



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 8, 2026 – 10:18 AM UTC

PDB ID : 2VDH / pdb_00002vdh
Title : Crystal structure of Chlamydomonas reinhardtii Rubisco with a large- subunit C172S mutation
Authors : Garcia-Murria, M.-J.; Karkehabadi, S.; Marin-Navarro, J.; Satagopan, S.; Andersson, I.; Spreitzer, R.J.; Moreno, J.
Deposited on : 2007-10-09
Resolution : 2.30 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

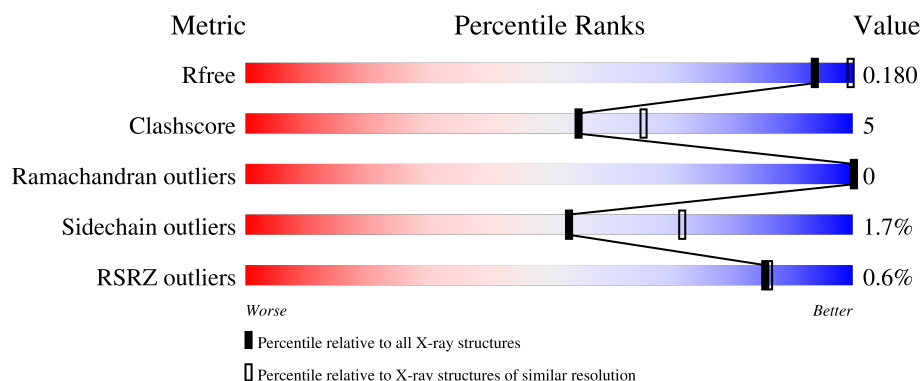
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.30 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.



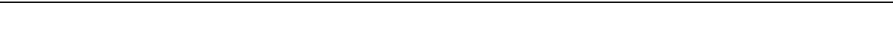
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	6319 (2.30-2.30)
Clashscore	190562	6919 (2.30-2.30)
Ramachandran outliers	187476	6854 (2.30-2.30)
Sidechain outliers	187428	6854 (2.30-2.30)
RSRZ outliers	180081	6325 (2.30-2.30)

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	475	87% 10% .
1	B	475	86% 12% .
1	C	475	85% 13% .
1	D	475	85% 13% .

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Mol	Chain	Length	Quality of chain
1	E	475	 87% 11% .
1	F	475	 86% 12% .
1	G	475	 85% 13% .
1	H	475	 88% 10% .
2	I	140	 84% 15% .
2	J	140	 89% 11%
2	K	140	 82% 17% .
2	L	140	 86% 14%
2	M	140	 86% 14%
2	N	140	 87% 13%
2	O	140	 84% 16%
2	P	140	 84% 15% .

2 Entry composition

There are 6 unique types of molecules in this entry. The entry contains 40416 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 RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	465	Total	C	N	O	S	0	0	0
			3628	2295	637	673	23			
1	B	468	Total	C	N	O	S	0	0	0
			3646	2306	641	676	23			
1	C	467	Total	C	N	O	S	0	0	0
			3637	2300	639	675	23			
1	D	465	Total	C	N	O	S	0	0	0
			3628	2295	637	673	23			
1	E	465	Total	C	N	O	S	0	0	0
			3627	2295	637	672	23			
1	F	467	Total	C	N	O	S	0	0	0
			3637	2300	639	675	23			
1	G	467	Total	C	N	O	S	0	0	0
			3637	2300	639	675	23			
1	H	465	Total	C	N	O	S	0	0	0
			3628	2295	637	673	23			

There are 16 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	46	PRO	LEU	conflict	UNP P00877
A	172	SER	CYS	engineered mutation	UNP P00877
B	46	PRO	LEU	conflict	UNP P00877
B	172	SER	CYS	engineered mutation	UNP P00877
C	46	PRO	LEU	conflict	UNP P00877
C	172	SER	CYS	engineered mutation	UNP P00877
D	46	PRO	LEU	conflict	UNP P00877
D	172	SER	CYS	engineered mutation	UNP P00877
E	46	PRO	LEU	conflict	UNP P00877
E	172	SER	CYS	engineered mutation	UNP P00877
F	46	PRO	LEU	conflict	UNP P00877
F	172	SER	CYS	engineered mutation	UNP P00877

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Chain	Residue	Modelled	Actual	Comment	Reference
G	46	PRO	LEU	conflict	UNP P00877
G	172	SER	CYS	engineered mutation	UNP P00877
H	46	PRO	LEU	conflict	UNP P00877
H	172	SER	CYS	engineered mutation	UNP P00877

- Molecule 2 is a protein called RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
2	I	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	J	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	K	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	L	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	M	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	N	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	O	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			
2	P	140	Total	C	N	O	S	0	0	0
			1143	739	190	203	11			

- Molecule 3 is MAGNESIUM ION (CCD ID: MG) (formula: Mg).

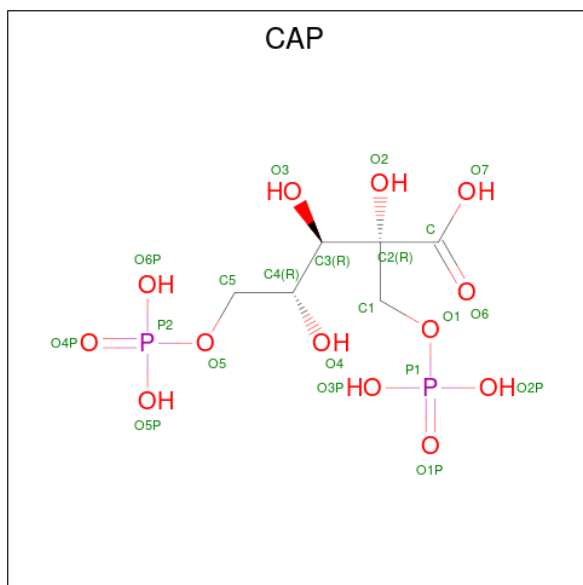
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		
3	C	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		
3	E	1	Total	Mg	0	0
			1	1		
3	F	1	Total	Mg	0	0
			1	1		
3	G	1	Total	Mg	0	0
			1	1		

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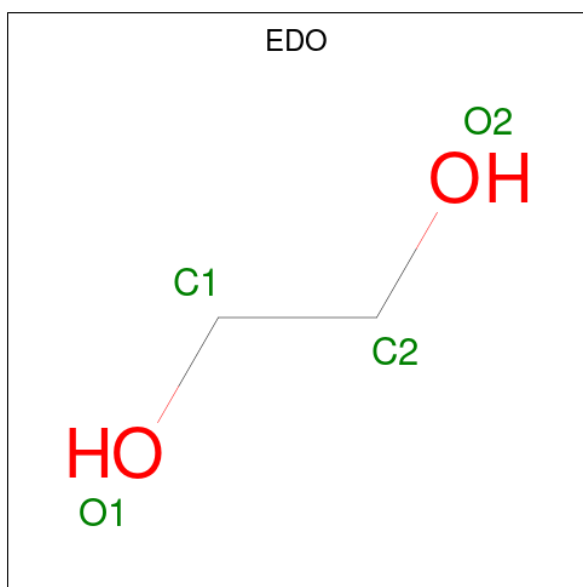
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	H	1	Total	Mg	0	0
			1	1		

- Molecule 4 is 2-CARBOXYARABINITOL-1,5-DIPHOSPHATE (CCD ID: CAP) (formula: $C_6H_{14}O_{13}P_2$).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	O	P	0	0
			21	6	13	2		
4	B	1	Total	C	O	P	0	0
			21	6	13	2		
4	C	1	Total	C	O	P	0	0
			21	6	13	2		
4	D	1	Total	C	O	P	0	0
			21	6	13	2		
4	E	1	Total	C	O	P	0	0
			21	6	13	2		
4	F	1	Total	C	O	P	0	0
			21	6	13	2		
4	G	1	Total	C	O	P	0	0
			21	6	13	2		
4	H	1	Total	C	O	P	0	0
			21	6	13	2		

- Molecule 5 is 1,2-ETHANEDIOL (CCD ID: EDO) (formula: $C_2H_6O_2$).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	A	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	B	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	C	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	C	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	D	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	E	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	F	1	Total	C	O	0	0
			4	2	2		
5	G	1	Total	C	O	0	0
			4	2	2		

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	G	1	Total 4	C 2	O 2	0	0
5	G	1	Total 4	C 2	O 2	0	0
5	G	1	Total 4	C 2	O 2	0	0
5	G	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	H	1	Total 4	C 2	O 2	0	0
5	I	1	Total 4	C 2	O 2	0	0
5	J	1	Total 4	C 2	O 2	0	0
5	J	1	Total 4	C 2	O 2	0	0
5	K	1	Total 4	C 2	O 2	0	0
5	K	1	Total 4	C 2	O 2	0	0
5	L	1	Total 4	C 2	O 2	0	0
5	M	1	Total 4	C 2	O 2	0	0
5	M	1	Total 4	C 2	O 2	0	0
5	N	1	Total 4	C 2	O 2	0	0
5	N	1	Total 4	C 2	O 2	0	0
5	O	1	Total 4	C 2	O 2	0	0

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Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
5	O	1	Total	C	O	0	0
			4	2	2		

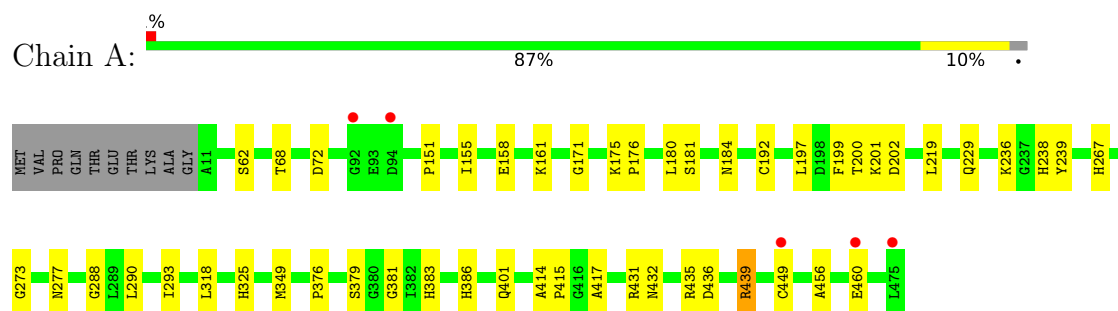
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	176	Total	O	0	0
			176	176		
6	B	192	Total	O	0	0
			192	192		
6	C	159	Total	O	0	0
			159	159		
6	D	171	Total	O	0	0
			171	171		
6	E	180	Total	O	0	0
			180	180		
6	F	178	Total	O	0	0
			178	178		
6	G	180	Total	O	0	0
			180	180		
6	H	190	Total	O	0	0
			190	190		
6	I	46	Total	O	0	0
			46	46		
6	J	39	Total	O	0	0
			39	39		
6	K	39	Total	O	0	0
			39	39		
6	L	55	Total	O	0	0
			55	55		
6	M	50	Total	O	0	0
			50	50		
6	N	49	Total	O	0	0
			49	49		
6	O	43	Total	O	0	0
			43	43		
6	P	53	Total	O	0	0
			53	53		

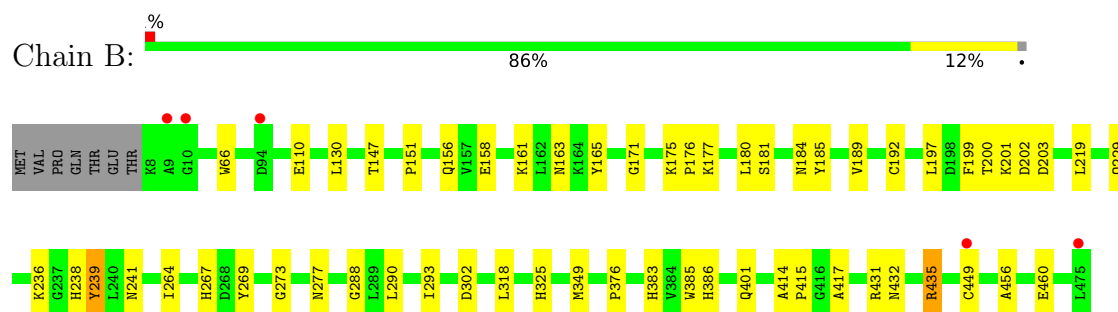
3 Residue-property plots

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.

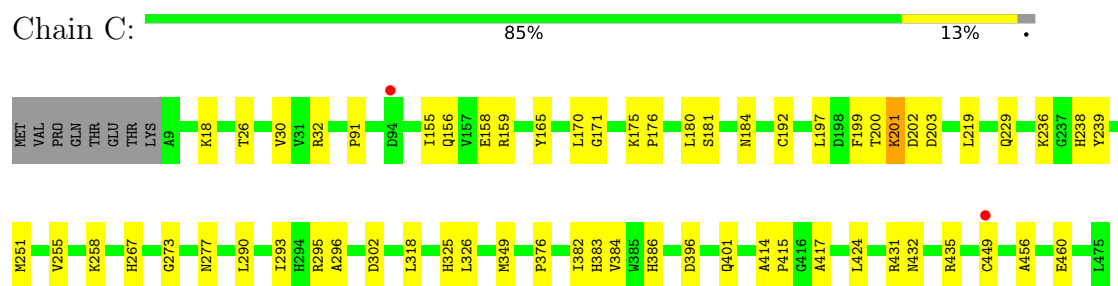
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



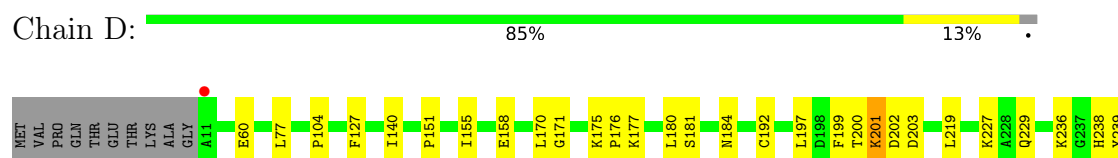
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



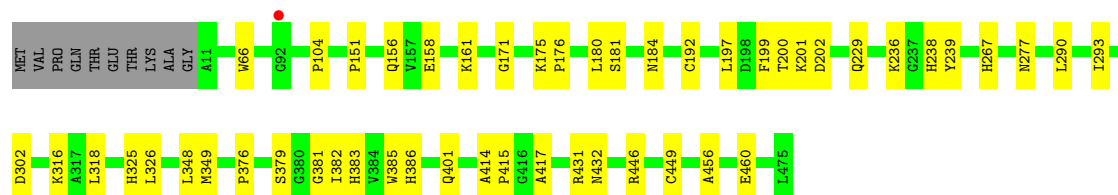
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN





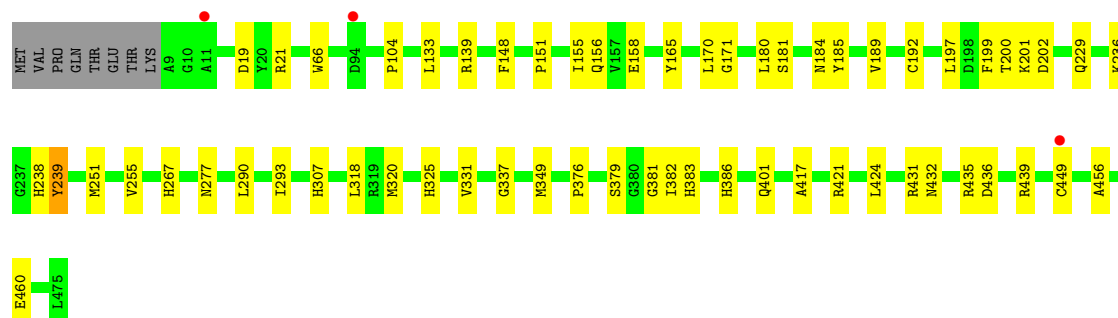
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

Chain E: 87% 11% .



• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

Chain F: 86% 12% .



• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

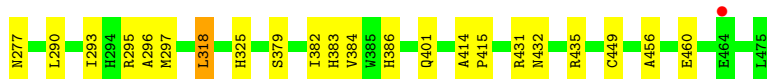
Chain G: 85% 13% .



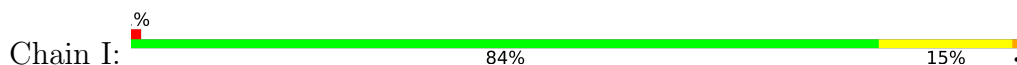
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

Chain H: 88% 10% .

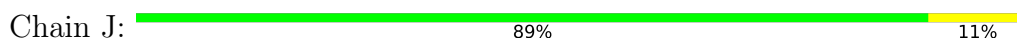




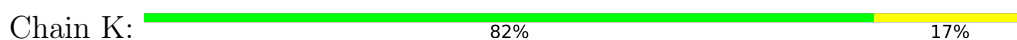
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



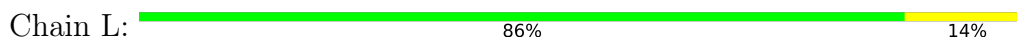
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



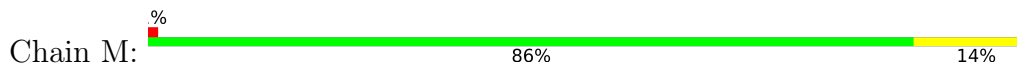
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



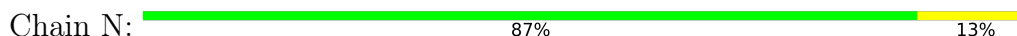
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



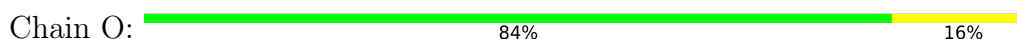
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1

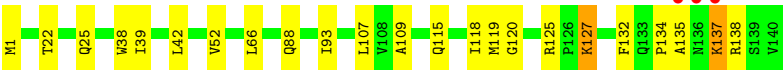
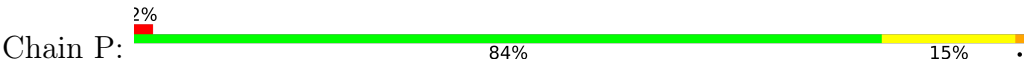


- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1





• Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	120.19Å 178.35Å 122.56Å 90.00° 117.87° 90.00°	Depositor
Resolution (Å)	30.00 – 2.30 30.00 – 2.30	Depositor EDS
% Data completeness (in resolution range)	88.3 (30.00-2.30) 88.3 (30.00-2.30)	Depositor EDS
R_{merge}	0.16	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.25 (at 2.19Å)	Xtriage
Refinement program	REFMAC 5.0	Depositor
R, R_{free}	0.171 , 0.203 0.172 , 0.180	Depositor DCC
R_{free} test set	8970 reflections (4.41%)	wwPDB-VP
Wilson B-factor (Å ²)	18.7	Xtriage
Anisotropy	0.266	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 35.2	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	0.000 for -h-l,k,h 0.000 for l,k,-h-l 0.013 for h,-k,-h-l 0.015 for -h-l,-k,l 0.187 for l,-k,h	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	40416	wwPDB-VP
Average B, all atoms (Å ²)	18.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.39% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: CAP, EDO, MME, HYP, MG, SMC, KCX

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	0.62	0/3666	0.81	1/4955 (0.0%)
1	B	0.67	0/3684	0.86	1/4978 (0.0%)
1	C	0.68	1/3675 (0.0%)	0.85	2/4967 (0.0%)
1	D	0.66	1/3666 (0.0%)	0.85	1/4955 (0.0%)
1	E	0.68	0/3665	0.84	0/4955
1	F	0.69	0/3675	0.86	1/4967 (0.0%)
1	G	0.68	0/3675	0.85	2/4967 (0.0%)
1	H	0.68	0/3666	0.87	2/4955 (0.0%)
2	I	0.57	0/1166	0.76	0/1584
2	J	0.64	0/1166	0.83	0/1584
2	K	0.60	0/1166	0.81	0/1584
2	L	0.64	0/1166	0.81	0/1584
2	M	0.60	0/1166	0.79	0/1584
2	N	0.65	0/1166	0.82	0/1584
2	O	0.64	0/1166	0.79	0/1584
2	P	0.65	0/1166	0.80	0/1584
All	All	0.66	2/38700 (0.0%)	0.84	10/52371 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	C	26	THR	CA-CB	5.72	1.59	1.53
1	D	140	ILE	CA-CB	5.01	1.59	1.53

The worst 5 of 10 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	H	384	VAL	N-CA-C	5.72	117.14	110.62
1	B	264	ILE	N-CA-C	5.55	115.68	108.35
1	D	155	ILE	N-CA-C	5.53	116.17	110.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	G	155	ILE	N-CA-C	5.49	116.13	110.36
1	A	155	ILE	N-CA-C	5.38	116.00	110.36

There are no chirality outliers.

There are no planarity outliers.

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	3628	0	3535	36	0
1	B	3646	0	3556	41	0
1	C	3637	0	3543	43	0
1	D	3628	0	3535	37	0
1	E	3627	0	3535	34	0
1	F	3637	0	3543	38	0
1	G	3637	0	3543	41	0
1	H	3628	0	3535	34	0
2	I	1143	0	1122	15	0
2	J	1143	0	1122	11	0
2	K	1143	0	1122	15	0
2	L	1143	0	1122	14	0
2	M	1143	0	1122	12	0
2	N	1143	0	1122	12	0
2	O	1143	0	1122	14	0
2	P	1143	0	1122	15	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
3	C	1	0	0	0	0
3	D	1	0	0	0	0
3	E	1	0	0	0	0
3	F	1	0	0	0	0
3	G	1	0	0	0	0
3	H	1	0	0	0	0
4	A	21	0	7	0	0
4	B	21	0	7	0	0
4	C	21	0	7	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
4	D	21	0	7	0	0
4	E	21	0	8	0	0
4	F	21	0	7	0	0
4	G	21	0	7	0	0
4	H	21	0	7	0	0
5	A	24	0	36	2	0
5	B	20	0	30	0	0
5	C	24	0	36	1	0
5	D	20	0	30	1	0
5	E	24	0	36	0	0
5	F	24	0	36	1	0
5	G	20	0	30	1	0
5	H	24	0	36	1	0
5	I	4	0	6	0	0
5	J	8	0	12	1	0
5	K	8	0	12	0	0
5	L	4	0	6	0	0
5	M	8	0	12	0	0
5	N	8	0	12	1	0
5	O	8	0	12	0	0
6	A	176	0	0	1	0
6	B	192	0	0	3	0
6	C	159	0	0	5	0
6	D	171	0	0	1	0
6	E	180	0	0	3	0
6	F	178	0	0	1	0
6	G	180	0	0	7	0
6	H	190	0	0	3	0
6	I	46	0	0	0	0
6	J	39	0	0	0	0
6	K	39	0	0	0	0
6	L	55	0	0	1	0
6	M	50	0	0	0	0
6	N	49	0	0	1	0
6	O	43	0	0	2	0
6	P	53	0	0	2	0
All	All	40416	0	37700	366	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 5.

The worst 5 of 366 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:68:THR:HA	5:A:1478:EDO:H21	1.28	1.09
1:E:267:HIS:HD2	1:E:277:ASN:HD22	1.08	0.98
1:D:267:HIS:HD2	1:D:277:ASN:HD22	1.08	0.98
1:B:184:ASN:HD22	2:L:115:GLN:HE21	1.11	0.96
1:B:267:HIS:HD2	1:B:277:ASN:HD22	1.08	0.95

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	458/475 (96%)	445 (97%)	13 (3%)	0	100	100
1	B	461/475 (97%)	449 (97%)	12 (3%)	0	100	100
1	C	460/475 (97%)	445 (97%)	15 (3%)	0	100	100
1	D	458/475 (96%)	444 (97%)	14 (3%)	0	100	100
1	E	458/475 (96%)	446 (97%)	12 (3%)	0	100	100
1	F	460/475 (97%)	450 (98%)	10 (2%)	0	100	100
1	G	460/475 (97%)	447 (97%)	13 (3%)	0	100	100
1	H	458/475 (96%)	446 (97%)	12 (3%)	0	100	100
2	I	138/140 (99%)	131 (95%)	7 (5%)	0	100	100
2	J	138/140 (99%)	133 (96%)	5 (4%)	0	100	100
2	K	138/140 (99%)	130 (94%)	8 (6%)	0	100	100
2	L	138/140 (99%)	129 (94%)	9 (6%)	0	100	100
2	M	138/140 (99%)	134 (97%)	4 (3%)	0	100	100
2	N	138/140 (99%)	132 (96%)	6 (4%)	0	100	100
2	O	138/140 (99%)	133 (96%)	5 (4%)	0	100	100
2	P	138/140 (99%)	132 (96%)	6 (4%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
All	All	4777/4920 (97%)	4626 (97%)	151 (3%)	0	100	100

There are no Ramachandran outliers to report.

5.3.2 Protein sidechains ⓘ

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

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

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	A	368/376 (98%)	364 (99%)	4 (1%)	65	81
1	B	369/376 (98%)	360 (98%)	9 (2%)	43	62
1	C	368/376 (98%)	364 (99%)	4 (1%)	65	81
1	D	368/376 (98%)	364 (99%)	4 (1%)	65	81
1	E	368/376 (98%)	366 (100%)	2 (0%)	81	90
1	F	368/376 (98%)	365 (99%)	3 (1%)	73	86
1	G	368/376 (98%)	363 (99%)	5 (1%)	59	76
1	H	368/376 (98%)	364 (99%)	4 (1%)	65	81
2	I	122/122 (100%)	119 (98%)	3 (2%)	42	60
2	J	122/122 (100%)	119 (98%)	3 (2%)	42	60
2	K	122/122 (100%)	118 (97%)	4 (3%)	33	50
2	L	122/122 (100%)	118 (97%)	4 (3%)	33	50
2	M	122/122 (100%)	118 (97%)	4 (3%)	33	50
2	N	122/122 (100%)	118 (97%)	4 (3%)	33	50
2	O	122/122 (100%)	118 (97%)	4 (3%)	33	50
2	P	122/122 (100%)	118 (97%)	4 (3%)	33	50
All	All	3921/3984 (98%)	3856 (98%)	65 (2%)	53	72

5 of 65 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	O	52	VAL

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Mol	Chain	Res	Type
2	O	127	LYS
1	F	435	ARG
1	F	239	TYR
2	O	137	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 145 such sidechains are listed below:

Mol	Chain	Res	Type
2	L	9	ASN
2	P	115	GLN
2	L	133	GLN
2	N	29	GLN
1	E	156	GLN

5.3.3 RNA ⓘ

There are no RNA molecules in this entry.

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

48 non-standard protein/DNA/RNA residues 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
1	KCX	B	201	3,1	10,11,12	0.90	0	6,12,14	1.11	1 (16%)
1	HYP	B	104	1	7,8,9	0.71	0	5,10,12	1.05	0
1	SMC	G	256	1	5,6,7	0.52	0	3,6,8	0.28	0
1	HYP	H	104	1	7,8,9	0.98	0	5,10,12	1.13	0
2	MME	I	1	2	7,8,9	3.07	1 (14%)	5,8,10	1.31	1 (20%)
1	SMC	A	256	1	5,6,7	0.38	0	3,6,8	0.47	0
2	MME	L	1	2	7,8,9	2.92	1 (14%)	5,8,10	1.59	1 (20%)
1	SMC	E	256	1	5,6,7	0.60	0	3,6,8	0.37	0
1	SMC	E	369	1	5,6,7	0.55	0	3,6,8	0.99	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
1	SMC	C	369	1	5,6,7	0.71	0	3,6,8	0.39	0
1	HYP	F	151	1	7,8,9	0.95	0	5,10,12	1.58	2 (40%)
1	HYP	D	104	1	7,8,9	0.55	0	5,10,12	1.10	1 (20%)
1	KCX	F	201	3,1	10,11,12	0.86	0	6,12,14	1.94	1 (16%)
1	HYP	D	151	1	7,8,9	0.80	0	5,10,12	1.58	1 (20%)
1	SMC	F	369	1	5,6,7	0.80	0	3,6,8	0.63	0
1	KCX	G	201	3,1	10,11,12	0.88	0	6,12,14	1.71	1 (16%)
1	KCX	A	201	3,1	10,11,12	1.00	0	6,12,14	2.00	1 (16%)
2	MME	J	1	2	7,8,9	3.04	1 (14%)	5,8,10	1.29	1 (20%)
1	SMC	H	256	1	5,6,7	0.60	0	3,6,8	0.23	0
1	SMC	G	369	1	5,6,7	0.49	0	3,6,8	0.54	0
1	HYP	G	104	1	7,8,9	0.70	0	5,10,12	1.02	0
1	KCX	C	201	3,1	10,11,12	0.88	0	6,12,14	1.33	1 (16%)
1	SMC	F	256	1	5,6,7	0.39	0	3,6,8	0.41	0
1	HYP	G	151	1	7,8,9	0.87	0	5,10,12	1.46	1 (20%)
1	HYP	C	151	1	7,8,9	0.85	0	5,10,12	1.21	0
2	MME	P	1	2	7,8,9	3.00	1 (14%)	5,8,10	1.33	1 (20%)
1	HYP	B	151	1	7,8,9	0.99	1 (14%)	5,10,12	1.38	1 (20%)
1	SMC	D	256	1	5,6,7	0.72	0	3,6,8	0.36	0
1	HYP	E	151	1	7,8,9	1.02	1 (14%)	5,10,12	1.42	0
1	SMC	B	369	1	5,6,7	0.82	0	3,6,8	0.63	0
1	HYP	C	104	1	7,8,9	0.80	0	5,10,12	1.42	0
1	SMC	A	369	1	5,6,7	0.67	0	3,6,8	0.56	0
1	HYP	F	104	1	7,8,9	0.81	0	5,10,12	1.23	1 (20%)
2	MME	O	1	2	7,8,9	3.08	1 (14%)	5,8,10	1.13	0
2	MME	N	1	2	7,8,9	2.99	1 (14%)	5,8,10	1.33	1 (20%)
1	KCX	H	201	3,1	10,11,12	1.15	1 (10%)	6,12,14	2.10	1 (16%)
1	HYP	H	151	1	7,8,9	1.06	1 (14%)	5,10,12	1.36	1 (20%)
1	KCX	E	201	3,1	10,11,12	1.02	1 (10%)	6,12,14	1.41	1 (16%)
1	SMC	C	256	1	5,6,7	0.60	0	3,6,8	0.74	0
1	SMC	H	369	1	5,6,7	0.68	0	3,6,8	0.42	0
1	SMC	B	256	1	5,6,7	0.49	0	3,6,8	0.41	0
1	HYP	A	104	1	7,8,9	0.68	0	5,10,12	1.18	0
2	MME	K	1	2	7,8,9	2.97	1 (14%)	5,8,10	1.30	1 (20%)
1	HYP	A	151	1	7,8,9	0.88	0	5,10,12	1.41	1 (20%)
1	KCX	D	201	3,1	10,11,12	0.80	0	6,12,14	1.62	1 (16%)
1	SMC	D	369	1	5,6,7	0.56	0	3,6,8	0.83	0
1	HYP	E	104	1	7,8,9	0.56	0	5,10,12	1.16	1 (20%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	MME	M	1	2	7,8,9	2.93	1 (14%)	5,8,10	1.42	1 (20%)

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
1	KCX	B	201	3,1	-	0/9/10/12	-
1	HYP	B	104	1	-	0/0/11/13	0/1/1/1
1	SMC	G	256	1	-	0/3/5/7	-
1	HYP	H	104	1	-	0/0/11/13	0/1/1/1
2	MME	I	1	2	-	2/5/8/10	-
1	SMC	A	256	1	-	0/3/5/7	-
2	MME	L	1	2	-	2/5/8/10	-
1	SMC	E	256	1	-	0/3/5/7	-
1	SMC	E	369	1	-	1/3/5/7	-
1	SMC	C	369	1	-	2/3/5/7	-
1	HYP	F	151	1	-	0/0/11/13	0/1/1/1
1	HYP	D	104	1	-	0/0/11/13	0/1/1/1
1	KCX	F	201	3,1	-	0/9/10/12	-
1	HYP	D	151	1	-	0/0/11/13	0/1/1/1
1	SMC	F	369	1	-	2/3/5/7	-
1	KCX	G	201	3,1	-	0/9/10/12	-
1	KCX	A	201	3,1	-	0/9/10/12	-
2	MME	J	1	2	-	2/5/8/10	-
1	SMC	H	256	1	-	0/3/5/7	-
1	SMC	G	369	1	-	2/3/5/7	-
1	HYP	G	104	1	-	0/0/11/13	0/1/1/1
1	KCX	C	201	3,1	-	0/9/10/12	-
1	SMC	F	256	1	-	0/3/5/7	-
1	HYP	G	151	1	-	0/0/11/13	0/1/1/1
1	HYP	C	151	1	-	0/0/11/13	0/1/1/1
2	MME	P	1	2	-	2/5/8/10	-
1	HYP	B	151	1	-	0/0/11/13	0/1/1/1
1	SMC	D	256	1	-	0/3/5/7	-
1	HYP	E	151	1	-	0/0/11/13	0/1/1/1
1	SMC	B	369	1	-	2/3/5/7	-
1	HYP	C	104	1	-	0/0/11/13	0/1/1/1
1	SMC	A	369	1	-	2/3/5/7	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	HYP	F	104	1	-	0/0/11/13	0/1/1/1
2	MME	O	1	2	-	3/5/8/10	-
2	MME	N	1	2	-	3/5/8/10	-
1	KCX	H	201	3,1	-	0/9/10/12	-
1	HYP	H	151	1	-	0/0/11/13	0/1/1/1
1	KCX	E	201	3,1	-	0/9/10/12	-
1	SMC	C	256	1	-	0/3/5/7	-
1	SMC	H	369	1	-	1/3/5/7	-
1	SMC	B	256	1	-	0/3/5/7	-
1	HYP	A	104	1	-	0/0/11/13	0/1/1/1
2	MME	K	1	2	-	3/5/8/10	-
1	HYP	A	151	1	-	0/0/11/13	0/1/1/1
1	KCX	D	201	3,1	-	0/9/10/12	-
1	SMC	D	369	1	-	2/3/5/7	-
1	HYP	E	104	1	-	0/0/11/13	0/1/1/1
2	MME	M	1	2	-	2/5/8/10	-

The worst 5 of 13 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	O	1	MME	CM-N	-7.93	1.27	1.46
2	I	1	MME	CM-N	-7.89	1.27	1.46
2	J	1	MME	CM-N	-7.76	1.27	1.46
2	N	1	MME	CM-N	-7.70	1.27	1.46
2	P	1	MME	CM-N	-7.69	1.27	1.46

The worst 5 of 25 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	201	KCX	OQ1-CX-NZ	-4.84	117.56	124.92
1	H	201	KCX	OQ1-CX-NZ	-4.76	117.69	124.92
1	F	201	KCX	OQ1-CX-NZ	-4.64	117.86	124.92
1	G	201	KCX	OQ1-CX-NZ	-4.11	118.68	124.92
1	D	201	KCX	OQ1-CX-NZ	-3.90	119.00	124.92

There are no chirality outliers.

5 of 33 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
1	A	369	SMC	C-CA-CB-SG

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Mol	Chain	Res	Type	Atoms
1	B	369	SMC	N-CA-CB-SG
1	B	369	SMC	C-CA-CB-SG
1	C	369	SMC	C-CA-CB-SG
1	D	369	SMC	C-CA-CB-SG

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
1	G	201	KCX	1	0
1	C	201	KCX	1	0
1	H	201	KCX	1	0
1	D	201	KCX	1	0

5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

5.6 Ligand geometry [i](#)

Of 73 ligands modelled in this entry, 8 are monoatomic - leaving 65 for Mogul analysis.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. The Z score for a bond length (or angle) is the number of standard deviations the observed value is removed from the expected value. A bond length (or angle) with $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\# Z > 2$	Counts	RMSZ	$\# Z > 2$
5	EDO	A	1479	-	3,3,3	0.36	0	2,2,2	0.54	0
5	EDO	C	1482	-	3,3,3	0.49	0	2,2,2	0.27	0
5	EDO	J	1142	-	3,3,3	0.40	0	2,2,2	0.39	0
5	EDO	E	1480	-	3,3,3	0.56	0	2,2,2	0.27	0
5	EDO	I	1141	-	3,3,3	0.43	0	2,2,2	0.31	0
5	EDO	D	1479	-	3,3,3	0.46	0	2,2,2	0.35	0
5	EDO	F	1478	-	3,3,3	0.51	0	2,2,2	0.37	0
5	EDO	F	1483	-	3,3,3	0.57	0	2,2,2	0.21	0
5	EDO	G	1482	-	3,3,3	0.53	0	2,2,2	0.37	0
5	EDO	M	1142	-	3,3,3	0.50	0	2,2,2	0.36	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	EDO	C	1479	-	3,3,3	0.34	0	2,2,2	0.62	0
5	EDO	N	1141	-	3,3,3	0.44	0	2,2,2	0.17	0
5	EDO	A	1480	-	3,3,3	0.56	0	2,2,2	0.27	0
5	EDO	J	1141	-	3,3,3	0.43	0	2,2,2	0.14	0
5	EDO	A	1483	-	3,3,3	0.57	0	2,2,2	0.27	0
5	EDO	K	1141	-	3,3,3	0.37	0	2,2,2	0.59	0
5	EDO	H	1480	-	3,3,3	0.53	0	2,2,2	0.22	0
5	EDO	C	1481	-	3,3,3	0.43	0	2,2,2	0.40	0
5	EDO	E	1483	-	3,3,3	0.52	0	2,2,2	0.19	0
5	EDO	B	1478	-	3,3,3	0.68	0	2,2,2	0.37	0
5	EDO	C	1483	-	3,3,3	0.50	0	2,2,2	0.08	0
4	CAP	A	1477	3	18,20,20	0.93	0	23,31,31	0.91	1 (4%)
5	EDO	F	1480	-	3,3,3	0.50	0	2,2,2	0.23	0
4	CAP	G	1477	3	18,20,20	0.99	0	23,31,31	1.00	1 (4%)
4	CAP	D	1477	3	18,20,20	0.90	0	23,31,31	1.00	1 (4%)
5	EDO	C	1478	-	3,3,3	0.75	0	2,2,2	0.09	0
5	EDO	O	1142	-	3,3,3	0.43	0	2,2,2	0.39	0
4	CAP	C	1477	3	18,20,20	0.89	0	23,31,31	1.05	1 (4%)
5	EDO	M	1141	-	3,3,3	0.45	0	2,2,2	0.29	0
5	EDO	F	1481	-	3,3,3	0.55	0	2,2,2	0.21	0
5	EDO	G	1478	-	3,3,3	0.55	0	2,2,2	0.38	0
5	EDO	G	1481	-	3,3,3	0.42	0	2,2,2	0.37	0
5	EDO	D	1481	-	3,3,3	0.53	0	2,2,2	0.12	0
5	EDO	A	1482	-	3,3,3	0.55	0	2,2,2	0.15	0
5	EDO	H	1483	-	3,3,3	0.57	0	2,2,2	0.19	0
5	EDO	E	1479	-	3,3,3	0.55	0	2,2,2	0.25	0
5	EDO	K	1142	-	3,3,3	0.41	0	2,2,2	0.46	0
5	EDO	H	1482	-	3,3,3	0.57	0	2,2,2	0.16	0
5	EDO	C	1480	-	3,3,3	0.96	0	2,2,2	0.57	0
5	EDO	B	1479	-	3,3,3	0.30	0	2,2,2	0.56	0
5	EDO	D	1478	-	3,3,3	0.32	0	2,2,2	0.85	0
5	EDO	N	1142	-	3,3,3	0.51	0	2,2,2	0.14	0
4	CAP	B	1477	3	18,20,20	1.06	1 (5%)	23,31,31	1.08	1 (4%)
5	EDO	A	1478	-	3,3,3	0.39	0	2,2,2	0.40	0
5	EDO	H	1479	-	3,3,3	0.33	0	2,2,2	0.48	0
4	CAP	H	1477	3	18,20,20	0.96	0	23,31,31	0.86	1 (4%)
5	EDO	A	1481	-	3,3,3	0.41	0	2,2,2	0.54	0
5	EDO	B	1481	-	3,3,3	0.50	0	2,2,2	0.28	0
5	EDO	B	1480	-	3,3,3	0.50	0	2,2,2	0.35	0
5	EDO	E	1478	-	3,3,3	0.53	0	2,2,2	0.14	0
4	CAP	F	1477	3	18,20,20	0.91	1 (5%)	23,31,31	1.19	1 (4%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
5	EDO	E	1481	-	3,3,3	0.45	0	2,2,2	0.47	0
4	CAP	E	1477	3	18,20,20	0.92	0	23,31,31	0.98	1 (4%)
5	EDO	E	1482	-	3,3,3	0.55	0	2,2,2	0.16	0
5	EDO	H	1478	-	3,3,3	0.54	0	2,2,2	0.16	0
5	EDO	O	1141	-	3,3,3	0.43	0	2,2,2	0.32	0
5	EDO	F	1479	-	3,3,3	0.43	0	2,2,2	0.57	0
5	EDO	F	1482	-	3,3,3	0.51	0	2,2,2	0.31	0
5	EDO	H	1481	-	3,3,3	0.51	0	2,2,2	0.40	0
5	EDO	L	1141	-	3,3,3	0.46	0	2,2,2	0.31	0
5	EDO	G	1479	-	3,3,3	0.30	0	2,2,2	0.67	0
5	EDO	D	1482	-	3,3,3	0.52	0	2,2,2	0.24	0
5	EDO	G	1480	-	3,3,3	0.56	0	2,2,2	0.10	0
5	EDO	D	1480	-	3,3,3	0.45	0	2,2,2	0.32	0
5	EDO	B	1482	-	3,3,3	0.56	0	2,2,2	0.15	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	A	1479	-	-	0/1/1/1	-
5	EDO	C	1482	-	-	0/1/1/1	-
5	EDO	J	1142	-	-	0/1/1/1	-
5	EDO	E	1480	-	-	1/1/1/1	-
5	EDO	I	1141	-	-	1/1/1/1	-
5	EDO	D	1479	-	-	1/1/1/1	-
5	EDO	F	1478	-	-	1/1/1/1	-
5	EDO	F	1483	-	-	1/1/1/1	-
5	EDO	G	1482	-	-	0/1/1/1	-
5	EDO	M	1142	-	-	0/1/1/1	-
5	EDO	C	1479	-	-	0/1/1/1	-
5	EDO	N	1141	-	-	1/1/1/1	-
5	EDO	A	1480	-	-	0/1/1/1	-
5	EDO	J	1141	-	-	0/1/1/1	-
5	EDO	A	1483	-	-	1/1/1/1	-
5	EDO	K	1141	-	-	0/1/1/1	-
5	EDO	H	1480	-	-	0/1/1/1	-
5	EDO	C	1481	-	-	1/1/1/1	-
5	EDO	E	1483	-	-	1/1/1/1	-
5	EDO	B	1478	-	-	0/1/1/1	-
5	EDO	C	1483	-	-	0/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	CAP	A	1477	3	-	7/29/29/29	-
5	EDO	F	1480	-	-	0/1/1/1	-
4	CAP	G	1477	3	-	7/29/29/29	-
4	CAP	D	1477	3	-	7/29/29/29	-
5	EDO	C	1478	-	-	1/1/1/1	-
5	EDO	O	1142	-	-	0/1/1/1	-
4	CAP	C	1477	3	-	7/29/29/29	-
5	EDO	M	1141	-	-	0/1/1/1	-
5	EDO	F	1481	-	-	1/1/1/1	-
5	EDO	G	1478	-	-	1/1/1/1	-
5	EDO	G	1481	-	-	1/1/1/1	-
5	EDO	D	1481	-	-	0/1/1/1	-
5	EDO	A	1482	-	-	1/1/1/1	-
5	EDO	H	1483	-	-	1/1/1/1	-
5	EDO	E	1479	-	-	0/1/1/1	-
5	EDO	K	1142	-	-	0/1/1/1	-
5	EDO	H	1482	-	-	1/1/1/1	-
5	EDO	C	1480	-	-	1/1/1/1	-
5	EDO	B	1479	-	-	1/1/1/1	-
5	EDO	D	1478	-	-	1/1/1/1	-
5	EDO	N	1142	-	-	0/1/1/1	-
4	CAP	B	1477	3	-	6/29/29/29	-
5	EDO	A	1478	-	-	1/1/1/1	-
5	EDO	H	1479	-	-	1/1/1/1	-
4	CAP	H	1477	3	-	6/29/29/29	-
5	EDO	A	1481	-	-	1/1/1/1	-
5	EDO	B	1481	-	-	0/1/1/1	-
5	EDO	B	1480	-	-	1/1/1/1	-
5	EDO	E	1478	-	-	0/1/1/1	-
4	CAP	F	1477	3	-	7/29/29/29	-
5	EDO	E	1481	-	-	0/1/1/1	-
4	CAP	E	1477	3	-	7/29/29/29	-
5	EDO	E	1482	-	-	0/1/1/1	-
5	EDO	H	1478	-	-	0/1/1/1	-
5	EDO	O	1141	-	-	0/1/1/1	-
5	EDO	F	1479	-	-	1/1/1/1	-
5	EDO	F	1482	-	-	0/1/1/1	-
5	EDO	H	1481	-	-	0/1/1/1	-
5	EDO	L	1141	-	-	1/1/1/1	-
5	EDO	G	1479	-	-	1/1/1/1	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	D	1482	-	-	1/1/1/1	-
5	EDO	G	1480	-	-	1/1/1/1	-
5	EDO	D	1480	-	-	1/1/1/1	-
5	EDO	B	1482	-	-	1/1/1/1	-

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	B	1477	CAP	C4-C3	-2.18	1.51	1.54
4	F	1477	CAP	O2-C2	2.09	1.47	1.43

The worst 5 of 8 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	1477	CAP	O7-C-C2	3.59	120.08	114.06
4	F	1477	CAP	O7-C-C2	3.52	119.95	114.06
4	C	1477	CAP	O7-C-C2	2.73	118.63	114.06
4	E	1477	CAP	O7-C-C2	2.72	118.62	114.06
4	D	1477	CAP	O7-C-C2	2.67	118.53	114.06

There are no chirality outliers.

5 of 84 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
4	A	1477	CAP	O6-C-C2-C1
4	A	1477	CAP	O7-C-C2-C1
4	A	1477	CAP	O6-C-C2-O2
4	A	1477	CAP	O7-C-C2-O2
4	A	1477	CAP	O3-C3-C4-O4

There are no ring outliers.

9 monomers are involved in 9 short contacts:

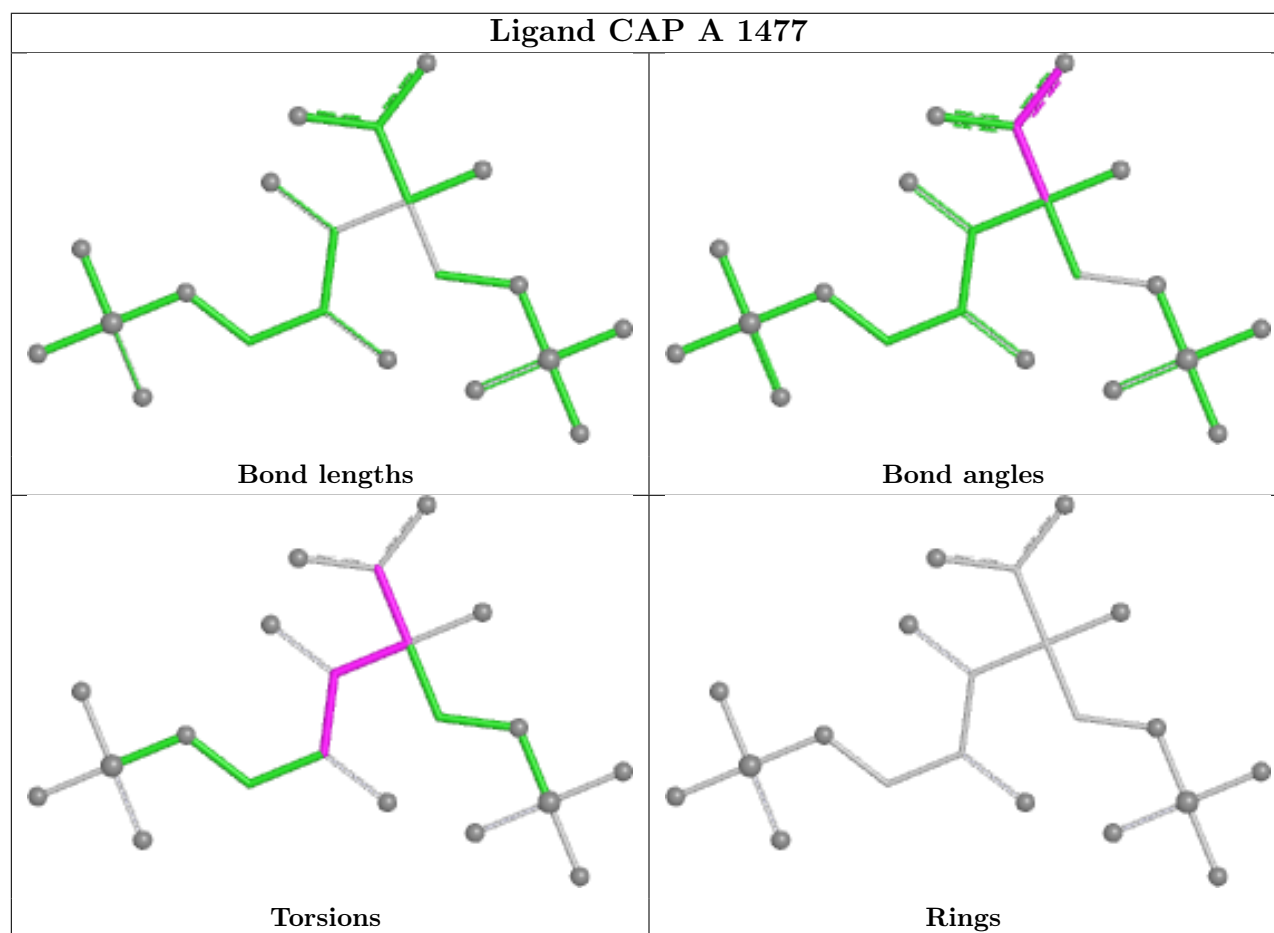
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	F	1483	EDO	1	0
5	C	1479	EDO	1	0
5	N	1141	EDO	1	0
5	J	1141	EDO	1	0
5	D	1481	EDO	1	0
5	A	1478	EDO	2	0
5	H	1479	EDO	1	0

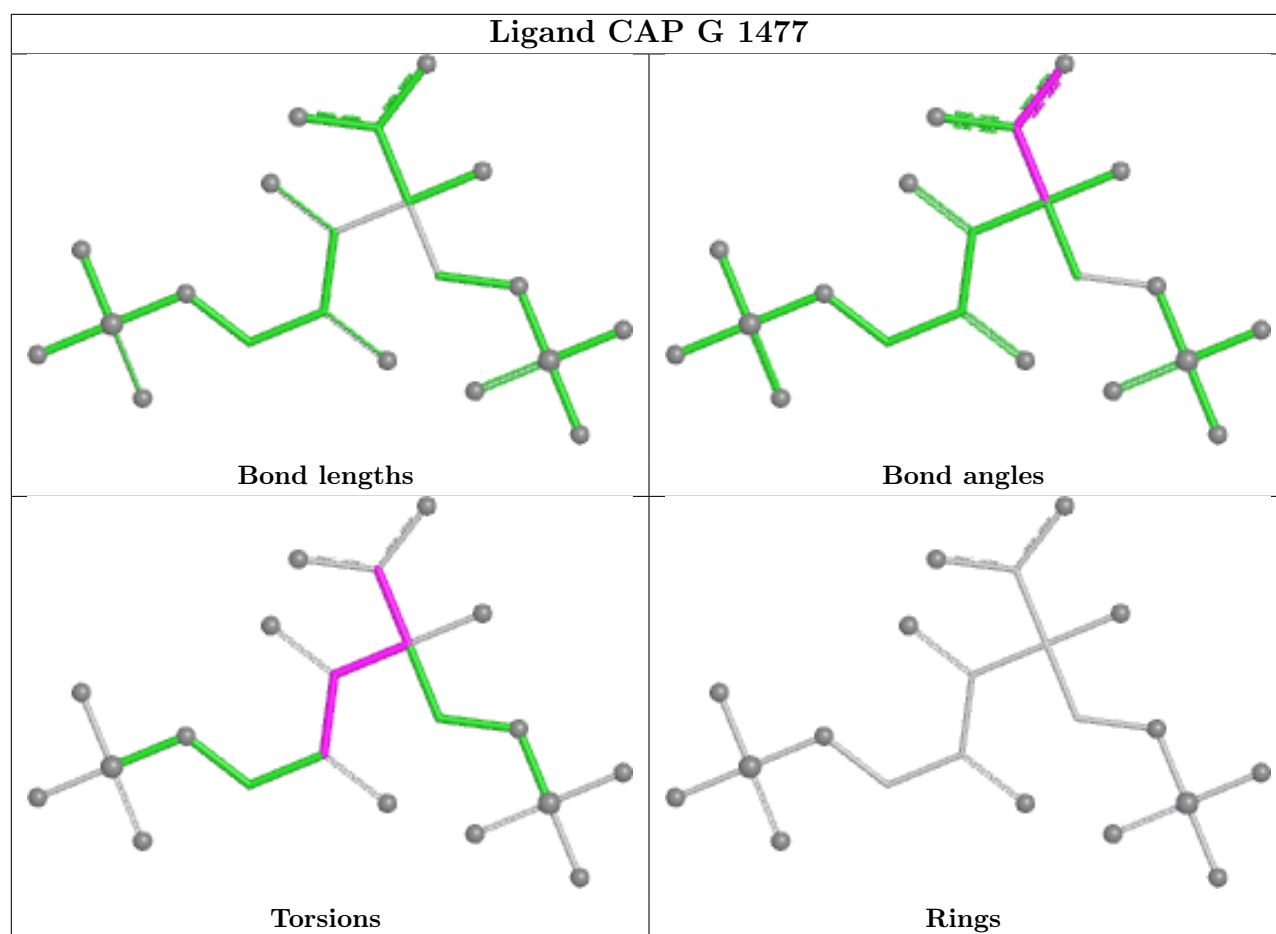
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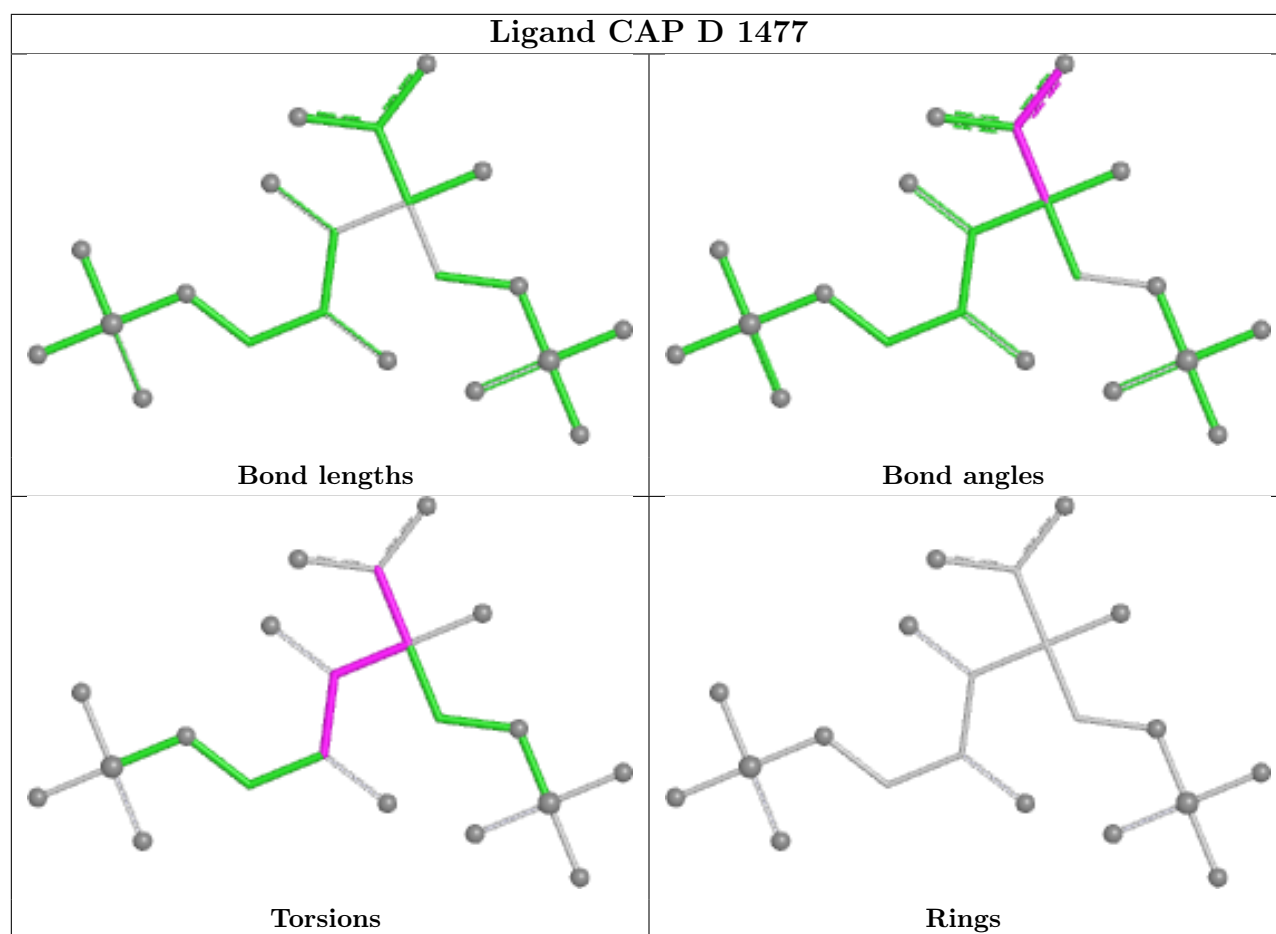
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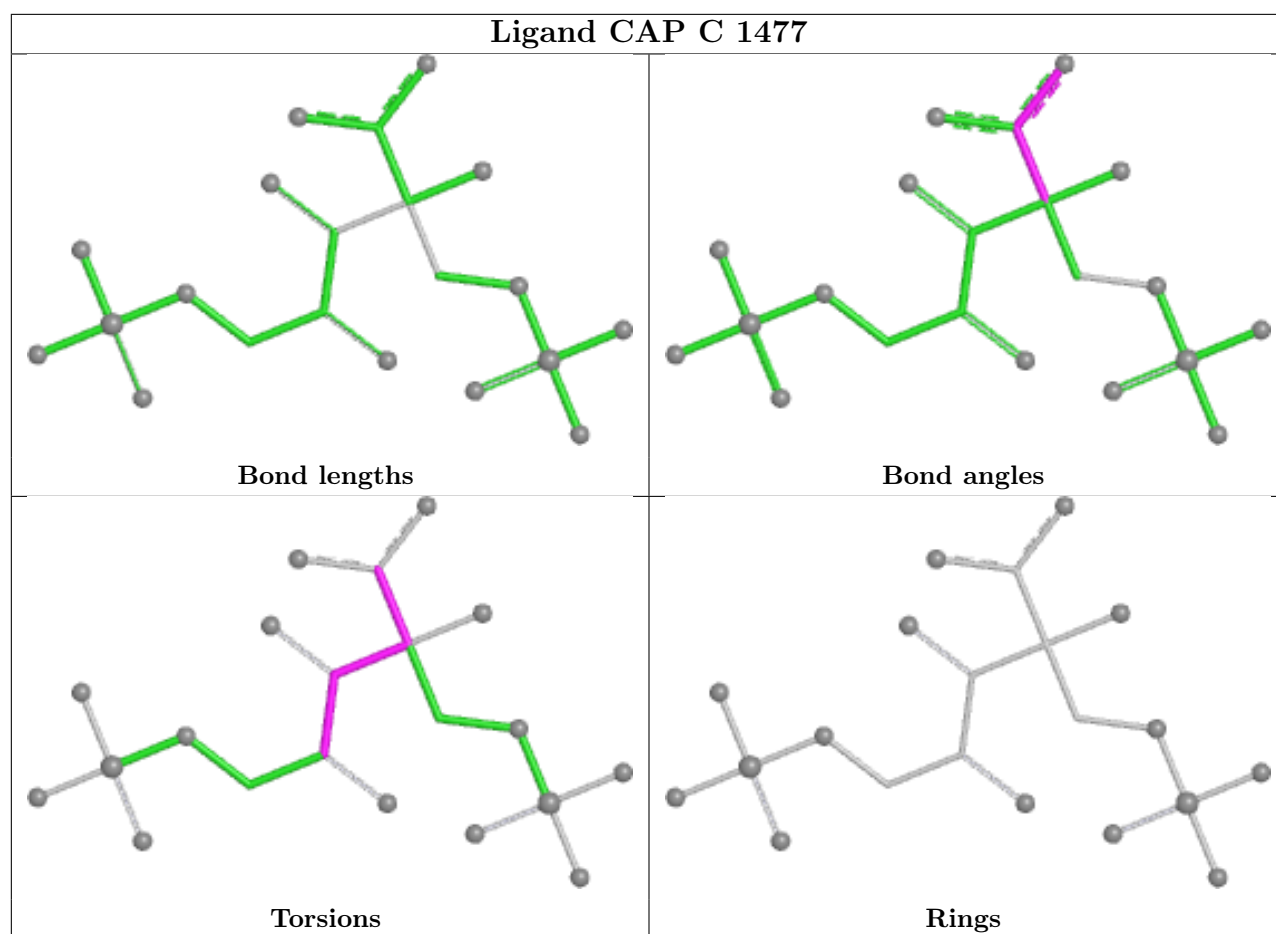
Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	1478	EDO	1	0
5	G	1479	EDO	1	0

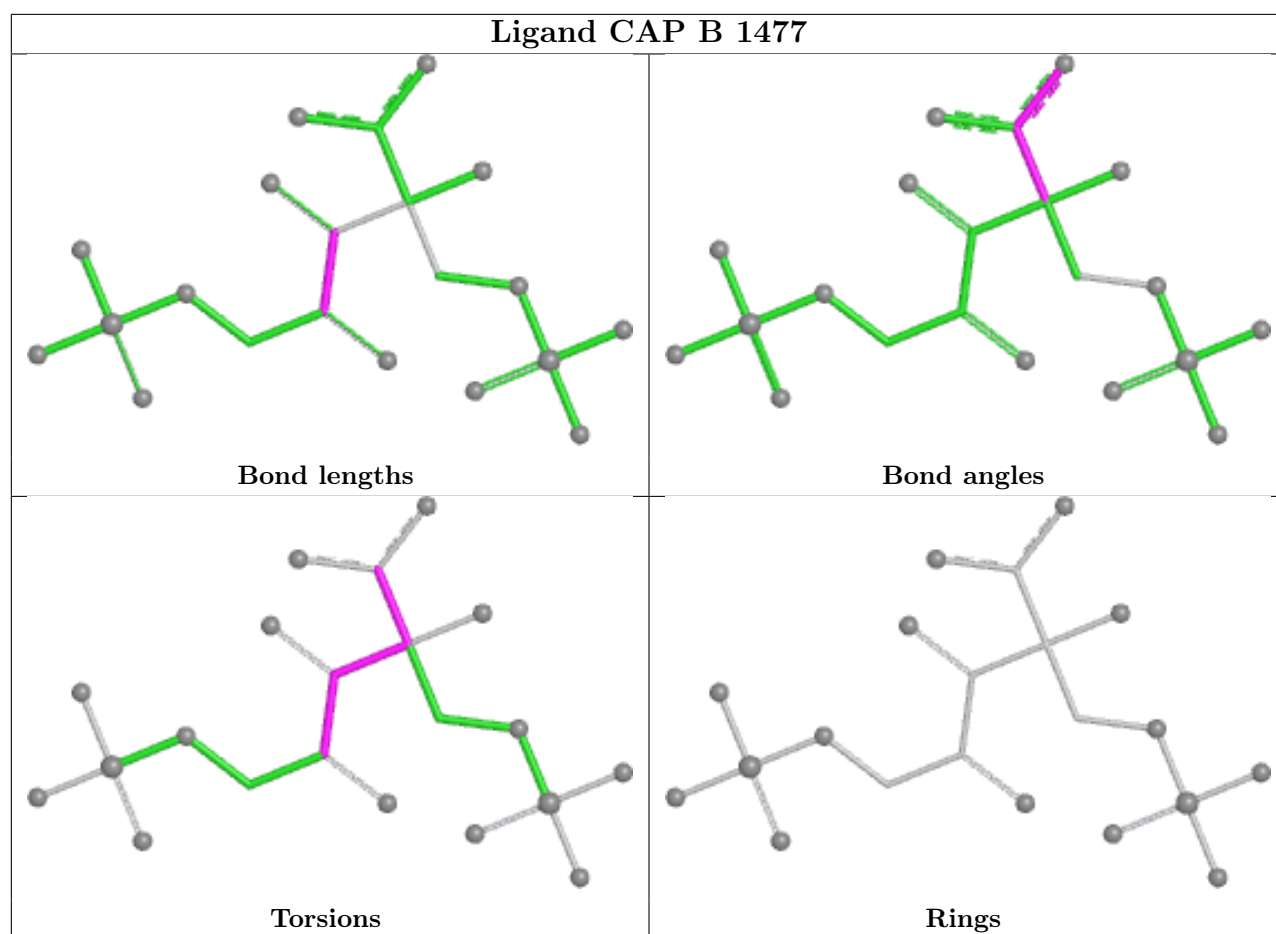
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less 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.

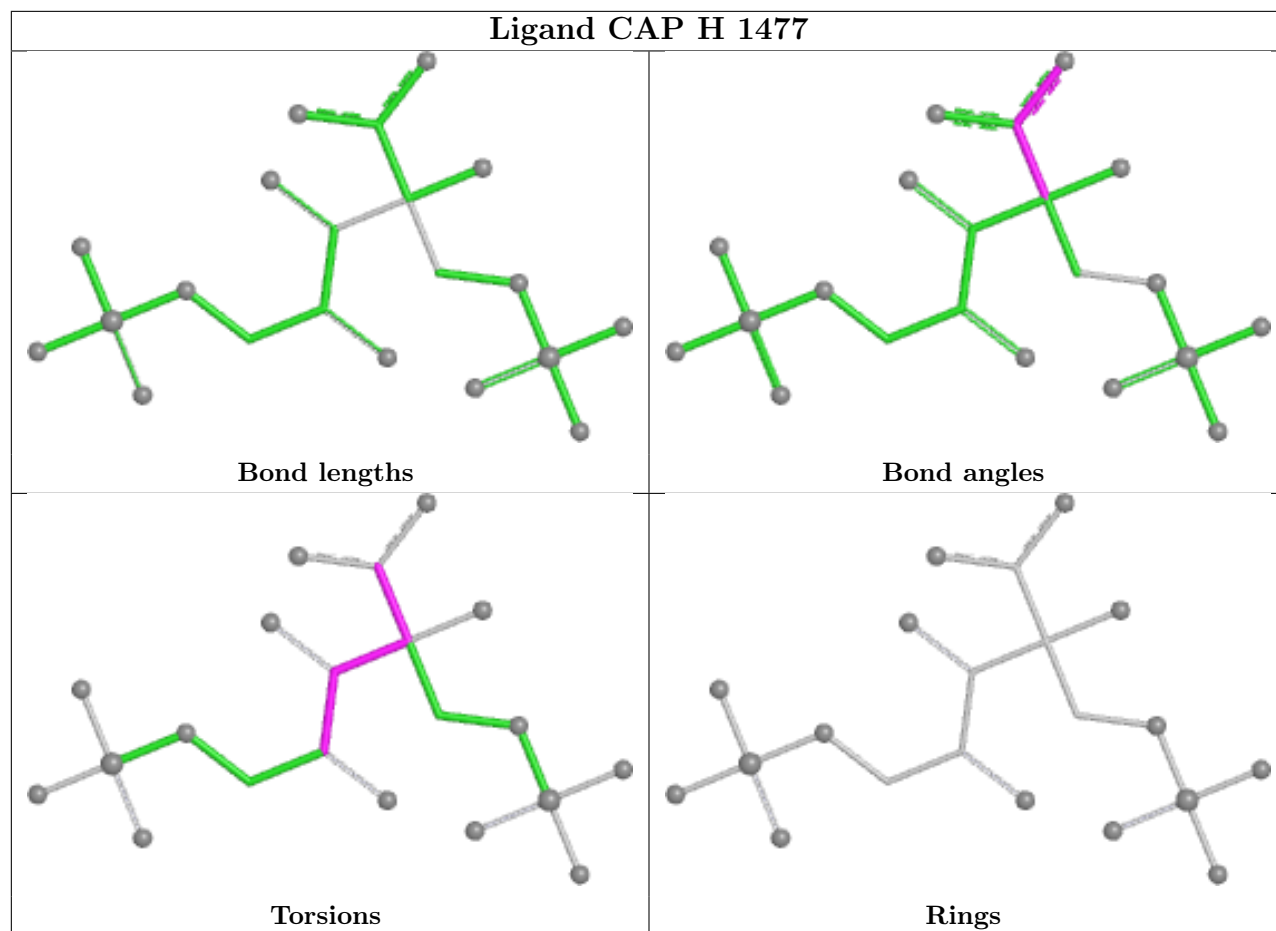


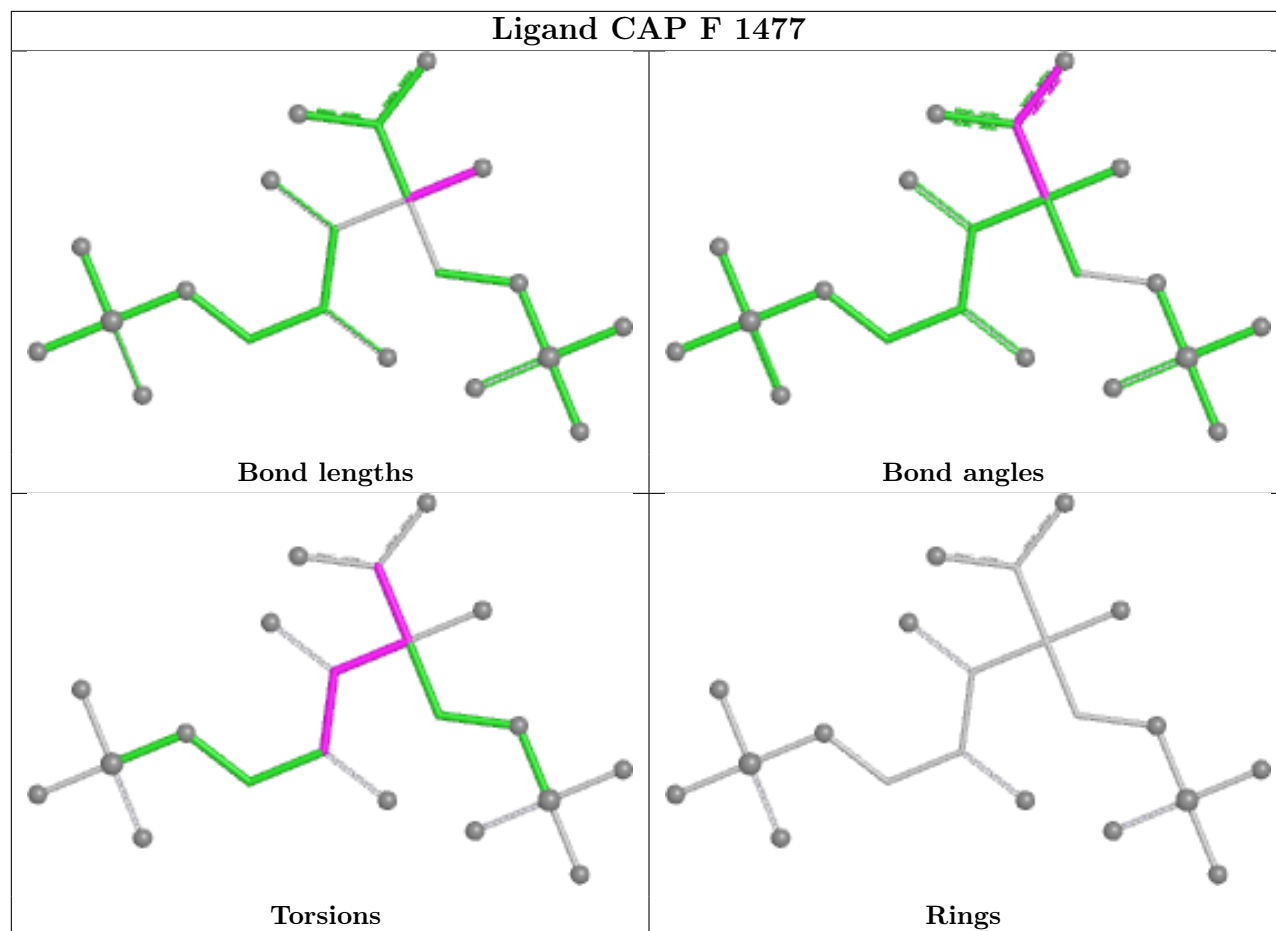


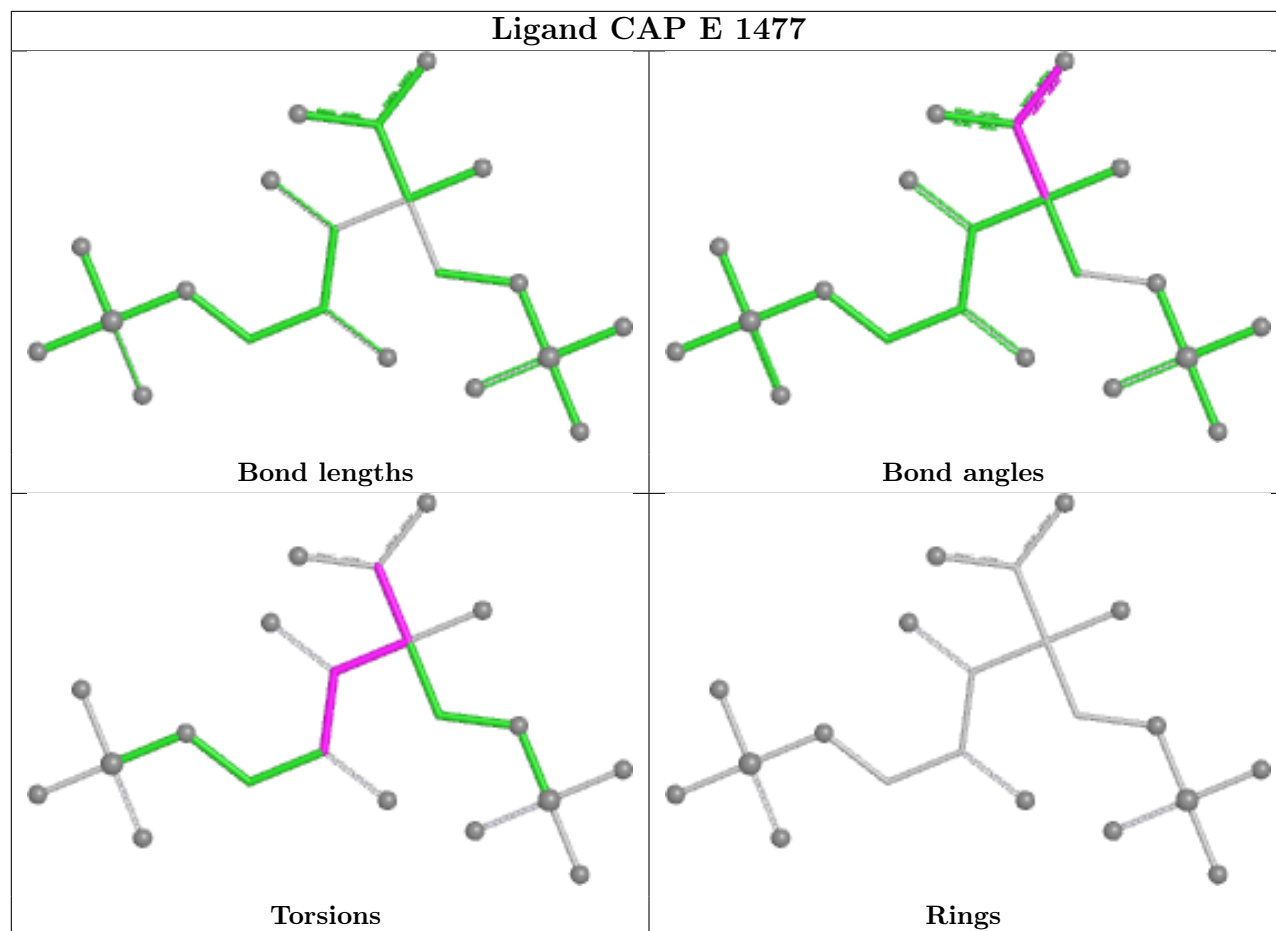












5.7 Other polymers [i](#)

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

6.1 Protein, DNA and RNA chains

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	460/475 (96%)	-0.38	5 (1%) 78 79	8, 15, 29, 41	1 (0%)
1	B	463/475 (97%)	-0.45	5 (1%) 78 79	8, 15, 30, 49	1 (0%)
1	C	462/475 (97%)	-0.36	2 (0%) 88 89	8, 15, 30, 39	1 (0%)
1	D	460/475 (96%)	-0.39	2 (0%) 88 89	8, 15, 30, 42	1 (0%)
1	E	460/475 (96%)	-0.42	1 (0%) 91 91	8, 15, 29, 41	1 (0%)
1	F	462/475 (97%)	-0.42	3 (0%) 85 86	8, 15, 30, 41	1 (0%)
1	G	462/475 (97%)	-0.41	2 (0%) 88 89	8, 15, 30, 40	0
1	H	460/475 (96%)	-0.46	2 (0%) 88 89	8, 15, 29, 39	1 (0%)
2	I	139/140 (99%)	0.05	2 (1%) 73 75	14, 22, 33, 36	0
2	J	139/140 (99%)	-0.14	0 100 100	14, 22, 33, 39	0
2	K	139/140 (99%)	-0.17	0 100 100	14, 22, 33, 38	0
2	L	139/140 (99%)	-0.13	0 100 100	14, 22, 32, 35	0
2	M	139/140 (99%)	-0.10	1 (0%) 84 85	14, 22, 32, 35	0
2	N	139/140 (99%)	-0.15	0 100 100	14, 22, 33, 40	0
2	O	139/140 (99%)	-0.13	0 100 100	14, 22, 33, 37	0
2	P	139/140 (99%)	-0.03	3 (2%) 62 64	14, 22, 33, 39	0
All	All	4801/4920 (97%)	-0.34	28 (0%) 85 86	8, 17, 31, 49	7 (0%)

The worst 5 of 28 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	94	ASP	4.9
1	E	92	GLY	3.3
1	F	449	CYS	3.2
1	H	94	ASP	2.9
1	A	449	CYS	2.9

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

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(Å ²)	Q<0.9
2	MME	K	1	9/10	0.88	0.10	27,28,33,33	0
2	MME	L	1	9/10	0.89	0.13	27,28,33,34	0
1	HYP	C	104	8/9	0.91	0.08	10,11,12,12	0
2	MME	I	1	9/10	0.91	0.10	27,28,33,34	0
2	MME	M	1	9/10	0.91	0.12	27,28,33,33	0
2	MME	N	1	9/10	0.91	0.09	27,28,33,34	0
1	HYP	F	104	8/9	0.92	0.07	11,11,12,12	0
1	SMC	C	369	7/8	0.93	0.08	14,15,16,19	0
2	MME	O	1	9/10	0.93	0.08	27,28,33,34	0
2	MME	P	1	9/10	0.93	0.09	27,28,33,33	0
1	HYP	A	104	8/9	0.94	0.06	11,11,12,12	0
1	SMC	A	369	7/8	0.94	0.10	14,15,17,19	0
2	MME	J	1	9/10	0.94	0.08	27,28,33,33	0
1	HYP	E	151	8/9	0.95	0.06	10,11,12,12	0
1	HYP	B	104	8/9	0.95	0.06	10,11,12,12	0
1	HYP	H	104	8/9	0.95	0.07	10,11,12,12	0
1	SMC	H	369	7/8	0.95	0.09	14,15,17,19	0
1	SMC	B	369	7/8	0.95	0.08	14,15,17,19	0
1	SMC	D	369	7/8	0.95	0.07	14,15,17,18	0
1	KCX	H	201	12/13	0.96	0.06	10,12,12,13	0
1	KCX	B	201	12/13	0.96	0.06	10,11,12,13	0
1	HYP	D	104	8/9	0.96	0.05	11,11,12,12	0
1	KCX	D	201	12/13	0.96	0.06	10,12,12,13	0
1	KCX	A	201	12/13	0.96	0.06	10,12,12,13	0
1	HYP	B	151	8/9	0.96	0.06	11,11,12,12	0
1	HYP	C	151	8/9	0.96	0.07	10,12,12,12	0
1	SMC	F	369	7/8	0.96	0.07	14,15,16,18	0
1	KCX	C	201	12/13	0.96	0.05	10,12,12,13	0
1	HYP	H	151	8/9	0.96	0.06	10,11,12,12	0
1	KCX	E	201	12/13	0.97	0.05	9,12,12,13	0
1	SMC	H	256	7/8	0.97	0.06	10,11,11,12	0
1	SMC	D	256	7/8	0.97	0.06	10,11,11,12	0
1	HYP	F	151	8/9	0.97	0.05	10,11,12,12	0
1	KCX	F	201	12/13	0.97	0.06	10,11,12,13	0
1	HYP	D	151	8/9	0.97	0.05	10,11,12,12	0
1	HYP	G	104	8/9	0.97	0.06	11,11,11,11	0
1	HYP	G	151	8/9	0.97	0.06	11,11,12,12	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
1	SMC	G	369	7/8	0.97	0.06	14,15,16,18	0
1	HYP	E	104	8/9	0.97	0.05	11,11,12,12	0
1	HYP	A	151	8/9	0.97	0.06	10,11,12,12	0
1	SMC	E	369	7/8	0.98	0.05	14,15,17,19	0
1	KCX	G	201	12/13	0.98	0.05	10,12,12,13	0
1	SMC	C	256	7/8	0.98	0.04	10,11,11,13	0
1	SMC	E	256	7/8	0.98	0.05	10,11,11,13	0
1	SMC	B	256	7/8	0.99	0.04	10,10,11,11	0
1	SMC	G	256	7/8	0.99	0.03	10,11,11,11	0
1	SMC	A	256	7/8	0.99	0.04	10,11,11,12	0
1	SMC	F	256	7/8	0.99	0.04	10,10,11,12	0

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
5	EDO	H	1482	4/4	0.73	0.18	40,40,40,42	0
5	EDO	D	1482	4/4	0.77	0.12	49,49,49,50	0
5	EDO	A	1480	4/4	0.80	0.13	31,34,34,36	0
5	EDO	C	1480	4/4	0.81	0.16	57,59,59,61	0
5	EDO	N	1142	4/4	0.82	0.17	36,37,39,40	0
5	EDO	M	1142	4/4	0.83	0.13	37,38,38,39	0
5	EDO	F	1481	4/4	0.85	0.13	36,37,37,38	0
5	EDO	D	1480	4/4	0.85	0.13	41,43,44,45	0
5	EDO	C	1478	4/4	0.85	0.12	18,22,22,23	0
5	EDO	E	1479	4/4	0.85	0.10	25,28,29,31	0
5	EDO	H	1481	4/4	0.86	0.12	27,27,29,30	0
5	EDO	C	1483	4/4	0.86	0.12	31,33,33,33	0
5	EDO	K	1141	4/4	0.87	0.10	35,36,37,39	0
5	EDO	F	1483	4/4	0.88	0.12	32,33,33,33	0
5	EDO	L	1141	4/4	0.88	0.14	54,56,56,56	0
5	EDO	C	1482	4/4	0.88	0.10	33,33,33,34	0
5	EDO	A	1481	4/4	0.88	0.12	45,45,45,46	0

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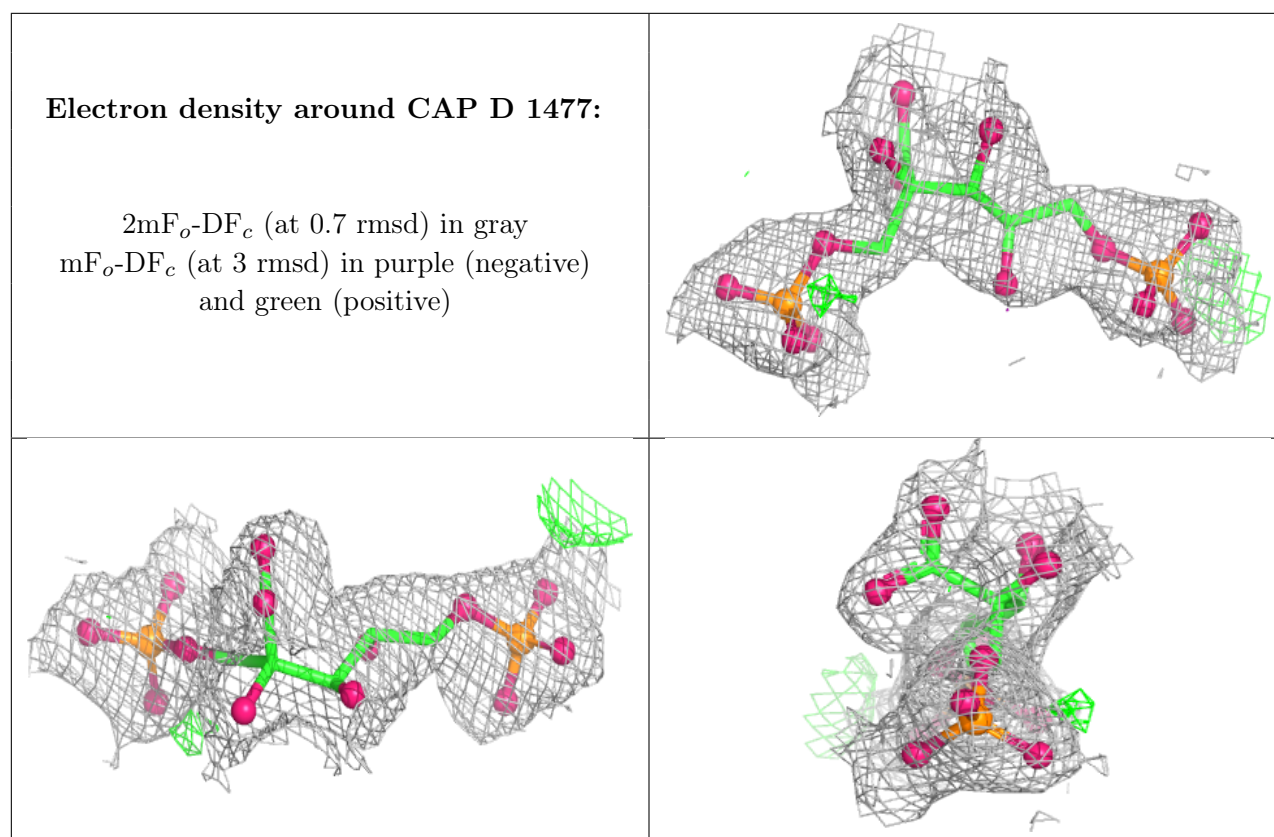
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
5	EDO	B	1478	4/4	0.89	0.09	18,19,19,19	0
5	EDO	G	1480	4/4	0.89	0.13	41,43,43,43	0
5	EDO	H	1483	4/4	0.89	0.09	26,26,26,28	0
5	EDO	J	1142	4/4	0.89	0.08	39,39,40,40	0
5	EDO	O	1141	4/4	0.89	0.09	38,38,38,39	0
5	EDO	D	1478	4/4	0.90	0.09	23,23,23,27	0
5	EDO	E	1478	4/4	0.90	0.20	6,7,7,8	4
5	EDO	A	1483	4/4	0.90	0.09	24,24,26,27	0
5	EDO	F	1482	4/4	0.91	0.09	36,37,37,39	0
5	EDO	M	1141	4/4	0.91	0.10	42,43,43,44	0
5	EDO	E	1482	4/4	0.91	0.08	30,31,31,32	0
5	EDO	E	1483	4/4	0.91	0.08	37,37,37,38	0
5	EDO	B	1482	4/4	0.91	0.12	33,35,36,36	0
5	EDO	G	1478	4/4	0.92	0.08	16,18,19,20	0
5	EDO	B	1480	4/4	0.92	0.10	38,38,39,39	0
5	EDO	B	1481	4/4	0.92	0.06	22,25,27,27	0
5	EDO	F	1478	4/4	0.92	0.10	28,29,30,31	0
5	EDO	F	1480	4/4	0.93	0.08	21,22,25,26	0
5	EDO	J	1141	4/4	0.93	0.09	34,35,36,36	0
5	EDO	E	1480	4/4	0.93	0.09	30,31,31,34	0
5	EDO	G	1482	4/4	0.94	0.06	21,21,21,22	0
5	EDO	H	1480	4/4	0.94	0.07	38,39,39,39	0
5	EDO	A	1478	4/4	0.94	0.14	14,18,19,19	0
5	EDO	D	1481	4/4	0.94	0.09	27,27,28,28	0
5	EDO	E	1481	4/4	0.94	0.08	30,30,31,31	0
5	EDO	N	1141	4/4	0.94	0.08	29,30,31,31	0
5	EDO	I	1141	4/4	0.94	0.13	47,48,48,49	0
5	EDO	G	1481	4/4	0.94	0.08	38,39,39,39	0
5	EDO	D	1479	4/4	0.95	0.07	30,30,31,31	0
5	EDO	B	1479	4/4	0.95	0.08	19,19,20,21	0
5	EDO	A	1479	4/4	0.95	0.06	15,17,18,19	0
5	EDO	K	1142	4/4	0.95	0.05	23,24,24,24	0
5	EDO	C	1481	4/4	0.95	0.13	2,4,4,7	4
5	EDO	O	1142	4/4	0.95	0.06	33,33,35,35	0
5	EDO	F	1479	4/4	0.96	0.06	19,20,20,21	0
5	EDO	H	1478	4/4	0.96	0.07	21,22,23,24	0
5	EDO	A	1482	4/4	0.96	0.06	20,25,25,25	0
4	CAP	D	1477	21/21	0.97	0.06	12,17,18,20	0
5	EDO	C	1479	4/4	0.97	0.06	21,22,22,24	0
3	MG	A	1476	1/1	0.97	0.04	10,10,10,10	0
4	CAP	A	1477	21/21	0.97	0.06	12,17,18,20	0
5	EDO	G	1479	4/4	0.97	0.05	13,13,16,18	0

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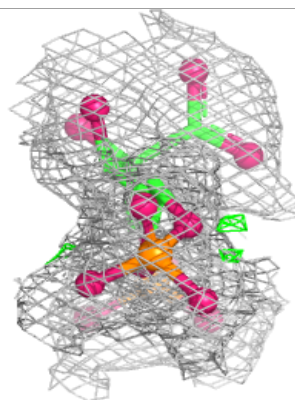
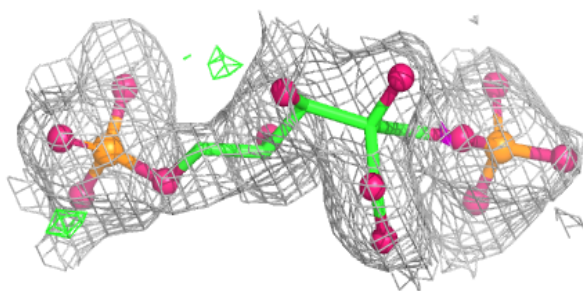
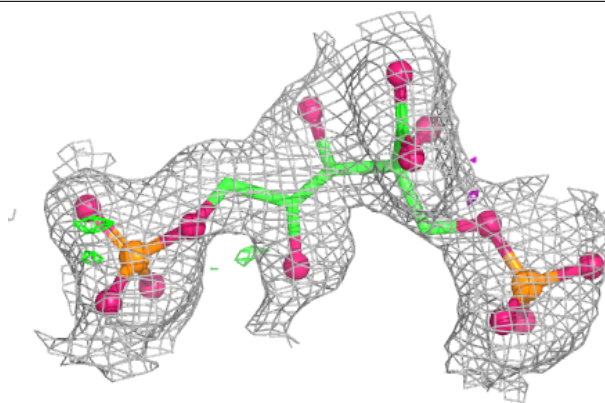
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
4	CAP	G	1477	21/21	0.98	0.06	12,17,18,20	0
4	CAP	H	1477	21/21	0.98	0.05	12,17,18,20	0
4	CAP	B	1477	21/21	0.98	0.06	12,17,18,19	0
4	CAP	C	1477	21/21	0.98	0.05	13,18,18,20	0
3	MG	C	1476	1/1	0.98	0.03	11,11,11,11	0
4	CAP	E	1477	21/21	0.98	0.06	13,17,18,20	0
4	CAP	F	1477	21/21	0.98	0.05	12,17,18,19	0
5	EDO	H	1479	4/4	0.98	0.04	20,20,20,20	0
3	MG	B	1476	1/1	0.99	0.05	10,10,10,10	0
3	MG	D	1476	1/1	0.99	0.02	11,11,11,11	0
3	MG	F	1476	1/1	0.99	0.03	10,10,10,10	0
3	MG	G	1476	1/1	0.99	0.03	9,9,9,9	0
3	MG	H	1476	1/1	0.99	0.02	11,11,11,11	0
3	MG	E	1476	1/1	1.00	0.02	11,11,11,11	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.

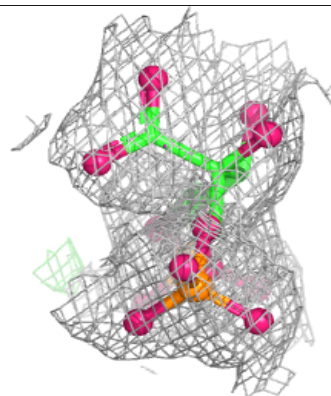
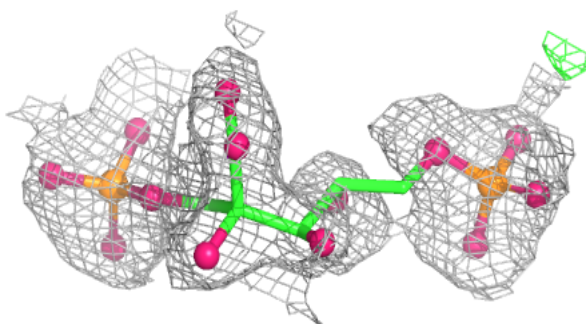
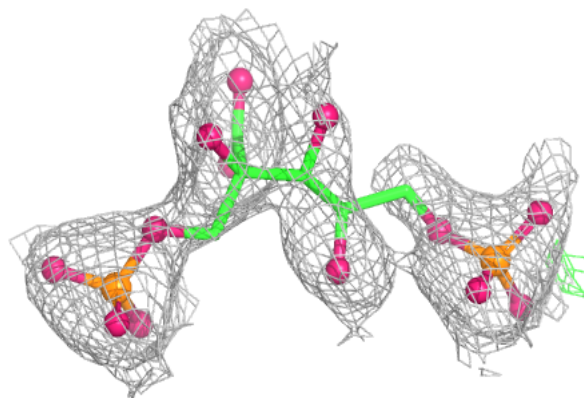


Electron density around CAP A 1477:

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

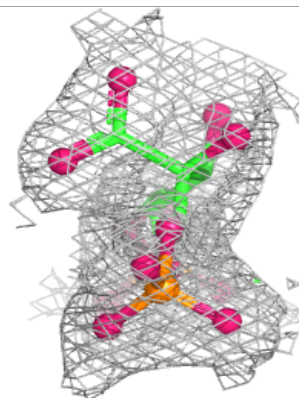
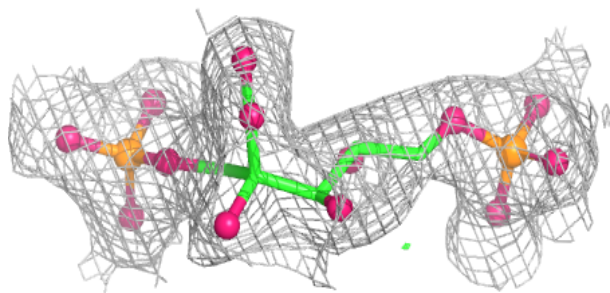
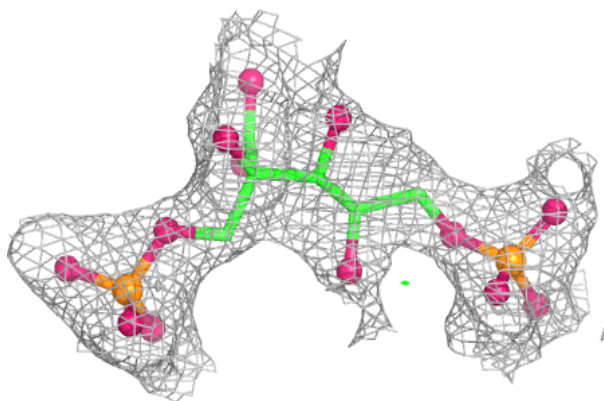
**Electron density around CAP G 1477:**

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

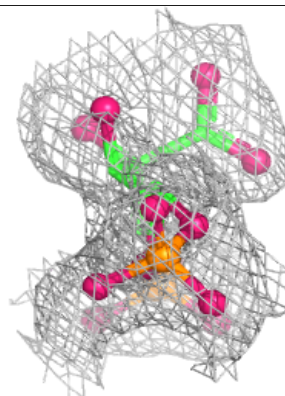
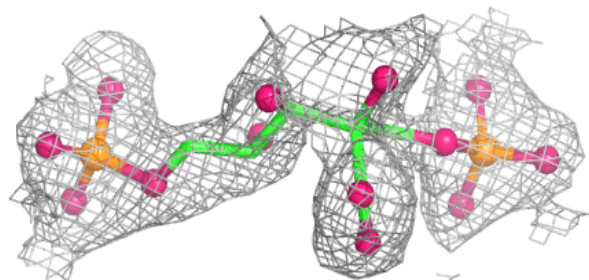
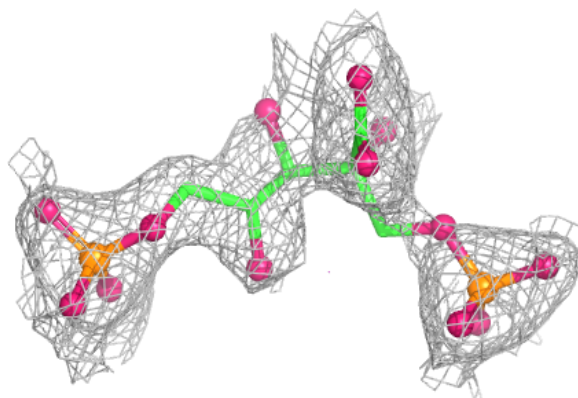


Electron density around CAP H 1477:

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

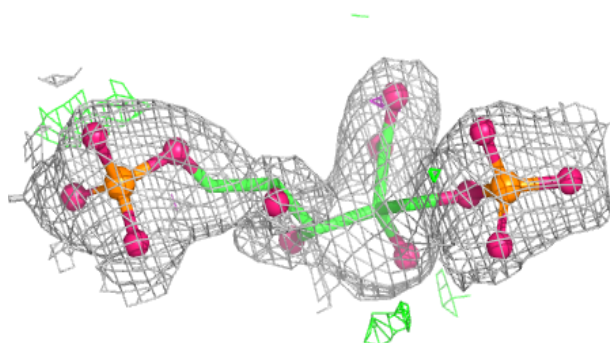
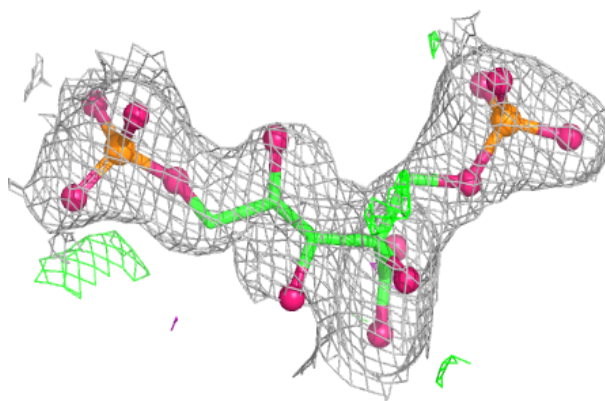
**Electron density around CAP B 1477:**

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

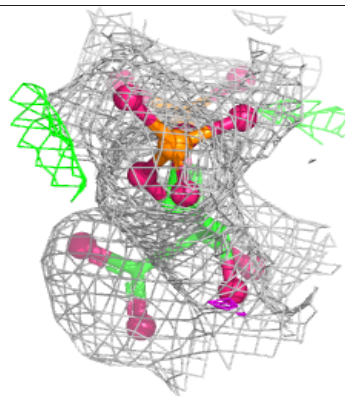
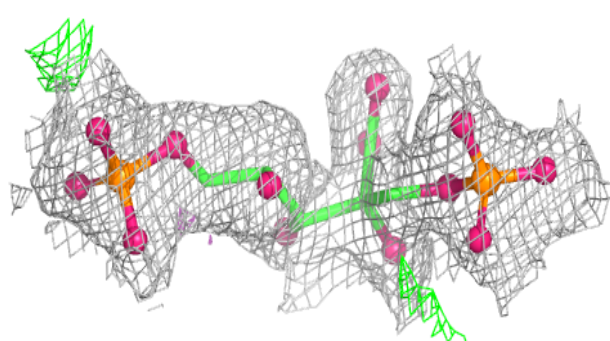
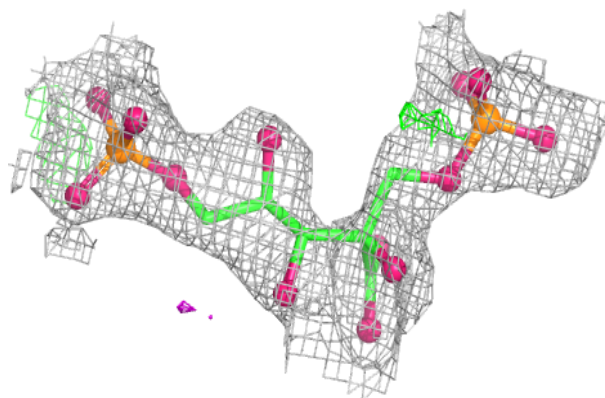


Electron density around CAP C 1477:

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

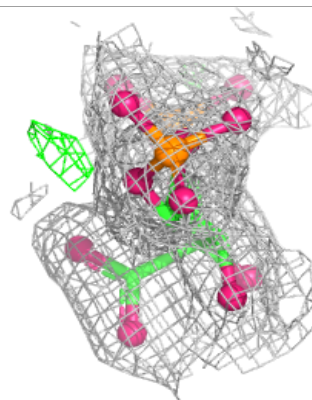
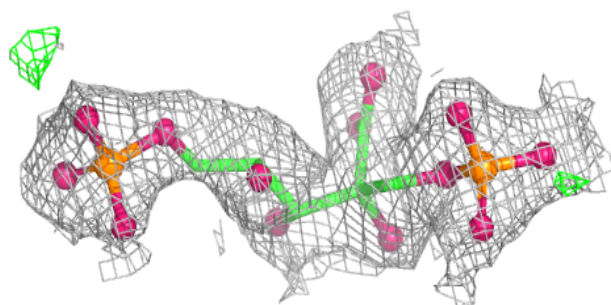
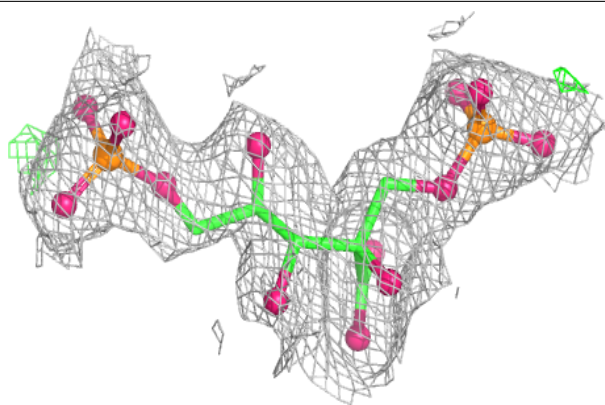
**Electron density around CAP E 1477:**

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



Electron density around CAP F 1477:

$2mF_o - DF_c$ (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.