



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 7, 2026 – 05:08 AM UTC

PDB ID : 4KUH / pdb_00004kuh
Title : Crystal structure of 3-hydroxybutyryl-CoA dehydrogenase with acetoacetyl-CoA from *Clostridium butyricum*
Authors : Kim, E.J.; Kim, S.; Kim, K.J.
Deposited on : 2013-05-22
Resolution : 2.51 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

The following versions of software and data (see [references ⓘ](#)) were used in the production of this report:

MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.010 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.49

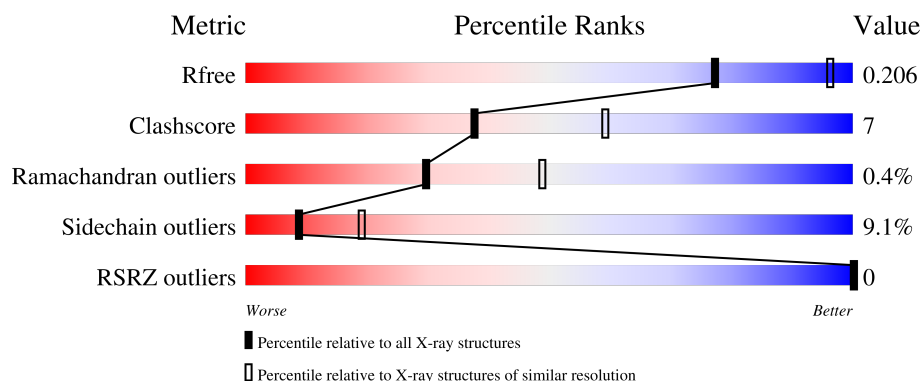
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.51 Å.

Percentile scores (ranging between 0-100) for global validation metrics of the entry are shown in the following graphic. The table shows the number of entries on which the scores are based.



Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	5829 (2.50-2.50)
Clashscore	190562	6492 (2.50-2.50)
Ramachandran outliers	187476	6378 (2.50-2.50)
Sidechain outliers	187428	6380 (2.50-2.50)
RSRZ outliers	180081	5833 (2.50-2.50)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	286	
1	B	286	
1	C	286	
1	D	286	
1	E	286	

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Mol	Chain	Length	Quality of chain
1	F	286	 74%21%...
1	G	286	 80%15%..
1	H	286	 76%20%..

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 17336 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

- Molecule 1 is a protein called 3-hydroxybutyryl-CoA dehydrogenase.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	B	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	C	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	D	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	E	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	F	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	G	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			
1	H	280	Total	C	N	O	S	0	0	0
			2114	1343	350	406	15			

There are 48 discrepancies between the modelled and reference sequences:

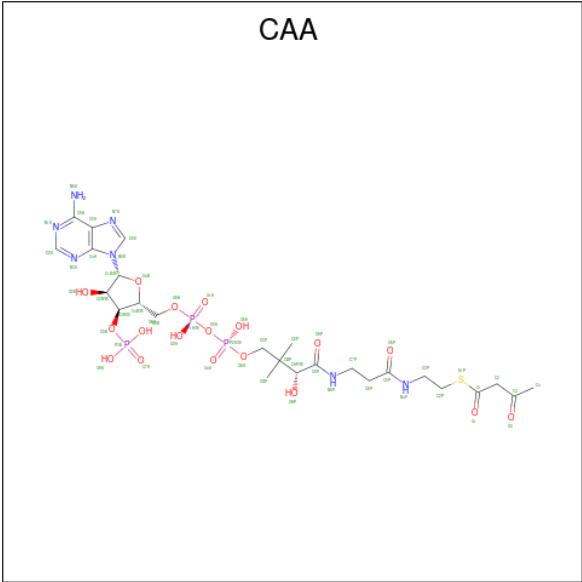
Chain	Residue	Modelled	Actual	Comment	Reference
A	281	HIS	-	expression tag	UNP C4IEM5
A	282	HIS	-	expression tag	UNP C4IEM5
A	283	HIS	-	expression tag	UNP C4IEM5
A	284	HIS	-	expression tag	UNP C4IEM5
A	285	HIS	-	expression tag	UNP C4IEM5
A	286	HIS	-	expression tag	UNP C4IEM5
B	281	HIS	-	expression tag	UNP C4IEM5
B	282	HIS	-	expression tag	UNP C4IEM5
B	283	HIS	-	expression tag	UNP C4IEM5
B	284	HIS	-	expression tag	UNP C4IEM5
B	285	HIS	-	expression tag	UNP C4IEM5
B	286	HIS	-	expression tag	UNP C4IEM5
C	281	HIS	-	expression tag	UNP C4IEM5

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Chain	Residue	Modelled	Actual	Comment	Reference
C	282	HIS	-	expression tag	UNP C4IEM5
C	283	HIS	-	expression tag	UNP C4IEM5
C	284	HIS	-	expression tag	UNP C4IEM5
C	285	HIS	-	expression tag	UNP C4IEM5
C	286	HIS	-	expression tag	UNP C4IEM5
D	281	HIS	-	expression tag	UNP C4IEM5
D	282	HIS	-	expression tag	UNP C4IEM5
D	283	HIS	-	expression tag	UNP C4IEM5
D	284	HIS	-	expression tag	UNP C4IEM5
D	285	HIS	-	expression tag	UNP C4IEM5
D	286	HIS	-	expression tag	UNP C4IEM5
E	281	HIS	-	expression tag	UNP C4IEM5
E	282	HIS	-	expression tag	UNP C4IEM5
E	283	HIS	-	expression tag	UNP C4IEM5
E	284	HIS	-	expression tag	UNP C4IEM5
E	285	HIS	-	expression tag	UNP C4IEM5
E	286	HIS	-	expression tag	UNP C4IEM5
F	281	HIS	-	expression tag	UNP C4IEM5
F	282	HIS	-	expression tag	UNP C4IEM5
F	283	HIS	-	expression tag	UNP C4IEM5
F	284	HIS	-	expression tag	UNP C4IEM5
F	285	HIS	-	expression tag	UNP C4IEM5
F	286	HIS	-	expression tag	UNP C4IEM5
G	281	HIS	-	expression tag	UNP C4IEM5
G	282	HIS	-	expression tag	UNP C4IEM5
G	283	HIS	-	expression tag	UNP C4IEM5
G	284	HIS	-	expression tag	UNP C4IEM5
G	285	HIS	-	expression tag	UNP C4IEM5
G	286	HIS	-	expression tag	UNP C4IEM5
H	281	HIS	-	expression tag	UNP C4IEM5
H	282	HIS	-	expression tag	UNP C4IEM5
H	283	HIS	-	expression tag	UNP C4IEM5
H	284	HIS	-	expression tag	UNP C4IEM5
H	285	HIS	-	expression tag	UNP C4IEM5
H	286	HIS	-	expression tag	UNP C4IEM5

- Molecule 2 is ACETOACETYL-COENZYME A (CCD ID: CAA) (formula: $C_{25}H_{40}N_7O_{18}P_3S$).



Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	S	0	0
			54	25	7	18	3	1		
2	C	1	Total	C	N	O	P	S	0	0
			54	25	7	18	3	1		
2	E	1	Total	C	N	O	P	S	0	0
			54	25	7	18	3	1		
2	F	1	Total	C	N	O	P	S	0	0
			54	25	7	18	3	1		
2	H	1	Total	C	N	O	P	S	0	0
			54	25	7	18	3	1		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	21	Total	O	0	0
			21	21		
3	B	22	Total	O	0	0
			22	22		
3	C	23	Total	O	0	0
			23	23		
3	D	25	Total	O	0	0
			25	25		
3	E	14	Total	O	0	0
			14	14		
3	F	20	Total	O	0	0
			20	20		
3	G	13	Total	O	0	0
			13	13		

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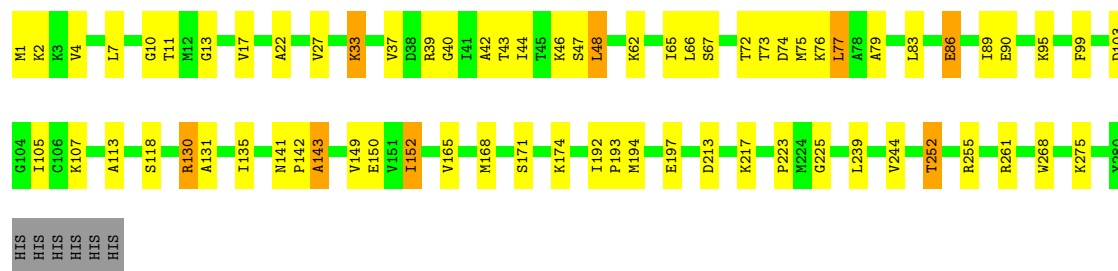
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	H	16	Total	O	0	0
			16	16		

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 electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density ($RSRZ > 2$). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

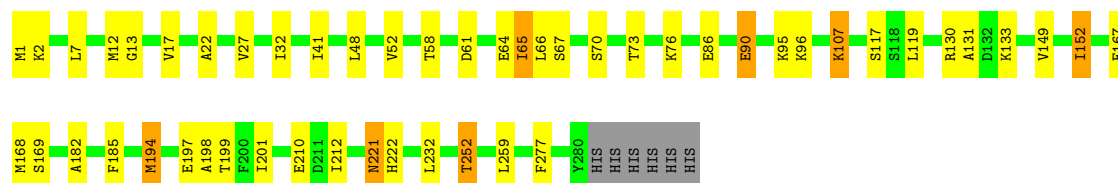
• Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain A: 



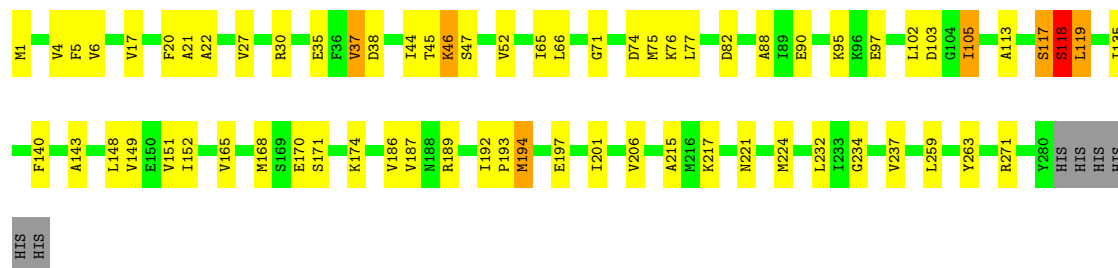
• Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain B: 



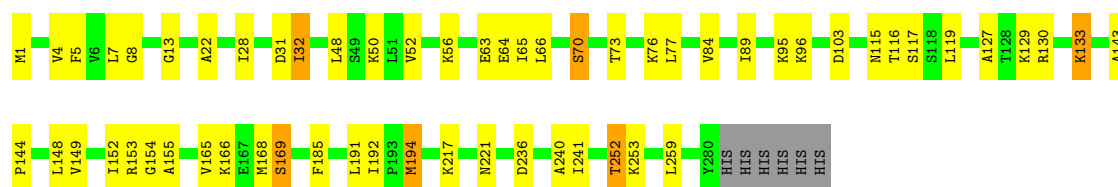
• Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain C: 



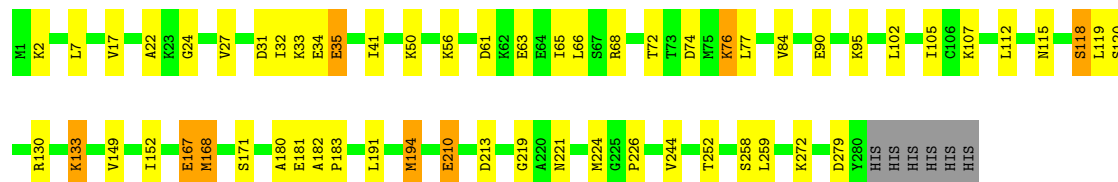
• Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain D: 



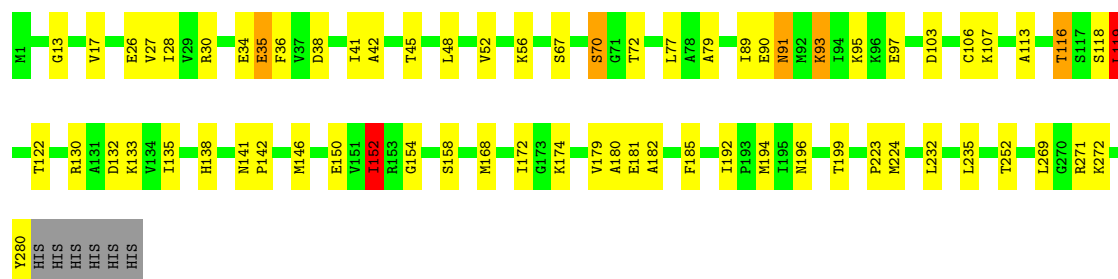
- Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain E: 77% 18% . .



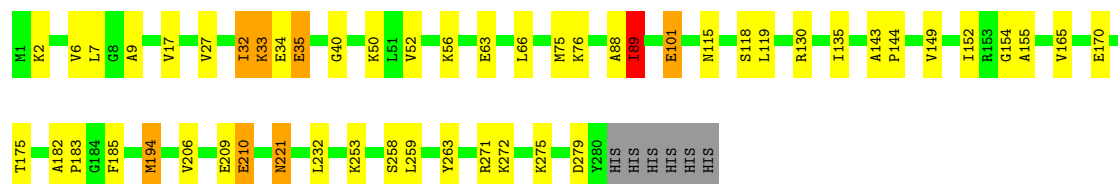
- Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain F: 74% 21% . . .



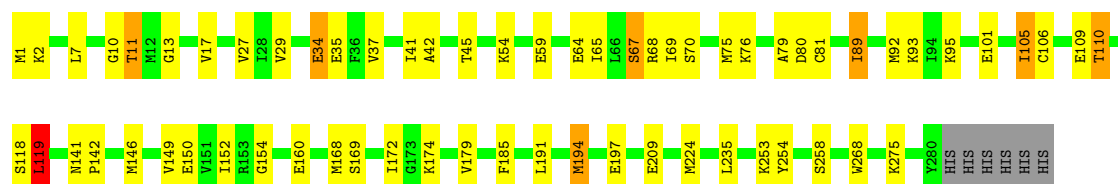
- Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain G: 80% 15% . .



- Molecule 1: 3-hydroxybutyryl-CoA dehydrogenase

Chain H: 76% 20% . .



4 Data and refinement statistics

Property	Value	Source
Space group	H 3	Depositor
Cell constants a, b, c, α , β , γ	146.34Å 146.34Å 409.76Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	29.55 – 2.51 29.55 – 2.51	Depositor EDS
% Data completeness (in resolution range)	92.4 (29.55-2.51) 92.6 (29.55-2.51)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.22 (at 2.51Å)	Xtriage
Refinement program	REFMAC	Depositor
R, R_{free}	0.191 , 0.257 (Not available) , 0.206	Depositor DCC
R_{free} test set	5229 reflections (4.66%)	wwPDB-VP
Wilson B-factor (Å ²)	40.4	Xtriage
Anisotropy	0.341	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 29.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	0.467 for -h-k,k,-l	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	17336	wwPDB-VP
Average B, all atoms (Å ²)	54.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.47% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

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

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	0.91	0/2140	1.10	6/2882 (0.2%)
1	B	0.94	0/2140	1.09	2/2882 (0.1%)
1	C	0.92	0/2140	1.14	9/2882 (0.3%)
1	D	0.92	2/2140 (0.1%)	1.08	3/2882 (0.1%)
1	E	0.90	0/2140	1.06	3/2882 (0.1%)
1	F	0.89	0/2140	1.09	7/2882 (0.2%)
1	G	0.86	0/2140	1.01	1/2882 (0.0%)
1	H	0.86	0/2140	1.04	3/2882 (0.1%)
All	All	0.90	2/17120 (0.0%)	1.08	34/23056 (0.1%)

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	C	0	2

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	D	240	ALA	N-CA	-6.32	1.38	1.46
1	D	236	ASP	C-O	-5.27	1.17	1.24

All (34) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	105	ILE	N-CA-C	8.06	118.16	110.42
1	C	118	SER	N-CA-C	7.57	120.88	108.99
1	A	105	ILE	N-CA-C	7.54	118.31	110.62

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	E	119	LEU	N-CA-C	7.39	120.29	110.53
1	C	119	LEU	N-CA-C	-6.85	99.83	109.69
1	D	103	ASP	N-CA-C	-6.45	104.17	111.14
1	C	117	SER	N-CA-C	6.40	123.63	114.16
1	D	116	THR	N-CA-C	6.33	118.47	110.24
1	F	154	GLY	N-CA-C	-6.22	102.83	112.85
1	H	119	LEU	N-CA-C	6.08	118.17	110.33
1	A	152	ILE	CB-CA-C	-5.98	102.79	110.98
1	A	105	ILE	CB-CA-C	-5.93	104.13	112.14
1	A	143	ALA	CA-C-N	-5.78	113.80	119.64
1	A	143	ALA	C-N-CA	-5.78	113.80	119.64
1	G	32	ILE	N-CA-CB	5.62	117.76	110.57
1	F	119	LEU	N-CA-C	5.61	117.31	110.41
1	H	154	GLY	N-CA-C	-5.55	104.11	112.89
1	E	152	ILE	CB-CA-C	-5.54	103.48	111.19
1	C	171	SER	N-CA-C	5.42	118.69	111.75
1	F	152	ILE	CB-CA-C	-5.38	103.61	110.98
1	D	4	VAL	N-CA-C	5.26	116.06	108.48
1	F	182	ALA	N-CA-C	-5.24	103.50	108.22
1	B	182	ALA	CA-C-N	-5.20	114.21	119.83
1	B	182	ALA	C-N-CA	-5.20	114.21	119.83
1	E	105	ILE	N-CA-C	5.18	115.95	110.72
1	F	192	ILE	CA-C-N	-5.18	114.49	119.87
1	F	192	ILE	C-N-CA	-5.18	114.49	119.87
1	A	103	ASP	N-CA-C	-5.16	104.91	111.11
1	C	152	ILE	CB-CA-C	-5.11	103.97	110.98
1	F	36	PHE	N-CA-C	-5.11	104.78	111.02
1	C	103	ASP	CA-C-N	5.02	125.51	119.94
1	C	103	ASP	C-N-CA	5.02	125.51	119.94
1	C	105	ILE	CB-CA-C	-5.02	105.54	111.97
1	H	11	THR	N-CA-C	-5.00	105.28	111.33

There are no chirality outliers.

All (2) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	C	117	SER	Peptide
1	C	118	SER	Peptide

5.2 Too-close contacts ⓘ

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	2114	0	2193	38	0
1	B	2114	0	2193	24	0
1	C	2114	0	2193	39	0
1	D	2114	0	2193	28	0
1	E	2114	0	2193	35	0
1	F	2114	0	2193	40	0
1	G	2114	0	2193	23	0
1	H	2114	0	2193	34	0
2	A	54	0	36	1	0
2	C	54	0	36	4	0
2	E	54	0	36	3	0
2	F	54	0	36	2	0
2	H	54	0	36	2	0
3	A	21	0	0	0	0
3	B	22	0	0	0	0
3	C	23	0	0	0	0
3	D	25	0	0	2	0
3	E	14	0	0	1	0
3	F	20	0	0	0	0
3	G	13	0	0	0	0
3	H	16	0	0	0	0
All	All	17336	0	17724	245	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 7.

All (245) 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:E:194:MET:HE2	1:F:194:MET:HE2	1.39	1.05
1:A:194:MET:HE2	1:B:194:MET:CE	1.92	0.99
1:A:194:MET:HE2	1:B:194:MET:HE2	1.47	0.96
1:E:194:MET:CE	1:F:194:MET:HE2	1.97	0.94
1:H:76:LYS:HA	1:H:105:ILE:HD12	1.57	0.87
1:C:194:MET:HE2	1:D:194:MET:CE	2.10	0.81

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:41:ILE:O	1:H:45:THR:HG22	1.81	0.80
1:C:194:MET:HE2	1:D:194:MET:HE2	1.66	0.77
1:F:90:GLU:OE1	1:F:116:THR:HG22	1.86	0.76
1:C:17:VAL:HG13	1:C:27:VAL:HG11	1.67	0.74
1:D:130:ARG:HG2	1:D:133:LYS:HB2	1.69	0.74
1:G:194:MET:HE1	1:H:194:MET:SD	2.28	0.72
1:A:86:GLU:OE1	1:A:95:LYS:NZ	2.23	0.70
1:C:259:LEU:O	1:C:259:LEU:HD23	1.91	0.70
1:E:221:ASN:HB3	1:F:223:PRO:HG3	1.73	0.70
1:H:92:MET:HE2	1:H:119:LEU:HD22	1.74	0.69
1:E:50:LYS:NZ	2:E:301:CAA:N7A	2.38	0.69
2:A:301:CAA:O5P	2:A:301:CAA:H21	1.94	0.68
1:F:13:GLY:O	1:F:17:VAL:HG23	1.93	0.68
1:F:42:ALA:HA	1:F:45:THR:HG22	1.75	0.68
1:C:1:MET:HE3	1:C:168:MET:HE2	1.78	0.66
1:C:143:ALA:O	1:C:174:LYS:NZ	2.27	0.64
1:F:224:MET:HE3	2:F:301:CAA:O9P	1.98	0.64
1:C:259:LEU:HD21	1:C:263:TYR:CE1	2.34	0.63
1:H:172:ILE:HG13	1:H:174:LYS:HG2	1.80	0.63
1:H:92:MET:HE2	1:H:119:LEU:CD2	2.29	0.62
1:E:130:ARG:O	1:E:130:ARG:HG2	2.00	0.61
1:D:152:ILE:HD13	1:D:185:PHE:CD1	2.35	0.61
1:C:22:ALA:HA	1:C:65:ILE:HD12	1.82	0.61
1:H:150:GLU:HB3	1:H:152:ILE:HD11	1.81	0.61
1:C:140:PHE:CE2	1:C:148:LEU:HD23	2.36	0.60
2:C:301:CAA:O5P	2:C:301:CAA:H21	2.00	0.59
1:H:7:LEU:HD12	1:H:7:LEU:N	2.17	0.59
1:C:135:ILE:HG21	1:C:165:VAL:HG21	1.85	0.59
1:F:152:ILE:HG21	1:F:185:PHE:CE1	2.37	0.59
1:H:191:LEU:HA	1:H:194:MET:HE3	1.85	0.58
1:C:259:LEU:HD23	1:C:259:LEU:C	2.28	0.58
1:E:194:MET:CE	1:F:194:MET:CE	2.78	0.58
1:F:196:ASN:O	1:F:199:THR:OG1	2.23	0.57
1:A:4:VAL:HG22	1:A:83:LEU:HB3	1.86	0.57
1:E:22:ALA:HA	1:E:65:ILE:HD12	1.84	0.57
1:H:13:GLY:O	1:H:17:VAL:HG23	2.04	0.57
1:D:22:ALA:HA	1:D:65:ILE:HD12	1.87	0.57
1:B:86:GLU:OE1	1:B:95:LYS:HE2	2.04	0.57
1:C:90:GLU:OE2	1:C:95:LYS:NZ	2.38	0.56
1:A:223:PRO:HG3	1:B:221:ASN:O	2.05	0.56
1:C:189:ARG:O	1:C:193:PRO:HG2	2.06	0.56

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:182:ALA:HB1	1:E:183:PRO:CD	2.35	0.56
1:G:182:ALA:HB1	1:G:183:PRO:CD	2.36	0.56
1:H:268:TRP:CD1	1:H:275:LYS:HD3	2.41	0.56
1:B:130:ARG:HG2	1:B:133:LYS:HB2	1.88	0.55
1:C:118:SER:O	1:C:119:LEU:HD12	2.07	0.55
1:B:90:GLU:OE2	1:B:95:LYS:NZ	2.38	0.55
1:H:191:LEU:HD12	1:H:194:MET:HE3	1.88	0.55
1:F:79:ALA:HA	1:F:106:CYS:HA	1.89	0.54
1:A:86:GLU:HG2	1:A:99:PHE:HE1	1.73	0.54
1:D:191:LEU:HA	1:D:194:MET:HE3	1.89	0.54
1:G:88:ALA:O	1:G:89:ILE:C	2.50	0.54
1:D:96:LYS:HE3	1:D:127:ALA:HB2	1.89	0.54
1:G:119:LEU:N	1:G:119:LEU:HD12	2.23	0.54
1:G:182:ALA:HB1	1:G:183:PRO:HD3	1.88	0.54
1:H:268:TRP:CG	1:H:275:LYS:HD3	2.41	0.54
1:A:141:ASN:ND2	1:A:142:PRO:HA	2.23	0.53
1:G:152:ILE:HG21	1:G:185:PHE:CE1	2.43	0.53
1:A:118:SER:HB2	1:A:244:VAL:HG11	1.90	0.53
1:A:135:ILE:HG21	1:A:165:VAL:HG21	1.91	0.53
1:F:17:VAL:HG13	1:F:27:VAL:HG11	1.89	0.53
1:G:221:ASN:HD22	1:H:146:MET:HE1	1.73	0.53
1:H:17:VAL:HG13	1:H:27:VAL:HG11	1.91	0.53
1:B:12:MET:HA	1:B:12:MET:HE2	1.90	0.53
1:A:7:LEU:HD21	1:A:75:MET:HE1	1.90	0.52
1:D:165:VAL:O	1:D:169:SER:OG	2.27	0.52
1:G:130:ARG:HG2	1:G:130:ARG:O	2.10	0.52
1:A:48:LEU:HD12	1:A:66:LEU:HD22	1.91	0.51
2:F:301:CAA:O5P	2:F:301:CAA:H21	2.10	0.51
1:C:194:MET:HE2	1:D:194:MET:SD	2.51	0.51
1:E:194:MET:HE2	1:F:194:MET:CE	2.26	0.51
1:G:33:LYS:HB3	1:G:35:GLU:HG2	1.92	0.51
1:A:130:ARG:O	1:A:131:ALA:C	2.54	0.51
1:A:17:VAL:HG13	1:A:27:VAL:HG11	1.93	0.51
1:B:1:MET:HE2	1:B:168:MET:HB2	1.93	0.51
1:H:101:GLU:O	1:H:105:ILE:HG23	2.12	0.50
1:A:194:MET:CE	1:B:194:MET:HE2	2.32	0.50
1:D:152:ILE:HD13	1:D:185:PHE:CG	2.46	0.50
1:C:113:ALA:HA	1:C:135:ILE:O	2.11	0.50
1:H:37:VAL:O	1:H:41:ILE:HD12	2.12	0.50
1:H:81:CYS:O	1:H:110:THR:HG22	2.12	0.50
2:H:301:CAA:H141	2:H:301:CAA:O9P	2.12	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:115:ASN:CG	1:G:115:ASN:O	2.54	0.50
1:G:232:LEU:HA	1:G:271:ARG:HD2	1.94	0.50
1:C:197:GLU:OE1	1:D:253:LYS:HE2	2.12	0.49
1:D:8:GLY:O	1:D:13:GLY:HA3	2.11	0.49
1:E:180:ALA:O	1:E:181:GLU:C	2.55	0.49
1:H:79:ALA:HA	1:H:106:CYS:HA	1.94	0.49
1:D:217:LYS:NZ	3:D:403:HOH:O	2.46	0.49
1:H:224:MET:HE2	2:H:301:CAA:O9P	2.12	0.49
1:A:13:GLY:O	1:A:17:VAL:HG23	2.12	0.49
1:B:48:LEU:O	1:B:52:VAL:HG23	2.12	0.49
1:F:91:ASN:OD1	1:F:91:ASN:C	2.55	0.49
1:B:90:GLU:HG3	1:B:119:LEU:HD13	1.93	0.49
1:G:17:VAL:HG13	1:G:27:VAL:HG11	1.94	0.49
1:F:72:THR:HG21	1:F:77:LEU:HD12	1.94	0.49
1:C:194:MET:CE	1:D:194:MET:CE	2.88	0.49
1:B:58:THR:O	1:B:61:ASP:HB2	2.12	0.48
1:D:143:ALA:N	1:D:144:PRO:CD	2.76	0.48
1:B:210:GLU:CD	1:B:210:GLU:H	2.20	0.48
1:G:75:MET:HE3	1:G:101:GLU:OE1	2.14	0.48
1:H:80:ASP:CG	1:H:80:ASP:O	2.56	0.48
1:F:172:ILE:HG13	1:F:174:LYS:HG2	1.94	0.48
2:C:301:CAA:N3A	2:C:301:CAA:H3B	2.29	0.48
1:B:13:GLY:O	1:B:17:VAL:HG23	2.14	0.48
1:F:132:ASP:OD1	1:F:132:ASP:N	2.47	0.47
1:F:95:LYS:HE3	1:F:116:THR:CG2	2.44	0.47
1:H:81:CYS:O	1:H:110:THR:CG2	2.62	0.47
1:E:90:GLU:OE2	1:E:95:LYS:NZ	2.47	0.47
1:F:116:THR:HG21	1:F:119:LEU:HB2	1.95	0.47
1:F:152:ILE:N	1:F:152:ILE:HD13	2.30	0.47
1:A:268:TRP:CE2	1:A:275:LYS:HE3	2.49	0.47
1:G:194:MET:CE	1:H:194:MET:CE	2.92	0.47
1:A:39:ARG:O	1:A:42:ALA:HB3	2.15	0.47
1:B:199:THR:HG22	1:B:277:PHE:CZ	2.50	0.47
1:C:232:LEU:HD12	1:C:271:ARG:HD2	1.96	0.47
1:E:74:ASP:OD1	1:E:76:LYS:HG3	2.15	0.47
1:E:182:ALA:HB1	1:E:183:PRO:HD2	1.97	0.47
1:G:210:GLU:CD	1:G:210:GLU:H	2.23	0.47
1:A:33:LYS:HA	1:A:73:THR:HG21	1.96	0.46
1:F:35:GLU:HA	1:F:38:ASP:OD2	2.14	0.46
1:B:17:VAL:HG13	1:B:27:VAL:HG11	1.96	0.46
1:E:210:GLU:CD	1:E:210:GLU:H	2.18	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:H:89:ILE:O	1:H:95:LYS:HE3	2.15	0.46
1:A:79:ALA:O	1:A:107:LYS:HG3	2.16	0.46
1:H:179:VAL:HG11	1:H:185:PHE:HB3	1.97	0.46
1:G:135:ILE:HG21	1:G:165:VAL:HG21	1.96	0.46
1:A:10:GLY:O	1:A:11:THR:C	2.59	0.46
1:D:48:LEU:O	1:D:52:VAL:HG23	2.15	0.46
1:A:74:ASP:OD1	1:A:76:LYS:HG3	2.15	0.46
1:C:75:MET:HE1	1:C:102:LEU:HG	1.98	0.46
1:F:113:ALA:HA	1:F:135:ILE:O	2.15	0.46
1:F:179:VAL:HG11	1:F:185:PHE:HB3	1.98	0.46
1:B:197:GLU:O	1:B:198:ALA:C	2.59	0.46
1:G:6:VAL:HG11	1:G:17:VAL:HG23	1.98	0.46
1:A:22:ALA:HA	1:A:65:ILE:HD12	1.99	0.45
1:A:150:GLU:HB3	1:A:152:ILE:HD11	1.98	0.45
1:C:75:MET:HE3	1:C:75:MET:HB3	1.79	0.45
1:E:219:GLY:O	1:F:146:MET:HE2	2.16	0.45
1:D:152:ILE:HG21	1:D:185:PHE:CE1	2.51	0.45
1:C:234:GLY:O	1:C:237:VAL:HB	2.16	0.45
1:C:75:MET:HE1	1:C:102:LEU:CD2	2.46	0.45
1:D:153:ARG:HB3	3:D:420:HOH:O	2.15	0.45
1:F:91:ASN:OD1	1:F:93:LYS:N	2.48	0.45
1:F:271:ARG:O	1:F:272:LYS:C	2.60	0.45
2:C:301:CAA:O9A	2:C:301:CAA:O2B	2.26	0.45
1:A:4:VAL:O	1:A:27:VAL:HA	2.16	0.45
1:D:154:GLY:O	1:D:155:ALA:C	2.59	0.45
1:F:122:THR:OG1	1:F:181:GLU:OE1	2.22	0.44
1:E:17:VAL:HG13	1:E:27:VAL:HG11	1.98	0.44
1:F:107:LYS:O	1:F:130:ARG:NH1	2.35	0.44
1:E:33:LYS:HD3	3:E:401:HOH:O	2.18	0.44
1:E:191:LEU:O	1:E:194:MET:HB3	2.17	0.44
1:C:224:MET:CE	2:C:301:CAA:H141	2.47	0.44
1:F:180:ALA:O	1:F:181:GLU:C	2.61	0.44
1:H:42:ALA:HA	1:H:45:THR:CG2	2.48	0.44
1:C:192:ILE:N	1:C:193:PRO:CD	2.81	0.44
1:E:112:LEU:HD12	1:E:130:ARG:HD2	2.00	0.44
1:A:194:MET:HE1	1:B:222:HIS:HE1	1.83	0.44
1:D:1:MET:HE2	1:D:168:MET:HB2	2.00	0.44
1:E:118:SER:CB	1:E:244:VAL:HG21	2.48	0.44
1:F:138:HIS:HB3	1:F:150:GLU:HB2	2.00	0.44
1:G:209:GLU:OE1	1:G:209:GLU:N	2.51	0.44
1:B:201:ILE:HG22	1:B:212:ILE:HD11	2.00	0.43

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:E:84:VAL:HG11	1:E:102:LEU:HD13	2.00	0.43
1:E:167:GLU:O	1:E:168:MET:C	2.60	0.43
1:G:154:GLY:O	1:G:155:ALA:C	2.60	0.43
1:G:259:LEU:HD21	1:G:263:TYR:CE1	2.53	0.43
1:A:239:LEU:HD11	1:A:261:ARG:NH1	2.32	0.43
1:C:17:VAL:HG13	1:C:27:VAL:CG1	2.41	0.43
1:E:194:MET:SD	1:F:194:MET:HE2	2.58	0.43
1:B:22:ALA:HA	1:B:65:ILE:HD12	2.00	0.43
1:B:152:ILE:HG21	1:B:185:PHE:CE1	2.53	0.43
1:G:143:ALA:N	1:G:144:PRO:CD	2.82	0.43
1:A:37:VAL:HG21	1:A:72:THR:O	2.19	0.43
1:A:48:LEU:HD12	1:A:66:LEU:CD2	2.49	0.43
1:C:37:VAL:HG21	1:C:71:GLY:HA3	2.00	0.43
1:E:33:LYS:O	1:E:34:GLU:C	2.62	0.43
1:D:5:PHE:HB3	1:D:84:VAL:HG22	2.01	0.43
1:F:269:LEU:N	1:F:269:LEU:HD23	2.34	0.42
1:A:44:ILE:O	1:A:47:SER:HB3	2.19	0.42
1:A:213:ASP:CG	1:A:225:GLY:HA3	2.45	0.42
1:C:5:PHE:CZ	1:C:30:ARG:HB2	2.55	0.42
1:F:141:ASN:HA	1:F:142:PRO:HA	1.84	0.42
1:H:69:ILE:O	1:H:69:ILE:HG22	2.19	0.42
1:A:113:ALA:HA	1:A:135:ILE:O	2.19	0.42
1:B:107:LYS:O	1:B:130:ARG:NH1	2.52	0.42
1:C:135:ILE:HD11	1:C:151:VAL:CG1	2.50	0.42
1:A:62:LYS:NZ	1:H:67:SER:OG	2.43	0.42
1:C:4:VAL:HG12	1:C:6:VAL:HG23	2.01	0.42
1:D:192:ILE:HG13	1:D:241:ILE:HG21	2.02	0.42
1:C:76:LYS:HA	1:C:105:ILE:HD13	2.02	0.42
1:E:224:MET:HE3	1:E:224:MET:HB2	1.90	0.42
1:F:28:ILE:HA	1:F:70:SER:O	2.20	0.42
1:F:48:LEU:O	1:F:52:VAL:HG23	2.19	0.42
1:G:9:ALA:HB1	1:G:40:GLY:HA3	2.00	0.42
1:C:74:ASP:HB3	1:C:77:LEU:HD23	2.00	0.42
1:C:30:ARG:NE	1:C:75:MET:HG2	2.35	0.42
1:E:31:ASP:OD1	1:E:32:ILE:N	2.47	0.42
1:F:103:ASP:OD1	1:F:130:ARG:HD2	2.20	0.42
1:D:28:ILE:HA	1:D:70:SER:O	2.20	0.41
1:D:115:ASN:CG	1:D:115:ASN:O	2.63	0.41
1:E:115:ASN:O	1:E:115:ASN:CG	2.62	0.41
1:E:224:MET:CE	2:E:301:CAA:H141	2.50	0.41
1:F:89:ILE:O	1:F:89:ILE:HG23	2.19	0.41

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:186:VAL:O	1:C:187:VAL:C	2.63	0.41
1:G:253:LYS:NZ	1:H:197:GLU:OE1	2.49	0.41
1:H:141:ASN:HA	1:H:142:PRO:HA	1.96	0.41
1:H:253:LYS:HD3	1:H:254:TYR:CZ	2.55	0.41
1:C:45:THR:HG22	1:C:46:LYS:N	2.34	0.41
1:E:130:ARG:HG2	1:E:133:LYS:HB2	2.02	0.41
1:H:75:MET:HE3	1:H:75:MET:HB3	1.94	0.41
1:A:252:THR:HG23	1:A:255:ARG:HD3	2.03	0.41
1:C:201:ILE:HG23	1:C:206:VAL:HB	2.02	0.41
1:E:61:ASP:O	1:E:65:ILE:HG12	2.19	0.41
1:F:17:VAL:HG13	1:F:27:VAL:CG1	2.50	0.41
1:A:1:MET:HB2	1:A:168:MET:CE	2.49	0.41
1:A:143:ALA:O	1:A:174:LYS:NZ	2.34	0.41
1:D:259:LEU:HD23	1:D:259:LEU:C	2.46	0.41
1:B:130:ARG:O	1:B:131:ALA:C	2.64	0.41
1:D:152:ILE:HD13	1:D:185:PHE:CE1	2.56	0.41
1:E:120:SER:OG	1:E:181:GLU:OE2	2.39	0.41
1:H:42:ALA:HA	1:H:45:THR:HG22	2.02	0.41
1:E:72:THR:HG21	1:E:77:LEU:HD12	2.03	0.41
1:F:30:ARG:C	1:F:30:ARG:HD3	2.45	0.41
1:C:44:ILE:O	1:C:47:SER:HB3	2.20	0.41
1:F:232:LEU:C	1:F:232:LEU:HD23	2.46	0.41
1:A:40:GLY:O	1:A:43:THR:N	2.54	0.40
1:A:192:ILE:N	1:A:193:PRO:CD	2.83	0.40
1:E:213:ASP:OD1	1:E:226:PRO:HD2	2.21	0.40
1:A:193:PRO:O	1:A:197:GLU:N	2.49	0.40
1:E:24:GLY:HA2	1:E:68:ARG:NE	2.36	0.40
2:E:301:CAA:H52A	2:E:301:CAA:P2A	2.61	0.40
1:B:64:GLU:O	1:B:67:SER:OG	2.35	0.40
1:C:20:PHE:O	1:C:21:ALA:C	2.65	0.40
1:D:31:ASP:OD1	1:D:32:ILE:HD13	2.21	0.40
1:E:35:GLU:CD	1:E:35:GLU:H	2.28	0.40
1:H:168:MET:HE2	1:H:168:MET:HB2	1.90	0.40
1:C:215:ALA:HA	1:D:148:LEU:HD22	2.03	0.40

There are no symmetry-related clashes.

5.3 Torsion angles

5.3.1 Protein backbone

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	278/286 (97%)	259 (93%)	18 (6%)	1 (0%)	30	49
1	B	278/286 (97%)	262 (94%)	15 (5%)	1 (0%)	30	49
1	C	278/286 (97%)	260 (94%)	17 (6%)	1 (0%)	30	49
1	D	278/286 (97%)	261 (94%)	16 (6%)	1 (0%)	30	49
1	E	278/286 (97%)	256 (92%)	21 (8%)	1 (0%)	30	49
1	F	278/286 (97%)	255 (92%)	23 (8%)	0	100	100
1	G	278/286 (97%)	263 (95%)	13 (5%)	2 (1%)	18	34
1	H	278/286 (97%)	256 (92%)	20 (7%)	2 (1%)	18	34
All	All	2224/2288 (97%)	2072 (93%)	143 (6%)	9 (0%)	30	49

All (9) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	D	252	THR
1	B	252	THR
1	C	88	ALA
1	G	272	LYS
1	E	272	LYS
1	H	34	GLU
1	A	77	LEU
1	H	10	GLY
1	G	89	ILE

5.3.2 Protein sidechains

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was

analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	226/232 (97%)	212 (94%)	14 (6%)	16	34
1	B	226/232 (97%)	204 (90%)	22 (10%)	8	17
1	C	226/232 (97%)	213 (94%)	13 (6%)	18	38
1	D	226/232 (97%)	203 (90%)	23 (10%)	7	15
1	E	226/232 (97%)	205 (91%)	21 (9%)	8	18
1	F	226/232 (97%)	206 (91%)	20 (9%)	9	20
1	G	226/232 (97%)	201 (89%)	25 (11%)	6	12
1	H	226/232 (97%)	199 (88%)	27 (12%)	5	11
All	All	1808/1856 (97%)	1643 (91%)	165 (9%)	9	19

All (165) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	2	LYS
1	A	33	LYS
1	A	46	LYS
1	A	48	LEU
1	A	67	SER
1	A	77	LEU
1	A	86	GLU
1	A	89	ILE
1	A	90	GLU
1	A	130	ARG
1	A	149	VAL
1	A	171	SER
1	A	217	LYS
1	A	252	THR
1	B	2	LYS
1	B	7	LEU
1	B	32	ILE
1	B	41	ILE
1	B	65	ILE
1	B	66	LEU
1	B	70	SER
1	B	73	THR
1	B	76	LYS
1	B	90	GLU
1	B	96	LYS

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Mol	Chain	Res	Type
1	B	107	LYS
1	B	117	SER
1	B	149	VAL
1	B	152	ILE
1	B	167	GLU
1	B	169	SER
1	B	194	MET
1	B	221	ASN
1	B	232	LEU
1	B	252	THR
1	B	259	LEU
1	C	35	GLU
1	C	37	VAL
1	C	38	ASP
1	C	46	LYS
1	C	52	VAL
1	C	66	LEU
1	C	82	ASP
1	C	97	GLU
1	C	149	VAL
1	C	170	GLU
1	C	194	MET
1	C	217	LYS
1	C	221	ASN
1	D	7	LEU
1	D	32	ILE
1	D	50	LYS
1	D	56	LYS
1	D	63	GLU
1	D	64	GLU
1	D	66	LEU
1	D	70	SER
1	D	73	THR
1	D	76	LYS
1	D	77	LEU
1	D	89	ILE
1	D	95	LYS
1	D	117	SER
1	D	119	LEU
1	D	129	LYS
1	D	133	LYS
1	D	149	VAL

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Mol	Chain	Res	Type
1	D	166	LYS
1	D	169	SER
1	D	194	MET
1	D	221	ASN
1	D	252	THR
1	E	2	LYS
1	E	7	LEU
1	E	35	GLU
1	E	41	ILE
1	E	56	LYS
1	E	63	GLU
1	E	66	LEU
1	E	76	LYS
1	E	107	LYS
1	E	118	SER
1	E	133	LYS
1	E	149	VAL
1	E	167	GLU
1	E	168	MET
1	E	171	SER
1	E	194	MET
1	E	210	GLU
1	E	252	THR
1	E	258	SER
1	E	259	LEU
1	E	279	ASP
1	F	26	GLU
1	F	34	GLU
1	F	35	GLU
1	F	41	ILE
1	F	56	LYS
1	F	67	SER
1	F	70	SER
1	F	91	ASN
1	F	93	LYS
1	F	97	GLU
1	F	116	THR
1	F	118	SER
1	F	119	LEU
1	F	133	LYS
1	F	152	ILE
1	F	158	SER

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Mol	Chain	Res	Type
1	F	168	MET
1	F	235	LEU
1	F	252	THR
1	F	280	TYR
1	G	2	LYS
1	G	7	LEU
1	G	32	ILE
1	G	33	LYS
1	G	34	GLU
1	G	35	GLU
1	G	50	LYS
1	G	52	VAL
1	G	56	LYS
1	G	63	GLU
1	G	66	LEU
1	G	76	LYS
1	G	89	ILE
1	G	101	GLU
1	G	118	SER
1	G	149	VAL
1	G	170	GLU
1	G	175	THR
1	G	194	MET
1	G	206	VAL
1	G	210	GLU
1	G	221	ASN
1	G	258	SER
1	G	275	LYS
1	G	279	ASP
1	H	1	MET
1	H	2	LYS
1	H	11	THR
1	H	29	VAL
1	H	34	GLU
1	H	35	GLU
1	H	54	LYS
1	H	59	GLU
1	H	64	GLU
1	H	65	ILE
1	H	67	SER
1	H	68	ARG
1	H	70	SER

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Mol	Chain	Res	Type
1	H	89	ILE
1	H	93	LYS
1	H	105	ILE
1	H	109	GLU
1	H	110	THR
1	H	118	SER
1	H	119	LEU
1	H	149	VAL
1	H	160	GLU
1	H	169	SER
1	H	194	MET
1	H	209	GLU
1	H	235	LEU
1	H	258	SER

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (11) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	141	ASN
1	B	91	ASN
1	B	222	HIS
1	C	91	ASN
1	C	141	ASN
1	C	222	HIS
1	D	222	HIS
1	G	221	ASN
1	G	222	HIS
1	H	91	ASN
1	H	222	HIS

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 [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

5 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	CAA	C	301	-	53,56,56	1.39	6 (11%)	77,83,83	1.88	16 (20%)
2	CAA	E	301	-	53,56,56	1.37	8 (15%)	77,83,83	1.76	11 (14%)
2	CAA	F	301	-	53,56,56	1.40	6 (11%)	77,83,83	1.83	18 (23%)
2	CAA	A	301	-	53,56,56	1.42	8 (15%)	77,83,83	1.62	13 (16%)
2	CAA	H	301	-	53,56,56	1.50	7 (13%)	77,83,83	1.76	14 (18%)

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	CAA	C	301	-	-	18/55/71/71	0/3/3/3
2	CAA	E	301	-	-	17/55/71/71	0/3/3/3
2	CAA	F	301	-	-	17/55/71/71	0/3/3/3
2	CAA	A	301	-	-	17/55/71/71	0/3/3/3
2	CAA	H	301	-	-	26/55/71/71	0/3/3/3

All (35) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	H	301	CAA	C5A-C4A	5.05	1.48	1.39
2	H	301	CAA	C1-S1P	-5.05	1.64	1.76
2	F	301	CAA	C5A-C4A	5.04	1.48	1.39

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	CAA	C5A-C4A	5.00	1.48	1.39
2	E	301	CAA	C5A-C4A	4.85	1.47	1.39
2	F	301	CAA	C1-S1P	-4.76	1.65	1.76
2	C	301	CAA	C5A-C4A	4.52	1.47	1.39
2	C	301	CAA	P1A-O3A	3.84	1.63	1.59
2	E	301	CAA	C1-S1P	-3.75	1.67	1.76
2	C	301	CAA	P2A-O3A	3.69	1.63	1.59
2	A	301	CAA	P1A-O3A	3.50	1.63	1.59
2	A	301	CAA	P2A-O3A	3.46	1.63	1.59
2	C	301	CAA	C1-S1P	-3.45	1.68	1.76
2	A	301	CAA	C1-S1P	-3.38	1.68	1.76
2	H	301	CAA	P1A-O3A	3.27	1.63	1.59
2	E	301	CAA	P2A-O3A	3.18	1.62	1.59
2	C	301	CAA	C5A-C6A	3.11	1.49	1.41
2	H	301	CAA	C5A-C6A	2.91	1.49	1.41
2	F	301	CAA	C5A-C6A	2.85	1.48	1.41
2	A	301	CAA	C5A-C6A	2.76	1.48	1.41
2	H	301	CAA	C8A-N7A	2.71	1.36	1.31
2	H	301	CAA	P2A-O3A	2.68	1.62	1.59
2	E	301	CAA	C5A-C6A	2.55	1.48	1.41
2	F	301	CAA	C8A-N7A	2.54	1.36	1.31
2	A	301	CAA	C8A-N7A	2.50	1.36	1.31
2	E	301	CAA	P1A-O3A	2.50	1.62	1.59
2	C	301	CAA	C8A-N7A	2.49	1.36	1.31
2	E	301	CAA	C5A-N7A	-2.48	1.34	1.39
2	A	301	CAA	C5A-N7A	-2.32	1.34	1.39
2	H	301	CAA	P3B-O3B	2.29	1.63	1.59
2	E	301	CAA	C8A-N7A	2.21	1.35	1.31
2	F	301	CAA	P2A-O3A	2.18	1.61	1.59
2	A	301	CAA	O1-C1	2.17	1.24	1.21
2	F	301	CAA	P1A-O3A	2.09	1.61	1.59
2	E	301	CAA	P3B-O3B	2.04	1.63	1.59

All (72) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	CAA	C5A-C4A-N3A	-6.72	117.46	126.72
2	C	301	CAA	C5A-C4A-N3A	-6.63	117.58	126.72
2	E	301	CAA	N3A-C4A-N9A	5.79	137.01	127.17
2	A	301	CAA	C5A-C4A-N3A	-5.74	118.82	126.72
2	H	301	CAA	C5A-C4A-N3A	-5.72	118.84	126.72
2	F	301	CAA	C5A-C4A-N3A	-5.63	118.96	126.72

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	301	CAA	N3A-C4A-N9A	5.33	136.23	127.17
2	C	301	CAA	C2A-N3A-C4A	4.97	123.97	111.83
2	C	301	CAA	N3A-C2A-N1A	-4.88	121.20	128.58
2	A	301	CAA	C2-C1-S1P	4.71	119.61	113.63
2	F	301	CAA	N3A-C4A-N9A	4.70	135.16	127.17
2	C	301	CAA	C2-C1-S1P	4.64	119.53	113.63
2	H	301	CAA	N3A-C4A-N9A	4.60	134.99	127.17
2	A	301	CAA	N3A-C4A-N9A	4.45	134.74	127.17
2	E	301	CAA	C2A-N3A-C4A	4.40	122.58	111.83
2	F	301	CAA	N3A-C2A-N1A	-4.33	122.03	128.58
2	E	301	CAA	C2-C1-S1P	4.25	119.03	113.63
2	E	301	CAA	N3A-C2A-N1A	-4.25	122.16	128.58
2	H	301	CAA	N3A-C2A-N1A	-4.24	122.16	128.58
2	F	301	CAA	C2A-N3A-C4A	4.10	121.84	111.83
2	H	301	CAA	C2A-N3A-C4A	4.09	121.81	111.83
2	H	301	CAA	C3P-N4P-C5P	-4.05	115.28	122.82
2	A	301	CAA	C2A-N3A-C4A	3.88	121.32	111.83
2	H	301	CAA	O1-C1-S1P	-3.84	117.80	122.68
2	A	301	CAA	N3A-C2A-N1A	-3.83	122.78	128.58
2	C	301	CAA	C4A-C5A-N7A	-3.76	106.29	110.58
2	H	301	CAA	C3B-C2B-C1B	3.71	108.06	99.89
2	F	301	CAA	CEP-CBP-CCP	3.67	114.28	108.22
2	F	301	CAA	C2-C1-S1P	3.65	118.26	113.63
2	F	301	CAA	O1-C1-S1P	-3.51	118.21	122.68
2	C	301	CAA	P3B-O3B-C3B	3.46	132.67	123.43
2	E	301	CAA	C3B-C2B-C1B	3.43	107.42	99.89
2	F	301	CAA	C6P-C7P-N8P	-3.35	104.88	112.00
2	C	301	CAA	C5A-N7A-C8A	3.23	108.53	103.45
2	F	301	CAA	CDP-CBP-CAP	3.18	114.19	108.77
2	H	301	CAA	C4A-C5A-N7A	-3.09	107.05	110.58
2	A	301	CAA	C4A-C5A-N7A	-3.04	107.10	110.58
2	H	301	CAA	CEP-CBP-CCP	3.03	113.22	108.22
2	F	301	CAA	C4A-C5A-N7A	-3.00	107.16	110.58
2	C	301	CAA	C6A-C5A-N7A	2.99	137.85	132.09
2	C	301	CAA	C4A-N9A-C8A	2.96	108.84	105.74
2	E	301	CAA	C4A-C5A-N7A	-2.79	107.39	110.58
2	F	301	CAA	O5P-C5P-C6P	-2.79	116.97	122.02
2	A	301	CAA	O4B-C1B-N9A	2.77	113.41	108.09
2	F	301	CAA	C4A-N9A-C8A	2.74	108.62	105.74
2	C	301	CAA	N9A-C8A-N7A	-2.67	110.15	113.94
2	F	301	CAA	C5A-N7A-C8A	2.65	107.61	103.45
2	E	301	CAA	C5A-N7A-C8A	2.62	107.58	103.45

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	F	301	CAA	CAP-C9P-N8P	-2.61	111.53	116.48
2	H	301	CAA	C5A-N7A-C8A	2.60	107.53	103.45
2	A	301	CAA	O1-C1-C2	-2.59	119.09	123.40
2	C	301	CAA	O1-C1-C2	-2.51	119.23	123.40
2	E	301	CAA	O1-C1-S1P	-2.45	119.56	122.68
2	H	301	CAA	C6A-C5A-N7A	2.40	136.73	132.09
2	F	301	CAA	C6A-C5A-N7A	2.40	136.72	132.09
2	H	301	CAA	C4A-N9A-C8A	2.36	108.22	105.74
2	F	301	CAA	C3B-C2B-C1B	2.36	105.09	99.89
2	A	301	CAA	C5A-N7A-C8A	2.34	107.13	103.45
2	E	301	CAA	C4A-N9A-C8A	2.29	108.15	105.74
2	H	301	CAA	C2A-N1A-C6A	2.27	122.45	118.73
2	F	301	CAA	N9A-C8A-N7A	-2.25	110.74	113.94
2	E	301	CAA	O4B-C1B-N9A	2.25	112.41	108.09
2	F	301	CAA	C2A-N1A-C6A	2.23	122.39	118.73
2	A	301	CAA	C2A-N1A-C6A	2.15	122.27	118.73
2	C	301	CAA	O4B-C1B-N9A	2.10	112.11	108.09
2	C	301	CAA	O3B-C3B-C4B	2.09	117.39	110.03
2	A	301	CAA	C3B-C2B-C1B	2.08	104.46	99.89
2	A	301	CAA	C6A-C5A-N7A	2.07	136.07	132.09
2	C	301	CAA	O3B-P3B-O7A	-2.06	101.97	109.33
2	H	301	CAA	N9A-C8A-N7A	-2.05	111.03	113.94
2	C	301	CAA	C6P-C7P-N8P	-2.03	107.67	112.00
2	A	301	CAA	C3-C2-C1	-2.02	106.03	113.95

There are no chirality outliers.

All (95) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	CAA	O4B-C4B-C5B-O5B
2	A	301	CAA	CAP-CBP-CCP-O6A
2	A	301	CAA	C5P-C6P-C7P-N8P
2	A	301	CAA	C2P-C3P-N4P-C5P
2	C	301	CAA	CCP-O6A-P2A-O3A
2	C	301	CAA	CCP-O6A-P2A-O4A
2	C	301	CAA	C2P-C3P-N4P-C5P
2	C	301	CAA	C1-C2-C3-C4
2	E	301	CAA	O4B-C1B-N9A-C4A
2	E	301	CAA	O4B-C1B-N9A-C8A
2	E	301	CAA	C5B-O5B-P1A-O1A
2	E	301	CAA	O1-C1-S1P-C2P
2	E	301	CAA	C2-C1-S1P-C2P

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Mol	Chain	Res	Type	Atoms
2	E	301	CAA	C1-C2-C3-C4
2	F	301	CAA	CCP-O6A-P2A-O3A
2	F	301	CAA	CCP-O6A-P2A-O4A
2	F	301	CAA	CCP-O6A-P2A-O5A
2	F	301	CAA	CBP-CCP-O6A-P2A
2	F	301	CAA	C2P-C3P-N4P-C5P
2	F	301	CAA	C1-C2-C3-O3
2	F	301	CAA	C1-C2-C3-C4
2	H	301	CAA	C2B-C1B-N9A-C8A
2	H	301	CAA	O4B-C4B-C5B-O5B
2	H	301	CAA	C5B-O5B-P1A-O2A
2	H	301	CAA	C5B-O5B-P1A-O3A
2	H	301	CAA	CCP-O6A-P2A-O3A
2	H	301	CAA	CCP-O6A-P2A-O4A
2	H	301	CAA	CCP-O6A-P2A-O5A
2	H	301	CAA	C5P-C6P-C7P-N8P
2	H	301	CAA	S1P-C2P-C3P-N4P
2	H	301	CAA	S1P-C1-C2-C3
2	H	301	CAA	C1-C2-C3-O3
2	A	301	CAA	C3B-C4B-C5B-O5B
2	H	301	CAA	C3B-C4B-C5B-O5B
2	C	301	CAA	C2B-C3B-O3B-P3B
2	H	301	CAA	C6P-C5P-N4P-C3P
2	H	301	CAA	C2B-C1B-N9A-C4A
2	C	301	CAA	C4B-C3B-O3B-P3B
2	E	301	CAA	C4B-C3B-O3B-P3B
2	A	301	CAA	S1P-C2P-C3P-N4P
2	F	301	CAA	C2B-C1B-N9A-C8A
2	F	301	CAA	O9P-C9P-CAP-OAP
2	H	301	CAA	O9P-C9P-CAP-OAP
2	A	301	CAA	C1-C2-C3-O3
2	A	301	CAA	C1-C2-C3-C4
2	C	301	CAA	C1-C2-C3-O3
2	E	301	CAA	C1-C2-C3-O3
2	H	301	CAA	C1-C2-C3-C4
2	H	301	CAA	O9P-C9P-CAP-CBP
2	E	301	CAA	N8P-C9P-CAP-CBP
2	F	301	CAA	O5P-C5P-C6P-C7P
2	H	301	CAA	O1-C1-S1P-C2P
2	H	301	CAA	C2-C1-S1P-C2P
2	C	301	CAA	N4P-C5P-C6P-C7P
2	C	301	CAA	P1A-O3A-P2A-O4A

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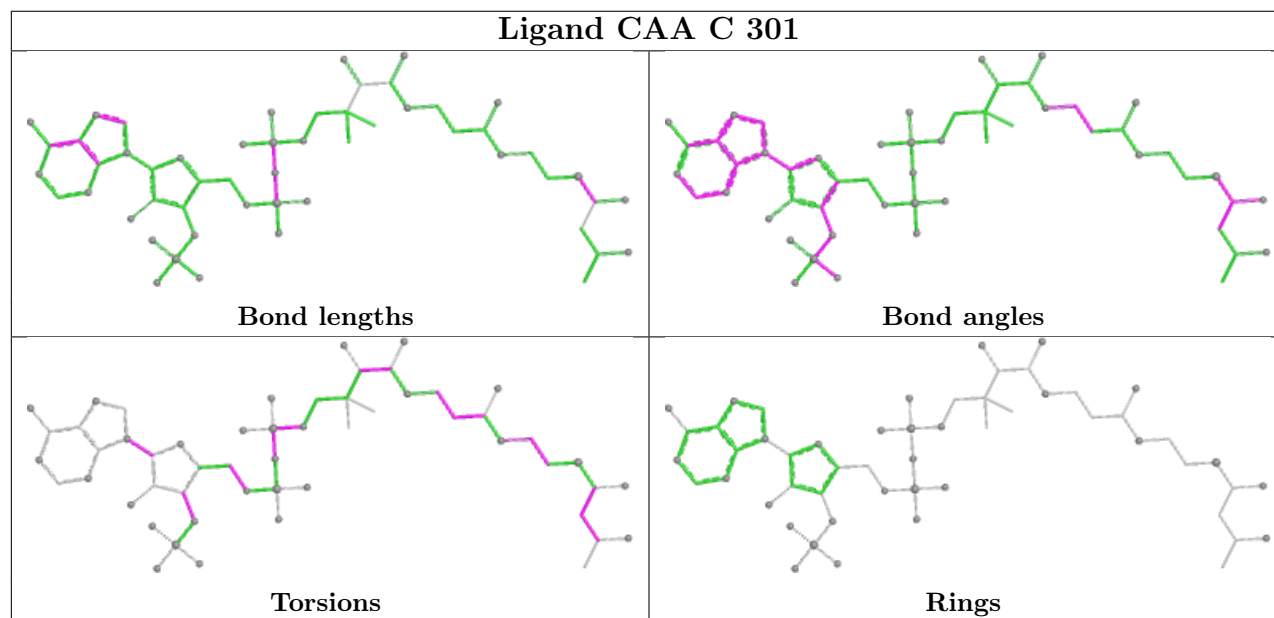
Mol	Chain	Res	Type	Atoms
2	C	301	CAA	S1P-C2P-C3P-N4P
2	E	301	CAA	O9P-C9P-CAP-OAP
2	C	301	CAA	O5P-C5P-C6P-C7P
2	A	301	CAA	CDP-CBP-CCP-O6A
2	A	301	CAA	CEP-CBP-CCP-O6A
2	H	301	CAA	O5P-C5P-N4P-C3P
2	C	301	CAA	C4B-C5B-O5B-P1A
2	C	301	CAA	CCP-O6A-P2A-O5A
2	E	301	CAA	C5B-O5B-P1A-O2A
2	E	301	CAA	C5B-O5B-P1A-O3A
2	H	301	CAA	C5B-O5B-P1A-O1A
2	C	301	CAA	C5P-C6P-C7P-N8P
2	F	301	CAA	C5P-C6P-C7P-N8P
2	H	301	CAA	P2A-O3A-P1A-O2A
2	F	301	CAA	C2B-C1B-N9A-C4A
2	A	301	CAA	C3B-O3B-P3B-O9A
2	E	301	CAA	C3B-O3B-P3B-O8A
2	A	301	CAA	C4B-C5B-O5B-P1A
2	H	301	CAA	N8P-C9P-CAP-CBP
2	F	301	CAA	N4P-C5P-C6P-C7P
2	E	301	CAA	N8P-C9P-CAP-OAP
2	F	301	CAA	N8P-C9P-CAP-OAP
2	H	301	CAA	N8P-C9P-CAP-OAP
2	H	301	CAA	C4B-C5B-O5B-P1A
2	A	301	CAA	O5P-C5P-C6P-C7P
2	A	301	CAA	P2A-O3A-P1A-O2A
2	C	301	CAA	P1A-O3A-P2A-O5A
2	E	301	CAA	O9P-C9P-CAP-CBP
2	C	301	CAA	O4B-C1B-N9A-C8A
2	F	301	CAA	O4B-C1B-N9A-C8A
2	F	301	CAA	O4B-C4B-C5B-O5B
2	E	301	CAA	CBP-CCP-O6A-P2A
2	H	301	CAA	CBP-CCP-O6A-P2A
2	E	301	CAA	C2B-C3B-O3B-P3B
2	A	301	CAA	N4P-C5P-C6P-C7P
2	F	301	CAA	C4B-C5B-O5B-P1A
2	A	301	CAA	O1-C1-C2-C3
2	C	301	CAA	O1-C1-C2-C3
2	A	301	CAA	N8P-C9P-CAP-OAP
2	C	301	CAA	N8P-C9P-CAP-OAP

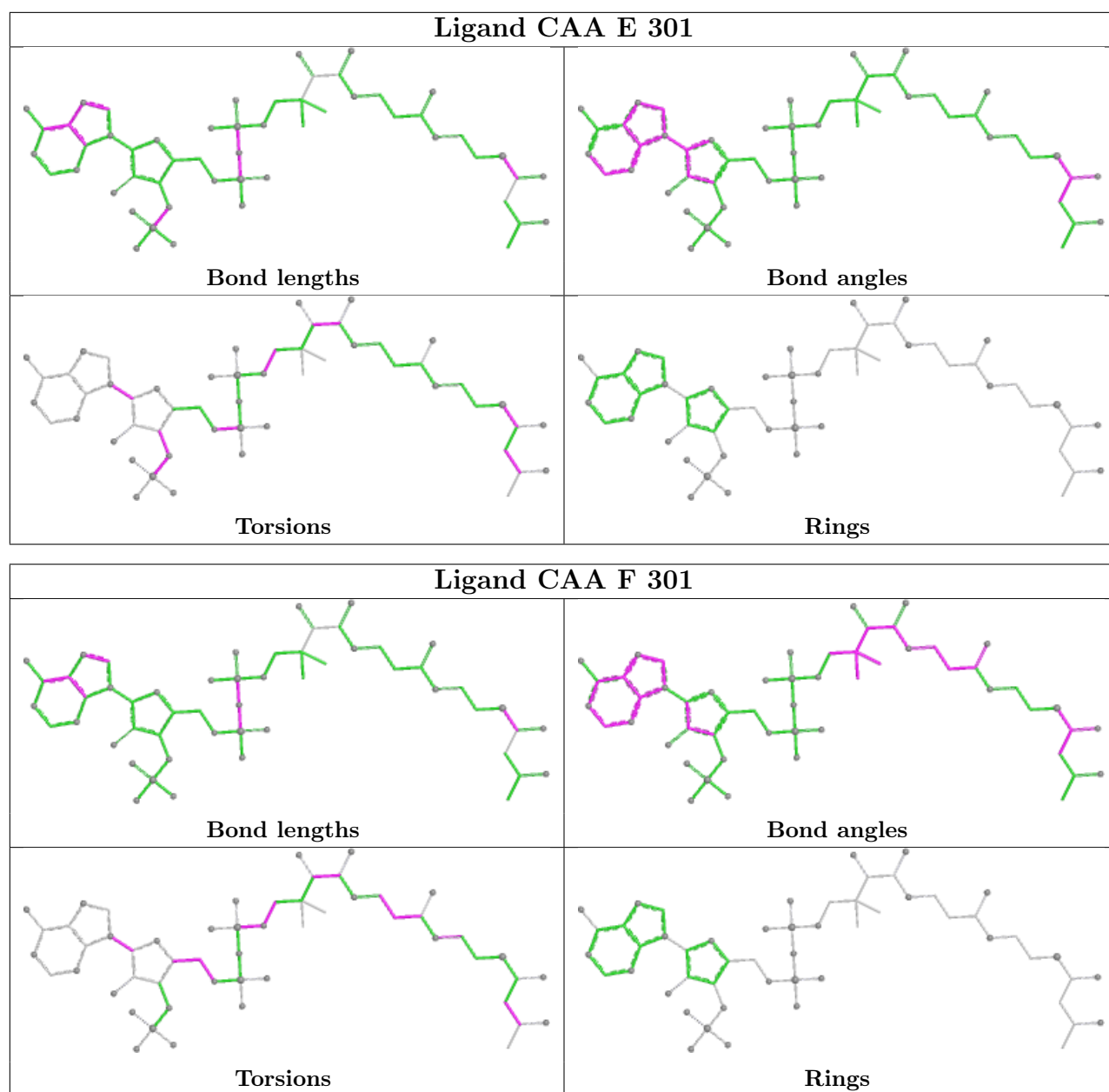
There are no ring outliers.

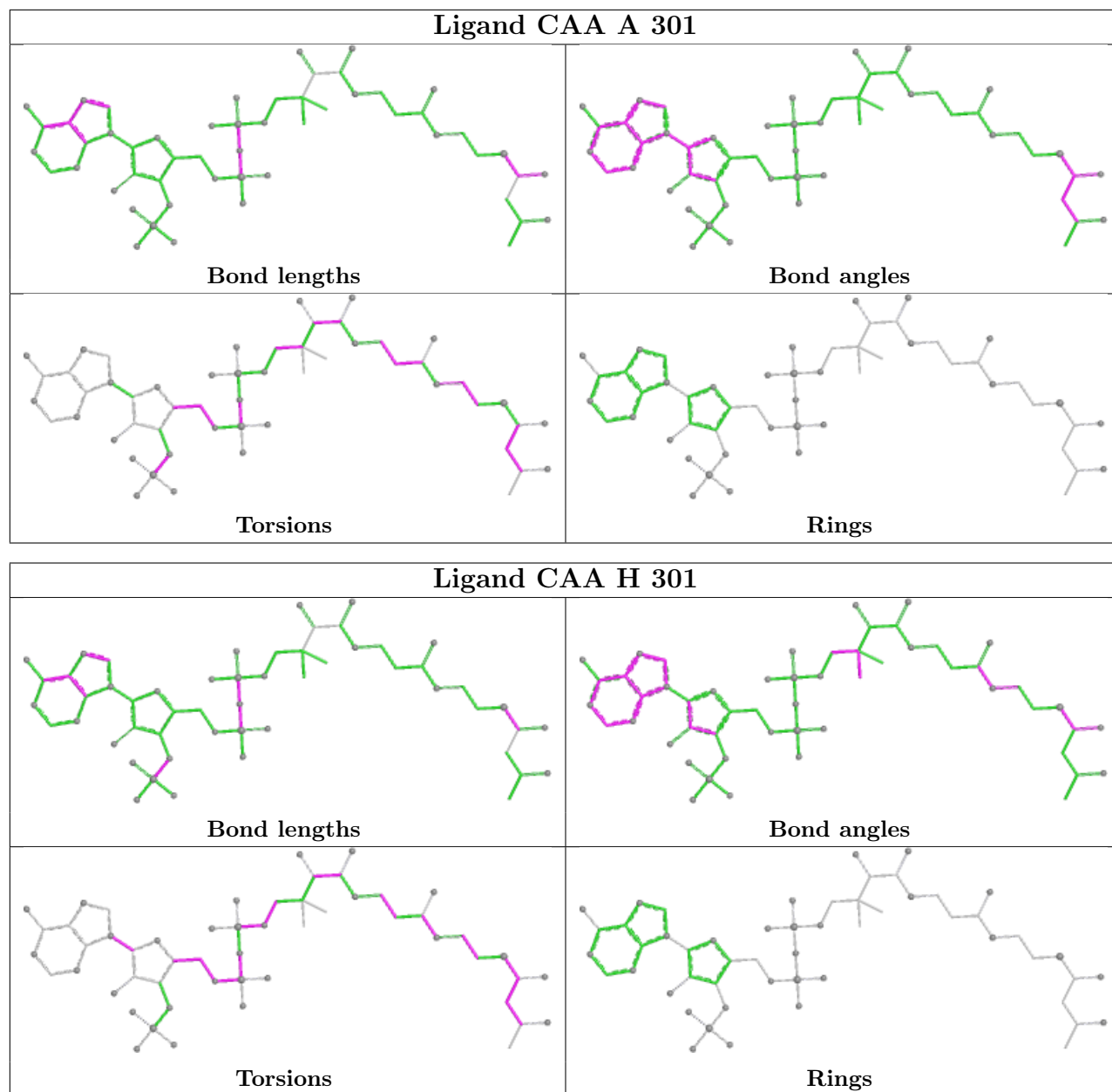
5 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	301	CAA	4	0
2	E	301	CAA	3	0
2	F	301	CAA	2	0
2	A	301	CAA	1	0
2	H	301	CAA	2	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 than 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.







5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

6.1 Protein, DNA and RNA chains [i](#)

In the following table, the column labelled ‘#RSRZ> 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q< 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	280/286 (97%)	-1.36	0 100 100	31, 52, 77, 101	0
1	B	280/286 (97%)	-1.45	0 100 100	32, 46, 67, 80	0
1	C	280/286 (97%)	-1.38	0 100 100	32, 52, 77, 108	0
1	D	280/286 (97%)	-1.47	0 100 100	31, 45, 66, 89	0
1	E	280/286 (97%)	-1.37	0 100 100	28, 50, 77, 103	0
1	F	280/286 (97%)	-1.33	0 100 100	27, 53, 84, 108	0
1	G	280/286 (97%)	-1.39	0 100 100	33, 52, 77, 98	0
1	H	280/286 (97%)	-1.37	0 100 100	34, 56, 86, 115	0
All	All	2240/2288 (97%)	-1.39	0 100 100	27, 50, 77, 115	0

There are no RSRZ outliers to report.

6.2 Non-standard residues in protein, DNA, RNA chains [i](#)

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

6.3 Carbohydrates [i](#)

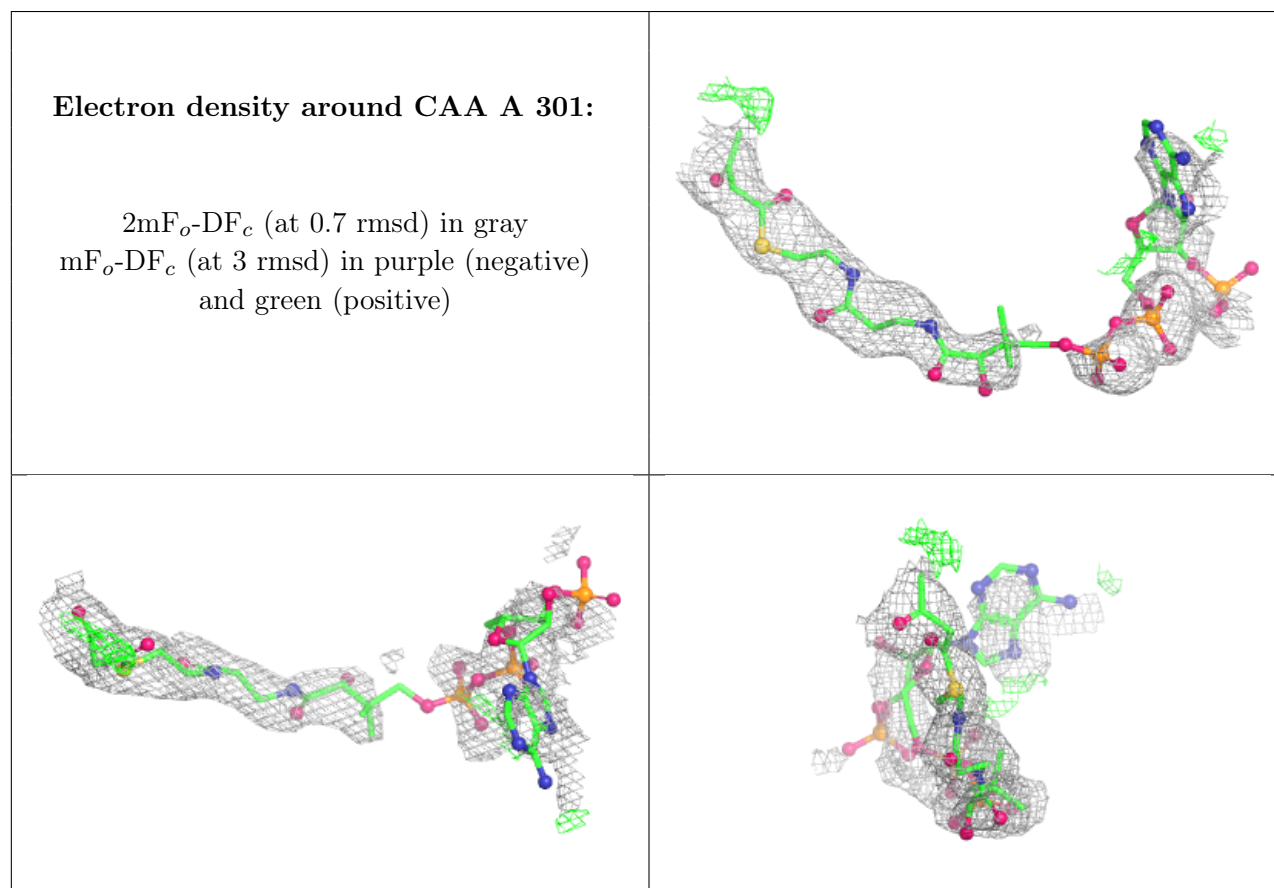
There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled ‘Q< 0.9’ lists the number of atoms with occupancy less than 0.9.

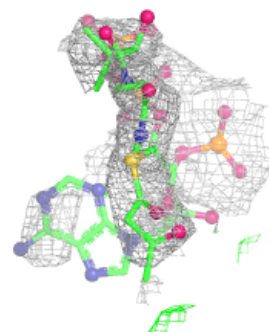
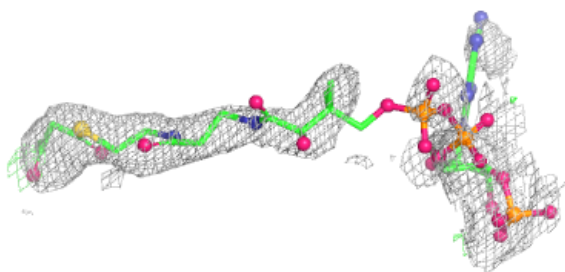
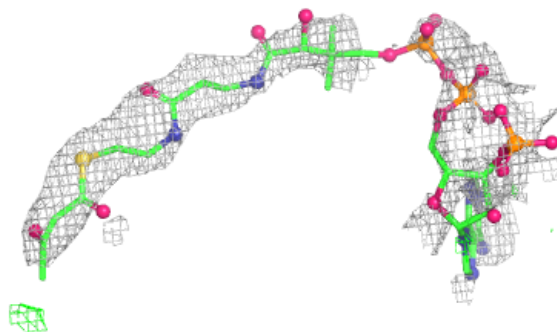
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	CAA	A	301	54/54	0.97	0.07	69,123,160,168	0
2	CAA	C	301	54/54	0.97	0.08	70,141,177,181	0
2	CAA	H	301	54/54	0.97	0.07	72,128,153,158	0
2	CAA	F	301	54/54	0.98	0.06	69,128,151,163	0
2	CAA	E	301	54/54	0.98	0.07	72,131,165,170	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

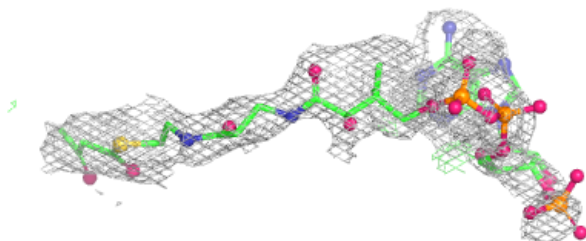
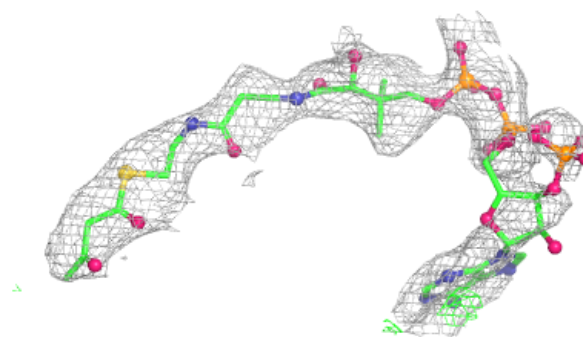


Electron density around CAA C 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

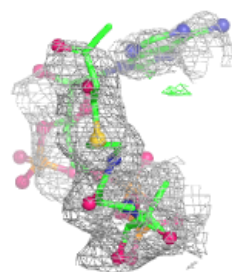
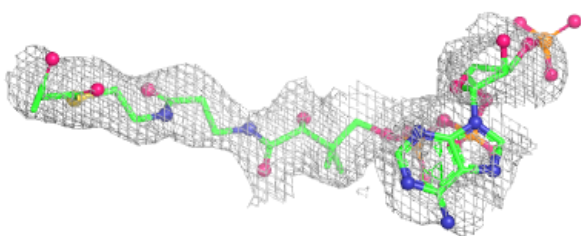
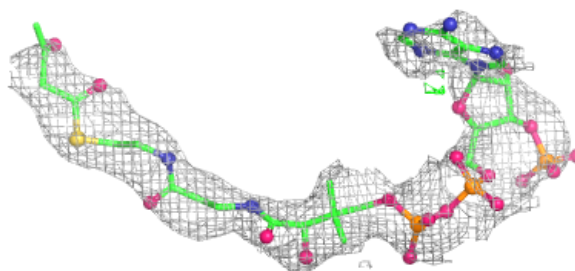
**Electron density around CAA H 301:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

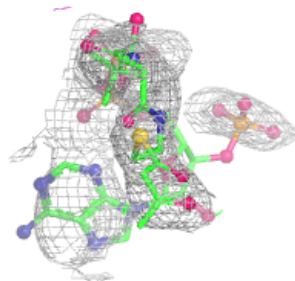
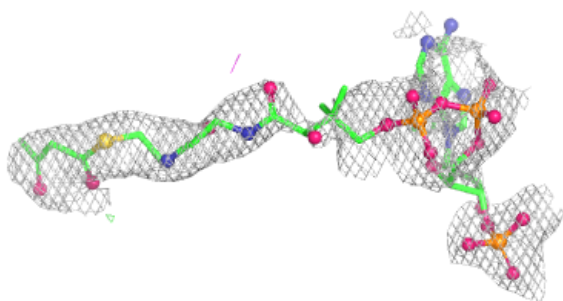
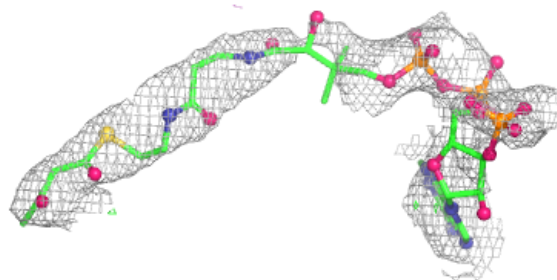


Electron density around CAA F 301:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)

**Electron density around CAA E 301:**

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.