



# Full wwPDB X-ray Structure Validation Report ⓘ

May 16, 2020 – 04:36 pm BST

PDB ID : 4UOX  
Title : Crystal structure of YgjG in complex with Pyridoxal-5'-phosphate and putrescine  
Authors : Jeong, J.H.; Kim, Y.G.  
Deposited on : 2014-06-11  
Resolution : 2.08 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.

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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 : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.11

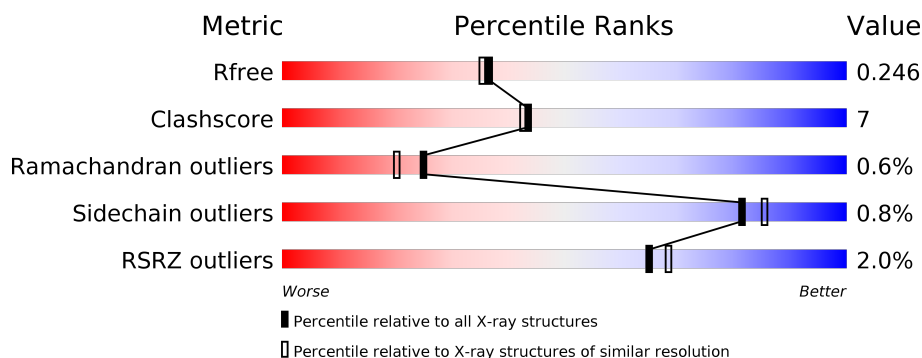
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.08 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))
$R_{free}$	130704	6189 (2.10-2.06)
Clashscore	141614	6738 (2.10-2.06)
Ramachandran outliers	138981	6663 (2.10-2.06)
Sidechain outliers	138945	6664 (2.10-2.06)
RSRZ outliers	127900	6057 (2.10-2.06)

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 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	467	<div> <div>3%</div> <div> <div></div> <div>79%</div> <div>17%</div> <div>••</div> </div> </div>
1	B	467	<div> <div>%</div> <div> <div></div> <div>82%</div> <div>14%</div> <div>••</div> </div> </div>
1	C	467	<div> <div>2%</div> <div> <div></div> <div>84%</div> <div>14%</div> <div>•</div> </div> </div>
1	D	467	<div> <div>%</div> <div> <div></div> <div>85%</div> <div>12%</div> <div>•</div> </div> </div>

## 2 Entry composition

There are 7 unique types of molecules in this entry. The entry contains 14395 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 PUTRESCINE AMINOTRANSFERASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	453	Total	C	N	O	S	0	0	0
			3436	2184	590	640	22			
1	B	452	Total	C	N	O	S	0	0	0
			3430	2181	589	638	22			
1	C	456	Total	C	N	O	S	0	0	0
			3463	2201	596	644	22			
1	D	452	Total	C	N	O	S	0	0	0
			3430	2181	589	638	22			

There are 32 discrepancies between the modelled and reference sequences:

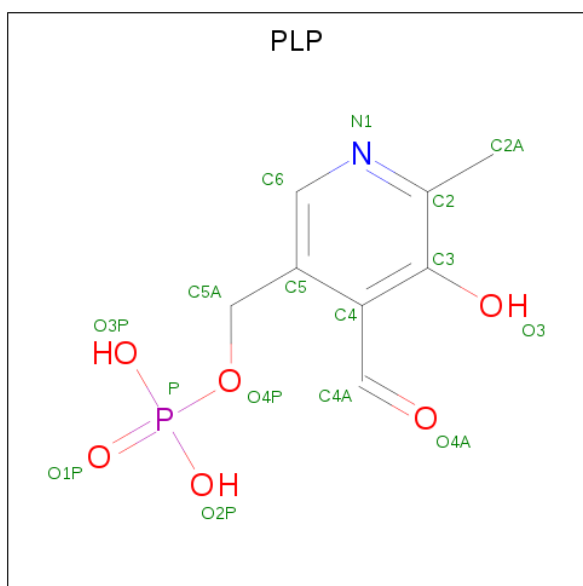
Chain	Residue	Modelled	Actual	Comment	Reference
A	460	LEU	-	expression tag	UNP P42588
A	461	GLU	-	expression tag	UNP P42588
A	462	HIS	-	expression tag	UNP P42588
A	463	HIS	-	expression tag	UNP P42588
A	464	HIS	-	expression tag	UNP P42588
A	465	HIS	-	expression tag	UNP P42588
A	466	HIS	-	expression tag	UNP P42588
A	467	HIS	-	expression tag	UNP P42588
B	460	LEU	-	expression tag	UNP P42588
B	461	GLU	-	expression tag	UNP P42588
B	462	HIS	-	expression tag	UNP P42588
B	463	HIS	-	expression tag	UNP P42588
B	464	HIS	-	expression tag	UNP P42588
B	465	HIS	-	expression tag	UNP P42588
B	466	HIS	-	expression tag	UNP P42588
B	467	HIS	-	expression tag	UNP P42588
C	460	LEU	-	expression tag	UNP P42588
C	461	GLU	-	expression tag	UNP P42588
C	462	HIS	-	expression tag	UNP P42588
C	463	HIS	-	expression tag	UNP P42588
C	464	HIS	-	expression tag	UNP P42588

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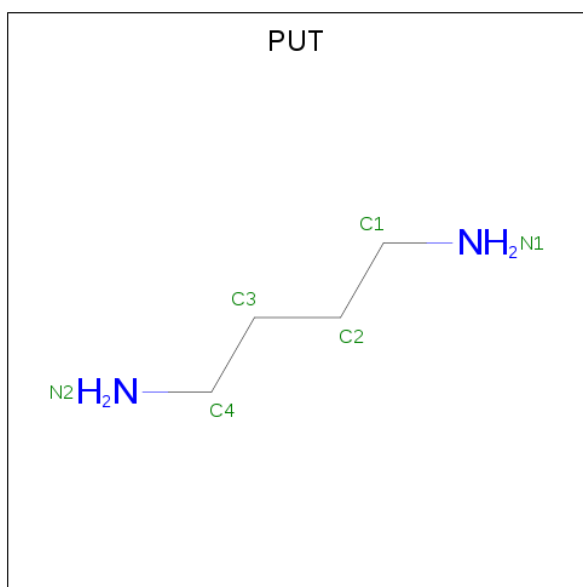
Chain	Residue	Modelled	Actual	Comment	Reference
C	465	HIS	-	expression tag	UNP P42588
C	466	HIS	-	expression tag	UNP P42588
C	467	HIS	-	expression tag	UNP P42588
D	460	LEU	-	expression tag	UNP P42588
D	461	GLU	-	expression tag	UNP P42588
D	462	HIS	-	expression tag	UNP P42588
D	463	HIS	-	expression tag	UNP P42588
D	464	HIS	-	expression tag	UNP P42588
D	465	HIS	-	expression tag	UNP P42588
D	466	HIS	-	expression tag	UNP P42588
D	467	HIS	-	expression tag	UNP P42588

- Molecule 2 is PYRIDOXAL-5'-PHOSPHATE (three-letter code: PLP) (formula:  $C_8H_{10}NO_6P$ ).



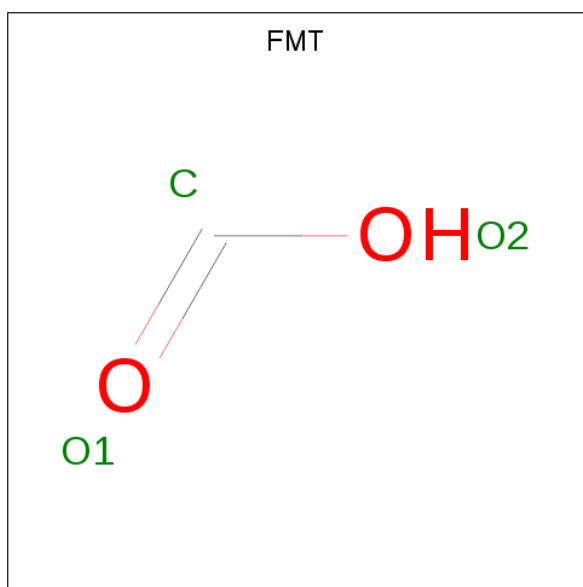
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	B	1	Total	C	N	O	P	0	0
			15	8	1	5	1		
2	C	1	Total	C	N	O	P	0	0
			16	8	1	6	1		
2	D	1	Total	C	N	O	P	0	0
			16	8	1	6	1		

- Molecule 3 is 1,4-DIAMINOBUTANE (three-letter code: PUT) (formula:  $C_4H_{12}N_2$ ).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
3	A	1	Total	C	N	0	0
			6	4	2		
3	B	1	Total	C	N	0	0
			6	4	2		
3	C	1	Total	C	N	0	0
			6	4	2		

- Molecule 4 is FORMIC ACID (three-letter code: FMT) (formula: CH<sub>2</sub>O<sub>2</sub>).



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

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

- Molecule 5 is GLYCEROL (three-letter code: GOL) (formula:  $C_3H_8O_3$ ).



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

- Molecule 6 is DI(HYDROXYETHYL)ETHER (three-letter code: PEG) (formula:  $C_4H_{10}O_3$ ).



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

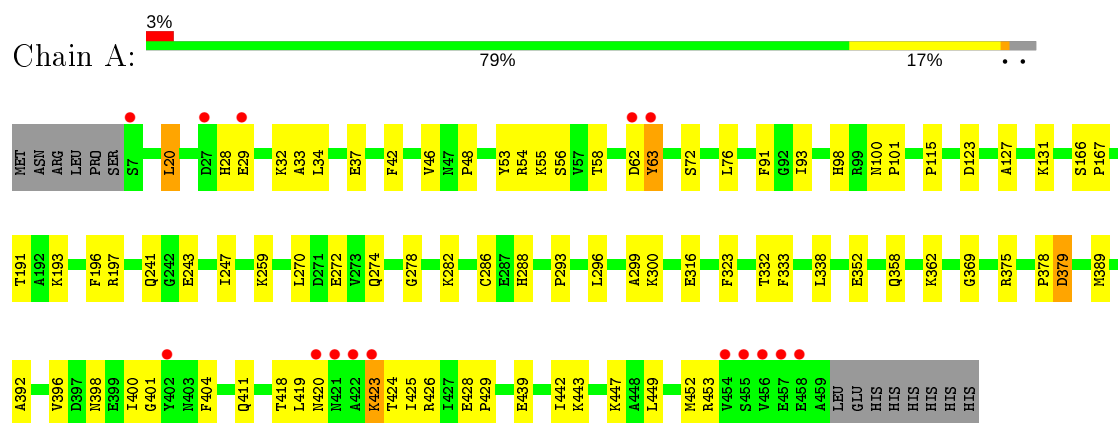
- Molecule 7 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
7	A	146	Total	O	0	0
			146	146		
7	B	137	Total	O	0	0
			137	137		
7	C	106	Total	O	0	0
			106	106		
7	D	124	Total	O	0	0
			124	124		

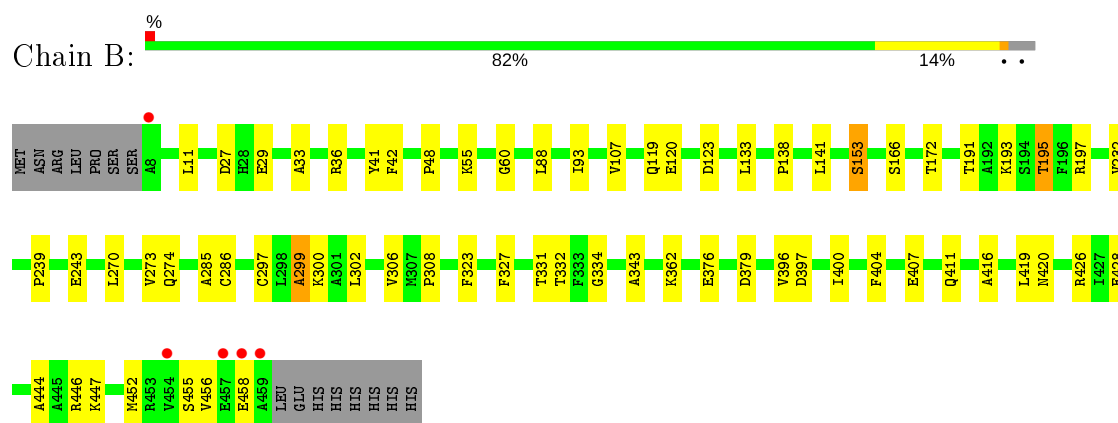
### 3 Residue-property plots

These plots are drawn for all protein, RNA and DNA chains in the entry. The first graphic for a chain summarises the proportions of 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.

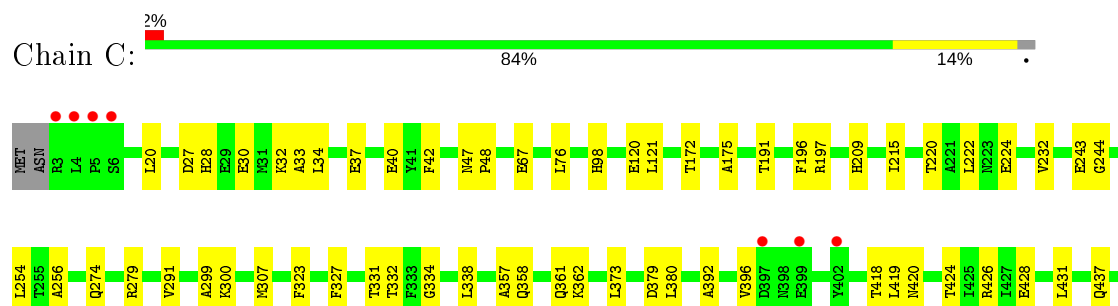
#### • Molecule 1: PUTRESCINE AMINOTRANSFERASE



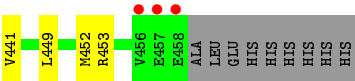
#### • Molecule 1: PUTRESCINE AMINOTRANSFERASE



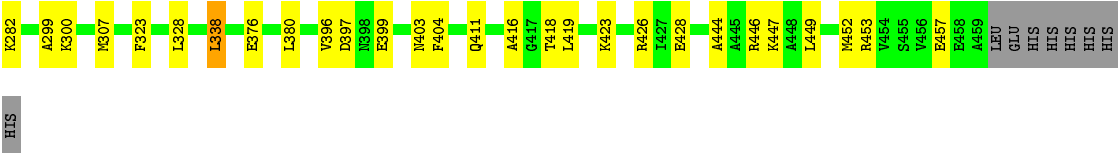
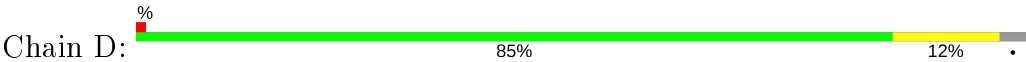
#### • Molecule 1: PUTRESCINE AMINOTRANSFERASE







● Molecule 1: PUTRESCINE AMINOTRANSFERASE



HIS

## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	121.12Å 129.52Å 131.27Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	36.26 – 2.08 36.26 – 2.08	Depositor EDS
% Data completeness (in resolution range)	88.9 (36.26-2.08) 88.9 (36.26-2.08)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.44 (at 2.08Å)	Xtriage
Refinement program	PHENIX (PHENIX.REFINE)	Depositor
R, $R_{free}$	0.188 , 0.245 0.193 , 0.246	Depositor DCC
$R_{free}$ test set	5528 reflections (5.05%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	21.1	Xtriage
Anisotropy	0.150	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.35 , 43.7	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	0.016 for -h,l,k	Xtriage
$F_o, F_c$ correlation	0.94	EDS
Total number of atoms	14395	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.45% 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: PUT, GOL, FMT, PEG, PLP

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	0.43	0/3500	0.59	0/4736
1	B	0.42	0/3494	0.56	0/4728
1	C	0.38	0/3527	0.53	0/4771
1	D	0.40	0/3494	0.55	0/4728
All	All	0.41	0/14015	0.56	0/18963

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	3436	0	3469	75	0
1	B	3430	0	3464	50	0
1	C	3463	0	3499	47	0
1	D	3430	0	3464	40	0
2	A	15	0	7	0	0
2	B	15	0	7	0	0
2	C	16	0	8	1	0
2	D	16	0	8	1	0
3	A	6	0	10	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	B	6	0	10	1	0
3	C	6	0	12	2	0
4	A	6	0	2	1	0
4	C	6	0	2	1	0
4	D	6	0	2	0	0
5	A	6	0	8	0	0
5	B	6	0	8	2	0
5	D	6	0	8	3	0
6	C	7	0	10	0	0
7	A	146	0	0	4	0
7	B	137	0	0	2	0
7	C	106	0	0	1	0
7	D	124	0	0	1	0
All	All	14395	0	13998	188	0

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 7.

All (188) 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:193:LYS:HD2	1:A:420:ASN:HA	1.59	0.84
1:C:307:MET:HE1	1:D:338:LEU:HD12	1.65	0.78
1:D:449:LEU:HA	1:D:452:MET:HE3	1.69	0.75
1:D:198:LYS:HD3	5:D:1461:GOL:H11	1.69	0.74
1:B:404:PHE:HA	1:B:452:MET:HE1	1.70	0.73
1:A:401:GLY:HA3	1:A:423:LYS:HG2	1.71	0.71
1:B:27:ASP:OD1	1:B:29:GLU:N	2.20	0.69
1:D:195:THR:HA	5:D:1461:GOL:H12	1.75	0.69
1:D:418:THR:HA	1:D:426:ARG:HH21	1.56	0.68
1:A:33:ALA:O	1:A:37:GLU:HG2	1.94	0.67
1:A:191:THR:O	1:A:197:ARG:HD2	1.96	0.66
1:C:338:LEU:HD12	1:D:307:MET:HE3	1.76	0.66
1:A:423:LYS:HZ1	1:A:425:ILE:CG1	2.09	0.66
1:A:404:PHE:HD1	1:A:452:MET:HE1	1.61	0.64
1:C:418:THR:HA	1:C:426:ARG:HH21	1.63	0.63
1:C:449:LEU:HA	1:C:452:MET:HE3	1.79	0.62
1:B:376:GLU:OE1	1:B:446:ARG:NH1	2.26	0.62
1:A:379:ASP:OD2	1:A:453:ARG:NE	2.29	0.61
1:A:423:LYS:HE3	1:A:425:ILE:HG12	1.81	0.61
1:A:274:GLN:HE22	1:A:426:ARG:NH1	2.00	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:33:ALA:O	1:D:37:GLU:HG2	2.01	0.60
1:A:439:GLU:O	1:A:443:LYS:HG3	2.01	0.59
1:B:455:SER:HA	1:B:458:GLU:HG2	1.84	0.59
1:C:67:GLU:OE2	1:D:114:GLN:NE2	2.36	0.58
1:C:358:GLN:HB3	1:C:362:LYS:HE3	1.84	0.58
1:A:91:PHE:O	1:A:300:LYS:HE2	2.03	0.58
1:B:411:GLN:HE22	1:B:447:LYS:HB2	1.69	0.57
1:A:423:LYS:HZ1	1:A:425:ILE:HG12	1.69	0.57
1:C:33:ALA:O	1:C:37:GLU:HG2	2.04	0.57
1:C:244:GLY:HA2	1:C:420:ASN:HB2	1.87	0.56
1:A:449:LEU:HA	1:A:452:MET:HE3	1.86	0.56
1:C:338:LEU:HD12	1:D:307:MET:CE	2.36	0.56
1:C:121:LEU:HD22	1:D:67:GLU:HB3	1.86	0.56
1:B:191:THR:O	1:B:197:ARG:HD2	2.06	0.56
1:D:243:GLU:HB3	1:D:419:LEU:HB2	1.88	0.56
1:C:196:PHE:HZ	1:C:419:LEU:HD22	1.71	0.55
1:C:307:MET:CE	1:D:338:LEU:HD12	2.35	0.55
1:C:254:LEU:HB3	1:C:291:VAL:HG21	1.89	0.55
1:C:327:PHE:O	1:D:183:LYS:NZ	2.39	0.54
1:A:401:GLY:HA3	1:A:423:LYS:HE2	1.90	0.54
1:D:199:PRO:HD3	5:D:1461:GOL:H2	1.88	0.54
1:A:332:THR:CG2	1:B:93:ILE:HD11	2.38	0.54
1:C:357:ALA:O	1:C:361:GLN:HG3	2.07	0.54
1:A:323:PHE:CE1	1:B:48:PRO:HD2	2.43	0.54
1:A:352:GLU:HG2	1:B:11:LEU:HD11	1.90	0.54
1:A:423:LYS:CE	1:A:425:ILE:HG12	2.38	0.53
1:D:376:GLU:OE1	1:D:446:ARG:NH1	2.34	0.53
1:C:222:LEU:HD12	1:C:232:VAL:HG21	1.90	0.53
1:D:243:GLU:OE1	1:D:426:ARG:NH2	2.40	0.53
1:D:399:GLU:O	1:D:403:ASN:ND2	2.31	0.53
1:A:37:GLU:HG3	7:A:2004:HOH:O	2.10	0.52
1:A:76:LEU:HD21	1:A:98:HIS:CE1	2.44	0.52
1:B:33:ALA:HA	1:B:36:ARG:HE	1.74	0.52
1:D:20:LEU:HD11	1:D:34:LEU:HD22	1.92	0.52
1:D:411:GLN:NE2	1:D:444:ALA:O	2.42	0.52
1:A:423:LYS:NZ	1:A:425:ILE:HD11	2.25	0.52
1:A:48:PRO:HD2	1:B:323:PHE:CE1	2.45	0.52
1:D:196:PHE:HZ	1:D:419:LEU:HD22	1.75	0.52
1:A:28:HIS:O	1:A:32:LYS:HG3	2.09	0.52
1:A:401:GLY:HA3	1:A:423:LYS:CG	2.40	0.51
1:A:243:GLU:CD	1:A:426:ARG:HH22	2.14	0.51

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:55:LYS:HA	1:A:63:TYR:HB2	1.92	0.51
1:C:40:GLU:OE1	7:C:2014:HOH:O	2.19	0.51
1:A:418:THR:HG22	1:A:426:ARG:CZ	2.41	0.51
1:B:397:ASP:HB2	1:B:400:ILE:HG13	1.92	0.51
1:A:131:LYS:HG3	1:B:41:TYR:CZ	2.45	0.50
1:A:358:GLN:HB3	1:A:362:LYS:HE3	1.94	0.50
1:A:392:ALA:HB1	1:A:424:THR:HG22	1.93	0.50
1:B:419:LEU:HD11	3:B:801:PUT:H22	1.94	0.50
1:A:127:ALA:HB1	1:B:41:TYR:HB2	1.94	0.50
1:A:369:GLY:HA3	1:A:442:ILE:HD13	1.93	0.49
1:C:332:THR:HB	2:D:800:PLP:O2P	2.13	0.49
1:D:37:GLU:HG3	7:D:2001:HOH:O	2.11	0.49
1:A:115:PRO:HA	1:A:338:LEU:HG	1.95	0.49
1:A:379:ASP:HB2	1:A:453:ARG:HH21	1.78	0.49
1:C:373:LEU:HD22	1:C:449:LEU:HD12	1.94	0.49
1:B:88:LEU:HD13	1:B:416:ALA:HB3	1.95	0.48
1:D:88:LEU:HD13	1:D:416:ALA:HB3	1.95	0.48
1:A:332:THR:HG23	1:B:93:ILE:HD11	1.95	0.48
1:A:398:ASN:HA	1:A:423:LYS:HB3	1.95	0.48
1:A:53:TYR:CD2	1:B:327:PHE:HZ	2.32	0.48
1:A:58:THR:HB	1:A:62:ASP:HB2	1.94	0.48
1:B:407:GLU:O	1:B:411:GLN:HG3	2.14	0.48
1:C:274:GLN:NE2	1:C:428:GLU:OE2	2.43	0.48
1:B:33:ALA:O	1:B:36:ARG:HG2	2.14	0.47
1:C:380:LEU:O	1:C:396:VAL:HG23	2.14	0.47
1:C:243:GLU:OE1	1:C:426:ARG:NH2	2.42	0.47
1:A:401:GLY:CA	1:A:423:LYS:HE2	2.43	0.47
1:A:93:ILE:HD11	1:B:332:THR:CG2	2.44	0.47
1:B:55:LYS:O	7:B:2012:HOH:O	2.20	0.47
1:A:401:GLY:C	1:A:423:LYS:HZ3	2.14	0.47
1:C:243:GLU:CD	1:C:426:ARG:HH22	2.17	0.47
1:B:33:ALA:HA	1:B:36:ARG:NE	2.29	0.47
1:B:426:ARG:HD3	1:B:428:GLU:OE1	2.15	0.47
1:A:423:LYS:NZ	1:A:425:ILE:HG12	2.29	0.46
1:B:270:LEU:CD2	1:B:286:CYS:HB3	2.45	0.46
1:D:397:ASP:HA	1:D:423:LYS:HD2	1.98	0.46
1:A:91:PHE:HE2	1:B:119:GLN:HB2	1.81	0.46
1:B:362:LYS:NZ	5:B:1460:GOL:H2	2.30	0.46
1:C:215:ILE:HG12	1:C:256:ALA:HB1	1.98	0.46
1:A:375:ARG:O	1:A:378:PRO:HD3	2.16	0.46
1:A:389:MET:CE	1:A:429:PRO:HG2	2.46	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:175:ALA:O	1:C:209:HIS:HA	2.15	0.45
1:A:259:LYS:HD3	1:A:259:LYS:HA	1.75	0.45
1:B:362:LYS:HZ1	5:B:1460:GOL:H2	1.82	0.45
1:D:404:PHE:HD1	1:D:452:MET:HE1	1.82	0.45
1:A:426:ARG:HD3	1:A:428:GLU:OE1	2.16	0.45
1:A:72:SER:OG	7:A:2019:HOH:O	2.16	0.45
1:A:54:ARG:HD3	1:B:120:GLU:O	2.17	0.45
4:C:1459:FMT:O1	4:C:1460:FMT:H	2.17	0.45
1:B:302:LEU:O	1:B:343:ALA:HA	2.16	0.45
1:A:278:GLY:HA2	1:A:282:LYS:O	2.17	0.45
1:C:279:ARG:HA	1:C:431:LEU:HD21	1.97	0.45
1:D:426:ARG:HD3	1:D:428:GLU:OE1	2.16	0.45
1:A:272:GLU:HG3	1:A:296:LEU:HD11	1.99	0.45
1:A:131:LYS:HG3	1:B:41:TYR:CE2	2.52	0.45
1:D:328:LEU:HA	1:D:328:LEU:HD12	1.85	0.44
1:B:396:VAL:HB	1:B:400:ILE:HD12	1.99	0.44
1:D:59:ALA:O	1:D:62:ASP:HB2	2.17	0.44
1:A:316:GLU:OE2	4:A:1460:FMT:H	2.17	0.44
1:C:379:ASP:HB2	1:C:453:ARG:HH21	1.83	0.44
1:D:91:PHE:HD1	1:D:426:ARG:CZ	2.30	0.44
1:A:243:GLU:OE1	1:A:426:ARG:NH2	2.49	0.44
1:A:423:LYS:HZ2	1:A:425:ILE:HD11	1.82	0.44
1:C:437:GLN:O	1:C:441:VAL:HG23	2.18	0.43
1:C:28:HIS:O	1:C:32:LYS:HG2	2.19	0.43
1:A:166:SER:HB3	1:A:167:PRO:HD3	2.00	0.43
1:D:174:ILE:HD13	1:D:232:VAL:HG22	1.99	0.43
1:A:270:LEU:HD12	1:A:270:LEU:HA	1.83	0.43
1:B:239:PRO:HG2	1:B:285:ALA:HB3	1.99	0.43
1:C:392:ALA:HB1	1:C:424:THR:HG23	2.00	0.43
1:B:123:ASP:N	1:B:123:ASP:OD1	2.50	0.43
1:C:191:THR:O	1:C:197:ARG:HD2	2.19	0.43
1:C:120:GLU:O	1:D:54:ARG:HD3	2.18	0.43
1:A:48:PRO:HD2	1:B:323:PHE:CD1	2.54	0.43
1:C:196:PHE:CZ	1:C:419:LEU:HD22	2.51	0.43
1:A:379:ASP:OD1	7:A:2138:HOH:O	2.20	0.42
1:A:243:GLU:HG2	7:A:2102:HOH:O	2.18	0.42
1:B:138:PRO:HD2	1:B:141:LEU:HD12	2.01	0.42
1:C:300:LYS:HZ1	3:C:801:PUT:HN22	1.68	0.42
1:A:396:VAL:HB	1:A:400:ILE:HD12	2.00	0.42
1:A:196:PHE:HZ	1:A:419:LEU:HD22	1.84	0.42
1:D:191:THR:O	1:D:197:ARG:HD2	2.19	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:D:278:GLY:HA2	1:D:282:LYS:O	2.20	0.42
1:D:453:ARG:O	1:D:457:GLU:HB3	2.20	0.42
1:A:91:PHE:HD1	1:A:426:ARG:NE	2.17	0.42
1:B:133:LEU:HD23	1:B:133:LEU:HA	1.85	0.42
1:B:273:VAL:HG13	1:B:299:ALA:HB3	2.01	0.42
1:C:48:PRO:HD2	1:D:323:PHE:CE1	2.54	0.42
1:D:416:ALA:O	1:D:426:ARG:HG2	2.19	0.42
1:B:107:VAL:HG21	1:B:306:VAL:HG11	2.02	0.42
1:C:20:LEU:HD11	1:C:34:LEU:HD22	2.02	0.42
1:A:270:LEU:HD23	1:A:286:CYS:HB3	2.01	0.42
1:B:153:SER:OG	1:B:297:CYS:HB3	2.19	0.42
1:C:220:THR:O	1:C:224:GLU:HG2	2.20	0.41
1:A:241:GLN:HB2	1:A:247:ILE:HB	2.01	0.41
1:A:333:PHE:CB	1:B:308:PRO:HB3	2.50	0.41
1:C:172:THR:HB	1:C:232:VAL:HA	2.02	0.41
1:B:411:GLN:NE2	1:B:444:ALA:O	2.53	0.41
1:C:76:LEU:HD21	1:C:98:HIS:CE1	2.55	0.41
1:D:411:GLN:OE1	1:D:447:LYS:HD2	2.21	0.41
1:A:20:LEU:HD11	1:A:34:LEU:HD13	2.01	0.41
1:A:423:LYS:HG3	1:A:423:LYS:O	2.20	0.41
1:B:379:ASP:OD1	1:B:379:ASP:N	2.40	0.41
1:C:331:THR:HG23	1:C:334:GLY:HA3	2.03	0.41
1:C:449:LEU:HD23	1:C:452:MET:HE1	2.02	0.41
2:C:800:PLP:O4A	3:C:801:PUT:N2	2.53	0.41
1:A:282:LYS:HG2	1:A:288:HIS:CE1	2.56	0.41
1:B:195:THR:HG21	7:B:2056:HOH:O	2.20	0.41
1:B:331:THR:HG23	1:B:334:GLY:H	1.85	0.41
1:B:274:GLN:HE22	1:B:426:ARG:NH1	2.18	0.41
1:A:123:ASP:N	1:A:123:ASP:OD1	2.52	0.41
1:C:27:ASP:HB2	1:C:30:GLU:OE1	2.21	0.41
1:A:411:GLN:CD	1:A:447:LYS:HD2	2.40	0.41
1:B:172:THR:HB	1:B:232:VAL:HA	2.03	0.41
1:B:452:MET:HE3	1:B:452:MET:HB2	1.87	0.41
1:D:380:LEU:O	1:D:396:VAL:HG23	2.21	0.41
1:A:29:GLU:OE1	1:A:29:GLU:HA	2.21	0.41
1:C:327:PHE:HZ	1:D:53:TYR:CD2	2.39	0.40
1:B:243:GLU:HB3	1:B:419:LEU:HB2	2.03	0.40
1:C:323:PHE:CE1	1:D:48:PRO:HD2	2.57	0.40
1:C:332:THR:CG2	1:D:93:ILE:HD11	2.51	0.40
1:A:42:PHE:HA	1:A:46:VAL:HB	2.03	0.40
1:B:193:LYS:HD2	1:B:420:ASN:HA	2.03	0.40

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:274:GLN:HE22	1:C:426:ARG:NH1	2.19	0.40
1:A:100:ASN:HA	1:A:101:PRO:HD2	1.88	0.40
1:A:270:LEU:HB2	1:A:293:PRO:HB3	2.04	0.40
1:C:47:ASN:HA	1:C:48:PRO:HD2	1.95	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	451/467 (97%)	423 (94%)	25 (6%)	3 (1%)	22	17
1	B	450/467 (96%)	430 (96%)	17 (4%)	3 (1%)	22	17
1	C	453/467 (97%)	429 (95%)	23 (5%)	1 (0%)	47	47
1	D	450/467 (96%)	433 (96%)	13 (3%)	4 (1%)	17	12
All	All	1804/1868 (97%)	1715 (95%)	78 (4%)	11 (1%)	25	20

All (11) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	60	GLY
1	A	423	LYS
1	B	299	ALA
1	A	299	ALA
1	A	379	ASP
1	B	300	LYS
1	D	299	ALA
1	D	300	LYS
1	C	299	ALA
1	D	246	VAL
1	D	115	PRO

### 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	360/374 (96%)	357 (99%)	3 (1%)	81	85
1	B	359/374 (96%)	354 (99%)	5 (1%)	67	72
1	C	364/374 (97%)	363 (100%)	1 (0%)	92	95
1	D	359/374 (96%)	357 (99%)	2 (1%)	86	89
All	All	1442/1496 (96%)	1431 (99%)	11 (1%)	81	85

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	20	LEU
1	A	56	SER
1	A	63	TYR
1	B	42	PHE
1	B	153	SER
1	B	166	SER
1	B	195	THR
1	B	456	VAL
1	C	42	PHE
1	D	270	LEU
1	D	338	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	274	GLN
1	A	421	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 carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

17 ligands are modelled in this entry.

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

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# $ Z  > 2$	Counts	RMSZ	# $ Z  > 2$
2	PLP	A	800	3	15,15,16	3.58	4 (26%)	20,22,23	1.46	3 (15%)
2	PLP	B	800	3	15,15,16	3.59	3 (20%)	20,22,23	1.40	3 (15%)
2	PLP	C	800	-	16,16,16	3.21	3 (18%)	20,23,23	1.75	3 (15%)
4	FMT	A	1460	-	0,2,2	0.00	-	0,1,1	0.00	-
5	GOL	B	1460	-	5,5,5	0.29	0	5,5,5	0.77	0
3	PUT	C	801	-	5,5,5	0.22	0	4,4,4	0.52	0
6	PEG	C	1461	-	6,6,6	0.65	0	5,5,5	0.28	0
3	PUT	A	801	2	5,5,5	0.20	0	4,4,4	0.55	0
2	PLP	D	800	-	16,16,16	3.16	3 (18%)	20,23,23	1.53	3 (15%)
4	FMT	C	1459	-	0,2,2	0.00	-	0,1,1	0.00	-
4	FMT	D	1462	-	0,2,2	0.00	-	0,1,1	0.00	-
5	GOL	D	1461	-	5,5,5	0.33	0	5,5,5	0.39	0
3	PUT	B	801	2	5,5,5	0.23	0	4,4,4	0.48	0
4	FMT	C	1460	-	0,2,2	0.00	-	0,1,1	0.00	-
5	GOL	A	1462	-	5,5,5	0.34	0	5,5,5	0.18	0
4	FMT	A	1461	-	0,2,2	0.00	-	0,1,1	0.00	-
4	FMT	D	1460	-	0,2,2	0.00	-	0,1,1	0.00	-

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	PLP	A	800	3	-	0/6/6/8	0/1/1/1
2	PLP	B	800	3	-	2/6/6/8	0/1/1/1
2	PLP	C	800	-	-	4/8/8/8	0/1/1/1
5	GOL	B	1460	-	-	2/4/4/4	-
3	PUT	C	801	-	-	1/3/3/3	-
6	PEG	C	1461	-	-	3/4/4/4	-
3	PUT	A	801	2	-	2/3/3/3	-
2	PLP	D	800	-	-	2/8/8/8	0/1/1/1
5	GOL	A	1462	-	-	0/4/4/4	-
5	GOL	D	1461	-	-	2/4/4/4	-
3	PUT	B	801	2	-	1/3/3/3	-

All (13) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	800	PLP	C3-C2	9.43	1.50	1.40
2	B	800	PLP	C3-C2	9.18	1.50	1.40
2	D	800	PLP	C3-C2	8.98	1.49	1.40
2	B	800	PLP	C5-C4	8.71	1.50	1.40
2	C	800	PLP	C3-C2	8.66	1.49	1.40
2	A	800	PLP	C5-C4	8.29	1.49	1.40
2	C	800	PLP	C4-C5	6.65	1.50	1.42
2	D	800	PLP	C4-C5	6.29	1.49	1.42
2	C	800	PLP	C4-C3	5.90	1.49	1.40
2	D	800	PLP	C4-C3	5.44	1.49	1.40
2	A	800	PLP	C3-C4	4.70	1.49	1.40
2	B	800	PLP	C3-C4	4.57	1.49	1.40
2	A	800	PLP	C2-N1	2.22	1.38	1.33

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	800	PLP	C4-C3-C2	-4.91	117.15	120.19
2	D	800	PLP	C4-C3-C2	-4.00	117.71	120.19
2	A	800	PLP	C2A-C2-C3	-2.68	117.58	120.89
2	A	800	PLP	C6-C5-C4	2.51	120.13	118.16
2	D	800	PLP	C3-C4-C5	-2.51	116.34	118.26
2	A	800	PLP	C4-C3-C2	-2.35	116.60	120.07
2	C	800	PLP	C6-N1-C2	2.30	123.42	119.17
2	B	800	PLP	C6-N1-C2	2.30	123.42	119.17

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	C	800	PLP	O4P-C5A-C5	2.27	113.68	109.35
2	D	800	PLP	C6-N1-C2	2.20	123.25	119.17
2	B	800	PLP	C4-C3-C2	-2.12	116.94	120.07
2	B	800	PLP	C6-C5-C4	2.02	119.75	118.16

There are no chirality outliers.

All (19) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	C	800	PLP	C4-C5-C5A-O4P
2	C	800	PLP	C5A-O4P-P-O2P
5	D	1461	GOL	C1-C2-C3-O3
5	B	1460	GOL	O1-C1-C2-C3
5	D	1461	GOL	O2-C2-C3-O3
6	C	1461	PEG	O1-C1-C2-O2
5	B	1460	GOL	O1-C1-C2-O2
2	C	800	PLP	C3-C4-C4A-O4A
3	A	801	PUT	C1-C2-C3-C4
6	C	1461	PEG	C1-C2-O2-C3
2	B	800	PLP	C4-C5-C5A-O4P
2	D	800	PLP	C5A-O4P-P-O1P
3	A	801	PUT	C2-C3-C4-N2
2	D	800	PLP	C3-C4-C4A-O4A
2	B	800	PLP	C6-C5-C5A-O4P
2	C	800	PLP	C6-C5-C5A-O4P
3	C	801	PUT	C1-C2-C3-C4
3	B	801	PUT	C2-C3-C4-N2
6	C	1461	PEG	O2-C3-C4-O4

There are no ring outliers.

9 monomers are involved in 11 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	C	800	PLP	1	0
4	A	1460	FMT	1	0
5	B	1460	GOL	2	0
3	C	801	PUT	2	0
2	D	800	PLP	1	0
4	C	1459	FMT	1	0
5	D	1461	GOL	3	0
3	B	801	PUT	1	0

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Mol	Chain	Res	Type	Clashes	Symm-Clashes
4	C	1460	FMT	1	0

## 5.7 Other polymers [i](#)

There are no such residues in this entry.

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

The following chains have linkage breaks:

Mol	Chain	Number of breaks
1	C	1

All chain breaks are listed below:

Model	Chain	Residue-1	Atom-1	Residue-2	Atom-2	Distance (Å)
1	C	457:GLU	C	458:GLU	N	2.96

## 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	453/467 (97%)	-0.27	15 (3%) 46 52	12, 24, 52, 74	0
1	B	452/467 (96%)	-0.47	5 (1%) 80 83	11, 21, 42, 70	0
1	C	456/467 (97%)	-0.29	10 (2%) 62 66	12, 26, 48, 74	0
1	D	452/467 (96%)	-0.36	6 (1%) 77 79	11, 23, 46, 72	0
All	All	1813/1868 (97%)	-0.35	36 (1%) 65 68	11, 24, 46, 74	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	C	458	GLU	5.3
1	A	456	VAL	5.1
1	A	63	TYR	4.8
1	A	421	ASN	4.1
1	A	422	ALA	4.1
1	C	6	SER	4.0
1	A	420	ASN	4.0
1	B	457	GLU	3.9
1	D	456	VAL	3.4
1	C	5	PRO	3.3
1	D	457	GLU	3.3
1	C	399	GLU	3.3
1	A	458	GLU	3.2
1	A	457	GLU	3.1
1	A	27	ASP	3.1
1	A	7	SER	3.1
1	C	402	TYR	3.0
1	C	3	ARG	2.8
1	B	458	GLU	2.7
1	A	29	GLU	2.7
1	A	455	SER	2.7

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Mol	Chain	Res	Type	RSRZ
1	C	4	LEU	2.7
1	C	456	VAL	2.6
1	A	454	VAL	2.6
1	B	454	VAL	2.6
1	D	455	SER	2.5
1	B	459	ALA	2.5
1	A	423	LYS	2.4
1	A	402	TYR	2.4
1	A	62	ASP	2.4
1	D	458	GLU	2.3
1	B	8	ALA	2.3
1	D	29	GLU	2.2
1	C	457	GLU	2.2
1	D	8	ALA	2.1
1	C	397	ASP	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. 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( $\text{\AA}^2$ )	Q<0.9
3	PUT	B	801	6/6	0.80	0.21	37,42,46,49	0
3	PUT	A	801	6/6	0.83	0.24	29,37,42,46	0
3	PUT	C	801	6/6	0.85	0.22	36,41,44,45	0
4	FMT	A	1461	3/3	0.87	0.14	35,35,41,45	0
5	GOL	A	1462	6/6	0.89	0.26	42,45,47,53	0
2	PLP	A	800	15/16	0.90	0.14	20,25,34,49	0
2	PLP	C	800	16/16	0.91	0.14	18,31,44,47	0
6	PEG	C	1461	7/7	0.91	0.10	32,34,39,40	0

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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	GOL	D	1461	6/6	0.93	0.33	29,36,37,46	0
2	PLP	B	800	15/16	0.94	0.14	19,24,37,40	0
4	FMT	D	1460	3/3	0.94	0.11	28,28,35,38	0
4	FMT	D	1462	3/3	0.95	0.08	28,28,31,34	0
2	PLP	D	800	16/16	0.95	0.10	21,27,36,39	0
4	FMT	A	1460	3/3	0.96	0.07	33,33,33,37	0
5	GOL	B	1460	6/6	0.96	0.12	19,23,25,26	0
4	FMT	C	1460	3/3	0.98	0.05	21,21,24,28	0
4	FMT	C	1459	3/3	0.98	0.07	35,35,35,37	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.