



# Full wwPDB X-ray Structure Validation Report ⓘ

Dec 15, 2025 – 03:45 pm GMT

PDB ID : 8PHA / pdb\_00008pha  
Title : O(S)-methyltransferase from *Pleurotus sapidus*  
Authors : Korf, L.; Essen, L.-O.  
Deposited on : 2023-06-19  
Resolution : 2.02 Å(reported)

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

We welcome your comments at [validation@mail.wwpdb.org](mailto: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>.

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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 : 1.8.4, CSD as541be (2020)  
Xtriage (Phenix) : 2.0  
EDS : 3.0  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
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) : 2.47

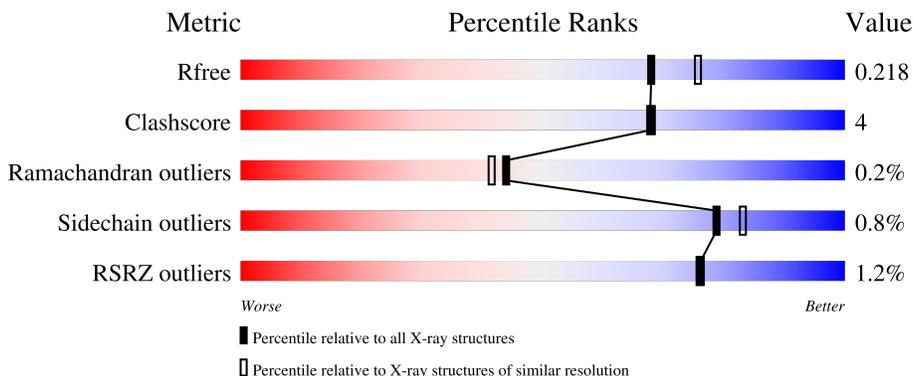
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.02 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))
$R_{free}$	164625	12358 (2.04-2.00)
Clashscore	180529	13897 (2.04-2.00)
Ramachandran outliers	177936	13770 (2.04-2.00)
Sidechain outliers	177891	13769 (2.04-2.00)
RSRZ outliers	164620	12358 (2.04-2.00)

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  $\geq 3$ , 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	479	 85% 8% 6%
1	B	479	 87% 7% 6%
1	C	479	 87% 9% .
1	D	479	 87% 9% .

## 2 Entry composition i

There are 6 unique types of molecules in this entry. The entry contains 15629 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 O-methyltransferase domain-containing protein.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	450	3538	2258	591	670	19	0	7	0
1	B	450	3555	2266	594	677	18	0	8	0
1	C	458	3623	2305	611	688	19	0	8	0
1	D	460	3626	2307	613	687	19	0	7	0

There are 120 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-15	MET	-	initiating methionine	UNP A0A067NAT9
A	-14	ASN	-	expression tag	UNP A0A067NAT9
A	-13	HIS	-	expression tag	UNP A0A067NAT9
A	-12	LYS	-	expression tag	UNP A0A067NAT9
A	-11	VAL	-	expression tag	UNP A0A067NAT9
A	-10	HIS	-	expression tag	UNP A0A067NAT9
A	-9	HIS	-	expression tag	UNP A0A067NAT9
A	-8	HIS	-	expression tag	UNP A0A067NAT9
A	-7	HIS	-	expression tag	UNP A0A067NAT9
A	-6	HIS	-	expression tag	UNP A0A067NAT9
A	-5	HIS	-	expression tag	UNP A0A067NAT9
A	-4	ILE	-	expression tag	UNP A0A067NAT9
A	-3	GLU	-	expression tag	UNP A0A067NAT9
A	-2	GLY	-	expression tag	UNP A0A067NAT9
A	-1	ARG	-	expression tag	UNP A0A067NAT9
A	0	HIS	-	expression tag	UNP A0A067NAT9
A	35	GLU	GLY	conflict	UNP A0A067NAT9
A	45	GLU	LYS	conflict	UNP A0A067NAT9
A	46	PRO	ALA	conflict	UNP A0A067NAT9
A	64	ILE	VAL	conflict	UNP A0A067NAT9
A	104	VAL	ILE	conflict	UNP A0A067NAT9

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Chain	Residue	Modelled	Actual	Comment	Reference
A	378	LYS	GLU	conflict	UNP A0A067NAT9
A	456	HIS	-	expression tag	UNP A0A067NAT9
A	457	HIS	-	expression tag	UNP A0A067NAT9
A	458	HIS	-	expression tag	UNP A0A067NAT9
A	459	HIS	-	expression tag	UNP A0A067NAT9
A	460	HIS	-	expression tag	UNP A0A067NAT9
A	461	HIS	-	expression tag	UNP A0A067NAT9
A	462	SER	-	expression tag	UNP A0A067NAT9
A	463	ARG	-	expression tag	UNP A0A067NAT9
B	-15	MET	-	initiating methionine	UNP A0A067NAT9
B	-14	ASN	-	expression tag	UNP A0A067NAT9
B	-13	HIS	-	expression tag	UNP A0A067NAT9
B	-12	LYS	-	expression tag	UNP A0A067NAT9
B	-11	VAL	-	expression tag	UNP A0A067NAT9
B	-10	HIS	-	expression tag	UNP A0A067NAT9
B	-9	HIS	-	expression tag	UNP A0A067NAT9
B	-8	HIS	-	expression tag	UNP A0A067NAT9
B	-7	HIS	-	expression tag	UNP A0A067NAT9
B	-6	HIS	-	expression tag	UNP A0A067NAT9
B	-5	HIS	-	expression tag	UNP A0A067NAT9
B	-4	ILE	-	expression tag	UNP A0A067NAT9
B	-3	GLU	-	expression tag	UNP A0A067NAT9
B	-2	GLY	-	expression tag	UNP A0A067NAT9
B	-1	ARG	-	expression tag	UNP A0A067NAT9
B	0	HIS	-	expression tag	UNP A0A067NAT9
B	35	GLU	GLY	conflict	UNP A0A067NAT9
B	45	GLU	LYS	conflict	UNP A0A067NAT9
B	46	PRO	ALA	conflict	UNP A0A067NAT9
B	64	ILE	VAL	conflict	UNP A0A067NAT9
B	104	VAL	ILE	conflict	UNP A0A067NAT9
B	378	LYS	GLU	conflict	UNP A0A067NAT9
B	456	HIS	-	expression tag	UNP A0A067NAT9
B	457	HIS	-	expression tag	UNP A0A067NAT9
B	458	HIS	-	expression tag	UNP A0A067NAT9
B	459	HIS	-	expression tag	UNP A0A067NAT9
B	460	HIS	-	expression tag	UNP A0A067NAT9
B	461	HIS	-	expression tag	UNP A0A067NAT9
B	462	SER	-	expression tag	UNP A0A067NAT9
B	463	ARG	-	expression tag	UNP A0A067NAT9
C	-15	MET	-	initiating methionine	UNP A0A067NAT9
C	-14	ASN	-	expression tag	UNP A0A067NAT9
C	-13	HIS	-	expression tag	UNP A0A067NAT9

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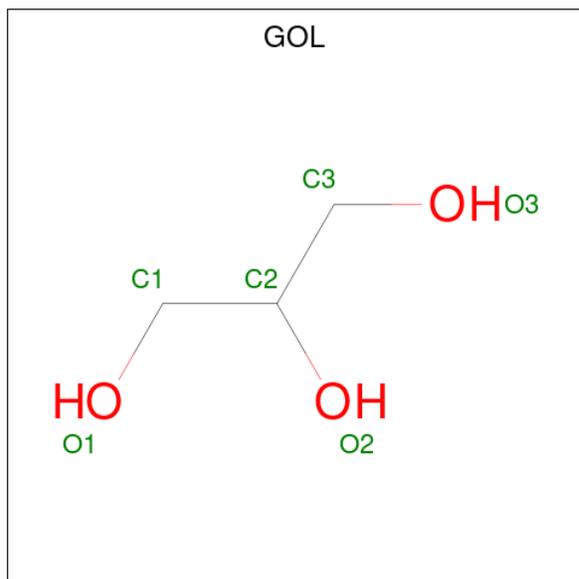
Chain	Residue	Modelled	Actual	Comment	Reference
C	-12	LYS	-	expression tag	UNP A0A067NAT9
C	-11	VAL	-	expression tag	UNP A0A067NAT9
C	-10	HIS	-	expression tag	UNP A0A067NAT9
C	-9	HIS	-	expression tag	UNP A0A067NAT9
C	-8	HIS	-	expression tag	UNP A0A067NAT9
C	-7	HIS	-	expression tag	UNP A0A067NAT9
C	-6	HIS	-	expression tag	UNP A0A067NAT9
C	-5	HIS	-	expression tag	UNP A0A067NAT9
C	-4	ILE	-	expression tag	UNP A0A067NAT9
C	-3	GLU	-	expression tag	UNP A0A067NAT9
C	-2	GLY	-	expression tag	UNP A0A067NAT9
C	-1	ARG	-	expression tag	UNP A0A067NAT9
C	0	HIS	-	expression tag	UNP A0A067NAT9
C	35	GLU	GLY	conflict	UNP A0A067NAT9
C	45	GLU	LYS	conflict	UNP A0A067NAT9
C	46	PRO	ALA	conflict	UNP A0A067NAT9
C	64	ILE	VAL	conflict	UNP A0A067NAT9
C	104	VAL	ILE	conflict	UNP A0A067NAT9
C	378	LYS	GLU	conflict	UNP A0A067NAT9
C	456	HIS	-	expression tag	UNP A0A067NAT9
C	457	HIS	-	expression tag	UNP A0A067NAT9
C	458	HIS	-	expression tag	UNP A0A067NAT9
C	459	HIS	-	expression tag	UNP A0A067NAT9
C	460	HIS	-	expression tag	UNP A0A067NAT9
C	461	HIS	-	expression tag	UNP A0A067NAT9
C	462	SER	-	expression tag	UNP A0A067NAT9
C	463	ARG	-	expression tag	UNP A0A067NAT9
D	-15	MET	-	initiating methionine	UNP A0A067NAT9
D	-14	ASN	-	expression tag	UNP A0A067NAT9
D	-13	HIS	-	expression tag	UNP A0A067NAT9
D	-12	LYS	-	expression tag	UNP A0A067NAT9
D	-11	VAL	-	expression tag	UNP A0A067NAT9
D	-10	HIS	-	expression tag	UNP A0A067NAT9
D	-9	HIS	-	expression tag	UNP A0A067NAT9
D	-8	HIS	-	expression tag	UNP A0A067NAT9
D	-7	HIS	-	expression tag	UNP A0A067NAT9
D	-6	HIS	-	expression tag	UNP A0A067NAT9
D	-5	HIS	-	expression tag	UNP A0A067NAT9
D	-4	ILE	-	expression tag	UNP A0A067NAT9
D	-3	GLU	-	expression tag	UNP A0A067NAT9
D	-2	GLY	-	expression tag	UNP A0A067NAT9
D	-1	ARG	-	expression tag	UNP A0A067NAT9

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Chain	Residue	Modelled	Actual	Comment	Reference
D	0	HIS	-	expression tag	UNP A0A067NAT9
D	35	GLU	GLY	conflict	UNP A0A067NAT9
D	45	GLU	LYS	conflict	UNP A0A067NAT9
D	46	PRO	ALA	conflict	UNP A0A067NAT9
D	64	ILE	VAL	conflict	UNP A0A067NAT9
D	104	VAL	ILE	conflict	UNP A0A067NAT9
D	378	LYS	GLU	conflict	UNP A0A067NAT9
D	456	HIS	-	expression tag	UNP A0A067NAT9
D	457	HIS	-	expression tag	UNP A0A067NAT9
D	458	HIS	-	expression tag	UNP A0A067NAT9
D	459	HIS	-	expression tag	UNP A0A067NAT9
D	460	HIS	-	expression tag	UNP A0A067NAT9
D	461	HIS	-	expression tag	UNP A0A067NAT9
D	462	SER	-	expression tag	UNP A0A067NAT9
D	463	ARG	-	expression tag	UNP A0A067NAT9

- Molecule 2 is GLYCEROL (CCD ID: GOL) (formula: C<sub>3</sub>H<sub>8</sub>O<sub>3</sub>).



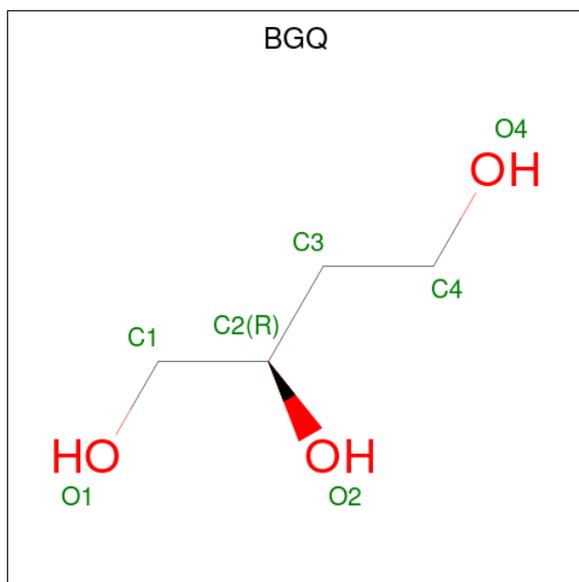
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			6	3	3		
2	B	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		
2	C	1	Total	C	O	0	0
			6	3	3		

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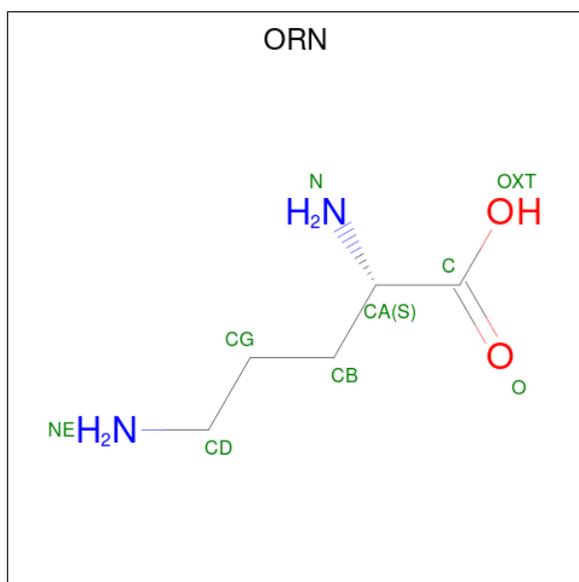
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	D	1	Total	C	O	0	0
			6	3	3		
2	D	1	Total	C	O	0	0
			6	3	3		

- Molecule 3 is 2-HYDROXY BUTANE-1,4-DIOL (CCD ID: BGQ) (formula: C<sub>4</sub>H<sub>10</sub>O<sub>3</sub>).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	O	0	0
			7	4	3		
3	B	1	Total	C	O	0	0
			7	4	3		

- Molecule 4 is L-ornithine (CCD ID: ORN) (formula: C<sub>5</sub>H<sub>12</sub>N<sub>2</sub>O<sub>2</sub>).



Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
4	A	1	Total	C	N	O	0	0
			9	5	2	2		
4	B	1	Total	C	N	O	0	0
			9	5	2	2		

- Molecule 5 is SODIUM ION (CCD ID: NA) (formula: Na).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
5	C	2	Total	Na	0	0
			2	2		
5	D	2	Total	Na	0	0
			2	2		

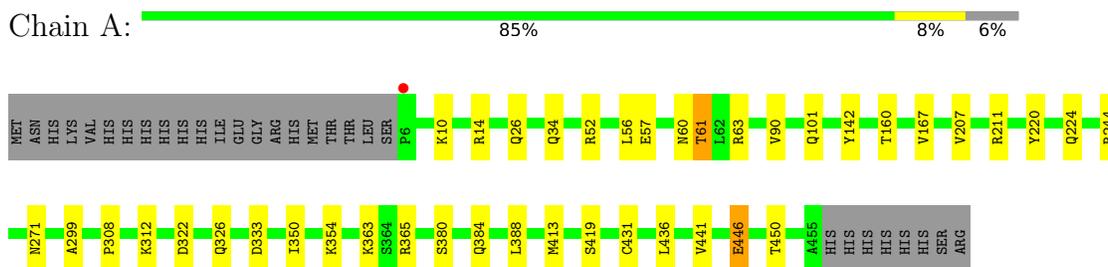
- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	331	Total	O	0	0
			331	331		
6	B	340	Total	O	0	0
			340	340		
6	C	275	Total	O	0	0
			275	275		
6	D	269	Total	O	0	0
			269	269		

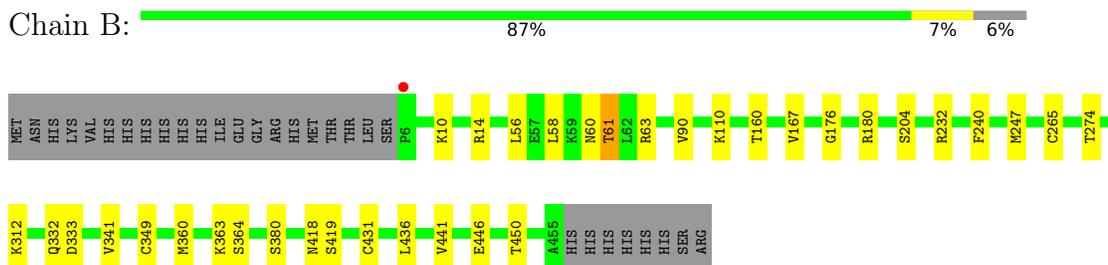
### 3 Residue-property plots

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.

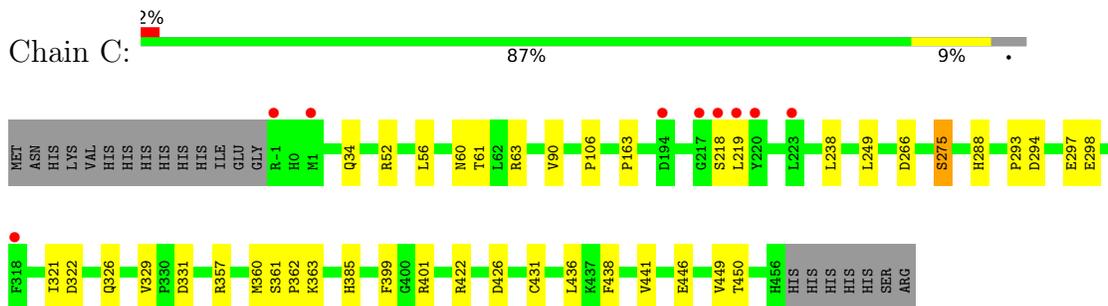
- Molecule 1: O-methyltransferase domain-containing protein



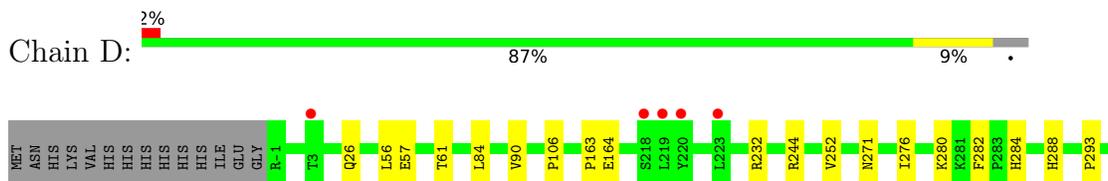
- Molecule 1: O-methyltransferase domain-containing protein



- Molecule 1: O-methyltransferase domain-containing protein



- Molecule 1: O-methyltransferase domain-containing protein





## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	97.36Å 109.12Å 192.93Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	48.23 – 2.02 48.23 – 2.02	Depositor EDS
% Data completeness (in resolution range)	88.5 (48.23-2.02) 98.8 (48.23-2.02)	Depositor EDS
$R_{merge}$	0.09	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.42 (at 2.01Å)	Xtrriage
Refinement program	PHENIX dev_4788	Depositor
R, $R_{free}$	0.171 , 0.212 0.181 , 0.218	Depositor DCC
$R_{free}$ test set	6647 reflections (4.92%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.6	Xtrriage
Anisotropy	0.375	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 53.4	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.50$ , $\langle L^2 \rangle = 0.33$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	15629	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	38.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 75.86 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.1655e-06. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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, 0.333 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: GOL, BGQ, NA, ORN

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	0.27	0/3641	0.44	0/4959
1	B	0.26	0/3655	0.43	0/4977
1	C	0.25	0/3715	0.43	0/5059
1	D	0.26	0/3718	0.44	0/5063
All	All	0.26	0/14729	0.44	0/20058

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts [i](#)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	3538	0	3539	29	0
1	B	3555	0	3550	21	0
1	C	3623	0	3610	26	0
1	D	3626	0	3609	29	0
2	A	6	0	8	0	0
2	B	6	0	8	0	0
2	C	12	0	16	0	0
2	D	12	0	16	0	0
3	A	7	0	9	1	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	7	0	9	1	0
4	A	9	0	11	1	0
4	B	9	0	11	1	0
5	C	2	0	0	0	0
5	D	2	0	0	0	0
6	A	331	0	0	4	1
6	B	340	0	0	2	1
6	C	275	0	0	0	0
6	D	269	0	0	2	0
All	All	15629	0	14396	101	1

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.

All (101) 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:B:380:SER:HB3	4:B:503:ORN:H	1.33	0.91
1:A:380:SER:HB3	4:A:503:ORN:H	1.38	0.89
1:A:60[B]:ASN:OD1	1:A:63:ARG:NH2	2.10	0.84
1:C:322:ASP:H	1:C:326:GLN:HE21	1.31	0.79
1:D:56:LEU:HD11	1:D:252:VAL:HG22	1.69	0.74
1:A:322:ASP:H	1:A:326:GLN:HE21	1.35	0.74
1:A:60[A]:ASN:ND2	6:A:604:HOH:O	2.25	0.69
1:B:60[A]:ASN:OD1	1:B:63:ARG:NH2	2.27	0.68
1:C:441:VAL:HG22	1:C:450[A]:THR:HG22	1.76	0.67
1:D:443:ASP:OD1	6:D:601:HOH:O	2.14	0.65
1:A:101:GLN:NE2	6:A:609:HOH:O	2.32	0.63
1:A:90:VAL:HG22	1:C:90:VAL:HG23	1.79	0.62
1:A:365:ARG:NH2	6:A:602:HOH:O	2.24	0.62
1:B:160:THR:HB	1:B:167:VAL:HG11	1.81	0.62
1:D:357:ARG:HD2	1:D:360:MET:HE2	1.85	0.59
1:A:26:GLN:HB3	1:A:61[A]:THR:HG21	1.85	0.59
1:C:357:ARG:HD2	1:C:360:MET:HE2	1.87	0.57
1:D:321:ILE:HG13	1:D:326:GLN:HG3	1.85	0.57
1:C:106:PRO:HG3	1:C:163:PRO:HD3	1.86	0.56
1:A:26:GLN:CG	1:A:61[B]:THR:HG21	2.36	0.55
1:C:321:ILE:HG13	1:C:326:GLN:HG3	1.88	0.55
1:C:294:ASP:O	1:C:298:GLU:HG2	2.07	0.54
1:C:34:GLN:HE21	1:C:52:ARG:HH11	1.54	0.54
1:A:160:THR:HB	1:A:167:VAL:HG11	1.89	0.54

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:288:HIS:HE1	1:C:329:VAL:HG11	1.72	0.54
1:C:431:CYS:HB3	1:C:436:LEU:HB2	1.91	0.53
1:B:90:VAL:HG22	1:D:90:VAL:HG23	1.90	0.52
1:A:431:CYS:HB3	1:A:436:LEU:HB2	1.91	0.52
3:A:502:BGQ:H11C	1:C:401:ARG:HH11	1.74	0.52
1:C:63:ARG:HG2	1:C:399:PHE:CD1	2.45	0.52
1:A:57:GLU:O	1:A:61[A]:THR:OG1	2.27	0.52
1:B:431:CYS:HB3	1:B:436:LEU:HB2	1.90	0.51
1:B:247:MET:HE1	1:B:274:THR:HA	1.92	0.50
1:C:288:HIS:ND1	1:C:329:VAL:HG21	2.27	0.50
1:C:34:GLN:NE2	1:C:52:ARG:HH11	2.10	0.50
1:D:431:CYS:HB3	1:D:436:LEU:HB2	1.92	0.50
1:C:288:HIS:CE1	1:C:329:VAL:HG11	2.47	0.49
1:C:361:SER:HB2	1:C:362:PRO:HD2	1.94	0.49
1:A:333:ASP:OD1	1:A:363:LYS:HE2	2.12	0.49
1:C:331:ASP:O	1:C:363:LYS:NZ	2.45	0.49
1:A:441:VAL:HG22	1:A:450:THR:HG22	1.95	0.49
1:B:240:PHE:HE1	1:D:84[A]:LEU:HD21	1.77	0.49
1:C:218[A]:SER:OG	1:C:219:LEU:N	2.44	0.48
1:D:276:ILE:HG12	1:D:280:LYS:NZ	2.29	0.48
1:A:26:GLN:HG2	1:A:61[B]:THR:HG21	1.94	0.48
1:C:322:ASP:N	1:C:326:GLN:HE21	2.06	0.48
1:C:385:HIS:CD2	1:C:438:PHE:HE2	2.31	0.47
1:B:58:LEU:O	1:B:61[A]:THR:HG22	2.14	0.47
1:D:304:LYS:O	1:D:308:PRO:HG3	2.15	0.47
1:A:57:GLU:O	1:A:61[B]:THR:HG23	2.15	0.47
1:B:441:VAL:HG22	1:B:450:THR:HG22	1.96	0.47
1:D:288:HIS:ND1	1:D:329:VAL:HG11	2.30	0.46
1:D:57[B]:GLU:O	1:D:61:THR:HG23	2.16	0.46
1:A:350:ILE:HG22	1:A:354:LYS:HE2	1.97	0.46
1:C:266:ASP:OD2	1:C:275:SER:OG	2.34	0.46
1:C:293:PRO:O	1:C:297:GLU:HG2	2.16	0.46
1:D:56:LEU:HD11	1:D:252:VAL:CG2	2.42	0.46
1:D:276:ILE:HA	1:D:303:TRP:CH2	2.51	0.46
1:C:249:LEU:HD13	1:C:449:VAL:HG21	1.98	0.45
1:B:333:ASP:OD1	1:B:363:LYS:HE2	2.17	0.45
1:D:282:PHE:HB3	1:D:284:HIS:CE1	2.52	0.45
1:D:309:ASP:O	1:D:313:ASP:HB2	2.17	0.45
1:B:160:THR:HB	1:B:167:VAL:CG1	2.46	0.45
1:D:341:VAL:HG13	1:D:349:CYS:SG	2.56	0.45
1:A:34:GLN:OE1	1:A:52:ARG:NH1	2.38	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:422:ARG:HB3	1:D:426:ASP:HB2	1.99	0.45
1:A:322:ASP:N	1:A:326:GLN:HE21	2.10	0.44
1:A:160:THR:HB	1:A:167:VAL:CG1	2.47	0.44
1:A:142:TYR:OH	6:A:601:HOH:O	2.10	0.44
1:B:232:ARG:NH2	6:B:622:HOH:O	2.44	0.44
1:D:232:ARG:NH2	6:D:611:HOH:O	2.44	0.44
1:D:441:VAL:HG22	1:D:450:THR:HG22	2.00	0.44
1:A:10:LYS:O	1:A:14:ARG:HG3	2.18	0.43
1:B:312:LYS:HE2	1:B:312:LYS:HB3	1.87	0.43
1:A:413:MET:HE3	1:A:419:SER:OG	2.19	0.43
1:B:176:GLY:O	1:B:180:ARG:HG3	2.18	0.43
1:C:294:ASP:OD1	1:C:294:ASP:N	2.52	0.43
1:D:276:ILE:HG12	1:D:280:LYS:HZ3	1.83	0.43
1:D:106:PRO:HG3	1:D:163:PRO:HD3	2.01	0.43
1:D:57[A]:GLU:O	1:D:61:THR:HG23	2.17	0.43
1:D:271:ASN:OD1	1:D:298:GLU:HG3	2.19	0.43
1:D:293:PRO:O	1:D:297:GLU:HG2	2.19	0.43
1:D:308:PRO:O	1:D:312:LYS:HG2	2.19	0.43
1:A:244:ARG:HB3	1:A:446:GLU:HG2	2.01	0.42
1:A:220:TYR:O	1:A:224:GLN:HG3	2.20	0.42
1:B:265:CYS:HB2	1:B:332:GLN:HG3	2.01	0.42
3:B:502:BGQ:H12C	1:D:401:ARG:HH11	1.85	0.42
1:A:308:PRO:O	1:A:312:LYS:HG2	2.20	0.41
1:B:204:SER:HB3	1:B:418:ASN:HB2	2.02	0.41
1:C:60:ASN:ND2	1:C:63:ARG:HH21	2.18	0.41
1:C:422:ARG:HB3	1:C:426:ASP:HB2	2.01	0.41
1:A:207:VAL:O	1:A:211:ARG:HG2	2.21	0.41
1:A:384:GLN:HB2	1:A:388:LEU:HD12	2.03	0.41
1:D:244:ARG:HB3	1:D:446:GLU:HG2	2.02	0.41
1:B:240:PHE:CE1	1:D:84[A]:LEU:HD21	2.55	0.41
1:B:10:LYS:O	1:B:14:ARG:HG3	2.21	0.41
1:A:271:ASN:HA	1:A:299:ALA:HB2	2.02	0.41
1:B:110:LYS:NZ	6:B:636:HOH:O	2.54	0.41
1:D:26[B]:GLN:CG	1:D:61:THR:HG21	2.51	0.41
1:B:360:MET:HB3	1:B:364:SER:HB2	2.04	0.40
1:B:341:VAL:HG13	1:B:349:CYS:SG	2.61	0.40

All (1) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
6:A:688:HOH:O	6:B:606:HOH:O[1_455]	2.11	0.09

### 5.3 Torsion angles [i](#)

#### 5.3.1 Protein backbone [i](#)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	455/479 (95%)	451 (99%)	3 (1%)	1 (0%)	44 41
1	B	456/479 (95%)	453 (99%)	2 (0%)	1 (0%)	44 41
1	C	464/479 (97%)	459 (99%)	4 (1%)	1 (0%)	44 41
1	D	465/479 (97%)	455 (98%)	9 (2%)	1 (0%)	44 41
All	All	1840/1916 (96%)	1818 (99%)	18 (1%)	4 (0%)	44 41

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	446	GLU
1	B	446	GLU
1	D	446	GLU
1	C	446	GLU

#### 5.3.2 Protein sidechains [i](#)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	395/418 (94%)	392 (99%)	3 (1%)	79 83
1	B	398/418 (95%)	394 (99%)	4 (1%)	73 77

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	C	404/418 (97%)	399 (99%)	5 (1%)	67	72
1	D	403/418 (96%)	400 (99%)	3 (1%)	81	85
All	All	1600/1672 (96%)	1585 (99%)	15 (1%)	79	80

All (15) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	56	LEU
1	A	61[A]	THR
1	A	61[B]	THR
1	B	56	LEU
1	B	61[A]	THR
1	B	61[B]	THR
1	B	419	SER
1	C	56	LEU
1	C	61[A]	THR
1	C	61[B]	THR
1	C	238	LEU
1	C	275	SER
1	D	164	GLU
1	D	313	ASP
1	D	363	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (22) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	12	GLN
1	A	26	GLN
1	A	111	HIS
1	A	154	ASN
1	A	224	GLN
1	A	251	ASN
1	A	284	HIS
1	A	326	GLN
1	B	26	GLN
1	B	111	HIS
1	B	141	ASN
1	B	383	ASN
1	C	0	HIS
1	C	34	GLN

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Mol	Chain	Res	Type
1	C	60	ASN
1	C	129	GLN
1	C	226	GLN
1	C	273	ASN
1	C	326	GLN
1	D	179	HIS
1	D	284	HIS
1	D	355	ASN

### 5.3.3 RNA [i](#)

There are no RNA molecules in this entry.

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

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

### 5.5 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

### 5.6 Ligand geometry [i](#)

Of 14 ligands modelled in this entry, 4 are monoatomic - leaving 10 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	$\# Z  > 2$
2	GOL	B	501	-	5,5,5	0.32	0	5,5,5	0.41	0
2	GOL	C	502	-	5,5,5	0.27	0	5,5,5	0.71	0
2	GOL	D	502	-	5,5,5	0.34	0	5,5,5	0.84	0
2	GOL	C	501	-	5,5,5	0.29	0	5,5,5	0.36	0
3	BGQ	A	502	-	6,6,6	0.54	0	4,6,6	0.38	0
3	BGQ	B	502	-	6,6,6	0.53	0	4,6,6	0.39	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
2	GOL	D	501	-	5,5,5	0.32	0	5,5,5	0.91	0
4	ORN	A	503	-	7,8,8	0.82	0	8,9,9	1.12	1 (12%)
4	ORN	B	503	-	7,8,8	0.68	0	8,9,9	1.26	1 (12%)
2	GOL	A	501	-	5,5,5	0.48	0	5,5,5	0.38	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
2	GOL	B	501	-	-	2/4/4/4	-
2	GOL	C	502	-	-	2/4/4/4	-
2	GOL	D	502	-	-	0/4/4/4	-
2	GOL	C	501	-	-	0/4/4/4	-
3	BGQ	A	502	-	-	2/5/5/5	-
3	BGQ	B	502	-	-	2/5/5/5	-
2	GOL	D	501	-	-	1/4/4/4	-
4	ORN	A	503	-	-	5/8/8/8	-
4	ORN	B	503	-	-	5/8/8/8	-
2	GOL	A	501	-	-	1/4/4/4	-

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	B	503	ORN	OXT-C-CA	2.32	121.29	113.38
4	A	503	ORN	CG-CB-CA	-2.15	106.42	113.35

There are no chirality outliers.

All (20) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
3	B	502	BGQ	O1-C1-C2-C3
4	A	503	ORN	N-CA-CB-CG
4	A	503	ORN	C-CA-CB-CG
4	A	503	ORN	O-C-CA-N
4	B	503	ORN	N-CA-CB-CG
4	B	503	ORN	OXT-C-CA-N

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Mol	Chain	Res	Type	Atoms
4	A	503	ORN	OXT-C-CA-N
3	A	502	BGQ	O1-C1-C2-C3
2	C	502	GOL	O1-C1-C2-C3
3	A	502	BGQ	O1-C1-C2-O2
3	B	502	BGQ	O1-C1-C2-O2
2	C	502	GOL	O1-C1-C2-O2
4	B	503	ORN	O-C-CA-N
4	B	503	ORN	C-CA-CB-CG
2	D	501	GOL	O1-C1-C2-O2
2	B	501	GOL	C1-C2-C3-O3
4	A	503	ORN	CA-CB-CG-CD
4	B	503	ORN	CA-CB-CG-CD
2	B	501	GOL	O2-C2-C3-O3
2	A	501	GOL	O1-C1-C2-C3

There are no ring outliers.

4 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	502	BGQ	1	0
3	B	502	BGQ	1	0
4	A	503	ORN	1	0
4	B	503	ORN	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 [i](#)

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	450/479 (93%)	-0.42	1 (0%) 92 91	17, 30, 52, 108	8 (1%)
1	B	450/479 (93%)	-0.45	1 (0%) 92 91	14, 31, 53, 99	8 (1%)
1	C	458/479 (95%)	-0.12	9 (1%) 64 64	14, 37, 80, 126	8 (1%)
1	D	460/479 (96%)	-0.14	10 (2%) 62 61	12, 36, 85, 135	7 (1%)
All	All	1818/1916 (94%)	-0.28	21 (1%) 76 76	12, 33, 68, 135	31 (1%)

All (21) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	D	219	LEU	5.1
1	A	6	PRO	3.3
1	D	220	TYR	3.1
1	C	218[A]	SER	3.0
1	C	219	LEU	2.8
1	B	6	PRO	2.8
1	D	458	HIS	2.7
1	D	218	SER	2.5
1	C	318	PHE	2.5
1	C	194	ASP	2.4
1	C	-1	ARG	2.4
1	D	307	TYR	2.3
1	C	1	MET	2.2
1	D	455	ALA	2.2
1	D	457	HIS	2.2
1	D	223	LEU	2.2
1	D	3	THR	2.2
1	C	223	LEU	2.1
1	D	299	ALA	2.1
1	C	217	GLY	2.1
1	C	220	TYR	2.0

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

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

## 6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

## 6.4 Ligands [i](#)

In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 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	B-factors(Å <sup>2</sup> )	Q<0.9
3	BGQ	B	502	7/7	0.78	0.15	27,41,49,53	7
3	BGQ	A	502	7/7	0.79	0.15	38,41,54,55	0
2	GOL	D	502	6/6	0.83	0.12	33,37,40,40	6
2	GOL	D	501	6/6	0.84	0.12	30,36,39,49	0
2	GOL	C	502	6/6	0.84	0.12	36,40,47,48	6
5	NA	C	504	1/1	0.86	0.08	53,53,53,53	0
4	ORN	B	503	9/9	0.87	0.14	29,39,52,56	0
4	ORN	A	503	9/9	0.88	0.15	19,36,48,49	0
2	GOL	C	501	6/6	0.90	0.09	34,37,41,47	0
2	GOL	A	501	6/6	0.92	0.09	28,33,35,37	0
5	NA	D	503	1/1	0.92	0.24	47,47,47,47	0
2	GOL	B	501	6/6	0.93	0.08	27,39,40,41	0
5	NA	C	503	1/1	0.93	0.12	47,47,47,47	0
5	NA	D	504	1/1	0.93	0.08	59,59,59,59	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.