



# wwPDB X-ray Structure Validation Summary Report ⓘ

Feb 1, 2016 – 06:03 AM GMT

PDB ID : 2VDH  
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](mailto:validation@mail.wwpdb.org)  
A user guide is available at  
<http://wwpdb.org/validation/2016/XrayValidationReportHelp>  
with specific help available everywhere you see the ⓘ symbol.

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

MolProbity : 4.02b-467  
Mogul : 1.7 (RC4), CSD as536be (2015)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20026688  
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)  
Refmac : 5.8.0135  
CCP4 : 6.5.0  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : trunk26865

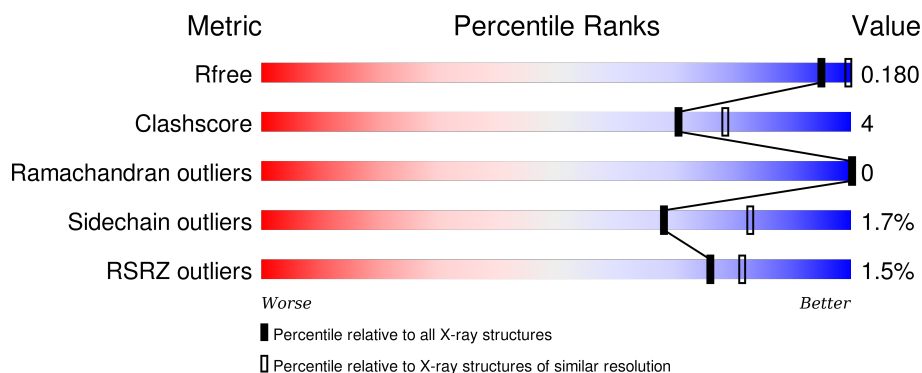
# 1 Overall quality at a glance ⓘ

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))
$R_{free}$	91344	3852 (2.30-2.30)
Clashscore	102246	4452 (2.30-2.30)
Ramachandran outliers	100387	4410 (2.30-2.30)
Sidechain outliers	100360	4409 (2.30-2.30)
RSRZ outliers	91569	3857 (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 on the lower bar indicate the fraction of residues that contain outliers for  $\geq 3$ , 2, 1 and 0 types of geometric quality criteria. 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	<div> <div>89%</div> <div>9%</div> <div>•</div> </div>
1	B	475	<div> <div>88%</div> <div>10%</div> <div>•</div> </div>
1	C	475	<div> <div>2%</div> <div>87%</div> <div>11%</div> <div>•</div> </div>
1	D	475	<div> <div>87%</div> <div>10%</div> <div>•</div> </div>
1	E	475	<div> <div>2%</div> <div>89%</div> <div>9%</div> <div>•</div> </div>

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Mol	Chain	Length	Quality of chain
1	F	475	
1	G	475	
1	H	475	
2	I	140	
2	J	140	
2	K	140	
2	L	140	
2	M	140	
2	N	140	
2	O	140	
2	P	140	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
5	EDO	A	1480	-	-	-	X
5	EDO	A	1481	-	-	-	X
5	EDO	A	1483	-	-	-	X
5	EDO	B	1482	-	-	-	X
5	EDO	C	1481	-	-	-	X
5	EDO	D	1482	-	-	-	X
5	EDO	E	1478	-	-	-	X
5	EDO	E	1479	-	-	-	X
5	EDO	E	1480	-	-	-	X
5	EDO	E	1483	-	-	-	X
5	EDO	F	1481	-	-	-	X
5	EDO	F	1482	-	-	-	X
5	EDO	F	1483	-	-	-	X
5	EDO	G	1480	-	-	-	X
5	EDO	H	1480	-	-	-	X
5	EDO	H	1482	-	-	-	X
5	EDO	H	1483	-	-	-	X
5	EDO	M	1141	-	-	-	X

## 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 BIPHOSPHATE 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 (three-letter code: MG) (formula: Mg).

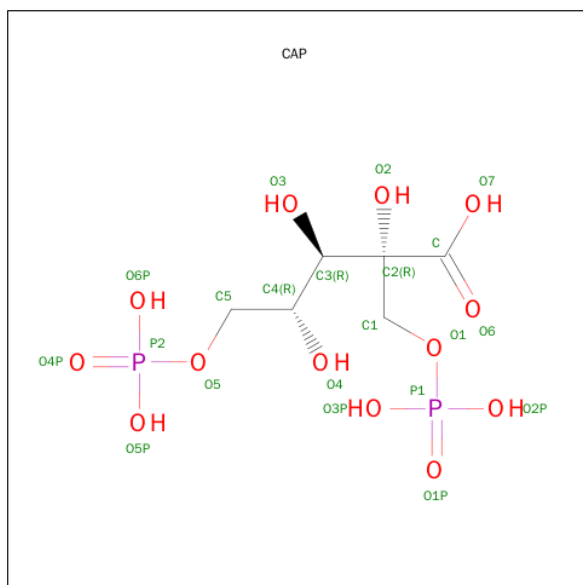
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	G	1	Total	Mg	0	0
			1	1		
3	D	1	Total	Mg	0	0
			1	1		
3	E	1	Total	Mg	0	0
			1	1		
3	H	1	Total	Mg	0	0
			1	1		
3	B	1	Total	Mg	0	0
			1	1		
3	C	1	Total	Mg	0	0
			1	1		
3	A	1	Total	Mg	0	0
			1	1		

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

- Molecule 4 is 2-CARBOXYARABINITOL-1,5-DIPHOSPHATE (three-letter code: 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 (three-letter code: 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	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 4	C 2	O 2	0	0
5	C	1	Total 4	C 2	O 2	0	0
5	C	1	Total 4	C 2	O 2	0	0
5	D	1	Total 4	C 2	O 2	0	0
5	D	1	Total 4	C 2	O 2	0	0
5	D	1	Total 4	C 2	O 2	0	0
5	D	1	Total 4	C 2	O 2	0	0
5	D	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	E	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	F	1	Total 4	C 2	O 2	0	0
5	G	1	Total 4	C 2	O 2	0	0

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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		

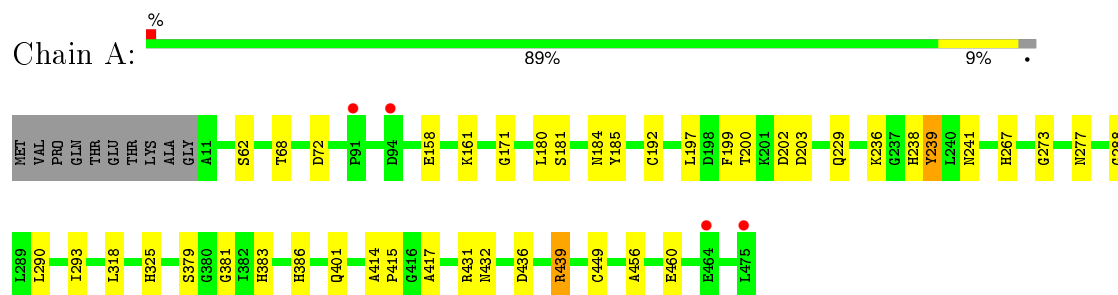
- Molecule 6 is water.

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		

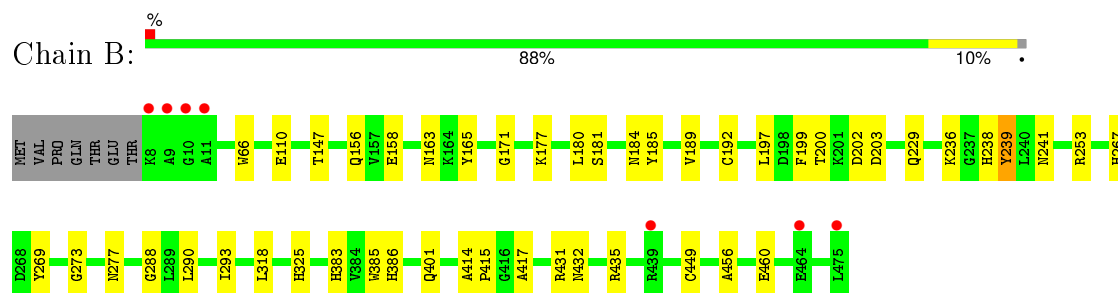
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of errors 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 ( $\text{RSRZ} > 2$ ). 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.

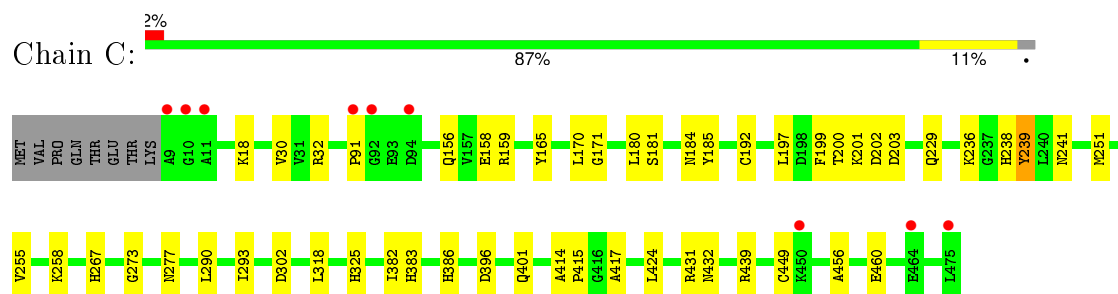
#### • Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



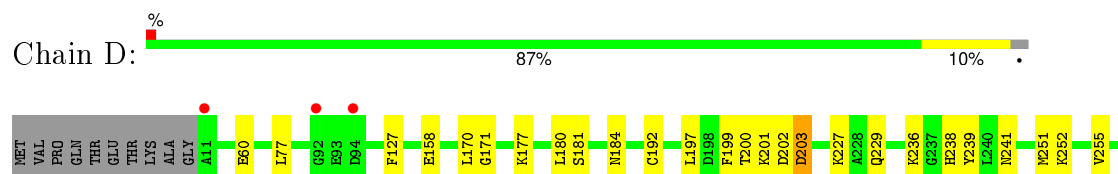
#### • Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



#### • Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

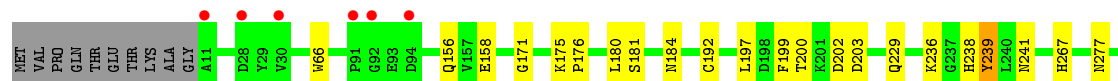
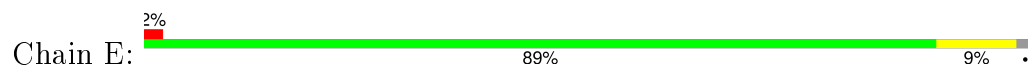


#### • Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

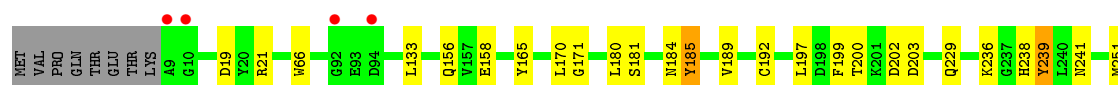
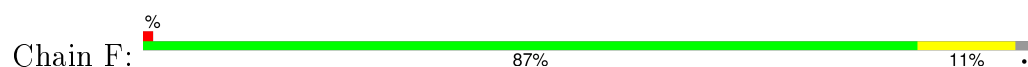




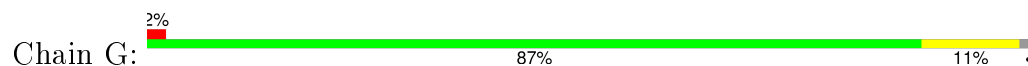
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



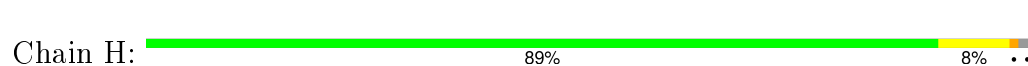
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



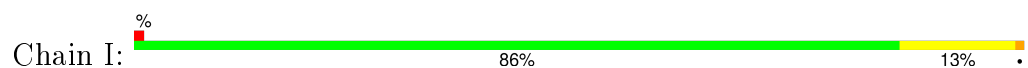
• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN



• Molecule 1: RIBULOSE BISPHOSPHATE CARBOXYLASE LARGE CHAIN

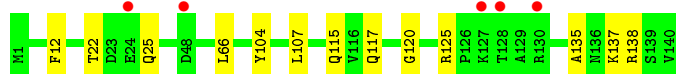
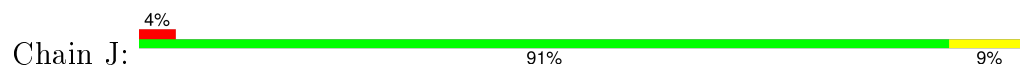


• Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1

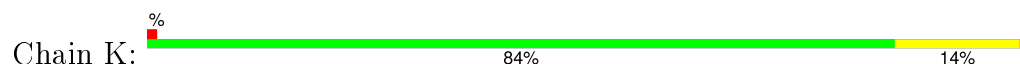




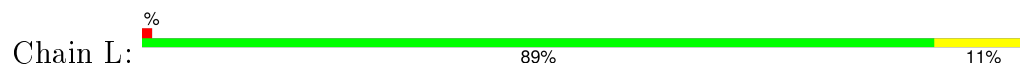
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



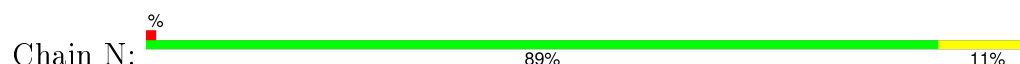
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



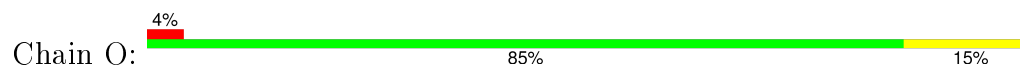
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



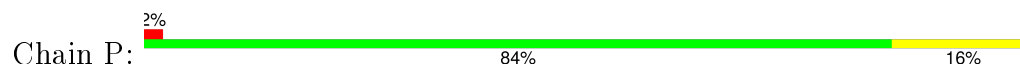
- Molecule 2: RIBULOSE BISPHOSPHATE CARBOXYLASE SMALL CHAIN 1



- 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, $\alpha$ , $\beta$ , $\gamma$	120.19Å 178.35Å 122.56Å 90.00° 117.87° 90.00°	Depositor
Resolution (Å)	30.00 – 2.30 19.90 – 2.20	Depositor EDS
% Data completeness (in resolution range)	88.3 (30.00-2.30) 88.4 (19.90-2.20)	Depositor EDS
$R_{merge}$	0.16	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	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 (5.30%)	DCC
Wilson B-factor (Å <sup>2</sup> )	18.7	Xtriage
Anisotropy	0.266	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 38.1	EDS
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
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.34$	Xtriage
Outliers	0 of 203531 reflections	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	40416	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	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.*

<sup>1</sup> Intensities estimated from amplitudes.

<sup>2</sup> Theoretical values of  $\langle |L| \rangle$ ,  $\langle L^2 \rangle$  for acentric reflections are 0.5, 0.375 respectively for untwinned datasets, and 0.333, 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: MG, CAP, EDO, HYP, MME, 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	0.49	0/3666	0.56	0/4955
1	B	0.53	0/3684	0.61	1/4978 (0.0%)
1	C	0.55	0/3675	0.61	0/4967
1	D	0.54	0/3666	0.62	0/4955
1	E	0.54	0/3665	0.60	0/4955
1	F	0.54	0/3675	0.62	0/4967
1	G	0.53	0/3675	0.59	0/4967
1	H	0.56	1/3666 (0.0%)	0.61	0/4955
2	I	0.48	0/1166	0.55	0/1584
2	J	0.54	0/1166	0.59	0/1584
2	K	0.51	0/1166	0.57	0/1584
2	L	0.53	0/1166	0.60	0/1584
2	M	0.52	0/1166	0.60	0/1584
2	N	0.53	0/1166	0.59	0/1584
2	O	0.53	0/1166	0.58	0/1584
2	P	0.54	0/1166	0.59	0/1584
All	All	0.53	1/38700 (0.0%)	0.60	1/52371 (0.0%)

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	H	192	CYS	CB-SG	-5.16	1.73	1.81

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	B	253	ARG	NE-CZ-NH1	5.02	122.81	120.30

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	34	0
1	B	3646	0	3556	38	0
1	C	3637	0	3543	39	0
1	D	3628	0	3535	34	0
1	E	3627	0	3535	31	0
1	F	3637	0	3543	35	0
1	G	3637	0	3543	38	0
1	H	3628	0	3535	32	0
2	I	1143	0	1122	14	0
2	J	1143	0	1122	11	0
2	K	1143	0	1122	14	0
2	L	1143	0	1122	14	0
2	M	1143	0	1122	12	0
2	N	1143	0	1122	11	0
2	O	1143	0	1122	13	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
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

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
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	339	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 4.

The worst 5 of 339 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
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%)	362 (98%)	6 (2%)	70	84
1	B	369/376 (98%)	364 (99%)	5 (1%)	74	86
1	C	368/376 (98%)	362 (98%)	6 (2%)	70	84
1	D	368/376 (98%)	364 (99%)	4 (1%)	80	90
1	E	368/376 (98%)	364 (99%)	4 (1%)	80	90
1	F	368/376 (98%)	363 (99%)	5 (1%)	74	86
1	G	368/376 (98%)	364 (99%)	4 (1%)	80	90
1	H	368/376 (98%)	362 (98%)	6 (2%)	70	84
2	I	122/122 (100%)	119 (98%)	3 (2%)	55	73
2	J	122/122 (100%)	120 (98%)	2 (2%)	70	84
2	K	122/122 (100%)	117 (96%)	5 (4%)	37	50
2	L	122/122 (100%)	120 (98%)	2 (2%)	70	84
2	M	122/122 (100%)	119 (98%)	3 (2%)	55	73
2	N	122/122 (100%)	118 (97%)	4 (3%)	45	61
2	O	122/122 (100%)	117 (96%)	5 (4%)	37	50
2	P	122/122 (100%)	118 (97%)	4 (3%)	45	61
All	All	3921/3984 (98%)	3853 (98%)	68 (2%)	68	83

5 of 68 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	G	203	ASP
1	H	335	LEU
2	O	84	ARG
1	G	239	TYR
1	H	185	TYR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 137 such sidechains are listed below:

Mol	Chain	Res	Type
1	F	229	GLN
1	G	267	HIS
2	O	9	ASN
1	F	241	ASN
1	F	432	ASN

### 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	HYP	A	104	1	7,8,9	0.58	0	5,10,12	1.22	1 (20%)
1	HYP	A	151	1	7,8,9	0.80	0	5,10,12	1.40	1 (20%)
1	KCX	A	201	1,3	7,11,12	0.81	0	7,12,14	0.78	0
1	SMC	A	256	1	5,6,7	0.41	0	2,6,8	2.02	1 (50%)
1	SMC	A	369	1	5,6,7	1.03	1 (20%)	2,6,8	1.20	0
1	HYP	B	104	1	7,8,9	0.60	0	5,10,12	1.11	0
1	HYP	B	151	1	7,8,9	0.96	1 (14%)	5,10,12	1.39	1 (20%)
1	KCX	B	201	1,3	7,11,12	0.81	0	7,12,14	0.82	0
1	SMC	B	256	1	5,6,7	0.90	0	2,6,8	1.64	1 (50%)
1	SMC	B	369	1	5,6,7	1.43	1 (20%)	2,6,8	1.44	0
1	HYP	C	104	1	7,8,9	0.68	0	5,10,12	1.42	0
1	HYP	C	151	1	7,8,9	0.71	0	5,10,12	1.24	1 (20%)
1	KCX	C	201	1,3	7,11,12	0.79	0	7,12,14	1.55	2 (28%)
1	SMC	C	256	1	5,6,7	0.92	0	2,6,8	1.55	1 (50%)
1	SMC	C	369	1	5,6,7	0.92	0	2,6,8	1.44	0
1	HYP	D	104	1	7,8,9	0.45	0	5,10,12	1.16	1 (20%)
1	HYP	D	151	1	7,8,9	0.71	0	5,10,12	1.53	2 (40%)
1	KCX	D	201	1,3	7,11,12	0.66	0	7,12,14	1.05	0
1	SMC	D	256	1	5,6,7	1.47	1 (20%)	2,6,8	1.39	0
1	SMC	D	369	1	5,6,7	0.82	0	2,6,8	1.23	0
1	HYP	E	104	1	7,8,9	0.44	0	5,10,12	1.20	1 (20%)
1	HYP	E	151	1	7,8,9	0.96	1 (14%)	5,10,12	1.36	0
1	KCX	E	201	1,3	7,11,12	0.99	1 (14%)	7,12,14	0.82	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	SMC	E	256	1	5,6,7	1.17	1 (20%)	2,6,8	1.43	1 (50%)
1	SMC	E	369	1	5,6,7	0.60	0	2,6,8	1.12	0
1	HYP	F	104	1	7,8,9	0.70	0	5,10,12	1.28	1 (20%)
1	HYP	F	151	1	7,8,9	0.85	0	5,10,12	1.57	2 (40%)
1	KCX	F	201	1,3	7,11,12	0.60	0	7,12,14	0.62	0
1	SMC	F	256	1	5,6,7	0.59	0	2,6,8	1.63	1 (50%)
1	SMC	F	369	1	5,6,7	1.23	1 (20%)	2,6,8	1.26	0
1	HYP	G	104	1	7,8,9	0.59	0	5,10,12	1.09	1 (20%)
1	HYP	G	151	1	7,8,9	0.79	0	5,10,12	1.45	1 (20%)
1	KCX	G	201	1,3	7,11,12	0.68	0	7,12,14	0.69	0
1	SMC	G	256	1	5,6,7	0.74	0	2,6,8	1.86	1 (50%)
1	SMC	G	369	1	5,6,7	0.73	0	2,6,8	1.42	0
1	HYP	H	104	1	7,8,9	0.86	0	5,10,12	1.16	1 (20%)
1	HYP	H	151	1	7,8,9	1.05	1 (14%)	5,10,12	1.36	1 (20%)
1	KCX	H	201	1,3	7,11,12	1.09	1 (14%)	7,12,14	1.08	1 (14%)
1	SMC	H	256	1	5,6,7	0.99	0	2,6,8	1.37	0
1	SMC	H	369	1	5,6,7	0.95	0	2,6,8	1.34	0
2	MME	I	1	2	7,8,9	2.73	1 (14%)	4,8,10	0.97	0
2	MME	J	1	2	7,8,9	2.71	1 (14%)	4,8,10	1.07	0
2	MME	K	1	2	7,8,9	2.64	1 (14%)	4,8,10	1.02	0
2	MME	L	1	2	7,8,9	2.60	1 (14%)	4,8,10	1.17	0
2	MME	M	1	2	7,8,9	2.61	1 (14%)	4,8,10	1.08	0
2	MME	N	1	2	7,8,9	2.66	1 (14%)	4,8,10	1.13	0
2	MME	O	1	2	7,8,9	2.74	1 (14%)	4,8,10	1.00	0
2	MME	P	1	2	7,8,9	2.67	1 (14%)	4,8,10	0.93	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
1	HYP	A	104	1	-	0/0/11/13	0/1/1/1
1	HYP	A	151	1	-	0/0/11/13	0/1/1/1
1	KCX	A	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	A	256	1	-	0/3/5/7	0/0/0/0
1	SMC	A	369	1	-	0/3/5/7	0/0/0/0
1	HYP	B	104	1	-	0/0/11/13	0/1/1/1

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
1	HYP	B	151	1	-	0/0/11/13	0/1/1/1
1	KCX	B	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	B	256	1	-	0/3/5/7	0/0/0/0
1	SMC	B	369	1	-	0/3/5/7	0/0/0/0
1	HYP	C	104	1	-	0/0/11/13	0/1/1/1
1	HYP	C	151	1	-	0/0/11/13	0/1/1/1
1	KCX	C	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	C	256	1	-	0/3/5/7	0/0/0/0
1	SMC	C	369	1	-	0/3/5/7	0/0/0/0
1	HYP	D	104	1	-	0/0/11/13	0/1/1/1
1	HYP	D	151	1	-	0/0/11/13	0/1/1/1
1	KCX	D	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	D	256	1	-	0/3/5/7	0/0/0/0
1	SMC	D	369	1	-	0/3/5/7	0/0/0/0
1	HYP	E	104	1	-	0/0/11/13	0/1/1/1
1	HYP	E	151	1	-	0/0/11/13	0/1/1/1
1	KCX	E	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	E	256	1	-	0/3/5/7	0/0/0/0
1	SMC	E	369	1	-	0/3/5/7	0/0/0/0
1	HYP	F	104	1	-	0/0/11/13	0/1/1/1
1	HYP	F	151	1	-	0/0/11/13	0/1/1/1
1	KCX	F	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	F	256	1	-	0/3/5/7	0/0/0/0
1	SMC	F	369	1	-	0/3/5/7	0/0/0/0
1	HYP	G	104	1	-	0/0/11/13	0/1/1/1
1	HYP	G	151	1	-	0/0/11/13	0/1/1/1
1	KCX	G	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	G	256	1	-	0/3/5/7	0/0/0/0
1	SMC	G	369	1	-	0/3/5/7	0/0/0/0
1	HYP	H	104	1	-	0/0/11/13	0/1/1/1
1	HYP	H	151	1	-	0/0/11/13	0/1/1/1
1	KCX	H	201	1,3	-	0/6/10/12	0/0/0/0
1	SMC	H	256	1	-	0/3/5/7	0/0/0/0
1	SMC	H	369	1	-	0/3/5/7	0/0/0/0
2	MME	I	1	2	-	0/4/8/10	0/0/0/0
2	MME	J	1	2	-	0/4/8/10	0/0/0/0
2	MME	K	1	2	-	0/4/8/10	0/0/0/0
2	MME	L	1	2	-	0/4/8/10	0/0/0/0
2	MME	M	1	2	-	0/4/8/10	0/0/0/0
2	MME	N	1	2	-	0/4/8/10	0/0/0/0
2	MME	O	1	2	-	0/4/8/10	0/0/0/0
2	MME	P	1	2	-	0/4/8/10	0/0/0/0

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	O	1	MME	CM-N	-7.05	1.27	1.46
2	I	1	MME	CM-N	-7.01	1.27	1.46
2	J	1	MME	CM-N	-6.89	1.27	1.46
2	N	1	MME	CM-N	-6.84	1.27	1.46
2	P	1	MME	CM-N	-6.84	1.27	1.46

The worst 5 of 24 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	C	201	KCX	CE-NZ-CX	-3.39	119.65	123.49
1	G	256	SMC	O-C-CA	-2.41	119.22	125.49
1	D	104	HYP	O-C-CA	-2.34	119.27	125.44
1	B	151	HYP	O-C-CA	-2.32	119.32	125.44
1	F	256	SMC	O-C-CA	-2.30	119.50	125.49

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

4 monomers are involved in 4 short contacts:

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

## 5.5 Carbohydrates [i](#)

There are no carbohydrates 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	$\# Z  > 2$
4	CAP	A	1477	3	14,20,20	0.98	1 (7%)	15,31,31	0.82	0
5	EDO	A	1478	-	3,3,3	0.45	0	2,2,2	0.44	0
5	EDO	A	1479	-	3,3,3	0.40	0	2,2,2	0.60	0
5	EDO	A	1480	-	3,3,3	0.58	0	2,2,2	0.30	0
5	EDO	A	1481	-	3,3,3	0.45	0	2,2,2	0.59	0
5	EDO	A	1482	-	3,3,3	0.59	0	2,2,2	0.18	0
5	EDO	A	1483	-	3,3,3	0.61	0	2,2,2	0.30	0
4	CAP	B	1477	3	14,20,20	1.04	1 (7%)	15,31,31	0.77	0
5	EDO	B	1478	-	3,3,3	0.70	0	2,2,2	0.41	0
5	EDO	B	1479	-	3,3,3	0.33	0	2,2,2	0.61	0
5	EDO	B	1480	-	3,3,3	0.54	0	2,2,2	0.39	0
5	EDO	B	1481	-	3,3,3	0.55	0	2,2,2	0.32	0
5	EDO	B	1482	-	3,3,3	0.61	0	2,2,2	0.18	0
4	CAP	C	1477	3	14,20,20	0.84	0	15,31,31	0.88	0
5	EDO	C	1478	-	3,3,3	0.78	0	2,2,2	0.08	0
5	EDO	C	1479	-	3,3,3	0.38	0	2,2,2	0.68	0
5	EDO	C	1480	-	3,3,3	0.97	0	2,2,2	0.62	0
5	EDO	C	1481	-	3,3,3	0.47	0	2,2,2	0.44	0
5	EDO	C	1482	-	3,3,3	0.53	0	2,2,2	0.31	0
5	EDO	C	1483	-	3,3,3	0.54	0	2,2,2	0.09	0
4	CAP	D	1477	3	14,20,20	0.89	1 (7%)	15,31,31	0.79	0
5	EDO	D	1478	-	3,3,3	0.36	0	2,2,2	0.92	0
5	EDO	D	1479	-	3,3,3	0.50	0	2,2,2	0.39	0
5	EDO	D	1480	-	3,3,3	0.49	0	2,2,2	0.36	0
5	EDO	D	1481	-	3,3,3	0.57	0	2,2,2	0.15	0
5	EDO	D	1482	-	3,3,3	0.56	0	2,2,2	0.28	0
4	CAP	E	1477	3	14,20,20	0.83	0	15,31,31	0.87	1 (6%)
5	EDO	E	1478	-	3,3,3	0.57	0	2,2,2	0.17	0
5	EDO	E	1479	-	3,3,3	0.59	0	2,2,2	0.29	0
5	EDO	E	1480	-	3,3,3	0.60	0	2,2,2	0.30	0
5	EDO	E	1481	-	3,3,3	0.49	0	2,2,2	0.52	0
5	EDO	E	1482	-	3,3,3	0.59	0	2,2,2	0.19	0
5	EDO	E	1483	-	3,3,3	0.56	0	2,2,2	0.23	0
4	CAP	F	1477	3	14,20,20	1.11	1 (7%)	15,31,31	0.92	0
5	EDO	F	1478	-	3,3,3	0.54	0	2,2,2	0.42	0
5	EDO	F	1479	-	3,3,3	0.48	0	2,2,2	0.63	0
5	EDO	F	1480	-	3,3,3	0.55	0	2,2,2	0.26	0
5	EDO	F	1481	-	3,3,3	0.59	0	2,2,2	0.23	0
5	EDO	F	1482	-	3,3,3	0.54	0	2,2,2	0.34	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
5	EDO	F	1483	-	3,3,3	0.61	0	2,2,2	0.24	0
4	CAP	G	1477	3	14,20,20	1.01	1 (7%)	15,31,31	0.95	0
5	EDO	G	1478	-	3,3,3	0.58	0	2,2,2	0.42	0
5	EDO	G	1479	-	3,3,3	0.33	0	2,2,2	0.73	0
5	EDO	G	1480	-	3,3,3	0.59	0	2,2,2	0.11	0
5	EDO	G	1481	-	3,3,3	0.46	0	2,2,2	0.41	0
5	EDO	G	1482	-	3,3,3	0.56	0	2,2,2	0.41	0
4	CAP	H	1477	3	14,20,20	0.90	1 (7%)	15,31,31	0.82	0
5	EDO	H	1478	-	3,3,3	0.58	0	2,2,2	0.19	0
5	EDO	H	1479	-	3,3,3	0.37	0	2,2,2	0.53	0
5	EDO	H	1480	-	3,3,3	0.57	0	2,2,2	0.25	0
5	EDO	H	1481	-	3,3,3	0.55	0	2,2,2	0.44	0
5	EDO	H	1482	-	3,3,3	0.60	0	2,2,2	0.16	0
5	EDO	H	1483	-	3,3,3	0.61	0	2,2,2	0.21	0
5	EDO	I	1141	-	3,3,3	0.47	0	2,2,2	0.35	0
5	EDO	J	1141	-	3,3,3	0.47	0	2,2,2	0.17	0
5	EDO	J	1142	-	3,3,3	0.44	0	2,2,2	0.44	0
5	EDO	K	1141	-	3,3,3	0.41	0	2,2,2	0.64	0
5	EDO	K	1142	-	3,3,3	0.45	0	2,2,2	0.51	0
5	EDO	L	1141	-	3,3,3	0.51	0	2,2,2	0.35	0
5	EDO	M	1141	-	3,3,3	0.49	0	2,2,2	0.33	0
5	EDO	M	1142	-	3,3,3	0.53	0	2,2,2	0.40	0
5	EDO	N	1141	-	3,3,3	0.48	0	2,2,2	0.20	0
5	EDO	N	1142	-	3,3,3	0.54	0	2,2,2	0.17	0
5	EDO	O	1141	-	3,3,3	0.47	0	2,2,2	0.36	0
5	EDO	O	1142	-	3,3,3	0.47	0	2,2,2	0.43	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
4	CAP	A	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	A	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	A	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	A	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	A	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	A	1482	-	-	0/1/1/1	0/0/0/0
5	EDO	A	1483	-	-	0/1/1/1	0/0/0/0
4	CAP	B	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	B	1478	-	-	0/1/1/1	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	B	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	B	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	B	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	B	1482	-	-	0/1/1/1	0/0/0/0
4	CAP	C	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	C	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	C	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	C	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	C	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	C	1482	-	-	0/1/1/1	0/0/0/0
5	EDO	C	1483	-	-	0/1/1/1	0/0/0/0
4	CAP	D	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	D	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	D	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	D	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	D	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	D	1482	-	-	0/1/1/1	0/0/0/0
4	CAP	E	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	E	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	E	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	E	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	E	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	E	1482	-	-	0/1/1/1	0/0/0/0
5	EDO	E	1483	-	-	0/1/1/1	0/0/0/0
4	CAP	F	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	F	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	F	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	F	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	F	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	F	1482	-	-	0/1/1/1	0/0/0/0
5	EDO	F	1483	-	-	0/1/1/1	0/0/0/0
4	CAP	G	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	G	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	G	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	G	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	G	1481	-	-	0/1/1/1	0/0/0/0
5	EDO	G	1482	-	-	0/1/1/1	0/0/0/0
4	CAP	H	1477	3	-	0/23/29/29	0/0/0/0
5	EDO	H	1478	-	-	0/1/1/1	0/0/0/0
5	EDO	H	1479	-	-	0/1/1/1	0/0/0/0
5	EDO	H	1480	-	-	0/1/1/1	0/0/0/0
5	EDO	H	1481	-	-	0/1/1/1	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
5	EDO	H	1482	-	-	0/1/1/1	0/0/0/0
5	EDO	H	1483	-	-	0/1/1/1	0/0/0/0
5	EDO	I	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	J	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	J	1142	-	-	0/1/1/1	0/0/0/0
5	EDO	K	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	K	1142	-	-	0/1/1/1	0/0/0/0
5	EDO	L	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	M	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	M	1142	-	-	0/1/1/1	0/0/0/0
5	EDO	N	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	N	1142	-	-	0/1/1/1	0/0/0/0
5	EDO	O	1141	-	-	0/1/1/1	0/0/0/0
5	EDO	O	1142	-	-	0/1/1/1	0/0/0/0

The worst 5 of 6 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
4	D	1477	CAP	O2-C2	2.19	1.46	1.43
4	A	1477	CAP	O2-C2	2.39	1.46	1.43
4	H	1477	CAP	O2-C2	2.46	1.46	1.43
4	G	1477	CAP	O2-C2	2.58	1.46	1.43
4	B	1477	CAP	O2-C2	2.68	1.46	1.43

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	E	1477	CAP	O4-C4-C5	-2.08	105.67	110.19

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

9 monomers are involved in 9 short contacts:

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

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	H	1478	EDO	1	0
5	H	1479	EDO	1	0
5	J	1141	EDO	1	0
5	N	1141	EDO	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

## 5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

## 6 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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	460/475 (96%)	-0.59	4 (0%)	85 89	8, 15, 29, 41	1 (0%)
1	B	463/475 (97%)	-0.60	7 (1%)	76 81	8, 15, 30, 49	1 (0%)
1	C	462/475 (97%)	-0.58	9 (1%)	70 76	8, 15, 30, 39	1 (0%)
1	D	460/475 (96%)	-0.60	5 (1%)	82 86	8, 15, 30, 42	1 (0%)
1	E	460/475 (96%)	-0.59	9 (1%)	68 75	8, 15, 29, 41	1 (0%)
1	F	462/475 (97%)	-0.61	5 (1%)	82 86	8, 15, 30, 41	1 (0%)
1	G	462/475 (97%)	-0.60	8 (1%)	73 79	8, 15, 30, 40	0
1	H	460/475 (96%)	-0.62	2 (0%)	93 95	8, 15, 29, 39	1 (0%)
2	I	139/140 (99%)	-0.20	2 (1%)	78 83	14, 22, 33, 36	0
2	J	139/140 (99%)	-0.26	5 (3%)	46 55	14, 22, 33, 39	0
2	K	139/140 (99%)	-0.26	2 (1%)	78 83	14, 22, 33, 38	0
2	L	139/140 (99%)	-0.37	1 (0%)	89 92	14, 22, 32, 35	0
2	M	139/140 (99%)	-0.33	2 (1%)	78 83	14, 22, 32, 35	0
2	N	139/140 (99%)	-0.33	1 (0%)	89 92	14, 22, 33, 40	0
2	O	139/140 (99%)	-0.23	5 (3%)	46 55	14, 22, 33, 37	0
2	P	139/140 (99%)	-0.28	3 (2%)	65 73	14, 22, 33, 39	0
All	All	4801/4920 (97%)	-0.52	70 (1%)	76 81	8, 17, 31, 49	7 (0%)

The worst 5 of 70 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	94	ASP	5.1
1	B	10	GLY	4.2
1	C	94	ASP	3.9
1	B	11	ALA	3.9
1	D	11	ALA	3.8

## 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors(Å <sup>2</sup> )	Q<0.9
1	HYP	D	104	8/9	0.97	0.07	-	11,11,12,12	0
1	HYP	C	104	8/9	0.94	0.09	-	10,11,12,12	0
1	SMC	D	369	7/8	0.96	0.08	-	14,15,17,18	0
1	KCX	C	201	12/13	0.98	0.06	-	10,12,12,13	0
1	SMC	A	369	7/8	0.96	0.10	-	14,15,17,19	0
1	SMC	D	256	7/8	0.98	0.07	-	10,11,11,12	0
1	HYP	E	151	8/9	0.98	0.07	-	10,11,12,12	0
1	SMC	E	369	7/8	0.99	0.05	-	14,15,17,19	0
1	SMC	C	256	7/8	0.98	0.06	-	10,11,11,13	0
1	KCX	D	201	12/13	0.97	0.08	-	10,12,12,13	0
2	MME	J	1	9/10	0.91	0.11	-	27,28,33,33	0
1	SMC	H	369	7/8	0.97	0.08	-	14,15,17,19	0
2	MME	L	1	9/10	0.88	0.20	-	27,28,33,34	0
2	MME	M	1	9/10	0.91	0.20	-	27,28,33,33	0
2	MME	K	1	9/10	0.90	0.17	-	27,28,33,33	0
2	MME	P	1	9/10	0.93	0.13	-	27,28,33,33	0
1	KCX	G	201	12/13	0.98	0.08	-	10,12,12,13	0
1	HYP	A	104	8/9	0.95	0.07	-	11,11,12,12	0
1	SMC	C	369	7/8	0.97	0.08	-	14,15,16,19	0
1	SMC	F	369	7/8	0.97	0.07	-	14,15,16,18	0
1	HYP	C	151	8/9	0.97	0.07	-	10,12,12,12	0
1	SMC	G	369	7/8	0.98	0.07	-	14,15,16,18	0
1	SMC	F	256	7/8	0.99	0.06	-	10,10,11,12	0
1	HYP	G	151	8/9	0.97	0.07	-	11,11,12,12	0
1	HYP	H	151	8/9	0.97	0.07	-	10,11,12,12	0
1	SMC	B	369	7/8	0.97	0.08	-	14,15,17,19	0
1	HYP	F	151	8/9	0.98	0.07	-	10,11,12,12	0
2	MME	N	1	9/10	0.93	0.14	-	27,28,33,34	0
1	SMC	H	256	7/8	0.98	0.06	-	10,11,11,12	0
1	SMC	A	256	7/8	0.99	0.06	-	10,11,11,12	0
1	HYP	E	104	8/9	0.98	0.06	-	11,11,12,12	0
1	SMC	B	256	7/8	0.99	0.06	-	10,10,11,11	0
1	KCX	A	201	12/13	0.96	0.08	-	10,12,12,13	0
2	MME	O	1	9/10	0.93	0.15	-	27,28,33,34	0
2	MME	I	1	9/10	0.91	0.14	-	27,28,33,34	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
1	HYP	D	151	8/9	0.98	0.06	-	10,11,12,12	0
1	SMC	E	256	7/8	0.98	0.08	-	10,11,11,13	0
1	HYP	G	104	8/9	0.98	0.09	-	11,11,11,11	0
1	KCX	H	201	12/13	0.97	0.09	-	10,12,12,13	0
1	HYP	B	104	8/9	0.96	0.07	-	10,11,12,12	0
1	KCX	B	201	12/13	0.97	0.10	-	10,11,12,13	0
1	KCX	E	201	12/13	0.98	0.07	-	9,12,12,13	0
1	HYP	H	104	8/9	0.96	0.08	-	10,11,12,12	0
1	HYP	A	151	8/9	0.97	0.07	-	10,11,12,12	0
1	SMC	G	256	7/8	0.99	0.05	-	10,11,11,11	0
1	KCX	F	201	12/13	0.98	0.07	-	10,11,12,13	0
1	HYP	B	151	8/9	0.97	0.08	-	11,11,12,12	0
1	HYP	F	104	8/9	0.94	0.10	-	11,11,12,12	0

## 6.3 Carbohydrates [i](#)

There are no carbohydrates 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. LLDF column lists the quality of electron density of the group with respect to its neighbouring residues in protein, DNA or RNA chains. The B-factors column lists the minimum, median, 95<sup>th</sup> 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	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	C	1481	4/4	0.95	0.28	20.40	2,4,4,7	4
5	EDO	E	1478	4/4	0.93	0.46	17.29	6,7,7,8	4
5	EDO	D	1482	4/4	0.70	0.32	10.20	49,49,49,50	0
5	EDO	A	1481	4/4	0.89	0.27	7.65	45,45,45,46	0
5	EDO	H	1482	4/4	0.70	0.24	5.86	40,40,40,42	0
5	EDO	A	1480	4/4	0.82	0.18	5.57	31,34,34,36	0
5	EDO	G	1480	4/4	0.82	0.24	5.36	41,43,43,43	0
5	EDO	E	1480	4/4	0.90	0.16	4.66	30,31,31,34	0
5	EDO	F	1481	4/4	0.86	0.21	4.63	36,37,37,38	0
5	EDO	E	1479	4/4	0.86	0.18	4.18	25,28,29,31	0
5	EDO	B	1482	4/4	0.92	0.19	3.80	33,35,36,36	0
5	EDO	E	1483	4/4	0.88	0.20	3.52	37,37,37,38	0
5	EDO	F	1482	4/4	0.87	0.17	3.49	36,37,37,39	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	M	1141	4/4	0.86	0.20	3.33	42,43,43,44	0
5	EDO	H	1483	4/4	0.91	0.15	3.19	26,26,26,28	0
5	EDO	A	1483	4/4	0.94	0.11	3.10	24,24,26,27	0
5	EDO	F	1483	4/4	0.88	0.17	2.67	32,33,33,33	0
5	EDO	H	1480	4/4	0.88	0.13	2.38	38,39,39,39	0
5	EDO	B	1480	4/4	0.85	0.14	1.86	38,38,39,39	0
5	EDO	N	1141	4/4	0.88	0.16	1.79	29,30,31,31	0
5	EDO	L	1141	4/4	0.81	0.16	1.78	54,56,56,56	0
5	EDO	I	1141	4/4	0.93	0.15	1.73	47,48,48,49	0
5	EDO	A	1478	4/4	0.92	0.13	1.65	14,18,19,19	0
5	EDO	A	1479	4/4	0.95	0.12	1.64	15,17,18,19	0
5	EDO	C	1478	4/4	0.93	0.14	1.61	18,22,22,23	0
5	EDO	M	1142	4/4	0.83	0.16	1.53	37,38,38,39	0
5	EDO	F	1478	4/4	0.93	0.13	1.45	28,29,30,31	0
5	EDO	N	1142	4/4	0.71	0.26	1.23	36,37,39,40	0
5	EDO	G	1478	4/4	0.94	0.11	1.23	16,18,19,20	0
5	EDO	O	1141	4/4	0.94	0.14	1.10	38,38,38,39	0
5	EDO	B	1479	4/4	0.97	0.11	0.88	19,19,20,21	0
5	EDO	D	1478	4/4	0.93	0.11	0.71	23,23,23,27	0
5	EDO	E	1481	4/4	0.93	0.11	0.62	30,30,31,31	0
5	EDO	B	1478	4/4	0.94	0.10	0.55	18,19,19,19	0
5	EDO	J	1141	4/4	0.91	0.13	0.42	34,35,36,36	0
5	EDO	K	1141	4/4	0.91	0.16	0.38	35,36,37,39	0
5	EDO	H	1479	4/4	0.98	0.09	0.01	20,20,20,20	0
5	EDO	D	1481	4/4	0.94	0.10	-0.02	27,27,28,28	0
3	MG	B	1476	1/1	0.99	0.09	-0.04	10,10,10,10	0
5	EDO	K	1142	4/4	0.94	0.09	-0.07	23,24,24,24	0
5	EDO	C	1483	4/4	0.95	0.10	-0.08	31,33,33,33	0
5	EDO	J	1142	4/4	0.93	0.14	-0.10	39,39,40,40	0
5	EDO	G	1479	4/4	0.96	0.08	-0.26	13,13,16,18	0
4	CAP	A	1477	21/21	0.98	0.08	-0.29	12,17,18,20	0
5	EDO	O	1142	4/4	0.95	0.11	-0.56	33,33,35,35	0
5	EDO	H	1478	4/4	0.97	0.09	-0.57	21,22,23,24	0
4	CAP	G	1477	21/21	0.98	0.07	-0.61	12,17,18,20	0
5	EDO	F	1479	4/4	0.97	0.08	-0.69	19,20,20,21	0
4	CAP	B	1477	21/21	0.98	0.08	-0.77	12,17,18,19	0
4	CAP	H	1477	21/21	0.98	0.07	-0.83	12,17,18,20	0
4	CAP	E	1477	21/21	0.98	0.07	-0.91	13,17,18,20	0
4	CAP	D	1477	21/21	0.98	0.07	-1.02	12,17,18,20	0
4	CAP	C	1477	21/21	0.98	0.07	-1.14	13,18,18,20	0
4	CAP	F	1477	21/21	0.98	0.06	-1.44	12,17,18,19	0
3	MG	A	1476	1/1	0.99	0.06	-1.53	10,10,10,10	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
5	EDO	C	1479	4/4	0.98	0.07	-1.53	21,22,22,24	0
3	MG	G	1476	1/1	0.99	0.06	-2.31	9,9,9,9	0
3	MG	C	1476	1/1	0.99	0.04	-2.69	11,11,11,11	0
3	MG	E	1476	1/1	0.98	0.04	-2.79	11,11,11,11	0
3	MG	H	1476	1/1	0.99	0.04	-3.27	11,11,11,11	0
3	MG	D	1476	1/1	0.99	0.04	-3.72	11,11,11,11	0
3	MG	F	1476	1/1	0.99	0.04	-4.10	10,10,10,10	0
5	EDO	G	1482	4/4	0.96	0.13	-	21,21,21,22	0
5	EDO	D	1479	4/4	0.93	0.10	-	30,30,31,31	0
5	EDO	A	1482	4/4	0.96	0.16	-	20,25,25,25	0
5	EDO	G	1481	4/4	0.91	0.14	-	38,39,39,39	0
5	EDO	C	1482	4/4	0.95	0.21	-	33,33,33,34	0
5	EDO	C	1480	4/4	0.70	0.25	-	57,59,59,61	0
5	EDO	B	1481	4/4	0.97	0.13	-	22,25,27,27	0
5	EDO	F	1480	4/4	0.95	0.19	-	21,22,25,26	0
5	EDO	E	1482	4/4	0.94	0.23	-	30,31,31,32	0
5	EDO	D	1480	4/4	0.91	0.23	-	41,43,44,45	0
5	EDO	H	1481	4/4	0.90	0.24	-	27,27,29,30	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.