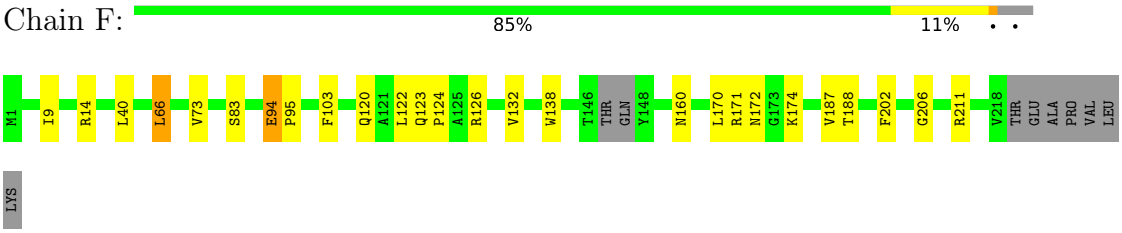
• Molecule 1: BmSF-TAL

Chain E:



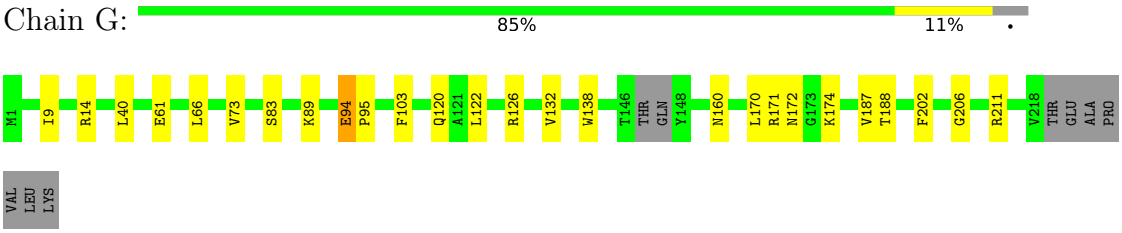
• Molecule 1: BmSF-TAL

Chain F:



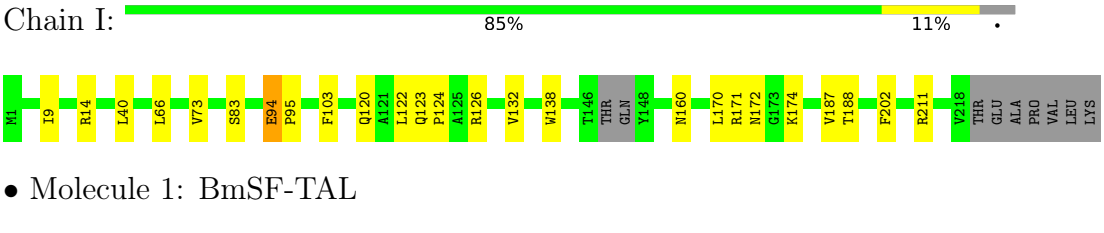
• Molecule 1: BmSF-TAL

Chain G:



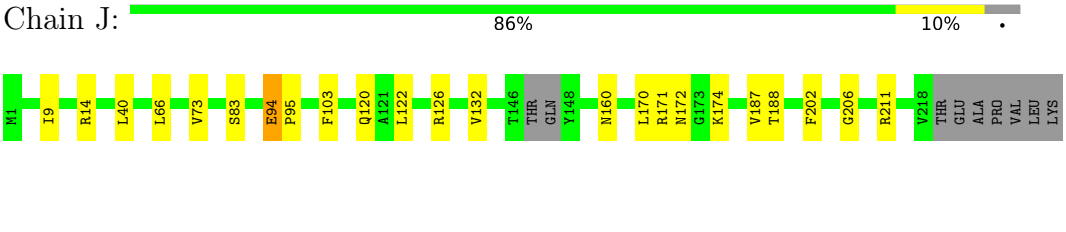
• Molecule 1: BmSF-TAL

Chain I:



• Molecule 1: BmSF-TAL

Chain J:



4 Experimental information (i)

Property	Value	Source
EM reconstruction method	SINGLE PARTICLE	Depositor
Imposed symmetry	POINT, D5	Depositor
Number of particles used	53450	Depositor
Resolution determination method	FSC 0.143 CUT-OFF	Depositor
CTF correction method	PHASE FLIPPING AND AMPLITUDE CORRECTION	Depositor
Microscope	TFS GLACIOS	Depositor
Voltage (kV)	200	Depositor
Electron dose ($e^-/Å^2$)	50	Depositor
Minimum defocus (nm)	2000	Depositor
Maximum defocus (nm)	1000	Depositor
Magnification	310000	Depositor
Image detector	FEI FALCON IV (4k x 4k)	Depositor

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: QC9

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	0.58	0/1664	0.68	0/2274
1	B	0.58	0/1664	0.68	0/2274
1	C	0.58	0/1664	0.68	0/2274
1	D	0.58	0/1664	0.68	0/2274
1	E	0.58	0/1664	0.68	0/2274
1	F	0.58	0/1664	0.68	0/2274
1	G	0.58	0/1664	0.68	0/2274
1	H	0.58	0/1657	0.67	0/2266
1	I	0.58	0/1664	0.68	0/2274
1	J	0.58	0/1664	0.68	0/2274
All	All	0.58	0/16633	0.68	0/22732

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	1
1	C	0	1
1	D	0	1
1	E	0	1
1	F	0	1
1	G	0	1
1	H	0	1
1	I	0	1
1	J	0	1
All	All	0	10

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

All (10) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	126	ARG	Sidechain
1	B	126	ARG	Sidechain
1	C	126	ARG	Sidechain
1	D	126	ARG	Sidechain
1	E	126	ARG	Sidechain
1	F	126	ARG	Sidechain
1	G	126	ARG	Sidechain
1	H	126	ARG	Sidechain
1	I	126	ARG	Sidechain
1	J	126	ARG	Sidechain

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	1624	0	1505	5	0
1	B	1624	0	1505	6	0
1	C	1624	0	1505	3	0
1	D	1624	0	1505	7	0
1	E	1624	0	1505	6	0
1	F	1624	0	1505	7	0
1	G	1624	0	1505	6	0
1	H	1624	0	1505	4	0
1	I	1624	0	1505	5	0
1	J	1624	0	1505	4	0
2	A	14	0	0	0	0
2	B	14	0	0	0	0
2	C	14	0	0	0	0
2	D	14	0	0	0	0
2	E	14	0	0	0	0
2	F	14	0	0	0	0
2	G	14	0	0	0	0
2	H	14	0	0	0	0
2	I	14	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
2	J	14	0	0	0	0
3	A	50	0	0	0	0
3	B	50	0	0	0	0
3	C	50	0	0	0	0
3	D	50	0	0	0	0
3	E	50	0	0	0	0
3	F	50	0	0	0	0
3	G	50	0	0	0	0
3	H	50	0	0	0	0
3	I	50	0	0	0	0
3	J	50	0	0	0	0
All	All	16880	0	15050	45	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 1.

All (45) 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:F:73:VAL:HA	1:F:103:PHE:CZ	2.42	0.55
1:I:73:VAL:HA	1:I:103:PHE:CZ	2.42	0.55
1:G:73:VAL:HA	1:G:103:PHE:CZ	2.42	0.55
1:E:73:VAL:HA	1:E:103:PHE:CZ	2.42	0.55
1:B:73:VAL:HA	1:B:103:PHE:CZ	2.42	0.54
1:A:73:VAL:HA	1:A:103:PHE:CZ	2.42	0.54
1:D:73:VAL:HA	1:D:103:PHE:CZ	2.42	0.54
1:J:73:VAL:HA	1:J:103:PHE:CZ	2.42	0.54
1:C:73:VAL:HA	1:C:103:PHE:CZ	2.42	0.54
1:H:73:VAL:HA	1:H:103:PHE:CZ	2.42	0.53
1:D:118:PRO:HD3	1:D:148:TYR:HB2	2.00	0.43
1:A:138:TRP:CZ3	1:F:206:GLY:HA3	2.54	0.43
1:B:206:GLY:HA3	1:G:138:TRP:CZ3	2.54	0.42
1:H:94:GLU:N	1:H:95:PRO:HD2	2.35	0.42
1:C:94:GLU:N	1:C:95:PRO:HD2	2.35	0.42
1:J:94:GLU:N	1:J:95:PRO:HD2	2.35	0.42
1:A:94:GLU:N	1:A:95:PRO:HD2	2.35	0.42
1:H:138:TRP:CZ3	1:J:206:GLY:HA3	2.55	0.42
1:D:66:LEU:HD12	1:D:66:LEU:HA	1.93	0.41
1:H:206:GLY:HA3	1:B:138:TRP:CZ3	2.55	0.41
1:I:94:GLU:N	1:I:95:PRO:HD2	2.35	0.41
1:E:94:GLU:N	1:E:95:PRO:HD2	2.35	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:94:GLU:N	1:F:95:PRO:HD2	2.35	0.41
1:G:94:GLU:N	1:G:95:PRO:HD2	2.35	0.41
1:E:206:GLY:HA3	1:F:138:TRP:CZ3	2.55	0.41
1:A:206:GLY:HA3	1:C:138:TRP:CZ3	2.55	0.41
1:B:66:LEU:HD12	1:B:66:LEU:HA	1.92	0.41
1:G:206:GLY:HA3	1:I:138:TRP:CZ3	2.55	0.41
1:B:94:GLU:N	1:B:95:PRO:HD2	2.35	0.41
1:D:94:GLU:N	1:D:95:PRO:HD2	2.35	0.41
1:D:206:GLY:HA3	1:E:138:TRP:CZ3	2.55	0.41
1:E:61:GLU:HA	1:E:89:LYS:HB3	2.03	0.41
1:G:61:GLU:HA	1:G:89:LYS:HB3	2.03	0.41
1:F:66:LEU:HD12	1:F:66:LEU:HA	1.93	0.40
1:D:61:GLU:HA	1:D:89:LYS:HB3	2.03	0.40
1:F:123:GLN:HB3	1:F:124:PRO:HD3	2.04	0.40
1:I:123:GLN:HB3	1:I:124:PRO:HD3	2.04	0.40
1:J:132:VAL:O	1:J:132:VAL:CG1	2.69	0.40
1:A:132:VAL:O	1:A:132:VAL:CG1	2.69	0.40
1:B:61:GLU:HA	1:B:89:LYS:HB3	2.03	0.40
1:D:132:VAL:O	1:D:132:VAL:CG1	2.69	0.40
1:E:132:VAL:O	1:E:132:VAL:CG1	2.69	0.40
1:F:132:VAL:O	1:F:132:VAL:HG13	2.21	0.40
1:G:132:VAL:O	1:G:132:VAL:CG1	2.69	0.40
1:I:132:VAL:O	1:I:132:VAL:HG13	2.21	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	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	B	213/226 (94%)	206 (97%)	7 (3%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	C	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	D	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	E	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	F	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	G	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	H	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	I	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
1	J	213/226 (94%)	206 (97%)	7 (3%)	0	100	100
All	All	2130/2260 (94%)	2060 (97%)	70 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	B	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	C	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	D	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	E	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	F	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	G	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	H	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	I	159/193 (82%)	142 (89%)	17 (11%)	6	3
1	J	159/193 (82%)	142 (89%)	17 (11%)	6	3
All	All	1590/1930 (82%)	1420 (89%)	170 (11%)	10	3

All (170) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	9	ILE
1	A	14	ARG
1	A	40	LEU
1	A	66	LEU
1	A	83	SER
1	A	94	GLU
1	A	120	GLN
1	A	122	LEU
1	A	160	ASN
1	A	170	LEU
1	A	171	ARG
1	A	172	ASN
1	A	174	LYS
1	A	187	VAL
1	A	188	THR
1	A	202	PHE
1	A	211	ARG
1	H	9	ILE
1	H	14	ARG
1	H	40	LEU
1	H	66	LEU
1	H	83	SER
1	H	94	GLU
1	H	120	GLN
1	H	122	LEU
1	H	160	ASN
1	H	170	LEU
1	H	171	ARG
1	H	172	ASN
1	H	174	LYS
1	H	187	VAL
1	H	188	THR
1	H	202	PHE
1	H	211	ARG
1	B	9	ILE
1	B	14	ARG
1	B	40	LEU
1	B	66	LEU
1	B	83	SER
1	B	94	GLU
1	B	120	GLN
1	B	122	LEU
1	B	160	ASN

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Mol	Chain	Res	Type
1	B	170	LEU
1	B	171	ARG
1	B	172	ASN
1	B	174	LYS
1	B	187	VAL
1	B	188	THR
1	B	202	PHE
1	B	211	ARG
1	C	9	ILE
1	C	14	ARG
1	C	40	LEU
1	C	66	LEU
1	C	83	SER
1	C	94	GLU
1	C	120	GLN
1	C	122	LEU
1	C	160	ASN
1	C	170	LEU
1	C	171	ARG
1	C	172	ASN
1	C	174	LYS
1	C	187	VAL
1	C	188	THR
1	C	202	PHE
1	C	211	ARG
1	D	9	ILE
1	D	14	ARG
1	D	40	LEU
1	D	66	LEU
1	D	83	SER
1	D	94	GLU
1	D	120	GLN
1	D	122	LEU
1	D	160	ASN
1	D	170	LEU
1	D	171	ARG
1	D	172	ASN
1	D	174	LYS
1	D	187	VAL
1	D	188	THR
1	D	202	PHE
1	D	211	ARG

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Mol	Chain	Res	Type
1	E	9	ILE
1	E	14	ARG
1	E	40	LEU
1	E	66	LEU
1	E	83	SER
1	E	94	GLU
1	E	120	GLN
1	E	122	LEU
1	E	160	ASN
1	E	170	LEU
1	E	171	ARG
1	E	172	ASN
1	E	174	LYS
1	E	187	VAL
1	E	188	THR
1	E	202	PHE
1	E	211	ARG
1	F	9	ILE
1	F	14	ARG
1	F	40	LEU
1	F	66	LEU
1	F	83	SER
1	F	94	GLU
1	F	120	GLN
1	F	122	LEU
1	F	160	ASN
1	F	170	LEU
1	F	171	ARG
1	F	172	ASN
1	F	174	LYS
1	F	187	VAL
1	F	188	THR
1	F	202	PHE
1	F	211	ARG
1	G	9	ILE
1	G	14	ARG
1	G	40	LEU
1	G	66	LEU
1	G	83	SER
1	G	94	GLU
1	G	120	GLN
1	G	122	LEU

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Mol	Chain	Res	Type
1	G	160	ASN
1	G	170	LEU
1	G	171	ARG
1	G	172	ASN
1	G	174	LYS
1	G	187	VAL
1	G	188	THR
1	G	202	PHE
1	G	211	ARG
1	I	9	ILE
1	I	14	ARG
1	I	40	LEU
1	I	66	LEU
1	I	83	SER
1	I	94	GLU
1	I	120	GLN
1	I	122	LEU
1	I	160	ASN
1	I	170	LEU
1	I	171	ARG
1	I	172	ASN
1	I	174	LYS
1	I	187	VAL
1	I	188	THR
1	I	202	PHE
1	I	211	ARG
1	J	9	ILE
1	J	14	ARG
1	J	40	LEU
1	J	66	LEU
1	J	83	SER
1	J	94	GLU
1	J	120	GLN
1	J	122	LEU
1	J	160	ASN
1	J	170	LEU
1	J	171	ARG
1	J	172	ASN
1	J	174	LYS
1	J	187	VAL
1	J	188	THR
1	J	202	PHE

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Mol	Chain	Res	Type
1	J	211	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (60) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	85	ASN
1	A	111	ASN
1	A	120	GLN
1	A	141	ASN
1	A	172	ASN
1	A	199	GLN
1	H	85	ASN
1	H	111	ASN
1	H	120	GLN
1	H	141	ASN
1	H	172	ASN
1	H	199	GLN
1	B	85	ASN
1	B	111	ASN
1	B	120	GLN
1	B	141	ASN
1	B	172	ASN
1	B	199	GLN
1	C	85	ASN
1	C	111	ASN
1	C	120	GLN
1	C	141	ASN
1	C	172	ASN
1	C	199	GLN
1	D	85	ASN
1	D	111	ASN
1	D	120	GLN
1	D	141	ASN
1	D	172	ASN
1	D	199	GLN
1	E	85	ASN
1	E	111	ASN
1	E	120	GLN
1	E	141	ASN
1	E	172	ASN
1	E	199	GLN
1	F	85	ASN

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Mol	Chain	Res	Type
1	F	111	ASN
1	F	120	GLN
1	F	141	ASN
1	F	172	ASN
1	F	199	GLN
1	G	85	ASN
1	G	111	ASN
1	G	120	GLN
1	G	141	ASN
1	G	172	ASN
1	G	199	GLN
1	I	85	ASN
1	I	111	ASN
1	I	120	GLN
1	I	141	ASN
1	I	172	ASN
1	I	199	GLN
1	J	85	ASN
1	J	111	ASN
1	J	120	GLN
1	J	141	ASN
1	J	172	ASN
1	J	199	GLN

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

There are no monosaccharides in this entry.

5.6 Ligand geometry

10 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	QC9	B	301	1	12,13,13	3.39	8 (66%)	15,18,18	4.93	10 (66%)
2	QC9	I	301	1	12,13,13	3.37	8 (66%)	15,18,18	4.94	10 (66%)
2	QC9	D	301	1	12,13,13	3.40	8 (66%)	15,18,18	4.79	9 (60%)
2	QC9	G	301	1	12,13,13	3.38	8 (66%)	15,18,18	4.93	10 (66%)
2	QC9	E	301	1	12,13,13	3.41	8 (66%)	15,18,18	4.79	9 (60%)
2	QC9	H	301	1	12,13,13	3.37	8 (66%)	15,18,18	4.93	10 (66%)
2	QC9	C	301	1	12,13,13	3.41	8 (66%)	15,18,18	4.79	9 (60%)
2	QC9	F	301	1	12,13,13	3.40	8 (66%)	15,18,18	4.80	9 (60%)
2	QC9	A	301	1	12,13,13	3.40	8 (66%)	15,18,18	4.79	9 (60%)
2	QC9	J	301	1	12,13,13	3.39	8 (66%)	15,18,18	4.93	10 (66%)

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	QC9	B	301	1	-	8/16/16/16	-
2	QC9	I	301	1	-	8/16/16/16	-
2	QC9	D	301	1	-	8/16/16/16	-
2	QC9	G	301	1	-	8/16/16/16	-
2	QC9	E	301	1	-	8/16/16/16	-
2	QC9	H	301	1	-	8/16/16/16	-
2	QC9	C	301	1	-	8/16/16/16	-
2	QC9	F	301	1	-	8/16/16/16	-
2	QC9	A	301	1	-	8/16/16/16	-
2	QC9	J	301	1	-	8/16/16/16	-

All (80) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	C	301	QC9	C1-C2	5.98	1.64	1.53
2	B	301	QC9	C1-C2	5.96	1.64	1.53
2	J	301	QC9	C1-C2	5.95	1.64	1.53
2	G	301	QC9	C1-C2	5.94	1.64	1.53
2	H	301	QC9	C1-C2	5.93	1.64	1.53
2	A	301	QC9	C1-C2	5.92	1.64	1.53
2	F	301	QC9	C1-C2	5.91	1.64	1.53
2	I	301	QC9	C1-C2	5.91	1.64	1.53
2	D	301	QC9	C1-C2	5.91	1.64	1.53
2	E	301	QC9	C1-C2	5.91	1.64	1.53
2	E	301	QC9	O6-C2	-5.70	1.29	1.43
2	B	301	QC9	O6-C2	-5.69	1.29	1.43
2	I	301	QC9	O6-C2	-5.69	1.29	1.43
2	J	301	QC9	O6-C2	-5.68	1.29	1.43
2	G	301	QC9	O6-C2	-5.68	1.29	1.43
2	A	301	QC9	O6-C2	-5.67	1.29	1.43
2	H	301	QC9	O6-C2	-5.67	1.29	1.43
2	C	301	QC9	O6-C2	-5.67	1.29	1.43
2	D	301	QC9	O6-C2	-5.66	1.29	1.43
2	F	301	QC9	O6-C2	-5.66	1.29	1.43
2	G	301	QC9	O1-C1	-4.41	1.34	1.43
2	C	301	QC9	O1-C1	-4.41	1.34	1.43
2	B	301	QC9	O1-C1	-4.41	1.34	1.43
2	E	301	QC9	O1-C1	-4.41	1.34	1.43
2	J	301	QC9	O1-C1	-4.40	1.34	1.43
2	I	301	QC9	O1-C1	-4.40	1.34	1.43
2	A	301	QC9	O1-C1	-4.39	1.34	1.43
2	D	301	QC9	O1-C1	-4.38	1.34	1.43
2	F	301	QC9	O1-C1	-4.37	1.34	1.43
2	H	301	QC9	O1-C1	-4.37	1.34	1.43
2	J	301	QC9	C3-C2	3.79	1.60	1.53
2	A	301	QC9	C3-C2	3.75	1.60	1.53
2	E	301	QC9	C3-C2	3.75	1.60	1.53
2	D	301	QC9	C3-C2	3.74	1.60	1.53
2	F	301	QC9	C3-C2	3.73	1.60	1.53
2	I	301	QC9	C3-C2	3.73	1.60	1.53
2	G	301	QC9	C3-C2	3.72	1.60	1.53
2	H	301	QC9	C3-C2	3.71	1.60	1.53
2	B	301	QC9	C3-C2	3.71	1.60	1.53
2	C	301	QC9	C3-C2	3.70	1.60	1.53
2	F	301	QC9	O2-S13	-3.65	1.34	1.47
2	C	301	QC9	O2-S13	-3.65	1.34	1.47
2	A	301	QC9	O2-S13	-3.65	1.34	1.47

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	E	301	QC9	O2-S13	-3.65	1.34	1.47
2	D	301	QC9	O2-S13	-3.64	1.34	1.47
2	J	301	QC9	O14-S13	-3.45	1.34	1.45
2	B	301	QC9	O14-S13	-3.44	1.34	1.45
2	G	301	QC9	O14-S13	-3.44	1.34	1.45
2	I	301	QC9	O14-S13	-3.42	1.34	1.45
2	H	301	QC9	O14-S13	-3.41	1.35	1.45
2	J	301	QC9	O7-C3	-2.97	1.37	1.43
2	B	301	QC9	O7-C3	-2.97	1.37	1.43
2	D	301	QC9	O7-C3	-2.96	1.37	1.43
2	I	301	QC9	O7-C3	-2.96	1.37	1.43
2	E	301	QC9	O7-C3	-2.96	1.37	1.43
2	A	301	QC9	O7-C3	-2.95	1.37	1.43
2	F	301	QC9	O7-C3	-2.95	1.37	1.43
2	H	301	QC9	O7-C3	-2.94	1.37	1.43
2	C	301	QC9	O7-C3	-2.94	1.37	1.43
2	G	301	QC9	O7-C3	-2.92	1.37	1.43
2	B	301	QC9	O15-S13	-2.77	1.36	1.45
2	J	301	QC9	O15-S13	-2.77	1.36	1.45
2	D	301	QC9	O15-S13	-2.76	1.36	1.45
2	H	301	QC9	O15-S13	-2.75	1.36	1.45
2	A	301	QC9	O15-S13	-2.75	1.36	1.45
2	F	301	QC9	O15-S13	-2.75	1.36	1.45
2	G	301	QC9	O15-S13	-2.75	1.36	1.45
2	C	301	QC9	O15-S13	-2.75	1.36	1.45
2	E	301	QC9	O15-S13	-2.74	1.36	1.45
2	I	301	QC9	O15-S13	-2.71	1.37	1.45
2	E	301	QC9	C4-C1	2.15	1.56	1.52
2	H	301	QC9	C4-C1	2.14	1.56	1.52
2	D	301	QC9	C4-C1	2.12	1.56	1.52
2	B	301	QC9	C4-C1	2.11	1.56	1.52
2	A	301	QC9	C4-C1	2.11	1.56	1.52
2	C	301	QC9	C4-C1	2.10	1.56	1.52
2	G	301	QC9	C4-C1	2.10	1.56	1.52
2	I	301	QC9	C4-C1	2.10	1.56	1.52
2	F	301	QC9	C4-C1	2.09	1.56	1.52
2	J	301	QC9	C4-C1	2.08	1.56	1.52

All (95) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	D	301	QC9	C3-C2-C1	11.86	138.02	113.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	F	301	QC9	C3-C2-C1	11.85	138.01	113.36
2	I	301	QC9	C3-C2-C1	11.85	138.01	113.36
2	A	301	QC9	C3-C2-C1	11.85	138.00	113.36
2	E	301	QC9	C3-C2-C1	11.84	138.00	113.36
2	H	301	QC9	C3-C2-C1	11.84	137.99	113.36
2	B	301	QC9	C3-C2-C1	11.84	137.98	113.36
2	G	301	QC9	C3-C2-C1	11.84	137.98	113.36
2	C	301	QC9	C3-C2-C1	11.83	137.97	113.36
2	J	301	QC9	C3-C2-C1	11.83	137.97	113.36
2	I	301	QC9	O14-S13-C12	8.03	116.48	106.94
2	B	301	QC9	O14-S13-C12	8.00	116.45	106.94
2	J	301	QC9	O14-S13-C12	8.00	116.45	106.94
2	G	301	QC9	O14-S13-C12	7.99	116.43	106.94
2	H	301	QC9	O14-S13-C12	7.97	116.41	106.94
2	B	301	QC9	C5-C4-C1	7.84	128.07	113.07
2	I	301	QC9	C5-C4-C1	7.83	128.04	113.07
2	A	301	QC9	C5-C4-C1	7.82	128.03	113.07
2	J	301	QC9	C5-C4-C1	7.82	128.03	113.07
2	G	301	QC9	C5-C4-C1	7.82	128.02	113.07
2	C	301	QC9	C5-C4-C1	7.82	128.02	113.07
2	H	301	QC9	C5-C4-C1	7.82	128.02	113.07
2	E	301	QC9	C5-C4-C1	7.81	128.01	113.07
2	D	301	QC9	C5-C4-C1	7.81	128.01	113.07
2	F	301	QC9	C5-C4-C1	7.81	128.00	113.07
2	F	301	QC9	O2-S13-C12	6.75	116.49	105.74
2	A	301	QC9	O2-S13-C12	6.72	116.45	105.74
2	E	301	QC9	O2-S13-C12	6.70	116.42	105.74
2	C	301	QC9	O2-S13-C12	6.69	116.40	105.74
2	D	301	QC9	O2-S13-C12	6.68	116.39	105.74
2	E	301	QC9	O1-C1-C2	4.57	120.20	109.10
2	G	301	QC9	O1-C1-C2	4.57	120.20	109.10
2	C	301	QC9	O1-C1-C2	4.56	120.18	109.10
2	H	301	QC9	O1-C1-C2	4.55	120.16	109.10
2	A	301	QC9	O1-C1-C2	4.55	120.16	109.10
2	F	301	QC9	O1-C1-C2	4.55	120.16	109.10
2	D	301	QC9	O1-C1-C2	4.55	120.16	109.10
2	B	301	QC9	O1-C1-C2	4.55	120.15	109.10
2	J	301	QC9	O1-C1-C2	4.54	120.14	109.10
2	I	301	QC9	O1-C1-C2	4.54	120.14	109.10
2	D	301	QC9	O6-C2-C3	-4.37	98.26	108.81
2	J	301	QC9	O6-C2-C3	-4.36	98.28	108.81
2	F	301	QC9	O6-C2-C3	-4.36	98.28	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	I	301	QC9	O6-C2-C3	-4.36	98.29	108.81
2	E	301	QC9	O6-C2-C3	-4.35	98.31	108.81
2	A	301	QC9	O6-C2-C3	-4.35	98.31	108.81
2	B	301	QC9	O6-C2-C3	-4.35	98.31	108.81
2	C	301	QC9	O6-C2-C3	-4.35	98.31	108.81
2	G	301	QC9	O6-C2-C3	-4.34	98.33	108.81
2	H	301	QC9	O6-C2-C3	-4.34	98.33	108.81
2	B	301	QC9	O7-C3-C12	-4.18	100.87	109.50
2	D	301	QC9	O7-C3-C12	-4.18	100.87	109.50
2	I	301	QC9	O7-C3-C12	-4.18	100.88	109.50
2	G	301	QC9	O7-C3-C12	-4.18	100.89	109.50
2	H	301	QC9	O7-C3-C12	-4.17	100.89	109.50
2	F	301	QC9	O7-C3-C12	-4.17	100.89	109.50
2	A	301	QC9	O7-C3-C12	-4.17	100.90	109.50
2	C	301	QC9	O7-C3-C12	-4.17	100.91	109.50
2	E	301	QC9	O7-C3-C12	-4.16	100.92	109.50
2	J	301	QC9	O7-C3-C12	-4.16	100.93	109.50
2	F	301	QC9	O7-C3-C2	-4.12	99.07	109.10
2	J	301	QC9	O7-C3-C2	-4.12	99.08	109.10
2	A	301	QC9	O7-C3-C2	-4.11	99.10	109.10
2	G	301	QC9	O7-C3-C2	-4.11	99.10	109.10
2	D	301	QC9	O7-C3-C2	-4.11	99.10	109.10
2	E	301	QC9	O7-C3-C2	-4.11	99.10	109.10
2	C	301	QC9	O7-C3-C2	-4.11	99.11	109.10
2	H	301	QC9	O7-C3-C2	-4.10	99.13	109.10
2	I	301	QC9	O7-C3-C2	-4.10	99.13	109.10
2	B	301	QC9	O7-C3-C2	-4.09	99.14	109.10
2	B	301	QC9	O15-S13-C12	-2.87	103.53	106.94
2	C	301	QC9	O15-S13-C12	-2.86	103.54	106.94
2	E	301	QC9	O15-S13-C12	-2.86	103.54	106.94
2	I	301	QC9	O15-S13-C12	-2.86	103.54	106.94
2	A	301	QC9	O15-S13-C12	-2.86	103.54	106.94
2	H	301	QC9	O15-S13-C12	-2.85	103.55	106.94
2	D	301	QC9	O15-S13-C12	-2.84	103.56	106.94
2	F	301	QC9	O15-S13-C12	-2.83	103.58	106.94
2	J	301	QC9	O15-S13-C12	-2.83	103.58	106.94
2	G	301	QC9	O15-S13-C12	-2.81	103.59	106.94
2	G	301	QC9	O6-C2-C1	-2.38	103.07	108.81
2	H	301	QC9	O6-C2-C1	-2.37	103.08	108.81
2	F	301	QC9	O6-C2-C1	-2.37	103.09	108.81
2	C	301	QC9	O6-C2-C1	-2.37	103.09	108.81
2	A	301	QC9	O6-C2-C1	-2.36	103.11	108.81

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Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	I	301	QC9	O6-C2-C1	-2.36	103.12	108.81
2	J	301	QC9	O6-C2-C1	-2.36	103.12	108.81
2	B	301	QC9	O6-C2-C1	-2.36	103.12	108.81
2	D	301	QC9	O6-C2-C1	-2.34	103.15	108.81
2	E	301	QC9	O6-C2-C1	-2.34	103.15	108.81
2	H	301	QC9	O2-S13-O15	2.04	116.26	111.27
2	B	301	QC9	O2-S13-O15	2.04	116.25	111.27
2	J	301	QC9	O2-S13-O15	2.03	116.23	111.27
2	G	301	QC9	O2-S13-O15	2.02	116.22	111.27
2	I	301	QC9	O2-S13-O15	2.02	116.22	111.27

There are no chirality outliers.

All (80) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	QC9	C4-C1-C2-O6
2	A	301	QC9	O1-C1-C2-C3
2	A	301	QC9	O1-C1-C2-O6
2	A	301	QC9	C2-C1-C4-C5
2	A	301	QC9	S13-C12-C3-O7
2	A	301	QC9	C1-C4-C5-O8
2	H	301	QC9	C4-C1-C2-O6
2	H	301	QC9	O1-C1-C2-C3
2	H	301	QC9	O1-C1-C2-O6
2	H	301	QC9	C2-C1-C4-C5
2	H	301	QC9	S13-C12-C3-O7
2	H	301	QC9	C1-C4-C5-O8
2	B	301	QC9	C4-C1-C2-O6
2	B	301	QC9	O1-C1-C2-C3
2	B	301	QC9	O1-C1-C2-O6
2	B	301	QC9	C2-C1-C4-C5
2	B	301	QC9	S13-C12-C3-O7
2	B	301	QC9	C1-C4-C5-O8
2	C	301	QC9	C4-C1-C2-O6
2	C	301	QC9	O1-C1-C2-C3
2	C	301	QC9	O1-C1-C2-O6
2	C	301	QC9	C2-C1-C4-C5
2	C	301	QC9	S13-C12-C3-O7
2	C	301	QC9	C1-C4-C5-O8
2	D	301	QC9	C4-C1-C2-O6
2	D	301	QC9	O1-C1-C2-C3
2	D	301	QC9	O1-C1-C2-O6

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Mol	Chain	Res	Type	Atoms
2	D	301	QC9	C2-C1-C4-C5
2	D	301	QC9	S13-C12-C3-O7
2	D	301	QC9	C1-C4-C5-O8
2	E	301	QC9	C4-C1-C2-O6
2	E	301	QC9	O1-C1-C2-C3
2	E	301	QC9	O1-C1-C2-O6
2	E	301	QC9	C2-C1-C4-C5
2	E	301	QC9	S13-C12-C3-O7
2	E	301	QC9	C1-C4-C5-O8
2	F	301	QC9	C4-C1-C2-O6
2	F	301	QC9	O1-C1-C2-C3
2	F	301	QC9	O1-C1-C2-O6
2	F	301	QC9	C2-C1-C4-C5
2	F	301	QC9	S13-C12-C3-O7
2	F	301	QC9	C1-C4-C5-O8
2	G	301	QC9	C4-C1-C2-O6
2	G	301	QC9	O1-C1-C2-C3
2	G	301	QC9	O1-C1-C2-O6
2	G	301	QC9	C2-C1-C4-C5
2	G	301	QC9	S13-C12-C3-O7
2	G	301	QC9	C1-C4-C5-O8
2	I	301	QC9	C4-C1-C2-O6
2	I	301	QC9	O1-C1-C2-C3
2	I	301	QC9	O1-C1-C2-O6
2	I	301	QC9	C2-C1-C4-C5
2	I	301	QC9	S13-C12-C3-O7
2	I	301	QC9	C1-C4-C5-O8
2	J	301	QC9	C4-C1-C2-O6
2	J	301	QC9	O1-C1-C2-C3
2	J	301	QC9	O1-C1-C2-O6
2	J	301	QC9	C2-C1-C4-C5
2	J	301	QC9	S13-C12-C3-O7
2	J	301	QC9	C1-C4-C5-O8
2	A	301	QC9	C4-C1-C2-C3
2	H	301	QC9	C4-C1-C2-C3
2	B	301	QC9	C4-C1-C2-C3
2	C	301	QC9	C4-C1-C2-C3
2	D	301	QC9	C4-C1-C2-C3
2	E	301	QC9	C4-C1-C2-C3
2	F	301	QC9	C4-C1-C2-C3
2	G	301	QC9	C4-C1-C2-C3
2	I	301	QC9	C4-C1-C2-C3

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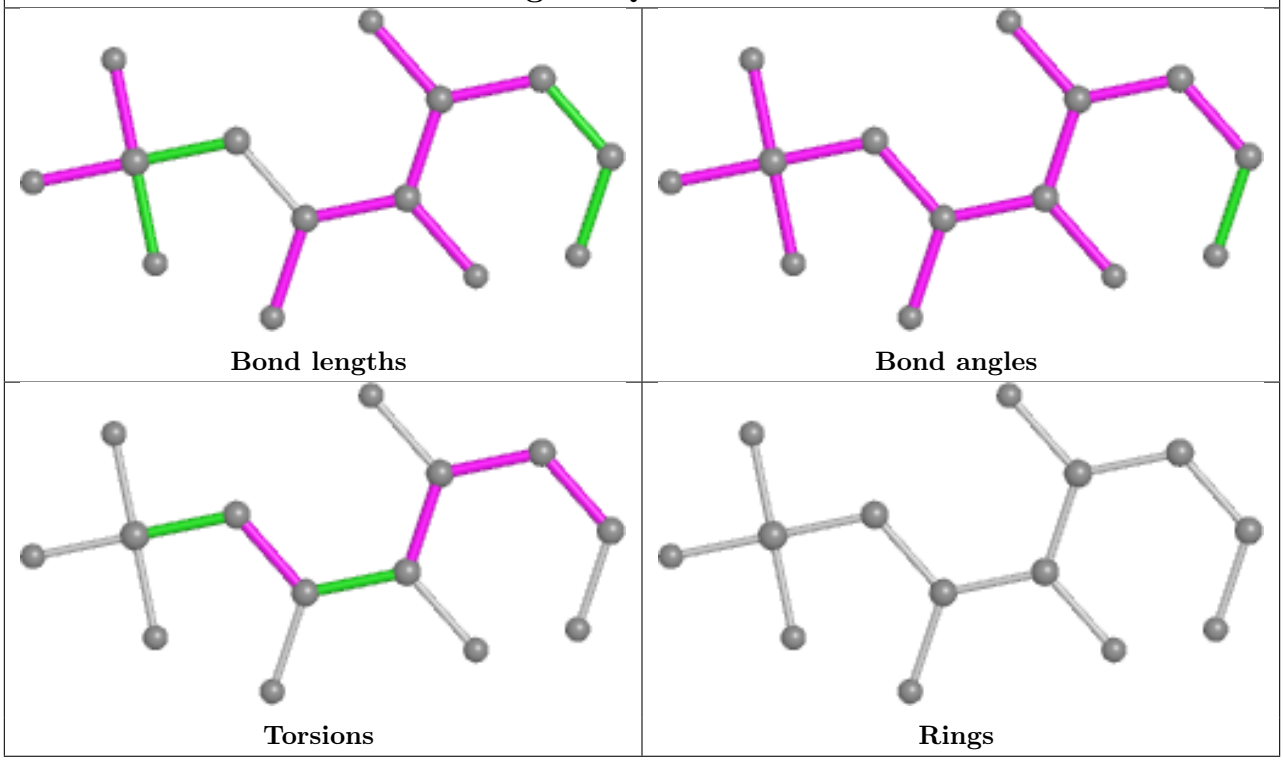
Mol	Chain	Res	Type	Atoms
2	J	301	QC9	C4-C1-C2-C3
2	A	301	QC9	O1-C1-C4-C5
2	H	301	QC9	O1-C1-C4-C5
2	B	301	QC9	O1-C1-C4-C5
2	C	301	QC9	O1-C1-C4-C5
2	D	301	QC9	O1-C1-C4-C5
2	E	301	QC9	O1-C1-C4-C5
2	F	301	QC9	O1-C1-C4-C5
2	G	301	QC9	O1-C1-C4-C5
2	I	301	QC9	O1-C1-C4-C5
2	J	301	QC9	O1-C1-C4-C5

There are no ring outliers.

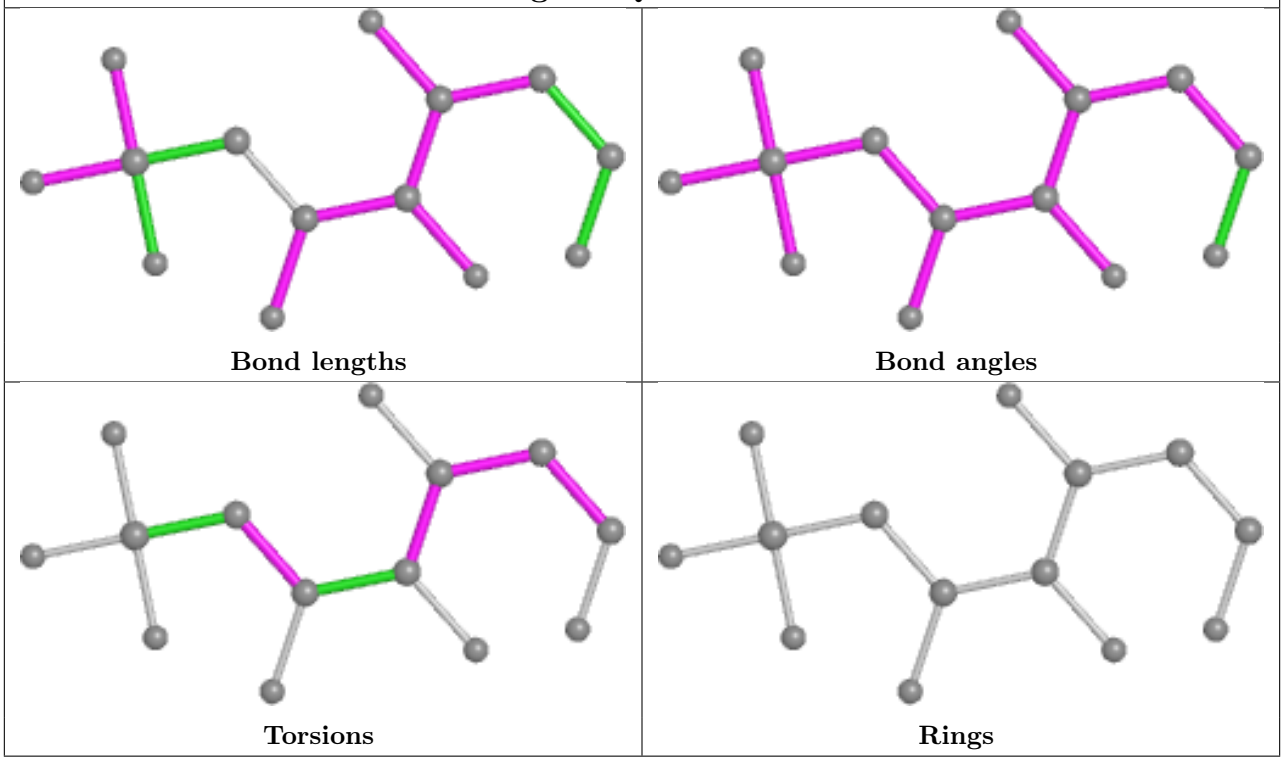
No monomer is involved in short contacts.

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for 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 QC9 G 301



Ligand QC9 J 301



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

This section contains visualisations of the EMDB entry EMD-15961. These allow visual inspection of the internal detail of the map and identification of artifacts.

Images derived from a raw map, generated by summing the deposited half-maps, are presented below the corresponding image components of the primary map to allow further visual inspection and comparison with those of the primary map.

6.1 Orthogonal projections

This section was not generated.

6.2 Central slices

This section was not generated.

6.3 Largest variance slices

This section was not generated.

6.4 Orthogonal standard-deviation projections (False-color)

This section was not generated.

6.5 Orthogonal surface views

This section was not generated.

6.6 Mask visualisation

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

7 Map analysis

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

7.1 Map-value distribution

This section was not generated.

7.2 Volume estimate versus contour level

This section was not generated.

7.3 Rotationally averaged power spectrum

This section was not generated. The rotationally averaged power spectrum had issues being displayed.

8 Fourier-Shell correlation

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

9 Map-model fit

This section was not generated.