



# Full wwPDB X-ray Structure Validation Report ⓘ

Sep 7, 2017 – 07:52 PM EDT

PDB ID : 5EZM  
Title : Crystal Structure of ArnT from Cupriavidus metallidurans in the apo state  
Authors : Petrou, V.I.; Clarke, O.B.; Tomasek, D.; Banerjee, S.; Rajashankar, K.R.; Mancina, F.; New York Consortium on Membrane Protein Structure (NY-COMPS)  
Deposited on : unknown  
Resolution : 2.70 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

<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 : 1.7.2 (RC1), CSD as538be (2017)  
Xtriage (Phenix) : 1.9-1692  
EDS : rb-20029824  
Percentile statistics : 20161228.v01 (using entries in the PDB archive December 28th 2016)  
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) : rb-20029824

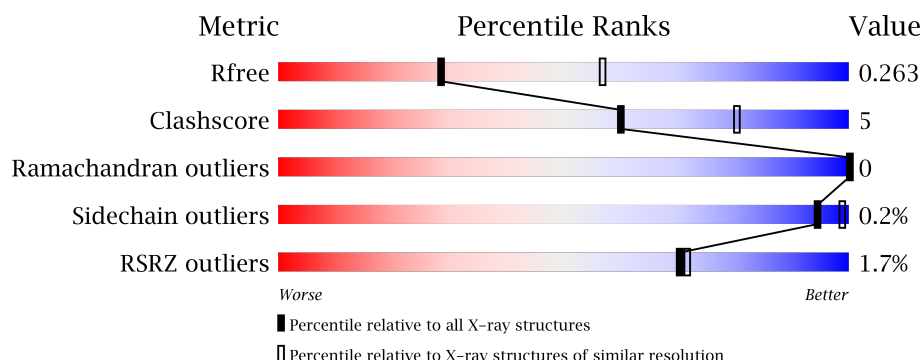
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

## *X-RAY DIFFRACTION*

The reported resolution of this entry is 2.70 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))
$R_{free}$	100719	2259 (2.70-2.70)
Clashscore	112137	2590 (2.70-2.70)
Ramachandran outliers	110173	2550 (2.70-2.70)
Sidechain outliers	110143	2550 (2.70-2.70)
RSRZ outliers	101464	2275 (2.70-2.70)

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	578	<div> <div>2%</div> <div>81%</div> <div>12%</div> <div>7%</div> </div>

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
3	DSL	A	602	-	-	-	X
4	MPG	A	604	-	-	-	X

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Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	MPG	A	605	-	-	-	X
4	MPG	A	607	-	-	-	X
4	MPG	A	608	-	-	-	X
4	MPG	A	609	-	-	-	X
4	MPG	A	610	-	-	-	X
4	MPG	A	611	-	-	-	X
4	MPG	A	613	-	-	-	X
4	MPG	A	614	-	-	-	X
4	MPG	A	615	-	-	-	X
4	MPG	A	616	-	-	-	X
4	MPG	A	618	-	-	-	X
4	MPG	A	619	-	-	-	X
4	MPG	A	622	-	-	-	X
4	MPG	A	623	-	-	-	X
4	MPG	A	624	-	-	-	X
4	MPG	A	625	-	-	-	X
4	MPG	A	628	-	-	-	X
4	MPG	A	629	-	-	-	X
4	MPG	A	631	-	-	-	X
4	MPG	A	638	-	-	-	X
4	MPG	A	641	-	-	-	X
4	MPG	A	642	-	-	-	X
4	MPG	A	643	-	-	-	X
4	MPG	A	645	-	-	-	X
4	MPG	A	646	-	-	-	X
4	MPG	A	647	-	-	-	X
7	PC	A	655	-	-	-	X
8	EPE	A	656	-	-	-	X

## 2 Entry composition

There are 9 unique types of molecules in this entry. The entry contains 4562 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 4-amino-4-deoxy-L-arabinose transferase or related glycosyl-transferases of PMT family.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	537	Total	C	N	O	S	0	1	0
			4097	2722	672	673	30			

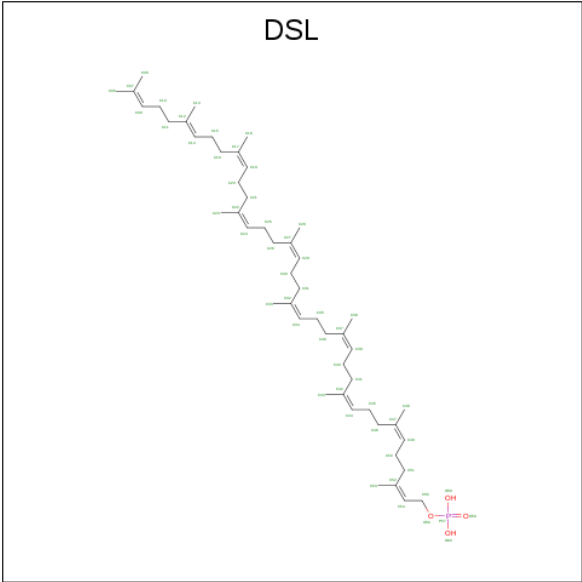
There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-2	SER	-	expression tag	UNP Q1LDT6
A	-1	TYR	-	expression tag	UNP Q1LDT6
A	0	VAL	-	expression tag	UNP Q1LDT6

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

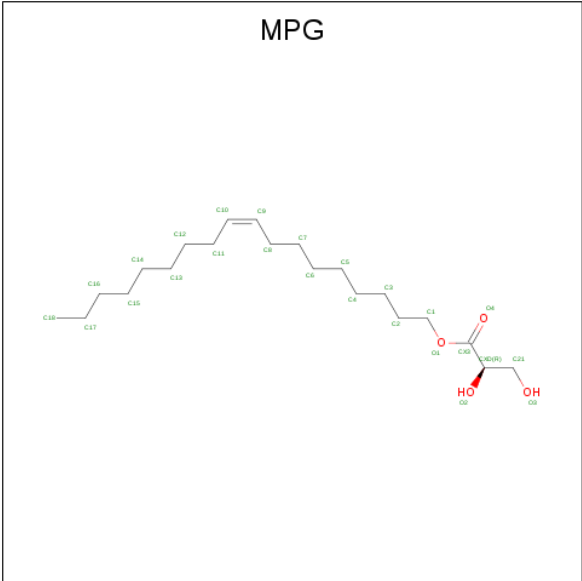
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Zn	0	0
			1	1		

- Molecule 3 is MONO-TRANS, OCTA-CIS DECAPRENYL-PHOSPHATE (three-letter code: DSL) (formula: C<sub>50</sub>H<sub>83</sub>O<sub>4</sub>P).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	1	Total	C	0	0
			14	14		

- Molecule 4 is [(Z)-octadec-9-enyl] (2R)-2,3-bis(oxidanyl)propanoate (three-letter code: MPG) (formula: C<sub>21</sub>H<sub>40</sub>O<sub>4</sub>).



Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	1	Total	C	0	0
			6	6		
4	A	1	Total	C	0	0
			6	6		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C 8 8	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 12 12	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 12 12	0	0
4	A	1	Total C 10 10	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 14 14	0	0
4	A	1	Total C 13 13	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 12 12	0	0

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C 7 7	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 14 14	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 5 5	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 4 4	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 5 5	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 10 10	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 12 12	0	0
4	A	1	Total C 8 8	0	0
4	A	1	Total C 9 9	0	0
4	A	1	Total C 6 6	0	0
4	A	1	Total C 9 9	0	0
4	A	1	Total C 7 7	0	0

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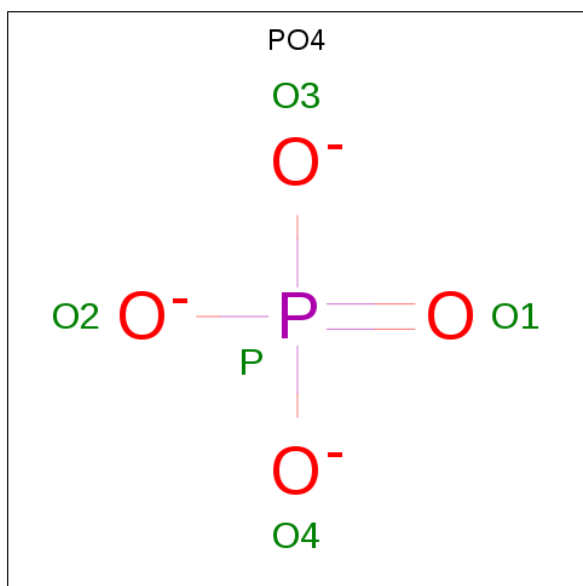
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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
4	A	1	Total C 4 4	0	0
4	A	1	Total C 7 7	0	0
4	A	1	Total C 12 12	0	0
4	A	1	Total C 6 6	0	0

- Molecule 5 is CHLORIDE ION (three-letter code: CL) (formula: Cl).

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
5	A	2	Total Cl 2 2	0	0

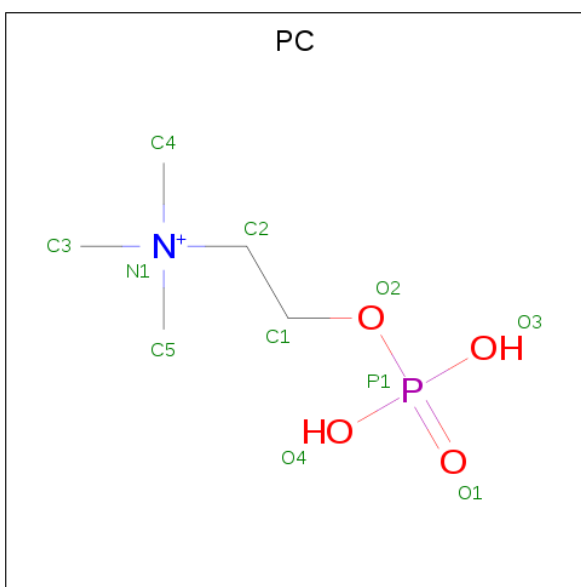
- Molecule 6 is PHOSPHATE ION (three-letter code: PO4) (formula: O<sub>4</sub>P).



Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
6	A	1	Total O P 5 4 1	0	0
6	A	1	Total O P 5 4 1	0	0

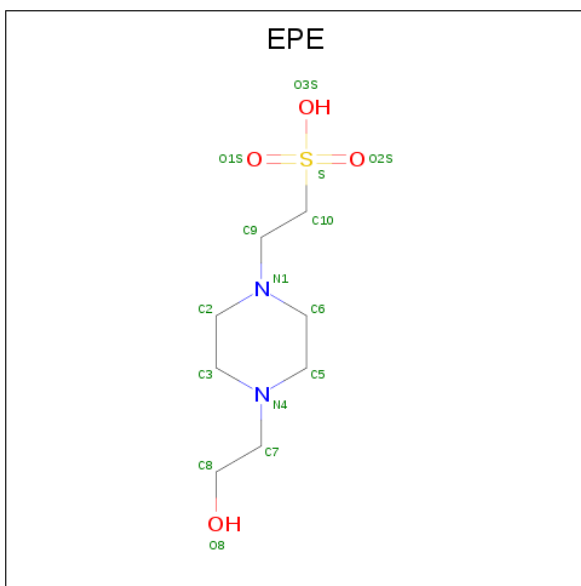
- Molecule 7 is PHOSPHOCHOLINE (three-letter code: PC) (formula: C<sub>5</sub>H<sub>15</sub>NO<sub>4</sub>P).





Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
7	A	1	Total	C	N	O	P	0	0
			11	5	1	4	1		

- Molecule 8 is 4-(2-HYDROXYETHYL)-1-PIPERAZINE ETHANESULFONIC ACID (three-letter code: EPE) (formula:  $C_8H_{18}N_2O_4S$ ).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
8	A	1	Total	C	N	O	S	0	0
			15	8	2	4	1		

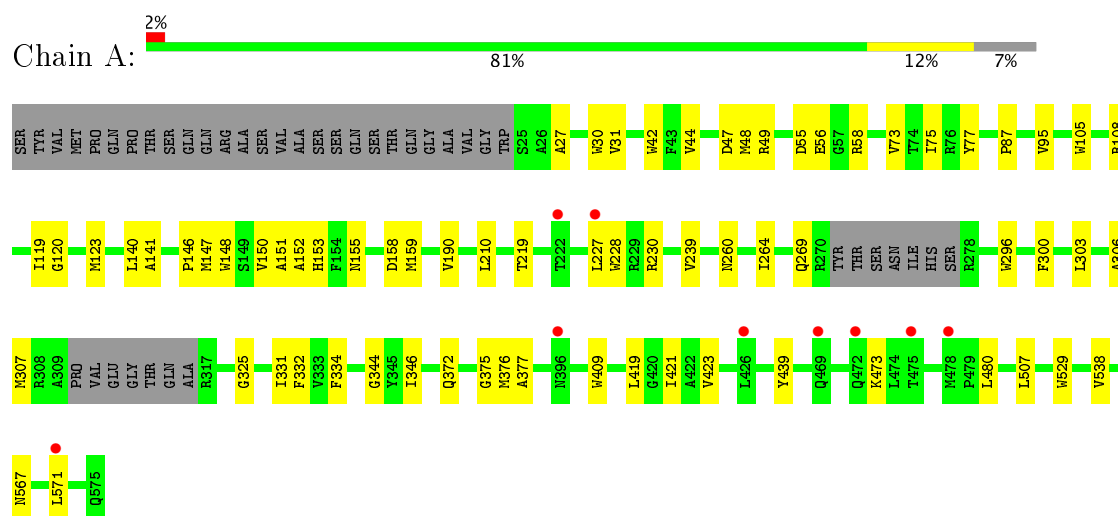
- Molecule 9 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
9	A	34	Total 34	O 34	0	0

### 3 Residue-property plots [i](#)

These plots are drawn for all protein, RNA and DNA 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: 4-amino-4-deoxy-L-arabinose transferase or related glycosyltransferases of PMT family



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	58.60 Å 80.63 Å 150.25 Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.41 – 2.70 47.41 – 2.70	Depositor EDS
% Data completeness (in resolution range)	98.5 (47.41-2.70) 98.8 (47.41-2.70)	Depositor EDS
$R_{merge}$	0.39	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.71 (at 2.69 Å)	Xtriage
Refinement program	PHENIX dev_2236	Depositor
R, $R_{free}$	0.212 , 0.260 0.222 , 0.263	Depositor DCC
$R_{free}$ test set	1045 reflections (5.51%)	DCC
Wilson B-factor (Å <sup>2</sup> )	65.0	Xtriage
Anisotropy	0.151	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.31 , 73.5	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.92	EDS
Total number of atoms	4562	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	75.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.06% 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, 0.333 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: MPG, ZN, CL, PO4, PC, DSL, EPE

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	0.26	0/4222	0.42	0/5779

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	4097	0	4143	47	0
2	A	1	0	0	0	0
3	A	14	0	19	1	0
4	A	378	0	546	11	0
5	A	2	0	0	0	0
6	A	10	0	0	0	0
7	A	11	0	13	0	0
8	A	15	0	17	0	0
9	A	34	0	0	1	0
All	All	4562	0	4738	49	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.

All (49) 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:260:ASN:O	1:A:264:ILE:HB	1.87	0.74
1:A:409:TRP:HE1	4:A:623:MPG:H21C	1.54	0.72
4:A:624:MPG:H31C	4:A:631:MPG:H42C	1.73	0.70
1:A:152:ALA:HA	1:A:159:MET:HG2	1.78	0.64
1:A:75:ILE:HD11	1:A:87:PRO:HB3	1.84	0.60
1:A:27:ALA:HB1	1:A:30:TRP:HD1	1.67	0.59
1:A:49:ARG:O	1:A:108:ARG:NH2	2.35	0.59
1:A:269:GLN:NE2	9:A:703:HOH:O	2.35	0.59
1:A:31:VAL:HG22	4:A:628:MPG:H52C	1.85	0.58
1:A:47:ASP:HB2	1:A:105:TRP:HB3	1.86	0.57
1:A:190:VAL:HG23	1:A:239:VAL:HG11	1.87	0.56
1:A:108:ARG:HG2	1:A:155:ASN:HB2	1.88	0.55
1:A:140:LEU:HD21	4:A:628:MPG:H82C	1.89	0.54
1:A:210:LEU:HD22	1:A:331:ILE:HG12	1.90	0.54
1:A:141:ALA:HA	1:A:296:TRP:CZ2	2.44	0.52
1:A:529:TRP:CE2	1:A:567:ASN:HB3	2.44	0.52
1:A:332:PHE:HA	1:A:346:ILE:HD11	1.91	0.52
1:A:227:LEU:HA	1:A:230:ARG:HD3	1.92	0.52
1:A:473:LYS:HB3	1:A:571:LEU:HD22	1.92	0.51
1:A:375:GLY:HA3	4:A:608:MPG:H32C	1.93	0.51
1:A:47:ASP:HB3	4:A:641:MPG:H21C	1.93	0.50
1:A:73:VAL:HG22	4:A:615:MPG:H32C	1.94	0.50
1:A:303:LEU:O	1:A:306:ALA:HB3	2.11	0.50
1:A:419:LEU:O	1:A:423:VAL:HG12	2.13	0.49
1:A:55:ASP:OD1	1:A:58:ARG:NH2	2.45	0.48
1:A:44:VAL:HG12	1:A:48:MET:HE2	1.96	0.48
1:A:119:ILE:O	1:A:123:MET:HG2	2.14	0.47
1:A:307:MET:SD	1:A:325:GLY:HA3	2.55	0.47
1:A:377:ALA:HB2	1:A:421:ILE:HG21	1.96	0.47
1:A:77:TYR:HB3	1:A:507:LEU:HD21	1.96	0.47
1:A:376[A]:MET:HG3	1:A:439:TYR:OH	2.14	0.47
1:A:146:PRO:O	1:A:150:VAL:HB	2.17	0.45
1:A:95:VAL:HG22	4:A:643:MPG:H22C	1.99	0.44
1:A:150:VAL:HG21	4:A:613:MPG:H71C	1.99	0.44
1:A:372:GLN:O	1:A:376[A]:MET:HG2	2.17	0.44
1:A:148:TRP:O	1:A:152:ALA:HB2	2.17	0.44
1:A:158:ASP:OD2	1:A:344:GLY:HA3	2.19	0.43
1:A:334:PHE:HE1	4:A:637:MPG:H31C	1.84	0.42
1:A:219:THR:HG21	1:A:228:TRP:HE1	1.84	0.42
1:A:346:ILE:HA	1:A:346:ILE:HD12	1.81	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:480:LEU:HD11	1:A:538:VAL:HG23	2.00	0.42
1:A:219:THR:HG21	1:A:228:TRP:NE1	2.35	0.42
3:A:602:DSL:H252	3:A:602:DSL:H283	1.89	0.41
1:A:210:LEU:HD23	1:A:210:LEU:HA	1.92	0.41
1:A:120:GLY:HA3	4:A:605:MPG:H71C	2.03	0.41
1:A:210:LEU:HD21	1:A:334:PHE:CD2	2.56	0.41
1:A:42:TRP:O	1:A:153:HIS:NE2	2.53	0.41
1:A:56:GLU:HG2	1:A:155:ASN:HB3	2.03	0.40
1:A:147:MET:O	1:A:151:ALA:HB3	2.22	0.40

There are no symmetry-related clashes.

## 5.3 Torsion angles [i](#)

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

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all 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	532/578 (92%)	517 (97%)	15 (3%)	0	100	100

There are no Ramachandran outliers to report.

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

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all 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	412/456 (90%)	411 (100%)	1 (0%)	94	99

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	300	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	176	GLN

### 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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

Of 56 ligands modelled in this entry, 3 are monoatomic - leaving 53 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	$\# Z  > 2$
3	DSL	A	602	-	13,13,54	1.56	2 (15%)	15,15,66	1.55	4 (26%)
4	MPG	A	603	-	5,5,24	0.37	0	4,4,25	0.21	0
4	MPG	A	604	-	5,5,24	0.36	0	4,4,25	0.23	0
4	MPG	A	605	-	7,7,24	0.41	0	6,6,25	0.32	0
4	MPG	A	606	-	6,6,24	0.39	0	5,5,25	0.29	0
4	MPG	A	607	-	6,6,24	0.41	0	5,5,25	0.16	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	MPG	A	608	-	7,7,24	0.41	0	6,6,25	0.35	0
4	MPG	A	609	-	6,6,24	0.43	0	5,5,25	0.29	0
4	MPG	A	610	-	7,7,24	0.43	0	6,6,25	0.31	0
4	MPG	A	611	-	11,11,24	1.50	1 (9%)	10,10,25	0.82	0
4	MPG	A	612	-	7,7,24	0.41	0	6,6,25	0.34	0
4	MPG	A	613	-	7,7,24	0.42	0	6,6,25	0.34	0
4	MPG	A	614	-	7,7,24	0.42	0	6,6,25	0.28	0
4	MPG	A	615	-	11,11,24	1.47	1 (9%)	10,10,25	1.20	1 (10%)
4	MPG	A	616	-	9,9,24	1.45	1 (11%)	8,8,25	0.85	1 (12%)
4	MPG	A	617	-	6,6,24	0.39	0	5,5,25	0.26	0
4	MPG	A	618	-	13,13,24	1.36	1 (7%)	12,12,25	0.76	0
4	MPG	A	619	-	12,12,24	1.36	1 (8%)	11,11,25	0.80	0
4	MPG	A	620	-	6,6,24	0.39	0	5,5,25	0.31	0
4	MPG	A	621	-	6,6,24	0.40	0	5,5,25	0.30	0
4	MPG	A	622	-	5,5,24	0.36	0	4,4,25	0.25	0
4	MPG	A	623	-	7,7,24	0.43	0	6,6,25	0.24	0
4	MPG	A	624	-	6,6,24	0.39	0	5,5,25	0.30	0
4	MPG	A	625	-	11,11,24	1.46	1 (9%)	10,10,25	1.21	1 (10%)
4	MPG	A	626	-	6,6,24	0.38	0	5,5,25	0.30	0
4	MPG	A	627	-	5,5,24	0.36	0	4,4,25	0.25	0
4	MPG	A	628	-	13,13,24	1.37	1 (7%)	12,12,25	0.76	0
4	MPG	A	629	-	6,6,24	0.38	0	5,5,25	0.28	0
4	MPG	A	630	-	5,5,24	0.35	0	4,4,25	0.26	0
4	MPG	A	631	-	4,4,24	0.36	0	3,3,25	0.29	0
4	MPG	A	632	-	5,5,24	0.36	0	4,4,25	0.26	0
4	MPG	A	633	-	3,3,24	0.47	0	2,2,25	0.61	0
4	MPG	A	634	-	5,5,24	0.36	0	4,4,25	0.25	0
4	MPG	A	635	-	4,4,24	0.35	0	3,3,25	0.30	0
4	MPG	A	636	-	5,5,24	0.37	0	4,4,25	0.22	0
4	MPG	A	637	-	6,6,24	0.40	0	5,5,25	0.25	0
4	MPG	A	638	-	9,9,24	1.44	1 (11%)	8,8,25	0.82	1 (12%)
4	MPG	A	639	-	6,6,24	0.39	0	5,5,25	0.28	0
4	MPG	A	640	-	5,5,24	0.37	0	4,4,25	0.23	0
4	MPG	A	641	-	11,11,24	1.45	1 (9%)	10,10,25	1.23	1 (10%)
4	MPG	A	642	-	7,7,24	0.43	0	6,6,25	0.32	0
4	MPG	A	643	-	8,8,24	0.45	0	7,7,25	0.32	0
4	MPG	A	644	-	5,5,24	0.36	0	4,4,25	0.25	0
4	MPG	A	645	-	8,8,24	0.45	0	7,7,25	0.32	0
4	MPG	A	646	-	6,6,24	0.56	0	5,5,25	0.29	0
4	MPG	A	647	-	3,3,24	0.48	0	2,2,25	0.59	0
4	MPG	A	648	-	6,6,24	0.38	0	5,5,25	0.29	0

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
4	MPG	A	649	-	11,11,24	1.44	1 (9%)	10,10,25	1.30	1 (10%)
4	MPG	A	650	-	5,5,24	0.37	0	4,4,25	0.23	0
6	PO4	A	653	-	4,4,4	0.74	0	6,6,6	0.40	0
6	PO4	A	654	-	4,4,4	0.74	0	6,6,6	0.39	0
7	PC	A	655	-	10,10,10	1.28	0	15,15,15	0.67	0
8	EPE	A	656	-	15,15,15	0.83	1 (6%)	18,20,20	1.99	7 (38%)

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
3	DSL	A	602	-	-	0/12/12/61	0/0/0/0
4	MPG	A	603	-	-	0/3/3/25	0/0/0/0
4	MPG	A	604	-	-	0/3/3/25	0/0/0/0
4	MPG	A	605	-	-	0/5/5/25	0/0/0/0
4	MPG	A	606	-	-	0/4/4/25	0/0/0/0
4	MPG	A	607	-	-	0/4/4/25	0/0/0/0
4	MPG	A	608	-	-	0/5/5/25	0/0/0/0
4	MPG	A	609	-	-	0/4/4/25	0/0/0/0
4	MPG	A	610	-	-	0/5/5/25	0/0/0/0
4	MPG	A	611	-	-	0/9/9/25	0/0/0/0
4	MPG	A	612	-	-	0/5/5/25	0/0/0/0
4	MPG	A	613	-	-	0/5/5/25	0/0/0/0
4	MPG	A	614	-	-	0/5/5/25	0/0/0/0
4	MPG	A	615	-	-	0/9/9/25	0/0/0/0
4	MPG	A	616	-	-	0/7/7/25	0/0/0/0
4	MPG	A	617	-	-	0/4/4/25	0/0/0/0
4	MPG	A	618	-	-	0/11/11/25	0/0/0/0
4	MPG	A	619	-	-	0/10/10/25	0/0/0/0
4	MPG	A	620	-	-	0/4/4/25	0/0/0/0
4	MPG	A	621	-	-	0/4/4/25	0/0/0/0
4	MPG	A	622	-	-	0/3/3/25	0/0/0/0
4	MPG	A	623	-	-	0/5/5/25	0/0/0/0
4	MPG	A	624	-	-	0/4/4/25	0/0/0/0
4	MPG	A	625	-	-	0/9/9/25	0/0/0/0
4	MPG	A	626	-	-	0/4/4/25	0/0/0/0
4	MPG	A	627	-	-	0/3/3/25	0/0/0/0
4	MPG	A	628	-	-	0/11/11/25	0/0/0/0
4	MPG	A	629	-	-	0/4/4/25	0/0/0/0
4	MPG	A	630	-	-	0/3/3/25	0/0/0/0

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
4	MPG	A	631	-	-	0/2/2/25	0/0/0/0
4	MPG	A	632	-	-	0/3/3/25	0/0/0/0
4	MPG	A	633	-	-	0/1/1/25	0/0/0/0
4	MPG	A	634	-	-	0/3/3/25	0/0/0/0
4	MPG	A	635	-	-	0/2/2/25	0/0/0/0
4	MPG	A	636	-	-	0/3/3/25	0/0/0/0
4	MPG	A	637	-	-	0/4/4/25	0/0/0/0
4	MPG	A	638	-	-	0/7/7/25	0/0/0/0
4	MPG	A	639	-	-	0/4/4/25	0/0/0/0
4	MPG	A	640	-	-	0/3/3/25	0/0/0/0
4	MPG	A	641	-	-	0/9/9/25	0/0/0/0
4	MPG	A	642	-	-	0/5/5/25	0/0/0/0
4	MPG	A	643	-	-	0/6/6/25	0/0/0/0
4	MPG	A	644	-	-	0/3/3/25	0/0/0/0
4	MPG	A	645	-	-	0/6/6/25	0/0/0/0
4	MPG	A	646	-	-	0/4/4/25	0/0/0/0
4	MPG	A	647	-	-	0/1/1/25	0/0/0/0
4	MPG	A	648	-	-	0/4/4/25	0/0/0/0
4	MPG	A	649	-	-	0/9/9/25	0/0/0/0
4	MPG	A	650	-	-	0/3/3/25	0/0/0/0
6	PO4	A	653	-	-	0/0/0/0	0/0/0/0
6	PO4	A	654	-	-	0/0/0/0	0/0/0/0
7	PC	A	655	-	-	0/8/8/8	0/0/0/0
8	EPE	A	656	-	-	0/9/19/19	0/1/1/1

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	A	602	DSL	C26-C27	2.66	1.57	1.51
8	A	656	EPE	C10-S	2.73	1.81	1.77
3	A	602	DSL	C31-C32	3.09	1.57	1.51
4	A	638	MPG	C10-C9	3.96	1.55	1.28
4	A	616	MPG	C10-C9	3.98	1.55	1.28
4	A	649	MPG	C10-C9	4.28	1.55	1.31
4	A	619	MPG	C10-C9	4.28	1.55	1.31
4	A	641	MPG	C10-C9	4.29	1.55	1.31
4	A	611	MPG	C10-C9	4.30	1.55	1.31
4	A	628	MPG	C10-C9	4.31	1.55	1.31
4	A	625	MPG	C10-C9	4.32	1.55	1.31
4	A	618	MPG	C10-C9	4.32	1.56	1.31
4	A	615	MPG	C10-C9	4.34	1.56	1.31

All (17) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	A	649	MPG	C11-C10-C9	-3.51	111.97	127.03
4	A	641	MPG	C11-C10-C9	-3.36	112.61	127.03
4	A	625	MPG	C11-C10-C9	-3.35	112.64	127.03
4	A	615	MPG	C11-C10-C9	-3.29	112.88	127.03
3	A	602	DSL	C30-C29-C27	-3.03	120.08	127.68
4	A	616	MPG	C8-C9-C10	-2.21	111.94	126.70
4	A	638	MPG	C8-C9-C10	-2.17	112.23	126.70
3	A	602	DSL	C25-C24-C22	-2.12	120.23	127.80
8	A	656	EPE	C6-N1-C2	2.08	113.59	108.87
3	A	602	DSL	C23-C22-C21	2.27	119.89	114.60
3	A	602	DSL	C28-C27-C26	2.63	119.85	115.29
8	A	656	EPE	O3S-S-C10	2.73	109.41	106.06
8	A	656	EPE	C7-N4-C5	3.00	118.95	111.26
8	A	656	EPE	O2S-S-C10	3.24	109.57	106.79
8	A	656	EPE	O1S-S-C10	3.27	109.60	106.79
8	A	656	EPE	C7-N4-C3	3.27	119.64	111.26
8	A	656	EPE	C5-N4-C3	3.65	117.14	108.87

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

12 monomers are involved in 12 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	A	602	DSL	1	0
4	A	605	MPG	1	0
4	A	608	MPG	1	0
4	A	613	MPG	1	0
4	A	615	MPG	1	0
4	A	623	MPG	1	0
4	A	624	MPG	1	0
4	A	628	MPG	2	0
4	A	631	MPG	1	0
4	A	637	MPG	1	0
4	A	641	MPG	1	0
4	A	643	MPG	1	0

## 5.7 Other polymers

There are no such residues in this entry.

## 5.8 Polymer linkage issues ⓘ

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	537/578 (92%)	-0.06	9 (1%) 70 72	50, 71, 110, 136	1 (0%)

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	426	LEU	3.1
1	A	571	LEU	2.5
1	A	475	THR	2.4
1	A	478	MET	2.3
1	A	396	ASN	2.2
1	A	472	GLN	2.2
1	A	469	GLN	2.1
1	A	222	THR	2.1
1	A	227	LEU	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 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(Å <sup>2</sup> )	Q<0.9
4	MPG	A	615	12/25	0.75	0.49	24.16	76,82,83,83	0
4	MPG	A	613	8/25	0.81	0.51	20.98	91,93,97,97	0
4	MPG	A	616	10/25	0.62	0.49	15.99	90,96,98,99	0
4	MPG	A	623	8/25	0.75	0.40	15.33	77,77,79,79	0
4	MPG	A	638	10/25	0.55	0.50	14.97	90,96,98,98	0
4	MPG	A	647	4/25	0.78	0.44	12.96	80,82,83,84	0
4	MPG	A	604	6/25	0.74	0.32	9.83	84,85,85,85	0
4	MPG	A	614	8/25	0.71	0.36	9.10	83,84,85,86	0
4	MPG	A	619	13/25	0.75	0.28	8.86	74,78,82,83	0
4	MPG	A	608	8/25	0.80	0.35	7.38	79,81,83,83	0
4	MPG	A	641	12/25	0.89	0.39	7.10	72,74,80,80	0
4	MPG	A	642	8/25	0.85	0.31	6.64	83,84,84,85	0
4	MPG	A	611	12/25	0.79	0.36	6.59	75,78,85,85	0
4	MPG	A	607	7/25	0.73	0.36	6.07	75,79,83,83	0
4	MPG	A	631	5/25	0.67	0.47	5.88	82,83,84,84	0
4	MPG	A	643	9/25	0.84	0.23	5.74	84,87,98,99	0
8	EPE	A	656	15/15	0.69	0.32	5.23	121,132,140,141	0
4	MPG	A	605	8/25	0.90	0.27	5.12	77,81,81,81	0
7	PC	A	655	11/11	0.81	0.26	4.79	101,104,108,108	0
4	MPG	A	610	8/25	0.77	0.27	4.23	78,80,81,81	0
4	MPG	A	622	6/25	0.91	0.29	4.01	76,76,77,77	0
3	DSL	A	602	14/55	0.89	0.30	3.97	80,82,83,84	0
4	MPG	A	646	7/25	0.84	0.30	3.97	86,90,94,94	0
4	MPG	A	624	7/25	0.82	0.32	3.96	81,82,87,88	0
4	MPG	A	628	14/25	0.77	0.31	3.49	73,74,86,86	0
4	MPG	A	645	9/25	0.84	0.25	3.33	79,80,85,85	0
4	MPG	A	629	7/25	0.79	0.22	3.27	87,89,90,90	0
4	MPG	A	609	7/25	0.84	0.31	3.10	80,81,85,85	0
4	MPG	A	625	12/25	0.80	0.35	3.00	82,86,93,94	0
4	MPG	A	618	14/25	0.77	0.28	2.84	72,78,87,88	0
4	MPG	A	626	7/25	0.88	0.28	1.74	76,77,78,78	0
4	MPG	A	603	6/25	0.84	0.23	1.52	65,71,73,74	0
2	ZN	A	601	1/1	0.94	0.17	0.02	31,31,31,31	1
4	MPG	A	606	7/25	0.77	0.17	-0.24	85,90,95,95	0
6	PO4	A	653	5/5	0.82	0.13	-0.58	142,142,143,143	0
5	CL	A	652	1/1	0.94	0.14	-0.85	94,94,94,94	0
4	MPG	A	630	6/25	0.84	0.18	-	79,79,80,81	0
5	CL	A	651	1/1	0.80	0.19	-	109,109,109,109	0
4	MPG	A	634	6/25	0.87	0.25	-	75,77,79,79	0
4	MPG	A	617	7/25	0.84	0.29	-	72,75,78,78	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	LLDF	B-factors( $\text{\AA}^2$ )	Q<0.9
4	MPG	A	627	6/25	0.80	0.16	-	88,90,92,92	0
4	MPG	A	639	7/25	0.83	0.20	-	101,104,105,106	0
4	MPG	A	633	4/25	0.88	0.33	-	70,70,70,71	0
6	PO4	A	654	5/5	0.68	0.18	-	127,127,128,128	5
4	MPG	A	648	7/25	0.82	0.37	-	101,102,105,105	0
4	MPG	A	635	5/25	0.73	0.41	-	103,104,107,108	0
4	MPG	A	640	6/25	0.47	0.40	-	99,102,103,103	0
4	MPG	A	636	6/25	0.67	0.28	-	87,91,92,92	0
4	MPG	A	612	8/25	0.89	0.28	-	80,84,87,88	0
4	MPG	A	632	6/25	0.89	0.41	-	85,86,88,89	0
4	MPG	A	621	7/25	0.71	0.42	-	80,82,84,84	0
4	MPG	A	637	7/25	0.61	0.36	-	81,84,86,86	0
4	MPG	A	650	6/25	0.60	0.53	-	116,117,117,118	0
4	MPG	A	620	7/25	0.81	0.31	-	84,84,88,88	0
4	MPG	A	644	6/25	0.85	0.16	-	95,96,98,98	0
4	MPG	A	649	12/25	0.38	0.39	-	105,115,120,120	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.